4.3 WATER QUALITY

1. SUMMARY

This section is based on the revised Landmark Village Water Quality Technical Report and related appendices, prepared by Geosyntec Consultants (February 2008). A copy of this report is included in Recirculated Draft EIR ***Appendix 4.3*** *of this Recirculated EIR. In addition, various materials and documents were used or referenced in connection with the preparation of this section. The documents are available for public review at the County of Los Angeles Department of Regional Planning and are incorporated by this reference. The report and this section focus on potential water quality impacts. For analysis of the potential hydrological impacts of the proposed project, please see* ***Section 4.2, Hydrology****.*

The Landmark Village tract map site is presently under agricultural cultivation, and runoff is channeled via agricultural ditches to ultimately discharge into the river. Construction and operation of the Landmark Village project would replace agricultural runoff with urban runoff. The following summarizes the impacts of the pollutants of concern under wet- and dry-weather conditions in the post-developed conditions:

- ***Sediments:*** *Municipal Separate Storm Sewer System (MS4) Permit, Construction General Permit, Dewatering General Permit, and Standard Urban Stormwater Mitigation Plan (SUSMP)-compliant Best Management Practices (BMPs) would be incorporated into the project to address sediment in both the construction phase and post-development. Mean total suspended solids concentration and load are predicted to be less in the post-development condition than under existing conditions. Turbidity in stormwater runoff would be controlled through implementation of a Construction Storm Water Pollution Prevention Plan (SWPPP) and would be permanently reduced through the stabilization of erodible soils with development. On this basis, the impact of the project on sediments is considered less than significant.*

- ***Nutrients (Phosphorus and Nitrogen [Nitrate+Nitrite-N, Ammonia-N, and Total Nitrogen]):*** *MS4 Permit, Construction General Permit, Dewatering General Permit, and SUSMP-compliant BMPs would be incorporated into the project to address nutrients in both the construction phase and post-development. Total phosphorus, nitrate-nitrogen plus nitrite-nitrogen, ammonia-nitrogen, and total nitrogen concentrations and loads are predicted to decrease in the post-developed condition and be within the range of observed values in Santa Clara River Reach 5.*[1] *Nitrate-N plus nitrite-N and ammonia-N concentrations are predicted to decrease with development to a point well below the Los Angeles Regional Water Quality Control Board Basin Plan's objectives and total maximum daily load (TMDL) wasteload allocations. The predicted total nutrient concentrations are not expected to cause increased algal growth. On this basis, the impact of the project on nutrients is considered less than significant.*

- ***Trace Metals:*** *MS4 Permit, Construction General Permit, General Dewatering Permit, and SUSMP-compliant BMPs will be incorporated into the project to address trace metals in both the construction phase and*

[1] The Santa Clara River is divided into reaches for purposes of establishing beneficial uses and water quality objectives. This EIR will utilize the Los Angeles Regional Water Quality Control Board (RWQCB) reach designations.

post-development. The mean loads and concentrations of dissolved copper, total lead, dissolved zinc, and total aluminum concentration are predicted to decrease with project development. Although total aluminum loads are predicted to increase with development, mean concentrations of dissolved copper, total lead, dissolved zinc, and total aluminum are predicted to be below benchmark Basin Plan objectives, California Toxics Rule (CTR) criteria, and the National Ambient Water Quality Criteria (NAWQC) criterion for aluminum. Cadmium is not expected to be present in material concentrations in runoff discharges from the project. On this basis, the impact of the project on trace metals is considered less than significant.

- ***Chloride:*** *MS4 Permit, Construction General Permit, Dewatering General Permit, and SUSMP-compliant BMPs would be incorporated into the project to address chloride in both the construction phase and post-development. The mean concentration of chloride would decrease with development, while the average annual load would increase slightly. The predicted concentration is well below the Los Angeles Basin Plan objective and is within the range of observed values in Santa Clara River Reach 5. Chloride is not a pollutant of concern in construction-related runoff. On this basis, the impact of the project on chloride is considered less than significant.*

- ***Pesticides:*** *Pesticides in runoff may or may not increase with development as a result of landscape applications. Proposed pesticide management practices, including source control, removal with sediments in treatment control BMPs, and advanced irrigation control, would minimize the presence of pesticides in runoff. During the construction phase of the project, erosion and sediment control BMPs and source controls implemented per general Permit and general De-Watering Permit requirements would prevent pesticides associated with sediment from being discharged. Final site stabilization would limit mobility of legacy pesticides that may be present in pre-development conditions. On this basis, the impact of pesticides is considered less than significant.*

- ***Pathogens:*** *Post-development pathogen sources include both natural and anthropogenic sources. The natural sources include bird and mammal excrement. Anthropogenic sources include leaking septic and sewer systems, and pet wastes. The project would not include septic systems, and the sewer system would be designed to current standards, minimizing the potential for leaks. Thus, pet wastes are the primary source of concern. Pathogens are not expected to occur at elevated levels during the construction phase of the project. The Project Design Features (PDFs) would include source controls and treatment controls, which in combination should reduce pathogen indicator levels in the post-development stormwater runoff. On this basis, the project's impact on pathogen and pathogen indicators is considered less than significant.*

- ***Hydrocarbons:*** *Hydrocarbon concentrations would likely increase with development because of vehicular emissions and leaks. In stormwater runoff, hydrocarbons are often associated with soot particles that can combine with other solids in the runoff. Such materials are subject to treatment in the proposed extended detention basins, bioretention areas, and vegetated swales. Source control BMPs incorporated in compliance with the MS4 Permit, the Construction General Permit, and the SUSMP also would minimize the presence of hydrocarbons in runoff. During the construction phase of the project, pursuant to the Construction General Permit, the Construction Stormwater Pollution Prevention Plan must include BMPs that address proper handling of petroleum products on the construction site, such as proper petroleum product storage and spill response practices, and those BMPs must effectively prevent the release of hydrocarbons to runoff per the Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology (BAT/BCT) standards. On this basis, the impact of the project on hydrocarbons is considered less than significant.*

- ***Trash and Debris:*** *Trash and debris in runoff would likely increase with development. However, the project PDFs, including source control and treatment BMPs incorporated in compliance with the MS4 Permit and the SUSMP requirements would minimize the adverse impacts of trash and debris. Source controls, such as street sweeping, public education, fines for littering, covered trash receptacles and storm drain stenciling, are effective in reducing the amount of trash and debris that is available for mobilization during wet weather. Trash and debris would be captured in catch basin inserts in the commercial area parking lots and in the treatment control PDFs. During the construction phase of the project, PDFs implemented per Construction General Permit and Dewatering General Permit requirements would remove trash and debris through the use of BMPs such as catch basin inserts and by general good housekeeping practices. Trash and debris are not expected to significantly impact receiving waters due to the implementation of the project PDFs.*

- ***Methylene Blue Activated Substances (MBAS):*** *The presence of soap in runoff from the project would be controlled through source control PDFs, including a public education program on residential and charity car washing and the provision of a centralized car wash area directed to the sanitary sewer in the multi-family residential areas. Project source control PDFs will reduce the impacts of soaps in post-construction runoff. Other sources of MBAS, such as cross connections between sanitary and storm sewers, are unlikely given modern sanitary sewer installation methods and inspection and maintenance practices. During the construction phase of the project, equipment and vehicle washing would not use soaps or any other MBAS sources. Therefore, MBAS are not expected to significantly impact the receiving waters of the proposed project.*

- ***Cyanide**: In addition to the expected relatively low level of cyanide in untreated stormwater, cyanide in runoff from the project would be readily removed by biological uptake, degradation by microorganisms, and by volatilization in the treatment PDFs. Therefore, cyanide is not expected to significantly impact the receiving waters of the proposed project.*

- ***Bioaccumulation:*** *According to scientific literature, the primary pollutants that are of concern with regard to bioaccumulation are mercury and selenium. However, selenium and mercury are not of concern in this watershed, so bioaccumulation of selenium and mercury also is not expected to occur either during the construction or post-development project phases. On this basis, the potential for bioaccumulation in the Santa Clara River and adverse effects on waterfowl and other species is considered less than significant.*

- ***Construction Impacts:*** *Construction impacts on water quality generally are caused by soil disturbance and subsequent suspended solids discharge, or by discharge of certain non-sediment-related pollutants, including construction materials (e.g., paint, stucco, etc); chemicals, liquid products, and petroleum products used in building construction or the maintenance of heavy equipment; and concrete-related pollutants. These impacts would be minimized through implementation of construction BMPs that would meet or exceed measures required by the Construction General Permit, as well as BMPs that control the other potential construction-related pollutants (e.g., petroleum hydrocarbons and metals). A SWPPP specifying BMPs for the site that meet or exceed BAT/BCT standards would be developed as required by, and in compliance with, the Construction General Permit and Los Angeles County Standard Conditions. Erosion control BMPs, including but not limited to hydro-mulch, erosion control blankets, stockpile stabilization, and other physical soil stabilization techniques, also would be implemented to prevent erosion, whereas sediment controls, including but not limited to silt fencing, sedimentation ponds, and secondary containment on stockpiles, would be implemented to trap sediment and prevent discharge. Non-stormwater and construction waste and materials management BMPs (such as vehicle and equipment fueling and washing BMPs; nonvisible pollutant monitoring; and BMPs to manage materials, products, and solid, sanitary, concrete, hazardous, and hydrocarbon wastes) also would be deployed to protect construction site runoff quality. On this basis, the construction-related impact of the project on water quality is considered less than significant.*

- ***Regulatory Requirements:*** *The proposed project satisfies MS4 Permit requirements for new development, including SUSMP requirements and Stormwater Quality Management Program (SQMP) requirements, and satisfies construction-related requirements of the Construction General Permit and General Dewatering Permit. Therefore, the project would comply with water quality regulatory requirements applicable to stormwater runoff.*

Finally, the proposed Landmark Village project, including proposed drainage and hydromodification controls, would not substantially alter the existing drainage pattern of the Santa Clara River in a manner that would cause substantial erosion, siltation, or channel instability; or substantially increase the rates, velocities, frequencies, duration, and/or seasonality of flows in a manner that causes channel instability or in a manner that harms sensitive habitats or species in the River. Therefore, the impact of the project on hydromodification is considered less than significant.

2. INTRODUCTION

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 impacts to hydrology and water quality for the entire Specific Plan. The Newhall Ranch mitigation program was adopted by the County in findings and in the revised Mitigation Monitoring Plans for the Specific Plan and Water Reclamation Plant (WRP). The Specific Plan Program EIR concluded that Specific Plan implementation would result in significant impacts, but that the identified mitigation measures would reduce the impacts to below a level of significance. The EIR also determined that site-specific final hydrology and grading plans would be required as the Specific Plan is implemented through the application and processing of tentative subdivision maps for Newhall Ranch. All subsequent project-specific development plans and tentative subdivision maps must be consistent with the Newhall Ranch Specific Plan, the County of Los Angeles General Plan, and Santa Clarita Valley Area Plan.

This project-level EIR is tiering from the previously certified Specific Plan Program EIR. **Section 4.3** assesses the Landmark Village project's existing conditions, potential water quality impacts, the applicable mitigation measures from the Specific Plan Program EIR, and new project-specific mitigation measures recommended by this EIR for the Landmark Village project.

b. Definitions

Several terms and acronyms are identified below and used throughout this section of the EIR.

Acute Toxicity — A toxic effect that occurs immediately or shortly after a single, episodic exposure (four days or less).

ACOE — United States Army Corps of Engineers.

Basin Plan — California Regional Water Quality Control Board, Los Angeles Region, Water Quality Control Plan (Basin Plan) for the Los Angeles Region (dated 13 June 1994; approved 23 February 1995).

Beneficial Uses — The existing or potential uses of receiving waters in the permit area as designated in the Basin Plan.[2]

Best Available Technology Economically Achievable (BAT) — A point source best management practice that reduces toxic (including heavy metals and man-made organics) and non-conventional (e.g., chloride, toxicity and nitrogen) pollutants in discharges.

Best Conventional Pollutant Control Technology (BCT) — A best management practice that reduces conventional pollutants (including Total Suspended Solids [TSS], oil and grease, fecal coliform, pH, and other pollutants) in discharges from construction sites.

Best Management Practices (BMPs) — In water pollution control, the best means available to control pollution of waterways from non-point sources, as opposed to best available technology, which applies to pollution control for point sources. BMPs include methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and non-point source discharges, including stormwater. BMPs include structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during and/or after pollution producing activities.[3]

Bioretention — Bioretention areas are vegetated (*i.e*., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration, and also provide for pollutant removal (*e.g.*, filtration, adsorption, nutrient uptake) by filtering stormwater through the vegetation and soils. In bioretention areas, pore spaces and organic material in the soils help to retain water in the form of soil moisture and promote the adsorption of pollutants (*e.g.*, dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants utilize soil moisture and promote the drying of the soil through transpiration.

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2 RWQCBLAR Order No. 01-182, NPDES Permit No. CAS004001, Glossary section.

3 *Ibid*.

Capital Flood (Qcap)	Theoretical 50-year design storm assumed to occur over a drainage area that has been burned and that contributes debris to runoff. Use in flood control design is required by Los Angeles County for major systems and sump conditions.
Chronic Toxicity	A toxic effect that occurs after repeated or prolonged exposure.
CDFG	California Department of Fish and Game.
CTR	California Toxics Rule (40 C.F.R. Section 131.38).
CWA	The Federal Clean Water Act (33 U.S.C. Sections 1251 *et seq*.).
EMC	Event Mean Concentration, which is the average concentration of a pollutant in the runoff from a storm event, equal to the total mass of pollutant divided by the total volume of storm runoff.
ESA	Endangered Species Act (7 U.S.C. Section 136; 16 U.S.C. Sections 460 *et seq*.).
First Flush	The first storm event in the wet season typically has higher concentrations of pollutants due to accumulation during the dry months. Pollutants deposited onto exposed areas can be dislodged and entrained by runoff; therefore, the stormwater that initially runs off an area will be more polluted than the stormwater that runs off after the initial rainfall. The stormwater containing this high initial pollutant load is called the "first flush." Storm events occurring later in the wet season will typically have lower concentrations as less time elapses between storm events and less accumulation occurs. In general terms, the water quality design storms defined by SUSMP approximate the first flush event (see SUSMP).
General MS4 Permit	Regional Water Quality Control Board, Los Angeles Region Order No. 01-182, National Pollutant Discharge Elimination System (NPDES) Permit No. CAS004001 (December 13, 2001).
LACDPW	Los Angeles County Department of Public Works.

MEP Maximum Extent Practicable, the standard established by Section 402(p) of the Federal Clean Water Act (33 U.S.C. Section 1342(p)) for the implementation of stormwater management programs to reduce pollutants in stormwater. CWA Section 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the administrator or the state determines appropriate for the control of such pollutants."[4] This standard has been defined to include technical feasibility, cost, and benefit derived, with the burden being on the municipality to demonstrate compliance with MEP by showing that a BMP is not technically feasible in the locality or that BMPs costs would exceed any benefit to be derived.[5]

MS4 Municipal Separate Storm Sewer System, a conveyance or system of conveyances (including roads with drainage systems, municipal streets, alleys, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) owned by a state, city, county town or other public body, that is designed or used for collecting or conveying stormwater, which is not a combined sewer, which is not part of a publicly owned treatment works, and which discharges to "Waters of the U.S." (See definition, below).[6]

NAWQC National Ambient Water Quality Criteria.

Non-Storm Water Discharge Any discharge to a storm drain that is not composed entirely of stormwater.[7]

NPDES National Pollutant Discharge Elimination System, the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits and imposing and enforcing pretreatment requirements, under Clean Water Act sections 307, 402, 318, and 405.[8]

Receiving Waters All surface water bodies in the Los Angeles region that are identified in the Basin Plan and to which the proposed project discharges.[9]

RWQCB Regional Water Quality Control Board, Los Angeles Region.

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4 *Ibid.*

5 February 11, 1993 memorandum issued by the Office of Chief Counsel of the State Water Resources Control Board.

6 RWQCBLAR Order No. 01-182, NPDES Permit No. CAS004001, Glossary section.

7 *Ibid.*

8 *Ibid.*

9 *Ibid.*

Source Control BMP Any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices, or operational practices that aim to prevent stormwater pollution by reducing the potential for contamination at the source of pollution.[10]

SUSMP The Los Angeles Countywide Standard Urban Stormwater Mitigation Plan, which addresses conditions and requirements of new development.[11]

SWRCB State Water Resources Control Board.

SQMP The Los Angeles Countywide Stormwater Quality Management Program, which includes descriptions of programs, collectively developed by the permittees under the General MS4 Permit in accordance with provisions of the NPDES Permit, to comply with applicable federal and state law, as the same is amended from time to time.[12]

SWPPP Storm Water Pollution Prevention Plan, a plan, as required by a State General Construction Activity Stormwater Permit, identifying potential pollutant sources, and describing the design, placement, and implementation of BMPs, to effectively prevent non-stormwater discharges and reduce pollutants in stormwater discharges during activities covered by the General Permit.[13]

Structural BMP Any structural facility designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution.[14]

TMDL Total Maximum Daily Load, the sum of the individual wasteload allocations for point sources and load allocations for non-point sources, and natural sources that a water body may receive without compromising the designated beneficial use.[15] TMDLs are designated only for impaired (*i.e.*, Section 303(d) listed) water bodies and then only as necessary to address the impairment.

Treatment Control BMP Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption, or any other physical, biological, or chemical process[16] (see Structural BMP).

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10 *Ibid*.
11 *Ibid*.
12 *Ibid*.
13 *Ibid*.
14 *Ibid*.
15 *Ibid*.
16 *Ibid*.

US EPA United States Environmental Protection Agency.

USFWS United States Fish and Wildlife Service.

Vegetated Swales Vegetated swales are vegetated channels specifically designed to remove particulates and to reduce the velocity of runoff through the storm system. Swales typically provide low to moderate treatment efficiencies and are mainly effective at removing debris and solid particles. Vegetated swales also help minimize overland and concentrated flow depths and velocities.

Water Quality Detention Basins Impoundments where stormwater temporarily is detained, allowing sediment, and particulates to settle out. The basins collect litter, total suspended solids, settable solids and pollutants that are attached (adsorbed) to the settled particulate matter. The basins can be designed as either above ground lined or unlined basins, or as underground storage facilities.

Waters of the U.S. All waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; all interstate waters including interstate wetlands; all other waters, such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters (1) which are or could be used by interstate or foreign travelers for recreational or other purposes; or (2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) which are used or could be used for industrial purposes by industries in interstate commerce. Also included are all impoundments of waters otherwise defined as "waters of the U.S." under the definition; tributaries of water identified above; the territorial seas; and wetlands adjacent to waters (other than the waters that are themselves wetlands) identified above.[17]

By ACOE definition, "waters of the US" are defined by the ordinary high water mark, which can be identified by physical characteristics, such as channel scouring, bank shelving, areas cleared of terrestrial vegetation, litter and debris, or other indications that may be appropriate.

Wetlands Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.[18]

17 33 C.F.R. Part 328.3a.

18 *Ibid*.

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

The Newhall Ranch Specific Plan Program EIR identified certain potentially significant impacts to water quality that would result from implementation of the Specific Plan. Specifically, the Program EIR, and related findings, determined that implementation of the adopted Specific Plan would significantly increase the potential for erosion and sediment discharge downstream during grading activity. On-going operation of urban uses also could result in the release of fertilizers, herbicides, or other types of contaminants that could potentially impact surface water quality. Without mitigation, impacts would be significant.

In response to identified significant impacts, the Specific Plan Program EIR identified seven (7) feasible mitigation measures.[19] Based on substantial evidence in the record, the Board of Supervisors found that adoption of the recommended mitigation measures would reduce the identified potentially significant impacts to less than significant levels.

4. EXISTING CONDITIONS

a. Regulatory Setting

(1) Federal Clean Water Act

The CWA sets forth the national strategy for controlling water quality. The primary purpose of the Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" and to attain a level of water quality "which provides for the protection of and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water." (33 U.S.C. Section 1251(a).)

In 1972, the CWA was amended to require NPDES permits for the discharge of pollutants to waters of the United States from any point source. In 1987, the CWA was amended again to require that the US EPA establish regulations for the permitting of municipal and industrial stormwater discharges under the NPDES permit program. The US EPA published final regulations regarding stormwater discharges on November 16, 1990. The regulations require that MS4 discharges to surface waters be regulated by an NPDES permit.

In addition, the CWA requires the states to adopt water quality standards for receiving water bodies and to have those standards approved by the US EPA. Water quality standards consist of designated

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19 See Mitigation Measures 4.2-1 through 4.2-7 in both the certified Newhall Ranch Specific Plan Program EIR and the adopted Mitigation Monitoring Plan (May 2003).

beneficial uses for a particular receiving water body (*e.g.*, wildlife habitat, agricultural supply, fishing, etc.), along with water quality criteria necessary to support those uses. Water quality criteria are prescribed concentrations or levels of constituents—such as lead, suspended sediment, and fecal coliform bacteria—or narrative statements that represent the quality of water that support a particular use. Because California did not establish a complete list of acceptable water quality criteria, the US EPA established, in the CTR, numeric water quality criteria for certain toxic constituents in receiving waters with human health or aquatic life designated uses in the form of the. (See 40 C.F.R. Section 131.38.)

(a) CWA Section 303(d) – TMDLs

When designated beneficial uses of a particular receiving water body are compromised by water quality, Section 303(d) of the CWA requires listing that water body as "impaired." Once a water body has been deemed impaired, a TMDL must be developed for the impairing pollutant(s). A TMDL is an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). Once established, the TMDL allocates the loads among current and future pollutant sources to the water body.

The Landmark Village project would discharge stormwater runoff to Santa Clara River Reach 5. **Table 4.3-1,** 2006 CWA Section 303(d) Listings for the Santa Clara River Main Stem, lists the water quality impairments for the Santa Clara River main stem, as reported in the 2006 CWA Section 303(d) list of water quality limited segments, at and downstream of the project location. **Table 4.3-2,** 2006 CWA Section 303(d) List of Water Quality Limited Segments Being Addressed By US EPA Approved TMDLs, lists the water quality limited segments that are being addressed by US EPA approved TMDLs, as reported on the 2006 CWA Section 303(d) list, at and downstream of the project location. Reach 5 of the Santa Clara River is listed for coliform bacteria and for chloride as "being addressed. Downstream segments of the River, below the dry gap in Reach 4, are listed for total dissolved solids (TDS), toxicity, coliform bacteria, chlorinated legacy pesticides, and Toxaphene. Reach 3 is listed for ammonia and chloride as "being addressed."

The RWQCB has adopted nitrogen compounds (nitrate-nitrogen plus nitrite-nitrogen and ammonia) and chloride TMDLs in the Basin Plan. The wasteload allocations for stormwater discharges into Reach 5 of the Santa Clara River are summarized in **Table 4.3-3**, TMDL Wasteload Allocations for MS4 and Stormwater Sources to Santa Clara River Reach 5. Pollutant reductions are regulated through effluent limits prescribed in Publicly Owned Treatment Works (POTW) and minor point source NPDES Permits, BMPs required in NPDES MS4 Permits, and SWRCB Management Measures for non-point source discharges. The RWQCB has not adopted a TMDL for coliform in Reach 5.

Table 4.3-1
2006 CWA Section 303(d) Listings for the Santa Clara River Main Stem

River Reach or Tributary[1]	Geographic Description and Distance from Project to Upstream End of Reach	Pollutants	303(d) List Proposed TMDL Completion	Potential Sources
5	Blue Cut Gaging Station to West Pier Hwy 99 (Project location)	High Coliform Count	2019	Nonpoint and Point Sources
3	Freeman diversion dam to "A" street [2] (25 miles)	Total Dissolved Solids	2019	Nonpoint and Point Sources
1	Estuary to Highway 101 Bridge (30 miles)	Toxicity	2019	Source Unknown
--	Estuary (40 miles)	ChemA[3] Coliform Toxaphene	2019 2019 2019	Source Unknown Nonpoint Source Nonpoint Source

Source: Geosyntec, 2008.

[1] *Santa Clara River reaches upstream of the Specific Plan area have not been included.*

[2] *Reach 3 is downgradient of the "dry gap" in Reach 4.*

[3] *ChemA suite of chlorinated legacy pesticides include: Aldrin, chlordane, Dieldrin, Endosulfan I/II, Endrin, gamma-BHC, heptachlor, heptachlor epoxide, and Toxaphene.*

Table 4.3-2
CWA Section 303(d) List of Water Quality Limited Segments Being Addressed by US EPA Approved TMDLs

Water Body Name	Pollutants	Potential Sources	US EPA Approved TMDL
Santa Clara River Reach 5	Chloride	Nonpoint/Point Source	2005
Santa Clara River Reach 3	Ammonia Chloride	Nonpoint/Point Source Nonpoint/Point Source	2004 2002

Table 4.3-3
TMDL Wasteload Allocations for MS4 and Stormwater Sources to Santa Clara River Reach 5

<table>
<tr><th>Impairing Pollutant</th><th colspan="3">Numeric Water Quality Objective</th><th>Wasteload Allocation</th></tr>
<tr><td>Chloride</td><td colspan="3">100 mg/L.</td><td>Wasteload allocations have been adopted for the Saugus WRP and the Valencia WRP. Other NPDES discharges contribute a minor chloride load. The wasteload allocation for these point sources is 100 mg/L.
The source analysis indicates that non-point sources are not a major source of chloride. The load allocations for non-point sources is 100 mg/L.</td></tr>
<tr><td rowspan="6">Nitrogen Compounds</td><td colspan="3">The numeric target for nitrogen in this TMDL is based on achieving the existing nitrogen water quality objective of 5 mg/L NO_3-N + NO_2-N. (Note: the numeric target that is used to calculate the wasteload allocations includes a 10% margin of safety; thus the numeric target is 4.5 mg/L NO_3-N + NO_2-N.)
The water quality objective for ammonia in Reach 5 used in the nitrogen compounds TMDL was based on temperature and pH for different River segments within the reach:</td><td rowspan="6">Concentration-based wasteloads are allocated to municipal, industrial and construction stormwater sources regulated under NPDES permits. For stormwater permittees discharging into Reach 5, the following wasteload allocations apply:
30-day average nitrate plus nitrite = 6.8 mg/L (NO_3-N+NO_2-N)
1-hour average ammonia = 5.2 mg/L (NH_3 as N)
30-day average ammonia = 1.75 mg/l (NH_3 as N)</td></tr>
<tr><th colspan="3">Ammonia Water Quality Objective (mg/L as N)[1]</th></tr>
<tr><th></th><th>1-hour average</th><th>30-day average</th></tr>
<tr><td>Reach 5 at County Line</td><td>3.4</td><td>1.2</td></tr>
<tr><td>Reach 5 below Valencia</td><td>5.5</td><td>2.0</td></tr>
<tr><td>Reach 5 above Valencia</td><td>4.8</td><td>2.0</td></tr>
</table>

Source: Geosyntec, 2008.
mg/L = milligrams per liter.

(2) California Toxics Rule

The CTR (see 40 C.F.R. Section 131.38) is a federal regulation issued by the US EPA that provides water quality criteria for toxic pollutants in waters with human health or aquatic life designated uses in California. Although CTR criteria do not apply directly to discharges of stormwater runoff, they can provide a useful benchmark to assess the potential impacts to the water quality of receiving waters from the proposed project's stormwater runoff discharges. Here, the freshwater aquatic life criteria are used as benchmarks to evaluate the potential impacts of stormwater runoff to the project's receiving waters. The CTR also contains human health criteria, which are derived for drinking water sources and fish consumption only. Since the human health criteria are less stringent than the aquatic life criteria for the pollutants of concern for the proposed project, the aquatic life criteria are used.

Freshwater aquatic life criteria for certain metals in the CTR are expressed as a function of hardness because hardness, and/or water quality characteristics that are usually correlated with hardness, can reduce the toxicities of some metals.[20] A hardness value of 250 mg/L as $CaCO_3$, the minimum value measured in the Santa Clara River at a monitoring station located immediately downstream of the Newhall Ranch Specific Plan boundary at the Los Angeles/Ventura County line, is used to approximate CTR criteria for metals.[21]

The CTR also establishes two types of aquatic life criteria: acute and chronic. Acute criteria represent the highest concentration of a pollutant to which aquatic life can be exposed for a short period without deleterious effects; chronic criteria equal the highest concentration to which aquatic life can be exposed for an extended period of time (four days) without deleterious effects. Due to the intermittent nature of stormwater runoff (especially in southern California), the acute criteria are considered to be more applicable to stormwater conditions than chronic criteria, and are used as benchmarks in assessing project runoff.

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20 The toxicity of a chemical to an aquatic organism may vary according to attributes of the organism, chemical composition, and exposure environment, so that the chemical is more or less "bioavailable." Many chemicals exist in a variety of forms (chemical species), and such chemical speciation affects bioavailability because relative uptake rates can differ among chemical species and the relative concentrations of chemical species can differ among exposure conditions. Usually, metal toxicity is reduced by increased water hardness, which is composed of cations (primarily calcium and magnesium). In some cases, the apparent effect of hardness on toxicity might be partly due to complexation of the metal by higher concentrations of hydroxide and/or carbonate (increased pH and alkalinity) commonly associated with higher hardness.

21 Average hardness values are higher; see **Tables 4.3-7** and **4.3-8**.

(3) California Porter-Cologne Act

The federal CWA places the primary responsibility for the control of surface water pollution and for planning the development and use of water resources with the states, although it does establish certain guidelines for the states to follow in developing their programs.

California's primary statute governing water quality and water pollution issues is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act). The Porter-Cologne Act grants the SWRCB and the RWQCBs power to protect water quality, and is the primary vehicle for implementation of California's responsibilities under the federal CWA. The Porter-Cologne Act grants the SWRCB and the RWQCBs authority and responsibility to: adopt plans and policies; regulate discharges of waste to surface and groundwater; to regulate waste disposal sites; and, require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, or oil or petroleum product.

Each RWQCB must formulate and adopt a water quality control plan (Basin Plan) for its region. The Basin Plan must conform to the policies set forth in the Porter-Cologne Act and established by the SWRCB in its state water policy. To implement state and federal law, the Basin Plan establishes beneficial uses for surface and groundwaters in the region, and sets forth narrative and numeric water quality standards to protect those beneficial uses. The Porter-Cologne Act also provides that a RWQCB may include, within its regional plan, water discharge prohibitions applicable to particular conditions, areas, or types of waste.

(4) Basin Plan

The Basin Plan (1994, as amended) for the Los Angeles region provides quantitative and narrative criteria for a range of water quality constituents applicable to certain receiving water bodies. Specific criteria are provided for the larger, designated water bodies within the region, as well as general criteria or guidelines for ocean waters, bays and estuaries, inland surface waters and groundwaters. In general, the narrative criteria require that degradation of water quality not occur via increases in pollutant loads that adversely impact the designated beneficial uses of a water body. For example, the Los Angeles Basin Plan requires that "[i]nland surface waters shall not contain suspended or settleable solids in amounts which cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors." Water quality criteria apply within receiving waters as opposed to applying directly to runoff; therefore, water quality criteria from the Basin Plan are utilized as benchmarks to evaluate the potential ecological impacts of project runoff on the receiving waters of the proposed project.

(5) MS4 Permit

In 2001, the RWQCB issued an NPDES Permit and Waste Discharge Requirements (Order No. 01-182) under the CWA and the Porter-Cologne Act for discharges of urban runoff in public storm drains in Los Angeles County. The permittees are Los Angeles County and cities in the County (collectively "the co-permittees"). This permit regulates runoff discharges from MS4s in the project area. The NPDES permit details requirements for new development and significant redevelopment, including specific sizing criteria for treatment BMPs and flow control. Compliance with MS4 permit requirements is used as one method to evaluate the significance of project development impacts on surface water runoff.

To implement the requirements of the NPDES permit, the co-permittees have established development planning guidance and control measures that regulate and mitigate stormwater quality and quantity impacts to receiving waters as a result of new development and redevelopment. The co-permittees also are required to implement other municipal source detection and elimination programs, as well as maintenance measures.

(a) Stormwater Quality Management Program

The MS4 Permit contains the following provisions for implementation of the SQMP by the co-permittees:

- General Requirements – Each permittee is required to implement the SQMP to comply with applicable stormwater program requirements and implement additional controls where necessary to reduce the discharge of pollutants in stormwater to the MEP.

- BMP Implementation – Permittees are required to implement the most effective combination of BMPs for stormwater/urban runoff pollution control. The project will implement BMPs, consistent with the County's Low Impact Development Standards Manual (January 2009), as applicable.

- SQMP Revision – Permittees are required to revise the SQMP to comply with regional, watershed specific requirements, and/or wasteload allocations for implementation of TMDLs for impaired water bodies.

- Responsibilities of the Principal Permittee – The responsibilities of the LACDPW (as the Principal Permittee) include, but are not limited to, coordinating activities necessary to comply with the NPDES permit, providing personnel and fiscal resources for SQMP updates and annual reports and summaries of reports required under the SQMP, and implementing and evaluating the results of a county-wide monitoring program.

- Responsibilities of Permittees – Each permittee is required to comply with the requirements of the SQMP applicable to the discharges within its boundaries.

- Watershed Management Committees (WMCs) – WMCs are comprised of a voting representative from each permittee within the Watershed Management Areas (WMAs). WMCs are required to facilitate efforts and exchange of information between permittees, establish additional goals for WMAs, prioritize pollution control efforts, monitor implementation of tasks designated for the WMA and assess the effectiveness of and recommend revisions to the SQMP.

- Legal Authority – Permittees are granted the necessary legal authority to prohibit non-stormwater discharges to the storm drain system.

The objective of the SQMP is to reduce pollutants in urban stormwater discharges to the "maximum extent practicable" in order to attain water quality objectives and to protect the beneficial uses of receiving waters in Los Angeles County. Special provisions are provided in the MS4 Permit to facilitate implementation of the SQMP. These provisions include:

- BMP Substitution – Substitution of site-specific BMPs is allowed, provided the alternative BMP will meet or exceed pollutant reduction of the original BMP, the fiscal burden of the original BMP is substantially greater than the proposed alternative, and the alternative BMP will be implemented within a similar period.
- Public Information and Participation Program (PIPP) – This requires the permittee to identify how public education needs were determined, who is responsible for developing and implementing the program, and the method used to determine its effectiveness.
- Industrial/Commercial Facilities Control Program – This requires the permittee to develop a plan for managing stormwater runoff from industrial and commercial facilities. This program will track, inspect, and ensure compliance at industrial and commercial facilities that are the sources of pollutants in stormwater.
- Development Planning Program – This requires the permittee to implement a development-planning program that requires new development and redevelopment projects to minimize impacts from stormwater and urban runoff.
- Development Construction Program – This requires the permittee to implement a program to control runoff from construction activity to minimize erosion and transportation of sediment and prevent non-stormwater discharges from equipment and vehicle washing.
- Public Agency Activities Program – This requires municipalities to evaluate existing public agency activities that have an impact on stormwater quality (such as vehicle maintenance, landscape maintenance and weed control, and construction and maintenance of streets, roads, and flood control systems) and to develop a program to reduce stormwater impacts, with a schedule for implementation.
- Illicit Connections and Illicit Discharges Elimination Program – This requires each permittee to have a plan for finding and preventing illegal connections and discharges and a mechanism for enforcing against illegal connections and discharges.

(b) Standard Urban Stormwater Mitigation Plan

On March 8, 2000, the development planning program requirements, including the SUSMP requirements (collectively, SUSMP requirements), were approved by the RWQCB as part of the MS4 program to address stormwater pollution from new construction and redevelopment. The SUSMP contains a list of minimum BMPs that must be employed to infiltrate or treat stormwater runoff, control peak flow discharge, and reduce the post-project discharge of pollutants from stormwater conveyance systems. The SUSMP defines, based upon land use type, the types of practices that must be included and issues that must be addressed as appropriate to the development type and size. Compliance with SUSMP requirements is used as one method to evaluate significance of project development impacts on surface water runoff.

Finalized in May 2000, the County of Los Angeles' *Manual for the Standard Urban Stormwater Mitigation Plan* (Manual) details the requirements for new development and significant redevelopment BMPs. The Manual is a model guidance document for use by permittees and individual project owners to select post-construction BMPs and otherwise comply with the SUSMP requirements. It addresses water quality and drainage issues by specifying design standards for structural or treatment control BMPs that infiltrate or treat stormwater runoff and control peak flow discharge. BMPs are defined in the Manual and SUSMP requirements as any program, technology, process, sizing criteria, operational methods or measures, or engineered systems, which, when implemented, prevent, control, remove or reduce pollution. Treatment BMP sizing criteria and design guidance also are contained in the MS4 Permit, the Manual, the *Technical Manual for Stormwater Best Management Practices in the County of Los Angeles*, issued by the LACDPW in February 2004, (LACDPW, 2004. Los Angeles County 1994-2005 Integrated Receiving Water Impacts Report Final Report - August 2005.), and the County's Low Impact Development Standards Manual (January 2009).[22]

One of the most important requirements within the SUSMP is the specific sizing criteria for stormwater treatment BMPs for new development and significant redevelopment projects. The SUSMP includes sizing criteria for both volume-based and flow-based BMPs. The sizing criteria options for volume-based BMPs, such as extended detention basins, are as follows:

1. The 85th percentile, 24-hour runoff storm event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff Quality Management, Water Environment Federation (WEF) 1998 Manual of Practice No. 23/ASCE Manual of Practice No. 87;

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22 The County's Low Impact Development Standards Manual (January 2009), http://www.ladpw.com/wmd /LA_County_LID_Manual.pdf.

2. The volume of annual runoff based on unit basin storage volume, to achieve 80 percent or more volume treatment by the method recommended in the 1993 *California Stormwater Best Management Practices Handbook – Industrial/Commercial*;

3. The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a stormwater conveyance system; or

4. The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile, 24-hour runoff event.

Flow-based BMPs, such as vegetated swales, must be designed to infiltrate or treat the maximum flow rate generated from one of the following scenarios:

1. The flow of runoff produced from a rain event equal to at least 0.2 inch per hour intensity;

2. The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for Los Angeles County; or

3. The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

Also, the SUSMP includes general design specifications for individual priority project categories. These include:

- single-family hillside homes;
- 100,000-square-foot commercial developments;
- restaurants;
- retail gasoline outlets;
- automotive repair shops; and
- parking lots.

For example, commercial developments must have properly designed loading and unloading dock areas, repair and maintenance bays, and vehicle equipment wash areas. Restaurants need to have properly designed equipment and accessory wash areas. Parking lots have to be properly designed to limit oil contamination and have regular maintenance of parking lot stormwater treatment systems (e.g., storm drain filters and biofilters).

The RWQCB issued a letter in December 2006 that clarifies its compliance expectations for the development planning requirements in Part 4.D of the MS4 Permit. (LARWQCB, 2006. Letter to Mark Pastrella, Assistant Deputy Director, Department of Public Works, County of Los Angeles, from Jonathan Biship, P.E., Executive Officer, California Regional Water Quality Control Board, Los Angeles Region. December 15, 2006.) Per the clarification letter, the three provisions in Part 4.D that are essential for compliance are: (1) maximization of the percentage of pervious surfaces, to allow percolation of stormwater into the ground; (2) minimization of the quantity of stormwater directed to impervious surfaces and the MS4; and (3) minimization of the pollution emanating from parking lots through the use of appropriate treatment control BMPs and good housekeeping practices.

The project is required to incorporate appropriate SUSMP requirements into its plans as part of the approval process for building and grading permits. This analysis will identify at a project level, and consistent with the framework, conclusions, and requirements of the *Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan*, the design specifications related to treatment control BMPs and other project features associated with the Landmark Village project. (Geosyntec Consultants, 2008. Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan. Prepared for Newhall Land by Geosyntec Consultants, April 2008.) Design of these BMPs would be finalized by the project engineer with the hydrology study prior to issuance of grading permits to ensure consistency with this analysis. Geosyntec's *Sub-Regional Plan* is provided in Recirculated Draft EIR **Appendix 4.3**.

(c) Hydromodification and Peak Flow Control

Part 4, Section D.1. of the MS4 Permit notes that increased volume, velocity, and discharge duration of stormwater runoff from developed areas may potentially accelerate downstream erosion and impair habitat-related beneficial uses in natural drainage systems. As a result, the permit stipulates that permittees shall control post-development peak stormwater runoff discharge rates, velocities, and durations in natural drainage systems to prevent accelerated stream erosion and to protect stream habitat. Natural drainage systems are defined by the permit to include the Santa Clara River.

Further, under Part 4, Section D.1. of the MS4 Permit, the County and its co-permittees (the County and all cities within the County, except for the City of Long Beach) were required to develop and implement numeric criteria for peak flow control, in accordance with the findings of the Peak Discharge Impact Study analyzing the potential impacts on natural streams due to impervious development, by February 1, 2005. The LACDPW and the Southern California Storm Water Monitoring Coalition did not complete the Peak Discharge Impact Study in time to meet this deadline. Therefore, on January 31, 2005, the County adopted and submitted to the RWQCB an Interim Peak Flow Standard (Interim Standard) to be in effect until such time as a final standard can be adopted based on a completed study.

The adopted Los Angeles County Interim Standard was derived from a similar Interim Peak Flow Standard for Ventura County approved by the RWQCB under the SUSMP requirement provisions of the MS4 Permit. The intent of the Interim Standard, as described by the County, is to provide protection for natural streams to the extent supported by findings from the ongoing study, and consistent with practical construction practices.

The Interim Standard adopted by the County requires all post development runoff from a 2-year, 24-hour storm not to exceed the pre-development peak flow rate, burned, from a 2-year, 24-hour storm when the pre-development peak flow rate equals or exceeds 5 cubic feet per second. Discharge flow rates shall be calculated using the County of Los Angeles Modified Rational Method. The Peak Flow Standard also requires that post development runoff from the 50-year capital storm not exceed the pre-development peak flow rate, burned and bulked, from the 50-year capital storm.[23]

As this is an Interim Standard, the County is aware that upon completion of the Peak Discharge Impact Study, new peak flow standards may be determined to be appropriate. Therefore, following final approval of the Peak Flow Interim Standard (PFIS), the County's peak flow requirements may be different.

Per Section 4.D(9) of the MS4 Permit, the *Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan* provides an alternative performance standard for Specific Plan projects, including Landmark Village, to the Interim Peak Flow Standard. The Landmark Village project would be conditioned to require, as a project design feature, sizing and design of hydraulic features as necessary to control hydromodification impacts in accordance with performance standards designed to protect channel integrity of the Santa Clara River. The proposed project would incorporate hydromodification control facilities in accordance with this analysis, and the *Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan*, both of which are currently under review by the RWQCB. As part of the hydrology study, and prior to issuance of a grading permit, the project engineer must analyze and design the drainage facilities to meet the performance standards set forth in this analysis and the *Newhall Ranch Specific Plan Sub-Regional Stormwater Mitigation Plan*.

23 See, January 31, 2005, letter, signed by Donald L. Wolfe, transmitting the Interim Standard to Jonathan Bishop of the RWQCB.

(6) Construction Permits

Pursuant to CWA Section 402(p), which requires regulations for permitting of certain stormwater discharges, the SWRCB has issued a statewide general NPDES Permit and Waste Discharge Requirements for stormwater discharges from construction sites (NPDES No. CAS000002). (See California Water Resources Control Board Resolution No. 2001-046; Modification of Water Quality Order 99-08-DWQ SWRCB NPDES General Permit for Stormwater Discharges Associated with Construction Activity (adopted by the SWRCB on April 26, 2001).)

Under this Construction General Permit, discharges of stormwater from construction sites with a disturbed area of one or more acres are required to either obtain individual NPDES permits for stormwater discharges or be covered by the Construction General Permit. Completing and filing a Notice of Intent with the SWRCB accomplishes coverage under the Construction General Permit. Each applicant under the Construction General Permit must ensure that a SWPPP is prepared prior to grading and implemented during construction. The primary objective of the SWPPP is to identify, construct, implement, and maintain BMPs to reduce or eliminate sediment and non-sediment construction-related pollutants in stormwater discharges and authorized non-stormwater discharges from the construction site. Compliance with the requirements of the Construction General Permit is used as one method to evaluate project construction-related impacts on surface water quality.

(7) General Waste Discharge Requirements for Dischargers of Groundwater From Construction and Project Dewatering

The Los Angeles RWQCB has issued a General NPDES Permit and General Waste Discharge Requirements (WDRs) (Order No. R4-2003-0111, NPDES No. CAG994004) governing construction-related dewatering discharges within the project development areas (the "General Dewatering Permit"). This permit addresses discharges from temporary dewatering operations during construction and permanent dewatering operations associated with development. The discharge requirements include provisions mandating notification, sampling and analysis, and reporting of dewatering and testing-related discharges. The General Dewatering Permit authorizes construction-related activities so long as all conditions of the permit are fulfilled. The primary objective of the General Dewatering Permit conditions is to identify and control pollutants in construction-related dewatering discharges. Compliance with the requirements of the General Dewatering Permit is used as one method to evaluate project construction-related impacts on surface water quality.

(8) Discharge of Fill or Dredge Materials

Hydrologic conditions of concern addressed in this report include instream changes in sediment transport, erosion, sedimentation and ultimately channel stability. There is a nexus between these concerns and the stream, habitat, and species protection programs administered by ACOE, CDFG, and USFWS.

Section 404 of the CWA is a program that regulates the discharge of dredged and fill material into "waters of the United States," including wetlands. Activities in waters of the United States that are regulated under this program include fills for development (including physical alterations to drainages to accommodate storm drainage, stabilization, and flood control improvements), water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. The US EPA and the ACOE have issued Section 404(b)(1) Guidelines (40 C.F.R. Section 230) that regulate dredge and fill activities, including water quality aspects of such activities. Subpart C, at sections 230.20 through 230.25, contains water quality regulations applicable to dredge and fill activities. Among other topics, these guidelines address discharges that alter substrate elevation or contours, suspended particulates, water clarity, nutrients and chemical content, current patterns and water circulation, water fluctuations (including those that alter erosion or sediment rates) and salinity gradients.

Section 401 of the CWA requires that any person applying for a federal permit or license that may result in a discharge of pollutants into waters of the United States obtain a state water quality certification that the activity complies with all applicable water quality standards, limitations, and restrictions. No license or permit may be issued by a federal agency until certification required by Section 401 has been granted. Further, no license or permit may be issued if certification has been denied. CWA Section 404 permits and authorizations are subject to Section 401 certification by the RWQCBs.

The CDFG is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the law requires the proponent of a project that may impact a river, stream, or lake to notify the CDFG before beginning the project. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life, and watercourses having a surface or subsurface flow that support or have supported riparian vegetation.

Section 1602 of the California Fish and Game Code requires any person who proposes a project that will substantially divert or obstruct the natural flow, or substantially change the bed, channel, or bank of any river, stream, or lake or use materials from a streambed, notify the CDFG before beginning the project. Similarly, under section 1602, before any state or local governmental agency or public utility begins a construction project that will (1) divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake; (2) use materials from a streambed; or (3) result in the disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake, it must first notify the CDFG of the proposed project. If the CDFG determines that the project may adversely affect existing fish and wildlife resources, a Lake or Streambed Alteration Agreement is required. (The impacts associated with physical alterations to jurisdictional areas are evaluated in **Section 4.4, Biota**, of this Recirculated EIR.) The direct and indirect effects on water quality associated with the proposed project, including physical alterations to jurisdictional areas, are evaluated below. In addition, potential changes in flow characteristics that affect beneficial uses and water quality due to increased erosion, deposition, or changes in channel stability are considered in this section.

b. Physical Setting

(1) Receiving Water Bodies and Beneficial Uses

(a) Santa Clara River

The Landmark Village project consists of an approximately 292-gross-acre tract map site, as well as off-site improvements necessary to support the development. Off-site improvements include the Adobe Canyon borrow site; the Chiquito Canyon grading site; a water tank site; the Long Canyon Road Bridge; bank stabilization; drainage improvements; improvements to State Route 126 (SR-126), including widening and land improvements from just west of Commerce Center Drive to the western edge of the tract map site; a utility corridor; and haul routes. As shown in **Figure 4.3-1**, the tract map site is located immediately west of the confluence of Castaic Creek and the Santa Clara River. The banks of the Santa Clara River form the southern tract map boundary while the northern boundary is defined by SR-126. The western boundary is defined by Chiquito Canyon Creek. The tract map site itself consists of land under agricultural cultivation.

The Adobe Canyon borrow site is located south of the Santa Clara River and adjacent to Long Canyon. The Chiquito Canyon grading site is located in the low-lying hills north of SR-126, easterly of Chiquito Canyon Road. The utility corridor runs parallel to SR-126, from the western boundary of the tract map site to the approved Newhall Ranch WRP near the Los Angeles County/Ventura County line, from the eastern boundary of the tract map site to Interstate 5 (I-5), and then south to Round Mountain. The Long Canyon Road Bridge is on the west side of the tract map site, and it would span approximately 1,000 feet over the Santa Clara River, with a width of about 100 feet. Support for the bridge would involve construction of 11 piers within the River corridor. Each pier would be spaced about 100 feet apart. Abutments and bank stabilization would be required on both sides of the bridge to protect against erosive forces. Existing conditions of the SR-126 improvement areas, water tank site, and utility corridor are undeveloped open space or agricultural lands.

The project is located adjacent to Santa Clara River Reach 5, immediately downstream of its confluence with Castaic Creek. The entire project site comprises approximately 972 gross acres within the 1,634-square-mile Santa Clara River Basin watershed.

The Los Angeles Basin Plan lists the beneficial uses of major water bodies within this region and includes Santa Clara River Reach 5, as shown in **Table 4.3.4, Beneficial Uses of Receiving Waters**.

Table 4.3-4
Beneficial Uses of Receiving Waters

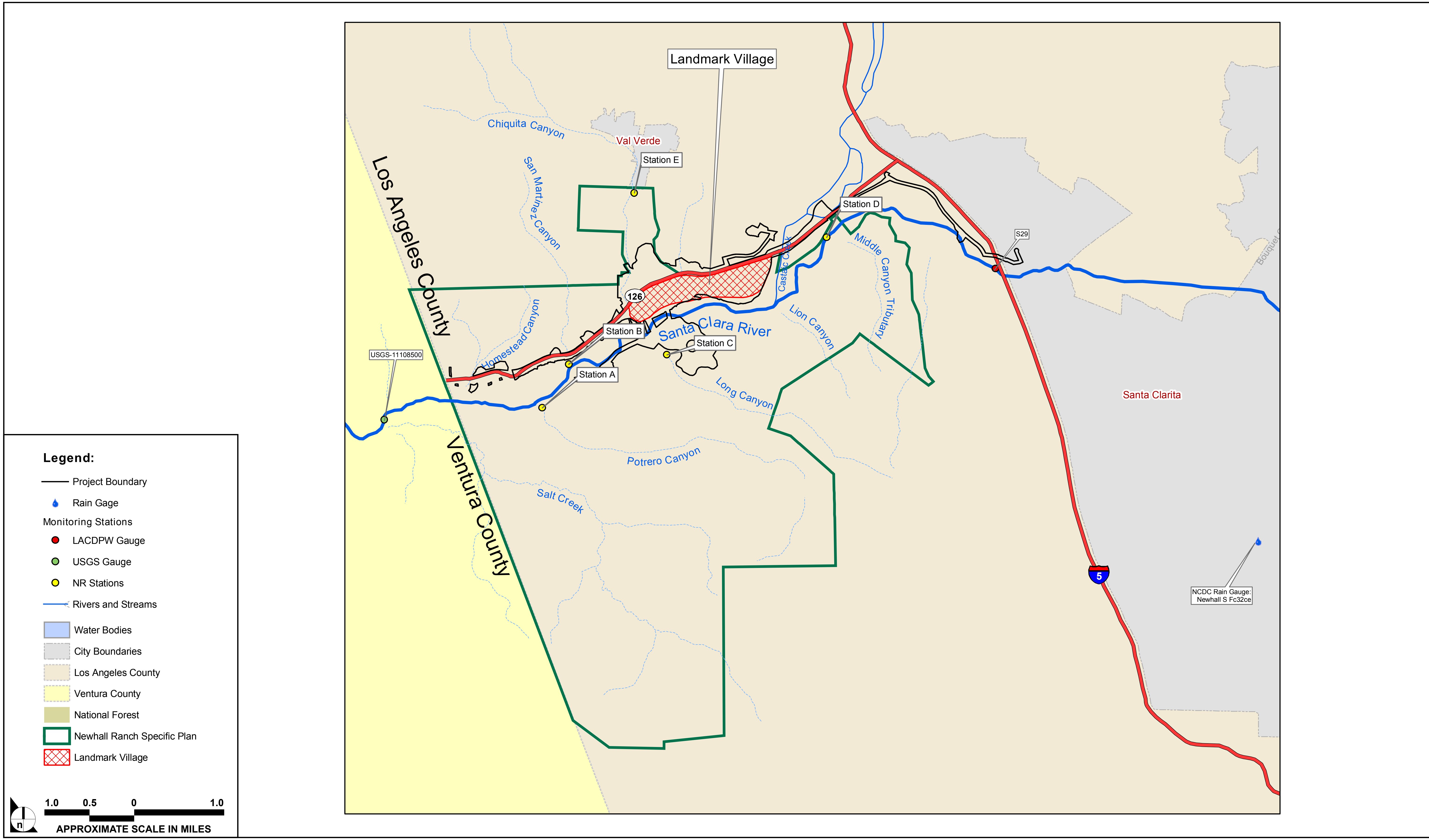
Water Body	Beneficial Uses[1]											
	MUN	IND	PROC	AGR	GWR	FRSH	REC1	REC2	WARM	WILD	RARE	WET[1]
Santa Clara River (Hydrologic Unit 403.51)	P*	E	E	E	E	E	E	E	E	E	E	E

Source: Geosyntec, 2008.

[1] *Water bodies designated as WET may have wetlands habitat associated with only a portion of the water body. Any regulatory action would require a detailed analysis of the area.*

E = Existing beneficial use; P = Potential beneficial use; I = Intermittent beneficial use

* *Asterisked MUN designations are designated under SB 88-63 and RB 89-03 as conditional potential MUN designations*



SOURCE: GeoSyntec Consultants – March 2005

FIGURE 4.3-1

Project Location Map

32-92A•11/08

As identified in **Table 4.3-4,** above, the existing, potential, and intermittent beneficial uses of Santa Clara River Reach 5 include the following:

MUN: Conditional, potential municipal and domestic water supply;

IND: Industrial activities that do not depend primarily on water quality;

PROC: Industrial activities that depend primarily on water quality;

AGR: Agricultural supply waters for farming, horticulture or ranching;

GWR: Groundwater recharge for natural or artificial recharge of groundwater;

FRSH: Natural or artificial maintenance of surface water quantity or quality;

REC1: Water contact recreation involving body contact with water where ingestion is reasonably possible;

REC2: Non-contact water recreation for activities in proximity to water, but not involving body contact;

WARM: Warm freshwater habitat to support warm water ecosystems;

WILD: Wildlife habitat waters that support wildlife habitats;

RARE: Waters that support rare, threatened or endangered species and associated habitats; and

WET: Wetland ecosystems.

The Santa Clara River watershed drains an area of 1,634 square miles in the Transverse mountain range of southern California. The Santa Clara River flows generally west from its headwaters near Acton to the Pacific Ocean near the City of Ventura, approximately 40 miles downstream of the project location. The River exhibits some perennial flow in its eastern-most stretches within the Angeles National Forest, then flows intermittently westward within Los Angeles County. The principal tributaries of the upper watershed in Los Angeles County are Castaic Creek, Bouquet Canyon Creek, San Francisquito Creek, and the South Fork of the Santa Clara River. Placerita Creek is a large tributary draining the western-most end of the San Gabriel Mountains; it joins the South Fork, which flows directly into the Santa Clara River. Castaic Creek is a south-trending creek that confluences with the Santa Clara River upstream and adjacent to the project. (Castaic Lake is a California Department of Water Resources (DWR) owned reservoir located on Castaic Creek.) San Francisquito Canyon Creek is an intermittent stream in the watershed adjacent to Bouquet Canyon and to the southeast. Elevations within the watershed range from sea level at the River mouth to 8,800 feet at the summit of Mount Pinos in the northwest corner of the watershed.

The principal sources of water contributing to the base flow of the Santa Clara River are: (1) groundwater from the Alluvial aquifer basin in Los Angeles County, which seeps into the riverbed near, and downstream of, Round Mountain (located just below the mouth of San Francisquito Creek); (2) tertiary-treated water discharged to the Santa Clara River from two existing Los Angeles County Sanitation District WRPs -- the Saugus WRP, located near Bouquet Canyon Road bridge and the Valencia WRP, located immediately downstream of I-5 (for locations, see **Figure 2.0-1**); and (3) in some years, DWR-released flood flows from Castaic Lake into Castaic Creek during winter and spring months. The Saugus WRP, located near Bouquet Canyon Road bridge, has a permitted dry weather average design capacity of 6.5 million gallons per day (mgd), creating surface flows from the outfall to near I-5. The Valencia WRP outfall is located immediately downstream of the I-5 bridge and has a permitted dry weather average design capacity of 21.6 mgd, creating surface flows extending through the project area and into the far eastern portion of Ventura County. The combined average treated discharge from both WRPs between January 2004 and June 2007 was approximately 20 mgd.

The reach of the Santa Clara River within and adjacent to the project has multiple channels (braided). This kind of system is characterized by high sediment loads, high bank erodibility, and intense and intermittent runoff conditions. Combined with the relatively flat gradient of the Santa Clara River at this point (less than one percent), the Santa Clara River has a high potential to aggrade (deposit sediment) at low flow velocities. (See Recirculated Draft EIR **Appendix 4.2**, Landmark Village Flood Technical Report. Prepared by Pacific Advanced Civil Engineering, Inc., for Newhall Land.)

Physiography. The Santa Clara River flows through a complex, tectonically-active trough. Some of the most rapid rates of geologically-current uplift in the world are reported from the Ventura anticline and San Gabriel Mountains, just to the northwest and southeast, respectively, of the River. Slopes are very steep, with local relief of 3,000 to 4,000 feet being common. These faults bring harder, more resistant sedimentary rocks over softer and younger sedimentary formations, though all formations are fundamentally soft and erodible. On either side of the faults, sandstone and mudstones prevail. The northeastern and southeastern corners of the watershed are underlain by deeply-weathered granitic and schistose rocks, which produce sands that are coarser than those of other rock units when they weather and erode. The San Gabriel fault crosses the valley, bringing slightly more resistant rock to the surface and creating a local base level reflected as a slight rise or 'bump' on the River's longitudinal profile.

Most geologic materials in the watershed decompose mainly to silt, clay, and sand, with some coarser materials. Most sediment moved by the Santa Clara River and its main tributaries is fine, with less than 5 percent bedload-sized material (>0.25 millimeters [mm], or about 0.01 inch in diameter). Some gravels and cobbles do occur within the beds of the stream and in their alluvium. Nonetheless, both the bed and the sediment transported by the River tend to be finer than in most southern California watersheds.

Flows. Downstream of the Valencia WRP, the Santa Clara River is perennial past the Los Angeles/Ventura County line to approximately Rancho Camulos. Flows in the Santa Clara River can be affected by groundwater dewatering operations or by diversions for agriculture or groundwater recharge. Throughout the Santa Clara River channel, there are complex surface water/groundwater interactions where both gaining and losing river segments are found. Downstream of the County line, however, the Santa Clara River flows through the Piru groundwater basin, which represents a "Dry Gap" where dry-season surface flows are interrupted and streamflow is lost to groundwater.

The Santa Clara River is underlain by several distinct alluvial groundwater basins in Ventura County—the Piru, Fillmore, and Santa Paula Basins. These basins are divided longitudinally by sills or ridges of bedrock that support areas of locally-high (shallow) groundwater, including the area upstream from the County line (above the Piru Basin), and upstream from the mouth of Sespe Creek (the transition between the Piru and Fillmore Basins). This locally-high groundwater sustains summer baseflow and riparian vegetation within the Santa Clara River corridor even through relatively dry climatic cycles.

Flows in the Santa Clara River, as in most Southern California streams, are highly episodic. For the gauged period between 1953 and 1996, annual flow at the Los Angeles/Ventura County line gauge ranged between 253,000 acre-feet (1969) and 561 acre-feet (1961). Annual peak flows at the County line between 1953 and 1996 ranged from 68,800 cubic feet per second (cfs) (1969) to 109 cfs (1960). Of note is that the second highest annual peak, 32,000 cfs in 1966, was less than half of the highest peak (68,800 in 1969). These large episodic events have a significant impact on the geomorphic characteristics of the Santa Clara River mainstem.

After studying the response of the River to several different anthropogenic and natural disturbances, Balance Hydrologics concluded that the Santa Clara River, as with many streams in semi-arid southern California, is highly episodic. Concepts of "normal" or "average" sediment-supply and flow conditions have limited value in this "flashy" environment, where episodic storm and wildfire events have enormous influence on sediment and storm flow conditions. In these streams, a large portion of the sediment movement events can occur in a matter of hours or days. Other perturbations that can potentially affect channel geometry appear to have transitory or minor manifestations. For example, effects on Santa Clara River channel width due to the 1980s levee construction were barely discernible by the first few years of the 21st century, probably mostly due to morphologic compensation associated with the storm events in the mid- to late-1990s. As a result, channel morphology, stability, and character of the Santa Clara River is almost entirely determined by the "reset" events that occur within the watershed.

Vegetation and Habitat Types. Much of the watershed upstream of the Specific Plan area receives rainfall averaging about 18 to 25 inches per year. As throughout southern California, rainfall in the Santa Clara

River watershed alternates between wet and dry periods, a variation that is central to understanding the geomorphic history of the watershed. Wet cycles tend to persist for several years, sometimes for periods of six or eight years, during which rainfall, although variable, may average about 140 to 150 percent of the long-term average. For the woody riparian vegetation along the banks and on islands in the braided channels, these are crucial periods for establishment and growth. During dry cycles, the roots of the riparian vegetation must grow downward to the water table or perched zones, and where it cannot do so, this band of vegetation will die back.

The existing Santa Clara River channel contains a variety of vegetation types. (See Impact Sciences, 2003. Revised Additional Analysis to the Newhall Ranch Specific Plan and WRP Final EIR, Volume VIII. Prepared for Los Angeles County Department of Regional Planning by Impact Sciences Inc. May 2003.) The active Santa Clara River channel is mostly barren due to scouring by seasonal storm flows. However, vegetation types on the adjacent terraces vary based on elevation relative to the active channel bottom and the frequency of flooding. The following series of vegetation types occur along a vertical gradient from the channel bottom to the highest Santa Clara River terrace on the floodplain: emergent herbaceous, woody shrubs, and trees.

The Santa Clara River corridor at the project site 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 active channel; and (3) riparian habitat, consisting of woody vegetation along the margins of the active channel and on the floodplain. (See Impact Sciences, 2003. Revised Additional Analysis to the Newhall Ranch Specific Plan and WRP Final EIR, Volume VIII. Prepared for Los Angeles County Department of Regional Planning by Impact Sciences Inc. May 2003.) Both year-round and seasonal aquatic habitats are provided and are subject to periodic disturbances from winter flood flows. These flows inundate areas that are dry most of the year. They also carry and deposit sediment, seeds, and organic debris; form new sandbars and destroy old ones; and erode stands of vegetation. New stands of vegetation are created where vegetation becomes established by seeds or buried stems. Thus, the aquatic habitats of the River are in a constant state of creation, development, disturbance, and destruction.

(b) Tributaries to the Santa Clara River

Several tributaries drain into the Santa Clara River adjacent to the Landmark Village project site. Chiquito Canyon and Castaic Creek define the eastern and western boundary of the Landmark Village tract map site, respectively, at the confluence of the Santa Clara River (**Figure 4.3-1**). Long Canyon is a drainage tributary to the southern bank of the Santa Clara River, across from the Landmark Village tract map site (**Figure 4.3-1**). All project runoff would be discharged to the Santa Clara River after receiving treatment in the project PDFs. Construction phase activities (borrow sources and grading) would occur in areas that drain to Adobe Canyon, Long Canyon, and Chiquito Creek.

The Chiquito Canyon, Long Canyon, and Castaic Creek watersheds are characterized by both rugged and steep foothills that have numerous smaller tributary canyons that dissect the watershed, connecting to the narrow alluvial valley associated with the main stem drainage. Approximately 90 percent or more of the watersheds' areas consist of rugged foothill topography, with the remainder being the narrow valley floor. Generally, the soils in the watersheds are characterized as silty clay loams from both the Castaic and Saugus formations. Also, the soils within the watersheds can be predominately classified as being in hydrologic soil group C (higher runoff potential), with the exception of areas adjacent to the main stem drainages that are within group A (lower runoff potential) and group B in the lower reaches.

The approximate 4.85 square mile (3,106 acres) Chiquito Canyon watershed is a tributary to the northern bank of the Santa Clara River. Approximately 490 acres of the Chiquito Canyon watershed, or about 16 percent of the watershed area, is located within the Specific Plan boundary, with the majority being upstream of the boundary in the developed Val Verde community. (See PACE, 2006b. Newhall Ranch River Fluvial Study Phase I Final Draft. Prepared for Newhall Land by Pacific Advanced Civil Engineering, Inc. Fountain Valley, California.) The upper portion of the drainage is aligned in a general west to east direction, while the lower portion of the drainage flows in a north to south direction. The linear distance from the upper headwaters to the canyon mouth is approximately 28,318 feet, with an average overall slope of 0.031. The major natural main stem drainage course within the watershed has an average slope through the Specific Plan area of approximately 0.025. The topography for the watershed varies from a maximum elevation of 1,800 feet in the headwaters to a low elevation of 925 feet near the mouth of the canyon at the Santa Clara River Valley. The area surrounding the upper channel in Chiquito Canyon, within Newhall Ranch, is primarily comprised of agricultural land. In contrast to the vegetation found in the upper portion of Chiquito Canyon within the project area, the vegetation found in the downstream portion of the drainage within the project area is quite diverse, supporting scalebroom scrub, coast live oak woodlands, and Great Basin scrub.

The approximate two square mile (1,295 acre) Long Canyon watershed is a tributary to the southern bank of the Santa Clara River. Approximately 845 acres of Long Canyon, or 65 percent of the watershed area, is located within the Specific Plan boundary, with the remainder being upstream in the Legacy Village subregion (see **Figure 2.0-1**). The drainage in the headwaters is aligned in a general west to east direction. The distance from the upper headwaters to the canyon mouth is approximately 18,350 lineal feet, with an average overall slope of 0.052. (See PACE, 2006b. Newhall Ranch River Fluvial Study Phase I Final Draft. Prepared for Newhall Land by Pacific Advanced Civil Engineering, Inc. Fountain Valley, California.) The major natural main stem drainage course within the watershed has an average slope in the lower reaches of the watershed of approximately 0.11. The topography for the watershed varies from a maximum elevation of 2,600 feet in the headwaters to a low elevation of 930 feet near the mouth of the canyon at the Santa Clara River Valley. Both sides of this watershed contain habitat types comprised primarily of coastal sage scrub, with small pockets of chamise chaparral, and grassland present. (See URS, 2003. Jurisdiction Delineation Package. Prepared for Newhall Land by URS Corporation, December 2003.) Within the stream channel, there is a mixture of grassland, elderberry scrub, live oak woodland, alluvial scrub, great basin scrub, mixed chaparral, and alluvial scrub.

The 8.7 square mile (5,555.3 acre) Castaic Creek watershed is a tributary located north of the Santa Clara River. The total length of the mainstem channel is approximately 36,819 feet, with an average overall slope of 3.7 percent. The maximum elevation difference from the headwaters to the mouth of the creek at the Santa Clara River is 1,378 feet. Generally, the soils in the watershed are characterized as Saugus loam and predominately are classified as being in hydrologic soil group B (lower runoff potential). The associated vegetative cover within the watershed varies, but primarily consists of California coastal sage scrub.

The Adobe Canyon borrow site is located south of the Landmark Village tract map site and east of Long Canyon, on the south side of the River. Adobe Canyon is characterized by sloping hillsides and adjacent agricultural use. The borrow site is dominated by coastal sage scrub, but also includes areas of coastal sage chaparral scrub, non-native grassland, and live oak woodland. Elevations on the borrow site range from approximately 920 feet (near the River), rising to 1,260 feet above mean sea level further south.

(2) Water Quality Leaving Tract Map Site

The tract map site is presently under agricultural cultivation, and runoff is channeled *via* agricultural ditches to the Santa Clara River. The following tables provide modeling estimates for pollutants of concern presently contained in existing average annual stormwater runoff leaving the tract map site, which is estimated at 183 acre-feet.

Table 4.3-5, Existing Modeled Pollutant Loads and Concentrations, shows predicted concentrations and loads of contaminants for which sufficient flow composite sampling data exists in the Los Angeles County database to conduct modeling predictions under existing conditions. As can be seen, the average annual TSS concentration is predicted to be 459 mg/L, while the average annual TSS load is predicted to be 228,000 pounds (114 tons) per year. The average annual total phosphorus concentration is predicted to be 1.5 mg/L, while the average annual load is predicted to be 759 pounds per year. The average annual nitrate-nitrogen plus nitrite nitrogen concentration is predicted to be 6.3 mg/L, while the average annual load is predicted to be 3,107 pounds per year. This table also indicates that the average annual ammonia concentrations are estimated at 1.0 mg/L, while the average annual load is estimated to be 473 pounds.

Total nitrogen concentrations are estimated at 10 mg/L, while the average annual load is estimated at 5,150 pounds. Finally, the average annual chloride concentrations are estimated at 24 mg/L, while the average annual load is estimated at 12,000 pounds.

Table 4.3-5
Existing Modeled Pollutant Loads and Concentrations

Constituent	Average Annual Concentration (mg/L)	Average Annual Load (lbs/year)
Total Suspended Solids	459	228,000
Total Phosphorus	1.5	759
Nitrate-nitrogen plus nitrite-nitrogen	6.3	3,107
Ammonia	1.0	473
Total Nitrogen	10	5,150
Chloride	24	12,000

Source: Geosyntec, 2008.

Site runoff also is predicted to contain metals in the existing condition, such as aluminum, copper, lead, and zinc. Existing modeled concentrations and loads for these metals in site runoff are contained in **Table 4.3-6, Existing Modeled Metals**. As shown, modeled average annual concentrations of copper are estimated at 26 micrograms per liter (µg/L), lead is estimated at 16 µg/L, zinc is estimated at 132 µg/L, and aluminum is estimated at 631 µg/L. Average annual loadings of copper and lead are also similar at 13 and 8 pounds per year, respectively, while zinc and aluminum loadings are much higher at an estimated 66 pounds per year and 313 pounds per year, respectively.

Table 4.3-6
Existing Modeled Metals

Constituent	Average Annual Concentration (µg/l)	Average Annual Load (lbs/year)
Copper*	26	13
Lead	16	8
Zinc*	132	66
Aluminum	631	313

Source: Geosyntec, 2008.
** Dissolved Form*

(3) Receiving Water Quality

In the *Landmark Village Water Quality Technical Report* (Recirculated Draft EIR **Appendix 4.3**), the existing wet and dry weather surface water quality in the project area was characterized from available water quality monitoring data obtained from the following four (4) sources:

1. **Newhall Ranch Tributary Stormwater Monitoring**. Newhall Land conducted stormwater monitoring of tributary streams in the Specific Plan subregion to characterize the existing surface water quality during wet weather conditions. Stormwater samples were collected during (2) two storm events in March 2001. The first storm was a small event (0.2 inch of rainfall) that was likely just large enough to result in runoff. The depth of the second event was larger and was equal to the median depth (0.7 inch) at the nearby National Climatic Data Center (NCDC) Newhall Rain Gauge.

   The stormwater samples were collected at five (5) monitoring locations shown on **Figure 4.3-1**. Three of the five stations were located at the mouths of tributaries to the Santa Clara River in Potrero (Station A), San Martinez (Station B), and Middle Canyons (Station D). The other two monitoring stations were located on tributaries upstream from the main stem of the River; one was just downstream of Val Verde in Chiquito Canyon (Station E) and one was on an unnamed tributary in Long Canyon, 0.25 mile upstream of the "Onion Field" (Station C). Aside from Station E, which is downgradient of existing residential uses, the land uses in the areas adjacent to Stations A, B, C, and D are predominantly open space, with some agricultural, natural gas, and oil extraction operations.

2. **Newhall WRP**. The Newhall Ranch WRP is required to conduct pre-startup water quality monitoring at upstream and downstream locations from the outfall of the proposed Newhall WRP. Wet and dry weather monitoring data were collected during six storm events at two stations in the Santa Clara River from the spring of 2004 through the spring of 2006: one station is near the downstream boundary of the Specific Plan area and close to the proposed WRP outfall location, and the second is about 2.5 miles further downstream.

3. **Los Angeles County Monitoring**. The County of Los Angeles conducts in-stream water quality monitoring on the mainstem of the Santa Clara River at a mass emission station located at The Old Road, which is at the upstream boundary of the Specific Plan area. Wet weather monitoring data are available from November 2002 through February 2007. The Los Angeles County monitoring data are the most current, and are the only source of wet weather monitoring in the Santa Clara River immediately upstream of the Specific Plan area.

4. **USGS Monitoring**. The US Geological Survey (USGS) has collected stream flow and water quality data in the Santa Clara River near the county line (USGS station 11108500) from 1951 through 1995. These data provide a historical perspective of wet and dry weather water quality in the River immediately downstream from the Specific Plan area.

Wet Weather Monitoring Data Summary. Table 4.3-7, Average Wet Weather Monitoring Data for 2-Day Precedent Rainfall Between 0.1 and 1.0 Inch, and **Table 4.3-8, Average Wet Weather Monitoring Data for 2-Day Precedent Rainfall of >1 Inch**, summarize the average values from wet weather monitoring data for all monitoring locations within the Newhall Ranch Specific Plan area. To facilitate interpretation, the wet weather water quality data were grouped into two categories depending on the depth of 2-day antecedent rainfall measured at the rain gauge:

1. 0.1–1 inch. Rainfall depths that would likely produce runoff volumes characteristic of more frequent, smaller storm events.
2. >1 inch. Rainfall depths that would likely produce runoff volumes characteristic of larger, less frequent storm events.

Table 4.3-7
Average Wet Weather Monitoring Data for 2-Day Precedent Rainfall Between 0.1 and 1.0 Inch

Constituent	LACDPW Mass Emission Station	Newhall Ranch Specific Plan Area Tributary Monitoring					Newhall Ranch WRP Startup Monitoring		USGS Wet Weather Monitoring
	S29	*Site A*	*Site B*	*Site C*	*Site D*	*Site E*	*NR1*	*NR3*	*USGS*
TSS (mg/L)	845	835	41,100	36,000	5,650	6,645	58	112	2,291
TDS (mg/L)	458	7,380	2,825	190	160	205	855	1,076	1,437[1]
Hardness (mg/L)	249	2,225	1,205	147	59	107	387	475	773
Chloride (mg/L)	68	870	125	3	3	11	100	105	122
Total P (mg/L)	0.60	-	-	-	-	-	0.4	0.4	1.3
Nitrate-N (mg/L)	1.2	18[2]	3.0[2]	1.6[2]	15.3[2]	2.8[2]	3.2	3.0	2.1[2]
Nitrite-N (mg/L)	0.17	-	-	-	-	-	<0.005	<0.005	-
Ammonia-N (mg/L)	0.14	-	-	-	-	-	0.2	0.1	0.16
TKN (mg/L)	2.5	-	-	-	-	-	0.3	0.4	0.64
Dissolved Copper (µg/L)	5.8	-	-	-	-	-	4.6	3.6	-
Total Copper (µg/L)	26	15	175	170	10	70	4.9	5.9	30
Dissolved Lead (µg/L)	4.4	-	-	-	-	-	<0.07	<0.07	7.8
Total Lead (µg/L)	5.9	6.1	54	95	7.6	37	1	0.8	-
Dissolved Zinc (µg/L)	12	-	-	-	-	-	12	8.7	10
Total Zinc (µg/L)	54	40	330	330	30	225	18	15	150
Dissolved Aluminum (µg/L)	894	-	-	-	-	-	27	19	-

Constituent	LACDPW Mass Emission Station	Newhall Ranch Specific Plan Area Tributary Monitoring					Newhall Ranch WRP Startup Monitoring		USGS Wet Weather Monitoring
	S29	*Site A*	*Site B*	*Site C*	*Site D*	*Site E*	*NR1*	*NR3*	*USGS*
Total Aluminum (µg/L)	5,040	-	-	-	-	-	740	770	-
Diazinon (µg/L)	0.05	-	-	-	-	-	<0.01	<0.01	0.02
Chlorpyrifos (µg/L)	<0.05	-	-	-	-	-	<0.6	<0.6	-
Cyanide (mg/L)	<0.01	-	-	-	-	-	-	-	-
Fecal Coliform (MPN/100mL)	7,332	4300	953	6300	>81200	81200	87	258	427[3]
Total Coliform (MPN/100mL)	115,590	40000	>1.6E5	125000	>50000	>81200	284	549	-

Source: Geosyntec, 2008.

[1] *Derived from Specific Conductance,* [2] *Nitrate + Nitrite-N,* [3] *CFU/100ml, - = no or insufficient data*

The wet weather monitoring data indicate the following existing water quality conditions:

Total Suspended Solids (TSS). The total solids in a liquid sample consist of total dissolved solids and total suspended solids. Total dissolved solids (TDS, discussed below) are materials in the water, primarily inorganic salts (calcium, magnesium, potassium, sodium, chlorides, and sulfates), that will pass through a filter with a 2.0 micrometer or smaller nominal average pore size; the material retained by the filter is the total suspended solids (TSS). (Sawyer et al., 1994. Chemistry for Environmental Engineering, Fourth Edition. Claire Sawyer, Perry McCarty, and Gene Parkin. McGraw-Hill, Inc., 1994.) It is generally expected that TSS concentrations in alluvial streams can be greatly elevated during storm runoff because of the combination of high sediment supply and a high capacity for in-stream transport and erosion. Average TSS concentrations in the Santa Clara River were sometimes very high due to the highly erodible, easily transportable, sandy alluvial soils and sediments , and average concentrations were much higher for the larger storms than the smaller storms. These results show the capacity of high flows in the Santa Clara River for sediment transport and are consistent with other data showing that large rainfall events result in a “reset” of the main channel. As concluded by Balance Hydrologics (2005), concepts of "normal" or "average" sediment-supply and flow conditions have limited value in this "flashy" environment, where episodic storm and wildfire events have enormous influence on sediment and storm flow conditions. In the Santa Clara River, a large portion of sediment movement events can occur in a matter of hours or days.

Table 4.3-8
Average Wet Weather Monitoring Data for 2-Day Precedent Rainfall of >1 Inch

Constituent	LACDPW SCR Mass Emission Station S29	Newhall Ranch WRP Startup Monitoring NR3	USGS Wet Weather Monitoring 11108500
TSS (mg/L)	1,635	43,360	10,711
TDS (mg/L)	216	2,100	838[1]
Hardness (mg/L)	108	832	546
Chloride (mg/L)	24	46	61
Total P (mg/L)	0.42	13	1.0
Nitrate-N (mg/L)	0.80	1.4	1.7[2]
Nitrite-N (mg/L)	0.18	ND	
Ammonia-N (mg/L)	0.29	0.5	-
TKN (mg/L)	5.6	46	0.69
Dissolved Copper (μg/L)	9.9	-	-
Total Copper (μg/L)	26	-	-
Dissolved Lead (μg/L)	3.3	-	-
Total Lead (μg/L)	17	-	-
Dissolved Zinc (μg/L)	26	-	-
Total Zinc (μg/L)	110	-	-
Dissolved Aluminum (μg/L)	1,086	-	-
Total Aluminum (μg/L)	5,672	-	-
Diazinon (μg/L)	0.10	<0.01	-
Chlorpyrifos (μg/L)	<0.05	<0.6	-
Cyanide (μg/L)	200	-	-
Fecal Coliform (MPN/100 mL)	65,275	>1,600	2,700[3]
Total Coliform (MPN/100 mL)	246,812	>1,600	-

Source: Geosyntec, 2008.
1 Derived from Specific Conductance, 2 Nitrate + Nitrite-N, 3 CFU/100ml, - = no or insufficient data

Total Dissolved Solids (TDS). Stormwater monitoring data collected in the tributaries showed greatly differing TDS levels among the five monitoring stations. Measured TDS concentrations were very high at Sites A (Potrero Canyon) and B (San Martinez Grande Canyon), while TDS concentrations at the other three sites were low. Elevated TDS levels in runoff at Sites A and B are likely a result of the natural soil properties of the marine layers of the Pico formation and the high groundwater table conditions in these two canyons, suggesting that groundwater discharges to the channels contributed to the elevated TDS levels. These greatly differing dissolved solid (TDS) concentrations also are reflected in some of the components that make up the TDS (chloride and hardness), as described below.

Average concentrations of TDS in the Santa Clara River were moderate to high, ranging from 216 milligrams per liter (mg/L) to 2,100 mg/L. The Basin Plan objective for TDS in Santa Clara River Reach 5 is 1,000 mg/L. Much higher average concentrations were observed at the three downstream Santa Clara River stations (Newhall Ranch WRP start-up monitoring and USGS station) compared with the upstream LACDPW station, likely due to their location downstream of Potrero Canyon and San Martinez Grande Canyon (Sites A and B), with their much higher salt content.

Hardness. Hardness is a measure of the multivalent metallic cations in water, principally calcium, magnesium, strontium, iron, and manganese. (Sawyer *et al*., 1994. Chemistry for Environmental Engineering, Fourth Edition. Claire Sawyer, Perry McCarty, and Gene Parkin. McGraw-Hill, Inc., 1994.) These cations are capable of reacting with soap to form precipitates, and with certain anions to form scale. The hardness in water is derived largely from contact with soil and rock formations, and hardness affects the CTR values for certain metals, as discussed above. Waters with a hardness concentration from 150 mg/L to 300 mg/L as $CaCO_3$ are considered hard; waters with a hardness concentration above 300 mg/L as $CaCO_3$ are considered very hard.

The stormwater monitoring data for hardness were analogous to the data for TDS. Hardness concentrations were very high at the tributary Sites A and B, and low to moderate at the other three tributary sites. High hardness at Sites A and B are likely due to natural high levels of calcium and magnesium in the local soils (such as lime and gypsum deposits), and the high groundwater table conditions in these two canyons, suggesting again that groundwater discharges contributed to the elevated hardness levels.

In the Santa Clara River, average hardness values were greater downstream than at the upstream LACDPW station, and generally decreased with larger antecedent rainfall depth. This is most likely due to the influence of tributary inflows of high hardness waters (such as measured at Sites A and B), other groundwater inputs, and agricultural return flows that enter the Santa Clara River between these stations.

Chloride. Similar to TDS and hardness, monitoring data collected in the tributaries found very high chloride concentrations at Site A, high levels at Site B, and low concentrations at the remaining three sites. Overall, the average chloride concentrations during stormwater monitoring were highly variable and ranged between 3 mg/L and 125 mg/L, with the exception of the very high chloride concentrations detected at the mouth of Potrero Canyon (Site A). Average chloride concentration at the USGS station was about 61 mg/L for storm flows. The average chloride concentration observed in the larger storms at all of the Santa Clara River stations were lower than the Basin Plan objective for chloride of 100 mg/L, while the average chloride concentrations in the smaller storms were above the Basin Plan objective at the downstream monitoring stations.

Phosphorus. Recent wet weather monitoring (LACDPW mass emission station and Newhall Ranch WRP start-up monitoring) showed somewhat consistent total phosphorus levels of a magnitude of about 0.4 to 0.6 mg/L. An exception was the large storm sample (>1.0 inch) collected at station NR3, which measured 13.4 mg/L. This was likely due to the high concentration of TSS measured during the same storm event, because total phosphorus is predominately found in the particulate-phase in stormwater runoff. Historical average total phosphorus concentrations at the USGS station were somewhat higher than recent results, at 1.0 to 1.3 mg/L, and appeared to be somewhat independent of storm event size.

Nitrogen. Measured nitrate-nitrogen concentrations in the tributary stormwater monitoring were generally low (less than 3 mg/L) at three of the sites, and were elevated at Sites A and D (17.5 mg/L and 15.3 mg/L, respectively). The numeric target for nitrate plus nitrite-nitrogen in the Santa Clara River nitrogen compounds TMDL is 4.5 mg/L (30-day average), which is based on achieving the Basin Plan water quality objective of 5 mg/L. (Note that nitrate-nitrogen is typically an order of magnitude greater than nitrite-nitrogen in natural waters, as nitrite is converted to nitrate in aerobic conditions.) The Santa Clara River average nitrate-nitrogen concentrations were below this objective (0.8 mg/L to 3.2 mg/L). The average historical nitrate-N + nitrite-N concentrations at the USGS station were roughly similar, varying from 2.1 mg/L for lower storm flows to 1.7 mg/L for higher storm flows.

Average ammonia concentrations were low and ranged from 0.1 mg/L to 0.5 mg/L. The ammonia water quality objectives in the Santa Clara River nitrogen compounds TMDL range from 3.4 mg/L to 5.5 mg/L (1-hour average) and 1.2 mg/L to 2.0 mg/L (30-day average).

Average total Kjeldahl nitrogen concentrations, which is the measure of ammonia plus the organic forms of nitrogen, generally ranged from 0.3 mg/L to 5.6 mg/L. One exception was the concentration found in the large storm at NR3, which measured 46 mg/L. As with total phosphorus, the organic forms of nitrogen in stormwater runoff are generally in the particulate-phase, and this result correlated with the high levels of total phosphorus and suspended solids measured during this same event.

Metals. Total copper, lead, and zinc concentrations measured at Sites B and C were much higher than the concentrations measured at Sites A and D. Concentrations at Site E fell in the middle of the measured range. Elevated total metal concentrations are often associated with elevated TSS levels ; however, this trend is not evident in the tributary monitoring data. The average total copper concentrations at Sites B, C, and E were greater than the CTR acute copper criterion. The average total copper concentrations ranged from 10 micrograms per liter (μg/L) to 175 μg/L; the CTR acute total copper criterion for a hardness concentration of greater than 400 mg/L is 52 μg/L. The average total lead and total zinc concentrations in all the tributaries were below the CTR acute criteria. The average total lead concentrations ranged from 6.1 μg/L to 95 μg/L; the CTR acute total lead criterion for a hardness concentration of greater than 400 mg/L is 480 μg/L. The average total zinc concentrations ranged from 30 μg/L to 330 μg/L; the CTR acute total zinc criterion for a hardness concentration of greater than 400 mg/L is 390 μg/L.

Average concentrations of dissolved and total copper measured in the Santa Clara River (3.6 μg/L to 9.9 μg/L, dissolved copper; 4.9 to 26 μg/L, total copper) were below the respective CTR acute criteria for the average hardness of 250 mg/L (32 μg/L, dissolved copper; 33 μg/L, total copper). Average concentrations of dissolved and total lead measured in the Santa Clara River (<0.07 μg/L to 4.4 μg/L, dissolved lead; 0.8 to 17 μg/L, total lead) were well below the respective CTR acute criteria for the average hardness of 250 mg/L (170 μg/L, dissolved lead; 260 μg/L, total lead). Average concentrations of dissolved and total zinc measured in the Santa Clara River (8.7 μg/L to 26 μg/L, dissolved zinc; 15 to 110 μg/L, total zinc) were all well below the respective CTR acute criteria for the average hardness of 250 mg/L (250 μg/L, dissolved zinc; 260 μg/L, total zinc).

Average dissolved aluminum concentrations showed a very wide range in the Santa Clara River, ranging from a low of 19 μg/L dissolved aluminum measured in small storms at station NR3 to 1,086 μg/L measured in large storms at the Los Angeles County mass emission station. Similarly, total aluminum ranged from a low of 740 μg/L dissolved aluminum measured in small storms at station NR1 to 5,672 μg/L measured in large storms at the Los Angeles County mass emission station. The NAWQC acute criterion for aluminum is 750 μg/L for a pH range of 6.5 to 9.0; the CTR does not include an aluminum criterion.

Pesticides. Chlorpyrifos was not detected in the 19 samples taken at the County's mass emission station, while diazinon was detected in 8 of the 19 samples, with an average concentration of 0.05 μg/L in small storms and 0.10 μg/L in the larger storms. Diazinon and chlorpyrifos were not detected further downstream in the Santa Clara River during Newhall Ranch WRP wet weather sampling, but were detected in the one wet weather sample in the historical USGS data. There is no CTR criterion for diazinon; the recommended NAWQC is 0.17 μg/L (acute). The diazinon criterion derived by the CDFG is 0.08 μg/L. (Marshack, 2003. A Compilation of Water Quality Goals. Prepared by Jon B. Marshack, California Regional Water Quality Control Board, Central Valley Region. August 2003 with tables updated August 2007.)

Cyanide. Cyanide was detected in 6 of the 19 wet weather samples taken at the County's mass emission station. Concentrations of cyanide ranged from below 10 μg/L to 590 μg/L. The CTR criterion for freshwater acute aquatic life protection for cyanide is 22 μg/L.

Coliform Bacteria. Consistent with other stormwater data for the region, concentrations of total and fecal coliform bacteria in wet weather flows at all tributary monitoring stations and the County's mass emission station were very high, ranging from 87 Most Probable Number per 100 milliliters (MPN/100 mL) to 323,000 MPN/100 mL. Average bacteria concentrations at the lower stations were significantly lower, but still elevated, and more so during larger storms. In waters designated for water contact recreation (REC-1), the Basin Plan objective for fecal coliform is a log mean of 200/100 mL (based on a minimum of not less than 10 percent of total samples during any 30-day period), nor shall more than 10 percent of the total number of samples during any 30-day period exceed 400/100 mL.

Dry Weather Monitoring Data Summary. Dry season base flows in the Santa Clara River through the proposed project area are perennial. Dry season base flows may include contributions from natural groundwater flows; however, discharges from the upstream Saugus and Valencia WRPs contribute the majority of base flow. Discharges from the WRPs during dry weather conditions are a source of impairing pollutants in downstream reaches, including chloride, TDS, and nitrogen compounds. Dry weather water quality monitoring data in the Santa Clara River are available from LACDPW sampling at the Santa Clara River mass emission station, Newhall Ranch WRP pre-startup monitoring, and USGS water quality monitoring. **Table 4.3-9** summarizes the average values from dry weather monitoring data for these monitoring locations.

Table 4.3-9
Average Wet Weather Monitoring Data for 2-Day Precedent Rainfall of > 1 Inch

	SCR Mass Emission Station	USGS Dry Weather Monitoring	Newhall Ranch WRP Startup Monitoring	
Constituent	*S29*	*11108500*	*NR1*	*NR3*
TSS (mg/L)	200	349	66	128
Hardness (mg/L)	420	881	388	458
TDS (mg/L)	812	1541[1]	845	936
Chloride (mg/L)	115	140	120	124
Total P (mg/L)	0.26	1.13	0.5	0.5
Nitrate-N (mg/L)	1.2	4[2]	2.8	2.9
Nitrite-N (mg/L)	0.1	-	0.02	0.02
Ammonia-N (mg/L)	0.1	0.18	0.1	0.1
TKN (mg/L)	0.6	0.83	0.4	0.5
Dissolved Copper (µg/L)	2.9	1.8	4	4.2
Total Copper (µg/L)	15.2	20	5	6.5
Dissolved Lead(µg/L)	<5.0	7.8	0.2	0.2
Total Lead (µg/L)	1.8	ND	0.9	1.4
Dissolved Zinc (µg/L)	6.4	15.8	11	10.7

Constituent	SCR Mass Emission Station	USGS Dry Weather Monitoring	Newhall Ranch WRP Startup Monitoring	
	S29	*11108500*	*NR1*	*NR3*
Total Zinc (μg/L)	20.7	45	15.4	19.5
Dissolved Aluminum (μg/L)	-	-	170	289
Total Aluminum (μg/L)	845	-	1018	1685
Diazinon (μg/L)	0.01	0.03	<0.01	<0.01
Chlorpyrifos (μg/L)	<0.05	-	-	-
Cyanide (mg/L)	<0.01	-	-	-
Fecal Coliform (MPN/100 mL)	165	250[1]	209	213
Total Coliform (MPN/100 mL)	3,626	-	961	1207

Source: Geosyntec, 2008.
[1] CFU/100 mL, - = no or insufficient data

The dry weather monitoring data indicate the following:

TSS. Relatively high average TSS concentrations were observed, particularly in the historical data from USGS station, which may have included samples taken during times of higher erosion or larger dry weather flows. Average dry weather flow TSS concentrations observed by the Newhall Ranch WRP pre-startup monitoring were similar to those observed for small storms in wet weather monitoring. Average concentrations of TSS appeared higher at the upstream LACDPW mass emission station than at the downstream Newhall Ranch WRP pre-startup sites. Differences may be due to physical factors such as channel substrate material, local flow regime, and tributary influences.

Hardness, TDS and Chloride. The average concentrations of hardness, TDS, and chloride were more similar between the LACDPW mass emission station and Newhall Ranch WRP monitoring locations. However, the USGS county line station historically recorded higher averages (approximately double) than the baseline data observed at the LACDPW mass emission station and Newhall Ranch WRP monitoring locations. The baseline data suggests that the water flowing in the Santa Clara River in the proposed project area during dry weather is very hard with high levels of other dissolved salts, including chloride. The average concentrations of TDS in the baseline data ranged from 812 mg/L to 936 mg/L, below the Basin Plan objective for TDS in Santa Clara River Reach 5 (1,000 mg/L). Average chloride concentrations in dry weather flows ranged from 115 mg/L to 124 mg/L, which are above the Basin Plan objective of 100 mg/L.

Phosphorus and Nitrogen. The average concentrations for total phosphorus and nitrate in dry weather flows increased downstream, while ammonia and total kjeldahl nitrogen concentrations were relatively consistent from upstream to downstream. All average nutrient concentrations were higher in the historical dataset. Nutrient concentrations measured in dry weather flows reflect the influence of the Saugus and Valencia WRPs. Lower average concentrations in the Newhall WRP startup monitoring, compared with the data at the USGS gauge, could be due to historically greater WRP nutrient discharge concentrations and/or less responsible use of fertilizers. Higher historic total kjeldahl nitrogen concentrations also could be attributed to the higher TSS concentrations, and hence particulate nutrients, observed at this site.

Metals. Concentrations of heavy metals in dry weather flows were generally low and, for the most part, reasonably similar. Total metal concentrations are related to TSS concentrations, and this is reflected in the difference between the historical data collected at the USGS site with higher TSS and the more recent data with lower TSS. Average dissolved copper concentrations were fairly similar and ranged from 1.8 to 4.2 μg/L. Average dissolved zinc concentrations also were fairly similar and ranged from 6.4 to 15.8 μg/L. Dissolved lead concentrations were slightly higher for the historical than the more recent datasets, and this is likely due to the widespread use of leaded gasoline prior to 1995.

Average concentrations of dissolved and total copper measured dry weather flows in the baseline data (2.9 μg/L to 4.2 μg/L, dissolved copper; 5 to 15.2 μg/L, total copper) were below the respective CTR chronic criteria for a hardness greater than 400 mg/L (29 μg/L, dissolved copper; 30 μg/L, total copper). Average concentrations of dissolved and total lead measured in dry weather flows (<5 μg/L to 2.5 μg/L, dissolved lead; 0.9 to 1.8 μg/L, total lead) were well below the respective CTR chronic criteria for a hardness greater than 400 mg/L (11 μg/L, dissolved lead; 19 μg/L, total lead). Average concentrations of dissolved and total zinc measured in dry weather flows (6.4 μg/L to 11 μg/L, dissolved zinc; 15.4 to 20.7 μg/L, total zinc) were all well below the respective CTR chronic criteria for a hardness greater than 400 mg/L (380 μg/L, dissolved zinc; 390 μg/L, total zinc).

Aluminum concentrations only were measured at the Newhall Ranch WRP pre-startup monitoring stations. Average dissolved aluminum concentrations in the dry weather flows ranged from 170 μg/L to 289 μg/L. Total aluminum ranged from 1,018 μg/L to 1,685 μg/L. The NAWQC acute criterion for acid soluble aluminum is 750 μg/L for a pH range of 6.5 to 9.0. The CTR does not include an aluminum criterion.

Pesticides. Diazinon was detected at the upstream LACDPW site and historically at the USGS site in dry weather flows. The more extensive data set collected at NR1 and NR3 did not detect diazinon and this may be due to its recent phase-out by the US EPA for residential uses.

Cyanide. Cyanide was measured but not detected in dry weather flows at the LACDPW mass emission station.

Coliform Bacteria. The concentrations of indicator bacteria indicated highly variable but generally elevated fecal indicator bacteria concentrations in dry weather flows. The observed data were above the REC-1 Basin Plan objective for fecal coliform (i.e., log mean of 200/100 mL (based on a minimum of not less than 10 percent of total samples during any 30-day period), nor shall more than 10 percent of the total number of samples during any 30-day period exceed 400/100 mL).

(4) Existing Groundwater Quality and Beneficial Uses

The project site is within the Basin Plan's Castaic Valley and Saugus Aquifer subbasin of the Santa Clarita Valley Groundwater Basin, East Subbasin. Beneficial uses for groundwaters for this subbasin are shown in **Table 4.3-10**, Beneficial Uses of Groundwater.

Table 4.3-10
Beneficial Uses of Groundwaters

Groundwater Basin	MUN
DWR 4.07 - Eastern Santa Clara Sub-basin: Castaic Valley and Saugus Aquifer	E

Source: Geosyntec, 2008.
E=Existing Beneficial Use
MUN: Community, military, or individual water supply systems including, but not limited to, drinking water supply.

The project area lies at the western end of the upper Santa Clara River hydrologic area, as defined by the DWR. The Santa Clara River Valley East Groundwater Subbasin lies within this hydrologic area and is the source of essentially all local groundwater used for water supply in the Santa Clarita Valley. The local groundwater supplies are obtained from relatively young surficial alluvial deposits and from an older geologic unit (the Saugus Formation) that underlies the alluvium and adjoining areas. The alluvium and the Saugus Formation are underlain by bedrock units consisting of the Pico Formation in the project area and other geologic units in the eastern and northern portions of the Santa Clarita Valley. These deep bedrock units yield little water and are not considered viable for groundwater development.

The alluvial sediments lie within the portion of the Santa Clarita Valley occupied by the Santa Clara River and also are present in side canyons that contain tributaries to the River. The alluvium consists of extensively interlayered and interfingered mixtures of gravel and sand, with variable amounts of cobbles and boulders and minor amounts of silt and clay. Due to the unconsolidated to poorly consolidated condition of the alluvium, and its lack of cementation, the alluvium has relatively high permeability and porosity. The groundwater flow direction in the Alluvial aquifer follows the topography of the Valley and its tributaries. Groundwater recharge occurs in the eastern, northern, and southern portions of the Valley. Natural mechanisms for groundwater discharge occur at the west end of the Valley and consist of discharge to the Santa Clara River, subsurface outflow beneath the River, and evapotranspiration by deep-rooted vegetation.

The Saugus Formation is present beneath the project site and most of the Santa Clarita Valley area east of the Specific Plan area. The upper subunits of the Saugus Formation consist of terrestrial sediments deposited by ancestral drainage systems in stream channels, floodplains, and alluvial fans. The upper subunits are a source of groundwater supply in the Santa Clarita Valley because of their productive nature and their good water quality. Deeper subunits of the Saugus Formation were deposited in a marine environment and are subsequently not used for water supplies because of their brackish water quality and fine-grained, low-permeability nature.

Faulting and folding of the Saugus Formation and the underlying bedrock units have created a bowl-shaped structure beneath the Santa Clarita Valley. The Saugus Formation and underlying bedrock generally dip downwards from the periphery of the Valley towards the deepest portion of the "bowl" beneath the central portion of the Valley. The thickness of the Saugus Formation also is controlled by the San Gabriel fault, which is present in the eastern and northern portions of the Valley. Because of its structure and its connection with the overlying Alluvial aquifer, groundwater flow in the Saugus Formation generally is towards the center of the bowl and also towards the western portion of the Santa Clara River. Like the Alluvial aquifer, the Saugus Formation is recharged in the eastern and other peripheral portions of the Santa Clarita Valley. Groundwater discharge from the Saugus Formation occurs at the west end of the Valley in the form of groundwater discharge into the overlying Alluvial aquifer, which in turn discharges to the River in the western end of the Valley.

Alluvium. In terms of the aquifer system, there is no convenient long-term record of water quality (i.e., water quality data in one or more single wells that spans several decades and continues to the present). Thus, in order to examine a long-term record of water quality in the alluvium, individual records have been integrated from several wells completed in the same aquifer materials and in close proximity to each other to examine historical trends in general mineral groundwater quality throughout the basin. (Luhdorff & Scalmanini Consulting Engineers, 2008. Santa Clarita Valley Water Report 2007.) Based on these records of groundwater quality, wells within the alluvium have experienced historical fluctuations in general mineral content, as indicated by electrical conductivity (EC), which correlates with fluctuations of individual constituents that contribute to EC. However, the historic water quality data indicates that, on a long-term basis, there has not been a notable trend and, specifically, there has not been a decline in water quality within the alluvium.

Specific conductance within the alluvium exhibits a westward gradient, corresponding with the direction of groundwater flow in the alluvium. EC is lowest in the easternmost portion of the basin, and highest in the west, and generally exhibits an inverse correlation with precipitation and streamflow, with a stronger correlation in the easternmost portion of the basin where groundwater levels fluctuate the most. Wet periods have produced substantial recharge of higher quality (low EC) water, and dry periods have resulted in declines in groundwater levels, with a corresponding increase in EC (and individual contributing constituents) in the deeper parts of the alluvium.

The most notable groundwater quality issue in the alluvium is perchlorate contamination in a localized area situated about 3 miles east of the project area. In 2002, one well (the Santa Clarita Water Division's Stadium Well), located near the former Whittaker-Bermite facility, was inactivated for municipal water supply due to detection of perchlorate slightly below the notification level. In early 2005, perchlorate was detected in a second well, the Valencia Water Company's Well Q2. In October 2005, Well Q2 was returned to service with wellhead perchlorate treatment under a permit from the California DHS. Ongoing monitoring in the alluvium north of the Whittaker-Bermite site (an ammunition manufacturing site) has shown no detections of perchlorate in any other Alluvial municipal water supply wells in this area.

Table 4.3-11, Groundwater Monitoring Data**,** summarizes average metals, general chemistry, and organic compounds data for three Alluvial aquifer wells located in and near the project area (see **Figure 4.3-1**). One well is a municipal water supply well that belongs to the Valencia Water Company (E-15) and is located in the Valencia Commerce Center area, northeast of the project boundary. Two Newhall Ranch agricultural Alluvial aquifer wells (C and B6) were monitored twice (once each in 2000 and 2001).

Laboratory testing indicates that all constituents tested were at acceptable levels for drinking water, for all tested wells, with the exception of sulfate and iron in the agricultural supply Well B6. Specifically, the average sulfate concentration (360 mg/L) exceeded the Basin Plan objective of 350 mg/L and the average iron concentration (0.4 mg/L) exceeded the secondary drinking water standard of 0.3 mg/L in Alluvial Well B6.

Tests conducted for perchlorate at the Alluvial aquifer wells listed in **Table 4.3-11, Groundwater Monitoring Data,** indicated "non-detect," meaning no perchlorate was detected. Furthermore, no organic contaminants have been detected in any Alluvial aquifer wells.

Saugus Formation. Similar to the Alluvial aquifer, groundwater quality in the Saugus Formation is a key factor in assessing that aquifer as a municipal and agricultural water supply. As with the Alluvial aquifer, long-term Saugus groundwater quality data is not sufficiently extensive (few wells) to permit any basin-wide analysis or assessment of pumping-related impacts on quality. Accordingly, EC has been chosen as an indicator of overall water quality, and records have been combined to produce a long-term depiction of water quality. Water quality in the Saugus Formation historically has not exhibited the precipitation-related fluctuations seen in the Alluvial aquifer, and based on the historical record over the last 50 years; groundwater quality in the Saugus Formation has exhibited a slight overall increase in EC.

Table 4.3-11, Groundwater Monitoring Data, summarizes average metals, general chemistry, and organic compounds data for one Saugus aquifer well located near the Project location (see **Figure 4.3-1**). Saugus Well 206 is a municipal water supply well that belongs to the Valencia Water Company. Laboratory testing indicates that all constituents tested were at acceptable levels for drinking water in Saugus Well 206.

As with the Alluvial aquifer, the most notable groundwater quality issue in the Saugus Formation is perchlorate contamination. Since 1997, four Saugus wells located near the former Whittaker-Bermite facility (about 2 miles east of the project location) have been inactivated for water supply service due to the presence of perchlorate. A fifth well in that same location showed a detection of perchlorate below the DHS reporting level of 4 μg/L. To date, in the Saugus Formation, there have been no perchlorate detections in other active municipal-supply wells located down gradient (west) of the impacted wells. The development and implementation of a cleanup plan for the former Whittaker-Bermite facility and the impacted groundwater resources is being coordinated among the Castaic Lake Water Agency (CLWA), impacted purveyors, the California Department of Toxic Substances Control (DTSC), and the ACOE. For the impacted groundwater, a Final Interim Remedial Action Plan for containment and extraction of perchlorate was completed and approved by DTSC in January 2006. Design of the treatment facilities and related pipelines also was completed in 2006. Construction of these facilities to implement the pump-and-treat program and to restore inactivated well capacity began in November 2007, with the facilities operational by 2009. (Luhdorff and Scalmanini Consulting Engineers, 2007. Santa Clarita Valley Water Report 2008.)

Table 4.3-11
Groundwater Monitoring Data

Parameter	Units	Basin Plan Objective /Maximum Contaminant Level	Average Concentration			
			Alluvial Well E-15	Alluvial Well C	Alluvial Well B6	Saugus Well 206
Aluminum	µg/L	1,000(2)	ND	ND	ND	ND
Arsenic	µg/L	50(2)	n/a	ND	ND	n/a
Barium	mg/L	1(2)	ND	0.02	0.03	ND
Beryllium	µg/L	4(2)	ND	n/a	n/a	ND
Cadmium	µg/L	5(2)	ND	ND	ND	ND
Chromium	µg/L	50(2)	ND	ND	ND	ND
Copper	µg/L	1,000(3)	ND	ND	ND	ND
Iron	mg/L	0.3(3)	ND	0.1	**0.4**	ND
Manganese	µg/L	50(3)	ND	ND	ND	ND
Mercury, Total	µg/L	2(2)	n/a	ND	ND	n/a
Nickel	µg/L	100(2)	ND	ND	ND	ND
Selenium	µg/L	50(2)	n/a	ND	ND	n/a
Silver	µg/L	100(3)	NA	ND	ND	n/a
Thallium	µg/L	2(2)	NA	ND	ND	n/a
Zinc	µg/L	5,000(3)	ND	ND	ND	ND
Alkalinity as CaCO3	mg/L	--	226	255	295	221
Boron	mg/L	1.0(1)	0.48	0.39	0.48	n/a
Chloride	mg/L	150(1)	90	57	82	45
Color	Color unit	15(3)	ND	ND	5	ND
Cyanide, total	mg/L	0.15(2)	n/a	ND	ND	n/a
Fluoride	mg/L	2.0(2)	0.8	0.7	0.8	0.2
Hardness as CaCO3	mg/L	--	499	410	510	464
MBAS	mg/L	0.5(3)	n/a	ND	ND	n/a
Nitrate as NO3	mg/L	45(1)	18.5	9.5	10.6	20.9
Nitrite as N	mg/L	1(1)	ND	ND	ND	ND
Nitrate+Nitrite as N	mg/L	10(1)	3.6	2.1	2.4	4.7
Odor	TON	3(3)	1.1	ND	ND	1
Specific Conductance	umhos/cm	900-1600(3)	1317	1150	1400	1158
Sulfate	mg/L	350(1)	314	285	**360**	293

Parameter	Units	Basin Plan Objective /Maximum Contaminant Level	Average Concentration			
			Alluvial Well E-15	Alluvial Well C	Alluvial Well B6	Saugus Well 206
TDS	mg/L	1,000(1)	969	760	950	861
Turbidity	NTU	5(3)	0.4	0.35	1.4	0.2
Volatile Organic Chemicals (VOCs)	µg/L	variable	ND	ND	ND	ND
Synthetic Organic Chemicals (SVOCs)	µg/L	variable	ND	ND	ND	ND
Key: **Bold = Exceeds Standard**						

Source: Geosyntec 2008.
-- = no applicable Basin Plan objective or MCL
n/a = not analyzed
ND = none detected
1 Los Angeles Basin Plan Regional Objectives for Groundwater (Table 3-10).
2 California Department of Public Health Primary Drinking Water MCL (Title 22 CCR Table 64431-A and Table 64444-A).
3 California Department of Public Health Secondary Drinking Water MCL (Title 22 CCR Table 64449-A and Table 64449-B).

5. POLLUTANTS AND CONDITIONS CONSIDERED

a. Surface Water Pollutants of Concern

Pollutants of concern, as defined in the Los Angeles County SUSMP Manual, consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water; elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein; or detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna. The pollutants of concern for the water quality analysis are those that are anticipated or potentially could be generated by the project at concentrations, based on water quality data collected in Los Angeles County from land uses that are the same as those proposed by the project, that exhibit these characteristics. Identification of the pollutants of concern also considered Basin Plan beneficial uses and water quality objectives, CTR criteria, and current Section 303(d) listings and TMDLs in the Santa Clara River, as well as pollutants that have the potential to cause toxicity or bioaccumulate in the project's receiving waters.

The pollutants described below were chosen as pollutants of concern for purposes of evaluating water quality based upon the above considerations.

Sediments (TSS and Turbidity). Excessive erosion, transport, and deposition of sediment in surface waters are a significant form of pollution resulting in major water quality problems. Sediment imbalances impair the designated uses of water. Excessive sediment also can impair aquatic life by filling interstitial spaces of spawning gravels, impairing fish food sources, filling rearing pools, and reducing beneficial habitat structure in stream channels. In addition, excessive sediment can cause taste and odor problems in drinking water supplies and block water intake structures. Turbidity is associated with project development primarily during the construction phase.

Nutrients (Phosphorus and Nitrogen (Nitrate+Nitrite-N, Ammonia-N, and Total Nitrogen)). Nutrients of concern include the inorganic forms of nitrogen (nitrate, nitrite, and ammonia) and phosphorus. Organic forms of nitrogen are associated with vegetative matter such as particulates from sticks and leaves. Inorganic forms of nitrogen include nitrate, nitrite, and ammonia. Total Nitrogen (TN) is a measure of all nitrogen present, including inorganic and particulate forms. Phosphorus can be measured as total phosphorus (TP) or as dissolved phosphorus. Dissolved phosphorus is the more bioavailable form of phosphorus. TP is often composed mostly of soil-related particulate phosphorus. There are several sources of nutrients in urban areas, mainly fertilizers in runoff from lawns, pet wastes, failing septic systems, atmospheric deposition from industry and automobile emissions, and soil erosion. Nutrient over-enrichment is especially prevalent in agricultural areas where manure and fertilizer inputs to crops significantly contribute to nitrogen and phosphorus levels in streams and other receiving waters. Eutrophication due to excessive nutrient input can lead to changes in algae, benthic, and fish communities; extreme eutrophication can cause hypoxia or anoxia, resulting in fish kills. Surface algal scum, water discoloration, and the release of toxins from sediment also can occur.

Various downstream reaches of the Santa Clara River are identified as impaired by ammonia and nitrate-plus nitrite-nitrogen. Evidence of impairment includes low diversity of benthic macroinvertebrates and observations of excessive algae growth. A source analysis found that the majority of ammonia and nitrate/nitrite loads are from point sources; primarily WRPs. (LARWQCB, 2003. Santa Clara River Total Maximum Daily Loads for Nitrogen Compounds Staff Report. California Regional Water Quality Control Board Los Angeles Region. June 16 2003.) Sources from municipal storm sewers are considered a minor source, but have a potential to cause significant local effects on water quality (LARWQCB, 2003. Santa Clara River Total Maximum Daily Loads for Nitrogen Compounds Staff Report. California Regional Water Quality Control Board Los Angeles Region. June 16 2003.) TMDLs have been developed and adopted into the Basin Plan for nitrogen compounds, including nitrate/nitrite and ammonia.

Trace Metals (Aluminum, Copper, Lead, and Zinc). The primary sources of trace metals in stormwater are typically commercially available metals used in transportation (*e.g*., automobiles), buildings, and infrastructure. Metals also are found in fuels, adhesives, paints, and other coatings. Copper, lead, and zinc are the most prevalent metals typically found in urban runoff. Other trace metals, such as cadmium, chromium, and mercury, are typically either not detected in urban runoff or are detected at very low levels. (LACDPW, 2000. Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report.) Metals are of concern because of the potential for toxic effects on aquatic life and the potential for ground water contamination. High metal concentrations can lead to bioaccumulation in fish and shellfish and affect the beneficial uses of receiving waters.

Aluminum. Aluminum has been identified by the LACDPW as a constituent of concern for the Santa Clara River based on monitoring conducted at mass emission station S29 (see **Existing Water Quality**, above). In stormwater, the majority of aluminum is in the particulate phase. Its presence in stormwater is mainly due to aluminosilicate minerals found in soils, because stormwater particles are largely composed of eroded soils. Aluminum is a large component of soils and is the third most common element in the earth's crust. The average aluminum soil content is about (8) eight percent (or 80,000 mg/kg) and suspended sediments in rivers have total aluminum contents of a similar order of magnitude. Aluminosilicates include a wide range of minerals with varying properties; some are formed during the laying down of the earth's crust and some by weathering processes. In urban areas, aluminum building materials are a minor source of aluminum, as the metal is coated in unreactive aluminum oxide.

Pathogens (Bacteria, Viruses, and Protozoa). Elevated pathogens typically are caused by the transport of domestic animal, wildlife, or human fecal wastes from the watershed. Runoff that flows over land (such as urban runoff) can mobilize pathogens, including bacteria and viruses. Even runoff from natural areas (e.g., from wildlife) can contain pathogens. Other sources of pathogens in urban areas include pets, septic systems, and leaky sanitary sewer pipes. The presence of pathogens in runoff can impair receiving waters and contaminate drinking water sources.

Historically an indicator organism such as fecal coliform has been used for pathogens due to the difficulty of monitoring for pathogens directly. More recently, the scientific community has questioned the use of indicator organisms, as scientific studies have shown no correlation between indictor and pathogen levels; therefore, total and fecal coliform may not indicate a significant potential for causing human illness. (Paulsen, Susan and J. List, 2005. Review of Bacteria Data from Southern California Watersheds. Prepared by Flow Science for The Irvine Company. April 2005.) Santa Clara River Reach 5 is identified as impaired by high fecal coliform counts from point and non-point sources. Coliform TMDLs have not yet been developed for this reach.

Petroleum Hydrocarbons (Oil and Grease and PAHs). The sources of oil, grease, and other petroleum hydrocarbons in urban areas include spillage fuels and lubricants, discharge of domestic and industrial wastes, atmospheric deposition, and runoff. Runoff can be contaminated by leachate from asphalt roads, wearing of tires, and deposition from automobile exhaust. Also, do-it-yourself auto mechanics may dump used oil and other automobile-related fluids directly into storm drains. Petroleum hydrocarbons, such as polycyclic aromatic hydrocarbons (PAHs), can bioaccumulate in aquatic organisms from contaminated water, sediments, and food and are toxic to aquatic life at low concentrations. Hydrocarbons can persist in sediments for long periods of time and result in adverse impacts on the diversity and abundance of benthic communities. Hydrocarbons can be measured as total petroleum hydrocarbons (TPH), oil and grease, or as individual groups of hydrocarbons, such as PAHs.

Pesticides. Pesticides (including herbicides, insecticides, and fungicides) are chemical compounds commonly used to control insects, rodents, plant diseases, and weeds. Excessive application of a pesticide in connection with agriculture cultivation or landscaping may result in runoff containing toxic levels of its active component. Pesticides may be classified as organochlorine pesticides or organophosphorus pesticides, the former being associated with persistent bioaccumulative pesticides (e.g., dichlorodiphenyltrichloroethane [DDT] and other legacy pesticides), which have been banned. The Santa Clara River estuary is listed as impaired for legacy pesticides. Organophosphorus pesticides include diazinon and chlorpyrifos, the use of which is restricted by the US EPA.

Trash and Debris. Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic debris (such as leaves, grass cuttings, and food waste) are general waste products on the landscape that can be entrained in urban runoff. The presence of trash and debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a water body and, thereby, lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds, such as hydrogen sulfide.

Chloride. High levels of chloride in Santa Clara River Reaches 3, 5 and 6 are causing impairment of listed beneficial uses for agricultural irrigation. Irrigation of salt sensitive crops, such as avocados and strawberries, with water containing elevated levels of chloride can result in reduced crop yields. Chloride levels in some areas exceed water quality standards associated with groundwater recharge. Chloride TMDLs are included in the Basin Plan. The major sources of elevated chloride are dry-weather discharges from WRPs, contributing about 70 percent of the chloride load. Minor point sources are dewatering operations, which may discharge chloride occurring naturally in groundwater, and uncontrolled swimming pool and water ride discharges.

Methylene Blue Activated Substances (MBAS). MBAS are related to the presence of detergents in water. Positive results may indicate the presence of wastewater or be associated with urban runoff due to commercial and/or residential vehicle washing or other outdoor washing activities. Surfactants disturb the surface tension, which affects insects and can affect gills in aquatic life.

Cyanide. Cyanide has been identified by the LACDPW as a constituent of concern for the Santa Clara River based on monitoring conducted at mass emission station S29. (LACDPW, 2005. Los Angeles County 1994-2005 Integrated Receiving Water Impacts Report Final Report - August 2005.) Cyanide is used in electroplating, metallurgy, and mining. It also is used to make synthetic fibers, plastics, dyes, pharmaceuticals, and pesticides, including fumigants. In addition, cyanide serves as a chemical intermediate in various production processes. Natural cyanides are produced by certain bacteria, fungi, and algae; and they are present in a number of plants and foods as cyanogenic glycosides. Man-made cyanides typically enter the environment from metal finishing and organic chemical industries. Other sources include iron and steel works, municipal waste burning, cyanide-containing pesticides, road deicers, and vehicle exhaust.

Bioaccumulation. Certain pollutants, such as pesticides, selenium and mercury, have a tendency to bioaccumulate. The Basin Plan and the CTR criteria set forth toxicity objectives for receiving water levels of substances that bioaccumulate in aquatic resources to prohibit concentrations of toxic substances that are harmful to human health and adversely affect beneficial uses.

b. Other Constituents in Surface Water

This section discusses other constituents that are listed in the Basin Plan, but for reasons explained below, are not pollutants of concern for the Landmark Village project.

BOD (Biochemical Oxygen Demand) and Dissolved Oxygen. Adequate levels of dissolved oxygen are necessary to support aquatic life. High levels of oxygen demanding substances discharged to receiving waters can depress oxygen levels and contribute to algal growth. Oxygen demanding substances are compounds that can be biologically degraded through aerobic processes. Nutrients in fertilizers and food wastes in trash are examples of likely oxygen demanding compounds that would be present on the project site. Other biodegradable organic materials include human and animal waste and vegetative matter. Biodegradable pollutants largely are subsumed by the nutrients and trash and debris categories above; therefore, these pollutants will not be discussed as a separate constituent category.

Chemical Constituents. Chemical constituents in excessive amounts in drinking water are harmful to human health. The Basin Plan objective for chemical constituents states: "Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use." As Santa Clara River Reach 5 is not designated with a municipal water supply designated use, chemical constituents are not a pollutant of concern for the project.

Temperature. Increases in temperature can result in lower dissolved oxygen levels, impairing habitat and other beneficial uses of receiving waters. Discharges of wastewater also can cause unnatural and/or rapid changes the in temperature of receiving waters, which can adversely affect aquatic life. Elevated temperatures typically are associated with discharges of process wastewaters or non-contact cooling waters. As the beneficial uses in the receiving waters for the project include warm freshwater habitat to support warm water ecosystems, temperatures of stormwater runoff from the project are not of concern.

Total Residual Chlorine. Total residual chlorine can be present in WRP discharges, or may be present in dry weather urban runoff from the emptying of swimming pools that have not been de-chlorinated. Chlorine is a strong oxidant and is, therefore, toxic to aquatic life. Municipal pools and private pools in areas served by a municipal sanitary system are required to be discharged into the sanitary system; therefore, total residual chlorine will not be present in runoff from the project.

Color, Taste, and Odor. The Basin Plan contains narrative objectives for color, taste, and odor that cause a nuisance or adversely affects beneficial uses. Undesirable tastes and odors in water may be a nuisance and may indicate the presence of a pollutant(s). Odor associated with water can result from decomposition of organic matter or the reduction of inorganic compounds, such as sulfate. Other potential sources of odor causing substances, such as industrial processes, will not occur as part of the project. Color in water may arise naturally, such as from minerals, plant matter, or algae, or may be caused by industrial pollutants. The project will contain no industrial uses. Therefore, color-, taste-, or odor-producing substances are not pollutants of concern for the project.

Exotic Vegetation. Non-native (exotic) vegetation typically provides little habitat value and can out-compete native vegetation that is more suitable habitat for aquatic and terrestrial organisms. The Basin Plan objective for exotic vegetation states: "Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects designated beneficial uses." The potential for non-native plant species to impact natural drainages is analyzed in **Section 4.4, Biota**, of this Recirculated EIR.

Mineral Quality: TDS, Sulfate, Boron, and Sodium Absorption Rate (SAR). Mineral quality in natural waters largely is determined by the mineral assemblage of soils and rocks near the land surface. Elevated mineral concentrations could impact beneficial uses; however, the minerals listed in the Basin Plan, except for chloride and nitrogen, are not believed to be constituents of concern due to the absence of River impairments and/or because, as with TDS, anticipated post-development runoff concentrations well below the Basin Plan objectives (**Table 4.3-12**). Therefore, these constituents are not considered pollutants of concern for the project.

Table 4.3-12
Comparison of Mineral Basin Plan Objectives with Mean Measured Values in Los Angeles County

Mineral	Los Angeles Basin Plan Water Quality Objective for Santa Clara River Reach 5 (mg/L)	Range of Mean Concentration in Urban Runoff[1] (mg/L)
Total Dissolved Solids	1000	53–226
Sulfate	400	7–35
Boron	1.5	0.16–0.25
Sodium Absorption Ratio[2]	10	0.4–1.9

Source: Geosyntec, 2008.
[1] *Los Angeles County, 2000. Land uses include SFR, MFR, commercial, education, transportation, light industrial, and mixed residential.*
[2] *Sodium absorption ratio (SAR) predicts the degree to which irrigation water tends to enter into cation-exchange reactions in soil.*

pH. The hydrogen ion activity of water (pH) is measured on a logarithmic scale, ranging from 0 to 14. While the pH of "pure" water at 25 °C is 7.0, the pH of natural waters is usually slightly basic due to the solubility of carbon dioxide from the atmosphere. Aquatic organisms can be highly sensitive to pH. The Basin Plan objective for pH states: "the pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge."

Mean runoff pH concentrations in the Los Angeles County stormwater monitoring data ranged from 6.5 for mixed- and single-family residential land uses to 7.0 for commercial land use. Therefore, it is not expected that pH in the Santa Clara River would be affected by runoff discharges from the project.

PCBs. Polychlorinated Biphenyls (PCBs) are highly toxic persistent chemicals that, historically, were released into the environment from industrial uses, such as transformers, but are no longer produced in the United States. Due to their persistence, PCBs can still be detected in urban runoff due to historic industrial sources of these chemicals. The project area did not historically include PCB-producing land uses. Therefore, PCBs are not a pollutant of concern for the project.

Radioactive Substances. Radioactive substances typically occur at very low concentrations in natural waters. Some activities, such as mining or certain industrial activities (e.g., energy production, fuel reprocessing), can increase the amount of radioactive substances impairing beneficial uses. The project would not have industrial or other activities that would be a source of any radioactive substances, and development would stabilize any naturally radioactive soils, which are unlikely to be present in the project area. Therefore, radioactive substances are not a pollutant of concern for the project.

Toxicity. Certain pollutants in stormwater runoff have the potential to be highly toxic to aquatic organisms and result in effects such as impaired reproduction or mortality. The Basin Plan water quality objective for toxicity is that "[a]ll surface waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life." Toxicity in urban runoff could be caused by ammonia, trace metals, PAHs, or pesticides. These constituents are subsumed by the pollutant of concern categories above.

c. Groundwater Pollutants

The project may require dewatering of shallow groundwater during the construction phase. The potential for dewatering discharges to affect surface water quality is addressed by considering surface water pollutants of concern. The project would allow for incidental infiltration of urban runoff to groundwater after receiving treatment in the project PDFs, as well as incidental infiltration of irrigation water. Research conducted on the effects on groundwater from stormwater infiltration by Pitt et al. (1994) indicate that the potential for contamination due to infiltration is dependent on a number of factors, including the local hydrogeology and the chemical characteristics of the pollutants of concern.

Pollutant characteristics that influence the potential for groundwater impacts from infiltration include high mobility (low absorption potential), high solubility fractions, and abundance in runoff, including dry weather flows. As a class of constituents, trace metals tend to adsorb onto soil particles and are filtered out by the soils. This has been confirmed by extensive data collected beneath stormwater detention/retention ponds in Fresno (conducted as part of the Nationwide Urban Runoff Program), which showed that trace metals tend to be adsorbed in the upper few feet in the bottom sediments. (Brown & Caldwell, 1984. Fresno Nationwide Urban Runoff Program Project. Report for the Fresno Metropolitan Flood Control Board, May 1984.) Bacteria also are filtered out by soils. More mobile and soluble pollutants, such as chloride and nitrate, have a greater potential for impacting groundwater through infiltration.

(1) Groundwater Pollutants of Concern

The pollutants of concern for the groundwater quality analysis are those that are anticipated or potentially could be generated by the project at concentrations, based on water quality data collected in Los Angeles County from land uses that are the same as those included in the project, that exhibit these characteristics. Identification of the pollutants of concern for the project considered proposed land uses, as well as pollutants that have the potential to impair beneficial uses of the groundwaters below the project based on applicable water quality standards. The Los Angeles Basin Plan contains numerical objectives for bacteria, mineral quality, nitrogen, and various toxic chemical compounds, and contains qualitative objectives for taste and odor.

Nitrate+nitrite-N was chosen as the pollutant of concern for purposes of evaluating groundwater quality impacts based upon the above considerations. High nitrate levels in drinking water can cause health problems in humans. Infants can develop methemoglobinemia (blue-baby syndrome). Human activities and land use practices can influence nitrogen concentrations in groundwaters. For example, irrigation water containing fertilizers can increase levels of nitrogen in groundwater.

(2) Other Groundwater Constituents

Other constituents typically associated with groundwater include the following:

Bacteria. The Basin Plan contains numeric criteria for bacteria in drinking water sources. As bacteria are removed through straining in soils (for example, as with septic tank discharges), incidental infiltration of runoff in the project treatment PDFs is not expected to affect bacteria levels in groundwater. The WRP will include a disinfection process to reduce bacteria below levels of concern; therefore, bacteria in irrigation water are not expected to impact groundwater.

Chemical Constituents and Radioactivity. Drinking water limits for inorganic and organic chemicals that can be toxic to human health in excessive amounts and radionuclides are contained in Title 22 of the California Code of Regulations. These chemicals and radionuclides are not expected to occur in this project's runoff because this project does not include industrial uses. Title 22 specifies California's Wastewater Reclamation Criteria (WRC) and the Newhall Ranch WRP's reclaimed water must meet or exceed these criteria. These criteria apply to the treatment processes; treatment performance standards, such as removal efficiencies and effluent water quality; process monitoring programs, including type and frequency of monitoring; facility operation plans; and necessary reliability features. Due to compliance with these criteria, chemical constituents and radionuclides are not expected to occur in irrigation water in amounts that would impact groundwater.

Taste and Odor. The Basin Plan contains a narrative objective for taste and odor that cause a nuisance or adversely affect beneficial uses. Undesirable tastes and odors in groundwater may be a nuisance and may indicate the presence of a pollutant(s). Odor associated with water can result from natural processes, such as the decomposition of organic matter or the reduction of inorganic compounds, such as sulfate. Pollutants causing taste and odor issues are not expected to occur in stormwater or irrigation water in amounts that would impact groundwater. Other potential sources of odor causing substances, such as industrial processes, would not occur as part of this project. Therefore, taste and odor-producing substances are not pollutants of concern for the project.

Mineral Quality: TDS, Sulfate, Chloride, and Boron. Mineral quality in groundwaters is largely influenced by the mineral assemblage of soils and rocks that it comes into contact with. Elevated mineral concentrations could impact beneficial uses; however, the minerals listed in the Basin Plan are not believed to be pollutants of concern due to the anticipated runoff concentrations and the expected mineral concentrations in Newhall Ranch WRP irrigation water, which are below the Basin Plan groundwater objectives (**Table 4.3-13**, below) for minerals. As required by the CWA, the Newhall Ranch WRP discharge permit includes effluent limitations that are protective of receiving water quality and designated beneficial uses. Effluent limits in the WDR were developed based on the most stringent of applicable technology-based and water quality-based standards, including Basin Plan surface and groundwater objectives, CTR criteria, and applicable TMDL wasteload allocations. Therefore, these constituents are not considered pollutants of concern for the project.

Table 4.3-13
Comparison of Basin Plan Mineral Groundwater Objectives with Mean Measured Values in Los Angeles County Urban Runoff and Anticipated Irrigation Water Quality

Mineral	Los Angeles Basin Plan Groundwater Quality Objective[1] (mg/L)	Range of Mean Concentrations in Urban Runoff[2] (mg/L)	Anticipated Average Concentration in Effluent from the Newhall Ranch WRP[3](mg/L)
Total Dissolved Solids	1,000	53–237	790
Sulfate	350	7–35	165
Chloride	150	4–50	<100
Boron	1.0	0.2–0.3	0.69

Source: Geosyntec, 2008.
[1] *Eastern Santa Clara-Castaic Valley*
[2] *Source: LACDPW, 2000. Includes all monitored land uses.*
[3] *Source: CH2M Hill, 2007.*

d. Hydrologic Conditions of Concern (Hydromodification)

Urbanization modifies natural watershed and stream hydrologic and geomorphic processes by introducing increased volumes and duration of flow *via* increased runoff from impervious surfaces and drainage infrastructure. Several studies have evaluated affects of increased runoff associated with the introduction of impervious surfaces and drainage facilities on geomorphic processes. (SCCWRP, 2005a; Geosyntec, 2002; Bledsoe & Watson, 2001; Booth, 1990; Hollis, 1975; Hammer, 1972). Potential changes to the hydrologic regime may include increases in runoff volumes, frequency of runoff events, long-term cumulative duration, as well as increased peak flows. Urbanization also may introduce dry weather flows where only wet weather flows existed prior to development. These changes are referred to as "hydromodification."[24]

Hydromodification intensifies sediment transport and often leads to stream channel enlargement and loss of habitat and associated riparian species. (SCCWRP, 2005; Geosyntec, 2002; Bledsoe & Watson, 2001; MacRae, 1992; Booth, 1990). Under certain circumstances, development can also cause a reduction in the amount of sediment supplied to the stream system, which can lead to stream channel incision and widening. These changes also have the potential to impact downstream channels and habitat integrity. A project that increases runoff due to impervious surfaces and traps sediment from upland watershed sources creates potential compounding effects.

A change to the project site's hydrologic regime would be considered a condition of concern if the change could have a significant impact on downstream natural channels and habitat integrity, alone or in conjunction with impacts of other projects.

6. POST DEVELOPMENT PROJECT DESIGN FEATURES

PDFs incorporated into the Landmark Village tract map project and off-site improvements to address surface water quality and hydromodification impacts include low impact/site design, source control, treatment control, and hydromodification control BMPs. Effective management of wet and dry weather runoff water quality begins with limiting increases in runoff pollutants and flows at the source. Low impact/site design and source control BMPs are practices designed to minimize runoff and the introduction of pollutants into runoff. Treatment control BMPs are designed to remove pollutants once they have been mobilized by rainfall and runoff. Hydromodification control BMPs are designed to control increases in post-development runoff flows, volumes, and/or durations.

a. Low Impact/Site Design BMPs

The purpose of low impact/site design BMPs, to the extent feasible, is to mimic the pre-developed hydrologic regime. This low impact/site design philosophy is often referred to as Low Impact Development (LID). (See County of Los Angeles Low Impact Development Standards Manual, January 2009.) The primary goals of low impact/site design BMPs are to maintain a landscape functionally equivalent to pre-development hydrologic conditions and to minimize the generation of pollutants of concern.

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24 Hydromodification also can refer to physical alterations to drainage beds and banks. The impacts and affects resulting from these types of physical alterations, rather than the effects associated with changes in flows, are addressed in **Section 4.5,** Floodplain Modification.

Low impact/site design principles include:

Minimize Impervious Area/Maximize Permeability. Principles include preserving natural open space; reducing impervious surfaces (such as roads); using more permeable paving materials; reducing street widths; using minimal disturbance techniques during development to avoid soil compaction; reducing the land coverage of buildings by building taller and narrower footprints; minimizing the use of impervious materials, such as decorative concrete in landscape design; and incorporating detention or infiltration into landscape design.

Minimize Directly Connected Impervious Areas (DCIAs). Minimizing DCIA can be achieved by directing runoff from impervious areas to vegetated areas (e.g., landscaped areas or vegetated treatment control BMPs) or to infiltration BMPs.

Conserve Natural Areas. Conserving and protecting native soils, vegetation, and stream corridors helps to mimic the site's natural hydrologic regime. This may be accomplished by clustering development within portions of the site to conserve as much natural open space as possible, limiting the extent of clearing and grading of native vegetation, planting additional vegetation, using native and/or non-native/non-invasive vegetation in parking lot islands and other landscape areas, and preserving and/or restoring riparian areas and wetlands.

Select Appropriate Building Materials. Use of appropriate building materials reduces the generation and discharge of pollutants of concern in runoff (and is, therefore, also a source control BMP).

Protect Slopes and Channels. Protecting slopes and channels reduces the potential for erosion and preserves natural sediment supply.

Low impact/site design implementation for the project occurs at different spatial scales of development. These spatial scales are listed below, from larger to smaller scale:

- Ranch scale – the Newhall Ranch Specific Plan subregion;
- Village scale – the Landmark Village project;
- Land use scale – single family residential, multi-family residential, commercial, education, parks, and roadways within the Landmark Village project, and
- Lot or parcel scale – individual lots or parcels within the Landmark Village project.

Table 4.3-14, Landmark Village Low Impact/Site Design BMPs, lists the low impact/site design BMPs that would be implemented by the project at each spatial scale.

Table 4.3-14
Landmark Village Low Impact/Site Design BMPs

Spatial Scale	Corresponding Low Impact/Site Design BMP
Ranch Scale	The Newhall Ranch Specific Plan clusters development into villages. Approximately 70% (8,335 acres) of the Specific Plan subregion will remain undeveloped Open Areas.
	A system of Open Areas will weave through the Specific Plan area. The Open Areas include community parks, prominent ridges, bluffs, slopes, creek beds, and utility and trail system easements, and would often function as a transition between development areas and the Special Management Areas (SMAs), which include the Santa Clara River Corridor and the Newhall Ranch High Country. The Open Areas are designed to protect significant landforms and natural resources.
	The Newhall Ranch Specific Plan Land Use Plan designates a total of approximately 5,200 acres for the SMAs. These SMAs are designed to protect the existing natural resources within Los Angeles County's Significant Ecological Areas (SEA) 20 and 23.
	The nearly 1,000-acre Santa Clara River Corridor SMA is designed to protect the sensitive biological resources in SEA 23. The River Corridor SMA will be dedicated to the Center for Natural Lands Management, and the Center will assume responsibility for management of this area.
	The largest land use designation of the Land Use Plan is the approximately 4,200-acre High Country SMA/SEA 20. The High Country SMA/SEA 20 is located in the southern portion of the subregion and includes oak savannahs, high ridgelines, and various canyon drainages, including Salt Creek, a regionally significant wildlife corridor that provides an important habitat link to the Santa Clara River. The High Country SMA/SEA 20 will be dedicated in fee to the Newhall Ranch Joint Powers Authority (JPA), consisting of the County of Los Angeles, the City of Santa Clarita, and the Santa Monica Mountains Conservancy; this JPA will assume responsibility for management of this area.
	As a result of approval of the Newhall Ranch Specific Plan, the 1,500-acre portion of the Salt Creek watershed situated in Ventura County, which is under the ownership of Newhall Land, will be dedicated to the JPA. This dedication area is west of Newhall Ranch, and will be managed in the same manner as the High Country SMA, discussed above.
	Two conservation easements have been granted to CDFG for the purpose of conserving populations of spineflower that occur on the Specific Plan area.

Spatial Scale	Corresponding Low Impact/Site Design BMP
Landmark Village Scale	Impervious areas would be minimized by incorporating landscaped areas into each village, including Landmark Village. Approximately 59.6 acres (20%) of the 292.6 gross acre Landmark Village project tract map area would remain as trails, parks, and vegetated slopes, and water quality treatment BMPs. Additional landscaped areas would be provided in conjunction with the residential and commercial uses, resulting in approximately 39% of the tract map site being pervious.
	The Landmark Village stormwater treatment system would provide treatment control for 100% of post-development impervious surface *via* the use of vegetated treatment BMPs that provide for volume reduction through infiltration and evapotranspiration, including one or more of the following volume reduction BMPs: bioretention, vegetated swales, and a dry extended detention basin. See **Figure 4.3-2** and **Tables 5.0-4** through **5.0-7**.
	In areas not subject to mass grading, the smallest site disturbance area possible would be delineated and flagged; temporary storage of construction equipment would be restricted in these areas to minimize soil compaction on site. Site clearing and grading would be limited to the footprint necessary to allow development, access, and provide fire protection.
	The Santa Clara River Corridor, Chiquita Canyon, Long Canyon and Castaic Creek would be largely preserved, and development impacts to these resources would be minimized., An average buffer (the distance between the existing riparian resources and the Regional River Trail) of 100 feet would be provided along the Santa Clara River Corridor; additionally, commercial, residential, and mixed use development would be setback 100 feet from the Regional River Trail outside of the Santa Clara River SMA/SEA 23, which would further separate development from the Santa Clara River Corridor.
	Natural slopes and native vegetation on slopes adjacent to the Santa Clara River would be restored and enhanced.

Spatial Scale	Corresponding Low Impact/Site Design BMP
Land Use Scale	Streets, sidewalks, and parking lot aisles would be constructed to the minimum widths specified in the Specific Plan, and in compliance with regulations for the Americans with Disabilities Act and safety requirements for fire and emergency vehicle access.
	Portions of the Santa Clara River Regional River Trail would incorporate granular materials, or other pervious materials.
	Native and/or non-native/non-invasive, climate-appropriate vegetation that requires less watering and chemical application would be utilized within the common area landscaping in commercial areas and multi-family residential areas.
	Impervious surfaces would be minimized in common area landscape design for commercial areas and multi-family residential areas.
	Landscape watering in common areas, commercial areas, multiple family residential areas, and parks would use efficient reclaimed water irrigation technologies with centralized irrigation controls. Efficient irrigation for common area irrigation systems would include a combination of the following techniques: • Low volume irrigation systems, including low volume sprinkler heads, drip emitters, and bubbler emitters. • "Smart" irrigation controllers, to control the amount of time irrigation systems are operated each day, including satellite controlled sensors or other equally effective technology.
Lot Scale	Bioretention would be placed within the road right-of-way along "A" Street.
	Runoff from most sidewalks, walkways, trails, and patios would be directed into adjacent landscaping or to vegetated swales.
	Bioretention areas or vegetated swales would collect and treat runoff from some of the commercial and multi-family residential areas. These bioretention areas would be located in parking lot islands and other on-site landscaped areas.
	Landscape areas would be integrated into each site.
	Porous pavement would be used in some parking and low traffic areas.
	Building materials for roof gutters and downspouts would not include copper or zinc.
	Future structures would direct rooftop runoff through landscaped areas to the extent feasible.

Source: Geosyntec, 2008.

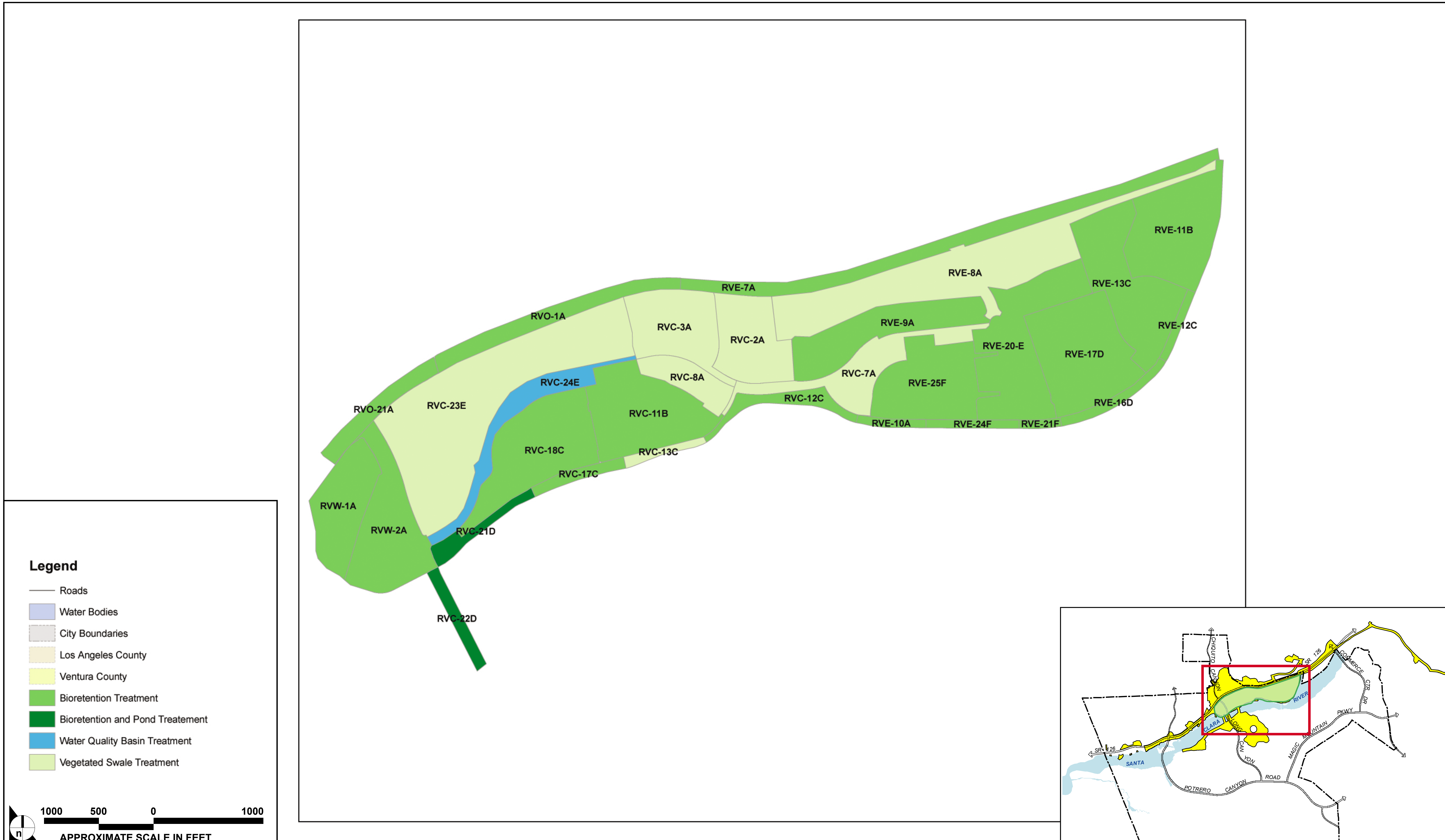
b. Treatment BMPs

As currently planned, stormwater runoff from all urban areas within the project would be routed to bioretention areas, vegetated swales and/or extended detention basin treatment control BMPs (**Figure 4.3-2, Project Design Features**). Catch basin inserts also would be used in high-use parking lots. Collectively, the water quality treatment control PDFs would treat the pollutants of concern in runoff from the approximately 292.6-gross-acre Landmark Village development area. Long Canyon Bridge would drain to a water quality extended detention basin located within the tract map site. The off-site SR-126 expansion project would provide vegetated swale treatment for both the new and existing untreated roadway area. The utility corridor maintenance access road and potential future trail, as well as the water tank and access roads, would drain to biofiltration (vegetated swale or filter strip) or bioretention treatments. These extended detention basin, vegetated swales, and bioretention areas would be designed to operate off-line, receiving dry weather flows, small storm flows and the initial portion of large storm flows from a low-flow diversion structure in the storm drain. The proposed treatment control PDFs are illustrated in **Figure 4.3-3, Examples of Bioretention Facilities**; **Figure 4.3-4**, **Conceptual Illustration of a Vegetated Swale**; and **Figure 4.3-5, Conceptual Illustration of a Water Waste Basin.**

In addition to site design and source control BMPs, the water quality treatment control PDFs for the tract map site and off-site project features are described below. Treatment control PDFs for the tract map site are summarized in **Table 4.3-15, Extended Detention Basin Treatment Control BMP; Table 4.3-16, Bioretention Treatment Control BMPs;** and **Table 4.3-17, Vegetated Swale Treatment Control BMPs**. Project-related improvements at the borrow sites would not result in the introduction of impervious surfaces or any changes in drainage or hydrology characteristics. Therefore, all water quality potential impacts of runoff discharges from the borrow sites are limited to the construction phase pollutants.

- ***Bioretention:*** Bioretention areas are vegetated (*i.e.*, landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration, and also provide for pollutant removal (e.g., filtration, adsorption, nutrient uptake) by filtering runoff through the vegetation and soils. In bioretention areas, as well as in vegetated swales, pore spaces and organic material in the soils help to retain water in the form of soil moisture and to promote the adsorption of pollutants (e.g., dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants utilize soil moisture and promote the drying of the soil through transpiration.

- ***Vegetated Swales:*** Vegetated swales are engineered, vegetation-lined channels that provide water quality treatment in addition to conveying runoff. Swales provide pollutant removal through settling and filtration in the vegetation (often grasses) lining the channels and also provide the opportunity for volume reduction through infiltration and evapotranspiration. Swales are most effective where longitudinal slopes are small (2 percent to 6 percent), thereby increasing the residence time for treatment, and where water depths are less than the vegetation height.



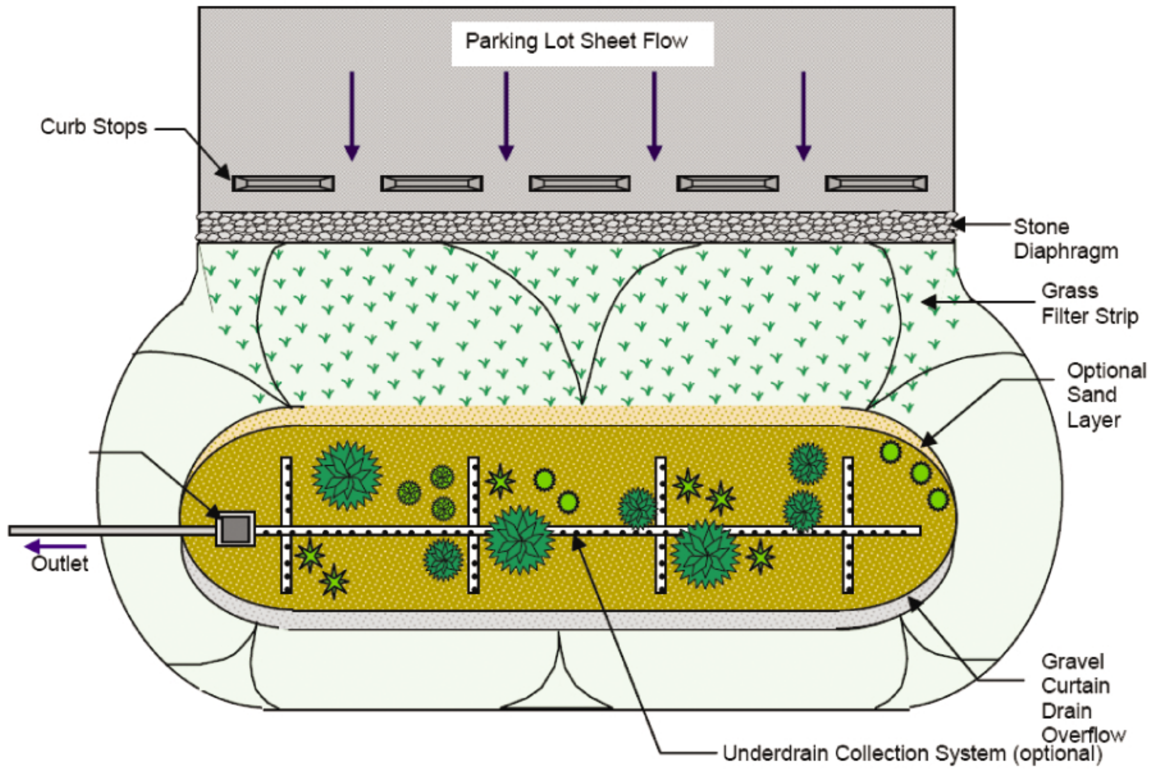
SOURCE: GeoSyntec Consultants – March 2005

FIGURE **4.3-2**

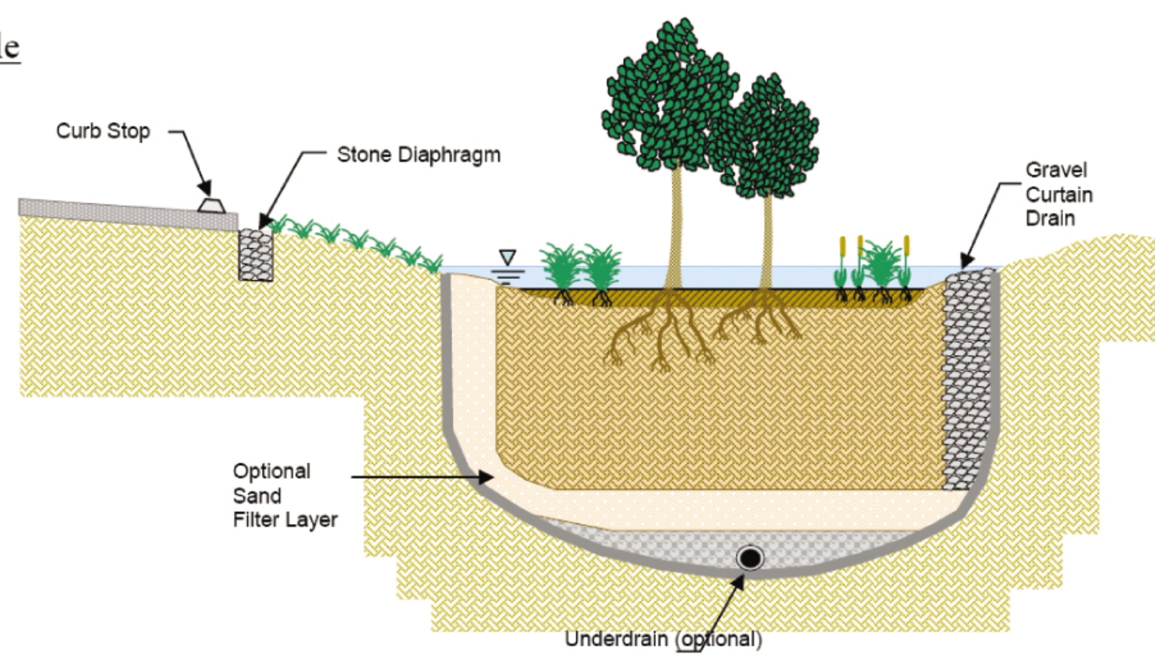
Project Design Features

32-92A•11/08

Plan View



Profile



500 250 0 500

APPROXIMATE SCALE IN FEET

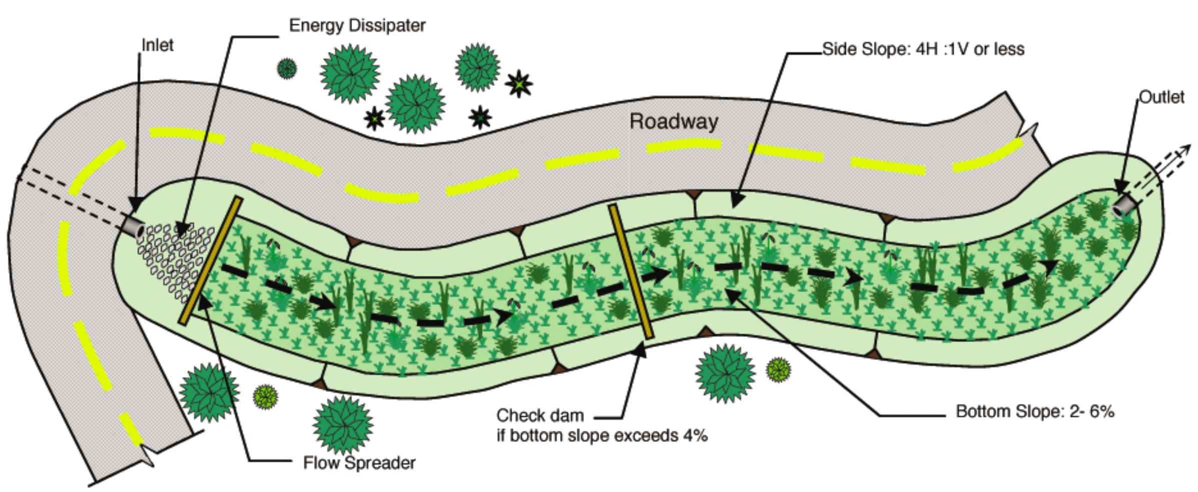
SOURCE: GeoSyntec Consultants – March 2005

FIGURE **4.3-3**

Examples of Bioretention Facilities

32-92•05/06

Plan View



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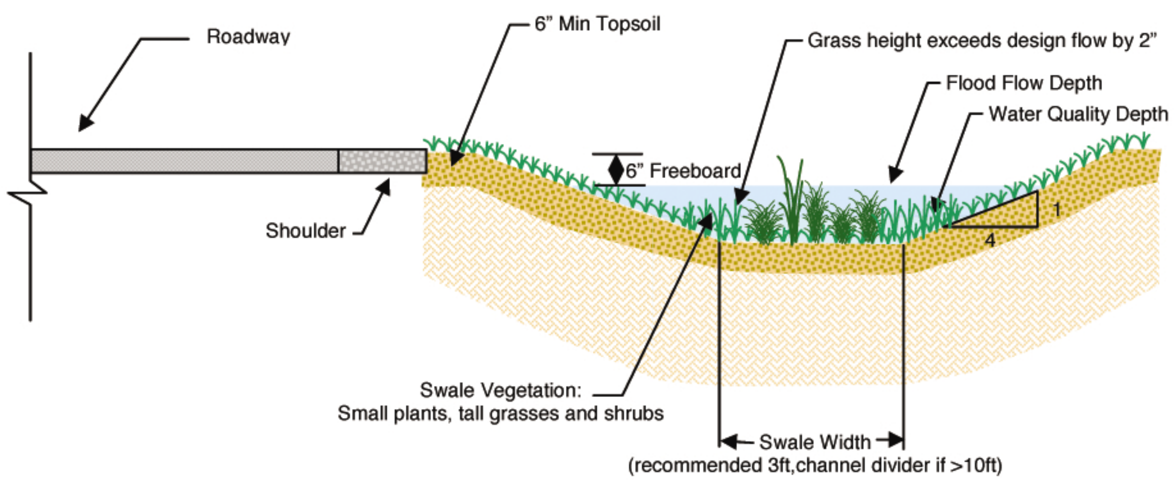


500 250 0 500

APPROXIMATE SCALE IN FEET

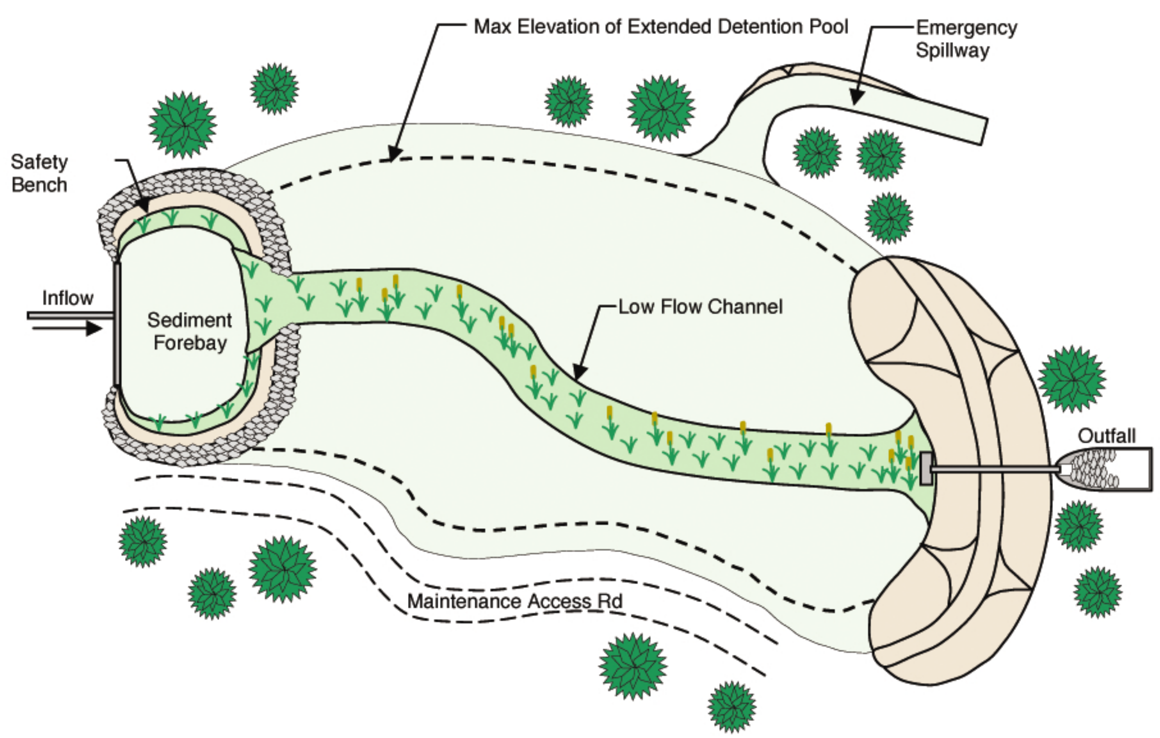
SOURCE: GeoSyntec Consultants – March 2005

FIGURE **4.3-4**

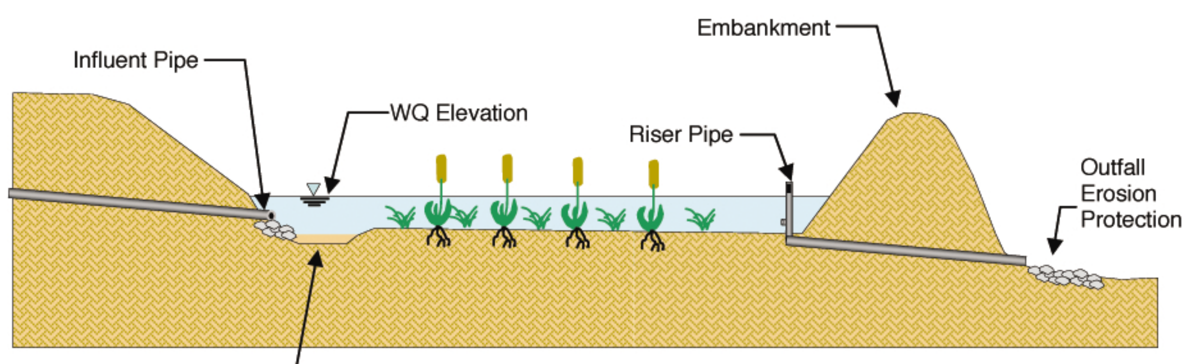
Conceptual Illustration of a Vegetated Swale

32-92•05/06

Plan View



Profile



500 250 0 500
APPROXIMATE SCALE IN FEET

SOURCE: GeoSyntec Consultants – March 2005

FIGURE **4.3-5**

Conceptual Illustration of a Water Waste Basin

32-92•05/05

***Extended Detention Basins*:** Extended detention basins (EDBs) store stormwater runoff for sufficient periods of time to promote the removal of pollutants primarily through sedimentation. Dry extended detention basins are designed with outlets that detain the runoff volume from the water quality design storm for some minimum time (in this case, 48 hours) to allow particulates and associated pollutants (phosphorus, trace metals, some pesticides, and other pollutants) to settle out. These basins are not designed or anticipated to contain standing water for periods in excess of 48 hours. The EDBs also would incorporate a series of gravel-filled subsurface flow trenches that would provide water quality treatment and facilitate evapotranspiration (ET) and percolation of dry weather flows and small storm events within the basin footprint. As runoff flows through the trenches, pollutant removal is achieved through settling and biological uptake of nutrients and dissolved pollutants within the wetland plants that would grow within the trenches, filtration within the trench gravel, and percolation into underlying soils. In addition, a specially constructed dry well that would support deep subsurface percolation of dry weather flows that may exceed the capacity of the gravel trenches would be provided. It is anticipated that the dry well would receive water primarily during the winter months, when ET rates are lower.

Table 4.3-15
Extended Detention Basin Treatment Control BMP

BMP ID	Tributary Area ID(s)	Tributary Area (acres)	Catchment % Imperviousness[1]	Minimum Basin Volume Required[2] (ac-ft)
RVC-21Db	RVC-22D RVC-23E RVC-24E RVC-21Db	50.5	90%	4.25

Source: Geosyntec, 2008.

[1] *Imperviousness based on area weighted average of land use-based values from Los Angeles County Hydrology Manual.*

[2] *Basin sized using catchment-specific modeling results to capture and treat 80% of annual average runoff. Additional storage would be provided for sediment storage and freeboard requirements. Stormwater treatment facilities would be designed to meet or exceed the sizing standards contained in the SUSMP Manual.*

Table 4.3-16
Bioretention Treatment Control BMPs

BMP ID	Tributary Area ID(s)	Tributary Area (acres)	Catchment % Imperviousness[1]	Minimum Area Required[2] (acre)
RVE-8A	RVE-8A	22.8	61%	0.61
RVE-9A	RVE-9A	5.7	61%	0.15
RVC-12C	RVE-27B RVE-28B RVC-2A RVC-3A RVC-7A RVC-8A RVC-12C	53.8	58%	1.39

Source: Geosyntec, 2008.

[1] *Imperviousness based on area weighted average of land use-based values from Los Angeles County Hydrology Manual.*

[2] *Bioretention area sized to capture and treat 80% of annual average runoff. Bioretention area based on a ponding depth of 18 inches, 2-ft media depth, and underdrain present. Stormwater treatment facilities would be designed to meet or exceed the sizing standards contained in the SUSMP Manual.*

Table 4.3-17
Vegetated Swale Treatment Control BMPs

BMP ID	Tributary Area ID(s)	Tributary Area (acres)	Catchment % Imperviousness[1]	Minimum Design Flow Rate[2] (cfs)
RVE-12C	RVE-11B RVE-12C	17.4	59%	3.01
RVE-16D	RVE-13C RVE-16D	18.6	61%	3.29
RVE-21F	RVE-17D RVE-21F	18.7	57%	3.15
RVE-24F	RVE-20E RVE-24F	19.8	65%	3.69
RVE-29B	RVE-25F RVE-29B	15.5	55%	2.54

BMP ID	Tributary Area ID(s)	Tributary Area (acres)	Catchment % Imperviousness[1]	Minimum Design Flow Rate[2] (cfs)
RVC-13C	RVC-13C	1.5	35%	0.17
RVC-17C	RVC-11B RVC-17C	18.5	63%	3.37
RVC-21Da	RVC-18C RVC-21Da	18.7	64%	3.44
RVW-2Aa	RVW-1A	10.8	65%	2.03
RVW-2Ab	RVW-2A	14.7	73%	3.05

Source: Geosyntec, 2008.

1 *Imperviousness based on area weighted average of land use-based values from Los Angeles County Hydrology Manual.*

2 *Design flow rate based on an intensity of 0.3 in/hr. Stormwater treatment facilities would be designed to meet or exceed the sizing standards contained in the SUSMP Manual.*

c. Hydromodification Control BMPs

Post-development flows would be directed to the Santa Clara River after treatment; no flows would be directed to tributaries to the Santa Clara River. A series of progressive hydromodification control measures would be used to prevent and control hydromodification impacts to the Santa Clara River:

- Avoid, to the extent possible, the need to mitigate for hydromodification impacts by preserving natural hydrologic conditions and protecting sensitive hydrologic features, sediment sources, and sensitive habitats.
- Minimize the effects of development through low impact/site design practices (*e.g.*, reducing connected impervious surfaces) and implementation of stormwater volume-reducing BMPs (project-based hydrologic source control).
- Mitigate hydromodification impacts in-stream using geomorphically based channel design.

The hydromodification control measures are summarized below.

- **Low Impact/Site Design.** Low impact/site design PDFs that help to reduce the increase in runoff volume include the clustering of development into village areas, leaving large amounts of undeveloped open space within the Specific Plan subregion (of which Landmark Village is a part); routing stormwater runoff to vegetated areas and/or vegetated BMPs; use of native or non-native/non-invasive plants in landscaped areas; and the use of efficient irrigation systems in common area landscaped areas. The tract map project's development design and footprint accommodates "natural stream channel" activity. This includes establishing buffer zones and maintaining setbacks to allow for channel movement and adjustment to changes in energy associated with runoff as recommended by the Southern California Coastal Water Research Project (SCCWRP) Technical Report 450. (SCCWRP, 2005a. Effects of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. Technical Report 450. April 2005.)

- **Volume Reduction BMPs.** The project's treatment control PDFs also would serve as hydromodification source control BMPs. Vegetated swales, bioretention areas, and extended detention basins can provide volume reduction on the order of 20 to 30 percent through infiltration and evaporation. (See County of Los Angeles Low Impact Development Standards Manual, January 2009.) Using conservative values for volume reduction, the treatment control PDFs are estimated to reduce the increase in average annual stormwater runoff volume by approximately 57 acre-feet per year, which is a 19 percent reduction of the predicted average post-development stormwater runoff volume without the treatment control PDFs. In addition, these facilities also would receive and eliminate dry weather flows.

- **Geomorphically Based Channel Design.** The hydromodification management approach for the Santa Clara River also would incorporate "geomorphically referenced" channel design, as described in SCCWRP Technical Report 450 (SCCWRP, 2005a). The goal of this approach is to preserve the natural stream channel function to the maximum extent practicable while limiting instability in stream channel morphology. The project's development footprint would allow for the greatest freedom possible for "natural stream channel" activity. This includes establishing buffer zones and maintaining setbacks to allow for channel movement and adjustment to changes in energy associated with runoff.

The engineered structural elements that would be implemented where needed for the Santa Clara River stability include energy dissipation and geomorphically-referenced bank stabilization, pursuant to the Newhall Ranch Resource Management and Development Plan.

- **Energy Dissipation.** Energy dissipation at storm drain outfalls provides erosion protection in areas where discharges have the potential to cause localized stream erosion. Erosion protection would be provided at all storm drain outlets to the Santa Clara River.

- **Bank Stabilization.** The project would include buried soil cement along the Santa Clara River and Castaic Creek adjacent to and downstream of the project site. In total, approximately 18,600 linear feet (LF) of bank would be provided with buried soil cement protection. This would include approximately 11,000 feet fronting the tract map site and approximately 6,400 LF on the south bank downstream (west) of the Long Canyon Road Bridge. Additional buried bank stabilization would be constructed as part of the approved Newhall Ranch WRP and between The Old Road and the Santa Clara River to protect the utility corridor. The bank protection between The Old Road and the Santa Clara River was approved as part of the Santa Clara River Natural River Management Plan (NRMP).

Most of the proposed bank protection would consist of buried soil cement to provide scour and freeboard flood control protection. Soil cement is a modern flood control technique used to protect against erosion while maintaining natural vegetation and soft banks. Soil cement would be buried below the existing banks of the Santa Clara River. Disturbed areas would then re-vegetated with native plant species, maintaining the natural habitat presently found along the River.

Approximately 6,600 LF of Turf Reinforcement Mat (TRM) or similar bank stability protection would be provide along the southern edge of the utility corridor downstream or west of the tract map site. TRMs are designed to reinforce vegetation at the root and stem allowing vegetation to be used as erosion control in areas where flow conditions exceed the ability of natural vegetation to remain rooted. This includes applications with high slopes or stream banks where grouted rip-rap and concrete channels are aesthetically undesirable.

In summary, the Landmark Village PDFs for water quality and hydrologic impacts have been created to address SUSMP requirements and include site design, source control, treatment control, and hydromodification control BMPs.

7. PROJECT IMPACTS

The analysis of potential impacts to water quality associated with construction and operation of the proposed project, including the significance criteria applicable to assessing such impacts, is presented below.

a. Significance Threshold Criteria

Based on the guidance offered by the *State CEQA Guidelines*, applicable water quality standards, and potential project impacts, the following thresholds of significance are utilized:

(1) Surface Water Quality

Thresholds of significance for surface water quality impacts have been developed based on a review of the MS4 Permit, Construction General Permit, Dewatering General Permit, applicable receiving water quality standards, and the *State CEQA Guidelines*, Appendix G. Significant adverse water quality impacts are presumed to occur if the proposed project would:

- Create sizeable additional sources of polluted runoff that would be discharged to receiving waters, which would result in exceedances of receiving water quality or substantially degrade water quality in receiving waters;

- Create sizeable additional sources of polluted runoff that would violate any water quality standards or waste discharge requirements for surface water runoff; or

- Create sizeable additional sources of polluted construction site runoff (including polluted discharges associated with construction activities such as materials delivery, staging or storage, vehicle or equipment fueling, vehicle or equipment maintenance, waste handling, or hazardous materials handling or storage) that would violate any water quality standards or waste discharge requirements for surface water runoff or groundwater discharge.

This section analyzes whether sizeable additional sources of polluted runoff may result from the project based on the results of water quality modeling, qualitative assessments, and comparison with discharge requirements that take into account water quality controls or BMPs that are considered PDFs. Any deviation from, or failure to, comply with discharge requirements is considered a potentially significant adverse water quality impact. Further, increases in pollutant concentrations or loads in runoff resulting from project development are considered an indication of a potentially significant adverse water quality impact. If loads and concentrations resulting from development are predicted to stay the same or to be reduced when compared with existing conditions, it is concluded that the project would not cause a significant adverse impact to the ambient water quality of the receiving waters for that pollutant.

If pollutant loads or concentrations are expected to increase, then, for both the post-development and construction phases, potential impacts are assessed by evaluating compliance of the project, including PDFs, with applicable regulatory requirements of the MS4 Permit, including SQMP and SUSMP requirements, the Construction General Permit, and the General Dewatering Permit. Further, post-development increases in pollutant loads and concentrations are evaluated by comparing the magnitude of the increase to relevant benchmarks, including receiving water TMDLs and receiving water quality objectives from the Basin Plan and CTR.

(2) Hydromodification

Thresholds of significance for evaluating hydrologic impacts and conditions of concern have been developed based on a review of the MS4 Permit and the *State CEQA Guidelines*, Appendix G. Significant adverse impacts to natural drainage systems created by altered hydrologic conditions of concern are presumed to occur if the proposed project would:

- Substantially alter the existing drainage pattern of a natural drainage, stream, or river, thereby causing substantial erosion, siltation, or channel instability in a manner that substantially adversely affects beneficial uses; or
- Substantially increase the rates, velocities, frequencies, duration, and/or seasonality of flows, thereby causing channel instability and harming sensitive habitats or species in natural drainages in a manner that substantially adversely affects beneficial uses.

(3) Groundwater

Thresholds of significance for evaluating the hydrologic and water quality impacts of the project on groundwater have been developed based on the *State CEQA Guidelines*, Appendix G. Significant adverse impacts to groundwater are presumed to occur if the proposed project would:

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge so as to cause a net deficit in aquifer volume or a lowering of the local groundwater table; or

- Through changes in surface water runoff quality and quantity (including project treatment PDFs), and changes in groundwater recharge, result in a violation of any groundwater quality standards or waste discharge requirements or otherwise substantially degrade water quality.

Groundwater quality benchmarks were compared with post-development runoff water quality to establish the likelihood that runoff would result in a degradation of groundwater quality. The hydrologic effects of the project on groundwater were examined by comparison of historical and present levels of the underlying aquifer to determine the impact of development on aquifer volume.

b. Methodology for Evaluating Post-Development and Surface Water Quality Impacts

(1) Computer Modeling

A water quality model was used to estimate pollutant loads and concentrations in project stormwater runoff for certain pollutants of concern for pre-development conditions and post-development conditions with PDFs for the tentative map portion of the project. The water quality model is one of the few models that accounts for observed variability in stormwater hydrology and water quality. This is accomplished by characterizing the probability distribution of observed rainfall event depths, the probability distribution of EMCs and the probability distribution of the number of storm events per year. These distributions are then sampled randomly using a "Monte Carlo Approach"[25] to develop estimates of mean annual loads and concentrations. A detailed description of the water quality model is presented in Recirculated Draft EIR **Appendix 4.3.** The following summarizes major features of the water quality model:

- **Rainfall Data**: The water quality model estimates the volume of runoff from storm events. The storm events were determined from 32 years (1969–2002) of hourly rainfall data measured at the National

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25 The Monte Carlo Approach is a method of water quality impact analysis that combines project-specific watershed and BMP characterizations, mechanistic estimates of hydrology and hydraulics, and statistical descriptions of rainfall, runoff water quality and BMP effectiveness to provide statistical estimates runoff volumes, pollutant loads, and pollutant concentrations under specified conditions. Watershed and BMP characterization inputs are developed from a variety of spatial and non-spatial data including existing condition delineations and land uses, proposed land uses and drainage plans, and proposed BMP types, sizes and operational parameters. Estimates of watershed runoff coefficients and BMP capture efficiency are generated in the Storm Water Management Model (SWMM) and aggregated by storm event. Statistical descriptions of rainfall are developed from actual rainfall records and Monte Carlo simulations sample directly from these records. Statistical descriptions of land use runoff concentrations and BMP effluent concentrations are input as statistical distributions of Event Mean Concentrations (EMCs) developed from land use runoff water quality data sampled by Los Angeles and Ventura Counties and water quality data from the ASCE/EPA International BMP Database, respectively. Monte Carlo simulations sample from these distributions to estimate runoff water quality by land use for each storm event and BMP effluent quality by BMP type for each storm event. The Approach employs simplified rainfall-runoff relationships and volume-based pollutant generation and routing.

Climatic Data Center (NCDC) Newhall rain gauge that incorporates a wide range of storm events. The rainfall analysis that is incorporated in the water quality model requires rainfall measurements at one-hour intervals and a period of record that is at least 20 to 30 years in length.

- **Land Use Runoff Water Quality**: The water quality model estimates the concentration of pollutants in runoff from storm events based on existing and proposed land uses. The pollutant concentrations for various land uses, in the form of EMCs, were estimated from data collected in Los Angeles County. The Los Angeles County database was chosen for use in the model because: (1) it is an extensive database that is quite comprehensive; (2) it contains monitoring data from land use specific drainage areas; and (3) the data is representative of the semi-arid conditions in southern California. Agriculture land use EMC statistics were not available from the Los Angeles County database, and, therefore, were derived from the Ventura County stormwater quality monitoring database.

- **Pollutant Load:** The pollutant load associated with each storm is estimated as the product of the storm event runoff times the EMC. For each year in the simulation, the individual storm event loads are summed to estimate the annual load. The mean annual load is then the average of all the annual loads.

- **PDFs Modeled:** The modeling only considers the structural treatment PDFs (e.g., vegetated swales, bioretention areas, and dry extended detention basin) and does not take into account the low impact/site design and source control PDFs (e.g., street sweeping and catch basin inserts) that also would improve water quality. In this respect, the modeling results are conservative and tend to overestimate pollutant loads and concentrations.

- **Treatment Effectiveness:** The water quality model estimates mean pollutant concentrations and loads in stormwater following treatment. The amount of stormwater runoff that is captured by the treatment BMPs was calculated for each storm event, taking into consideration the intensity of rainfall, duration of the storm, and duration between storm events. The mean effluent water quality for treatment BMPs was based on the International Stormwater BMP Database. (American Society of Civil Engineers [ASCE], 2001. User's Guide National Stormwater Best Management Practices (BMP) Database Version 1.2. Prepared by Urban Water Resources Research Council of ASCE and Wright Water Engineers, Inc., Urban Drainage and Flood Control District, URS Greine Woodward Clyde, in cooperation with Office of Water US EPA, Washington, DC. March 2001/US EPA, 2003. Ecological Soil Screening Level for Aluminum. EPA OSWER directive 9285.7-60, November 2003. County of Los Angeles Low Impact Development Standards Manual, January 2009) The International Stormwater BMP Database was used because it is a robust, peer reviewed database that contains a wide range of BMP effectiveness studies that are reflective of diverse land uses. An analysis of the monitored inflow and outflow data contained in the International Stormwater BMP Database showed a volume reduction on the order of 38 percent for biofilters and 30 percent for extended detention basins. (Strecker, E. et al., 2004. Analyses of the Expanded EPA/ASCE International BMP Database and Potential Implications for BMP Design, World Water and Envt. Cong. Proc. (June 27–July 1, 2004).) Based on this analysis, a conservative estimate of 25 percent of the inflow to the vegetated swales and bioretention areas, and 20 percent of the inflow to extended detention basins was assumed to infiltrate and/or evapotranspire in the water quality model. These assumptions regarding volumetric losses also were used to assess the quantity of dry weather flows that would be captured in the treatment BMPs. (See Section 7.8.2 of the Water Quality Technical Report in Recirculated Draft EIR **Appendix 4.3**.)

BMP effectiveness studies in the International Stormwater BMP database infrequently monitor aluminum; therefore, insufficient effluent data were available to model the removal effectiveness of treatment control BMPs for this water quality constituent. The total aluminum content of a water sample will be directly related to the concentrations of the suspended particulate matter. The aluminum content of the suspended solids is likely to directly reflect the composition of the source materials (e.g., the catchment soils). Therefore, it would be expected and is assumed that total aluminum concentrations and loads would be reduced proportionally to removal of suspended solids by project BMPs. In order to estimate the reduction in total aluminum load and concentration (dissolved aluminum was assumed to pass through BMPs without removal), TSS removal was used as a surrogate.

- **Bypass Flows:** The water quality model takes into account conditions when the treatment facility is full and flows are bypassed.
- **Representativeness to Local Conditions**: The water quality model utilizes runoff water quality data obtained from tributary areas that have a predominant land use, and as measured prior to discharge into a receiving water body. Currently such data are available from stormwater programs in Los Angeles County, San Diego County, and Ventura County, although the amount of data available from San Diego County and Ventura County is small in comparison with the Los Angeles County database. Such data is often referred to as "end-of-pipe" data to distinguish it from data obtained in urban streams, for example.
- **Infiltration:** Existing condition infiltration parameters were assumed based on soil hydrologic group, soil texture class, and the NRCS Soil Survey of the project area. The majority of the site would be impacted by fill operations; therefore, post-development soil compaction impacts were modeled for post-development open and landscaped areas assuming a 25 percent reduction in saturated hydraulic conductivity, or infiltration rate, from the pre-developed to post-developed condition. Impervious surfaces were modeled assuming no infiltration.

(a) Pollutants of Concern

Pollutants Modeled

The appropriate form of data used to address water quality are flow composite storm event samples, which are a measure of the average water quality during the event. To obtain such data usually requires automatic samplers that collect data at a frequency that is proportionate to flow rate. The pollutants of concern for which there are sufficient flow composite sampling data in the Los Angeles County database are:

- Total Suspended Solids
- Total Phosphorus
- Nitrate-Nitrogen, Nitrite-Nitrogen, Ammonia-Nitrogen, and Total Nitrogen (TN)
- Total Aluminum
- Dissolved Copper

- Total Lead
- Dissolved Zinc
- Chloride

(b) Qualitative Impact Analysis

The other pollutants of concern, such as pathogens, hydrocarbons, pesticides, and trash and debris, are not amenable to this type of sampling either because of short holding times (e.g., pathogens), difficulties in obtaining a representative sample (e.g., hydrocarbons), or low detection levels (e.g., pesticides). These pollutants were addressed qualitatively, using literature information and best professional judgment, due to the lack of statistically reliable monitoring data for these pollutants. These pollutants include:

- Turbidity
- Pathogens (Bacteria, Viruses and Protozoa)
- Hydrocarbons (Oil and Grease, Polycyclic Aromatic Hydrocarbons)
- Pesticides
- Trash and Debris
- Methylene Blue Activated Substances (MBAS)
- Cyanide

Human pathogens usually are not directly measured in stormwater monitoring programs because of the difficulty and expense involved; rather, indicator bacteria such as fecal coliform or certain strains of *E. Coli* are measured. Unfortunately, these indicators are not very reliable measures of the presence of pathogens in stormwater, in part because stormwater tends to mobilize pollutants from many sources, some of which contain non-pathogenic bacteria. For this reason, and because holding times for bacterial samples are necessarily short, most stormwater programs do not collect flow-weighted composite samples that potentially could produce more reliable statistical estimates of concentrations. Fecal coliform or *E. Coli* typically are measured with grab samples, making it difficult to develop reliable EMCs. Total coliform and fecal bacteria (fecal coliform, fecal streptococcus and fecal enterococcus) were detected in stormwater samples tested in Los Angeles County at highly variable densities (or most probable number [MPN]) ranging between several hundred to several million cells per 100 ml. (LACDPW, 2000. Los Angeles County 1994–2000 Integrated Receiving Water Impacts Report.)

Hydrocarbons are difficult to measure because of laboratory interference effects and sample collection issues (hydrocarbons tend to coat sample bottles). Hydrocarbons typically are measured with single grab samples, making it difficult to develop reliable EMCs.

Pesticides in urban runoff are often at concentrations that are below detection limits for most commercial laboratories and, therefore, there is limited statistically reliable data available on pesticides in urban runoff. Pesticides were not detected in Los Angeles County monitoring data for land use-based samples, except for diazinon and glyphosate, which were detected in less than 15 percent and 7 percent of samples, respectively. (LACDPW, 2000. Los Angeles County 1994–2000 Integrated Receiving Water Impacts Report.)

Turbidity, trash and debris, MBAS, and cyanide typically are not included in routine urban stormwater monitoring programs, and turbidity typically is not included in post-construction treatment control BMP effectiveness studies. Several studies conducted in the Los Angeles River basin have attempted to quantify trash generated from discrete areas, but the data represent relatively small areas and/or relatively short periods. MBAS was included in the land use-based monitoring data, but not enough data is available for modeling purposes. Cyanide was not included in the Los Angeles County land use-based monitoring program.

Also addressed qualitatively are potential water quality impacts from runoff and dewatering discharges during construction, potential water quality impacts due to pollutant bioaccumulation, and dry weather runoff water quality impacts.

c. Impact Analysis

(1) Construction-Related Impacts

The analysis of potential impacts of construction activities, construction materials, and non-stormwater runoff on water quality during the construction phase is focused primarily on sediment (TSS and turbidity) and certain non-sediment related pollutants. Construction-related activities that expose soils to potential mobilization by rainfall/runoff and wind are primarily responsible for sediment releases. Such activities include the removal of vegetation from the project site, grading, and trenching for infrastructure improvements. Environmental factors that affect erosion include topographic, soil and rainfall characteristics. Non-sediment-related pollutants associated with waste construction materials (e.g., paint, stucco, etc); chemicals, liquid products, and petroleum products used in building construction or the maintenance of heavy equipment; and concrete-related pollutants also are of concern during construction.

Construction impacts due to project development, including the grading activities and in-stream construction elements, would be minimized through compliance with the Construction General Permit. This permit requires the development and implementation of a SWPPP, which must include erosion, sediment, waste, and construction material control BMPs that meet the BAT/BCT standard required by the Construction General Permit.

Erosion control BMPs are designed to prevent erosion, whereas sediment controls are designed to trap sediment once it has been mobilized. Waste and construction material control BMPs generally call for management of construction-related materials, such as cement, stucco, paint, hydrocarbons, and similar materials, to avoid discharges of runoff containing these materials.

A Landmark Village SWPPP would be developed as required by, and in compliance with, the Construction General Permit and the County of Los Angeles Standard Conditions. Moreover, the SWPPP would include BMPs that meet or exceed the measures recommended to control construction-related pollutants.

The General Permit requires the SWPPP to include a menu of BMPs to be selected and implemented based on the phase of construction and the weather conditions to effectively control erosion and pollutants to the BAT/BCT. The following types of BMPs from the Stormwater Best Management Practice Handbook - Construction (CASQA 2003) will be implemented during construction (CASQA Handbook BMP numbers are indicated in parenthesis):

- **Erosion Control (EC-3 through EC-7 and WE-1)**:
  - Physical stabilization through hydraulic mulch, soil binders, straw mulch, bonded fiber matrices, and erosion control blankets (*i.e.*, rolled erosion control products).
  - Limiting the area and duration of exposure of disturbed soils.
  - Soil roughening of graded areas (through track walking, scarifying, sheepsfoot rolling, or imprinting) to slow runoff, enhance infiltration, and reduce erosion.
  - Vegetation stabilization through temporary seeding to establish interim vegetation.
  - Wind erosion (dust) control through the application of water or other dust palliatives as necessary to prevent and alleviate dust nuisance.
- **Sediment Control**:
  - Perimeter protection to prevent discharges through silt fences, fiber rolls, gravel bag berms, sand bag barriers, and straw bale barriers (SE-1, 5, 6, 8 and 9).
  - Storm drain inlet protection (SE-10).
  - Resource (environmentally sensitive area) protection through silt fences, fiber rolls, gravel bag berms, sand bag barriers, and straw bale barriers (SE-1, 5, 6, 8, and 9).

- Sediment capture through sediment traps, storm drain inlet protection, and sediment basins (SE-3, 10, and 2).
- Velocity reduction through check dams, sediment basins, and outlet protection/velocity dissipation devices (SE-2, 4, and 10).
- Reduction in off-site sediment tracking through stabilized construction entrance/exit, construction road stabilization, and entrance/exit tire wash (TE-1, 2, and 3).

- **Waste and Materials Management**:
  - Management of the following types of materials, products, and wastes: solid, sanitary, concrete, hazardous, and equipment-related wastes (MW-1, 2, and 4 through 10 and NS-8 through 10).
  - Protection of soil stockpiles through covers, the application of water or soil binders, and perimeter control measures (MW-3).
- **Non-Stormwater Management**:
  - BMPs or good housekeeping practices to reduce or limit pollutants at their source before they are exposed to stormwater, including such measures as: water conservation practices, vehicle and equipment cleaning and fueling practices (NS-1 through 16).
- **Training and Education**:
  - Training of individuals responsible for SWPPP preparation, implementation, and permit compliance, including contractors and subcontractors.
  - Signage (bilingual, if appropriate) to address SWPPP-related issues (such as, site clean-up policies, BMP protection, washout locations, *etc*).
- **Maintenance, Monitoring and Inspections**:
  - Performing routine site inspections and inspections before, during (for storm events > 24 hours), and after storm events.
  - Implementing maintenance and repairs of BMPs as indicated by routine and storm-event inspections.
  - Preparation and implementation of a Sampling and Analysis Plan for non-visible pollutants.

These construction site management BMPs would be implemented for the project during the dry season and wet season as follows:

Dry Season Construction Phase BMPs:

a. Wind erosion BMPs (dust control).

b. Soil roughening of graded areas (track walking, scarifying, sheepsfoot rolling, or imprinting).

c. Sediment control BMPs at the down gradient site perimeter and all operational storm drain inlets internal to the planning area.

d. Off-site tracking BMPs.

e. Appropriate waste management and materials pollution BMPs.

f. Appropriate non-stormwater BMPs to prevent or reduce the contamination of stormwater by construction activities and materials.

g. A "weather triggered" action plan to deploy standby erosion and sediment control BMPs to protect exposed portions of the site within 48 hours of a predicted storm event.

h. Sufficient standby BMP materials to implement the above action plan.

i. Deployment of post-construction erosion control BMPs as soon as practicable.

Wet Season Construction Phase BMPs

In addition to the dry season BMPs noted above:

a. Limiting the area and duration of exposure of disturbed soil areas. This may be accomplished by retention of natural vegetation in areas not scheduled for immediate grading, phasing the grading, and stabilizing disturbed areas quickly.

b. Implementation of an effective combination of erosion and sediment control measures on all disturbed areas.

c. Sufficient standby BMP materials to implement the above weather triggered action plan.

The Construction General Permit does not recognize a wet season by dates; therefore, the wet season requirements would be implemented year round if there is a storm event predicted.

The proposed project would reduce or prevent erosion and sediment transport and transport of other potential pollutants from the project site during the construction phase through implementation of BMPs meeting BAT/BCT standards in order to prevent or minimize environmental impacts and to ensure that discharges during the construction phase of the project would not cause or contribute to any exceedance of water quality standards in the receiving waters. These BMPs would assure effective control of not only sediment discharge, but also pollutants associated with sediments, such as (but not limited to) nutrients, heavy metals, and certain pesticides, including legacy pesticides. In addition, compliance with BAT/BCT requires that BMPs used to control construction water quality are updated over time as new water quality control technologies are developed and become available for use. Thus, erosion and sediment impacts of the project are considered less than significant.

Hydrocarbons in site runoff could result from construction equipment/vehicle fueling or spills. However, pursuant to the Construction General Permit, the SWPPP would include BMPs that address proper handling of petroleum products on the construction site, such as proper petroleum product storage and spill response practices, and those BMPs must effectively prevent the release of hydrocarbons to runoff per BAT/BCT standards. PAH that are absorbed to sediment during the construction phase would be effectively controlled *via* the erosion and sediment control BMPs. For these reasons, construction-related impacts related to hydrocarbons on water quality are considered less than significant.

Finally, construction on the project site may require dewatering and non-stormwater related discharges. For example, dewatering may be needed if water has been standing on site and needs to be removed for construction, vector control, or other reasons. Further, dewatering and non-stormwater related discharges may be necessary if groundwater is encountered during grading, or to allow discharges associated with testing of water lines, sprinkler systems, and other facilities.

In general, the Construction General Permit authorizes construction dewatering activities and other construction-related non-stormwater discharges as long as they: (a) comply with Section A.9 of the General Permit; (b) do not cause or contribute to violation of any water quality standards; (c) do not violate any other provisions of the General Permit; (d) do not require a non-stormwater permit as issued by some RWQCBs; and (e) are not prohibited by a Basin Plan provision. Such discharges would occur in compliance with the Los Angeles RWQCB's General Waste Discharge Requirements (WDRs), under Order No. R4-2003-0111, NPDES No. CAG994004, governing construction-related dewatering discharges within the project development areas. Typical BMPs for construction dewatering include infiltration of clean groundwater; on-site treatment using suitable treatment technologies; on-site or transport off-site for sanitary sewer discharge with local sewer district approval; or, use of a sedimentation bag for small volumes of localized dewatering.

Full compliance with applicable local, state and federal water quality standards and waste discharge requirements of the Construction General Permit and Dewatering General Permit by the applicant would assure that potential impacts from construction runoff and dewatering discharges would not be significant. On this basis, the impact of construction-related runoff from the project is considered less than significant.

(2) Post-Development Operational Impacts to Surface Waters

(a) MS4 Permit Requirements for New Development as Defined in the SUSMP

Table 4.3-18, SUSMP Requirements and Corresponding Project Design Features, analyses compliance of the proposed project, including proposed site design, source control, treatment control, and hydromodification control BMPs, with applicable post-development waste discharge requirements of the MS4 Permit, including the SUSMP requirements.

Table 4.3-18
SUSMP Requirements and Corresponding Project Design Features

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
1. Runoff Flow Control	• Control post-development peak stormwater runoff discharge rates, velocities, and duration in natural drainage systems to prevent accelerated downstream erosion and to protect habitat-related beneficial uses.[1] • All post-development runoff from a 2-year, 24-hour storm shall not exceed the pre-development peak flow rate, burned, from a 2-year, 24-hour storm when the pre-development peak flow rate equals or exceeds five cfs. Discharge flow rates shall be calculated using the County of Los Angeles Modified Rational Method. • Post-development runoff from the 50-year capital storm shall not exceed the pre-development peak flow rate, burned and bulked, from the 50-year capital storm. • Control peak flow discharge to provide stream channel and over bank flood protection, based on flow design criteria selected by the local agency.	• Hydromodification source controls include minimizing impervious surfaces through clustering development and using bioretention, extended detention, and other vegetated treatment control BMPs to disconnect impervious surfaces and reduce runoff volumes through evapotranspiration and infiltration. • The volume reduction PDFs are estimated to reduce the increase in average annual stormwater runoff volume by approximately 57 acre-feet per year, which is a 19 percent reduction of the predicted average post-development stormwater runoff volume without the treatment control PDFs. In addition these facilities also would receive and eliminate dry weather flows. • The 50-year capital storm peak flow rate analysis is contained in the *Landmark Village Tentative Tract Map 53108 Drainage Concept*, prepared by Psomas. (Psomas, 2006. Landmark Village Tentative Tract Map 53108 Drainage Concept. Prepared for Newhall Land and Farming Company by Psomas.) (See Recirculated Draft EIR **Appendix 4.2.**)

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
2. Conserve Natural Areas	• Concentrate or cluster development on portions of a site while leaving the remaining land in a natural undisturbed condition. • Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection. • Maximize trees and other vegetation at each site, planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants. • Promote natural vegetation by using parking lot islands and other landscaped areas. • Preserve riparian areas and wetlands.	• The Newhall Ranch Specific Plan clusters development into villages, including Landmark Village. Approximately 70% (8,335 acres) of the Specific Plan subregion will remain undeveloped. • Approximately 59.6 acres of the 292.6 acre Landmark Village project area would accommodate trails, parks, vegetated slopes, and water quality BMPs. • The existing land use on the project site is agriculture, so little or no native vegetation is found in pre-development conditions. • Site clearing and grading would be limited allowing development, and promoting access and fire protection. • Native and/or non-native/non-invasive vegetation would be utilized throughout Newhall Ranch. • The final project stormwater system would include the use of the vegetated treatment BMPs, including bioretention (placed in common area landscaping in commercial and multi-family residential areas, roadway median strips and parking lot islands (where applicable)), vegetated swales, and extended detention basins. • Riparian buffers would be preserved along the Santa Clara River Corridor by clustering development upland and away from the River.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
3. Minimize Stormwater Pollutants of Concern	• Minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts generated from site runoff of directly connected impervious areas (DCIA) to the stormwater conveyance system, as approved by the building official.	• Treatment control BMPs would be selected to address the pollutants of concern for the project. These BMPs are designed per SUSMP standards to minimize introduction of pollutants to the MEP. • The project would include numerous source controls, including education programs, animal waste bag stations, street sweeping and catch basin cleaning, an Integrated Pest Management (IPM) Program for common area landscaping in commercial areas and multi-family residential areas, use of native and/or non-native/non-invasive vegetation, and installation of a car wash pad in multi-family residential areas. • An education program would be implemented, targeting residents and commercial businesses, regarding water quality issues. Topics would include services that could affect water quality, such as carpet cleaners and others that may not properly dispose of cleaning wastes; community car washes; and residential car washing. The education program would emphasize animal waste management, such as the importance of cleaning up after pets and not feeding pigeons, seagulls, ducks, and geese. • Vegetated treatment control BMPs would allow for infiltration of treated stormwater. • Landscape watering in common areas, commercial areas, multiple family residential areas, and in parks would use efficient reclaimed water irrigation technologies with centralized irrigation controls.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
4. Protect Slopes and Channels	Project plans must include BMPs consistent with local codes and ordinances and the SUSMP requirements to decrease the potential of slopes and/or channels from eroding and impacting stormwater runoff: • Convey runoff safely from the tops of slopes and stabilize disturbed slopes. • Utilize natural drainage systems to the maximum extent practicable. • Control or reduce or eliminate flow to natural drainage systems to the maximum extent practicable. • Stabilize permanent channel crossings. • Vegetate slopes with native or drought tolerant vegetation. • Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion with the approval of all agencies with jurisdiction, e.g., the ACOE and the CDFG.	• There are no significant slopes or natural drainage channels within the developed portion of the project in the post-developed condition. • Natural slopes and native vegetation on slopes adjacent to the Santa Clara River would be preserved and/or, if impacted during construction, restored and enhanced. Native vegetation would be used in all plant palettes placed on restored slopes. • Project PDFs, including swales, bioretention areas, and water quality basins (hydrologic source controls), would reduce flows to natural channels through infiltration and evapotranspiration. • The banks of the Santa Clara River at portions of this site would be stabilized primarily using buried bank stabilization, per the Newhall Ranch Resource Management and Development Plan (RMDP). After the implementation of these measures and other flow control and volume reduction PDFs, the Santa Clara River would be capable of handling the expected flow volumes, velocities, and durations with little or no erosion. • All outlet points to the Santa Clara River would include localized energy dissipaters per the RMDP.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
5. Provide Storm Drain System Stenciling and Signage	• All storm drain inlets and catch basins within the project area must be stenciled with prohibitive language and/or graphical icons to discourage illegal dumping. • Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area. • Legibility of stencils and signs must be maintained.	• All storm drain inlets and water quality inlets would be stenciled or labeled. • Signs would be posted in areas where dumping could occur. • The County, a Landscape or Local Maintenance District (LMD), Home Owners Association (HOA), or other maintenance entity would maintain stencils and signs.
6. Properly Design Outdoor Material Storage Areas	• Where proposed project plans include outdoor areas for storage of materials that may contribute pollutants to the stormwater conveyance system measures to mitigate impacts must be included.	• Pesticides, fertilizers, paints, and other hazardous materials used for maintenance of common areas, parks, commercial areas, and multifamily residential common areas would be kept in enclosed storage areas.
7. Properly Design Trash Storage Areas	All trash containers must meet the following structural or treatment control BMP requirements: • Trash container areas must have drainage from adjoining roofs and pavement diverter around the areas. • Trash container areas must be screened or walled to prevent off-site transport of trash.	• All outdoor trash storage areas would be covered and isolated from stormwater runoff.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
8. Provide Proof of Ongoing BMP Maintenance	• Applicant required to provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, and/or Conditional Use Permits.	• Depending on the type and location of the BMP, either the County LMD, or HOA would be responsible for maintenance. The County would have the right, but not the duty, to inspect and maintain the BMPs that are maintained by the HOA or LMD, at the expense of the HOA or LMD, if they are not being properly maintained. • The HOA or commercial/business owners would be responsible for operation and maintenance of site-based BMPs (such as bioretention placed in common area landscaping in multi-family residential areas and commercial areas). • The LACDPW will be responsible for maintenance of village-level and subregional BMPs (vegetated swales and extended detention basins).

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
9. Design Standards for Structural or Treatment Control BMPs	• Post-construction Structural or Treatment Control BMPs shall be designed to mitigate (infiltrate or treat) stormwater runoff using either volumetric treatment control BMPs or flow-based treatment control BMPs sized per listed criteria.	• Stormwater treatment facilities would be designed to meet or exceed the sizing standards in the Los Angeles County SUSMP requirements. • Volume-based treatment control BMPs for the project would be designed to capture 80 percent or more of the annual runoff volume per Criteria 2 of the MS4 Permit. • Flow-based BMPs would be sized using Criteria 3, which will provide 80 percent capture of annual runoff volume per criteria of the MS4 Permit. • The size of the facilities would be finalized during the design stage by the project engineer with the final hydrology study, which would be prepared and approved to ensure consistency with this analysis prior to issuance of a final grading permit. • Types of treatment control BMPs that would be employed include vegetated swales, bioretention, and dry extended detention basins, and a combination thereof.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
10.B.1 Properly Design Loading/Unloading Dock Areas (100,000 ft^2 Commercial Developments)	• Cover loading dock areas or design drainage to minimize run-on and runoff of stormwater. • Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.	• Loading dock areas would be covered or designed to preclude run-on and runoff. • Direct connections to storm drains from depressed loading docks (truck wells) would be prohibited. • Below grade loading docks for fresh food items would drain through a treatment control BMP applicable to the use, such as a catch basin insert. • Loading docks would be kept in a clean and orderly condition through weekly sweeping and litter control, at a minimum and immediate cleanup of spills and broken containers without the use of water.
10B.2. Properly Design Repair/Maintenance Bays (100,000 ft^2 Commercial Developments)	• Repair/maintenance bays must be indoors or designed in such a way that does not allow stormwater run-on or contact with stormwater runoff. • Design a repair/maintenance bay drainage system to capture all wash water, leaks, and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.	• Commercial areas would not have repair/maintenance bays, or the bays would comply with design requirements.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
10B.3. Properly Design Vehicle/Equipment Wash Areas (100,000 ft^2 Commercial Developments)	• Self-contained and/or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer.	• Areas for washing/steam cleaning of vehicles would be self-contained or covered with a roof or overhang; would be equipped with a wash racks and with the prior approval of the sewering agency; would be equipped with a clarifier or other pretreatment facility: and would be properly connected to a sanitary sewer.
10.C. Properly Design Equipment/Accessory Wash Areas (Restaurants)	• Self-contained, equipped with a grease trap, and properly connected to a sanitary sewer. • If the wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer.	• Food preparation areas would have either contained areas or sinks, each with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes. • If located outside, the containment areas or sinks would also be structurally covered to prevent entry of stormwater. Adequate signs would be provided and appropriately placed stating the prohibition of discharging washwater to the storm drain system.
10.D. Properly Design Fueling Area (Retail Gasoline Outlets)	• The fuel dispensing area must be covered with an overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. • The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.	• Retail gasoline outlets would comply with these design requirements.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
	• The fuel dispensing areas must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff. • At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.	
10.E.1. Properly Design Fueling Area (Automotive Repair Shops)	• See requirement 10.D. above.	• Automotive repair shop fueling areas would comply with the design requirements.
10.E.2. Properly Design Repair/Maintenance Bays (Automotive Repair Shops)	• See requirement 10.B.2 above.	• Automotive repair shop repair/maintenance bays would comply with the design requirements.
10.E.3. Properly Design Vehicle/Equipment Wash Areas (Automotive Repair Shops)	• Self-contained and/or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer or to a permitted disposal facility.	• Automotive repair shop vehicle/equipment wash areas would comply with the design requirements.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
10.E.4. Properly Design Loading/Unloading Dock Areas (Automotive Repair Shops)	• See requirement 10.B.1 above.	• Automotive repair shop loading/unloading dock areas would comply with the design requirements.
10.F.1. Properly Design Parking Area (Parking Lots)	• Reduce impervious land coverage of parking areas. • Infiltrate runoff before it reaches the storm drain system. • Treat runoff before it reaches storm drain system.	• Commercial and multi-family parking lots would incorporate bioretention facilities located in islands to promote filtration and infiltration of runoff. • Stormwater runoff from parking lots would be directed to treatment control BMPs, including swales, water quality basins, bioretention areas, and/or catch basin media filters in compliance with SUSMP requirements.
10.F.2. Properly Design to Limit Oil Contamination and Perform Maintenance (Parking Lots)	• Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used. • Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal.	• See above. • Treatment of runoff in detention basins, bioretention areas, or vegetated swales and catch basin inserts would be used to address oil and petroleum hydrocarbons from high-use parking lots. • The HOA or business owners would be responsible for operation and maintenance of treatment control BMPs that serve private parking lots.

SUSMP Requirement	Criteria/Description	Corresponding Landmark Village PDFs
13. Limitation of Use of Infiltration BMPs	• Infiltration is limited based on design of BMP, pollutant characteristics, land use, soil conditions, and traffic. • Appropriate conditions (groundwater >10 feet from grade) must exist to utilize infiltration to treat and reduce stormwater runoff for the project.	• Per the RWQCB Clarification Letter, generally, the common pollutants in stormwater are filtered or adsorbed by soil, and unlike hydrophobic solvents and salts, do not cause groundwater contamination. In any case, infiltration of 1-2 inches of rainfall in semi-arid areas like Southern California where there is a high rate of evapo-transpiration, presents minimal risks. (LARWQCB, 2006. Letter to Mark Pastrella, Assistant Deputy Director, Department of Public Works, County of Los Angeles, from Jonathan Biship, P.E., Executive Officer, California Regional Water Quality Control Board, Los Angeles Region. December 15, 2006.) • The proposed treatment control BMPs are not considered infiltration BMPs; they allow for infiltration of fully-treated runoff only.

Source: Geosyntec, 2008.
[1] *This requirement is from Part 4, Section D.1, of the MS4 Permit.*

(b) Post-Development Modeled Surface Water Pollutants of Concern

Table 4.3-19, Predicted Average Annual Stormwater Runoff Volumes, shows the predicted changes in stormwater runoff mean annual volumes. As shown, mean annual runoff volumes are expected to increase substantially with development. The increase is the result of imperviousness associated with urbanization and the highly infiltrative nature of the soils in the tract map site's existing, agricultural condition. Project PDFs include site design, source control, and treatment control BMPs in compliance with the SUSMP requirements. Most of the site design PDFs, especially the minimization of impervious area and the provision of 59.6 acres of trails, parks, and vegetated slopes and water quality BMPs within the tract map project site, reduce the proposed development's increases in stormwater runoff volume. The treatment control BMPs provide some runoff volume reduction and, therefore, provide hydromodification source control, as well as treatment control. Based on BMP monitoring data in the International Stormwater BMP Database, a 25 percent reduction in stormwater runoff volume was conservatively assumed to occur in the vegetated swales and bioretention PDFs.[26] Water quality basins were modeled with a 20 percent volume reduction.

Table 4.3-19
Predicted Average Annual Stormwater Runoff Volumes

Site Conditions	Average Annual Stormwater Runoff Volume (acre-ft)
Existing	183
Developed with PDFs	331
Change	148

Source: Geosyntec, 2008.

Total Suspended Solids. Table 4.3-20, Predicted Average Annual TSS Concentration and Load, shows the predicted average annual TSS concentration and loads. Conversion from agriculture to urban land-uses (with treatment) would reduce the average TSS concentration and loads in stormwater runoff from the project site.

26 Actual database information suggests that project treatment/hydromodification source control BMPs may provide greater than 30 percent average annual runoff volume reduction, but for purposes of this analysis, only a 20 to 25 percent volume reduction is anticipated.

Table 4.3-20
Predicted Average Annual TSS Concentration and Load

Site Conditions	Average Annual TSS Concentration (mg/L)	Average Annual TSS Load (tons/yr)
Existing	459	114
Developed with PDFs	37	17
Change	-422	-97

Source: Geosyntec, 2008.

The predicted average annual TSS concentration in stormwater runoff from the total modeled area with PDFs is compared to water quality criteria and the range of observed concentrations in the Santa Clara River in **Table 4.3-21, Comparison of Predicted TSS Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5**. Predicted TSS load and concentration declines with development and is at the low end of the range of observed concentrations in Santa Clara River Reach 5. Based on the comprehensive site design, the source control and treatment control strategy, the predicted decrease in TSS anticipated after development, and comparison with available in-stream data and basin plan benchmark objectives, the TSS in stormwater runoff from the project would not cause a nuisance or adversely affect beneficial uses in the receiving waters and, thus, would not represent a significant impact to water quality.

Table 4.3-21
Comparison of Predicted TSS Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Predicted Average Annual TSS Concentration (mg/L)	Los Angeles Basin Plan Water Quality Objectives	California Toxics Rule Criteria	Range of Observed[1] Concentrations in Santa Clara River Reach 5 (mg/L)
37	Water shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.	NA	32–6,591

Source: Geosyntec, 2008.
[1] *Range of concentrations observed in the Santa Clara River during wet weather (Stations S29, NR1, and NR3).*
NA = not applicable

Phosphorus. Table 4.3-22, **Predicted Average Annual Total Phosphorus Concentration and Annual Load**, shows the predicted average TP concentration and annual loads. The information presented in this table indicates that TP concentration and load also are predicted to decrease post-development. Because much of the total phosphorus load is associated with sediments, and the sediment load and concentrations are predicted to decrease with development, the TP concentration and annual TP load also are predicted to decrease.

Table 4.3-22
Predicted Average Annual Total Phosphorus Concentration and Annual Load

Site Conditions	Average Annual TP Concentration (mg/L)	Average Annual TP Load (lbs/yr)
Existing	1.5	759
Developed with PDFs	0.3	239
Change	-1.2	-520

Source: Geosyntec, 2008.

There are no numeric objectives for TP in the Los Angeles Basin Plan. A narrative objective for biostimulatory substances in the Los Angeles Basin Plan states: "waters shall not contain biostimulatory substances in concentrations that promote algal growth to the extent that such growth causes nuisance or adversely affects beneficial uses." The low predicted TP concentrations in project stormwater discharges would not promote (*i.e.*, increase) algae growth, and therefore, comply with the narrative objective for biostimulatory substances in the Los Angeles County Basin Plan. As shown in **Table 4.3-23, Comparison of Predicted Total Phosphorus Concentration with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5**, the predicted total phosphorus concentration is at the low end of the range of observed concentrations in Santa Clara River Reach 5. Based on the comprehensive site design, the source control and treatment control strategy, the predicted decrease in TP concentrations and loads anticipated after development, and the comparison with available in-stream monitoring data and Basin Plan benchmark objectives, potential impacts associated with total phosphorus are predicted to be less than significant.

Table 4.3-23
Comparison of Predicted Total Phosphorus Concentration with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Predicted Average Annual Total Phosphorus Concentration (mg/L)	Los Angeles Basin Plan Water Quality Objectives	California Toxics Rule Criteria	Range of Observed[1] Concentrations in Santa Clara River Reaches 7E (mg/L)
0.3	Waters shall not contain biostimulatory substances in concentrations that promote algal growth to the extent that such growth causes nuisance or adversely affects beneficial uses	NA	0.18–13.4

Source: Geosyntec, 2008.
[1] *Range of concentrations observed in the Santa Clara River during wet weather (Stations S29, NR1, and NR3).*
NA – not applicable

Nitrate-Nitrogen + Nitrite-Nitrogen and Ammonia. The predicted average nitrate-nitrogen plus nitrite-nitrogen, ammonia, and total nitrogen concentrations and annual loads are summarized in **Table 4.3-24, Predicted Average Annual Nitrate-N + Nitrite-N Concentration and Load; Table 4.3-25, Predicted Average Annual Ammonia-N Concentration and Load**; and **Table 4.3-26, Predicted Average Annual Total Nitrogen Concentration and Load**, respectively. As shown, average concentrations and loads of nitrate-nitrogen plus nitrite-nitrogen, ammonia-nitrogen, and total nitrogen are predicted to decrease. The decrease in nitrogen loads and concentrations can be attributed to higher nitrite-, nitrate- and ammonia-nitrogen EMCs observed in monitoring data from agricultural land uses versus urbanized land uses, along with nitrogen reductions that would be achieved in the treatment control PDFs.

Table 4.3-24
Predicted Average Annual Nitrate-N + Nitrite-N Concentration and Load

Site Conditions	Average Annual NO3-N+NO2-N Concentration (mg/L)	Average Annual NO3-N+NO2-N Load (lbs/yr)
Existing	6.3	3,107
Developed with PDFs	0.5	420
Change	-5.8	-2,687

Source: Geosyntec, 2008.

Table 4.3-25
Predicted Average Annual Ammonia-N Concentration and Load

Site Conditions	Average Annual NH3 Concentration (mg/L)	Average Annual NH3 Load (lbs/yr)
Existing	1.0	473
Developed with PDFs	0.2	145
Change	-0.8	-328

Source: Geosyntec, 2008.

Table 4.3-26
Predicted Average Annual Total Nitrogen Concentration and Load

Site Conditions	Average Annual Total Nitrogen Concentration (mg/L)	Average Annual Total Nitrogen Load (lbs/yr)
Existing	10	5,150
Developed with PDFs	1.9	1,703
Change	-8.1	-3,447

Source: Geosyntec, 2008.

Predicted nitrogen compound concentrations are compared to Basin Plan objectives and observed concentrations in **Table 4.3-27, Comparison of Predicted Nitrogen Compound Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5**. Average annual stormwater concentration of ammonia is predicted to be considerably less than the wasteload allocation for Santa Clara River Reach 5 and the Basin Plan objective, and within the low end of the range of observed concentrations. Likewise, the average annual stormwater concentration of nitrate-N plus nitrite-N is predicted to be considerably less than the TMDL wasteload allocation or the Basin Plan water quality objective, and within the range of observed concentrations for this reach of the Santa Clara River.

There are no numeric objectives for total nitrogen in the Basin Plan. A narrative objective for biostimulatory substances in the Basin Plan states: "waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses." The low predicted total nitrogen concentrations in project stormwater discharges would not promote (*i.e.*, increase) aquatic growth and, therefore, comply with the narrative objective for biostimulatory substances in the Basin Plan. As shown in **Table 4.3-27**, the predicted total nitrogen concentration is within the range of observed concentrations in Santa Clara River Reach 5.

Table 4.3-27
Comparison of Predicted Nitrogen Compound Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Nutrient	Predicted Average Annual Concentration (mg/L)	Los Angeles Basin Plan Water Quality Objectives[1] (mg/L)	TMDL Wasteload Allocation for Santa Clara River Reach 5 (mg/L)	Range of Observed[2] Concentrations in Santa Clara River Reach 5 (mg/L)
Nitrate-N + Nitrite-N	0.5	5.0	6.8[3]	0.5–4.8
Ammonia-N	0.2	2.2[4]	1.75[5]	<0.005–1.1
Total Nitrogen	1.9	Waters shall not contain bio-stimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.	NA	<0.04–46[6]

Source: Geosyntec, 2008.
[1] *There are no CTR criteria for nitrogen compounds.*
[2] *Range of concentrations observed in the Santa Clara River during wet weather (Stations S29, NR1, and NR3).*
[3] *30-day average concentration.*
[4] *4-day average concentration, ELS present, 90th percentile pH and temperature pairing observed at USGS Monitoring Station 11108500.*
[5] *30-day average in Reach 5 below Valencia.*
[6] *Observed values for TKN (ammonia plus organic nitrogen).*

Based on the comprehensive site design, the source control and treatment control strategy, anticipated reductions in nitrate- plus nitrite-N, ammonia-N, and total nitrogen, and the comparison with available in-stream monitoring data, benchmark Basin Plan objectives and wasteload allocations, potential impacts associated with nitrogen compounds are predicted to be less than significant.

Metals. Projected loads and concentrations for the trace metals copper, lead, zinc, and total aluminum are presented in **Tables 4.3-28** through **4.3-32.** Except for aluminum and lead, the projections are for the dissolved form of the metal, as it is the dissolved form to which the CTR criteria applies. Due to consistently low concentrations of dissolved lead in the available stormwater runoff data, it was not possible to develop reliable EMC parameters for most land uses for modeling the dissolved fraction of lead. This constituent was therefore modeled as the total recoverable metal. Copper, lead, and zinc are the most prevalent metals typically found in urban runoff. Other trace metals, such as cadmium, chromium, and mercury, typically are not detected in urban runoff or are detected at very low levels. (LACDPW, 2000. Los Angeles County 1994–2000 Integrated Receiving Water Impacts Report.)

The data indicates that post-development dissolved copper, total lead, and dissolved zinc loads and concentrations and total aluminum concentrations are projected to decrease, when compared to pre-development conditions. These results can be explained by the difference in EMC values observed in representative monitoring data from the pre-developed agriculture and open space condition and the post-developed urban condition. Total aluminum loads are predicted to increase.

Project PDFs include site design, source control, and treatment control BMPs, in compliance with the SUSMP requirements. Specific site design PDFs that would be implemented to minimize increases in trace metals include directing drainage from impervious areas to vegetated areas, and the selection of building material for roof gutters and downspouts that do not include copper or zinc. Source control PDFs that target metals include education of property owners, BMP maintenance, and street sweeping of private streets and parking lots. The treatment control BMPs also would reduce trace metals in the runoff from the proposed development. Only the effects of the treatment control PDFs are reflected in the model results; effects of site design and treatment control BMPs are not modeled.

Table 4.3-28
Predicted Average Annual Dissolved Copper Concentration and Load

Site Conditions	Average Annual Dis. Cu Concentration (μg/L)	Average Annual Dis. Cu Load (lbs/yr)
Existing	26	13
Developed with PDFs	9.9	8.9
Change	-16.1	-4.1

Source: Geosyntec, 2008.

Table 4.3-29
Predicted Average Total Lead Concentration and Annual Load

Site Conditions	Average Annual Total Pb Concentration (μg/L)	Average Annual Total Pb Load (lbs/yr)
Existing	16	8.0
Developed with PDFs	5.2	4.7
Change	-10.8	-3.3

Source: Geosyntec, 2008.

Table 4.3-30
Predicted Average Annual Dissolved Zinc Concentration and Load

Site Conditions	Average Annual Dis. Zn Concentration (μg/L)	Average Annual Dis. Zn Load (lbs/yr)
Existing	132	66
Developed with PDFs	60	54
Change	-72	-12

Source: Geosyntec, 2008.

Table 4.3-31
Predicted Average Annual Total Aluminum Concentration and Load

Site Conditions	Average Annual Total Aluminum Concentration (μg/L)	Average Annual Total Aluminum Load (lbs/yr)
Existing	631	313
Developed with PDFs	480	432
Change	-151	119

Source: Geosyntec, 2008.

A narrative objective for toxic substances in the Basin Plan states: "all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life."

The CTR criteria are the applicable water quality objectives for protection of aquatic life. The CTR criteria are expressed for acute and chronic (4-day average) conditions; however, only acute conditions were considered to be applicable for stormwater discharges because the duration of stormwater discharge is consistently less than 4 days. The CTR criteria are calculated on the basis of the hardness of the receiving waters. Lower hardness concentrations result in lower, more stringent CTR criteria. The minimum hardness value (250 mg/L as $CaCO_3$) observed in the Santa Clara River at the USGS Station 11108500 during wet weather was used as a conservative estimate; the mean observed hardness value was 660 mg/L as $CaCO_3$.

Comparison of the predicted runoff metal concentrations and the acute CTR criteria for dissolved copper, total lead, and dissolved zinc and the NAWQC criterion for aluminum are shown in **Table 4.3-32**, along with the range of observed concentrations in Santa Clara River Reach 5. The comparison of the post-developed with PDFs condition to the benchmark CTR and NAWQC values shows that all of the trace metal concentrations are below the benchmark water quality criteria. Predicted trace metal concentrations are within or slightly above the range of observed concentrations.

For aluminum, the NAWQC acute criterion (750 μg/L for a pH range of 6.5 to 9.0) was used as a benchmark, as the CTR does not include aluminum. Although the NAWQC criterion is in the form of acid soluble aluminum (US EPA, 1988), the available monitoring data are for either dissolved aluminum or total aluminum. (US EPA, 1988. Ambient Water Quality Criteria for Aluminum – 1988. EPA 440/ 5-86-008. August 1988). Acid soluble aluminum, which is operationally defined as the aluminum that passes through a 0.45 μm membrane filter after the sample has been acidified to a pH between 1.5 and 2.0 with nitric acid, represents the forms of aluminum toxic to aquatic life or that can be readily converted to toxic forms under natural conditions. The acid soluble measurement does not measure forms of aluminum, such as aluminum that is occluded in minerals or clays, or strongly sorbed to particulate matter, that are not toxic and are not likely to become toxic under natural conditions. Acid soluble aluminum data is not available because this form of aluminum is not typically measured. Nevertheless, total aluminum has been used in this analysis and compared with the NAWQC in order to be conservative.

Table 4.3-32
Comparison of Predicted Trace Metal Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Metal	Predicted Average Annual Concentration (μg/L)	California Toxics Rule Criteria[1] (μg/L)	Range of Observed[2] Concentrations in Santa Clara River Reach 5 (μg/L)
Dissolved Copper (μg/L)	9.1	32	3.3–22.6
Total Lead (μg/L)	4.9	260	0.6–40
Dissolved Zinc (μg/L)	56	250	3–37
Total Aluminum	480	750	131–19,650

Source: Geosyntec, 2008.

[1] *Hardness = 250 mg/L, based on minimum observed value at USGS Station 11108500. A lead criterion is for total recoverable lead. NAWQC aluminum criteria for pH 6.5 – 9.0.*

[2] *Range of concentrations observed in the Santa Clara River during wet weather (Stations S29, NR1, and NR3).*

Based on the comprehensive site design, the source control and treatment strategy, predicted decrease in concentrations of all metals of concern and in loads of all metals of concern (except for total aluminum), and the comparison with the instream water quality monitoring data and benchmark water quality criteria and the available information regarding aluminum toxicology, the project would not have significant impacts resulting from trace metals.

Chloride. Table 4.3-33, Predicted Average Annual Chloride Concentration and Load, shows the predicted average annual chloride concentration and load. Due to the conversion from agricultural to urban land uses, and the associated EMCs, annual chloride concentration is predicted to decrease when compared to the existing conditions, although the average annual chloride load is predicted to increase slightly due to increased runoff volume.

Table 4.3-33
Predicted Average Annual Chloride Concentration and Load

Site Conditions	Average Annual Cl Concentration (mg/L)	Average Annual Cl Load (lbs/yr)
Existing	24	6.0
Developed with PDFs	14	6.2
Change	-10	0.2

Source: Geosyntec, 2008.

The predicted chloride concentration in post-development project runoff is compared to the Los Angeles Basin Plan water quality objective and the range of observed concentrations in Santa Clara River Reach 5 in **Table 4.3-34, Comparison of Predicted Chloride Concentrations with Water Quality Objective, TMDL, and Observed Concentrations in Santa Clara River Reach 5**. This data indicates that the predicted average annual chloride concentration in stormwater runoff from the project area is within the low range of observed concentrations for this pollutant and is well below the Santa Clara River Reach 5 Basin Plan water quality objective and the TMDL wasteload allocation for Santa Clara River Reach 5 (100 mg/L for both). Based on the comprehensive site design, source control, and treatment control strategy, predicted decrease in chloride concentration, and comparison with benchmark receiving water criteria, the project would not have significant water quality impacts resulting from chloride.

Table 4.3-34
Comparison of Predicted Chloride Concentrations with Water Quality Objective, TMDL, and Observed Concentrations in Santa Clara River Reach 5

Pollutant	Predicted Average Annual Concentration (mg/L)	Santa Clara River Reach 5 TMDL Wasteload Allocation and Basin Plan Water Quality Objective[1] (mg/L)	Range of Observed[2] Concentrations in Santa Clara River Reach 5 (mg/L)
Chloride	14	100	3–121

Source: Geosyntec, 2008.
[1] *There are no CTR criteria for chloride. This is the Basin Plan objective for Santa Clara River Reach 5.*
[1] *Range of concentrations observed in the Santa Clara River during wet weather (Stations S29, NR1, and NR3).*

(c) Post-Development Surface Water Pollutants Addressed Without Modeling

Turbidity. Turbidity is a measure of suspended matter that interferes with the passage of light through the water, or in which visual depth is restricted. (Sawyer *et al.*, 1994. Chemistry for Environmental Engineering, Fourth Edition. Clair Sawyer, Perry McCarty, and Gene Parkin. McGraw-Hill, Inc., 1994.) Turbidity may be caused by a wide variety of suspended materials, which range in size from colloidal to coarse dispersions, depending upon the degree of turbulence. In lakes or other waters existing under relatively quiescent conditions, most of the turbidity will be due to colloidal and extremely fine dispersions. In rivers under flood conditions, most of the turbidity will be due to relatively coarse dispersions. Erosion of clay and silt soils may contribute to in-stream turbidity. Organic materials reaching rivers serve as food for bacteria, and the resulting bacterial growth and other microorganisms that feed upon the bacteria produce additional turbidity. Nutrients in runoff may stimulate the growth of algae, which also contributes to turbidity.

Discharges of turbid runoff primarily are of concern during the construction phase of development. The Construction SWPPP must contain sediment and erosion control BMPs pursuant to the Construction General Permit, and those BMPs must effectively control erosion and discharge of sediment, along with other pollutants, per the BAT/BCT standards. Additionally, fertilizer control, non-visible pollutant monitoring, and trash control BMPs in the SWPPP would combine to help control turbidity during the construction phase. (See **Subsection 4.3.7.c**, above.)

In the post-development condition, placement of impervious surfaces would serve to stabilize soils and to reduce the amount of erosion that may occur from the project area during storm events, and would therefore decrease turbidity in the runoff from the project. Project PDFs, including source controls (such as, common area landscape management and common area litter control) and treatment control BMPs in compliance with the SUSMP requirements, would prevent or reduce the release of organic materials and nutrients (which might contribute to algal blooms) to receiving waters. As shown earlier in this section, post-development nutrients in runoff are not expected to cause significant water quality impacts. Based on implementation of the project PDFs and the construction-related controls, runoff discharges from the project would not cause increases in turbidity; therefore, the water quality impacts of the project on turbidity are considered less than significant.

Pathogens. Pathogens are viruses, bacteria, and protozoa that can cause illness in humans. Identifying pathogens in water is difficult as the number of pathogens is exceedingly small, thereby requiring the sampling and filtering of large volumes of water. Traditionally, water managers have relied on measuring "pathogen indicators," such as total and fecal coliform, as an indirect measure of the presence of pathogens. Although such indicators were considered reliable for sewage samples, indicator organisms are not necessarily reliable indicators of viable pathogenic viruses, bacteria, or protozoa in stormwater because coliform bacteria, in addition to being found in the digestive systems of warm-blooded animals, also are found in plants and soil. Certain pathogen indicators can multiply in the field if the substrate, temperature, moisture, and nutrient conditions are suitable. Paulsen and List summarize the debate over the use of pathogenic indicators and point out that scientific studies show no correlation between fecal coliform densities and gastrointestinal illness in swimmers; therefore, coliform may not indicate a significant potential for causing human illness. (Paulsen, Susan and J. List, 2005. Review of Bacteria Data from Southern California Watersheds. Prepared by Flow Science for The Irvine Company. April 2005. Provided in Appendix D of the Water Quality Technical report in Recirculated Draft EIR **Appendix 4.3**.) In a recent field study conducted by Schroeder *et al.*, pathogens (in the form of viruses, bacteria, or protozoa) were found to occur in 12 of the 97 samples taken, but the samples that contained pathogens did not correlate with the concentrations of indicator organisms. (Schroeder et al. 2002. Management of Pathogens Associated with Storm Drain Discharge, Center for Environmental and Water Resources Engineering, Dept. of Civil and Environmental Engineering, University of California, Davis prepared for

Division of Environmental Analysis, California Department of Transportation, May.) Most researchers who have correlated human illness to fecal indicator bacteria levels have conducted epidemiological studies in waters receiving point inputs of treated or raw sewage; few epidemiological studies have tested the health effects of exposure to water receiving direct and recent stormwater runoff. Thus, there is no explicit documentation of the health effects of stormwater based on epidemiological studies. (WERF, 2007. Development of a Protocol for Risk Assessment of Microorganisms in Separate Stormwater Systems. 03-SW-2. 2007.)

There are numerous sources of pathogen indicators, including birds and other wildlife, as well as domesticated animals and pets, soils, and plant matter. Anthropogenic sources may include poorly functioning septic systems, cross-connections between sewer and storm drains, and the utilization of outdoor areas for human waste disposal by people without access to indoor sanitary facilities.

It is recognized that natural levels of bacteria are present in the project's receiving waters and that control of such natural sources is not required nor desired by regulatory agencies. For example, the RWQCB TMDL for bacteria in the Malibu Creek watershed makes provisions for background levels of bacteria associated with natural sources. (LARWQCB, 2004. Total Maximum Daily Loads for Bacteria Malibu Creek Watershed. January 29, 2004.) Bacteria TMDLs have not been developed for the Santa Clara River.

Data collected from undeveloped watersheds or watersheds, with little development, indicate that bacterial standards are often exceeded. For example, monitoring data obtained by Los Angeles County for vacant land use showed a mean fecal coliform concentration of 1,397 MPN/100 mL in 21 samples (compared to the REC1 water quality criteria of 400 MPN/100 mL). (LACDPW, 2000. Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report.) The US EPA has recognized that routine exceedances of ambient water quality criteria due to natural sources of pollution do occur. In response, the US EPA has recommended changes to designated uses as the most appropriate way to address these situations. (Paulsen, Susan and J. List, 2005. Review of Bacteria Data from Southern California Watersheds. Prepared by Flow Science for The Irvin Company. April 2005.) The monitoring data collected in the tributaries of the Santa Clara River showed a range of fecal coliform concentrations from 953 MPN/100 mL to greater than 81,200 MPN/100 mL (see **Tables 4.3-8** and **4.3-9**).

The US EPA has compiled an extensive database on stormwater data collected as part of its program to regulate stormwater. (Pitt, R., A. Maestre, and R. Morguecho, 2003. "The National Stormwater Quality Database," prepared by University of Alabama and Center for Watershed Protection.) These data were drawn from 65 programs in 17 states throughout the United States. The data indicate that median fecal concentrations range from about 4,500 to 7,700 MPN/100 mL for a range of commercial and residential land uses, compared to a median value of around 3,000 MPN/100 mL for open space and vacant land.

These data represent urban areas that in general do not have source and treatment controls, and, therefore, are not indicative of runoff from Landmark Village.

Runoff from agricultural watersheds involving horticulture and row cropping is known to similarly contain relatively high levels of indicator bacteria. Data from a stormwater drain serving an agricultural watershed with predominantly row crops in Ventura County showed similar median fecal coliform levels (~ 7,000 MPN/100 mL) to that found for general urban runoff. Agricultural land and open space areas likely share some of the same wildlife sources, but livestock may be present as well. These data indicate that wildlife, livestock, plants, and/or soils can be a very important source of pathogens and/or pathogen indicators such as fecal coliform.

A study conducted by PBS&J in coastal watersheds near Laguna Beach in Orange County found that indicator bacteria concentrations in receiving waters downstream from the developed/urban watersheds were not significantly different than concentrations in receiving waters downstream from undeveloped watersheds. (PBS&J, 1999. Evaluation of Bacteriological Impacts to Runoff and Coastal Waters from the Crystal Cove Development.) Additional analysis conducted by Paulsen and List further supported these findings. (Paulsen, Susan and J. List, 2005. Review of Bacteria Data from Southern California Watersheds. Prepared by Flow Science for The Irvine Company. April 2005.) These studies suggest that the development proposed for Landmark Village would not result in appreciable changes in pathogen levels in the receiving waters when compared to the existing conditions.

The primary sources of fecal coliform from Landmark Village would likely be sediment, pet wastes, wildlife, and regrowth in the storm drain itself. Other sources of pathogens and pathogen indicators, such as cross connections between sanitary and storm sewers, are unlikely given modern sanitary sewer installation methods and inspection and maintenance practices.

The levels of bacteria in runoff from Landmark Village would be reduced by source controls and treatment controls. The most effective means of controlling pet wastes and wastes from human interaction with wildlife is through source control, specifically education of pet owners, education regarding feeding of waterfowl near water bodies, providing products and disposal containers that encourage and facilitate cleaning up after pets, and storm drain cleaning practices.

Although, there are limited data on the effectiveness of extended detention basins to treat pathogen indicators, the treatment processes known to be occurring in extended detention basins involve sunlight (ultraviolet light) degradation, sedimentation, and infiltration, all of which can reduce pathogen concentrations and loads. Many of the proposed detention basins are to be located on relatively infiltrative soils and pathogen removal by filtration is a common and effective practice in wastewater treatment. The Center for Watershed Protection maintains a National Pollutant Removal Performance

Database that indicates that removal performance for pathogen indicators in various types of extended detention basins ranged between 70 to 80 percent. (CWP, 2000. National Pollutant Removal Performance Database.)

In addition to treatment by extended detention, bioretention areas and vegetated swales are proposed. Bioretention relies on filtration through an amended sand soil layer for water quality treatment, while vegetated swales provide sediment removal through settling and allow for infiltration of low flows. Again, filtration and infiltration are effective means of treating pathogen indicators. The city of Austin, Texas conducted a number of studies on the effectiveness of sedimentation/filtration treatment systems for treating stormwater runoff. Most of the structures were designed to treat one-half inch of runoff. Data from four sand filters indicated a range of removals from 37 percent to 83 percent for fecal coliform, and 25 percent to 81 percent for fecal streptococci.

Research on the use of filtration to remove bacteria also has been conducted in Florida by the Southwest Florida Water Management District. (Significant reductions in total and fecal coliform bacteria and the other indicators were observed between inflow and outflow samples for sand filtration. Percent reductions were measured using flow-weighted sampling techniques. Total coliform bacteria removals were less than 70 percent, and fecal coliform bacteria reduction varied from 65 percent to 100 percent. In a literature summary, the US EPA reported typical pathogen removal for infiltration basins and trenches as 65 to 100 percent. (US EPA, 1993. Office of Water. Guidance to Specify Management Measures for Sources of Nonpoint Pollution in Coastal Waters. EPA-840-B-920002. Washington, DC.)

In summary, stormwater discharges from the project could potentially exceed the REC-1 Basin Plan standard for fecal coliform; therefore, impacts from indicator bacteria may be significant prior to mitigation. However, although such fecal indicator bacteria were considered reliable for sewage samples, indicator organisms are not necessarily reliable indicators of viable pathogenic viruses, bacteria, or protozoa in stormwater because coliform bacteria, in addition to being found in the digestive systems of warm-blooded animals, also are found in plants and soil. Potential post-development pathogen sources include natural sources, and it is recognized that natural levels of bacteria are present in the project's receiving waters and that control of such natural sources is neither required nor desired by regulatory agencies. Anthropogenic sources include leaking septic and sewer systems and pet wastes. The project would not include septic systems and the sewer system would be designed to current standards, which minimizes the potential for leaks. The proposed project development, consistent with the MS4 Permit requirements, includes a comprehensive set of source and treatment control BMPs selected to manage pollutants of concern, including pathogens and pathogen indicators. With this series of BMPs, the project would not result in substantial changes in pathogen levels in the receiving waters compared to existing conditions, and potential water quality impacts related to pathogens are considered less than significant.

Hydrocarbons. Various forms of hydrocarbons (oil and grease) are common constituents associated with urban runoff; however, these constituents are difficult to measure. Typically, measurements are taken by grab samples, making it difficult to develop reliable EMCs for modeling. Based on this consideration, hydrocarbons were not modeled, but instead are addressed qualitatively.

Hydrocarbons are a broad class of compounds, most of which are non-toxic. Hydrocarbons are hydrophobic (low solubility in water), have the potential to volatilize, and most forms are biodegradable. A subset of hydrocarbons, PAHs can be toxic depending on the concentration levels, exposure history, and sensitivity of the receptor organisms. Of particular concern are those PAH compounds associated with transportation-related sources.

Although the concentration of hydrocarbons in runoff is expected to increase slightly under post-development project conditions, due to the increase in roadways, driveways, parking areas and vehicle use, the project PDFs are expected to prevent appreciable increases in hydrocarbon concentrations from leaving the project site. Source control PDFs that address petroleum hydrocarbons include educational materials on used oil programs; carpooling and public transportation alternatives to driving; BMP maintenance; and street sweeping private streets. Although vehicle emissions and leaks are the primary source of hydrocarbons in urban areas, it is anticipated that vehicles in the proposed development generally would be well maintained and newer models, which would help to limit emissions and leaks. Lastly, the parking lot site design, source controls, treatment BMPs and vegetation and soils within the treatment control PDFs would adsorb the low levels of emulsified oils in stormwater runoff, preventing discharge of hydrocarbons and visible film in the discharge or the coating of objects in the receiving water.

The majority of PAHs in stormwater adsorb to the organic carbon fraction of particulates in the runoff, including soot carbon generated from vehicle exhaust. For example, a stormwater runoff study found that the dissolved-phase PAHs represented less than 11 percent of the total concentration of PAHs. (Marslek, J., Watt, W.E., Anderson, B.C., and Jaskot, C., 1997. "Physical and Chemical Characteristics of Sediments from a Stormwater Management Pond." Water Quality Research Journal of Canada, 32(1), 89-100.) Consequently, the extended detention basins, bioretention areas, and vegetated swales proposed as PDFs, which are designed to treat pollutants through settling, filtration, and infiltration, would be effective in treating PAHs.

Los Angeles County conducted PAH analyses on 27 stormwater samples from a variety of land uses in the period 1994-2000. (Los Angeles County Department of Public Works, 2000. Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report.) For those land uses where sufficient samples were taken and were above detection levels to estimate statistics, the mean concentrations of individual PAH compounds ranged from 0.04 to 0.83 μg/L. The reported means were less than acute toxicity criteria available from the literature (Suter and Tsao, 1996). Moreover, the Los Angeles County data do not account for any treatment, whereas the treatment in the project's PDFs will result in some reduction in hydrocarbon concentrations, inclusive of PAHs. This makes it very unlikely that impacts will occur to the receiving water due to hydrocarbon loads or concentrations. On this basis, the effect of the project on petroleum hydrocarbon levels in the receiving waters post-development is considered less than significant.

Pesticides. Pesticides can be of concern where past farming practices involved the application of persistent organochlorine pesticides. Legacy pesticides Chlordane, Dieldrin, DDT, and Toxaphene are of particular concern, as TMDLs have been established for these pesticides in the Santa Clara River estuary, approximately 40 miles downstream of the project and Reach 5. Historical pesticides should no longer be discharged in the watershed, except in association with erosion of sediments to which these pollutants may have adhered in the past. Site development involves the importation of approximately 6 million cubic yards of soil from non-agricultural areas, as well as required remedial grading which would stabilize soils and prevent their transport from the project site, actually reducing the potential for discharge of sediments to which historical pesticides may have adsorbed in pre-development conditions.

In the post-developed condition, pesticides would be applied to common landscaped areas and residential lawns and gardens. Pesticides that have been commonly found in urban streams include the organophosphate pesticides chlorpyrifos and diazinon. (Katznelson, R. and T. Mumley, 1997. Diazinon in Surface Waters in the San Francisco Bay Area: Occurrence and Potential Impact. Prepared for California State Water Resources Control Board, and Alameda County Clean Water Program.) However, only 0 to 13 percent of the samples in the Los Angeles County database had detectable levels of diazinon (depending on the land use), while chlorpyrifos was below detection limits for all land uses in all samples taken between 1994 and 2000. (Los Angeles County Department of Public Works, 2000. Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report.) Other pesticides presented in the database were seldom measured above detection limits. Furthermore, these data represent flows from areas without treatment controls, unlike the proposed project, which does incorporate treatment control PDFs.

Diazinon and chlorpyrifos are two pesticides of concern due to their potential toxicity in receiving waters. The US EPA has banned all indoor uses of diazinon in 2002 and stopped all sales for all outdoor non-agricultural use in 2003 (US EPA, June, 2002)[27]. (US EPA, 2002. Total Maximum Daily Loads for Toxic Pollutants - San Diego Creek and Newport Bay, California, June 14, 2002.) With no agricultural uses planned for the proposed project, diazinon would not be used at the proposed project site. The US EPA also has phased out most indoor and outdoor residential uses of chlorpyrifos and has stopped all non-residential uses where children may be exposed. Use of chlorpyrifos in the proposed project area is not expected, with the possible exception of emergency fire ant eradications (until such time as reasonable alternative products are available and only with appropriate application practices, in accordance with the landscape pesticide management program).

Diazinon had long been one of the most commonly used pesticides on the market (SFBRWQCB, 2005) before its use was phased-out. Although the US EPA's actions eliminated most urban diazinon uses by the end of 2004, phasing out diazinon likely has increased post-2004 reliance on alternative pesticides and encouraged new pesticides to enter the marketplace.

The San Francisco Regional Water Quality Control Board commissioned a study, Insecticide Market Trends and Potential Water Quality Implications, to evaluate pesticide use trends as they relate to water quality. In 2003, on the basis of current and projected pesticide use and possible water quality risks, the report considered the pesticide alternatives of potential concern for water quality to be pyrethrums; parathyroid's (bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, and permethrin); carbaryl; malathion; and imidacloprid (SFBRWQCB, 2003). A more recent study also identified lambda cyhalothrin (a pyrethroid) and fipronil among pesticides of interest (SFEP, 2005).

The water quality risks posed by a pesticide relate to the quantity of the pesticide used, its runoff characteristics, and its relative toxicity in water and sediment. As urban diazinon applications are phased out, the use of some alternatives may inadvertently pose new water quality risks. Given what is known about alternative pesticide use trends, pyrethroids may be the alternatives that pose the greatest concerns

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27 Changes to the use of chlorpyrifos include reductions in the residue tolerances for agricultural use, phase out of nearly all indoor and outdoor residential uses, and prohibition of non-residential uses where children may be exposed. In Orange County, residential use accounts for around 90% of total chlorpyrifos. (USEPA, 2002a. Total Maximum Daily Loads for Toxic Pollutants – San Diego Creek and Newport Bay, California, June 14, 2002.) Retail sales of chlorpyrifos were stopped by December 31, 2001, and structural (*e.g.* construction) uses were phased out by December 31, 2005. Some continued uses are allowed; for example, public health use for fire ant eradication and mosquito control is permitted by professionals.

Permissible uses of diazinon also will be restricted. All indoor uses are prohibited (as of 12/2002) and retailers were required to end sales for indoor use on December, 2002. All outdoor non-agricultural uses were phased out by December 31, 2004. Therefore, it is likely that the USEPA will eliminate most of the use of diazinon within the Specific Plan area. The use of diazinon for many agricultural crops has been eliminated, while some use of this chemical will continue to be permitted for some agricultural activities. (USEPA, 2001. Organophosphate Pesticide; Availability of Revised Risk Assessments. Federal Register: January 31, 2001 (Volume 66, Number 21), Page 8400-8401.)

for water quality. Although pyrethroids tend to be toxic to Ceriodaphnia dubia test organisms at concentrations in water comparable to diazinon, pyrethroids do not dissolve well in water but instead adhere well to surfaces, including particles in the environment. At equilibrium, pyrethroid concentrations in sediment are reported to be about 3,000 times greater than dissolved concentrations in water. Thus, BMPs targeting reductions and removal of sediment loads would be effective to reduce and remove pyrethroids as well.

Source control measures, such as education programs for owners, occupants, and employees on the proper application, storage, and disposal of pesticides, are the most promising strategies for controlling the pesticides that would be used post-development. Structural treatment controls are less practical because of the variety of pesticides and wide range of chemical properties that affect the ability to treat these compounds. However, most pesticides, including historical pesticides that may be present at the site, are relatively insoluble in water and therefore tend to adsorb to the surfaces of sediment, which would be settled or filtered out of the water column in the water quality treatment PDFs. Thus, treatment in the bioretention, vegetated swales, and extended detention basin should achieve some removal of pesticides from stormwater as TSS is reduced.

For common area landscaping in commercial areas, multi-family residential areas and parks, an IPM Program will be incorporated. The goal of an IPM is to keep pest levels at or below threshold levels, reducing risk and damage from pest presence, while eliminating the risk from the pest control methods used. IPM programs achieve these goals through the use of low risk management options by emphasizing use of natural biological methods and the appropriate use of selective pesticides. IPM programs also incorporate environmental consideration by implementing procedures that minimize intrusion and alteration of biodiversity in ecosystems.

While pesticides are subject to degradation, they vary in how long they maintain their ability to eradicate pests. Some break down almost immediately into nontoxic byproducts, while others can remain active for longer periods of time. While pesticides that degrade rapidly are less likely to adversely affect non-targeted organisms, in some instances it may be more advantageous to apply longer-lasting pesticides if it results in fewer applications or smaller amounts of pesticide use. As part of the IPM program, careful consideration would be made as to the appropriate type of pesticides for use on the project site. While pesticide use is likely to occur due to maintenance of landscaped areas, particularly in the residential portions of the development, careful selection, storage, and application of these chemicals for use in common areas would help prevent adverse water quality impacts from occurring. Additionally, as discussed above, removal of sediments in the PDFs also would remove sediment-adsorbed pesticides.

Based on the site design, and the source control and treatment control BMPs designed pursuant to SUSMP requirements, potential post-development impacts associated with pesticides would be less than significant.

Trash and Debris. Urban development tends to generate significant amounts of trash and debris. Trash refers to any human-derived materials, including paper, plastics, metals, glass, and cloth. Debris is defined as any organic material transported by stormwater, including leaves, twigs, and grass clippings (DLWC, 1996). Debris can be associated with the natural condition. Trash and debris can be characterized as material retained on a 5-mm mesh screen. It contributes to the degradation of receiving waters by imposing an oxygen demand, attracting pests, disturbing physical habitats, clogging storm drains and conveyance culverts, and mobilizing nutrients, pathogens, metals and other pollutants that may be attached to the surface.

Urbanization could significantly increase trash and debris loads if left unchecked. However, the project PDFs, including source control and treatment BMPs, would minimize the adverse impacts of trash and debris. Source controls, such as street sweeping, public education, fines for littering and storm drain stenciling, can be effective in reducing the amount of trash and debris that is available for mobilization during wet and dry weather events. Common area litter control would include a litter patrol, covered trash receptacles, emptying of trash receptacles in a timely fashion, and noting trash violations by tenants/homeowners or businesses and reporting the violations to the owner/HOA for investigation. Catch basin inserts would be provided for commercial area parking lots. The project's PDFs would remove or prevent the release of floating materials, including solids, liquids, foam, or scum, from runoff discharges and would prevent impacts on dissolved oxygen in the receiving water due to decomposing debris. Based on these considerations, trash and debris would not significantly impact the receiving waters of the project.

Methylene Blue Activated Substances (MBAS). MBAS, which is related to the presence of detergents in runoff, may be incidentally associated with urban development due to commercial and/or residential vehicle washing or other outdoor washing activities. Surfactants disturb the surface tension, which affects insects and can affect gills in aquatic life.

The presence of soap in runoff from the project would be controlled through source control PDFs, including a public education program on residential and charity car washing, and the provision of a car wash pad connected to sanitary sewer in the multi-family residential areas. Other sources of MBAS, such as cross connections between sanitary and storm sewers, are unlikely given modern sanitary sewer installation methods and inspection and maintenance practices. Therefore, MBAS would not significantly impact the receiving waters of the proposed project.

Cyanide. The information on cyanide levels in urban stormwater is relatively sparse. The incidence of detection of cyanide in urban stormwater is relatively low, except in some special cases. In the Nationwide Urban Runoff Project (NURP), cyanide was detected in runoff from four cities out of a total of 15 cities that participated in the monitoring program (US EPA 1983). Overall, cyanide was detected in 23 percent of the urban runoff samples collected (16 out of a total of 71 samples), at concentrations ranging from 2 to 33 µg/L (Cole et al. 1984). Of the 71 samples, only 3 percent (*i.e.*, 2) exceeded the freshwater acute guideline of 22 µg/L. *(US EPA 1983).* The predominant sources of cyanides found in urban runoff samples were reported to be products of gasoline combustion and anti-caking ingredients in road salts used in colder climates (Cole et al. 1984).

A review of highway runoff suggested that deicing salts are the main source of cyanide in highway runoff. It has been estimated that approximately two million pounds of sodium ferrocyanide, which is used as an anticaking agent in road salts during the winter in the northeastern United States, are washed off from roads into streams and storm sewers (US EPA 1981; Gaffney et al. 1987). Information on the quality of snow packs and snow melt support the premise that deicing salts are the major source of cyanide in stormwater. For example, concentrations of cyanide in snow packs ranged up to 314 µg/L in Milwaukee and Syracuse. (Novotny, V., D.W. Smith, D.A. Kuemmel, J. Mastriano, and A. Bartosova, 1999. Urban and Highway Snowmelt: Minimizing the Impact on Receiving Water. Project 94-IRM-2. Report for Water Environment Research Foundation.) An urban stream receiving snow melt in Milwaukee had an average cyanide concentration of 31 µg/L (<2–45 µg/L). Two urban streams in Syracuse had average cyanide concentrations of 8 µg/L (<2–27 µg/L) and 48 µg/L (<2–167 µg/L), respectively. Reconsidering the NURP findings, three of the four cities which detected cyanide are within the snowbelt, and may have used deicing salts containing anti-caking agents. One city that detected cyanide in stormwater (Austin, Texas) presumably does not.

In contrast to these relatively high concentrations associated with deicing salts, runoff from cities which do not use deicing salts or from northern cities outside the snow season has lower concentrations of cyanides. The City of Fresno NURP study found undetectable cyanide (<10 µg/L) in 19 grab samples of stormwater runoff from four watersheds with different land uses. Highway runoff from three urban sites in Michigan had average cyanide concentrations ranging from 5.8–9.3 µg/L. Samples were collected from June through October, which was outside the season where deicing salts might be used. Traffic volumes were high and ranged from 40,000 to 120,000 vehicles per day.

It is highly probable that the reported concentrations which exceed the freshwater acute guideline in urban stormwater are associated with the use of deicing salts containing the de-caking agent ferrocyanide. In situations where deicing salts are not being used, and where vehicle exhaust may be the dominant source, concentrations are much less (e.g., typically <10 µg/L), even with high traffic volumes.

Anti-caking agents would not be a source of cyanide in urban stormwater in the project, and the forgoing discussion suggests that concentrations in stormwater runoff from the project may reach concentrations of magnitude of approximately 10 μg/L, but are highly unlikely to exceed the acute CTR criteria of 22 μg/L.

The detectable concentrations observed in the Santa Clarita River at the mass emission station S29 (average of 10 μg/L) may be in part due to untreated urban stormwater runoff from the City of Santa Clarita. However, other sources are likely to be more significant. A potential source is cyanide from burnt catchments. For example, cyanide concentrations in run-off obtained from an area that had been burned in a wildfire that occurred in Tennessee and North Carolina averaged 49 μg/L. (Barber, T.R., Lutes, C.C., Doorn, M.R.J., Fuchsman, P.C., Timmenga, H.J., and R.L. Crouch, 2003. Aquatic Ecological Risks Due to Cyanide Releases from Biomass Burning. Chemosphere 50:33, 343-348, January 2003.) Higher cyanide concentrations were reported in runoff from a wildfire that occurred in New Mexico, with an average value of 80 μg/L.

In addition to the expected relatively low level of cyanide in untreated stormwater, cyanide in runoff from the project would be readily removed by biological uptake, degradation by microorganisms, and by volatilization in the treatment PDFs, especially the dry extended detention basins. Therefore, cyanide would not significantly impact the receiving waters of the project.

(d) Summary for Pollutants of Concern

With the exception of runoff volume and total aluminum and chloride loads (but not concentrations), concentrations and loads of modeled constituents would decrease under following project buildout, when compared to existing conditions. The modeled concentrations in runoff from developed areas with PDFs are below all benchmark water quality objectives and criteria and TMDL wasteload allocations for the Santa Clara River, and are addressed by a comprehensive site design, source control and treatment control strategy.

Concentrations of hydrocarbons are expected to increase, while concentrations of pathogens, pesticides and trash and debris may or may not increase under proposed conditions when compared to existing conditions. However, none of the qualitatively assessed constituents would significantly impact receiving waters due to the implementation of the project PDFs in compliance with the SUSMP requirements.

The project site design, source control, treatment control, and hydromodification control BMPs planned as PDFs meet or exceed the requirements of the MS4 Permit, including SUSMP requirements. Therefore, potential impacts from Landmark Village on receiving water quality are expected to be less than significant.

(3) Post-Development Operational Impacts to Groundwater

Discharge from the project's developed areas to groundwater would occur in three ways: (1) through general infiltration of irrigation water; (2) through incidental infiltration of urban runoff in the proposed treatment control PDFs after treatment; and (3) through infiltration of urban runoff, after treatment in the project PDFs, into the groundwater under the Santa Clara River, which is the primary recharge zone for groundwater in the Santa Clara Valley. Groundwater quality would be fully protected through implementation of the project's site design, source control, and treatment control PDFs prior to discharge of project runoff to groundwater.

The pollutant of concern with respect to groundwater is nitrate-N plus nitrite-N. The Basin Plan groundwater quality objective for nitrate-nitrogen plus nitrite-nitrogen is 10 mg/L (which is more stringent than the objective for nitrate-nitrogen alone (10 mg/L) and for nitrite-nitrogen alone (1 mg/L)). The predicted nitrate-nitrogen plus nitrite-nitrogen concentration in runoff after treatment in the project PDFs is 0.5 mg/L, which is well below the groundwater quality objective. Therefore, infiltration of post-development stormwater runoff would not cause significant adverse groundwater quality impacts.

Wastewater generated by the Landmark Village project would be treated in the Newhall Ranch WRP. Treatment at the Newhall Ranch WRP would consist of screening, activated sludge secondary treatment with membrane bioreactors, nitrification/denitrification, ultraviolet disinfection, and partial reverse osmosis. Discharges from the Newhall Ranch WRP treatment facility are permitted by a NPDES Permit and WDRs issued by the RWQCB in October 2007 (LARWQCB, 2007). Treated effluent from the Newhall Ranch WRP would be used to supply distribution of recycled water throughout the Specific Plan area for irrigation of landscaping and other approved uses. The WRP permit contains effluent limitations that would control the amount of conventional, non-conventional, and toxic pollutants discharged to the receiving waters. These effluent limits are a combination of technology-based limits (per 40 C.F.R. section 122.44(a)) and water quality-based limits (per 40 C.F.R. section 122.44(d)). The effluent limitation contained in the Newhall Ranch WRP permit for nitrate-N plus nitrite-N is 5 mg/L, and the limitation for nitrite-N is 0.9 mg/L (average monthly). As the Basin Plan groundwater quality objective for nitrate-nitrogen plus nitrite-nitrogen is 10 mg/L or 1 mg/L for nitrite-nitrogen, the Newhall Ranch WRP irrigation water supply that would serve Landmark Village would be well below the groundwater quality objectives. On this basis, infiltration of irrigation water would not cause significant adverse groundwater quality impacts.

For a discussion of impacts associated with perchlorate-contaminated groundwater, please see this EIR, **Section 4.10, Water Service**.

(4) Post-Development Operational Impact Associated with Pollutant Bioaccumulation

Certain pollutants have the potential to accumulate in ponded water, and/or in treatment BMP vegetation and soils, potentially increasing the risk of exposure to wildlife and the food chain. Factors that could affect the extent of potential bioaccumulation include the following:

- The bioavailability of the pollutant;
- Conditions in the soils (e.g., pH, acid-volatile sulfide concentration, organic content) that affect the form and bioavailability of the pollutant;
- The efficiency by which pollutants in the soils enter the plant community, the storage of these pollutants in plant tissues that are edible, and the utilization of the plants as a food source by animals;
- The type of habitats, organisms attracted to these habitats and their feeding habits; and
- BMP system design and maintenance.

The primary pollutants of concern with regard to bioaccumulation are mercury and selenium. However, as indicated by the water quality monitoring conducted by Los Angeles County at the Santa Clara River mass emission station S29 (LACDPW, 2005), selenium and mercury are not naturally present at levels of concern in this watershed. Since these pollutants would not be introduced by the project, bioaccumulation of selenium and mercury is not expected.

The potential for bioaccumulation impacts from the proposed bioretention, vegetated swale, and extended detention basin facilities would be minimal. Since the site is largely impervious, very little coarse solids and associated pollutants would likely be generated. The vegetation in the facilities would trap sediments and pollutants in the soils, which contain bacteria that metabolize and transform trace metals, therefore, reducing the potential for these pollutants to enter the food chain. The facilities do not provide open water areas and would not likely attract waterfowl.

Bioaccumulation of pollutants in the Santa Clara River is not of concern due to the low concentrations of pollutants, which are below the benchmark Basin Plan objectives and CTR criteria predicted in the treated runoff. Also, sediments in the Santa Clara River are transported downstream in the wet season by storm flows and, therefore, do not accumulate.

On this basis, the potential for bioaccumulation and adverse effects on waterfowl and other species would be less than significant.

(5) Post-Development Operational Impact Associated with Dry Weather Flows

While there are no specific requirements in the MS4 Permit and the SUSMP requirements to treat dry-weather discharges from the project area, pollutants in dry weather flows also could be of concern because dry weather flow conditions occur throughout a large majority of the year, and because some of the TMDLs in downstream reaches of the Santa Clara River are applicable for dry weather conditions (*e.g.*, nutrients and chloride).

Dry weather flows typically are low in sediment because the flows are relatively low, and coarse suspended sediment tends to settle out or is filtered out by vegetation. As a consequence, pollutants that tend to be associated with suspended solids (e.g., phosphorus, some bacteria, some trace metals and some pesticides) typically are found in very low concentrations in dry weather flows. The focus of the following discussion is, therefore, on constituents that tend to be dissolved (e.g., nitrate and trace metals) or constituents that are so small as to be effectively transported (e.g., pathogens and oil and grease).

In order to minimize the potential generation and transport of dissolved constituents, landscaping in public and common areas would utilize drought tolerant vegetation that requires little watering and chemical application. Landscape watering in common areas, commercial areas, multi-family residential areas, and parks would use efficient irrigation technology with evapotranspiration sensors to minimize excess watering.

In addition, educational programs and distribution of materials (source controls) would emphasize appropriate car washing locations (at commercial car washing facilities or the car wash pad in the multi-family residential areas) and techniques (minimizing usage of soap and water), encourage low-impact landscaping and appropriate watering techniques, appropriate swimming pool dechlorination and discharge procedures, and discourage driveway and sidewalk washing. Illegal dumping would be discouraged by stenciling storm drain inlets and posting signs that illustrate the connection between the storm drain system and the receiving waters and natural systems downstream.

The bioretention areas, vegetated swales, and the extended detention basin would provide treatment for and infiltrate dry weather flows and small storm events. Water cleansing is a natural function of vegetation, offering a range of treatment mechanisms. Sedimentation of particulates is the major removal mechanism. However, the performance is enhanced as plant materials allow pollutants to come in contact with vegetation and soils containing bacteria that metabolize and transform pollutants, especially nutrients and trace metals. Plants also take up nutrients in their root system. Some pathogens would be removed through ultraviolet light degradation. Any oil and grease would be effectively adsorbed by the vegetation and soil within the low flow wetland vegetation. Dry weather flows and small storm flows would infiltrate into the bottom of the basin after receiving treatment in the low flow wetland vegetation.

The treatment control PDFs would infiltrate or evapotranspire all expected dry weather runoff from the project. It is expected that no dry weather discharge would occur to the Santa Clara River from the project. Based on source control PDFs reducing the amount of dry weather runoff and treatment control PDFs capturing and treating the dry weather runoff that does occur, the impact from dry weather flows is considered less than significant.

(5) Post-Development Operational Impact Associated with Hydromodification

Development typically increases impervious surfaces on formerly undeveloped (or less developed) landscapes, reducing the capture and infiltration of rainfall. The result is that, as a watershed develops, a larger percentage of rainfall becomes runoff during any given storm. In addition, runoff reaches the stream channel more efficiently due to the development of storm drain systems, so that, if no controls are implemented, the peak discharge rates for rainfall events and floods are higher for an equivalent event than they were prior to development. Further, the introduction of irrigation and other dry weather flows can change the seasonality of runoff reaching natural receiving waters. These changes, in turn, affect the stability and habitat of natural drainages, including the physical and biological character of these drainages. This process is termed "hydromodification." (SCCWRP, 2005)

Flows from the Landmark Village project site, the SR-126 improvements, Long Canyon Bridge, and the utility corridor would be discharged directly to the Santa Clara River. Therefore, this analysis addresses the potential for hydromodification impacts to the Santa Clara River as a result of the proposed project. The impervious surfaces associated with the proposed water tank are very minor and would not alter drainage patterns; therefore, no potential for hydromodification impacts exists from these areas of the project.

The physical alteration of natural drainages, such as bank protection, energy dissipaters, and bridge abutments, are not impacts created by changes in runoff seasonality, volume, duration, or flow associated with development. Instead, these types of alterations are physical alterations to the streambed and bank, with associated effects on stream habitat and species. These types of effects are analyzed in **Section 4.4, Biota**, of the Recirculated EIR and Section 4.5, Floodplain Modification, of the Draft EIR.

(a) Wet Weather Flows

The project proposes development of approximately 80 percent (233 acres) of the 292.6-acre tract map site; the remaining 59.6 acres would be used for trails, parks, and vegetated slopes and water quality BMPs. Overall, approximately 61 percent (178.4 acres) of the tract map area would be impervious and 39 percent (114.2 acres) would be vegetated. The size of the project in comparison to both the 1,618 square mile total watershed area and the expected total impervious area in the watershed in the existing condition and at buildout is small. It is estimated, based on the land use data provided by LACDPW, that the proposed project would comprise 0.5 percent of the total impervious area in the watershed encompassing the project location at ultimate buildout for the watershed.

A series of progressive hydromodification control measures would be used throughout the project site to prevent and control hydromodification impacts to the Santa Clara River:

- Avoid, to the extent possible, the need to mitigate for hydromodification impacts by preserving natural hydrologic conditions and protecting sensitive hydrologic features, sediment sources, and sensitive habitats.
- Minimize the effects of development through site design practices (e.g., reducing connected impervious surfaces and providing buffer areas) and implementation of stormwater volume-reducing BMPs (project-based hydromodification source control).
- Mitigate hydromodification impacts in-stream using geomorphically based channel design measures (e.g., buried soil cement bank stabilization).

Project-based Hydrologic Source Control. Disconnecting impervious areas from the drainage network and adjacent impervious areas is a key approach to protecting channel stability. Several hydrologic source controls would be included in the project design that would limit impervious area and disconnect imperviousness:

Low Impact/Site Design. Low impact/site design PDFs would help to reduce the increase in runoff volume. These PDFs include the clustering of Specific Plan development into village areas, including the Landmark Village; the preservation of 70 percent of the Specific Plan area in open space, and 59.6 acres (20 percent) of the tract map site in trails, slopes, and vegetated water quality treatment BMPs; routing of impervious area runoff to vegetated areas; use of native (and/or non-native/non-invasive) and drought tolerate plants in landscaped areas; and the use of efficient irrigation systems in common area landscaped areas. These measures will help to protect the stability of the Santa Clara River, and avoid and minimize direct impacts to the River.

Treatment Controls. The project's treatment control BMPs also would serve as hydromodification source control BMPs. Vegetated swales, bioretention areas, and extended detention basins can provide volume reduction on the order of 38 percent for vegetated swales and bioretention and 30 percent for extended detention basins. (Strecker, E. *et al.*, 2004. Analyses of the Expanded EPA/ASCE International BMP Database and Potential Implications for BMP Design, World Water and Envt. Cong. Proc. (June 27-July 1, 2004). Collectively these vegetated treatment facilities are expected to provide significant reduction in wet weather runoff. In addition these facilities also would receive and eliminate dry weather flows.

The increase in impervious surface within the project area is predicted to increase the average annual stormwater runoff volume from the project area by approximately 148 acre-feet per year, after accounting for the estimated volume reductions in the proposed treatment control PDFs. Using conservative values for volume reduction, the treatment control PDFs are estimated to reduce the increase in average annual stormwater runoff volume by approximately 57 acre-feet per year, which is a 19 percent reduction of the predicted average post-development stormwater runoff volume without the treatment control PDFs.

Geomorphically Referenced Channel Design. The hydromodification management approach for the Santa Clara River will incorporate "geomorphically-referenced river engineering," as described in SCCWRP Technical Report 450 (SCCWRP, 2005a). The goal of this approach is to preserve the appearance of the natural stream channel, to the maximum extent practicable, while maintaining stability in stream channel morphology. The project's development footprint would allow for the greatest freedom possible for "natural stream channel" activity. This includes establishing buffer zones, and maintaining setbacks to allow for channel movement and adjustment to changes in energy associated with runoff. The engineered structural elements that would be implemented where needed for the Santa Clara River include energy dissipation and bank stabilization.

Energy Dissipation. Energy dissipation at storm drain outfalls provides erosion protection in areas where discharges have the potential to cause localized stream erosion. Erosion protection would be provided at all storm drain outlets to the Santa Clara River.

Bank Stabilization. The project would include buried soil cement along the Santa Clara River and Castaic Creek adjacent to and downstream of the project site where necessary to protect against flooding and erosion pursuant to Federal Emergency Management Administration (FEMA) and LACDPW requirements. In total, approximately 18,600 LF of bank would be provided with buried soil cement protection. This would include approximately 11,000 feet fronting the tract map site and approximately 6,400 LF on the south bank downstream (west) of the Long Canyon Road Bridge. The alignment was selected so that bank protection along the River would generally be excavated from non-jurisdictional upland areas adjacent to the River. Installing bank protection in non-jurisdictional areas reduces and/or avoids impacts to the River, has the potential to create new riverbed areas, allows for channel movement and adjustment to changes in energy associated with runoff, and increases riparian habitat.

Additional buried bank stabilization would be constructed as part of the approved Newhall Ranch WRP and between The Old Road and Santa Clara River (protecting the utility corridor). The bank protection between The Old Road and the Santa Clara River was approved as part of the Santa Clara River NRMP.

Approximately 6,600 LF of TRM or similar bank stability protection would be provide along the southern edge of the utility corridor downstream or west of the tract map site. TRMs are designed to reinforce vegetation at the root and stem, thereby allowing vegetation to be used as erosion control in areas where flow conditions exceed the ability of natural vegetation to remain rooted. This includes applications with high slopes or stream banks where grouted rip-rap and concrete channels are aesthetically undesirable.

In summary, although project runoff volumes, flow rates, and durations would increase, potential impacts of hydromodification (i.e., the potential to cause erosion, siltation, or channel instability) would be minimized by the project PDFs. The project's site design PDFs, and volume reductions in treatment controls PDFs would minimize increases in runoff volume from the development area, the preferred method for controlling hydromodification impacts from new development. (SCCWRP, 2005a. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. Technical Report 450. April 2005.)

Potential instream impacts of increased volumes, rates, and flow durations would be managed and mitigated with energy dissipaters at the discharge points to the Santa Clara River, and the River banks would be protected with vegetated buried bank stabilization primarily in non-jurisdictional upland areas adjacent to the River. This type of stabilization technique is the preferred approach for bank stabilization. (SCCWRP, 2005a. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. Technical Report 450. April 2005.).

For these reasons, the wet weather hydromodification impacts of the project on the Santa Clara River would be less than significant.

(b) Dry Weather Runoff

In order to quantitatively address dry weather impacts, a dry weather water balance was performed. The quantity of dry weather flows from urban sources is variable and not easily quantified. Information available from the Irvine Ranch Water District suggests an average dry weather flow from urban areas of 2.9×10^{-4} cfs per urbanized acre (Irvine Ranch Water District [IRWD], 2003). Dry weather flow estimates in Santa Monica, used to design a dry weather flow recycling facility, indicate a range of dry weather flows between 8.3×10^{-5} to 1.8×10^{-4} cfs per urbanized acre (Antich et al., 2003).

For purposes of conservatively estimating the impacts of dry weather flows, a dry weather discharge of 3.0×10^{-4} cfs per urbanized acre was used in this report. **Table 4.3-35, Predicted Dry Weather Water Balance**, presents a monthly dry weather flow balance for the proposed project. Vegetated swales, bioretention areas, and water quality basins were assumed to infiltrate at 0.05 in/hr. Infiltration volume was calculated as the BMP bottom area times the infiltration rate. Evapotranspiration rates were conservatively assumed to be 60 percent of reference rates from CIMIS Zone 14, in which the project is located. Finally, it was assumed that open space in the project area would result in no dry weather runoff.

It is predicted that all dry weather flows would be infiltrated or removed by evapotranspiration in the treatment control PDFs, which also provide hydrologic source control. As a result, no change in seasonality of flows is anticipated to result from development.

Based on comprehensive site planning, source control, and treatment control strategy and the above water balance analysis, the potential for dry weather flows to result in hydromodification or associated habitat or water quality impacts is considered less than significant, as shown in **Table 4.3-35**.

Table 4.3-35
Predicted Dry Weather Water Balance

Month	Dry Weather Flow (af)[1]	ETo Capacity (af)[2]	Infiltration Capacity (af)[3]	Excess Capacity (af)[4]
January	5.3	0.4	15.6	16.0
February	4.8	0.6	14.1	14.6
March	5.3	0.9	15.6	16.5
April	5.1	1.3	15.1	16.4
May	5.3	1.7	15.6	17.3
June	5.1	2.0	15.1	17.1
July	5.3	2.2	15.6	17.8
August	5.3	1.9	15.6	17.5
September	5.1	1.4	15.1	16.5
October	5.3	1.0	15.6	16.6
November	5.1	0.5	15.1	15.6
December	5.3	0.4	15.6	16.0

Source: Geosyntec, 2008.
1 *Based on dry weather flow of 0.0003 cfs/acre from a range of researched values.*
2 *60% of Reference ETo from CIMIS Zone 14.*
3 *Equal to 0.05 in/hr over BMP bottom area.*
4 *Equal to (ETo + Infiltration Capacity) – Dry Weather Flow.*

(6) Groundwater Recharge

In a groundwater basin, the effect of urbanization on recharge to underlying groundwater is dependent on land uses, water uses, vegetative cover, and geologic conditions. Groundwater recharge from undeveloped lands occurs from precipitation alone, whereas areas that are developed for agricultural or urban land uses receive both precipitation and irrigation of vegetative cover. In an urban area, groundwater recharge occurs directly beneath irrigated lands and in drainages whose bottoms are not paved or cemented. A memorandum prepared by CH2MHill entitled, "*Effect of Urbanization on Aquifer Recharge in the Santa Clarita Valley*" discusses the general effects of urbanization on groundwater recharge and the specific effects in the Santa Clarita Valley (see Recirculated Draft EIR **Appendix 4.10**).

Currently, the site is irrigated agricultural land. As a result, in the existing condition, recharge occurs within the project site from irrigation and precipitation. On one hand, development of the site would introduce impervious surface over approximately 61 percent of the tract map site, which would tend to reduce recharge. In addition, development of agricultural lands would eliminate agricultural irrigation as a source of recharge. On the other hand, development of the site would increase runoff volume discharged after treatment to the Santa Clara River, whose channel is predominantly natural and consists of vegetation and coarse-grained sediments (rather than concrete). The porous nature of the sands and gravels forming the streambed would allow for significant infiltration to occur to the underlying groundwater. Also, the project would introduce landscaping, irrigation, and PDFs designed to infiltrate runoff. These project features would increase groundwater recharge from the project. On balance, it is unlikely that the project would result in a significant change in groundwater recharge in the project vicinity. Based on the above discussion, the project's impact on groundwater recharge is considered less than significant.

Please see **Section 4.10, Water Service**, of the Recirculated EIR for further information regarding the groundwater basin and recharge.

8. PROJECT MITIGATION MEASURES

Although the proposed project may result in potential impacts absent mitigation, the County already has imposed mitigation measures required to be implemented as part of the approved Newhall Ranch Specific Plan. These mitigation measures, as they relate to water quality, are found in the previously certified Specific Plan Program EIR and the adopted Mitigation Monitoring Plan (May 27, 2003). The project applicant has committed to implementing the applicable mitigation measures from the Specific Plan to ensure that future development of the project site would not adversely impact adjacent properties.

a. Mitigation Measures Required by the Adopted Newhall Ranch Specific Plan, as they Relate to the Landmark Village Project

The mitigation measures set forth below were adopted by the County in connection with its approval of the Newhall Ranch Specific Plan (May 27, 2003). All of the mitigation measures are applicable to the Landmark Village project due to its geographic location and nature of the proposed improvements. The applicable mitigation measures would be implemented to mitigate the potentially significant impacts associated with the proposed project. These measures are preceded by "SP," which stands for Specific Plan.

SP 4.2-1 All on- and off-site flood control improvements necessary to serve the NRSP are to be constructed to the satisfaction of the County of Los Angeles Department of Public Works Flood Control Division.

SP 4.2-2 All necessary permits or letters of exemption from the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, California Department of Fish and Game, and the Regional Water Quality Control Board for Specific Plan-related development are to be obtained prior to construction of drainage improvements. The performance criteria to be used in conjunction with 1603 agreements and/or 404 permits are described in Section 4.4, Biological Resources, Mitigation Measures 4.6-1 through 4.6-10 (restoration) and 4.6-11 through 4.6-16 (enhancement).

SP 4.2-3 All necessary streambed agreement(s) are to be obtained from the California Department of Fish and Game wherever grading activities alter the flow of streams under CDFG jurisdiction. The performance criteria to be used in conjunction with 1603 agreements and/or 404 permits are described in Section 4.6, Biological Resources, Mitigation Measures 4.6-1 through 4.6-10 (restoration) and 4.6-11 through 4.6-16 (enhancement).

SP 4.2-4 Conditional Letters of Map Revision (CLOMR) relative to adjustments to the 100-year FIA flood plain are to be obtained by the applicant before the proposed drainage facilities are constructed.

SP 4.2-5 Prior to the approval and recordation of each subdivision map, a Hydrology Plan, Drainage Plan, and Grading Plan (including an Erosion Control Plan if required) for each subdivision must be prepared by the applicant of the subdivision map to ensure that no significant erosion, sedimentation, or flooding impacts would occur during or after site development. These plans shall be prepared to the satisfaction of the County of Los Angeles Department of Public Works.

SP 4.2-6 Install permanent erosion control measures, such as desilting and debris basins, drainage swales, slope drains, storm drain inlet/outlet protection, and sediment traps in order to prevent sediment and debris from the upper reaches of the drainage areas which occur on the Newhall Ranch site from entering storm drainage improvements. These erosion control measures shall be installed to the satisfaction of the County of Los Angeles Department of Public Works.

SP 4.2-7 The applicant for any subdivision map permitting construction shall satisfy all applicable requirements of the NPDES Program in effect in Los Angeles County to the satisfaction of the County of Los Angeles Department of Public Works. These requirements currently include preparation of an Urban Storm Water Mitigation Plan (USWMP) containing design features and BMPs appropriate and applicable to the subdivision. In addition, the requirements currently include preparation of an SWPPP containing design features and BMPs appropriate and applicable to the subdivision. The County of Los Angeles Department of Public Works shall monitor compliance with those NPDES requirements.

b. Additional Mitigation Measures Proposed by this EIR

In addition to the mitigation measures adopted in connection with the Specific Plan, identified above, the project applicant is committed to implementing project-specific mitigation to ensure that water quality impacts are less than significant. This measure is preceded by "LV," which stands for Landmark Village.

LV 4.3-1 Prior to issuance of a building permit, and as a part of the design level hydrology study and facilities plan, the project applicant shall submit to LACDPW for review and approval of drainage plans showing the incorporation into the project of those water quality and hydrologic control project design features (i.e., the post-development water quality and hydrologic control BMPs)(the "PDFs"), identified in this **Section 4.3**, which PDFs shall be designed to meet the standards set forth in this **Section 4.3**, including the sizing, capacity, and volume reduction performance standards set forth herein, all as summarized in **Table 4.3-13**.

LV 4.3-2 Prior to issuance of a building permit, and as a part of the design level hydrology study and facilities plan, the project applicant shall submit to planning staff for review a Landscape and Integrated Pest Management Plan, identified in this **Section 4.3**, which shall be designed to meet the standards set forth as follows.

A Landscape and Integrated Pest Management Plan shall be developed and implemented for common area landscaping within the Landmark Village Project that addresses integrated pest management (IPM) and pesticide and fertilizer application guidelines. IPM is a strategy that focuses on long-term prevention or suppression of pest problems (i.e., insects, diseases and weeds) through a combination of techniques including: using pest-resistant plants; biological controls; cultural practices; habitat modification; and the judicious use of pesticides according to treatment thresholds, when monitoring indicates pesticides are needed because pest populations exceed established thresholds. The Landscape and Integrated Pest Management Plan will address the following components:

1. Pest identification.
2. Practices to prevent pest incidence and reduce pest buildup.
3. Monitoring to examine vegetation and surrounding areas for pests to evaluate trends and to identify when controls are needed.
4. Establishment of action thresholds that trigger control actions.

5. Pest control methods - cultural, mechanical, environmental, biological, and appropriate pesticides.

6. Pesticide management - safety (e.g., Material Safety Data Sheets, precautionary statements, protective equipment); regulatory requirements; spill mitigation; groundwater and surface water protection measures associated with pesticide use; and pesticide applicator certifications, licenses, and training (i.e., all pesticide applicators must be certified by the California Department of Pesticide Regulation).

7. Fertilizer management - soil assessment, fertilizer types, application methods, and storage and handling.

9. CUMULATIVE IMPACTS

a. Surface Water Quality

This section defines the geographic area of potential impact for the cumulative impacts analysis, and evaluates impacts from probable future projects together with the incremental effects of the proposed project to determine effects on water quality and hydromodification within this geographic area. The model results presented below are used in addition to consideration of the other projects reflected in adopted plans and projections for areas tributary to Santa Clara River Reach 5 to get a better overall assessment of cumulative water quality effects on the Santa Clara River.

The geographic area for evaluating cumulative impacts includes the unincorporated area of Los Angeles County west of I-5 to the Ventura County line (see **Figure 4.3-1**). This geographic area includes the Newhall Ranch subregion, the Entrada subregion, the Legacy Village subregion, and the Valencia Commerce Center, as well as existing development in the Six Flags Magic Mountain area and the existing Valencia WRP.

The proposed Entrada project site is located directly east of the Specific Plan area and west of I-5. Entrada is bounded by the Santa Clara River to the east and north, the Mission Village project within the Specific Plan area to the west, and the Westridge project to the south. The existing Six Flags Magic Mountain Theme Park is located adjacent to the Specific Plan and Entrada, but is not included in the project site. The Entrada project proposes development of single and multi-family residential units, commercial/retail uses, and a hotel on 813 acres. The project also includes private recreational facilities and various trail and road improvements.

The proposed Legacy Village project is located south of the Specific Plan area, bordering the Mission Village and Homestead projects, and north of Stevenson Ranch. The 1,750-acre Legacy project proposes construction of residential areas and commercial space. Over 1,000 acres of open space will be incorporated into the

Legacy Village project, including 50 acres of parks and trails. The above noted sites can be found on **Figure 1.0-3, Project Boundary/Environmental Setting**.

The remaining unbuilt portions of the Valencia Commerce Center are located approximately 0.5 mile upstream of the confluence of Castaic Creek and the Santa Clara River. Approximately 4 million square feet of building floor area will be developed over the next five to ten years. Additionally, bank stabilization improvements to Castaic Creek and Hasley Creek would be constructed in conjunction with these remaining phases of the Commerce Center.

Urban runoff from the Specific Plan, Entrada, Legacy Village, and the Valencia Commerce Center project areas will discharge to the Santa Clara River after treatment. Each of the projects will utilize vegetated swales, bioretention areas, and/or dry extended detention basins, as well as a full suite of site design and source control BMPs, to address pollutants of concern in stormwater runoff and dry weather discharges from the proposed projects. Urban runoff from the Magic Mountain Theme Park and the Valencia WRP currently drains to the Santa Clara River and will continue to do so in proposed conditions without any anticipated change to stormwater management controls.

The combined effect on modeled pollutant loads and concentrations of the Specific Plan, Entrada, Legacy Village, and the Valencia Commerce Center proposed projects and the existing Magic Mountain Theme Park and Valencia WRP are summarized in **Tables 4.3-37** and **4.3-38,** below, respectively. (Note that only stormwater impacts from runoff from the Valencia WRP site are included in modeled loads and concentrations; wastewater discharges are not included.) As shown in **Table 4.3-36, Predicted Average Annual Combined Runoff Volume and Pollutant Loads for the Newhall Ranch Specific Plan, Legacy Village, Entrada, and Valencia Commerce Center Projects**, when considered cumulatively, runoff volumes and loads of TKN, total nitrogen, total phosphorus, metals, and chloride are predicted to increase, while pollutant loads are expected to decrease for TSS and nitrate-N + nitrite-N. Pollutant concentrations from the combined projects are predicted to decrease for all modeled parameters (**Table 4.3-38**). Increases in pollutant loadings are not anticipated to be significant based on the fact that predicted pollutant concentrations are well below benchmark water quality standards and TMDL wasteload allocations and are primarily within the range of observed concentrations in Santa Clara River Reach 5 (**Table 4.3-38**).

Table 4.3-36
Predicted Average Annual Combined Runoff Volume and Pollutant Loads for the Newhall Ranch Specific Plan, Legacy Village, Entrada, and Valencia Commerce Center Projects

Modeled Parameter	Units	Development Condition		Change
		Existing	Developed w/ PDFs	
Volume	acre-ft	1,245	3,968	2,723
Total Suspended Solids	tons	483	302	-181
Nitrate-N + Nitrite-N	tons	5.4	3.3	-2.1
Total Kjeldahl Nitrogen	tons	5.2	9.6	4.4
Total Nitrogen	tons	10.6	12.9	2.3
Total Phosphorus	tons	1.3	1.5	0.2
Total Aluminum	lbs	4,030	7,396	3,366
Dissolved Aluminum	lbs	732	1,508	776
Dissolved Copper	lbs	39	99	60
Total Lead	lbs	37	77	40
Dissolved Zinc	lbs	477	670	193
Chloride	tons	44	93	49

Source: Geosyntec, 2008.

Table 4.3-37
Predicted Average Annual Combined Pollutant Concentrations for the Newhall Ranch Specific Plan, Legacy Village, Entrada, and Valencia Commerce Center Projects

Modeled Parameter	Units	Development Condition		Change
		Existing	Developed w/ PDFs	
Total Suspended Solids	mg/L	285	56	-229
Nitrate-N + Nitrite-N	mg/L	3.2	0.6	-2.6
Total Kjeldahl Nitrogen	mg/L	3.1	1.8	-1.3
Total Nitrogen	mg/L	6.3	2.4	-3.9
Total Phosphorus	mg/L	0.8	0.3	-0.5
Total Aluminum	ug/L	1,191	685	-506
Dissolved Aluminum	ug/L	216	140	-76
Dissolved Copper	ug/L	12	9	-3
Total Lead	ug/L	11	7	-4
Dissolved Zinc	ug/L	141	62	-79
Chloride	mg/L	26	17	-9

Source: Geosyntec, 2008.

Table 4.3-38
Comparison of Predicted Pollutant Concentrations for the Newhall Ranch Specific Plan, Entrada, Legacy Village, and Commerce Center Projects with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Modeled Parameter	Units	Predicted Average Annual Concentration	TMDL/ LA Basin Plan Water Quality Objectives	California Toxics Rule Criteria[1]	Wasteload Allocations for MS4 Discharges into the Santa Clara River Reach 5	Range of Observed[2] Concentrations in Santa Clara River Reach 5
Total Suspended Solids	mg/L	56	Water shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.	NA	NA	32–6,591
Nitrate-N + Nitrite-N	mg/L	0.6	5	NA	6.8[3]	0.5–4.8
Total Ammonia	mg/L	0.5	2.0[4]	NA	1.75[5]	<0.005–1.1
Total Nitrogen	mg/L	2.4	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.	NA	NA	<0.04–46[6]
Total Phosphorus	mg/L	0.3		NA	NA	0.18–13.4
Dissolved Copper	µg/L	9	NA	32	NA	3.3–22.6
Total Lead	µg/L	7	NA	260	NA	0.6–40
Dissolved Zinc	µg/L	62	NA	250	NA	3–37

Modeled Parameter	Units	Predicted Average Annual Concentration	TMDL/ LA Basin Plan Water Quality Objectives	California Toxics Rule Criteria[1]	Wasteload Allocations for MS4 Discharges into the Santa Clara River Reach 5	Range of Observed[2] Concentrations in Santa Clara River Reach 5
Total Aluminum	µg/L	685	NA	750	NA	131–19,650
Chloride	mg/L	17	100	NA	100	3–121

Source: Geosyntec, 2008.

1 *Hardness = 250 mg/L, based on minimum observed value at USGS Station 11108500. Lead criteria is for total recoverable lead. NAWQC aluminum criteria for pH 6.5 – 9.0.*

2 *Range of concentrations observed in the Santa Clara River during wet weather (Stations S29, NR1, and NR3, see Section 2.3.1 of Recirculated Draft EIR **Appendix 4.3**).*

3 *30-day average.*

4 *4-day average, ELS present, 90th percentile pH and temperature pairing observed at USGS Monitoring Station 11108500.*

5 *30-day average in Reach 5 below Valencia.*

6 *Observed values for TKN (ammonia plus organic nitrogen).*

NA – not applicable

As discussed above, the anticipated quality of effluent expected from Landmark Village would not contribute concentrations of pollutants of concern that would be expected to cause or contribute to a violation of the water quality standards in the project's receiving waters. Therefore, the project's incremental effects on surface water quality are not expected to be significant.

The Landmark Village project's surface runoff water quality, after PDFs, both during construction and post-development, is predicted to comply with adopted regulatory requirements that are designed by the RWQCB to assure that regional development does not adversely affect water quality, including MS4 Permit and SUSMP requirements; Construction General Permit and General Dewatering Permit requirements; and benchmark Basin Plan water quality objectives, CTR criteria, and TMDLs. Any future urban development occurring in the Santa Clara River watershed also must comply with these requirements. By extrapolating the results of the direct and cumulative impact analysis modeling, it can be predicted that analysis of other proposed development combined with existing conditions would have similar water quality results. Therefore, cumulative impacts on surface water quality of receiving waters from the project and future urban development in the Santa Clara Watershed are addressed through compliance with the MS4 Permit and SUSMP requirements; Construction General Permit and General Dewatering Permit requirements; and benchmark Basin Plan water quality objectives, CTR criteria, and TMDLs, which are intended to be protective of beneficial uses of the receiving waters. Based on compliance with these requirements designed to protect beneficial uses, cumulative water quality impacts are mitigated to a level that is less than significant.

b. Groundwater Quality

As discussed above, the anticipated quality of runoff discharges from the project's developed areas and irrigation to groundwater would not contribute loads or concentrations of pollutants of concern that would be expected to cause or contribute to a violation of the groundwater quality standards. By extrapolating these results to existing and proposed development throughout the watershed, and based on a review of adapted plans and projections, it is concluded that no adverse cumulative effects would occur to groundwaters. Therefore, the project's incremental effects on groundwater quality are not expected to be significant.

The project's discharges to groundwater, after PDFs, both during construction and post-development, would comply with adopted regulatory requirements that are designed by the RWQCB to assure that regional development does not adversely affect water quality, including MS4 Permit and SUSMP requirements; Construction General Permit and General Dewatering Permit requirements; and benchmark Basin Plan groundwater quality objectives. Any future urban development occurring in the Santa Clara River watershed must also comply with these requirements. Therefore, cumulative impacts on groundwater quality from the proposed project and future urban development in the Santa Clara Watershed are addressed through compliance with the MS4 Permit and SUSMP requirements; Construction General Permit and, General Dewatering Permit requirements; and benchmark Basin Plan groundwater quality objectives, which are intended to be protective of beneficial uses of the groundwater. Based on compliance with these requirements designed to protect beneficial uses, cumulative groundwater quality impacts are mitigated to a level that is less than significant.

c. Groundwater Recharge

Increased urbanization in the Santa Clarita Valley has resulted in the irrigation of previously undeveloped lands. The effect of irrigation is to maintain higher soil moisture levels during the summer than would exist if no irrigation were occurring. Consequently, a greater percentage of the fall/winter precipitation recharges groundwater beneath irrigated land parcels than beneath undeveloped land parcels. In addition, urbanization in the Santa Clarita Valley has occurred in part because of the importation of State Water Project (SWP) water, which began in 1980. SWP water use has increased steadily, reaching nearly 44,500 acre-feet (AF) in 2003. Two-thirds of this water is used outdoors, and a portion of this water eventually infiltrates to groundwater. The other one-third is used indoors and is subsequently routed to local WRPs and then to the Santa Clara River (after treatment). A portion of this water flows downstream out of the basin, and a portion infiltrates to groundwater.

Records show that groundwater levels and the amount of groundwater in storage were similar in both the late 1990s and the early 1980s, despite a significant increase in the urbanized area during these two decades. This long-term stability of groundwater levels is attributed in part to the significant volume of natural recharge that occurs in the streambeds, which do not contain paved, urban land areas. On a long-term historical basis, groundwater pumping volumes have not increased due to urbanization, compared with pumping volumes during the 1950s and 1960s when water was used primarily for agriculture. Also, the importation of SWP water is another process that contributes to recharge in the Valley. In summary, urbanization has been accompanied by long-term stability in pumping and groundwater levels, plus the addition of imported SWP water to the Valley, which together have not reduced recharge to groundwater, nor depleted the amount of groundwater that is in storage within the Valley.

Based on the above discussion, the cumulative impact on groundwater recharge is considered less than significant.

d. Hydromodification

As identified in the MS4 Permit, the increased volume, velocity, and discharge duration of stormwater runoff from the cumulative existing and future developed areas in watersheds of natural drainages, including the Santa Clara River, have the potential to accelerate downstream erosion and impair stream habitat. Given the very large size of the Santa Clara River watershed, the contribution of the project to cumulative hydromodification impacts to the Santa Clara River is difficult to assess quantitatively. Therefore, a qualitative assessment that references total predicted development per adopted General Plans and projections for the Santa Clara River watershed is provided below.

Effect of Watershed Impervious Area. The limited hydromodification impact research to date has focused on empirical evidence of channel failures in relationship to directly connected impervious area (DCIA) or total impervious area. However, more recent research has established the importance of the size of watershed, channel slope and materials, and climatic and precipitation patterns. (Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. Technical Report 450. April 2005.) Impervious area that drains directly to a storm drain system and then to the receiving water is considered "directly connected," whereas impervious area that drains through vegetation or to infiltration facilities is considered "disconnected."

Booth and Jackson (1997) reported finding a correlation between loss of channel stability and increases in DCIA. In Washington state, streams were found to display the onset of degradation when the DCIA increases to ten percent or more, and a lower imperviousness of five percent was found to cause significant degradation in sensitive watersheds. (Booth, D.B., and Jackson C.R. 1997 Urbanization of Aquatic Systems: Degradation Thresholds, Stormwater Detection, and the Limits of Mitigation. Journal of the American Water Resources Association, volume 33 (5), pg 1077-1090.) The Center for Watershed Protection described the impacts of urbanization on stream channels and established thresholds based on total imperviousness within the tributary drainage area. It states "a threshold for urban stream stability exists at about 10 percent imperviousness." It further states that a "sharp threshold in habitat quality exists at approximately 10 percent to 15 percent imperviousness." These studies, however, addressed changes in a very different climatic region than Southern California.

Geosyntec's work in the San Francisco Bay area's Santa Clara Valley (Geosyntec, 2004) also evaluated the relationship between imperviousness and stream channel degradation in an area that had predominately, directly connected impervious areas. (Geosyntec Consultants, 2004. Hydromodification Management Plan, Santa Clara Valley Urban Runoff Pollution Prevention Program.) Geosyntec found similar results to those published by Booth and Schuler, where channel erosion was observed at approximately six to nine percent imperviousness for two separate watershed systems. More recent studies conducted by Geosyntec in this same watershed area showed that levels as low as two to three percent total imperviousness could lead to stream channel degradation, depending on channel characteristics. This region also has different climatic characteristics than southern California.

Although physical degradation of stream channels in semi-arid climates of California may be detectable when watershed imperviousness is between three and five percent, not all streams will respond in the same manner. (SCCRWP, 2005b. Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California. Technical Report 475. December 2005.) Management strategies need to account for differences in stream type, stage of channel adjustment, current and expected amount of basin imperviousness, and existing or planned hydromodification control strategies.

The absolute measure of watershed imperviousness that could cause stream instability in the Santa Clara River depends on many factors, including watershed area, land cover, and soil type; development impervious area and connectedness; reduced sediment yield; longitudinal slope of the river; channel geometry; and local boundary materials, such as bed and bank material properties and vegetation characteristics. Based on land use data provided by the County of Los Angeles, the estimated cumulative level of percent impervious area at buildout in the Santa Clara River watershed upstream from the Specific Plan area is 9 percent.

Effect of Catchment Drainage Area. The Southern California Coastal Water Research Project (SCCWRP) found signs of hydromodification impacts in Southern California streams when watershed percent imperviousness was around two to three percent for streams with a catchment drainage area of less than five square miles (mi^2). (SCCWRP, 2005a. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. Technical Report 450. April 2005.) Recognizing that their findings were based on the type and size of catchments that were measured, the researchers in the

SCCWRP study attempted to develop a framework by which their results could be extended to other stream types. They developed a classification system based on watershed characteristics, stream channel characteristics (including level of vegetative development), and stream channel resistance, and suggested these features could be important in selecting management strategies and approaches to control hydromodification impacts. The Level 1 classification is based on watershed characteristics that include the size, shape, and topography of the watershed.

The catchment drainage area (CDA) is stated to be the most obvious differentiator among watersheds, as this is likely to have the greatest effect on runoff. The SCCWRP study focused on small watersheds (< 5 mi^2), whereas the CDA of the Santa Clara River at the Los Angeles County line, near the western edge of the Specific Plan area (the Upper Watershed), is about 640 mi^2. Based on the differences in CDA, the SCCWRP findings with respect to CDA would not be applicable to the Santa Clara River. Information in the SCCWRP report, suggests that smaller watersheds are more responsive and sensitive to changes in land use, whereas larger watersheds (> 30 mi^2) were said to be less responsive to land use changes. Geosyntec's work in the San Francisco Bay area found significant hydromodification impacts on streams of watersheds that were 40 mi^2 in size; however, this is still substantially smaller than the Santa Clara River watershed at the Los Angeles County line. Given the large CDA for the Santa Clara River, The River is likely less responsive to potential hydromodification effects, but channel morphology must still be examined to determine the level and potential significance of Santa Clara River response.

Application to the Santa Clara River. Balance Hydrologics assessed the potential effects of the planned cumulative urbanization within the Santa Clara River upstream of the County line (the upper watershed) on channel morphology by examining historical changes in the Santa Clara River channel pattern in response to different types of major disturbance, using historical rainfall and other relevant records and aerial channel photography. (Balance Hydrologics, 2005. Assessment of Potential Impacts Resulting from Cumulative Hydromodification Effects, Selected Reaches of the Santa Clara River, Los Angeles County, California. Prepared by Balance Hydrologics Inc. for Newhall Land. October 2005 [provided in Appendix F of the Water Quality Technical Report in Recirculated Draft EIR **Appendix 4.3**]) The findings of this analysis are summarized below.

The Santa Clara River is a dynamic, episodic system. Understanding the magnitude of geomorphic change over the course of recent history in response to natural and human disturbances in the watershed is a key factor in assessing the potential response to future urbanization within the watershed.

For example, the construction of Castaic Dam in the 1974 (affecting approximately 30 percent of the Santa Clara River watershed above Castaic Creek) cut off a significant supply of sediment to the Santa Clara River. This change, however, does not appear to have had an effect on the channel dimensions of the

Santa Clara River mainstem. The width of the active corridor as well, as the general form of the channel, are generally consistent before and after construction of the dam. It appears that the Santa Clara River had enough buffering capacity to absorb this change. The depletion of sediment supply to the mainstem, which would typically be expected to cause erosive effects, did not, in fact, result in those effects, perhaps because reductions in sediment were offset by additional available sediment stored in the basin in the upper watershed as a result of movement along the San Gabriel fault.

Similarly, the amount of vegetation within the Santa Clara River corridor appears to have generally increased since the 1960s, likely due to the increase in available summer flows due to the Valencia and Saugus WRPs' discharges. However, this vegetation does not seem to provide enough erosion resistance to maintain a "stable" channel capable of withstanding regular 're-sets,' large events that completely alter the form of the Santa Clara River channel (which occur at intervals averaging about a decade), or much less than the expected lifetime of the riparian woodlands, which do get established. Despite heavy vegetation on the channel banks near the Specific Plan area and in areas of groundwater upwelling, the stream still responds to large events by a general widening and/or shift of the active channel within the River corridor.

After studying the response of the River to several different anthropogenic and natural disturbances, the report concluded that the Santa Clara River, as with many streams in semi-arid southern California, is highly episodic. Concepts of "normal" or "average" sediment-supply and flow conditions have limited value in this "flashy" environment, where episodic storm and wildfire events have enormous influence on sediment and storm flow conditions. In these streams, a large portion of the sediment movement events can occur in a matter of hours or days. Other perturbations that can potentially affect channel geometry appear to have transitory or minor manifestations. For example, effects on the channel width due to the 1980s levee construction were barely discernible by the first few years of the 21st century, probably mostly due to morphologic compensation associated with the storm events in the mid- to late 1990s. As a result, channel morphology, stability, and character of the Santa Clara River is almost entirely determined by the "re-set" events that occur within the watershed.

Fluvial Study. Additional study of the Santa Clara River has been performed by Pacific Advanced Civil Engineering, Inc., which prepared a comprehensive fluvial analysis for Santa Clara River through the Specific Plan area for LACDPW. (PACE, 2006b. Newhall Ranch River Fluvial Study Phase I Final Draft. Prepared for Newhall Land by Pacific Advanced Civil Engineering, Inc. Fountain Valley, California) A river fluvial analysis is the study of the river bed and bank sediment movement over time, as a result of flow in the river and changes in the tributary watershed.

The fluvial analysis had three distinct components:

- Analysis of long term trends of river bed and bank sediment build-up (aggregation) or removal (degradation) was performed. More than 80 years of available historic topographic mapping of the River indicated no real trend of aggregation or degradation in the study reach.
- General (capital storm event) aggredation/degradation calculations were performed to determine the expected fluvial response of the River to the LACDPW design storm event (>140,000 cfs). USACOE computer modeling software (SAM) was used to evaluate existing and proposed project conditions. Only minor variations in the fluvial response were shown in the modeling.
- Local aggredation/degradation resulting from river curvature, bridges, river bed material, and various other components were considered, and estimates of aggredation and degradation were calculated.

To complete the fluvial analysis, long term, general, and local aggredation/degradation components were added together to obtain the total aggredation/degradation for each river section within the study reach.

One of the purposes for the fluvial analysis, which has been approved by LACDPW, was to provide a level of understanding of the Santa Clara River reach fluvial mechanics near Newhall Ranch, as it relates to existing conditions and proposed Specific Plan development conditions, in order to identify any potential project impacts. The fluvial analysis showed very little change between the pre- and post-development conditions and, therefore, concluded that there is no potential adverse impact to the fluvial mechanics of the River.

Conclusion. As discussed above, the project would include a number of hydrologic source control PDFs that would substantially lessen any potential contribution to cumulative hydromodification impacts to the Santa Clara River. In addition, it is presumed that all future development within the Specific Plan, Legacy, and Entrada subregions would implement hydromodification controls consistent with the Newhall Ranch Specific Plan Sub-regional Stormwater Mitigation Plan. Further, other future projects within the watershed reflected in adopted plans and projections would implement hydromodification controls to meet flow criteria that will be adopted by the LACDPW under Part 4, Section D.1 of the MS4 Permit. These measures are designed to mitigate and prevent direct and cumulative hydromodification impacts.

Within the Santa Clara River watershed, major perturbations (urbanization, dam construction, levee construction, decadal changes in climate, and increases in woody vegetation) do not appear to have had a significant impact on the geomorphic expression of the Santa Clara River. Large "re-set" events (those which are typically not as affected by increases in impervious area) have episodically completely altered the form of the Santa Clara River channel. These events, occurring on average once every ten years, are a dominant force in defining channel characteristics. The geomorphic dominance of "re-set" events determines the geomorphic character of the Santa Clara River, and the Santa Clara River's response to anthropogenic perturbations, including hydromodification impacts associated with development, is expected to be minimal in light of the "re-set" driven nature of the Santa Clara River channel. Due to these episodic "re-sets," "unraveling" of the Santa Clara River mainstem due to hydromodification associated with cumulative urban development within the watershed, as is seen in many smaller southern California watersheds, is not expected to occur. The "re-set" events appear to adequately buffer changes that may occur in short-term sediment transport between re-set events.

Based upon the above discussion, concluding that the project includes hydromodification controls as PDFs, that future development projects within the watershed would control flow in compliance with the regional program, and that large-scale changes naturally occur in the Santa Clara River in response to major episodic events, the project's contribution to cumulative hydromodification impacts to the Santa Clara River would be less than significant and consistent with the requirements of the MS4 Permit.

10. CUMULATIVE MITIGATION MEASURES

Because cumulative development will be subject to the same or similar required mitigation measures as the proposed project, no additional cumulative mitigation measures are proposed or required.

11. SIGNIFICANT UNAVOIDABLE IMPACTS

a. Project-Specific Impacts

With the incorporation of source and treatment controls into the project design, and implementation of the Newhall Ranch Specific Plan Program EIR and Landmark Village-specific mitigation measures, no significant unavoidable impacts would occur with respect to water quality.

b. Cumulative Impacts

No significant unavoidable cumulative impacts have been identified or are anticipated for the proposed project, as it relates to water quality.