4.5 FLOODPLAIN MODIFICATIONS

1. SUMMARY

*The hydraulic impacts on sensitive aquatic/riparian resources in the Santa Clara River corridor due to floodplain modifications associated with construction and operation of the proposed Landmark Village project site would be localized, and not cause significant hydrological impacts adjacent to or downstream from the Landmark Village site. On that basis, and given the limited amount of riparian habitat permanently altered by Landmark Village site development, project construction and operation would not significantly impact the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), arroyo toad (*Bufo californicus*), California red-legged frog (*Rana aurora draytonii*), southwestern pond turtle (*Clemmys marmorata pallida*), or two-striped garter snake (*Thamnophis hammondii*). "Floodplain modifications" associated with the proposed project include the Long Canyon Road Bridge crossing over the river, bank stabilization along portions of the banks of the river, and importing soils from off-site grading areas to remove mostly agricultural land and non-native grasslands by raising these land areas from the floodplain to allow for development and placement of bank protection.*

*Three distinct habitat types are found in the river corridor including: (1) aquatic habitats, consisting of flowing or ponded water; (2) wetland habitats, consisting of emergent herbs rooted in ponded water or saturated soils along the margins of the flowing water; and (3) riparian habitat, consisting of woody vegetation along the margins of the active channel and on the floodplain. Wildlife species associated with these habitats include: (1) the Endangered unarmored threespine stickleback (known to be present adjacent to the Landmark Village project site); least Bell's vireo (*Vireo bellii pusillus*) (known to occur within Specific Plan), southwestern arroyo toad (known to occur upstream of the Landmark Village project site), southwestern willow flycatcher (*Empidonax traillii extimus*) (not known to be present on Landmark Village project site), and California red-legged frog (not known to be present on the Landmark Village project site); and (2) other sensitive, but not Endangered, species such as the arroyo chub (*Gila orcutti*), Santa Ana sucker (*Catastomus santaanae*), two-striped garter snake, western spadefoot toad (*spea hammondii*), and southwestern pond turtle (with the exception of the spadefoot toad, all are known to occur within the Specific Plan). The focus of this analysis is on five sensitive species: unarmored threespine stickleback, arroyo toad, California red-legged frog, southwestern pond turtle, and two-striped garter snake.*

2. BACKGROUND

a. Relationship of Project to Newhall Ranch Specific Plan Program EIR

Section 4.2 of the Newhall Ranch Specific Plan Program EIR identified and analyzed the existing conditions, potential impacts, and mitigation measures associated with the hydrology of the Santa Clara River for the entire Newhall Ranch Specific Plan. Subsequently, more detailed review of Specific Plan

impacts on the hydrology and hydraulics of the Santa Clara River was conducted in Section 2.3, Floodplain Modifications, of the Revised Additional Analysis (May 2003). The Revised Additional Analysis concluded that Specific Plan implementation would not significantly alter river hydrology or the mosaic of habitats because the effects associated with the proposed floodplain modifications would be infrequent and not substantially alter flows, water velocities, and water depths and that, under the Specific Plan, the river would retain sufficient width to allow natural fluvial processes to continue. All subsequent project-specific development plans and tentative subdivision maps must be consistent with the Newhall Ranch Specific Plan and the County of Los Angeles General Plan and Santa Clarita Valley Area Plan.

The Board of Supervisors' previously adopted Significant Ecological Area (SEA) Conditional Use Permit (CUP) No. 94-087-(5) authorized, among other things: (1) boundary adjustments to the existing SEA 23, consistent with General Plan policies requiring protection of natural resources within SEAs; and (2) Specific Plan development within SEA boundaries including bridge crossings (i.e., Long Canyon Road Bridge, Commerce Center Drive Bridge and the Potrero Road Bridge), trails, bank stabilization, and other improvements. The approved SEA boundary adjustments and development were found to be consistent with the natural resources within SEAs. Given that the adopted SEA CUP No. 94-087-(5) adjusted the River Corridor Special Management Area (SMA)/SEA 23 boundaries, this section analyzes Landmark Village impacts on sensitive biological resources in and adjacent to the previously approved and revised River Corridor SMA/SEA 23 boundary.

This project-level EIR is tiering from the previously certified Newhall Ranch Additional Analysis. **Section 4.5, Floodplain Modifications**, assesses the Landmark Village project's existing conditions, the project's potential environmental impacts, and the applicable mitigation measures from the Newhall Ranch Specific Plan Program EIR and Additional Analysis, as well as any mitigation measures recommended by this EIR for the Landmark Village project.

As mentioned above, the Landmark Village project is subject to the mitigation measures contained in the Resource Management Plan (RMP) of the Specific Plan, the Newhall Ranch Specific Plan Program EIR (March 1999) and the Revised Additional Analysis (May 2003). These mitigation measures were approved by the Board of Supervisors in May 2003, in association with the Newhall Ranch Specific Plan and Water Reclamation Plant (WRP) project approvals. These measures are found in the adopted Mitigation Monitoring Plans for both the Specific Plan and WRP and the approved RMP (see, Specific Plan (May 27, 2003), Section 2.6). Each is briefly discussed below.

(1) Specific Plan Resource Management Plan

The Specific Plan RMP contains numerous mitigation measures designed to offset the loss of habitat due to implementation of the Specific Plan (see, Specific Plan RMP, Section 2.6, pp. 2-85–2-135). For example, the RMP contains a mitigation and habitat management program for the: (1) River Corridor SMA/SEA 23 (Section 2.6, pp. 2-92–2-107); (2) High Country SMA/SEA 20 (Section 2.6, pp. 2-108–2-116); and (3) Open Area (Section 2.6, pp. 2-117–2-118). The RMP permits the use of mitigation banking within the Specific Plan area (Section 2.6, p. 2-119). It also establishes a San Fernando Valley spineflower special study mitigation overlay and preserve program (Section 2.6, pp. 2-120–2-123), an oak resources replacement program (Section 2.6, pp. 2-124–2-126), a wildfire fuel modification plan (Section 2.6, pp. 2-127–2-130), and the hillside preservation and grading plan (Section 2.6, pp. 2-134–2-135).

Further, the RMP requires that a conservation easement be established over the River Corridor SMA/SEA 23 after development of areas adjoining the river are complete, and includes the eventual removal of cattle grazing. The RMP requires that a plan be prepared by the applicant and approved by Los Angeles County (County) for the permanent ownership and management of the adopted River Corridor SMA/SEA 23 as a "significant ecological area."

The RMP further requires that a conservation agreement be established over the High Country SMA/SEA 20 and that a detailed program be developed for its long-term management and ownership. All of the existing High Country SMA/SEA 20 will be retained in a natural state. Vegetative cover within the adopted High Country SMA/SEA 20 will be enhanced by the eventual removal of cattle grazing, with the exception of grazing for management purposes, as provided in the Newhall Ranch RMP. The High Country SMA/SEA 20 is identified as a primary location for oak resource planting to mitigate impacts that will occur within the development areas of the Specific Plan.

A critical component of the Open Area system to be established by the RMP is the connection between the High Country SMA/SEA 20 and the River Corridor SMA/SEA 23 along Salt Creek. As a condition of approval, the County has required the applicant to dedicate to the public in fee and/or by conservation easement the approximately 1,517 acres of land encompassing the Salt Creek watershed in Ventura County, adjacent to the Newhall Ranch Specific Plan. This additional land dedication will be managed in conjunction with the High Country SMA/SEA 20. The Salt Creek Corridor will provide continuity between the habitats and the wildlife populations within the Newhall Ranch Specific Plan area, and form a permanent regional linkage between the Santa Clara River and the Santa Susana Mountains. Salt Creek is the most appropriate location for such a wildlife corridor connection because: (1) it provides of a direct link between the two major open areas; (2) it would create less disturbance than any of the other potential connections; (3) it is bound through most of its length by open area on the north side and, therefore, will

not be surrounded by development in the future; (4) it includes both upland and riparian vegetation through most of the corridor; and (5) it is topographically isolated from development areas on Newhall Ranch. All of these characteristics are unique in that no other wildlife corridor would encompass all of these factors.

(2) Newhall Ranch Specific Plan Program EIR Mitigation Measures

The Newhall Ranch Specific Plan Program EIR incorporates mitigation from the RMP and requires additional mitigation to address impacts to special-status plant and wildlife species, including San Fernando Valley spineflower, unarmored threespine stickleback, arroyo toad, southwestern pond turtle, southwestern willow flycatcher, least Bell's vireo, and other special-status species. Measures are also included that address impacts to sensitive plant communities (e.g., riparian habitat) and other resources under the jurisdiction of the Army Corps of Engineers (ACOE) and California Department of Fish and Game (CDFG).[1]

3. SUMMARY OF THE NEWHALL RANCH SPECIFIC PLAN PROGRAM EIR FINDINGS

The Newhall Ranch Revised Additional Analysis (Section 2.3) determined that the Specific Plan would modify the floodplain by placing soil cement along selected portions of the river, developing the floodplain areas behind the soil cement and installing three bridges across the river. However, it was further determined that the proposed improvements in the Specific Plan would maintain the key hydraulic characteristics that largely determine the overall mosaic of habitats in the river.

The prior analysis found that during more infrequent floods (20-year, 50-year and 100-year events), flows would spread out to the buried bank stabilization but not further. This condition would limit the area of the floodplain during these infrequent flood events, causing inundation over a smaller area because the bank protection would prevent flooding of formerly adjacent floodplain areas. However, the reduction in floodplain area caused by bank protection was found not to create a significant increase in overall velocities or water depth, because the volume of flow carried in these shallow, slow-moving areas along the margins of the river is small. Moreover, variations were determined to be localized and limited in scope, especially when viewed in the entirety of the river corridor within the Specific Plan site and downstream. Therefore, the prior analysis found that the overall mosaic of habitats in the river would be maintained because the key hydraulic characteristics would not be significantly different under the Specific Plan. Based on these results, the Board of Supervisors found that the proposed bridges and bank

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1 For a complete description of all of the adopted biota-related mitigation measures, please refer to the Revised Mitigation Monitoring Plan for the Specific Plan, Mitigation Measures 4.6-1 through 4.6-80.

protection associated with the Specific Plan would not cause significant changes to key hydraulic characteristics, and therefore, would not alter the amount and pattern of aquatic, wetland and riparian habitats in the river at the Specific Plan site and downstream in Ventura County.

4. INTRODUCTION

a. Study Scope and Methods

As illustrated in **Figure 4.5-1**, **Study Area Locations**, the study area includes the river corridor at the confluence with Castaic Creek and extends downstream approximately four miles into Ventura County. The scope of the assessment is focused on the potential effects of the project on aquatic, wetland, and riparian habitats and sensitive aquatic species.

The floodway engineering analysis used to prepare this section of the EIR was provided by Pacific Advanced Civil Engineering, Inc. (PACE) and the biological analysis was based, in part, on the biological studies and information described in **Section 4.4**, **Biota**, and on an additional analysis prepared by ENTRIX, Inc. (ENTRIX). Information from PACE is presented in its report entitled, *Flood Technical Report for Landmark Village*, August 2006 (Recirculated Draft EIR **Appendix 4.2**), and information from ENTRIX is presented in its report entitled, *Sensitive Aquatic Species Assessment, Santa Clara River, Landmark Village Project, Santa Clarita, California, 2006* (see Recirculated Draft EIR **Appendix 4.5**).

(1) Review of Existing Project Reports and Documentation

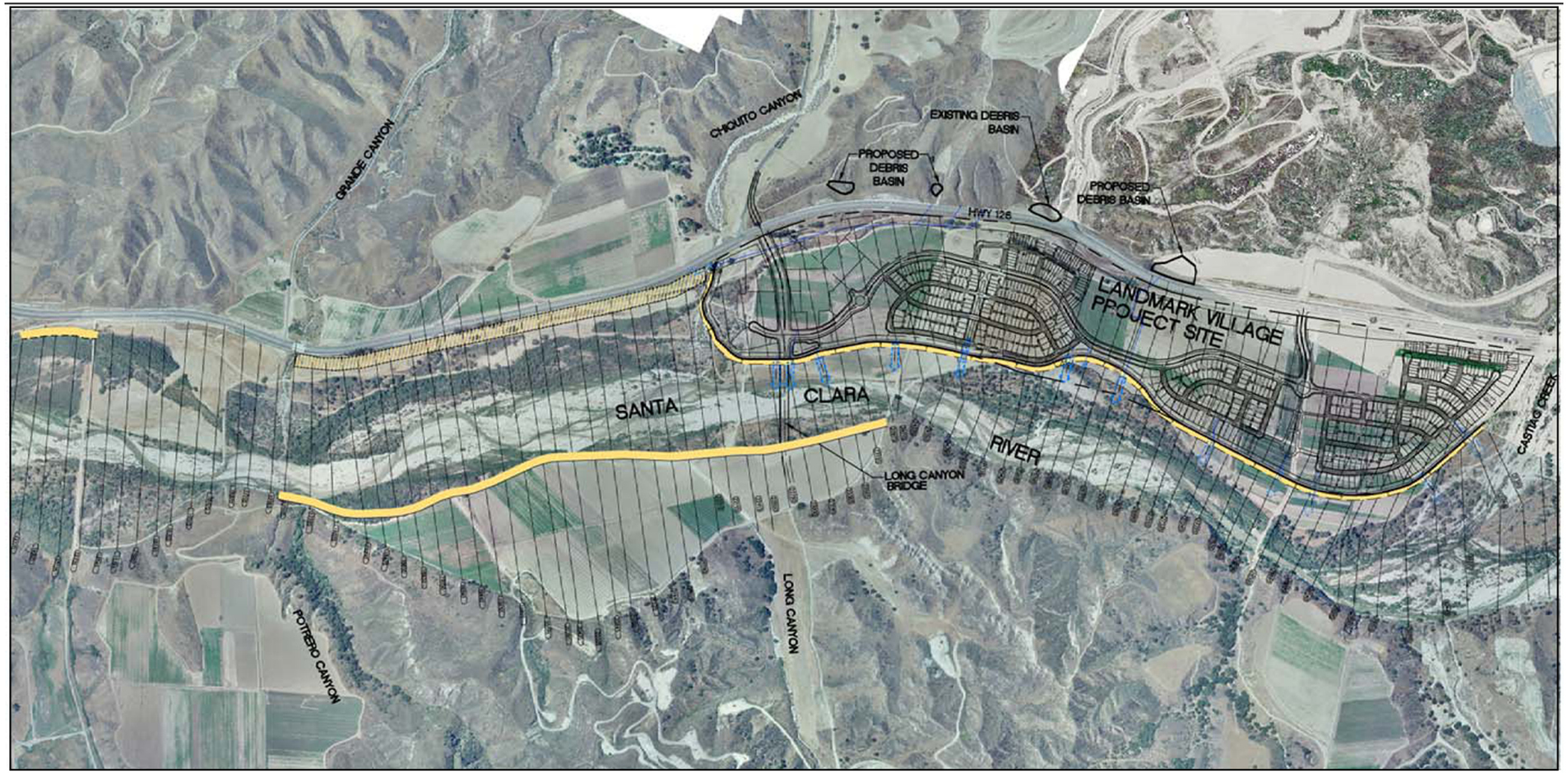
PACE characterized the hydrology and hydraulics of the river in a technical report (Recirculated Draft EIR **Appendix 4.2**). As explained in that report, hydraulic calculations and sediment transport potential assessments within the Santa Clara River were prepared using ACOE Hydraulic Engineering Center River Analysis System (HEC-RAS) and HEC-GEO-RAS (Global Positioning System [GPS] enabled HEC-RAS software) programs. These programs were used to determine floodplain limits, flow velocities and by extension scour/deposition potential for a range of flow frequencies within the river (2-year through 100-year flows). Existing Santa Clara River discharge rates for the 2-year, 5-year, 10-year, 20-year, 50-year, and 100-year return periods were obtained from an ACOE study entitled, *Santa Clara River Adopted Discharge Frequency Values* (ACOE, the Ventura County Flood Control Department and the Los Angeles County Department of Public Works, May 3, 1994). Santa Clara River flows in the proposed conditions were derived from the PACE *Flood Technical Report for Landmark Village* (PACE, 2006).

The modeling conducted for the river analysis was created by modifying existing cross-section geometrics of the river to simulate the hydraulic effects of the proposed project's use of soil cement (i.e., bank stabilization) for erosion protection, including the Long Canyon Road Bridge abutments and piers. This encroachment was conservatively approximated with levees in the hydraulic model (model levees set at equivalent elevation on slope of channel invert). The modeling of the proposed Long Canyon Road

Bridge span, soil cement, pier spacing, and abutment locations are substantially consistent with the Newhall Ranch Revised Additional Analysis, Volume VIII (May 2003). For modeling and impact analysis considerations, these conservative bridge configurations would have the greatest impact on river hydraulics.

In addition to review and incorporation of the information from the PACE report, the following technical reports and supporting documentation were reviewed by ENTRIX and considered in assessing the potential effects of the Landmark Village project on sensitive aquatic species inhabiting the Santa Clara River:

- *Biological Resources Assessment of the Proposed Santa Clara River Significant Ecological Area. Los Angeles County Department of Regional Planning.* PCR Services Corporation, Frank Hovore and Associates, FORMA Systems, November 2000.
- *Final EIS/EIR: 404 Permit and 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries, Los Angeles County*. Valencia Company, August 1998.
- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians, Landmark Village Project; Newhall Ranch, Valencia, California*. Newhall Ranch Company, Compliance Biology, Inc., Camarillo, CA, October 2004.
- *Biological Resources of the Upland Areas of the West Ranch*. Newhall Land and Farming Company, Valencia, California, Dames and Moore, Santa Barbara, California, July 1993.
- *Natural River Management Plan: Permitted Projects and Activities*. Santa Clara River and tributaries. Valencia Company, November 1998.
- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians within the Natural River Management Plan Area, Valencia, California*. Impact Sciences, September 2001.
- *Aquatic Surveys Along the Santa Clara River Part I: Castaic Junction Project Area, Los Angeles County, California*. Aquatic Consulting Services, Inc., April 2002.
- *Aquatic Surveys Along the Santa Clara River Part III: West of Commerce Center Bridge to the Ventura County Line, California*. Aquatic Consulting Services, Inc., June 2002.
- *Biological Opinion for the Natural River Management Plan*, Santa Clarita, Los Angeles County, California (1-8-02-F-4R) (File No. 940050400-BAH). U.S. Fish and Wildlife Service, November 2002.
- *Results of Focused Surveys for Unarmored Threespine Stickleback and Other Special-Status Fish Species, Newhall Ranch, Valencia California*. Impact Sciences, January 2003.
- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians within the Newhall Ranch Area, Los Angeles County, California*. Newhall Land and Farming, Impact Sciences, September 19, 2001.

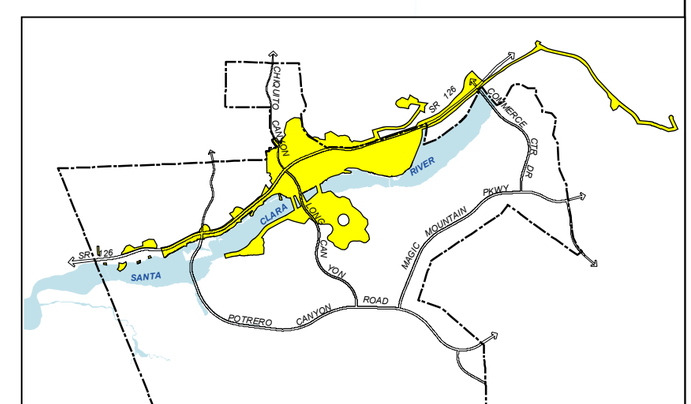


Legend:

- Treated Runoff and Storm Water Discharge Points for Project Area
- Storm Water Discharge for Project Area
- On-Site Storm Drain
- Proposed Soil Cement Bank Protection
- Proposed Utility Corridor Bank Protection
- Residential Project Boundary

1200 600 0 1200

APPROXIMATE SCALE IN FEET



SOURCE: PACE – August 2005

FIGURE **4.5-1**

Study Area Locations

32-92•01/09

- Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Rick Farris, U.S. Fish and Wildlife Service, Ventura, CA, Subject: Permit submittal requirements, TE 808242, arroyo toad surveys, Los Angeles County, California, August 2, 2001.
- Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of focused arroyo toad surveys, Auto Center Expansion Project and Hart Baseball and Softball Complex (Hart Complex Area), Santa Clarita, California.
- Letter from David Crawford (Impact Science, Inc, Agoura Hills, CA) to Mark Subbotin, Newhall Land and Farming, Subject: Brief summary of arroyo toad survey results in NRMP area, June 18, 2001.
- *Biota Report*, Newhall Ranch Specific Plan, Los Angeles County Department of Regional Planning, Los Angeles, California, September 7, 1995, July 1996 revision.
- SEATAC Biota Report, Combined San Francisquito Canyon Projects (West Creek (VTTM 52455) and East Creek (VTTM 44831, 52667), Newhall Land and Farming Company, Significant Ecological Area 19, San Francisquito Canyon, Los Angeles County, California, Los Angeles County Department of Regional Planning, Frank Hovore & Associates, San Marino Environmental Associates, Planning Consultants Research, August 19, 1998.
- Amended 404 Permit (No. 940050400-BAH) for Natural River Management Plan. U.S. Army Corps of Engineers, June 2003.
- Proposed Designation of Critical Habitat for the California Red-Legged Frog (*Rana aurora draytonii*), U.S. Fish and Wildlife Service, April 13, 2004, 69 FR 19620-19642.
- Proposed Designation of Critical Habitat for the Arroyo Toad, U.S. Fish and Wildlife Service, April 28, 2004, 69 FR 23254-23328.
- Final Designation of Critical Habitat for the Arroyo Toad, Final Rule. U.S. Fish and Wildlife Service, April 13, 2005, 50 CFR Part 17 (RIN 1018-AT42).
- Revised Additional Analysis to the Newhall Ranch Specific Plan and Water Reclamation Plant Final Program EIR, Volume VIII (May 2003), Section 2.3, Floodplain Modifications.
- EIR Technical Study – *Landmark Village (Flood Technical Report) (August 2006)*. Pacific Advanced Civil Engineering, Inc. (PACE)
- *Landmark Village Water Quality Technical Report* (GeoSyntec Consultants 2006).

In addition, applicable information referenced in **Section 4.4, Biota**, of this EIR was also referenced in order to prepare the information presented below.

(2) Review of Records and Literature

Information on the special-status wildlife of the project area was obtained by ENTRIX through a search of the California Natural Diversity Data Base (CNDDB; CDFG, 2004); the U.S. Fish and Wildlife Service

(USFWS), Ventura Office, Endangered Species Division's species list (USFWS, 2003); and other biological studies completed in the project vicinity. Preliminary identification of potential habitat for sensitive aquatic species within the project site was determined by reviewing aerial photography. Subsequent site visits on March 31, 2004 and November 10, 2004 identified other potential habitat.

To evaluate the effects of the project's bank stabilization and bridge components on potential populations of unarmored threespine stickleback, arroyo toads, California red-legged frogs, and other sensitive aquatic species, ENTRIX biologists queried the CNDDB (CDFG, 2004), the collection catalogue of the Los Angeles County Museum of Natural History, and the online collection databases of the Museum of Vertebrate Zoology, University of California, Berkeley (UC Berkeley, 2004) and the California Academy of Sciences (CAS, 2004) to determine the historical distribution of these species in the project area. Various literature sources (especially Jennings & Hayes, 1994) were also used.[2] The ENTRIX biologists also examined maps, aerial photographs, and ground photographs taken by ENTRIX biologists during the site visits to locate potential aquatic habitat within and near the banks of the Santa Clara River within the study area.

Potential aquatic habitat suitability for any of the five studied species was determined by comparison with previously published assessments (e.g., Holland, 1991; Jennings & Hayes, 1994; USFWS 1999, 2002), as well as by the ENTRIX biologists' extensive experience with the three species in various parts of California, including the Santa Clara River region (see Recirculated Draft EIR **Appendix 4.5**).

ENTRIX biologists also consulted the USFWS Biological Opinion for the Natural River Management Plan (NRMP), Santa Clarita, Los Angeles County, California (1-8-02-F-4R), dated November 15, 2002, the Environmental Assessment 404(b)(1) Evaluation Public Interest Review for Permit Application Number 940050400-BAH, Valencia Company Natural River Management Plan, dated June 18, 2003, the PACE *Flood Technical Report for Landmark Village* (August 2006), the GeoSyntec *Water Quality Report* (2006), and various natural history accounts for these species (e.g., Jennings & Hayes, 1994; Holland, 1991; Sweet, 1992; Swift et al., 1993; Stebbins, 1951); and the Newhall Ranch Revised Additional Analysis, Volume VIII (May 2003), Section 2.3, Floodplain Modifications.

(3) Field Reconnaissance Surveys

In addition to the focused sensitive aquatic species surveys conducted by others and summarized in the **Biota** section of this EIR, ENTRIX biologists, Dr. Camm Swift, Steve Howard, Sean Barry, and Matt

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2 Unless otherwise noted, neither the CNDDB nor the museum database records are verified independently. Experts usually identify museum specimens during accession, but taxonomic changes and misidentifications are always possible. Further, unless otherwise noted, the absence of CNDDB or museum species records from any site does not indicate that the species is absent from that site.

Carpenter, conducted reconnaissance-level field surveys, focusing on the following sensitive aquatic vertebrate species and their associated habitat within the Santa Clara River floodplain: (1) unarmored threespine stickleback; (2) arroyo toad; (3) California red-legged frog; (4) southwestern pond turtle, and; (5) two-striped garter snake. The purpose of the field survey was to analyze the project's potential effects on these species and their habitat. These species were targeted, as their life history and habitat preferences are representative of those aquatic species dependent upon riparian habitat in the River Corridor SMA/SEA 23.

The herpetological surveys were conducted on March 31 and November 10, 2004 in and along the Santa Clara River, within the boundaries of the Landmark Village project site. The project site was examined for potential aquatic habitat, such as flowing or standing water, emergent vegetation, and associated sensitive aquatic species. During the November survey, the river channel was photographed within the project area every 100 to 200 feet, and in areas of potential aquatic habitat. Species observed were recorded, along with water temperature, depth and width of wetted area. Field survey data is included in Recirculated Draft EIR **Appendix 4.5**.

Potential habitat for arroyo toads, California red-legged frogs, western pond turtles, and two-striped garter snakes was noted, along with other features relevant to life history, such as the presence of prey or predators. Habitat factors noted for arroyo toads included the presence of clear, standing water (required for egg deposition), sandy banks, and the presence of willows, cottonwood, and sycamore trees. Habitat factors noted for California red-legged frogs included relatively deep and vegetated sunlit pools. Habitat factors noted for southwestern pond turtles included permanent or nearly permanent water, depth of water, basking sites such as partially submerged logs, rocks, mats of floating vegetation or open mud banks, and suitable terrestrial sites for egg-laying. Habitat factors noted for two-striped garter snakes included isolated stream channels with adjacent shallow and deep moving water with bordering vegetative (including root masses) or rocky cover, in-stream cover, and evidence of fish.

The entire reach of the Santa Clara River from the mouth of Salt Creek to the Castaic Junction was surveyed on March 31 and April 1, 2004 focusing on the unarmored threespine stickleback fish. An additional survey was conducted on November 8, 2004 in the Santa Clara River and Castaic Creek from the mouth to the State Route 126 (SR-126) bridge within the Landmark Village project area. The surveys focused mainly on evaluating habitat conditions within these reaches and in establishing the relative proximity from the streamside project boundary to in-stream habitats. Most of these efforts were visual habitat assessments documented by field photographs with special reference to unarmored threespine stickleback and other fish. Some collecting was conducted with a small seine (1.8 x 1.2 meters, 3 millimeters (mm) mesh/6 x 3 feet, 0.125-inch mesh) and aquarium dip nets in habitats that could

potentially contain stickleback. Further upstream, the Santa Clara River at the Commerce Center Drive Bridge area, and Castaic Creek near the Interstate 5 (I-5) bridge, was examined on December 16, 2004.

Camm Swift and Sean Barry conducted an additional survey within the Landmark Village project reach of the Santa Clara River on February 1, 2005 to document and evaluate habitat changes due to the recent large storm flows that disturbed much of the habitat that was previously examined.

5. EXISTING CONDITIONS

a. Existing Hydrology and Hydraulic Conditions Along the River

The Santa Clara River traverses the southern portion of the site, which is located within a contributing drainage of 996 acres (Psomas, *Landmark Village Drainage Concept Report*) out of the 1,634-square-mile Santa Clara River watershed basin. This area represents less than 1 percent of the Santa Clara River basin and consists primarily of undeveloped property. Rainfall in the tributary area is an annual average of 17 inches and generally occurs in the winter months. Runoff flows to and through six contributing drainage areas on the site via sheet flows and natural concentrated flows. Each is described in greater detail below.

(1) Flows, Velocity, Depth

(a) Santa Clara River

The reach of the Santa Clara River adjacent to, and downstream of, the project site has perennial surface flows primarily created by tertiary treated effluent discharges from two upstream water reclamation plants operated by the County Sanitation Districts of Los Angeles County, and by urban runoff. Natural flows in the river only occur in the winter due to storm runoff. The flows vary significantly from year-to-year. The flow line of the river is currently along the southerly bank.

The reach of the river within and adjacent to the project site has multiple channels (braided). High sediment loads, high bank erodibility, and intense, intermittent runoff conditions characterize this kind of system. Combined with the relatively flat gradient of the river at this point (less than one percent), the river has a high potential to aggrade (deposit sediment) at low flow velocities.

The peak discharge rates or flows (i.e., volume of water for a given time frame) for floods of different return periods (2-year, 5-year, 10-year, 20-year, 50-year,[3] 100-year) at the downstream end of the project

[3] Note this is not the 50-year capital flood (Qcap), which is based on a theoretical 4-day storm event occurring right after the watershed has been burned with the resulting flow rate being increased again by a bulking factor. For purposes of comparison, the predicted flow during the 100-year FEMA flood event at the Castaic Creek confluence is 31,300 cfs, while the County Qcap at this same location is 163,000 cfs.

site under existing conditions are shown in **Table 4.5-1, Discharge, Velocity, and Flow Area Changes by Cross-Section – 2- and 100-Year Interval Storm Events**. A 2-year event has a probability of occurring once every two years, while a 50-year flood event has a probability of occurring once every 50 years. The 2-year flood event would have modest flows, while the latter event would have much higher flows.

As shown, velocities and water surface elevations in the river vary from section-to-section based on various hydraulic and hydrologic parameters. In general, velocity and depth along the river will increase with higher discharge. An example of these relationships is provided in **Table 4.5-1**. The data indicates that velocities measured in feet per second (fps) more than double, on average, from the 2-year to the 100-year event, while depth increases approximately 10.25 times, on average. In contrast, discharge increases almost 24 times from the 2-year to the 100- year event. Velocity and water depth percentage increases do not correspond to the discharge percentage increases because the wide river channel allows flood flows to spread out with increasing discharge.

Table 4.5-1
Discharge, Velocity, and Flow Area Changes by Cross-Section
2- and 100-Year Interval Storm Events

Station	Event	Q (CFS)	Velocity (FPS)	Flow Area (FT2)	Q100/Q2	A100/A2
33310	Q2	1720	4.6	374.6	2.1	11.1
	Q100	40300	9.7	4146.7		
33115	Q2	1720	2.9	602.9	3.6	6.4
	Q100	40300	10.4	3874.9		
32795	Q2	1720	4.9	348.2	1.7	13.7
	Q100	40300	8.4	4787.8		
32605	Q2	1720	4.0	432.0	1.9	12.5
	Q100	40300	7.4	5413.7		
32265	Q2	2527	5.4	468.3	2.0	11.5
	Q100	58207	10.9	5362.5		
31875	Q2	2527	3.7	688.4	2.3	10.1
	Q100	58207	8.4	6961.4		
31585	Q2	2527	2.7	950.1	2.1	10.8
	Q100	58207	5.7	10229.1		
31360	Q2	2527	4.3	592.5	1.7	13.6
	Q100	58207	7.2	8074.1		
31060	Q2	2527	5.4	464.8	1.0	24.2
	Q100	58207	5.2	11250.0		
30720	Q2	2527	3.8	668.1	1.1	21.7
	Q100	58207	4.0	14526.6		
30445	Q2	2527	5.7	446.6	0.6	36.6
	Q100	58207	3.6	16362.6		
30095	Q2	2527	2.3	1119.8	1.6	14.4
	Q100	58207	3.6	16071.5		
29815	Q2	2527	1.7	1461.3	2.4	9.5
	Q100	58207	4.2	13861.0		

Station	Event	Q (CFS)	Velocity (FPS)	Flow Area (FT2)	Q100/Q2	A100/A2
29565	Q2	2527	1.3	2017.5	3.4	6.8
	Q100	58207	4.2	13770.7		
29385	Q2	2527	1.5	1654.8	3.4	6.8
	Q100	58207	5.2	11200.7		
29140	Q2	2527	3.5	727.8	2.5	9.4
	Q100	58207	8.5	6820.6		
28895	Q2	2527	7.8	325.8	2.0	11.4
	Q100	58207	15.7	3712.6		
28695	Q2	2527	5.2	483/1	4.8	4.8
	Q100	58207	25.1	2315.0		
28500	Q2	2527	6.7	379.0	3.4	6.8
	Q100	58207	22.5	2588.7		
28280	Q2	2527	3.8	670.9	4.4	5.3
	Q100	58207	16.5	3528.9		
28080	Q2	2527	4.6	545.7	3.5	6.5
	Q100	58207	16.3	3566.8		
27925	Q2	2527	6.0	422.4	2.4	9.5
	Q100	58207	14.6	4000.1		
27725	Q2	2527	3.4	745.9	4.9	4.7
	Q100	58207	16.5	3535.9		
27545	Q2	2527	6.1	413.5	2.8	8.3
	Q100	58207	16.9	3438.7		
27335	Q2	2527	3.6	703.4	5.1	4.6
	Q100	58207	18.2	3207.5		
27155	Q2	2527	3.9	654.1	3.9	6.0
	Q100	58207	14.9	3906.9		
26990	Q2	2527	5.6	451.4	2.7	8.5
	Q100	58207	15.2	3841.5		
26780	Q2	2527	5.4	465.3	3.3	7.0
	Q100	58207	18	3240.4		
26575	Q2	2527	3.3	756.7	3.5	6.6
	Q100	58207	11.7	4958.9		
26355	Q2	2527	6.4	392.2	1.9	11.9
	Q100	58207	12.5	4675.8		
26170	Q2	2527	4.6	550.6	2.2	10.6
	Q100	58207	9.9	5861.5		
25965	Q2	2527	3.6	707.6	2.5	9.2
	Q100	58207	8.9	6512.3		
25785	Q2	2527	2.7	945.2	3.2	7.3
	Q100	58207	8.5	6860.9		
25600	Q2	2527	5.7	447.0	1.8	12.5
	Q100	58207	10.4	5578.0		
25425	Q2	2527	3.9	645.6	2.2	10.3
	Q100	58207	8.8	6640.0		
25215	Q2	2527	6.6	383.6	1.6	14.1
	Q100	58207	10.8	5394.3		
25000	Q2	2527	5.1	493.4	2.7	8.5
	Q100	58207	13.8	4209.4		
24795	Q2	2527	6.1	414.4	2.2	10.2
	Q100	58207	13.7	4242.0		

Station	Event	Q (CFS)	Velocity (FPS)	Flow Area (FT2)	Q100/Q2	A100/A2
24550	Q2	2527	4.0	639.3	3.8	6.1
	Q100	58207	14.9	3907.6		
24335	Q2	2527	5.3	474.0	1.8	12.6
	Q100	58207	9.8	5955.9		
24115	Q2	2527	5.8	435.7	1.9	12.2
	Q100	58207	11.0	5298.9		
23975	Q2	2527	4.5	557.9	2.4	9.7
	Q100	58207	10.7	5438.6		
23755	Q2	2527	6.7	376.1	1.3	18.2
	Q100	58207	8.5	6831.8		
23565	Q2	2527	5.2	486.8	1.9	12.1
	Q100	58207	9.9	5902.0		
23365	Q2	2527	6.7	378.5	1.7	13.2
	Q100	58207	11.7	4997.7		
23180	Q2	2527	4.4	571.4	2.9	7.9
	Q100	58207	12.9	4511.1		
23000	Q2	2527	5.6	452.1	1.3	17.5
	Q100	58207	7.4	7918.4		
22790	Q2	2527	4.6	549.3	1.9	12.2
	Q100	58207	8.7	6684.7		
22600	Q2	2527	4.4	578.2	2.0	1.8
	Q100	58207	8.6	6807.8		
22415	Q2	2527	5.9	430.4	1.4	16.5
	Q100	58207	8.2	7100.3		
22195	Q2	2558	6.8	378.8	1.8	12.6
	Q100	58922	12.3	4789.4		
22010	Q2	2558	4.7	550.2	3.3	7.1
	Q100	58922	15.2	3886.9		
21790	Q2	2558	4.2	608.4	2.7	8.5
	Q100	58922	11.3	5194.9		
21615	Q2	2558	5.4	476.7	1.8	12.5
	Q100	58922	9.9	5982.6		
21440	Q2	2558	3.7	699.2	3.4	6.7
	Q100	58922	12.6	4688.1		
21225	Q2	2558	6.7	381.5	1.6	14.4
	Q100	58922	10.7	5493.6		
21020	Q2	2558	2.3	1113.5	7.0	3.3
	Q100	58922	16.1	3657.5		
20845	Q2	2558	5.4	473.9	1.8	12.7
	Q100	58922	9.8	6020.3		
20595	Q2	2558	3.6	705.3	2.1	10.9
	Q100	58922	7.7	7689.4		
20435	Q2	2558	2.7	962.3	2.6	8.8
	Q100	58922	6.9	8499.8		
20280	Q2	2558	5.6	460.5	1.9	12.2
	Q100	58922	10.5	5630.4		
20070	Q2	2558	5.5	465.8	2.8	8.1
	Q100	58922	15.5	3791.2		
19855	Q2	2558	4.9	526.5	2.3	10.0
	Q100	58922	11.2	5248.7		

Station	Event	Q (CFS)	Velocity (FPS)	Flow Area (FT2)	Q100/Q2	A100/A2
19630	Q2	2558	5.6	460.6	2.2	10.5
	Q100	58922	12.2	4828.3		
19440	Q2	2558	3.7	684.7	2.1	11.1
	Q100	58922	7.7	7618.7		
19240	Q2	2558	5.0	512.0	1.8	13.0
	Q100	58922	8.9	6637.4		
19050	Q2	2558	4.7	550.4	1.5	15.6
	Q100	58922	6.9	8605.3		
18830	Q2	2558	6.2	414.7	1.1	21.7
	Q100	58922	6.5	9013.4		
18650	Q2	2558	5.5	461.9	1.0	22.6
	Q100	58922	5.7	10437.5		
18475	Q2	2558	4.5	565.8	1.1	21.4
	Q100	58922	4.9	12129.1		
18290	Q2	2558	6.5	394.0	0.8	29.6
	Q100	58922	5.0	11680.0		
18025	Q2	2558	3.1	825.2	1.4	16.4
	Q100	58922	4.4	13528.9		
17785	Q2	2558	3.4	747.3	1.4	16.2
	Q100	58922	4.9	12068.3		
17510	Q2	2558	3.6	711.3	2.2	10.3
	Q100	58922	8.1	7301.5		
17360	Q2	2581	4.3	600.4	2.2	10.4
	Q100	59457	9.6	6222.2		
17110	Q2	2581	4.8	536.8	1.9	12.3
	Q100	59457	9.0	6576.4		
16970	Q2	2581	3.9	667.8	3.5	6.7
	Q100	59457	13.4	4448.7		
16720	Q2	2581	5.7	450.2	2.1	11.0
	Q100	59457	12.0	4967.5		
16515	Q2	2581	6.7	383.6	1.7	13.8
	Q100	59457	11.2	5304.4		
				Max	7.0	36.6
				Min	0.6	3.3
				Avg	2.4	11.7

Source: PACE, 2006.
cfs = cubic feet per second

(b) On-Site (Tract Map) Drainages

Flows discharge from the tract map site to the Santa Clara River from six on-site areas (18 sub-basins). The acreage for each of the sub-basins is provided in **Table 4.5-2, Existing On-Site Drainage**. There are currently no existing drainage or erosion/sedimentation control improvements located within the site other than minor agricultural drainage ditches and an insignificant amount of earthen riverbank protection. The Chiquita Landfill drains through the site, and this man-made, open drainage would be

placed in a pipe upon completion of the project. However, the project is not proposing to drain into this channel, and, therefore, it would remain a separate, unmodified discharge.

Table 4.5-2
Existing On-Site Drainages

Subbasins	Area (Ac)	Capital Storm Event		
		Time of Conc. (min)	Qbb (cfs)[1]	Q/A (cfs/Ac)[2]
100A	32.7	22	54	1.65
110A	49.6	20	87	1.75
200A	17.3	17	34	1.97
210A	35.8	25	55	1.54
400B	18.4	24	29	1.58
405B	38.9	29	54	1.39
408C	15.3	8	46	3.01
410C	44.3	19	81	1.83
415B	35.3	11	89	2.52
420A	34.4	25	53	1.54
425A	39.9	21	69	1.73
500A	26.5	20	47	1.77
510A	40.0	25	61	1.53
CTQ-1A	6.1	8	18	2.95
CTQ-2A	3.6	6	13	3.61
CTQ-3A	1.8	5	7	3.89
CTQ-4A	12.3	10	33	2.68
CTQ-5A	4.4	5	17	3.86
CTQ-6A	24.9	15	52	2.09
CTQ-7A	2.1	5	8	3.81
CTQ-8A	2.8	5	11	3.93
CTQ-9A	31.8	14	70	2.2
CTQ-10A	15.6	11	39	2.5
CTQ-11A	10.2	17	27	2.65
CTQ-12A	11.7	10	40	3.42
620A	12.4	23	20	1.61
Total	**568.1**			

Source: PACE, 2006.
Notes:
1 *Burned and bulked flow*
2 *This was calculated by Sikand in the Newhall Ranch Specific Plan Master Hydrology and Drainage Concept, dated 6/29/99.*

Project site runoff quantities for the capital flood for each of the six existing drainages defined by Psomas are also provided in **Table 4.5-2**. Combined flows from the project site to the river total 1,823 cfs under existing conditions. Existing flow rates from observed data at the project site during the 2-, 5-, 10-, 20-,

50- and 100-year interval storm events are compiled in **Table 4.5-3, Existing Conditions River Discharge Stations 32265 to 22195 Downstream of Castaic Creek Confluence**. Also, please see **Figures 4.5-2a** through **4.5-2f**.

Table 4.5-3
Existing Conditions River Discharge Stations
32265 to 22195 Downstream of Castaic Creek Confluence[4]

Recurrence Interval	Flow (Discharge) Rate (cfs)
2-Year[1]	2,527
5-Year[1]	8,232
10-Year[1]	14,942
20-Year[1]	24,157
50-Year[1]	41,141
100-Year[1]	58,207
Capital Flood[2]	163,000
Capital Flood[3]	140,776

Source: PACE, 2006.

[1] *Existing flows from United States Army Corps of Engineers, Santa Clara River Adopted Discharge Frequency Values. Adopted May 3, 1994, by the United States Army Corps of Engineers and the Ventura County Flood Control Department.*

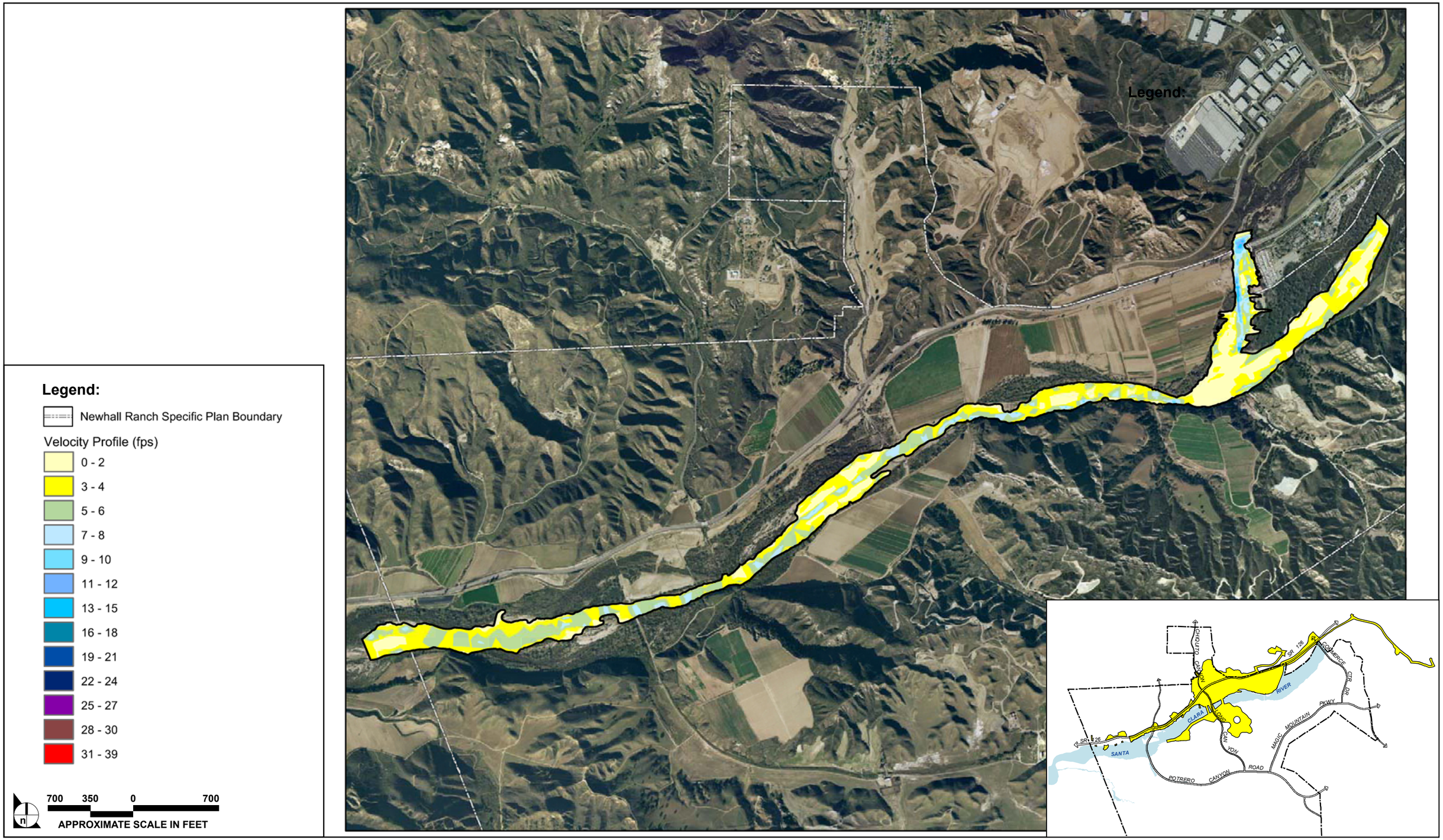
[2] *LACDPW published Capital Design Flows.*

[3] *Q_{CAP} used in the SPEIR.*

(c) Off-Site Drainages

The total contributing drainage area that drains through the project site is approximately 996 acres. This runoff flows to and through the project site via sheet flows and natural concentrated flows. The capital flood on the river is approximately 163,000 cfs at the Castaic Creek confluence. The project site peak existing (burned and bulked) flow rate is approximately 831 cubic feet per second (cfs). Therefore, capital flood flows from the project site are approximately less than one percent of the river capital flood discharge rate.

4 Flows from the U.S. Army Corps of Engineers, Santa Clara River Adopted Discharge Frequency Values. Adopted May 3, 1994, by the U.S. Army Corps of Engineers, the Ventura County Flood Control Department & DPW Published Capital Flood Design Flows.

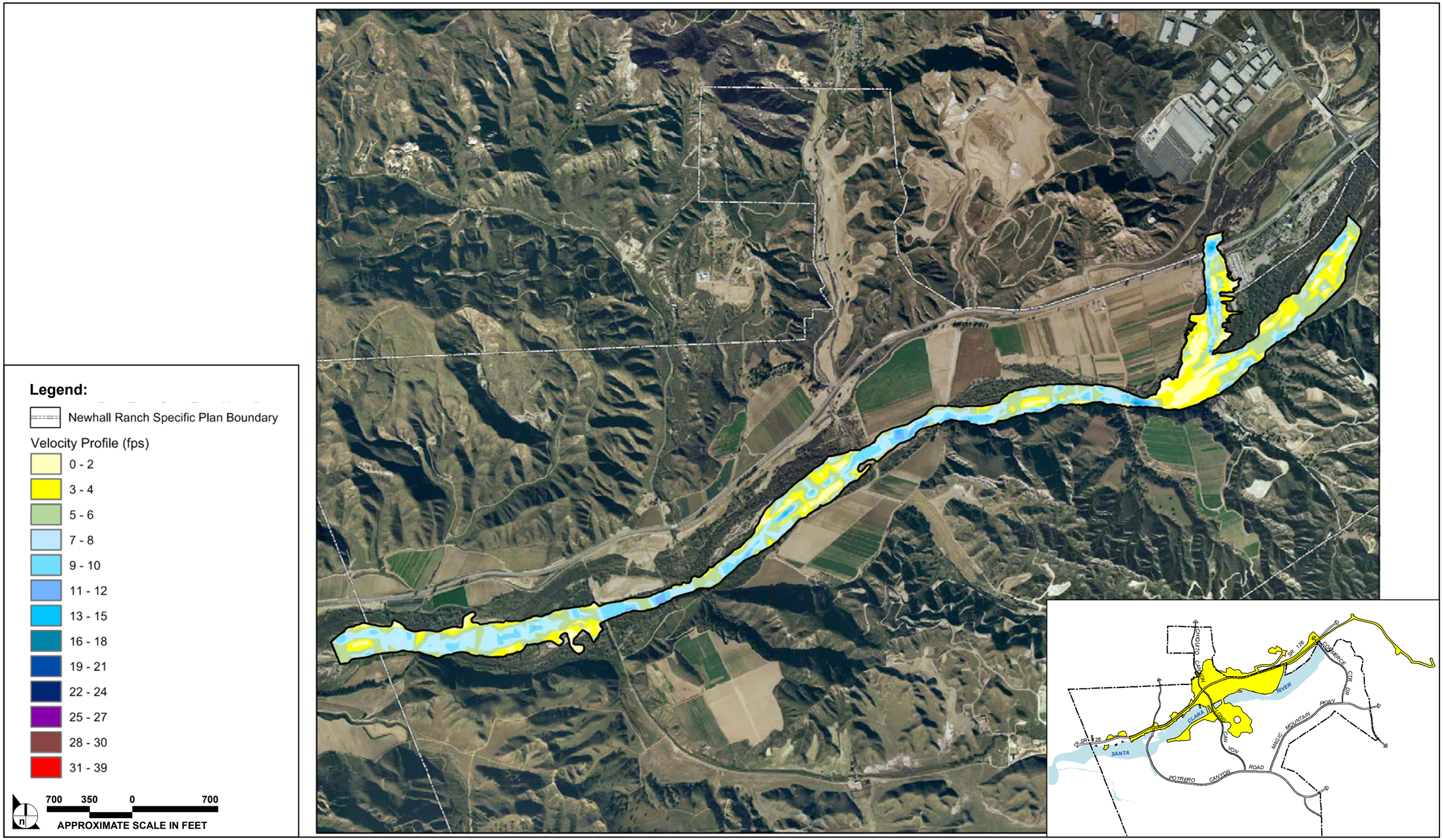


SOURCE: PACE – August 2006

FIGURE **4.5-2a**

Existing Conditions – Santa Clara River 2-Year Flood Event

32-92•01/09

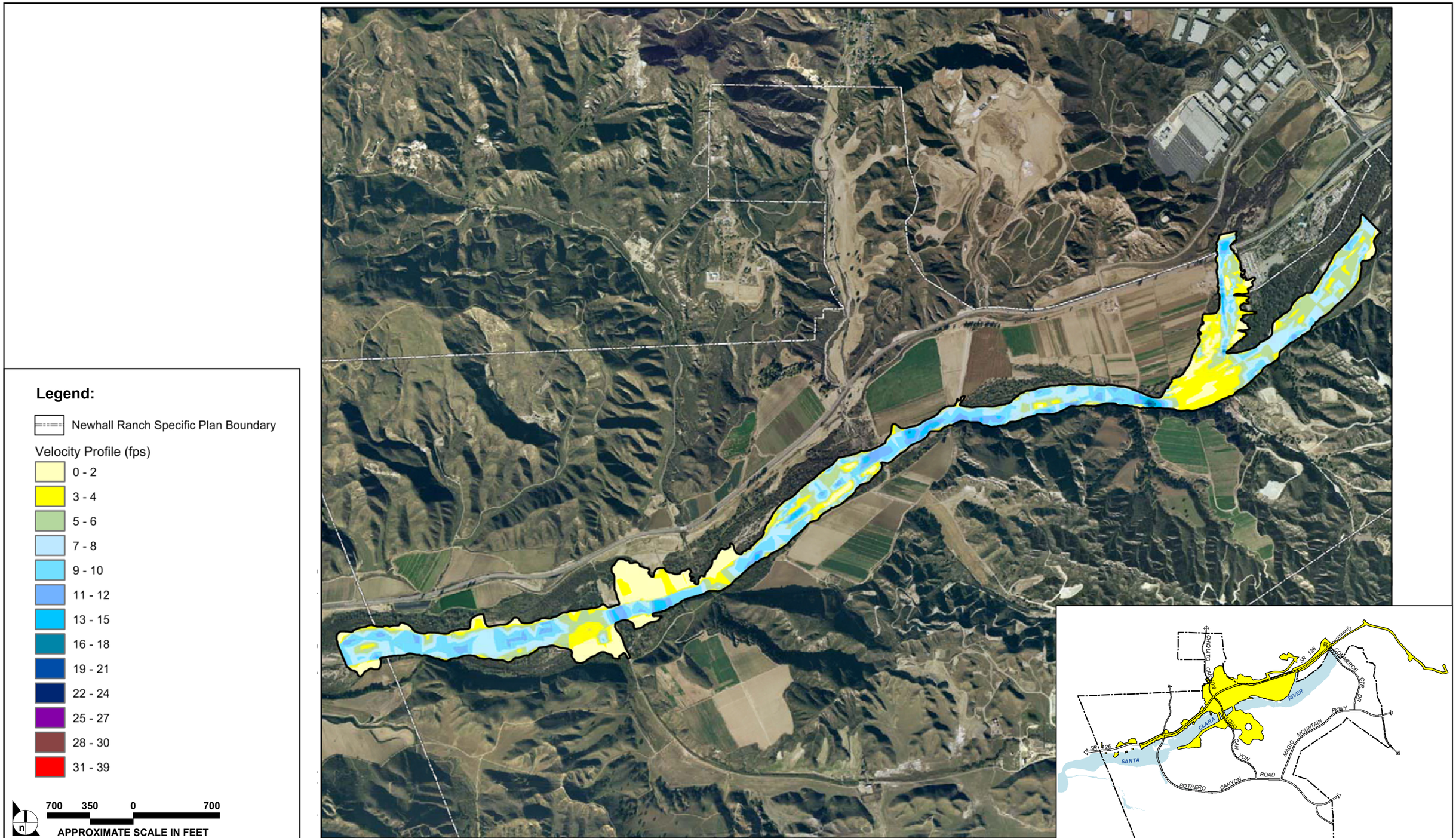


SOURCE: PACE – August 2006

FIGURE **4.5-2b**

Existing Conditions – Santa Clara River 5-Year Flood Event

32-92•01/09

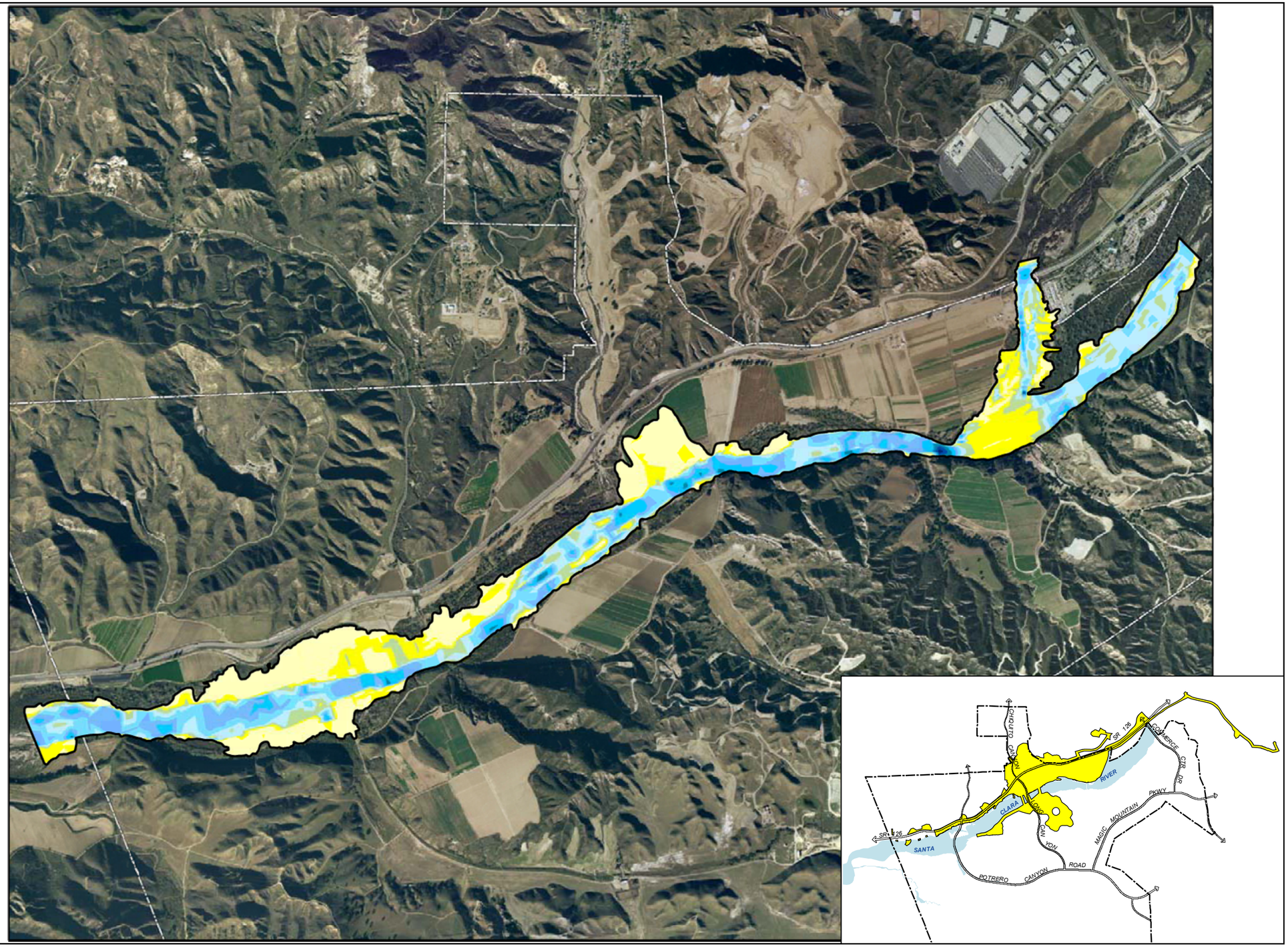


SOURCE: PACE – August 2006

FIGURE **4.5-2c**

Existing Conditions – Santa Clara River 10-Year Flood Event

32-92•01/09



Legend:

Newhall Ranch Specific Plan Boundary

Velocity Profile (fps)

- 0 - 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 10
- 11 - 12
- 13 - 15
- 16 - 18
- 19 - 21
- 22 - 24
- 25 - 27
- 28 - 30
- 31 - 39

700 350 0 700

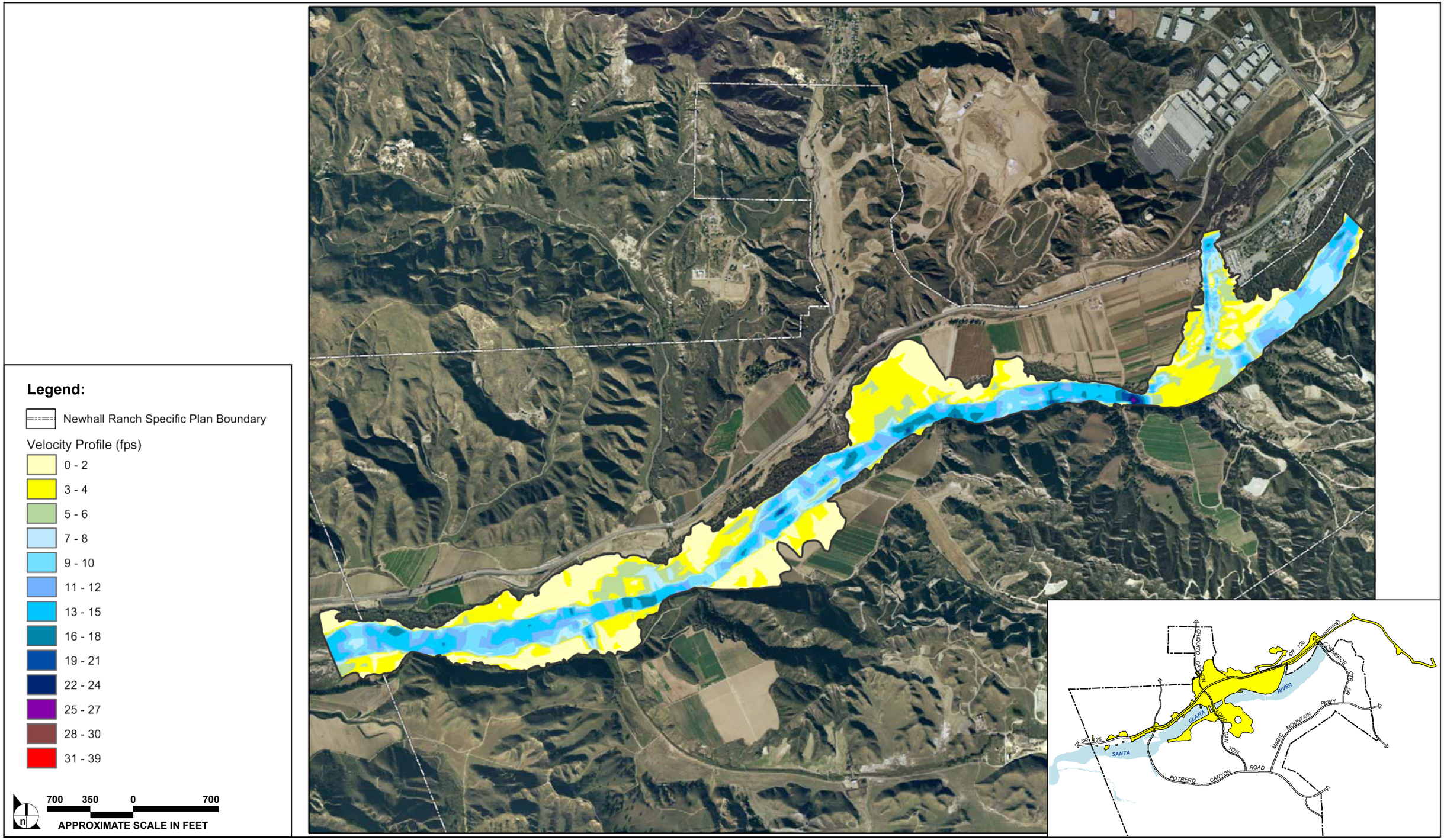
APPROXIMATE SCALE IN FEET

SOURCE: PACE – August 2006

FIGURE **4.5-2d**

Existing Conditions – Santa Clara River 20-Year Flood Event

32-92•01/09

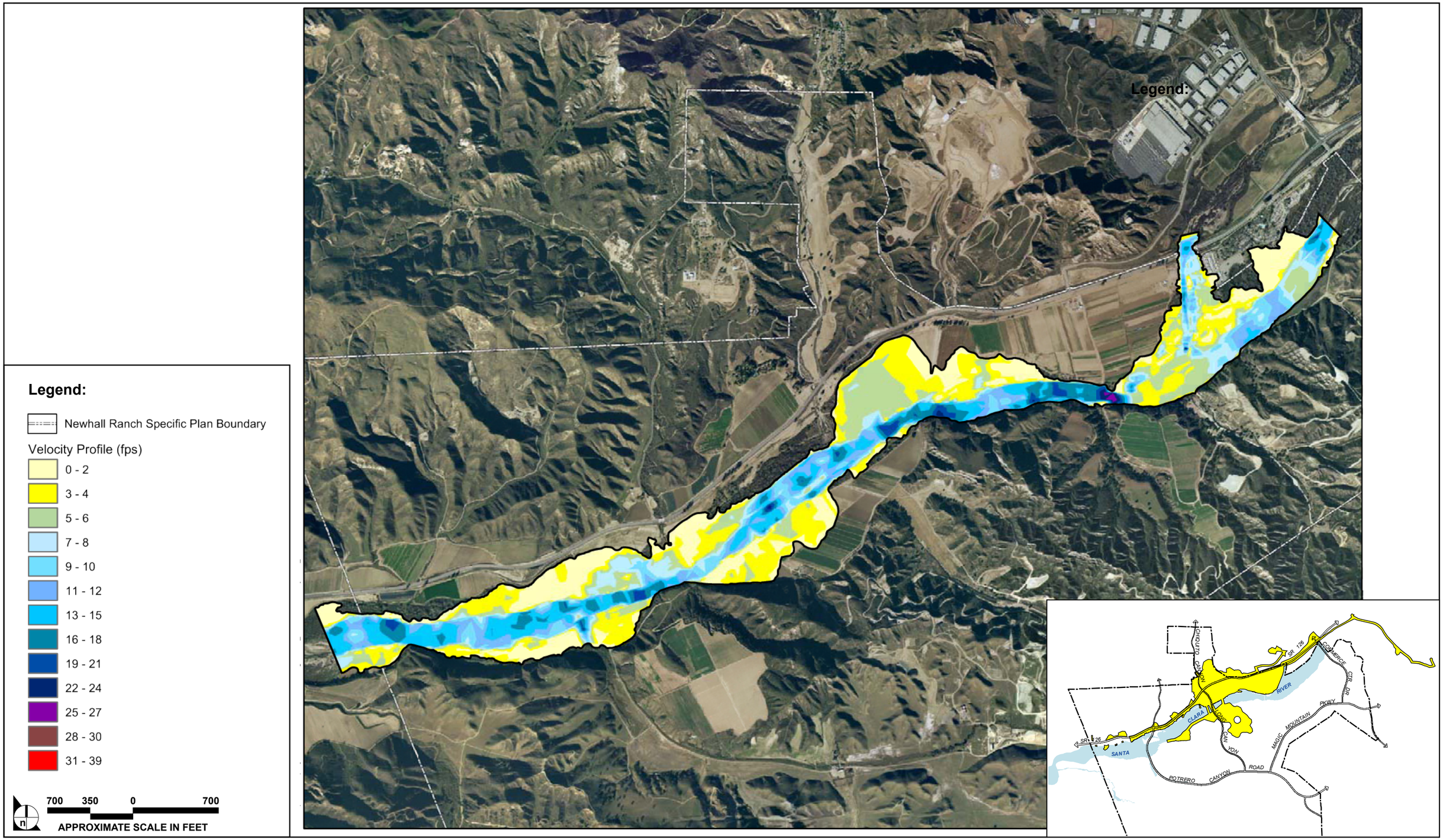


SOURCE: PACE – August 2006

FIGURE **4.5-2e**

Existing Conditions – Santa Clara River 50-Year Flood Event

32-92•01/09



SOURCE: PACE – August 2006

FIGURE **4.5-2f**

Existing Conditions – Santa Clara River 100-Year Flood Event

32-92•01/09

In addition to the 996-acre drainage area, there are four jurisdictional drainages located in the vicinity of the project, excluding the Santa Clara River. These include Castaic Creek, Chiquito Canyon Creek, San Martinez Grande Canyon Creek, and Potrero Canyon Creek.

(2) Channel and Floodplain Conditions

The difference in elevation between the active channel bottom and the 100-year floodplain along the margins of the river varies greatly at the project site. This difference ranges from approximately 4.3 to 16.3 feet and is dependent upon the width of the river channel at a particular location. For example, in wider portions of the river channel where flows widen with corresponding low velocities, there is only a small elevation difference between the channel bottom and the adjacent floodplain boundary. In contrast, the channel is often deep where it is narrower, creating a large elevation difference between the channel bottom and the floodplain boundary.

The existing river channel contains a variety of vegetation types. The active river channel is mostly barren due to annual scouring. However, vegetation types on the adjacent terraces vary based on elevation relative to the active channel bottom and the frequency of flooding. Vegetation types are described below.

The substrate of the river channel (i.e., top layer of the river bottom) is primarily sand, which is actively eroded and deposited in flood events. Previous studies by the Los Angeles County Flood Control District have demonstrated that sediment deposition and scouring along the upper Santa Clara River are generally in equilibrium, and that there are no major trends of channel degradation or aggradation.[5] However, some localized areas may experience either greater scouring or deposition.

b. Existing Aquatic, Wetland, and Riparian Habitats Along the River

The Santa Clara River corridor supports three general categories of habitat: (1) aquatic habitats, consisting of flowing or ponded water; (2) wetland habitats, consisting of emergent herbs rooted in ponded water or saturated soils along the margins of the flowing water; and (3) riparian habitat, consisting of woody vegetation along the margins of the active channel and on the floodplain. The key characteristics of the dominant aquatic, wetland, and riparian habitats in the river corridor at the project site are summarized in **Table 4.5-4, Summary of Dominant Wetland and Riparian Habitat Types in the River at the Specific Plan Site**.

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5 Simons, Li & Associates. 1990. *Fluvial Study of Santa Clara River and the Tributaries Summary Report*. Prepared for Los Angeles County Department of Public Works.

Table 4.5-4
Summary of Dominant Wetland and Riparian Habitat Types in the River at the Specific Plan Site

Habitat	Dominant Species	Structure	Location in the Floodplain	Height Above Channel Bottom (ft)
Alluvial Scrub	Sagebrush and scalebroom	Open, sparse mixture of shrubs.	Upper dry terraces; old braided channels.	8
Arrow weed scrub	Arrow weed	Dense monoculture.	Upper terraces.	8
Cottonwood willow forest	Fremont cottonwood and red willow	Mature woodland with large overstory trees and dense understory.	Upper terraces, near or at upland boundary.	9.5
Riverwash	Mule fat, sandbar willow, tamarisk, scalebroom, sandwash groundsel, big saltbush and Great Basin sagebrush	Highly variable because of the dynamic nature of vegetation growth within the river channel. The plant composition within the river channel can change from year to year.	River channel.	0–2
Mule fat scrub; contains some wetland areas	Mule fat, giant reed, arrow weed, and tamarisk	Moderately dense shrubs, 6 to 10 feet in height; patches of emergent wetlands.	Terrace adjacent to active channel.	5.5
Successional mule fat scrub (includes aquatic and wetland habitat)	Mule fat, giant reed, narrow-leaf willow	Mostly barren with scattered small shrubs; flowing water; pools; emergent wetlands.	Active channel that is continually disturbed by flows.	1.5
Willow woodland	Red and arroyo willow, Freemont cottonwood	Mature woodland with large overstory trees and dense understory.	Upper terraces, near or at upland boundary.	9
Willow scrub	Arroyo willow	Dense willow plants, 10 to 12 feet in height.	Mid-level terraces.	6.5

Source: Impact Sciences.

Figure 4.5-3, Habitats in the Santa Clara River, illustrates the location of different types of vegetation found in and adjacent to the river along the study corridor. The density, biomass, and location of the vegetation in relation to the channel bottom are directly dependent upon the frequency of disturbance by flood flows. A summary of the frequency of disturbance is provided in **Table 4.5-5, Summary of Flood Disturbance Frequencies for Dominant Wetland and Riparian Habitat Types in the River**. Successional mule fat scrub occupies the active channel and is disturbed annually by flows. This habitat also includes all aquatic features such as infrequent pools and flowing water, as well as most of the emergent wetlands in the river corridor because of the occasional presence of water. In contrast, Cottonwood willow forest is located above the active river channel and is only flooded during infrequent events, which allows large shrubs to become established between disturbance events.