4.8.1 Water Quality

1. SUMMARY

The approximately 185-acre project site is comprised primarily of vacant, undeveloped land, located adjacent to the City of Santa Clarita in Los Angeles County, and surrounded by urban uses. The site is contained within a tributary drainage area of approximately 191 square miles that drains into a portion of the Santa Clara River designated as Reach 7 in the Water Quality Control Plan (Basin Plan) for the Los Angeles Region, which extends from Bouquet Canyon Road to the Lang gauging station. This reach of the River is generally dry for most of the year, with intermittent flows occurring primarily during the "rainy" months. Consequently, except during storm events of sufficient size to create flows in this portion of the River, surface flows of Reach 7 do not reach downstream reaches of the River. Older residential, commercial, and industrial uses are located upstream and east of the project site, and residential and commercial uses are located downstream and west of the project site. The Saugus Water Reclamation Plant (WRP) is located downstream from the project site, just across Bouquet Canyon Road at Soledad Canyon Road. A second sewage treatment plant, the Valencia WRP, is located immediately downstream of I-5.

The project would generate pollutants typical of urban residential and commercial areas during construction, and after the site is built out and occupied. Primary pollutants of concern include total suspended solids, nutrients, trace metals, chloride, pathogens, petroleum hydrocarbons, pesticides, trash and debris, methylene blue activated substances, cyanide, and bioaccumulation. Constituents for which sufficient data was available were analyzed quantitatively using a water quality model created to address the project's features. Taking into account the project's non-structural and structural (treatment) project design features (PDFs), and evaluating the identified pollutants of concern, the following analysis concludes that project water quality impacts would be less than significant. The project would meet all applicable regional and local water quality requirements of the State Water Resources Control Board (SWRCB), the Regional Water Quality Control Board for the Los Angeles Region (LARWQCB), the National Pollutant Discharge Elimination System (NPDES), the County of Los Angeles and the City of Santa Clarita during both construction and operation of the project. Further, future development in the Santa Clarita Valley would be required to meet all of those same requirements in order to control stormwater discharges of pollutants of concern. Consequently, no unavoidable significant project or cumulative project water quality impacts would occur.

The proposed WRP treatment processes would incorporate best practicable treatment and control measures, which would be regularly maintained and optimally operated. A comparison of predicted groundwater quality at the critical downgradient production well to the water quality objectives for water supply showed that the WRP would not adversely impact the water quality of downstream water supply wells. The expected nitrate-nitrogen plus nitrite-nitrogen concentration in combined percolated recycled water and stormwater is less than the Basin Plan standard, thus would not result in a violation of the groundwater quality standards for nitrate-nitrogen plus nitrite-nitrogen. With mitigation, percolation of recycled water from the project would not result in a violation of the *groundwater quality standards for minerals (TDS, chloride, sulfate, and boron). Impacts to all other groundwater pollutants of concern would be prevented by the incorporation of best practicable treatment and control measures in the WRP treatment processes. Based on the analysis for the pollutants of concern in groundwater, the project would not result in a violation of any groundwater quality standards or waste discharge requirements or otherwise substantially degrade water quality. On this basis, the project's direct impact on groundwater quality is considered less than significant.*

2. INTRODUCTION

Stormwater discharges consist of surface runoff generated from various land uses in the hydrologic drainage basins that discharge into water bodies. The quality of these discharges varies considerably and is affected by the hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants in stormwater can have damaging effects on both human health and aquatic ecosystems. Absent special measures, development and urbanization typically increase pollutant loads for certain pollutants, volume and discharge velocity of stormwater runoff. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots. Second, urban development can create new stormwater pollution sources as the increased density of human population brings proportionately higher levels of vehicle emissions, vehicle maintenance wastes, pesticides, household hazardous wastes, trash, and other anthropogenic pollutants.

The information presented in this section is a summary of the Vista Canyon Water Quality Technical Report, prepared by Geosyntec Consultants (May 2010). This report is presented in its entirety in **Appendix 4.8** of this Draft EIR. The report and this section only focus on the potential water quality impacts of the project. For analysis of the potential hydrological impacts of the project, see **Section 4.2**, **Flood**, and **Appendix 4.2**. For additional geological information, see **Section 4.1, Geotechnical Hazards,** and **Appendix 4.1**.

a. Summary

Potential changes in water quality are evaluated for each pollutant/constituent of concern based on runoff water quality modeling, literature information, and/or a qualitative assessment, depending on the data available for assessing each constituent. Pollutants of concern were selected based on (1) pollutants commonly associated with urban stormwater runoff, (2) Basin Plan beneficial uses and water quality objectives, (3) California Toxics Rule (CTR) criteria, (4) current Section 303(d) listings, (5) Total Maximum Daily Loads (TMDLs) in the Santa Clara River, and (6) pollutants that have the potential to cause toxicity or bioaccumulate in the receiving waters. (See heading **4.a**, below). Impacts take into account changes in pollutant concentrations and the proposed project design features that have been designed to be consistent with or exceed federal, state, and local requirements.

The Event Mean Conditions (EMCs; defined below) used to characterize the existing and post-development stormwater quality at the proposed project site are based on the regional data presented in the Geosyntec report (see **Appendix 4.8**). When quantitative analysis is possible and useful, project development scenarios were modeled based on existing conditions for on- and off-site areas. Constituents modeled include total suspended solids (TSS), total phosphorus (TP), nitrate plus nitrite-nitrogen, ammonia, total nitrogen (TN), dissolved copper (Cu), total lead (Pb), dissolved zinc (Zn), and chloride (Cl). Turbidity, pathogens, petroleum hydrocarbons, pesticides, trash and debris, methylene blue activated substances, and cyanide were assessed qualitatively.

Significance criteria for surface water quality impacts have been identified based on Appendix G of the *State California Environmental Quality Act (CEQA) Guidelines* and the Municipal Separate Storm Sewer System (MS4) Permit. To evaluate whether the project would cause impacts under these thresholds, the following analysis was employed:

- Qualitative and quantitative (where valid results could be obtained) analyses were performed to determine when increases of pollutant loads and concentrations could be expected to result from development of the project. Such increases are a potential indication of significant adverse impacts.

- If pollutant loads or concentrations are predicted to increase, the potential impacts were assessed on a pollutant-by-pollutant basis by evaluating the compliance of the project with the requirements of the General MS4 Permit (defined below) and the General Construction Activity Storm Water Permit, as those requirements relate to the particular pollutant of concern. Pollutant-specific best management practices (BMPs) are thereby identified for inclusion in the project and its *Standard Urban Stormwater Mitigation Plan* (SUSMP) (defined below).

- Further, for pollutants predicted to increase, post-development pollutant predictions are compared to benchmarks that do not apply to stormwater runoff, but do apply to the ultimate receiving water. These benchmarks include the Basin Plan (defined below) narrative and numeric water quality objectives, as well as CTR criteria. In the event that post-development predictions were to show that end-of-pipe stormwater discharges would potentially exceed these receiving water benchmarks, further analysis would be necessary to determine the significance of these exceedances on the receiving water.

This analysis concludes that, with the controls discussed in this section in place, and with the implementation of the BMPs, no unavoidable significant project or cumulative project water quality impacts would occur.

b. Definitions

The following are definitions to several acronyms and terms that are frequently used in this section of the EIR.

Acute Toxicity	A toxic effect that occurs immediately or shortly after a single, episodic exposure (four days or less).
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 and approved 23 February 1995, as amended).
Beneficial Uses	The existing or potential uses of receiving waters in the permit area as designated by the Regional Board in the Basin Plan.[1]
Best Available Technology Economically Achievable (BAT)	A Clean Water Act technology-based standard that is applicable to construction site stormwater discharges for certain toxic pollutants and nonconventional pollutants.
Best Conventional Pollutant Control Technology (BCT)	A Clean Water Act technology-based standard that is applicable to construction site stormwater discharges for conventional pollutants (BOD, TSS, fecal coliform, pH and oil and grease).
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. Includes methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint 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.[2]

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

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

Bioretention	Bioretention areas are vegetated (i.e., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration. Bioretention areas also remove pollutants by filtering stormwater through plants adapted to the local climate and soil moisture conditions and an engineered soil mix. In bioretention areas, pore spaces, microbes, and organic material in the engineered 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. If no underdrain is provided, exfiltration of the stored water in the bioretention area engineered soil into the underlying soils occurs over a period of days.
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 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 CFR 131.38).
CWA	The Federal Clean Water Act (33 U.S.C. Sections 1251 et seq.).
Dry Well	Dry wells are much like infiltration trenches but may be installed deeper in the soil profile to specifically promote infiltration into highly infiltrative soil layers. Pretreatment is required for dry wells in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility. For best long term performance and minimal maintenance, pretreatment should be provided by a filtration BMP with the capability of addressing fine particulates.
ESA	Endangered Species Act (7 U.S.C. Section 136, 16 U.S.C. Sections 460 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.
Filter Strip	Filter strips treat stormwater runoff through both vegetative treatment and infiltration. Runoff from impervious surfaces sheet flows in a very shallow layer through grassy vegetation, removing pollutants by filtering stormwater through plants adapted to the local climate and soil moisture conditions. Incidental infiltration occurs into native soil when water is present. Plants utilize soil moisture and promote the drying of the soil through transpiration thereby promoting volume reduction.
General MS4 Permit	Regional Water Quality Control Board, Los Angeles Region Order No. 01-182, NPDES Permit No. CAS004001 (December 13, 2001).
Infiltration Gallery	Underground retention and infiltration galleries operate by storing and infiltrating water below roadways or other surfaces. These may consist of a thick layer of aggregate providing storage volume in pore space. Alternatively, underground retention products are available that provide storage capacity and promote infiltration, often more efficiently than aggregate reservoirs. Pretreatment is required for underground retention BMPs in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility. For best long term performance and minimal maintenance, pretreatment should be provided by a filtration BMP with the capability of addressing fine particulates.
Infiltration Trench	Infiltration trenches are rock-filled trenches design specifically to store stormwater during a storm and exfiltrate it into surrounding soils over a period of days. Infiltration trenches are used in areas with high infiltration rates and limited space. Pretreatment is required for infiltration trenches in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility.
LACDPW	Los Angeles County Department of Public Works.

LARWQCB	Regional Water Quality Control Board, Los Angeles Region.
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."[3] 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.[4]
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, and which is not part of a publicly owned treatment works, and which discharges to "Waters of the U.S." (See definition, below).[5]
Non-Storm Water Discharge	Any discharge to a storm drain that is not composed entirely of stormwater.[6]

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

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

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

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

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 CWA Subsection 307, 402, 318 and 405. [7]
Planning Management BMPs	In water pollution control, advanced planning for installation of the best means available to control pollution of waterways to minimize runoff from new development and to aid in siting infrastructure so as to discourage development in environmentally sensitive areas that are critical to maintaining water quality. Also referred to as "site design BMPs."
Permeable Pavements	Permeable pavements contain small voids that allow water to pass through to a stone base. They come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or poured in place solutions (porous concrete, permeable asphalt). All permeable pavements include an aggregate reservoir to retain and infiltrate water. An overflow pipe is generally installed near the top of this aggregate layer to ensure that water does not pond on the surface of the pavement. While conventional pavement result in increased rates and volumes of surface runoff, permeable pavements, when properly constructed and maintained, allow some of the stormwater to percolate through the pavement and enter the soil below.
Planter Boxes	Planter boxes are much like bioretention, with a soil media layer, a gravel drainage layer, and vegetation. Like bioretention, planter boxes provide storage, filtration, and evapotranspiration, and remove pollutants via filtration. However, unlike many bioretention, planter boxes are typically underlain by an impervious layer and not designed to infiltrate water. This allows planter boxes to be placed in areas where infiltration is prohibited. It also prevents them from achieving the LID volume reduction criteria. Planter boxes may be designed without a bottom where infiltration is permissible.

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

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.[8]
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.[9]
SUSMP	The Los Angeles Countywide Standard Urban Storm Water Mitigation Plan, which addresses conditions and requirements of new development.[10]
SWRCB	State Water Resources Control Board.
SQMP	The Los Angeles Countywide Stormwater Quality Management Plan, 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.[11]
Storage and Use	Stormwater storage and use systems may take a variety of forms, most typically consisting of cisterns or rain barrels connected to a roof gutter system. Roof runoff is captured and stored for non-potable use. The collection of stormwater reduces runoff and can make water available for non-potable uses such as irrigation, thus reducing overall water usage. To comply with the Project Performance Standard, cisterns must be designed for the entire water quality volume and must draw down a portion of this volume quickly enough to make room for subsequent storms.

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

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

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

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

SWPPP	Storm Water Pollution Prevention Plan, a plan, as required by a State General Construction Activity Storm Water 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.[12]
Structural BMP	Any structural facility designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution.[13]
TMDL	Total Maximum Daily Load, the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources, and natural sources that a water body may receive without compromising the designated beneficial use.[14] 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.[15] (See Structural BMP.)
EPA	United States Environmental Protection Agency.
USACE	United States Army Corps of Engineers.
U.S. FWS	United States Fish and Wildlife Service.

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

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

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

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

Vegetated swales	Vegetated swales treat stormwater runoff through both vegetative treatment and infiltration. Swales treat the water quality design flow as the runoff sheet-flows through grassy vegetation on the swale surface, removing pollutants by filtering stormwater through plants adapted to the local climate and soil moisture conditions. Incidental infiltration occurs into native soil when water is present. Plants utilize soil moisture and promote the drying of the soil through transpiration thereby promoting volume reduction.
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.[16]
	By USACE definition, "Waters of the U.S." 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.

16 33 CFR Part 328.3a.

c. Reference Materials and Documents

Portions of the following documents were used in connection with the preparation of this section.

- American Society of Civil Engineers. A Guide For Best Management Practice (BMP) Selection In Urban Developed Areas, 2001.
- Alliance Land Planning and Engineering, Inc., 2010. Drainage Concept/SUSMP Study, Vista Canyon, Tentative Tract No. 69164. Prepared for Vista Canyon by Alliance Land Planning and Engineering, Inc.
- American Society of Civil Engineers (ASCE), 1998. Urban Runoff Quality Management. ASCE Manual and Report on Engineering Practice No. 87; 259 pages.
- American Society of Civil Engineers Urban Water Resources Research Council and United States Environmental Protection Agency (ASCE/EPA), 2003, International Stormwater Best Management Practices Database. http://www.bmpdatabase.org/index.htm.
- Anderson, MA, 2005. Aliso Beach Clean Beaches Initiative, J01P28 Interim Water Quality Improvement Package Plant Best Management Practice, County of Orange Resources and Development Management Department, Watershed and Coastal Resources, January.
- Antich, Anthony, Harvey R. Gobas, and Jag Salgaonkar. The Santa Monica Urban Runoff Recycling Facility and the Sustainable Environment. Stormwater Journal. Available at: http://www.forester.net/sw_0207_santa.html.
- Balance Hydrologics. 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.
- Barber, T.R., Lutes, C.C., Doorn, M.R.J., Fuchsman, P.C., Timmenga, H.J., and R.L. Crouch. Aquatic Ecological Risks Due to Cyanide Releases from Biomass Burning. Chemosphere 50:33, 343–348, January 2003.
- Bledsoe, Brian P. and Chester C. Watson. 2001. Effects of Urbanization on Channel Instability. Journal of the American Water Resources Association, vol. 37 (2), 255–270.
- Boehm, AB, NJ Ashbolt, JM Colford Jr., LE Dunbar, LE Fleming, MA Gold, JA Hansel, PR Hunter, AM Ichida, CD McGee, JA Soller, SB Weisberg, A Sea Change Ahead for Recreational Water Quality Criteria, Journal of Water and Health, 07.1 (9-20).
- Booth, Derek, 1990. Stream-channel incision following drainage-basin urbanization. Water Resources Bulletin, vol 26, 407–417.
- Booth, D.B. and Jackson C.R. Urbanization of Aquatic Systems: Degradation Thresholds, Stormwater Detection, and the Limits of Mitigation. Journal of the American Water Resources Association, vol 33 (5), 1077–1090, 1997.

- Brown & Caldwell, 1984. Fresno Nationwide Urban Runoff Program Project. Report for the Fresno Metropolitan Flood Control Board, May 1984.

- California Stormwater Quality Association (CASQA). Stormwater Best Management Practices Handbook New Development and Redevelopment and Construction, 2003.

- Center for Watershed Protection (CWP), 1996. Design of Stormwater Filtering Systems, Prepared for the Chesapeake Research Consortium, December.

- Center for Watershed Protection (CWP), 2000. National Pollutant Removal Performance Database.

- CH2MHill,2004. Memorandum: "Effect of Urbanization on Aquifer Recharge in the Santa Clarita Valley."

- CH2MHill, and HGL, 2008. *Task 2B-1 – Numerical Model Development and Scenario Results East and Piru Subbasins;* Upper Santa Clara River Chloride TMDL Collaborative Process. Prepared for Los Angeles County Sanitation District and Los Angeles Regional Water Quality Control Board. March 2008.

- City of Austin. 1990. Removal Efficiencies of Stormwater Control Structures. Environmental Resources Management Division, Environmental and Conservation Services Department, City of Austin, Austin, TX.

- Cole, R.H., R.E. Frederick, and R.P. Healy. Preliminary Findings of the Priority Pollutant Monitoring Project of the Nationwide Urban Runoff Program. Journal of the Water Pollution Control Federation. 56:898-908, 1984.

- Colman, John A., Karen C. Rice, and Timothy C. Willoughby, 2001. Methodology and Significance of Studies of Atmospheric Deposition in Highway Runoff. USGS Open-File Report 01-259. A Contribution to the National Highway Runoff Data and Methodology Synthesis. Prepared in cooperation with the Federal Highway Administration. U.S. Department of the Interior, U.S. Geological Survey. Northborough, Massachusetts. 2001.

- Colford, JM Jr., TJ Wade, KC Schiff, CC Wright, JF Griffith, SK Sandhu, SB Weisberg. 2005. Recreational Water Contact and Illness in Mission Bay, California, Technical Report 449, Southern California Coastal Water Research Project, Westminster, California.

- Colker, Ryan M. and Robert D. Day, 2005. Environmental Impacts of Emerging Contaminants. Renewable Natural Resources Foundation's 2005 Congress on Environmental Impacts of Emerging Contaminants. (http://www.rnrf.org/).

- Department of Land and Water Conservation (DLWC), 1996. DRAFT: Department of Land and Water Conservation "The Manager's Guide to: Sediment, Nutrients, and Gross Pollutant Control," 1st ed., Resource Management Division, Sydney, Australia.

- Dexter Wilson Engineering, 2010. *Engineering Report for the Vista Canyon Water Factory (Municipal Wastewater Treatment Facility)*. March, 2010.

- Dudek. California Rapid Assessment Methodology Report Vista Canyon Ranch Property Los Angeles County, California. Prepared for Impact Sciences, February 2009.

- Forde Biological Consultants, 2008. Biological Assessment Vista Canyon Ranch Los Angeles County, California. August 27, 2008.

- Gaffney, J.S., G.E. Streit, and W.D. Spall, 1987. Beyond Acid Rain: Do Soluble Oxidants and Organic Toxins Interact with SO_2 and NO_X to Increase Ecosystem Effects? Environmental Science and Technology. 21:519–523.

- Geosyntec Consultants, 2002. Hydromodification Management Plan Literature Review, Santa Clara Valley Urban Runoff Pollution Prevention Program.

- Geosyntec Consultants, 2004. Hydromodification Management Plan, Santa Clara Valley Urban Runoff Pollution Prevention Program, 2004.

- Geosyntec Consultants, 2010. Vista Canyon Water Quality Technical Report. Prepared by Geosyntec Consultants for Impact Sciences. May 2010.

- Haile, Robert W., JS Witte, M Gold, R. Cressey, C McGee, RC Millikan, A Glasser, N Harawa, C Ervin, P Harmon, J Harper, J Dermand, J Alamillo, K Barrett, M Nides, G Wang, 1999. The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff, Epidemiology, 1999;10:355-363).

- Hammer, Thomas R. 1972. Stream and channel enlargement due to urbanization. Water Resources Research, vol. 8, 1530–1540.

- Hollis, G.E. 1975. The Effect of Urbanization on Floods of Different Recurrence Intervals. Water Resources Research, vol. 11 (3), 431–435.

- Irvine Ranch Water District (IRWD). The Residential Runoff Reduction Study Municipal Water District of Orange County, July 2004.

- Katznelson, R. and T. Mumley. 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, 1997.

- Kim, S. *et al*, 2007. Occurrence and removal of pharmaceuticals and endocrine disruptors in South Korean surface, drinking and waste waters. Water Research 41, 1013–1021.

- Kolpin, D. *et al*, 2002. Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in US Streams, 1999-200: A National Reconnaissance. Environmental Science and Technology 36, 1202-1211.

- Kurz, 1999. Removal of Microbial Indicators from Stormwater Using Sand Filtration, Wet Detention, and Alum Treatment Best Management Practices. Sixth Biennial Stormwater Research & Watershed Management Conference. September 1999.

- Los Angeles County Department of Public Works (LACDPW). Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report. Available at: http://ladpw.org/wmd/NPDES/IntTC.cfm.

- Los Angeles County, 2002. A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP Manual). September 2002.

- Los Angeles County Department of Public Works (LACDPW), 2005. Los Angeles County 1994-2005 Integrated Receiving Water Impacts Report Final Report – August 2005. Available at: http://ladpw.org/wmd/NPDES/1994-05_report/contents.html.

- Los Angeles Regional Water Quality Control Board (LARWQCB). Water Quality Control Plan Los Angeles Region (as amended), 1994.

- Los Angeles County, 2008. Ordinances for Green Building, Low Impact Development, and Drought Tolerant Landscaping (November 14, 2008).

- Los Angeles County Department of Public Works (LACDPW), 2009. Stormwater Best Management Practice Design and Maintenance Manual For Publicly Maintained Storm Drain Systems. May 2009. http://dpw.lacounty.gov/des/Design_Manuals.

- Los Angeles County, 2009. County of Los Angeles Low Impact Development Standards Manual (January, 2009).

- Los Angeles Regional Water Quality Control Board (LARWQCB), 2001. Los Angeles County Municipal Storm Water National Pollutant Discharge Elimination System (NPDES) Permit as Amended by Regional Board Order R4-2007-0042 on August 9, 2007 (Board Order No. 01-182; NPDES Permit No. CAS004001).

- Los Angeles Regional Water Quality Control Board (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.

- Los Angeles San Gabriel Rivers Watershed Councils, (LASGRWC), 2005. Water Augmentation Study Phase II. August, 2005 (www.lasgrwc.org/WAS/Documents/WAS%20Phase%20II%20Final %20Report_2005.pdf).

- Los Angeles Regional Water Quality Control Board, 2006a. Clarification Letter to Part 4.D. Development Planning Program, the Los Angeles County Municipal Storm Water Permit, Order No. 01-182, NPDES PERMIT No. CAS004001, from the Los Angeles Regional Water Quality Control Board to the Los Angeles County Department of Public Works. December 15, 2006.

- Los Angeles Regional Water Quality Control Board, 2006b. Waste Discharge Requirements for City of Fillmore, Order No. R4-2006-0049.

- Los Angeles Regional Water Quality Control Board, 2007. Waste Discharge Requirements for City of Santa Paula, Order No. R4-2007-0028.

- Luhdorff and Scalmanini and GSI, 2009. *Analysis of Groundwater Supplies and Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin.* Prepared for Santa Clarita Valley Municipal Water Purveyors. August 2009.

- Lyko, S. *et al*, 2005. Estrogenic trace contaminants in wastewater – possibilities of membrane bioreactor technology. Desalination 78, 95–105.

- MacRae, C.R. 1992. The Role of Moderate Flow Events and Bank Structure in the Determination of Channel Response to Urbanization. Resolving conflicts and uncertainty in water management: Proceedings of the 45th Annual Conference of the Canadian Water Resources Association. Shrubsole, Dan, ed. 1992, 12.1–12.21.

- Marshack. 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.

- Marsalek, J., Brownlee, B., Mayer, T., Lawal, S., and G. A. Larkin. "Heavy Metals and PAHs in Stormwater Runoff from the Skyway Bridge, Burlington, Ontario." Water Quality Research Journal of Canada, Vol. 32, No. 4 (1997), 815–827.

- MEC-Weston Solutions, 2004. Mission Bay Clean Beaches Initiative Final Report, Executive Summary, September 15. Prepared by City of San Diego for the State Water Resources Control Board.

- Melin, T. *et al*, 2006. Membrane bioreactor technology for wastewater treatment and reuse. Desalination 187, 271–282.

- Natural Resources Conservation Service (NRCS). Antelope Valley Area Soil Survey, NRCS Soil Map Antelope Valley Area, CA675, 2004.

- 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.

- Onesios, K. *et al*, 2009. Biodegradation and removal of pharmaceuticals and personal care products in treatment systems: a review. Biodegradation 20, 441-466.

- PACE. Vista Canyon Ranch VTTM #69164 Santa Clara River Bank Protection; EIR Flood Technical Report. Prepared by Pacific Advanced Civil Engineering, Inc. for Impact Sciences June 2009.

- Phillips, P.J *et a*l, 2005. A multi-disciplinary approach to the removal of emerging contaminants in municipal wastewater treatment plants in New York State (2003-2004). Water Environment Federation's WEFTEC 78th Annual Technical Exhibition and Conference, Conference Proceedings, Washington, DC, November 2005, 5095–5124.

- Pitt, *et al.*, 1994. Pitt, R., S. Clark, and K. Parmer. "Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration." Journal of Alabama's Water Environment Association. Vol. 15, No. 1. pp. 8-11. Summer 1994.

- Pitt, R., A. Maestre, and R. Morguecho, 2003. "The National Stormwater Quality Database (NSWQ, Version 1.0)," Prepared by University of Alabama and Center for Watershed Protection.

- Pruss, Annette, 1998. Review of Epidemiological Studies on Health Effects from Exposure to Recreational Water, International Journal of Epidemiology 1998; 27 1–9.

- Reemtsma, T, *et al*, 2006. Polar Pollutants Entry into the Water Cycle by Municipal Wastewater: A European Perspective. Environmental Science and Technology 40, 5451–5458.

- RTFA, 2006. Final Report, Geotechnical Constraints Investigation, Vista Canyon Ranch Project, Santa Clarita, California. Prepared for Vista Canyon Ranch, LLC February 10, 2006; 72 pages.

- RTFA, 2007a. Phase I Environmental Site Assessment Vista Canyon Ranch (Waldron Property). Prepared for Vista Canyon Ranch, LLC June 18, 2007; 183 pages.

- RTFA, 2007b. Geotechnical Constraints Investigation, Waldron Property. Prepared for Vista Canyon Ranch, LLC; June 22, 2007; 52 pages.

- RTFA, 2008. Limited Hydrogeologic Report, Analysis of Groundwater Resource, Vista Canyon Ranch Project, Santa Clarita, California. Prepared for Vista Canyon Ranch, LLC; May 20, 2008; 6 pages.

- RTFA, Personal Communication.

- San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). Insecticide Market Trends and Potential Water Quality Implications, prepared by K. Moran, TDC Environmental, April, 1–105, 2003.

- San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), 2005. Diazinon and Pesticide-Related Toxicity in Bay Area Urban Creeks. Water Quality Attainment Stratefy and Total Maximum Daily Load (TMDL) Proposed Basin Plan Amendment and Staff Report. California Regional Water Quality Control Board San Francisco Bay Region, November 9, 2005.

- San Francisco Estuary Project (SFEP) 2005. Pesticides in Urban Surface Water, Urban Pesticide Use Trends Annual Report 2005, prepared by TDC Environmental, March 2005.

- Sawyer et al. Chemistry for Environmental Engineering, Fourth Edition. Clair Sawyer, Perry McCarty, and Gene Parkin. McGraw-Hill, Inc., 1994.

- SCCWRP. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. Technical Report 450. April 2005.

- SCCRWP. Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California. Technical Report 475. December 2005.

- Schroeder, E.D., W.M. Stallard, D.E. Thompson, F.J. Loge, M.A. Deshusses, H.J. Cox, 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.

- Snyder, S. *et al*, 2007. Role of membranes and activated carbon in the removal of endocrine disruptors and pharmaceuticals, Desalination, 202, 156–181

- Stein, ED, LL Tiefenthaler, KC Schiff, 2007. Sources, Patterns, and Mechanisms of Stormwater Pollutant Loading from Watersheds and Land Uses of the Greater Los Angeles Area, Technical Report #510, Southern California Coastal Water Research Project, Westminster, California.

- Stormwater Quality Task Force (SWQTF). California Storm Water Best Management Practice Municipal Handbook. Prepared by CDM for the Storm Water Quality Task Force. March 1993.

- Strecker, E. et al., 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).

- Surbeck, CQ, AB Grant, JH Ahn, S Jiang, SA Soeller, PA Holden, LC Van Der Werfhorst, DJ Brooks, 2008. Urban Runoff Impact Study Phase III: Land Use and Fecal Indicator Bacteria Generation, National Water Research Institute (NWRI) Final Project Report, November.

- Suter, G.W, II, and C.L.Tsao. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Oak Ridge National Laboratory, ES/ER/TM-96/R2, Oak Ridge National Laboratory, Oak Ridge, TN, 1996.

- Tiefenthaler, L.L., Schiff, K.C., and Leecaster, M.K., 2000. Temporal Variability Patterns of Stormwater Concentrations in Urban Stormwater Runoff, as contained in the Southern California Coastal Research Project 1999-2000 Annual Report. (http://www.sccwrp.org/pubs/annrpt /99-00/table_of_contents.htm)

- Tiefenthaler, L.L., E.D. Stein, G.S. Lyon, 2009. Fecal Indicator Bacteria (FIB) Levels During Dry Weather from Southern California Reference Streams, Environmental Monitoring and Assessment, 155:477-492.

- U.S. EPA, 1972. Committee on Water Quality Criteria. National Academy of Sciences-National Academy of Engineering. Water Quality Criteria. U.S. EPA R3-73-033, Washington, D.C., 1972.

- U.S. EPA, 1981. Exposure and Risk Assessment for Cyanide. Washington, DC: U.S. Environmental Protection Agency. Office of Water. EPA440485008. PB85220572

- U.S. EPA, 1983. Nationwide Urban Runoff program. Final Report. Water Planning Division, U.S. EPA, Washington DC.

- U.S. EPA, 1986. Ambient Water Quality Criteria for Bacteria—1986, at 1–3 (U.S. EPA 440/5-84-001).

- U.S. EPA, 1993. Office of Water. Guidance to Specify Management Measures for Sources of Nonpoint Pollution in Coastal Waters. EPA-840-B-92-002. Washington, DC.

- U.S. EPA, 1999a. Stormwater Technology Fact Sheet: Sand Filters, Office of Water, Washington, D.C. EPA 832-F-99-007, September.

- U.S. EPA, 1999b. Stormwater Technology Fact Sheet: Bioretention, Office of Water, Washington, D.C. EPA 832-F-99-012, September.

- U.S. EPA, 2001. Organophosphate Pesticide; Availability of Revised Risk Assessments. Federal Register: January 31, 2001 (Volume 66, Number 21), 8400–8401.

- U.S. EPA, 2002a. Total Maximum Daily Loads for Toxic Pollutants – San Diego Creek and Newport Bay, California, June 14, 2002.

- U.S. EPA, 2007a. Aquatic Life Ambient Freshwater Quality Criteria – Copper 2007 Revision. United States Environmental Protection Agency Office of Water. EPA-822-R-07-001. February 2007.

- U.S. EPA, 2007b. Report of Experts Scientific Workshop on Critical Research Needs for the Development of New or Revised Recreational Water Quality Criteria, Washington, D.C., EPA 823-R -07-006, http://www.epa.gov/waterscience/criteria/recreation

- USGS, 2010. Toxic Substances Hydrology Program, Research Projects - Emerging Contaminants Web site (http://toxics.usgs.gov/regional/emc/).

- Ventura County, 2005. Ventura County stormwater quality monitoring data, from various annual reports (http://www.vcstormwater.org/publications.htm).

- Water Environment Federation (WEF), 1998. WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, Urban Runoff Quality Management.

- Water Environment Research Foundation (WERF), 2007. Development of a Protocol for Risk Assessment of Microorganisms in Separate Stormwater Systems. 03-SW-2. 2007.

- Water Environment Research Foundation (WERF), 2009. Report on the Experts Scientific Workshop on Critical Research and Science Needs for the Development of Recreational Water Quality Criteria for Inland Waters. PATH4W09. 2009.

3. EXISTING CONDITIONS

a. Physical Setting

The approximately 185-acre Vista Canyon project site is located immediately south of State Route 14 (SR-14), west of La Veda Avenue, north of the Metrolink rail line, and east of the Colony Townhome community in unincorporated Los Angeles County, directly adjacent to the City of Santa Clarita. (**Figure 4.8.1-1**). The Santa Clarita Valley is generally surrounded by the Los Padres and Angeles National Forest areas to the north; Agua Dulce and the Angeles National Forest to the east; the major ridgeline of the Santa Susana Mountains, which separates Santa Clarita Valley from the San Fernando and Simi Valleys to the south; and the County of Ventura to the west.

The project site is bisected by the Santa Clara River. The majority of project development is located south of the Santa Clara River Corridor (Planning Areas 1, 2, and 3) with smaller commercial development proposed north of the River Corridor on Mitchell Hill (Planning Area 4). The project site includes a portion of the Santa Clara River.

The project site is mostly disturbed, vacant land, with the exception of 1.5 acres of light industrial land use (open storage) and an adjacent residential use in the southwest corner of the site. Although most of the project site is not developed, it is surrounded by existing development. The site is also subject to repeated disturbance from utility construction and maintenance, illegal unauthorized dumping, unauthorized off-road vehicle activity, flood management activities, and the natural fluvial processes characteristic of the Santa Clara River floodplain (PACE 2009). Elevations across the property range from about 1,470 feet to about 1,580 feet above mean sea level (msl) (Dudek 2009). There are 1 soil types on the project site, although the majority is comprised of riverwash (14.1 percent), sandy alluvial land (24.4 percent), Cortina sandy loam (22.7 percent), and Yolo loam (20.5 percent) (NRCS 2004).

Vegetation across the project site reflects a confluence of topographic, hydrologic, climatic, and human disturbance factors (Forde 2008). These factors, along with the cumulative effects of activities such as dumping, off-road vehicle activity, and utility construction, have significantly disturbed the remaining vegetation communities and resulted in a mix of native and non-native species. Another notable feature of the vegetation is the mosaic of species reflecting the transitional climate between coast and desert in the eastern portion of the Santa Clarita Valley.

Vegetation communities identified within the project site include Fremont cottonwood-willow riparian forest, Fremont cottonwood-riparian scrub, coast live oak series, riparian scrub, alluvial scrub, mulefat series, rabbitbrush series, big sagebrush-buckwheat series, California sagebrush-buckwheat series, chamise series, scalebroom series, wild rye-saltbush scrub, saltgrass series, non-native annual grassland-ruderal, ruderal, rubble/dirt piles, and developed (Dudek 2009). (For a detailed discussion of biological resources, see **Section 4.6, Biological Resources,** and **Appendix 4.6**.)

(1) Rainfall Analysis

The precipitation gauge nearest to the project site is the Newhall S FC32CE gauge (NCDC no. 046162, LACDPW no. 32C). This gauge is located approximately 5.5 miles southwest of the project site at a similar elevation (1,243 feet msl at the gauge compared to approximately 1,500 feet msl at the project site). Based on estimates of average annual rainfall depths provided by the PRISM[17] model, the Newhall gauge and the project site receive comparable annual rainfall depths. The average annual precipitation at the project site is approximately 18 inches.

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[17] PRISM (Parameter Regression on Independent Slope Model, Oregon State University, 2008) is a robust model used to spatially interpolate rainfall depths based on topography, relationship to water bodies, and other parameters. Average annual depths reported by PRISM provide a sound basis for estimating the relative difference in rainfall between discrete points that may not be represented by a rain gauge.

SOURCE: Geosyntec - August 2009

FIGURE **4.8.1-1**

Vista Canyon Project Vicinity

112-024•10/10

A rainfall analysis was conducted to estimate the mean and 85th percentile storm events for the project site from a variety of sources. Storm events were defined as both 24-hour total accumulations (computed from both hourly and daily gauges) and variable-length storm events defined by a threshold rainfall depth and a minimum inter-event time. Variable-length events were computed using the SYNOP statistical rainfall analysis program (U.S. EPA 1989). The mean storm depth was estimated to be about 0.6 inch and the 85th percentile, 24-hour storm event was estimated to be 1.4 inches for the project vicinity.

(2) Existing Drainage

The project site consists of seven minor contributing drainage areas that independently drain via sheet flows and natural concentrated flows to the Santa Clara River.

(3) Drainage Improvements

Site preparation would include cut and fill grading with fill imported to the site from up to two borrow sites. The project would also include buried bank stabilization (soil cement) on both the north and south sides of the Santa Clara River, and construction of the Vista Canyon Road Bridge, including bridge abutments and piers, across the River. These drainage improvements are described below (PACE 2009).

(a) Proposed Bank Protection

The proposed soil cement bank protection on the north bank of the Santa Clara River, which begins at the westerly edge of Planning Area 4 at Mitchell Hill, is designed to protect the bank against potential erosion and flooding. Based upon its geologic formation, an exposed bedrock formation that rises approximately 40 feet above the elevation of the River, Mitchell Hill, does not require river bank erosion protection. The proposed north bank protection extends approximately 3,000 linear feet from Mitchell Hill downstream and terminates near the project's northwest boundary. This buried bank stabilization would replace rip-rap flood control improvements locations along a portion of this reach. The bank protection is also necessary to protect the Vista Canyon Road Bridge north abutment from erosion and flooding.

The proposed soil cement bank protection on the south bank of the Santa Clara River is located between the easterly project boundary near existing La Veda Avenue and the westerly project boundary near the existing Colony Townhomes. The proposed south bank protection would be approximately 4,500 linear feet with the horizontal alignment extending from approximately 1,400 feet downstream of Sand Canyon Bridge to 1,100 feet upstream of the SR-14 bridge. The south bank protection is designed to protect the proposed project and the southerly abutment of the Vista Canyon Road Bridge from potential erosion and flooding. The buried bank stabilization proposed by the project would also result in the removal of debris fencing located within the River Corridor along the margins of the active channel.

The proposed bank protection would consist of an 8-foot-wide soil cement section with a varied height (top and toe as required by the City/County) and a 1.5:1 slope (geotechnical analysis to verify slope). Once installed, the soil cement would be backfilled (buried) with native soils on a 3:1 or flatter slope. The excavation required to construct the bank protection would be backfilled and returned to existing grade, except as overlaid by the 3:1 or flatter fill slope. The final slope would be re-vegetated with native species and temporarily irrigated until the vegetation is established.

(b) Proposed Storm Drain Outlets/Energy Dissipaters

Two storm drains are proposed to outlet through the south bank and two through the north bank. To reduce storm flow velocities and prevent erosion at stormwater discharge points into the River, energy dissipaters would be constructed, consisting of either rip-rap or other larger reinforced concrete impact-type energy dissipaters, at these outlets into the River.

(c) Vista Canyon Road Bridge

The project proposes to construct the Vista Canyon Road Bridge over the Santa Clara River. The bridge would be located in the center of the project site, linking the southerly and northerly planning areas. The bridge length is estimated to be approximately 650 linear feet with abutments on each bank of the River and six support piers within the River.

(d) Vista Canyon WRP

The proposed WRP, which would be owned and operated by the City of Santa Clarita, would recycle up to 395,411 gallons per day (gpd) of wastewater, including the Project's estimated 214,265 gpd of wastewater (Dexter Wilson Engineering 2010). The WRP would be designed as a scalping plant with no solids processing; any solids generated would be discharged to the existing sewer and treated at the existing Valencia WRP.

The estimated on-site recycled water use would be 117,922 gpd (Dexter Wilson Engineering 2010). This water would be utilized for irrigation purposes and for public restroom facilities in commercial buildings. Castaic Lake Water Agency (CLWA), the regional water wholesaler, has expressed an interest in acquiring the excess recycled water, incorporating the supply into its future recycled water system, and using it for irrigation purposes for surrounding, existing development. Until CLWA's recycled system is operational, the proposed WRP would discharge excess recycled water to adjacent percolation ponds.

At this time, it is estimated that that 90 percent of the WRP's effluent would be recycled and utilized primarily for irrigation on and off site (i.e., through CLWA's recycled water system), with the remaining 10 percent discharged to the percolation ponds. During wetter years, the amount of water discharged to the percolation ponds would increase and, during dry years, the amount would decrease.

(4) Receiving Water Bodies and Beneficial Uses

(a) Santa Clara River Watershed

The project site is located within the Santa Clara River Hydrologic Basin and associated watershed, which is approximately 1,634 square miles in area. The project would discharge from its storm drain and water quality control facilities directly to Santa Clara River Reach 7,[18] which extends from Bouquet Canyon Road to the Lang gauging station. The portion of the Santa Clara River watershed that is located generally upstream or east of the project is approximately 191 square miles in size (PACE 2009). The watershed drains portions of the Angeles National Forest from the north, south, and southeast, which comprise approximately 40 percent of the watershed area at this location. The approximately 185-acre project area represents 0.15 percent of the 191-square-mile upstream watershed and 0.018 percent of the entire 1,634-square-mile Santa Clara River watershed.

The Santa Clara River watershed drains an area in the Transverse mountain range of Southern California. The River flows generally west from its headwaters near Acton to the Pacific Ocean near the City of Ventura, approximately 60 miles downstream of the project location. The River exhibits some perennial flow in its easternmost stretches within the Angeles National Forest, then flows intermittently westward within Los Angeles County. The principal tributaries of the upper River watershed (upstream of the Los Angeles/Ventura County boundary, but all downstream of the project location) 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 westernmost 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 downstream of the City of Santa Clarita. Castaic Lake is a Department of Water Resources-owned reservoir located along the course of Castaic Creek. San Francisquito Canyon Creek is an intermittent stream in the watershed adjacent to Bouquet Canyon to the

18 The Santa Clara River is divided into reaches for purposes of establishing beneficial uses and water quality objectives. However, there are two reach classifications, one established by the LARWQCB and one established by the United States Environmental Protection Agency (U.S. EPA). Both of these reach classifications are used by the LARWQCB and the U.S. EPA in various documents, which at times is a source of confusion. This report will use the LARWQCB reach numbers.

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 Santa Clara River at the project location is generally dry except after periods of heavy rainfall, generally occurring during the winter months (Dudek 2009). The principal sources of water contributing to the base flow of the Santa Clara River, where regular surface flows are present (approximately 8 miles downstream of the project location), are: (1) groundwater from the Alluvial aquifer basin 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; and (3) in some years, DWR-released flood flows from Castaic Lake into Castaic Creek during winter and spring months (CH2M Hill 2005). The Saugus WRP has a permitted dry weather average design capacity of 6.5 million gallons per day (mgd), creating surface flows from the outfall to near McBean Parkway. The Valencia WRP has a permitted dry weather average design capacity of 21.6 mgd, creating surface flows extending into the far eastern portion of Ventura County (these flows generally terminate at the "Dry Gap" within Ventura County). The combined average treated discharge from both WRPs between January 2004 and June 2007 was approximately 20 mgd.

The following description of the physiography, climate, flows, and vegetation of the Santa Clara River are summarized primarily from the *Assessment of Potential Impacts Resulting from Cumulative Hydromodification Effects, Selected Reaches of the Santa Clara River, Los Angeles County, California* (Balance Hydrologics 2005) and the *California Rapid Assessment Methodology Report Vista Canyon Ranch Property* (Dudek 2009).

(b) Physiography

The Santa Clara River flows through a complex, tectonically active trough. Slopes are very steep, with local relief of 3,000 to 4,000 feet being common. These faults uplift harder, more resistant sedimentary rocks over softer and younger sedimentary formations, but 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.

Geologic materials in the watershed decompose mainly to silts, clays, 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 of sediment being bedload-sized material (>0.25 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.

(c) Flows

As in most Southern California rivers, flows in the Santa Clara River are highly episodic. For the gauged period between 1952 and 2005, annual mean flow at the Lang gauge ranged between 0.04 and 52.3 cubic feet per second. These large episodic events have a significant impact on the geomorphic characteristics of the Santa Clara River mainstem. The annual mean runoff for this period is 5.68 cubic feet per second or 4,120 acre-feet per year (afy).

After studying the response of the River to several different anthropogenic and natural disturbances, Balance Hydrologics (2005) 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, which can potentially affect channel geometry, appear to have transitory or minor manifestations. 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.

(d) Vegetation and Habitat Types

The portion of the Santa Clara River within the project area exhibits an intermittent surface water hydrologic regime (Dudek 2009). The River conveys runoff from precipitation in the upper watershed as well as urban runoff during storms from the developed portion of the watershed. The active channel of the River ranges in width on site from approximately 28 to 64 feet. A majority of the River within the project area is characterized by earthen banks that have been realigned over time due to storms, and a streambed that displays evidence of some aggradation and degradation.

The stretch of Santa Clara River within the project area is characterized by a wide, meandering channel that supports vegetated and unvegetated islands of varying size, composition, and age that have developed both within and outside the bankfull channel (Dudek 2009). The sparse, poorly developed riparian scrub community is characterized by a limited assemblage of native and non-native species including willows and mulefat with an understory of annual bur-sage, California buckwheat, black mustard, rubber rabbitbrush, and Mediterranean grass. Stands of giant cane also occur, but comprise less than 15 percent species cover overall. The adjacent uplands support sparsely vegetated disturbed habitat and developed land.

(e) Santa Clara River Beneficial Uses

The Basin Plan (LARWQCB 1994, as amended) lists beneficial uses of major water bodies within this region (see **Table 4.8.1-1, Beneficial Uses of Surface Receiving Waters**). Santa Clara River Reach 7 is listed and has specific beneficial uses assigned to it. The existing beneficial uses of Santa Clara River Reach 7 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 used 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 and 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
- WET: Wetland ecosystems

Table 4.8.1-1
Beneficial Uses of Surface Receiving Waters

Water Body	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

[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 * – Asterixed MUN designations are conditional potential MUN designations.*
Source: Water Quality Control Plan for the Los Angeles Region (Basin Plan) (LARWQCB 1994, as amended)

(5) Existing Receiving Water Quality

(a) USGS Water Quality Monitoring Data

The U.S. Geological Survey (USGS) has collected stream flow and water quality data at a number of locations in the Santa Clara River watershed (http://waterdata.usgs.gov/nwis). USGS gauging stations have intermittently functioned at Lang (USGS 11107745) and Ravenna (USGS 342613118131601), approximately 5 miles and 13 miles upstream of the project site, respectively, and Bouquet Canyon (USGS 342526118322101) at the junction of the Santa Clara River and Bouquet Canyon Creek (Bouquet Junction), approximately 6 miles downstream of the project site (Figure 2-1). The USGS collected water quality data between August 1974 and March 1976 at Lang and Ravenna, and between August 1974 and June 1976 at Bouquet Junction. There is no current water quality data available at the Project location.

As discussed above, flows in the Santa Clara River are highly episodic in nature and this characteristic affects surface water quality considerably. Data collected by the USGS at the Santa Clara River Lang, Ravenna, and Bouquet Junction water quality monitoring sites summarized below provide historical perspective of water quality within the Santa Clara River upstream (Lang, Ravenna) and downstream (Bouquet Junction) of the project boundary.

To facilitate interpretation, the wet weather water quality data were grouped into two categories depending on the depth of two-day antecedent rainfall measured at the Newhall rain gauge: (1) 0–0.1 inch; and (2) >0.1 inch.

(b) Selected General Constituents

The selected general constituents examined were specific conductance as a surrogate for total dissolved solids (TDS), hardness, and chloride (see subsection 4 for a discussion of pollutant selection). TDS is a measure of the dissolved cations and anions, primarily inorganic salts (calcium, magnesium, potassium, sodium, chlorides and sulfates). TDS is an impairing pollutant in Reach 3 of the Santa Clara River as listed in the state's 2006 303(d) list of impaired water bodies. High TDS levels can impair agricultural, municipal supply, and groundwater recharge beneficial uses.

Hardness and chloride are important components of TDS. Hardness is a measure of the polyvalent cations, primarily calcium and magnesium. It is expressed as an equivalent concentration of calcium carbonate ($CaCO_3$). Hardness measurements are important because the toxicity of metals (and the associated water quality objectives) decreases as hardness increases. Chloride comprises a large proportion of the TDS. According to the LARWQCB, high levels of chloride in Santa Clara River Reaches 3, 5, 6 and 7 are causing impairment of listed beneficial uses for agricultural irrigation, and irrigation of salt sensitive crops, such as avocados and strawberries, with water containing elevated levels of chloride that could result in reduced crop yields.

Results for concentrations of specific conductance, chloride, and hardness for the three datasets are listed in **Table 4.8.1-2, USGS Water Quality Data for Selected General Constituents in the Santa Clara River at the Lang, Ravenna, and Bouquet Junction Gauges, 1974–1976**. Rather than measuring TDS, the USGS station has recorded specific conductance (that is, the extent to which the sample conducts an electric current), which is related to TDS concentration. TDS concentration can be estimated as 0.55 to 0.9 times the specific conductance (Sawyer et al. 1994).

Specific Conductance (TDS). The Basin Plan objective for TDS in Santa Clara River Reach 7 is 800 mg/L. Using an estimate of 0.64 times the specific conductance for the USGS data, the TDS concentrations at Lang station averaged 440 mg/L for storm flows. At Ravenna station, TDS concentrations averaged 400 mg/L and at Bouquet Junction, TDS concentrations averaged 850 mg/L.

Table 4.8.1-2
USGS Water Quality Data for Selected General Constituents in the Santa Clara River at the Lang, Ravenna, and Bouquet Junction Gauges, 1974–1976

Constituent	Gauge	2-day Antecedent Rainfall (inches)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Specific Conductance (μS/cm)	Lang	<0.1	12	12	720	820	765
		≥0.1	3	3	680	690	685
	Ravenna	<0.1	7	7	578	650	609
		≥0.1	2	2	620	651	635.5
	Bouquet Junction	<0.1	18	18	1110	1500	1338
		≥0.1	3	3	1290	1400	1333
Hardness (mg/L)	Lang	<0.1	6	6	280	300	290
		≥0.1	3	3	270	300	273
	Bouquet Junction	<0.1	14	14	280	360	320
		≥0.1	3	3	280	340	310
Chloride (mg/L)	Lang	<0.1	5	5	36	45	42
		≥0.1	3	3	33	39	35
	Bouquet Junction	<0.1	13	13	92	140	117
		≥0.1	3	3	100	120	110

Hardness. Hardness is a measure of the multivalent metallic cations in water, principally calcium, magnesium, strontium, iron, and manganese (Sawyer et al. 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 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. In the Santa Clara River, average hardness values were greater than 150, classifying as 'hard' at the Lang Gauge and 'very hard' at Bouquet Junction for storm flows.

Chloride. Similar to TDS and hardness, chloride affects ion concentrations and contributes to TDS. Chloride in the Santa Clara River has a Basin Plan Water Quality Objective (WQO) of 100 mg/L. A recently completed TMDL study by the LARWQCB has presented a water resource plan that would allow higher chloride concentrations in Santa Clara River Reaches 4, 5, and 6. Reach 7 is still subject to the 100 mg/L limit for chloride. The historic data shows that chloride levels upstream of the site (Lang gauge) are well below this WQO, while chloride levels at the Bouquet Junction station downstream of the site generally exceed this level.

(c) Nutrients

Nutrient water quality data collected at the three USGS stations are summarized in **Table 4.8.1-3, USGS Water Quality Data for Selected Nutrients in the Santa Clara River at the Lang, Ravenna, and Bouquet Junction Gauges, 1974-1976**, below. Phosphorus was measured as total phosphorus (TP). Dissolved phosphorus is the more bioavailable form of phosphorus compared to TP, which is often made up of a high proportion of particulate phosphorus. Nitrogen is measured variously as nitrate, nitrite, ammonia, and total Kjeldahl nitrogen (TKN). TKN is the measure of ammonia plus the organic forms of nitrogen. Nitrate, nitrite, and ammonia are the more bioavailable forms of nitrogen, and of these, nitrate (or nitrate + nitrite) has the higher concentration in natural waters and is more important than ammonia as a nutrient.

Table 4.8.1-3
USGS Water Quality Data for Selected Nutrients in the Santa Clara River at the Lang, Ravenna, and Bouquet Junction Gauges, 1974–1976

Constituent	Gauge	2-day Antecedent Rainfall (inches)	No. of Samples	No. of Detects	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)
Total Phosphorus	Lang	<0.1	10	10	0.01	9.30	1.01
		≥0.1	3	3	0.07	0.12	0.09
	Ravenna	<0.1	7	7	0.04	0.09	0.06
		≥0.1	2	2	0.06	0.08	0.07
	Bouquet Junction	<0.1	18	18	0.31	17	8.68
		≥0.1	3	3	9.9	12	11.30
Ammonia as N	Lang	<0.1	10	8	0.03	5.60	0.76
		≥0.1	3	2	0.05	0.06	0.06
	Ravenna	<0.1	7	6	0.02	0.05	0.04
		≥0.1	2	2	0.03	0.09	0.06
	Bouquet Junction	<0.1	18	18	0.08	29	8.01
		≥0.1	3	3	0.43	6.4	4.28
Nitrate + Nitrite as N	Lang	<0.1	10	7	0.03	0.61	0.22
		≥0.1	3	1	0.09	0.09	0.09
	Ravenna	<0.1	7	6	0.05	2.6	1.94
		≥0.1	2	1	2.4	2.4	2.4
	Bouquet	<0.1	18	15	0.02	10	3.49

Constituent	Gauge	2-day Antecedent Rainfall (inches)	No. of Samples	No. of Detects	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)
TKN as N	Junction	≥0.1	3	1	5.8	5.8	5.8
	Lang	<0.1	10	10	0.09	7.50	1.00
		≥0.1	3	3	0.09	0.26	0.17
	Ravenna	<0.1	7	7	0.13	0.47	0.32
		≥0.1	2	2	0.16	0.35	0.26
	Bouquet Junction	<0.1	18	18	0.37	26	9.73
		≥0.1	3	3	1.8	6.7	4.93
Total Nitrogen	Lang	<0.1	10	10	0.14	7.50	1.15
		≥0.1	3	3	0.09	0.35	0.20
	Ravenna	<0.1	7	6	0.16	3.1	2.32
		≥0.1	2	2	0.18	0.34	0.26
	Bouquet Junction	<0.1	20	20	0.65	29	12.47
		≥0.1	3	3	1.8	12	6.7

Phosphorus. Historical average total phosphorus concentrations at the USGS stations upstream of the project ranges from 0.06 mg/L to 1.01 mg/L and were independent of storm size. Total phosphorous measured downstream at the Bouquet Junction station averaged 8.7 mg/L for small storms (<0.1 inch) and 11.3 mg/L for larger storms (≥0.1 inch). There are no numeric objectives for total phosphorus in the Basin Plan.

Nitrogen. The numeric target for nitrate plus nitrite-nitrogen in the Santa Clara River Nitrogen Compounds TMDL is 4.5 mg/L (30-day average) based on achieving the Basin Plan water quality objective of 5 mg/L. The average historical nitrate-N + nitrite-N concentrations at the USGS station were roughly similar, varying from 0.09 to 2.4 mg/L for storm flows upstream of the project, and varying from 0.02 to 10 mg/L for all flows at Bouquet Junction, downstream of the project. The higher concentrations for ammonia and nitrate in the historical data at the downstream USGS station Bouquet Junction may be attributed to farming and single-family residential units that historically used on-site sewage treatment systems in Bouquet Canyon.

(d) Selected Metals, Pesticides, and Cyanide

Metal and pesticide water quality data collected by the USGS at the three stations are summarized in **Table 4.8.1-4, USGS Water Quality Data for Selected Metals and Pesticides in the Santa Clara River at the Lang, Ravenna, and Bouquet Junction Gauges, 1974–1976**. The heavy metals cadmium (Cd), copper (Cu), lead (Pb), and zinc (Zn) can be toxic at high concentrations. Trace metals occur naturally in soils and sediments, and are present in urban runoff. The organophosphorous pesticides chlorpyrifos and diazinon are two pesticides of concern due to their potential toxicity in receiving waters and, in the past, have been frequently detected downstream from urban and agricultural land uses. These pesticides are currently banned for residential use. Cyanide is a highly toxic substance and has a number of man-made and natural sources. The only data available from the USGS stations immediately upstream or downstream of the project site were for lead and diazinon.

Table 4.8.1-4
USGS Water Quality Data for Selected Metals and Pesticides in the Santa Clara River at the Lang, Ravenna, and Bouquet Junction Gauges, 1974–1976

Constituent	Gauge	2-day Antecedent Rainfall (inches)	No. of Samples	No. of Detects	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)
Total Lead	Lang	<0.1	10	0	N/A	N/A	N/A
		≥0.1	3	0	N/A	N/A	N/A
	Ravenna	<0.1	7	0	N/A	N/A	N/A
		≥0.1	2	0	N/A	N/A	N/A
	Bouquet Junction	<0.1	18	0	N/A	N/A	N/A
		≥0.1	3	0	N/A	N/A	N/A
Diazinon	Lang	<0.1	3	0	N/A	N/A	N/A
		≥0.1	2	0	N/A	N/A	N/A
	Bouquet Junction	<0.1	5	5	0.01	0.13	0.05
		≥0.1	2	0	N/A	N/A	N/A

Metals. Metals data is only available for lead from the USGS site, and for a total of 43 samples there were no detects. The detection limit at the time of the monitoring was 200 μg/L.

Pesticides. Diazinon was detected in five dry weather samples at Bouquet Junction station. The CTR acute criterion for diazinon is 0.17 μg/L. The diazinon criterion derived by CDFG is 0.08 μg/L (Marshack 2003). The limited data available shows that the downstream station at Bouquet Canyon ranged from 0.01 to 0.13 μg/L, with the higher end of the range exceeding the CDFG criterion.

(6) Groundwater

(a) Basin

The project site is located at the eastern end of the upper Santa Clara River hydrologic area, as defined by the California Department of Water Resources (DWR). The Santa Clara River Valley East Groundwater Subbasin lies within this hydrologic area and is the source of the local groundwater used for water supply in the Santa Clarita Valley. The local groundwater supplies are obtained from surficial alluvial deposits. The alluvium is underlain by bedrock units consisting of the Mint Canyon Formation in the project area and other geologic units in the eastern and northern portions of the Santa Clarita Valley.

The alluvial sediments lie within the portion of the 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 portion of the project site where the WRP and percolation pond would be located is underlain by up to 7 feet of fill, below which is a silt-sand-gravel alluvium that extends to at least 35 feet below ground surface, and locally greater than 50 feet below ground surface. At the time of investigation, groundwater levels were measured at approximately 40 feet below ground surface, but have been recorded in nearby production wells (which are located much closer to the active channel of the River) as shallow as 5 feet and as deep as 100 feet (RTFA, 2007a, 2007b).

(b) Groundwater Beneficial Uses

The project area is within the Basin Plan's Santa Clara – Mint Canyon subbasin of the Santa Clarita Valley Groundwater Basin, East Subbasin. Beneficial uses for groundwater for this subbasin are shown in **Table 4.8.1-5**.

Table 4.8.1-5
Beneficial Uses of Groundwaters

Groundwater Basin	MUN	IND	PROC	AGR
DWR 4-4.07 – Santa Clara – Mint Canyon	E	E	E	E

E-Existing Beneficial Use
MUN: Community, military, or individual water supply systems including, but not limited to, drinking water supply
Source: Water Quality Control Plan for the Los Angeles Region (Basin Plan) (LARWQCB, 1994 as amended)
IND: Industrial activities that do not depend primarily on water quality; PROC: Industrial activities that depend primarily on water quality; AGR: Agricultural supply waters used for farming, horticulture, or ranching

(c) Existing Groundwater Quality

Groundwater in the alluvial aquifer beneath and adjacent to the Santa Clara River reflects direct interactions with Santa Clara River flows. This interaction is evidenced by declining groundwater levels over a period of several sequential dry precipitation years, followed by immediate and complete rebound of groundwater levels during a single wet year. This groundwater-surface water interaction can be viewed to a lesser extent in groundwater chloride values, which increase during dry precipitation cycles and then quickly decline during a wet year (CH2MHill/HGL, 2008). Few other water quality parameters are likely to mimic this increase and decrease caused by dry and wet precipitation cycles.

Data for water supply wells in the vicinity of the project site (Mitchell 5A, Mitchell 5B, Sand Canyon, and Lost Canyon 2, and Lost Canyon 2A) indicate that alluvial aquifer water quality is reasonably good, but has elevated boron and moderate sulfate and total dissolved solids (TDS) levels.

b. Regulatory Setting

Storm runoff from the project site, and discharges of runoff into and/or encroachment upon natural drainages, wetlands, and/or flood plains are subject to the federal Clean Water Act (33 U.S.C. Section 1251 et seq.; CWA) and associated regulations, the State Porter-Cologne Water Quality Control Act (Cal. Water Code Section 13000 et seq.) and associated regulations, and other regulations established by the U.S. EPA, SWRCB, LARWQCB, the Flood Control and Watershed Management Divisions of the of LACDPW, and the City of Santa Clarita. In addition, intrusions into jurisdictional areas are subject to the CWA, sections 1600–1607 of the California Fish and Game Code, and to requirements established by the USACE and CDFG. Each of these requirements and agencies is discussed below.

(1) Clean Water Act

In 1972, the Federal Water Pollution Control Act (later referred to as the CWA) was amended to require that the discharge of pollutants to "waters of the U.S." from any point source be effectively prohibited, unless the discharge is in compliance with a NPDES Permit. In 1987, the CWA was again amended to add Section 402(p), requiring that the U.S. EPA establish regulations for permitting of stormwater discharges by municipal and industrial facilities and construction activities under the NPDES Permit Program. The U.S. EPA published final regulations directed at MS4s serving a population of 100,000 or more, and stormwater discharges associated with industrial activities, including construction activities, on November 16, 1990. The regulations require that MS4 discharges to surface waters be regulated by a NPDES Permit (Phase I Final Rule, 55 Fed. Reg. 47990).

In addition, the CWA requires the states to adopt water quality standards for water bodies and have those standards approved by the U.S. EPA. Water quality standards consist of designated beneficial uses for a particular water body (e.g., wildlife habitat, agricultural supply, fishing etc.), along with water quality objectives necessary to support those uses. Water quality objectives can be numerical concentrations or levels of constituents, such as lead, and suspended sediment, or narrative statements that represent the quality of water needed to support a particular use. Because California had not established a complete list of acceptable water quality criteria, U.S. EPA Region IX (in which California lies) established numeric water quality criteria applicable to all receiving waters for certain toxic constituents in the form of the CTR (40 CFR Section 131.38).

(2) CWA Section 303(d) - TMDLs

When designated beneficial uses of a particular water body are being compromised and fail to meet water quality objectives, Section 303(d) of the CWA requires identifying and listing that water body as "impaired." Once a water body has been deemed impaired, a TMDL must be developed for each water quality constituent that compromises a beneficial use. 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 (often with a "factor of safety" included). Once established, the TMDL is allocated among current and future dischargers into the water body.

The proposed project would discharge runoff to Santa Clara River Reach 7. **Table 4.8.1-6, 2006 CWA Section 303(d) List of Water Quality Limited Segments – Santa Clara River**, lists the water quality impairments for the Santa Clara River at and downstream of the project location as reported in the 2006 CWA Section 303(d) List of Water Quality Limited Segments. States are required to submit the Section 303(d) list and TMDL priorities to the U.S. EPA for approval. The 2006 Section 303(d) list was approved by U.S. EPA on June 28, 2007. Reach 7 of the Santa Clara River is listed for coliform bacteria. Reach 6 (downstream of Bouquet Canyon Road) is listed for coliform bacteria, chlorpyrifos, diazinon, and toxicity. Reach 5 is listed for coliform bacteria and for chloride. 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 also listed for ammonia and chloride as "being addressed."

Table 4.8.1-6
2006 CWA Section 303(d) List of Water Quality Limited Segments – Santa Clara River

SCR Reach[1]	Geographic Description & Distance from Project to Upstream End of Reach	Pollutants	TMDL Status/Proposed or U.S. EPA Approved TMDL Completion Date	Potential Sources
7	Bouquet Canyon Rd. to above Lang Gauging Station (project is in Reach 7, located 4 miles downstream of upstream end)	1) Coliform Bacteria	1) Requires TMDL/2019	1) Nonpoint and Point Sources
6	West Pier Hwy 99 to Bouquet Cyn Rd. (6.5 miles)	1) Coliform Bacteria 2) Chlorpyrifos 3) Diazinon 4) Toxicity 5) Ammonia 6) Chloride	1) Requires TMDL/2019 2) Requires TMDL/2019 3) Requires TMDL/2019 4) Requires TMDL/2019 5) Approved TMDL/2004 6) Approved TMDL/2005	1) Source Unknown 2) Nonpoint and Point Sources 3) Source Unknown 4) Source Unknown 5) Source Unknown 6) Nonpoint and Point Sources
5	Blue Cut Gauging Station to West Pier Hwy 99 (10 miles)	1) Coliform Bacteria 2) Ammonia 3) Chloride 4) Nitrate and Nitrite	1) Requires TMDL/2019 2) Approved TMDL/2004 3) Approved TMDL/2005 4) Approved TMDL/2004	1) Nonpoint and Point Sources 2) Source Unknown 3) Nonpoint and Point Sources 4) Source Unknown

SCR Reach[1]	Geographic Description & Distance from Project to Upstream End of Reach	Pollutants	TMDL Status/Proposed or U.S. EPA Approved TMDL Completion Date	Potential Sources
3	Freeman diversion dam to "A" street [2] (30 miles)	1) Total Dissolved Solids 2) Ammonia 3) Chloride	1) Requires TMDL/2019 2) Approved TMDL/2004 3) Approved TMDL/2005	1) Nonpoint and Point Sources 2) Source Unknown 3) Nonpoint and Point Sources
1	Estuary to Highway 101 Bridge (50 miles)	1) Toxicity	1) Requires TMDL/2019	1) Source Unknown
--	Estuary (54 miles)	1) ChemA[3] 2) Coliform Bacteria 3) Toxaphene	1) Requires TMDL/2019 2) Requires TMDL/2019 3) Requires TMDL/2019	1) Source Unknown 2) Nonpoint Source 3) Nonpoint Source

[1] SCR reaches upstream of the project area have not been included.
[2] Reach 3 is downstream 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.

The LARWQCB has adopted TMDLs for nitrogen compounds (nitrate plus nitrite-nitrogen and ammonia) and chloride in the Basin Plan. The waste load allocations for stormwater discharges into the Santa Clara River in the reaches downstream of the project reach (Reaches 3, 5, and 6) are summarized in **Table 4.8.1-7, TMDL Waste Load Allocations for MS4 and Stormwater Sources to Reaches 3, 5, and 6**. The LARWQCB has not yet adopted a TMDL for coliform in the Santa Clara River.

The Los Angeles Region 2008 Integrated Report and updated 303(d) list was approved by the LARWQCB in July 2009. The Integrated Report, including the updated 303(d) list, was submitted to the SWRCB. The full State Integrated Report will then be submitted to the U.S. EPA for approval and will then become final. The Santa Clara River impairments in the draft 2008 303(d) list are summarized in **Table 4.8.1-8** below. There are no changes in the listed impairments for Reach 1 and Reach 7. New impairments are listed for nitrate in the estuary, toxicity in the estuary and Reach 3, iron in Reach 5 and Reach 6, benthic-macroinvertebrate bioassessment in Reach 6, and copper in Reach 6. Ammonia, nitrate and nitrite are proposed for delisting in Reach 5 and ammonia is proposed for delisting in Reach 6.

Table 4.8.1-7
TMDL Waste Load Allocations for MS4 and Stormwater Sources to Reaches 3, 5, and 6

Impairing Pollutant	Numeric Water Quality Objective	Waste Load Allocation
Chloride (Resolution No. 04-004)	100 mg/L	Waste load allocations for point sources is **100 mg/L**. The load allocations for nonpoint sources is **100 mg/L**.
Nitrogen Compounds (Resolution No. 03-011)	The numeric target for NO_3-N + NO_2-N in the Nitrogen Compounds TMDL was based on achieving the existing water quality objective of 5 mg/L NO_3-N + NO_2-N. The numeric target that was used to calculate the waste load allocations included a 10% margin of safety; thus the numeric target is 4.5 mg/L NO_3-N + NO_2-N (30-day average).	Concentration-based waste loads are allocated to municipal, industrial, and construction stormwater sources regulated under NPDES permits. For stormwater permittees discharging into Reach 7, the following waste load allocations apply: **30-day average nitrate plus nitrite = 6.8 mg/L (NO_3-N + NO_2-N).**

The Los Angeles Region 2008 Integrated Report and updated 303(d) list was approved by the Los Angeles Regional Board in July 2009. The Integrated Report, including the updated 303(d) list, was submitted to the State Water Resources Control Board (SWRCB) for approval along with the other Region's reports. The full State Integrated Report will then be submitted to the U.S. EPA for approval and will then be final. The Santa Clara River impairments in the draft 2008 303(d) list are summarized in **Table 4.8.1-8**, below. There are no changes in the listed impairments for Reach 1 and Reach 7. New impairments are listed for nitrate in the estuary, toxicity in the estuary and Reach 3, iron in Reach 5 and Reach 6, benthic-macroinvertebrate bioassessment in Reach 6, and copper in Reach 6. Ammonia, nitrate and nitrite are proposed for delisting in Reach 5 and ammonia is proposed for delisting in Reach 6.

Table 4.8.1-8
Proposed 2008 CWA Section 303(d) List of Water Quality Limited Segments – Santa Clara River

SCR Reach[1]	Geographic Description	Pollutants	TMDL Status/Proposed or U.S. EPA Approved TMDL Completion Date	Potential Sources
7	Bouquet Canyon Rd. to above Lang Gauging Station	1) Coliform Bacteria	1) Requires TMDL/2019	1) Nonpoint and Point Sources
6	West Pier Hwy 99 to Bouquet Cyn Rd.	1) Benthic-Macroinvertebrate Bioassessments 2) Chloride 3) Chlorpyrifos 4) Coliform Bacteria 5) Copper 6) Diazinon 7) Iron 8) Toxicity	1) Requires TMDL/2021 2) Approved TMDL/2005 3) Requires TMDL/2019 4) Requires TMDL/2019 5) Requires TMDL/2021 6) Requires TMDL/2019 7) Requires TMDL/2021 8) Requires TMDL/2021	1) Nonpoint and Point Sources 2) Nonpoint and Point Sources 3) Nonpoint and Point Sources 4) Source Unknown 5) Source Unknown 6) Source Unknown 7) Source Unknown 8) Source Unknown
5	Blue Cut Gauging Station to West Pier Hwy 99	1) Coliform Bacteria 2) Chloride 3) Iron	1) Requires TMDL/2019 2) Approved TMDL/2005 3) Requires TMDL/2021	1) Nonpoint and Point Sources 2) Nonpoint and Point Sources 3) Source Unknown
3	Freeman diversion dam to "A" street [2]	1) Total Dissolved Solids 2) Ammonia 3) Chloride 4) Toxicity	1) Requires TMDL/2023 2) Approved TMDL/2004 3) Approved TMDL/2005 4) Requires TMDL/2021	1) Nonpoint and Point Sources 2) Source Unknown 3) Nonpoint and Point Sources 4) Source Unknown
1	Estuary to Highway 101 Bridge	1) Toxicity	1) Requires TMDL/2019	1) Source Unknown
--	Estuary	1) ChemA[3] 2) Coliform Bacteria 3) Toxaphene 4) Nitrate 5) Toxicity	1) Requires TMDL/2019 2) Requires TMDL/2019 3) Requires TMDL/2019 4) Requires TMDL/2021 5) Requires TMDL/2021	1) Source Unknown 2) Nonpoint Source 3) Nonpoint Source 4) Source Unknown 5) Source Unknown

[1] *SCR reaches upstream of the Project area have not been included.*
[2] *Reach 3 is downstream 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.*

(3) California Toxics Rule (CTR)

The California Toxics Rule (40 C.F.R. Section 131.38) is a federal regulation issued by the U.S. 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 project 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 developed for drinking water sources and for fish consumption only. Since the human health criteria are less stringent than the aquatic life criteria for the pollutants of concern for the project, the aquatic life criteria are used.

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 of time 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. For example, the average storm duration in the 40-year Newhall gauge rainfall record is 7.6 hours. In this document, the acute CTR criteria are used as one type of benchmark to evaluate the potential ecological impacts of project runoff on the receiving waters.

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.[19] The minimum wet weather hardness value of 270 mg/L as $CaCO_3$ from USGS station at Lang (11107745) was used to approximate CTR criteria for metals. The hardness value of 270 mg/L is a conservative estimate of wet weather hardness values that should occur in the project area; higher values are likely to occur.

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19 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. (U.S. EPA 2007)

(4) 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 and allows U.S. EPA to withdraw control from states with inadequate implementation mechanisms.

California's primary statute governing water quality and water pollution issues with respect to both surface waters and groundwater is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act). The Porter-Cologne Act grants the SWRCB and the Regional Water Quality Control Boards (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, to regulate discharges of waste to surface and groundwater, to regulate waste disposal sites and to 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 (e.g., 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 groundwater 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.

(5) Basin Plan

The applicable Basin Plan (LARWQCB 1994, as amended) provides quantitative and narrative criteria for a range of water quality constituents applicable to certain receiving water bodies and groundwater basins within the Los Angeles Region. 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 groundwater. In general, the narrative criteria require that degradation of water quality does not occur due to increases in pollutant loads that would adversely impact the designated beneficial uses of a water body. For example, the Basin Plan requires that "Inland 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 as one method to evaluate the potential ecological impacts of project runoff on the receiving waters of the proposed project. **Table 4.8.1-1,** above, lists the beneficial uses of applicable receiving surface waters.

The Basin Plan also contains water quality criteria for groundwater basins. For example, the Basin Plan requires that: "Groundwaters shall not contain taste or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses." **Table 4.8.1-5,** above, lists the beneficial uses of the applicable groundwater basin.

(6) MS4 Permit

In 2001, the LARWQCB 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 the Los Angeles County cities and the County (collectively, "the co-permittees"). This permit regulates stormwater 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 requirements.

To implement the requirements of the NPDES permit, the co-permittees have established development planning guidance and control measures that control and mitigate stormwater quality and quantity impacts to receiving waters as a result of new development and redevelopment. They are also 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 Stormwater Quality Management Program (SQMP) by the co-permittees:

- General Requirement – 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 "maximum extent practicable" (MEP).
- BMP Implementation – Permittees are required to implement the most effective combination of BMPs for stormwater/urban runoff pollution control.
- SQMP Revision – Permittees are required to revise the SQMP to comply with regional, watershed specific requirements, and/or waste load allocations for implementation of TMDLs for impaired water bodies.

- Responsibilities of the Principal Permittee – The responsibilities of the Los Angeles County Department of Public Works (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 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 tracks, inspects, and ensures compliance at industrial and commercial facilities that are sources of pollutants in stormwater.

- Development Planning Program – This requires the Permittees 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 were approved by the LARWQCB 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" details the requirements for new development and significant redevelopment BMPs (the SUSMP Manual). The SUSMP 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 SUSMP 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 are also contained in the MS4 Permit and in the SUSMP Manual.

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 are as follows:

1. The 85^{th} percentile 24-hour runoff event 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) Manual of Practice No. 23/ASCE Manual of Practice No. 87 (WEF 1998);

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 California Stormwater Best Management Practices Handbook – Industrial/Commercial (SWQTF 1993);

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 85^{th} 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 85^{th} 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.

Stormwater treatment facilities would be designed to meet or exceed the sizing standards contained in the SUSMP Manual. Facility sizing would be finalized by the project engineer with the final hydrology study prior to issuance of a grading permit, which would be prepared and approved to ensure consistency with this analysis. Also, the SUSMP includes general design specifications for individual priority project categories. These include (1) single-family hillside home, (2) 100,000-square-foot commercial developments, (3) restaurants, (4) retail gasoline outlets, (5) automotive repair shops, and (6) 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). This document preliminarily identifies appropriate BMPs for these categories.

The LARWQCB issued a letter in December 2006 that clarifies the Board's compliance expectations for the development planning requirements in Part 4.D of the MS4 Permit. Per the clarification letter, the three provisions in Part 4.D that are the essential requirements for compliance are to (1) maximize the percentage of pervious surfaces to allow percolation of stormwater into the ground, (2) minimize the quantity of stormwater directed to impervious surfaces and the MS4, and (3) minimize pollution emanating from parking lots through the use of appropriate treatment control BMPs and good housekeeping practices.

The proposed project is required to incorporate appropriate SUSMP requirements into project plans as part of the development plan approval process for building and grading permits. This analysis would identify at a project level the design specifications related to treatment control BMPs and other project features associated with the Vista Canyon project. Prior to issuance of grading permits, final design of these BMPs consistent with this analysis would be completed by the project engineer.

(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, Section D.1 of 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 were required to develop and implement by February 1, 2005, 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. The County of Los Angeles Department of Public Works and the Southern California Storm Water Monitoring Coalition had been conducting the study, but the study was not completed in time to meet the February 1st deadline. Therefore, on January 31, 2005, the County adopted and submitted to the LARWQCB an Interim Peak Flow 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 Peak Flow Standard was derived from a similar Interim Peak Flow Standard for Ventura County approved by the LARWQCB under the SUSMP requirements provisions of the MS4 Permit. The intent of the Interim Standard, as described by the County in the cover letter dated January 31, 2005, signed by Donald L. Wolfe transmitting the Interim Standard to Jonathan Bishop of the LARWQB, 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 Peak Flow Standard adopted by the County is:

> *The Peak Flow Standard shall require that all post-development runoff from a 2-year, 24-hour storm shall not exceed the predevelopment peak flow rate, burned, from a 2-year, 24-hour storm when the predevelopment peak flow rate equals or exceeds five cubic feet per second. Discharge*

> *flow rates shall be calculated using the County of Los Angeles Modified Rational Method. The Peak Flow Standard shall also require that post-development runoff from the 50-year capital storm shall not exceed the predevelopment peak flow rate, burned and bulked, from the 50-year capital storm.*

In its cover letter dated January 31, 2005, signed by Donald L. Wolfe, transmitting the Peak Flow Interim Standard to Jonathan Bishop of the LARWQB, the County notes that upon completion of the Peak Discharge Impact Study, new peak flow standards may be determined to be appropriate.

The Vista Canyon project would be conditioned to require, as a project design feature, sizing and design of hydraulic features as necessary to control hydromodification impacts.

(7) Los Angeles County Low Impact (LID) Development Ordinance

Chapter 12.84 of the Los Angeles County Municipal Code requires the use of low impact development (LID) standards in development projects. Chapter 12.84 requires that applicable development projects

- mimic undeveloped stormwater and urban runoff rates and volumes in any storm event up to and including the "50-year capital design storm event," as defined by LACDPW;
- prevent pollutants of concern from leaving the development site in stormwater as the result of storms, up to and including a water quality design storm event; and
- minimize hydromodification impacts to natural drainage systems.

To meet these standards, development projects that consist of five or more residential units, or nonresidential development, shall comply with the following:

- The excess volume (defined as the post-developed runoff volume minus the pre-developed runoff volume for the 85th percentile storm event) from each lot upon which such development is occurring shall be infiltrated at the lot level, or in the alternative, the excess volume from the entire development site, including streets and public right-of-way, shall be infiltrated in sub-regional facilities. The tributary area of a sub-regional facility shall be limited to 5 acres, but may be exceeded with approval of the Director of LACDPW. When infiltration of all excess volume is not technically feasible, on-site storage, reuse, or other water conservation uses of the excess volume is required and shall be implemented as authorized by the Director of LACDPW.

LACDPW has developed a LID Standards Manual that outlines stormwater runoff quantity and quality control development principles, technologies, and design standards for achieving the LID Standards of Chapter 12.84. The LID Standards Manual requires that large scale residential and nonresidential development projects prioritize the selection of BMPs to treat stormwater pollutants, reduce stormwater runoff volume, and promote groundwater infiltration and stormwater reuse in an integrated approach to protecting water quality and managing water resources. The Manual states that BMPs should be implemented in the following order of preference:

1. BMPs that promote infiltration.
2. BMPs that store and beneficially use stormwater runoff.
3. BMPs that utilize the runoff for other water conservation uses including, but not limited to, BMPs that incorporate vegetation to promote pollutant removal and runoff volume reduction and integrate multiple uses, and BMPs that percolate runoff through engineered soil and allow it to discharge downstream slowly.

If compliance with the above LID requirements is technically infeasible, in whole or in part, the project must incorporate design features demonstrating compliance with the LID requirements to the maximum extent practicable. The LID goals of increasing groundwater recharge, enhancing water quality, and preventing degradation to downstream natural drainage courses would be considered by LACDPW in the determination of infeasibility.

The LID Standards Manual outlines site conditions where infiltration may not be possible:

- Locations where seasonal high groundwater is within 10 feet of the surface.
- Within 100 feet of a groundwater well used for drinking water.
- Brownfield development sites or other locations where pollutant mobilization is a documented concern.
- Locations with potential geotechnical hazards as outlined in a report prepared and stamped by a licensed geotechnical engineer.
- Locations with natural, undisturbed soil infiltration rates of less than 0.5 inch per hour that do not support infiltration-based BMPs.
- Locations where infiltration could cause adverse impacts to biological resources.
- Development projects in which the use of infiltration BMPs would conflict with local, state, or federal ordinances or building codes.
- Locations where infiltration would cause health and safety concerns.

The LID Standards Manual outlines where storage and reuse of the excess volume may not be possible:

- Projects that would not provide sufficient irrigation or (where permitted) domestic grey water demand for use of stored runoff due to limited landscaping or extensive use of low water use plant palettes in landscaped areas.
- Projects that are required to use reclaimed water for irrigation of landscaping.

- Development projects in which the storage and reuse of stormwater runoff would conflict with local, state, or federal ordinances or building codes.
- Locations where storage facilities would cause potential geotechnical hazards as outlined in a report prepared and stamped by a licensed geotechnical engineer.
- Locations where storage facilities would cause health and safety concerns.

The LID Standards Manual also contains drainage analysis requirements for hydromodification impacts to off-site property. Although project applicants must still demonstrate that the project mitigates for hydromodification impacts to the satisfaction of the Director of Public Works, the LID Standards Manual provides for the following exemptions from conducting a full analysis for hydromodification impacts:

- Projects that disturb less than 1 acre.
- Less than 10,000 square feet of new impervious area.
- Projects that do not increase impervious area or decrease the infiltration capacity of pervious areas compared to pre-project conditions.
- Projects that are replacement, maintenance, or repair of an existing permitted flood control facility.
- Projects within a watershed or subwatershed where a geomorphically based watershed study has been prepared that establishes that the potential for hydromodification impacts is not present based on appropriate assessment and evaluation of relevant factors, including: runoff characteristics, soil conditions, watershed size and conditions, channel conditions, and proposed levels of development within the watershed.
- Projects that discharge directly or via a storm drain into concrete or significantly hardened channels, which in turn discharge into a sump area under tidal influence, or other receiving water that is not susceptible to hydromodification impacts.
- Projects that have hydrologic control measures that include sufficient subregional, regional, in-stream control measures, or a combination thereof such that hydromodification will not occur.

The project proposes annexation to the City of Santa Clarita. Consistent with this request, all discretionary applications were filed with the City of Santa Clarita prior to January 1, 2009. Therefore, the project is not required to adhere to the County's LID Ordinance. However, the project applicant has committed to adhere to these requirements to the maximum extent feasible.

(8) Construction Permits

Pursuant to the CWA Section 402(p), requiring regulations for permitting of certain stormwater discharges, the SWRCB has issued a statewide general NPDES Permit for stormwater discharges from construction sites ((NPDES No. CAR000002) Water Quality Order 2009-0009-DWQ SWRCB NPDES

General Permit for Stormwater Discharges Associated with Construction Activity [adopted by the SWRCB on September 2, 2009]).

Under this Construction General Permit, discharges of stormwater from construction sites with a disturbed area of one or more acres (effective July 1, 2010) are required to either obtain individual NPDES permits for stormwater discharges or be covered by the Construction General Permit. Coverage under the Construction General Permit is accomplished by (1) completing a construction site risk assessment to determine the appropriate coverage level; (2) preparing a Stormwater Pollution Prevention Plan (SWPPP), including site maps, a Construction Site Monitoring Program (CSMP), and sediment basin design calculations; (3) for projects located outside of a Phase I or Phase II permit area, completing a post-construction water balance calculation for hydromodification controls; and (iv) completing a Notice of Intent. All of these documents must be electronically submitted to the SWRCB for General Permit coverage. The primary objective of the SWPPP is to identify and apply proper construction, implementation, and maintenance of BMPs to reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the construction site during construction. The SWPPP also outlines the monitoring and sampling program required for the construction site to verify compliance with discharge Numeric Action Levels (NALs) set by the Construction General Permit

(9) General Waste Discharge Requirements for Dischargers of Groundwater from Construction and Project Dewatering

The LARWQCB has issued a General NPDES Permit and General Waste Discharge Requirements (WDRs) (Order No. R4-2008-0032 [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 associated with 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 such construction-related activities so long as all conditions of the permit are fulfilled. Compliance with the requirements of the General Dewatering Permit is used as one method to evaluate project construction-related impacts on surface water quality.

(10) Discharge of Fill or Dredge Materials

Hydrologic conditions of concern addressed in this report include in-stream changes in sediment transport, erosion, and sedimentation, and ultimately channel stability. There is a nexus between these concerns and the stream, habitat, and species protection programs administered by the USACE, CDFG, and the U.S. Fish and Wildlife Service.

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 fill 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. U.S. EPA and the USACE have issued Section 404(b)(1) Guidelines (40 CFR 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 must obtain a state water quality certification that the activity complies with all applicable water quality standards, limitations, and restrictions. Subject to certain limitations, 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.

This section does not analyze the habitat and wildlife impacts associated with physical alterations to Waters of the U.S. proposed in conjunction with the project, such as dredge, fill, or bed, bank or channel improvements or stabilization measures affecting Waters of the U.S. The impacts associated with these physical alterations are analyzed in **Section 4.6, Biological Resources,** and **Section 4.20, Santa Clara River Corridor Analysis**. As discussed below, this report analyzes the adverse impacts to natural drainage systems that may be caused by the project's alteration of hydrologic conditions.

(11) Lake or Streambed Alteration Agreement

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 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 to notify the CDFG before beginning the project. Similarly, under section 1602 of the Fish and Game Code, 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.

As discussed above, this report does not analyze the habitat and wildlife impacts associated with physical alterations to Waters of the U.S. proposed in conjunction with the project, such as dredge, fill, or bed, bank or channel improvements or stabilization measures affecting Waters of the U.S. The impacts associated with these physical alterations are analyzed in **Section 4.6, Biological Resources,** and **Section 4.20, Santa Clara River Corridor Analysis**. As discussed below, this report analyzes the adverse impacts to natural drainage systems that may be caused by the project's alteration of hydrologic conditions.

(12) Recycled Water

(a) Recycled Water Policy

The SWRCB adopted a Recycled Water Policy (the Policy) in 2009 (see Resolution No. 2009-0011). The Policy requires the increased usage of recycled water while considerate of water quality concerns, and contains incentives for the use of recycled water. The SWRCB states in the Policy that they anticipate developing additional policies that encourage the use of stormwater, water conservation, the conjunctive use of surface and groundwater, and the improved use of local water supplies. The following goals are included in the Policy:

- Increase the use of recycled water over 2002 levels by at least 1 million afy by 2020 and at least 2 million afy by 2030.
- Increase the use of stormwater over use in 2007 by at least 500,000 afy by 2020 and at least 1 million afy by 2030.
- Increase the amount of water conserved in urban and industrial areas by comparison to 2007 by at least 20 percent by 2020.

- Substitute as much recycled water for potable water as possible by 2030.

The Recycled Water Policy provides direction to RWQCBs regarding appropriate criteria to utilize when issuing permits for recycled water projects; these criteria are intended to streamline the permitting of recycled water projects, while also reserving sufficient authority and flexibility to address site-specific conditions. The Policy also addresses the benefits of recycled water, and encourages other public agencies to presume there is a benefit from the use of recycled water in evaluating the impacts of recycled water projects on the environment, as required by CEQA. The Policy indicates that the SWRCB will exercise their authority to the fullest extent possible to encourage the use of recycled water, consistent with state and federal water quality laws.

The Policy also addresses water quality concerns by requiring a number of key provisions. For example, to manage salts and nutrients, the Policy requires every groundwater basin or sub-basin in California to have a consistent salt/nutrient management plan. Each salt/nutrient plan must include a monitoring plan, which includes monitoring of emerging constituents/chemicals of emerging concern (CECs) consistent with CDPH recommendations; be protective of water sources; and encourage recycling to meet the Policy's reuse goals. The Policy also requires that incidental runoff from landscape irrigation projects be controlled. Further, landscape irrigation projects that use recycled water must have a permit. Additionally, the Policy addresses groundwater recharge projects by requiring that all projects be reviewed and permitted on a site-specific basis. (Of note, the project does not propose to recharge recycled water to groundwater.)

The Policy also addresses control of emerging CECs. Due to the lack of knowledge on the full effects of these relatively new pollutants of concern, the Recycled Water Policy emphasizes the need for additional scientific research. The Policy states that the regulatory requirements for recycled water should be updated regularly and based on the best available peer-reviewed science. Additionally, the Policy sets forth a research program, which includes a "blue-ribbon" advisory panel consisting of experts from all relevant fields of science. The panel is required to review all related scientific literature and to submit a report describing the current state of scientific knowledge and the actions that the State of California should take to improve current understanding of and human health protections against CECs.

(13) Municipal Recycled Water Landscape Irrigation Use Permit

The General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled Water (Water Quality Order No. 2009-0006-DWQ) (Landscape Irrigation General Permit) regulates landscape irrigation with recycled water. Specified uses of recycled water considered to be "landscape irrigation" include any of the following: (1) parks, greenbelts, and playgrounds; (2) school yards; (3) athletic fields;

(4) golf courses; (5) cemeteries; (6) residential landscaping and common areas (not including individually owned residential areas); (7) commercial landscaping, except eating areas; (8) industrial landscaping, except eating areas; and (9) freeway, highway, and street landscaping. Producers or distributors of recycled water must submit a Notice of Intent (NOI) for coverage under the Landscape Irrigation General Permit. This permit is not required for individual recycled water users and does not cover use of harvested stormwater for irrigation.

(a) Producer and Distributor Responsibilities

Producers must produce disinfected tertiary recycled water as defined by CCR Title 22, sections 60301.230 and 60301.320, which address disinfection requirements and "filtered wastewater" requirements, respectively. Producers are responsible for ensuring that recycled water meets the quality standards for disinfected tertiary recycled water as described in Title 22 and any associated waste discharge requirement order for the WRP. Distributors are responsible for drafting and submitting an Operations and Maintenance (O&M) Plan to the State Water Board. The plan contents are contained in the permit, and include operation and maintenance/management of transport facilities and associated infrastructure necessary to convey and distribute recycled water from the point of production to the point of use. Additionally, distributors must designate a Recycled Water Use Supervisor for each use area. The permit also addresses best management practices, including general operations and maintenance, which producers and distributors must apply to manage recycled water and prevent water quality impacts.

(b) Usage

The permit establishes terms and conditions of discharge to ensure that the discharge does not unreasonably affect beneficial uses of groundwater and surface water. This includes minimum setback distances, signage, application control, and use restrictions, along with other preventative measures, such as backflow prevention and cross-contamination programs.

(14) California Department of Public Health Regulations

(a) Title 17

Title 17 drinking water supply standards (Division 1, Chapter 5, Group 4, Articles 1 and 2) include requirements related to recycled water. The related standards concern the protection of potable water supply from recycled water due to cross-contamination. The water supplier is responsible for protecting the public water supply and for evaluating the degree of potential health hazard to the public water supply created as a result of conditions existing on a user's premises. The standards also call for backflow protection. Backflow protection must be provided by the water supplier and water user commensurate with the degree of hazard that exists on the consumer's premises.

(b) Title 22

The requirements of Title 22, as revised in 1978, 1990, and 2001, establish the quality and/or treatment processes required for a recycled effluent to be used for a non-potable application. In addition to recycled water uses and treatment requirements, Title 22 addresses (1) sampling and analysis requirements at a treatment plant; (2) preparing an engineering report prior to production or use of recycled water; and (3) ensuring there are general treatment design requirements, reliability requirements, and alternative methods of treatment. Permits are issued to each water-recycling project by one of the nine RWQCBs. The LARWQCB would issue this permit for the project site. These permits include water quality and public health protections, as detailed in Title 22.

4. WATER QUALITY METHODOLOGY

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. The water quality model is one of the few models that accounts for the observed variability in stormwater hydrology and water quality. This is accomplished by characterizing the probability distribution of: (a) observed rainfall event depths; (b) stormwater event mean concentrations; and (c) the number of storm events per year. These distributions are then sampled randomly using a Monte Carlo Approach to develop estimates of mean annual loads and concentrations.

A detailed description of the stormwater quality modeling approach is presented in the Water Quality Technical Report (Geosyntec 2010; see **Appendix 4.8**). The following summarizes major features of the model:

- **Rainfall Data:** The water quality model estimates the volume of runoff from storm events. The storm events were determined from 40 years (1969–2008) of hourly rainfall data measured at the National 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 1-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 Event Mean Concentrations (EMCs), were estimated from data collected in Los Angeles County (LACDPW 2000). 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.

- **Pollutant Load:** The pollutant load associated with each storm is estimated as the product of the storm event runoff times the event mean concentration. 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 (vegetated swales, and bioretention areas, infiltration, cisterns) and does not take into account source control PDFs (e.g., street sweeping and catch basin inserts) that would also improve water quality. In this respect, the modeling results are conservative (i.e., 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 (ASCE/EPA 2003). The International Stormwater BMP Database was used because it is a 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 (Strecker et al. 2004). Based on this analysis, a conservative estimate of 25 percent of the inflow to the vegetated swales and bioretention with underdrains was assumed to infiltrate and/or evapotranspire in the water quality model. These assumptions regarding volumetric losses were also used to assess the quantity of dry weather flows that would be captured in the treatment BMPs.

- **Bypass Flows:** The water quality model takes into account conditions when the treatment facility is full and flows are bypassed.

- **Representativeness of Local Conditions:** The water quality model utilizes runoff water quality data obtained from tributary areas that have a predominant land use, and are 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 conditions 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 development area would be impacted by cut/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 of concern for the proposed project were chosen for the water quality analysis based upon typical pollutants found in urban runoff from land uses similar to the proposed project. 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 receiving waters.

The primary pollutants of concern chosen for analysis are:

- Total Suspended Solids (TSS)
- Nutrients (Phosphorus, Nitrogen, etc.)
- Trace Metals (Copper, Lead, Zinc)
- Chloride (Cl)
- Pathogens (Bacteria, Viruses, Protozoa)
- Petroleum Hydrocarbons
- Pesticides
- Trash and Debris
- Methylene Blue Activated Substances (MBAS)
- Cyanide
- Bioaccumulation

b. Pollutants Addressed

The appropriate form of data used to address water quality are flow composite storm event samples, which measure the average water quality during an 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 (sediment)
- Total Phosphorus
- Nitrate-Nitrogen, Nitrite-Nitrogen, Ammonia-Nitrogen, and Total Nitrogen
- Dissolved Copper
- Total Lead
- Dissolved Zinc
- Chloride

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). Due to the lack of statistically reliable monitoring data for these pollutants, they were addressed qualitatively using literature information and best professional judgment due to the lack of statistically reliable monitoring data available.

The pollutants of concern for which a qualitative analysis was undertaken 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 are usually 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 are typically measured with grab samples, making it difficult to develop reliable EMCs. Total coliform and fecal bacteria (fecal coliform, fecal streptococcus, and fecal enterococci) 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).

Hydrocarbons are difficult to measure because of laboratory interference effects and sample collection issues (hydrocarbons tend to coat sample bottles). Hydrocarbons are typically 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 are 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).

Trash and debris, MBAS, and cyanide are not typically included in routine urban stormwater monitoring programs. 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 or relatively short periods, or both. 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, if any, during construction, potential water quality impacts due to pollutant bioaccumulation, dry weather runoff water quality impacts, and groundwater quality impacts.

c. WRP Analysis

Potential impacts to groundwater from percolating WRP effluent were qualitatively assessed based on the estimated recycled water quality. Potential impacts to downstream drinking water supply wells were assessed based on water quality, volume of pumping, and the likely volume of the alluvial aquifer that the water supply wells draw from. The WRP would not discharge to the Santa Clara River, so surface water quality impacts were not analyzed.

(1) Recycled Water Pollutants of Concern

The recycled water pollutants of concern for the groundwater quality analysis include bacteria, chemical constituents and radioactivity, taste and odor, mineral quality, and nutrients. Contaminants of emerging concern (CECs), described below, are also pollutants of concern for recycled water.

(2) Contaminants of Emerging Concern (CECs)

Emerging contaminants are new chemicals or existing chemicals that were not previously considered pollutants of concern, but have more recently been found to have adverse effects on ecological systems. Many of these emerging contaminants arise from household use. They are not completely removed during wastewater treatment processes, thus can be released in wastewater treatment plant effluent. While there are hundreds of different CECs, they can be grouped into a number of general categories (Colker and Day, 2005; USGS, 2010).

(3) Pharmaceuticals and Personal Care Products

Pharmaceuticals and Personal Care Products (PPCPs) encompass a broad array of chemicals, including antibiotics and other prescription drugs, pain relievers, fragrances, lotions, sunscreen agents, and a number of other products. These chemicals are commonly found in municipal wastewater plants, as they are typically excreted or washed off by consumers into the municipal sewer system. Wastewater treatment plants often cannot biodegrade these complex synthetic chemicals and they are discharged in effluent into the environment. Many of these chemicals are endocrine disrupters and can affect the reproductive cycle of aquatic organisms.

(4) Industrial and Household Chemicals

Industrial and household CECs include cleaning agents, mechanical lubricants and solvents, and flame retardants. These synthetic chemicals are generally very toxic, and are often considered endocrine disrupters, adversely affecting aquatic organisms. These chemicals are difficult to treat and generally have low removal rates in traditional wastewater treatment systems.

(5) Nanomaterials

Nanomaterials have recently been explored and used in industries from biotechnology to electronic circuitry. While nanomaterials are efficient and useful for these new applications, due to their size and reactivity, they could potentially negatively affect ecosystems and water bodies.

d. Event Mean Concentrations Used For Quantitative Analysis

Stormwater runoff water quality would vary within a storm event depending on the rainfall pattern and storm duration (intra-event variability). Because of this variability, water quality concentrations are often expressed in the form of event mean concentrations (EMCs), which are the concentrations that would be measured if the entire runoff from an event were captured and mixed before sampling. The extensive use of EMCs to characterize stormwater quality was initiated in the EPA's Nationwide Urban Runoff Program (NURP) (EPA, *Nationwide Urban Runoff Program*, Executive Summary, 1983).

Stormwater runoff quality would also vary from storm to storm (inter-event variability) depending on a variety of conditions, including the characteristics of the storm event, the time between storms, conditions in the watershed, and time of year. This latter effect is particularly important in semi-arid environments where there is a dry and wet season, and where soil saturation and runoff vary greatly depending on the season and changes in long-term climate cycles. Because of this intra- and inter-event variability, stormwater quality is often expressed and evaluated statistically.

e. Land Uses under Existing and Proposed Conditions

(1) Existing Land Uses

The Los Angeles County Land Use Map (initially adopted February 16, 1984, and as amended through May 13, 2003) designates the property as M (Industry) and W (Floodplain/Floodway). The property is currently zoned M-1.5 (Light Industrial), A-1-1 (Light Agriculture – 1 Acre minimum lot size), R-A-8,000 (Residential Agriculture – 8,000-square-foot minimum lot size), and A-1-10,000 (Light Agriculture – 10,000-square-foot minimum lot size).

The property was included in the Planning Area of the City of Santa Clarita General Plan. The City's adopted Land Use Plan (adopted June 26, 1991, and as amended through April 24, 2007) designates the property as BP (Business Park) with portions of the site covered by an SEA overlay. The City's General Plan Land Use Concept (Exhibit L-3 of the General Plan) identified the project as a major sub-center with Business Park/Office Uses.

Land uses surrounding the project site include:

- Multi-family residential development, Colony Townhomes, directly west of the project site;
- SR-14, residential, and commercial development, north of the project site;
- Single-family residences along both sides of La Veda Avenue and Lost Canyon Road, public elementary school, and private elementary school, east of the project site;
- The Metrolink rail line and a commercial horse breeding facility property with accessory residential and barn structures, south of the eastern portion of the project site; and
- Vacant land, the Metrolink rail line, and residential development (Fair Oaks Ranch), south of the western portion of the project site.

(2) Proposed Project Land Uses

The proposed land uses shown on the tentative tract map include 1,117 dwelling units (96 single-family residential lots and 1,021 multi-family residential units) and up to 950,000 square feet of commercial and medical office, retail, theater, restaurant, and hotel uses within four Planning Areas (PA). A residential overlay over the corporate office campus site within PA-2 would allow for a conversion of up to 250,000 square feet of office floor area to 233 attached residential units. If implemented, this conversion would permit a maximum of 1,350 residential units and 700,000 square feet of commercial floor area. The project includes various parks/recreation amenities, including the Oak Park, Town Green, Community Garden, and the River Education/Community Center; a Metrolink Station; Bus Transfer Station; WRP, private recreational facilities, and various trail and road improvements.

The project also proposes a 395,411 gallon per day (gpd) on-site WRP (Dexter Wilson Engineering, 2010). The WRP and associated percolation ponds would be located in Planning Area 1, between the Santa Clara River Regional Trail and Lost Canyon Road.

The project applicant is proposing a Specific Plan (SP) designation for the project site. The Vista Canyon Specific Plan has been designed to deliver a mixed-use, transit-oriented neighborhood to the eastern Santa Clarita Valley.

The proposed project land uses within the project are summarized below in **Table 4.8.1-9, Vista Canyon Ranch Proposed Land Uses**.

Table 4.8.1-9
Vista Canyon Proposed Land Uses

Land Use	Area (acres)
Residential	
Single-Family Detached	8.1
Multi-Family	25.2
Mixed-Use/Multi-Family	1.1
Commercial	
Mixed-Use - Commercial/Office	9.6
Office[1]	2.7
Commercial	3.4
Parking Structures	4.2
WRP	1.5
Open Space	
Parks	7.8
Landscaping/Open Space/Recreation	23.2
River Bank Protection[2]	22.1
Santa Clara River	5
Roads	
Roads	21.4
TOTAL	**185.3**

[1] *The Specific Plan allows a residential overlay within PA-2. This overlay allows for the conversion of up to 250,000 square feet of office uses to a maximum of 233 attached residential units.*

[2] *River Bank Protection encompasses maintenance access roads (2.8 acres), buried bank stabilization (6.8 acres), and areas of the river bed, which would be temporarily impacted by construction (12.7 acres).*

(3) Off-Site Project Improvements

To facilitate development of the project, the following off-site improvements are proposed:

- Extension of Lost Canyon Road (approximately 800 feet), from its present terminus at the northerly abutment of the bridge over the Metrolink railroad tracks within Fair Oaks Ranch, north across adjacent properties to the south and west to the Specific Plan site. The right-of-way for this road would accommodate two vehicular lanes in each direction, a raised landscaped median, parkway, sidewalk and Class III bike lanes. Approximately 160,000 cubic yards of grading is necessary to complete this improvement.

- Extension of Lost Canyon Road to the south into the Cloyd property, along with the extension of the east-west "Y Street" into the Cloyd property from southern boundary of the project.

- Extension of Jakes Way (approximately 250 feet) from its present terminus directly west of the Specific Plan site to the proposed roundabout at Lost Canyon Road and Jakes Way. The right-of-way for this road would accommodate one vehicular lane in each direction, parkway, sidewalk and Class III bike lanes. Approximately 2,000 cubic yards of grading is necessary to complete this improvement. Buried bank stabilization is necessary along this roadway extension, and would connect to the existing concrete-gunite flood protection located directly north of the existing Jakes Way.

- Grading on portions of the adjacent property to the south for slope and drainage purposes as shown on the tentative map.

- Santa Clara River Regional Trail extension easterly from the Specific Plan site along Lost Canyon Road to Sand Canyon Road. This maximum 10-foot-wide trail would consist of decomposed granite or a similar surface and include a pedestrian bridge crossing over the Sand Canyon Wash.

- Widening and completion of roadway improvements on Lost Canyon Road under SR-14, within the existing right-of-way. This roadway is presently partially improved and used for public access. Proposed improvements would include the addition of pavement, curb gutter, and sidewalk (east side).

- Import of up to 500,000 cubic yards of dirt from one or both of the following borrow sites: (a) the George Caravalho Santa Clarita Sports Complex, and (b) the Center Pointe Business Park. Development on both of the borrow sites has been previously approved.

- Construction of the platform and accessory station improvements within the Metrolink right-of-way as part of a new City/Metrolink transit center as shown on Tentative Tract Map No. 69164.

- Grading and various trail improvements within the Metrolink right-of-way adjacent to the project site as shown on Tentative Tract Map No. 69164.

Land use acreages associated with these improvements are summarized in **Table 4.8.1-10**, below.

Table 4.8.1-10
Summary of Off-Site Impact Areas

Land Use	Area (acres)
Roadways[1]	7.2
Trails	0.4
Metrolink Platform	1.3
School[2]	16.5
Residential[2]	8.4
Grading in Metrolink ROW	1.6
TOTAL	35.4

[1] *Roadway acreage includes pavement and non-paved areas within right-of-way*
[2] *Off-site school and residential land uses are not proposed to be improved as part of the project, but drainage would be routed to project BMPs*

5. PROJECT DESIGN FEATURES

PDFs for surface water quality and hydrologic impacts include site design, source control, treatment control, and hydromodification control BMPs that would be incorporated into the project and are considered a part of the project for impact analysis. Effective management of wet and dry weather runoff water quality begins with limiting increases in runoff pollutants and flows at the source. Site design and source control BMPs are practices designed to minimize surface 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 and/or volumes.

a. Standard Urban Stormwater Mitigation Plan Requirements and Project Design Features

Table 4.8.1-11, SUSMP Requirement and Corresponding Project Design Features, summarizes the SUSMP requirements and corresponding proposed PDFs that would be incorporated into the project.

Table 4.8.1-11
SUSMP Requirement and Corresponding Project Design Features

SUSMP Requirement	Criteria/Description	Corresponding Vista Canyon PDFs

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon 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. • All post-development runoff from a 2-year, 24-hour storm shall not exceed the predevelopment peak flow rate, burned, from a 2-year, 24-hour storm when the predevelopment peak flow rate equals or exceeds 5 cfs. Discharge flow rates shall be calculated using the County of Los Angeles Modified Rational Method.	• Controls proposed to reduce runoff volumes include routing runoff to treatment control BMPs that promote evapotranspiration and/or infiltration including bioretention, bioretention swales, planter boxes, vegetated swales, filter strips, infiltration facilities, and/or rainwater capture and use systems. • 50-year capital storm peak flow rate analysis is contained in the Vista Canyon Project (TTM #69164) EIR Flood Technical Report - Santa Clara River (PACE 2009).
1.	Runoff Flow Control (continued)	• Post-development runoff from the 50-year capital storm shall not exceed the predevelopment 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.	

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon 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	• Approximately 32 acres (17%) of the project site will remain as parks, landscaping, open spaces (non-River related), and water quality treatment BMPs. • Approximately 74.5 acres (41%) of the project site will consist of buried bank stabilization, the Santa Clara River Regional Trail, and the Santa Clara River Corridor. • Site clearing and grading will be limited as necessary to allow development, allow access, and provide fire protection. • Native and/or non-native/non-invasive vegetation will be utilized within the development. • The final project stormwater system will include the use of the vegetated treatment BMPs placed in common area landscaping in commercial and multi-family residential areas and parking lot islands (where applicable). • The excavation required to construct the bank protection will be backfilled and returned to existing grade, except as overlaid by the 3:1 or flatter fill slope. The final slope will be re-vegetated with native species.

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon 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.	• LID, source control and treatment control BMPs will be selected to address the pollutants of concern for the project (see below). These BMPs are designed to minimize introduction of pollutants to the Maximum Extent Practicable (MEP). • The project will include numerous source controls, including education programs, animal waste bag stations, street sweeping and catch basin cleaning. • An education program will be implemented that includes both the education of residents and commercial businesses regarding water quality issues. Topics will 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 will emphasize animal waste management, such as the importance of cleaning up after pets and not feeding pigeons, seagulls, ducks, and geese. • LID, treatment control BMPs will promote the infiltration of treated stormwater.

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon 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 • 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., USACE and 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 will be preserved and/or, if impacted during construction, they will be restored and enhanced. Native plants will be used in all plant palettes placed on restored slopes. • Project PDFs (hydrologic source controls), will reduce flows to the Santa Clara River through infiltration and evapotranspiration. • The banks of the Santa Clara River at portions of this site will be stabilized using buried bank stabilization. After implementation of these measures and other flow control and volume reduction PDFs, the Santa Clara River will be capable of handling the expected flow volumes, velocities, and durations with little or no erosion. • All outlet points to the Santa Clara River will include energy dissipaters.
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 will be stenciled or labeled. • Signs will be posted in areas where dumping could occur. • The City, a Landscape or Local Maintenance District (LMD), Homeowners Association (HOA), or other maintenance entity will maintain stencils and signs.

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon PDFs
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 will 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 will be covered and isolated from stormwater runoff.
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 City, a Landscape or LMD, or HOA will be responsible for maintenance. • The Homeowners/Property Owners Associations or residential, commercial/business owners will be responsible for operation and maintenance of site-based BMPs (such as BMPs placed in common area landscaping in multi-family residential areas and commercial areas). • The City of Santa Clarita will be responsible for maintenance of BMPs located in public right-of-way or in larger open space parcels.

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon 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 will be designed to meet or exceed the sizing standards in the SUSMP requirements. • The size of the facilities will be finalized during the design stage by the project engineer with the final hydrology study, which will be prepared and approved to ensure consistency with this analysis prior to issuance of a final grading permit. • Types of treatment control BMPs that may be employed include planter boxes, bioretention, bioretention swales, vegetated swales, filter strips, permeable pavement, infiltration trenches and galleries, dry wells, storage and reuse systems, proprietary filtration BMPs, and combinations thereof.
10.B.1.	Properly Design Loading/Unloading Dock Areas (100,000 sf 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 will be covered or designed to preclude run-on and runoff. • Direct connections to storm drains from depressed loading docks (truck wells) will be prohibited. • Below grade loading docks for fresh food items will drain through a treatment control BMP applicable to the use, such as a catch basin insert. • Loading docks will 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.

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon PDFs
10.B.2.	Properly Design Repair/Maintenance Bays (100,000 sf 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 will not have repair/maintenance bays or the bays will comply with design requirements.
10.B.3.	Properly Design Vehicle/Equipment Wash Areas (100,000 sf Commerical 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 will be self-contained or covered with a roof or overhang, will be equipped with a wash racks and with the prior approval of the sewering agency, will be equipped with a clarifier or other pretreatment facility, and will 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 shall 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 shall also be structurally covered to prevent entry of stormwater. Adequate signs shall be provided and appropriately placed stating the prohibition of discharging washwater to the storm drain system.

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon PDFs
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. • The fuel dispensing areas must have a 2 to 4 percent 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 from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot, whichever is less.	• None are proposed. However, retail gasoline outlets will comply with design requirements.
10.E.1.	Properly Design Fueling Area (Automotive Repair Shops)	• See requirement 10.D. above.	• Automotive repair shop fueling areas will comply with design requirements.
10.E.2.	Properly Design Repair/Maintenance Bays (Automotive Repair Shops)	• See requirement 10.B.2. above.	• None are proposed. However, automotive repair shop repair/maintenance bays will comply with 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.	• None are proposed. However, automotive repair shop vehicle/equipment wash areas will comply with design requirements.

SUSMP Requirement		Criteria/Description	Corresponding Vista Canyon PDFs
10.E.4.	Properly Design Loading/Unloading Dock Areas (Automotive Repair Shops)	• See requirement 10.B.1. above.	• None are proposed. However, automotive repair shop loading/unloading dock areas will comply with 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	• Surface parking lots may incorporate BMPs in selected islands to promote filtration and infiltration of runoff as part of the overall suite of treatment control PDFs. • Stormwater runoff from parking lots will be directed to treatment control BMPs 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 BMPs capable of addressing oil and petroleum hydrocarbons will be used for high-use parking lots. • The HOA/Property Owners Associations or Business Owners will be responsible for operation and maintenance of treatment control BMPs that serve private parking lots.
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 ft from grade) must exist to utilize infiltration to treat and reduce stormwater runoff for the project.	• Per the LARWQCB Clarification Letter (2006), generally, the common pollutants in stormwater are filtered or adsorbed by soil, and unlike hydrophobic solvents and salts, do not cause groundwater contamination. In addition, the Water Augmentation Study by the Los Angeles and San Gabriel River Watershed Council determined no impacts to groundwater from infiltration of stormwater at several sites studied over a number of years. Seasonal high groundwater levels are greater than 10 feet below the proposed finished grade under infiltration-based BMPs. • BMPs that infiltrate directly into sub-grade soil, such as infiltration galleries and dry wells, will be preceded upstream where necessary by pretreatment BMPs and include design features allowing isolation of the BMP in case of a spill in the watershed.

b. Site Design/Low Impact Development (LID) BMPs

The site design/low impact development (LID) BMPs are designed to mimic the pre-developed hydrologic regime. This low impact/site design philosophy is often referred to as Low Impact Development (LID). The primary goals of site design/LID BMPs are to maintain a landscape functionally equivalent to predevelopment hydrologic conditions, and to minimize the generation of pollutants of concern. Site design/LID 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 pre-development hydrologic regime. This may be accomplished by clustering development within portions of the site to conserve as much natural open space as possible, 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). For example, restricting the use of architectural copper on the outside of buildings and reducing the use of galvanized materials will reduce the impact of copper and zinc to stormwater runoff.

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

Project design features include site design/LID BMPs, as described above and summarized in **Table 4.8.1-12, Vista Canyon Site Design/Low Impact Development BMPs,** below. These PDFs would reduce stormwater runoff volume and promote groundwater recharge in an integrated approach to protecting water quality and managing water resources in accordance with the Los Angeles County LID Ordinance requirements as established in the LID Standards Manual.

Table 4.8.1-12
Vista Canyon Site Design/Low Impact Development BMPs

LID Manual Requirement	Corresponding Vista Canyon LID Practice
1. Large scale residential and nonresidential development projects shall prioritize the selection of BMPs to treat stormwater pollutants, reduce stormwater runoff volume, and promote groundwater infiltration and stormwater reuse in an integrated approach to protecting water quality and managing water resources.	• The types of treatment control BMPs that may be employed include planter boxes, bioretention, bioretention swales, vegetated swales, filter strips, permeable pavement, infiltration trenches and galleries, dry wells, storage and reuse systems, proprietary filtration BMPs, and combinations thereof.
2. BMPs shall be implemented in the following order of preference: 1. BMPs that promote infiltration. 2. BMPs that store and beneficially use stormwater runoff. 3. BMPs that utilize the runoff for other water conservation uses including, but not limited to, BMPs that incorporate vegetation to promote pollutant removal and runoff volume reduction and integrate multiple uses, and BMPs that percolate runoff through engineered soil and allow it to discharge downstream slowly. 4. If the Director of Public Works determines that compliance with the above (No. 3) LID requirements is technically infeasible, in whole or in part, in response to an applicant's submittal, the Director shall require the applicant to submit a proposal for approval by the Director that incorporates design features demonstrating compliance with the LID requirements to the maximum extent practicable.	• The types of treatment control BMPs that may be employed include: 1. BMPs that promote infiltration (e.g., bioretention, bioretention swales, vegetated swales, filter strips, permeable pavement, infiltration trenches and galleries, and dry wells) 2. BMPs that store and beneficially use stormwater runoff (e.g., stormwater harvesting systems). 3. BMPs that utilize the runoff for other water conservation uses including, but not limited to, BMPs that incorporate vegetation to promote pollutant removal and runoff volume reduction and integrate multiple uses, and BMPs that percolate runoff through engineered soil and allow it to discharge downstream slowly (e.g., bioretention, bioretention swales, vegetated swales, filter strips, planter boxes, proprietary filtration BMPs). 4. Technically feasible determination will be finalized by the project engineer as part of the final hydrology study.
3. The LID goals of increasing groundwater recharge, enhancing water quality, and preventing degradation to downstream natural drainage courses shall be used in the evaluation, approval, and implementation of LID BMPs, as well as any determination of infeasibility.	• The types of treatment control BMPs included as PDFs for the project promote the LID goals of increasing groundwater recharge, enhancing water quality, and preventing degradation to downstream natural drainage courses.
4. The excess volume (ΔV) shall be infiltrated, stored and used, or captured and treated in vegetated BMPs throughout the project site whenever possible. This can be accomplished on a lot-by-lot or on a subregional scale provided that equivalent benefit can be demonstrated.	• The excess volume (ΔV) will be infiltrated, stored and used, or captured and treated in vegetated BMPs throughout the project site whenever possible based on the feasibility analysis finalized by the project engineer as part of the final hydrology study.

c. Treatment and Volume Control

Stormwater runoff from all urban areas within the project would be routed to treatment control and volume control PDFs consistent with the following criteria:

1. Treatment of runoff will be provided for all developed areas by BMPs sized for the entire water quality volume or flowrate as defined by SUSMP:

   a. **Water Quality Volume.** The runoff volume resulting from the 85th percentile, 24-hour storm event at the Newhall rainfall gauge (1.4 inches) based on 48-hour drawdown of stored water, or an equivalent combination of design storm and drawdown time; or

   b. **Water Quality Flowrate.** The runoff flowrate resulting from 0.2 inch per hour uniform rainfall intensity based on a 30 minute time of concentration, adjusted per SUSMP Appendix A, Table A-1 for shorter times of concentration.

2. Infiltration or capture and use of the difference between pre-development and post-development runoff volume from the water quality storm event (i.e., the "delta volume") will be provided by project PDFs except where infeasible or where exempted based on land use or ownership.

   a. **Where infeasible:** infiltrate or capture and use the maximum amount feasible and capture, treat and discharge the remaining volume in a vegetated BMP.

   b. **Where exempted:** detain, treat and discharge the delta volume in a vegetated BMP.

Infiltration may be deemed infeasible where soils to do not have sufficient infiltration rate or where natural features, such as shallow bedrock, limit infiltration. Infiltration may be prohibited where groundwater is less than 10 feet below the ground surface, within 100 feet of a drinking water well in locations where infiltration could cause geotechnical instability, or in locations where infiltration may mobilize soil or groundwater contamination. Capture and reuse is not appropriate on projects that use reclaimed water for irrigation as sufficient irrigation demand must exist for stormwater capture and use systems to control pollutant loads properly, and the demand for reclaimed water conflicts with the demand for stormwater on such projects. Public road and flood control infrastructure projects are not subject to the County's LID Ordinance and manual.

(1) LID Performance Standard

The spatial application of the Performance Standard is influenced by soil and groundwater conditions and land use as described above.

Geotechnical investigations of the project site (RTFA, 2006, 2008) permit a planning-level assessment of areas where infiltration may be infeasible based on physical factors (low infiltration rates, shallow bedrock, etc.). It was assumed that areas of the project site underlain by bedrock would not be able to meet infiltration goals on site due to low infiltration rates, thus would be exempt from the requirement to infiltrate the "delta volume." While it may be feasible to route runoff from these areas to adjacent areas for infiltration, this planning-level assumption is consistent with the current level of design detail and serves to bracket the lower bound on the portion of the site that will be able to achieve the "delta volume" criterion.

Two production wells are present within the Project in the River Corridor, but are not within 100 feet of proposed development. Implementation of the Specific Plan would result in the removal of one of the two wells. Based on current grading plans and water level records in production wells (Personal Communication, RTFA), seasonal high groundwater is greater than 10 feet below proposed ground surface everywhere on the proposed project site with the exception of the River Corridor where development is not proposed. Finally, the site does not contain known pollutant plumes. Therefore, none of these factors limit the areas over which infiltration can occur.

BMPs accepting drainage from public roads, Metrolink infrastructure, and off-site land uses not constructed by the project (but comingled with untreated project runoff) are required to provide treatment for the full water quality volume or flowrate but are exempt from volume control requirements.

The Project will use reclaimed water for irrigation, thus is exempt from the requirement to preferentially incorporate capture and reuse systems over BMPs that detain, treat and discharge where infiltration is not feasible. One capture and reuse system is proposed for the project. This system is located within an area suitable for infiltration and will meet the delta volume criterion through a combination of storage and irrigation use in a community garden and storage and infiltration in an infiltration gallery.

The SUSMP requirements mandate that treatment control address the pollutants of concern. Treatment BMPs for the proposed project along with the pollutants of concern addressed by each are listed in **Table 4.8.1-13, Treatment Control BMP Selection Matrix**.

Treatment BMPs to be used for the proposed project are described below. The effectiveness of the selected treatment BMPs is described in detail in **Appendix 4.8**. The effectiveness of treatment BMPs is evaluated without taking source control BMPs into account; therefore, the analysis is conservative in that it understates water quality controls.

Table 4.8.1-13
Treatment Control BMP Selection Matrix

Pollutant of Concern[1]	Treatment Control BMP Categories				
	Vegetated Swale	Bioretention with Underdrains	Infiltration BMPs[3]	Retention/ Irrigation	Media Filters[4]
Sediment	M	H	H	H	M
Nutrients	L	M	H	H	L
Trace Metals	M	H	H	H	M
Bacteria	L	H	H	H	L
Organics[2]	M	H	H	H	M
Trash	L	H	H	H	H

Source: California Stormwater Best Management Practices Handbook for New Development and Redevelopment (CASQA 2003)
Note: H, M, L indicates high, medium, and low removal efficiency.
1 *Chloride and MBAS are addressed with source control BMPs as they are not treatable in typical stormwater treatment BMPs aside through infiltration.*
2 *Includes pesticides and petroleum hydrocarbons.*
3 *Same rankings apply to all infiltration BMPs (permeable pavement, bioretention without underdrains, infiltration trenches, dry wells, underground infiltration galleries).*
4 *Treatment effectiveness for this category is estimated based on best professional judgment, as effectiveness results are not reported for proprietary treatment technologies in the CASQA BMP Handbook.*

Bioretention: Bioretention areas are vegetated (i.e., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration. Bioretention areas also remove pollutants by filtering stormwater through plants adapted to the local climate and soil moisture conditions and an engineered soil mix. In bioretention areas, pore spaces, microbes, and organic material in the engineered 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. If no underdrain is provided, exfiltration of the stored water in the bioretention area engineered soil into the underlying soils occurs over a period of days. A conceptual illustration of a bioretention area is shown in Figure 5-2 of the May 2010 Geosyntec report in **Appendix 4.8**.

Planter Boxes: Planter boxes are much like bioretention, with a soil media layer, a gravel drainage layer, and vegetation. Like bioretention, planter boxes provide storage, filtration, and evapotranspiration, and remove pollutants via filtration. However, unlike many bioretention, planter boxes are typically underlain by an impervious layer and not designed to infiltrate water. This allows planter boxes to be placed in areas where infiltration is prohibited. It also prevents them from achieving the LID volume reduction criteria. Planter boxes may be designed without a bottom where infiltration is permissible. A conceptual illustration of a planter box is shown in Figure 5-3 of the May 2010 Geosyntec report in **Appendix 4.8**.

Vegetated Swales: Vegetated swales treat stormwater runoff through both vegetative treatment and infiltration. Swales treat the water quality design flow as the runoff sheet-flows through grassy vegetation on the swale surface, removing pollutants by filtering stormwater through plants adapted to the local climate and soil moisture conditions. Incidental infiltration occurs into native soil when water is present. Plants utilize soil moisture and promote the drying of the soil through transpiration thereby promoting volume reduction. A conceptual illustration of a vegetated swale is shown in Figure 5-4 of the May 2010 Geosyntec report in **Appendix 4.8**.

Combination Bioretention Swales: Combination bioretention swales have attributes of both bioretention areas and swales described above and are intended specifically to meet the Project Performance Standard. Bioretention swales have all the attributes of a bioretention area, but do not include an underdrain. Runoff is stored in the pores of the amended soil and in shallow surface ponding and exfiltrates into native soil over a period of days. The facilities are designed to retain a specified volume of water and have no surface discharge for this volume. When this volume fills during a storm, the facility begins to overflow but continues to treat water that flows through by filtering water through the plants, as occurs in a swale. Bioretention swales are linear in shape, have dense vegetation that protrudes above the maximum water surface elevation, and are configured with the inlet and outlet at opposite ends to promote flow through the length of the facility. Outlet controls above the retained volume promote sufficient residence time. A conceptual illustration of a bioretention swale is shown in Figure 5-5 of the May 2010 Geosyntec report in **Appendix 4.8**.

Filter Strip: Filter strips treat stormwater runoff through both vegetative treatment and infiltration. Runoff from impervious surfaces sheet flows in a very shallow layer through grassy vegetation, removing pollutants by filtering stormwater through plants adapted to the local climate and soil moisture conditions. Incidental infiltration occurs into native soil when water is present. Plants utilize soil moisture and promote the drying of the soil through transpiration thereby promoting volume reduction. A conceptual illustration of a filter strip is shown in Figure 5-6 of the May 2010 Geosyntec report in **Appendix 4.8**.

Permeable Pavement: Permeable pavements contain small voids that allow water to pass through to a stone base. They come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or poured in place solutions (porous concrete, permeable asphalt). All permeable pavements include an aggregate reservoir to retain and infiltrate water. An overflow pipe is generally installed near the top of this aggregate layer to ensure that water does not pond on the surface of the pavement. While conventional pavement result in increased rates and volumes of surface runoff, permeable pavements, when properly constructed and maintained, allow some of the stormwater to percolate through the pavement and enter the soil below. A conceptual illustration of a permeable pavement installation is shown in Figure 5-7 of the May 2010 Geosyntec report in **Appendix 4.8**.

Underground Infiltration Gallery: Underground retention and infiltration galleries operate by storing and infiltrating water below roadways or other surfaces. These may consist of a thick layer of aggregate providing storage volume in pore space. Alternatively, underground retention products are available that provide storage capacity and promote infiltration, often more efficiently than aggregate reservoirs. Pretreatment is required for underground retention BMPs in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility. For best long term performance and minimal maintenance, pretreatment should be provided by a filtration BMP with the capability of addressing fine particulates. A conceptual illustration of an underground infiltration gallery is shown in Figure 5-8 of the May 2010 Geosyntec report in **Appendix 4.8**.

Infiltration Trench: Infiltration trenches are rock-filled trenches designed specifically to store stormwater during a storm and exfiltrate it into surrounding soils over a period of days. Infiltration trenches are used in areas with high infiltration rates and limited space. Pretreatment is required for infiltration trenches in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility. A conceptual illustration of an infiltration trench is shown in Figure 5-9 of the May 2010 Geosyntec report in **Appendix 4.8**.

Dry Well: Dry wells are much like infiltration trenches but may be installed deeper in the soil profile to specifically promote infiltration into highly infiltrative soil layers. Pretreatment is required for dry wells in order to reduce the sediment load entering the facility and maintain the infiltration rate of the facility. For best long term performance and minimal maintenance, pretreatment should be provided by a filtration BMP with the capability of addressing fine particulates. A conceptual illustration of a dry well is shown in Figure 5-10 of the May 2010 Geosyntec report in **Appendix 4.8**.

Storage and Use: Storage and use systems may take a variety of forms, most typically consisting of cisterns or rain barrels connected to a roof gutter system. Roof runoff is captured and stored. The collection of stormwater reduces runoff and can make water available for non-potable uses such as irrigation, thus reducing overall water usage. To comply with the Project Performance Standard, cisterns must be designed for the entire water quality volume and must draw down a portion of this volume quickly enough to make room for subsequent storms. A conceptual illustration of a storage and reuse system is shown in Figure 5-11 of the May 2010 Geosyntec report in **Appendix 4.8**.

Proprietary Devices: Proprietary devices are commercial products that typically aim to provide stormwater treatment in space-limited applications, often using patented innovative technologies. The most commonly encountered classes of proprietary stormwater management controls include hydrodynamic separation, catch basin insert technologies, cartridge media filters, and proprietary biotreatment devices. These devices are briefly explained below. Generally, proprietary devices that do not incorporate vegetation are discouraged by regulatory agencies, and are not capable of meeting LID Ordinance and Manual standard. These may be effective for pretreatment upstream of underground infiltration facilities, for capture of trash, or for small parts of the development that cannot otherwise be treated. Typical proprietary devices include:

- Hydrodynamic separation devices (alternatively, swirl concentrators) are devices that are installed in a gutter or manhole and remove trash, debris, and coarse sediment from incoming flows using screening, gravity settling, and centrifugal forces generated by forcing the influent into a circular motion.

- Catch basin inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris and may include sorbent media to remove floating oils and grease. There are a multitude of inserts of various shapes and configurations, typically falling into one of three groups: socks, boxes, and trays.

- Cartridge filters typically consist of cartridges packed with filter media contained in a vault or catch basin that provide treatment through filtration and sedimentation. The vault may be divided into multiple chambers where the first chamber acts as a pre-settling basin for removal of coarse sediment while another chamber acts as the filter bay and houses the filter cartridges.

- Proprietary biotreatment devices are devices that are manufactured to mimic natural systems such as soil columns and wetlands by incorporating plants, soil, and microbes engineered to provide treatment at higher flow rates or higher volumes and with smaller footprints than their natural counterparts. Incoming flows are typically filtered through natural media (mulch, compost, soil, plants, microbes, etc) and either infiltrated or collected by an underdrain and delivered to the storm system. Tributary areas for biotreatment devices tend to be limited to 0.5 to 1.0 acres.

Conceptual illustrations of selected proprietary BMPs are shown in Figure 5-12 of the May 2010 Geosyntec report in **Appendix 4.8**.

d. Hydromodification Control PDFs

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

- Avoid, to the extent feasible, the need to mitigate for hydromodification impacts by preserving natural hydrologic conditions and protecting sensitive hydrologic features, sediment sources, and sensitive habitats within the River Corridor.

- 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 using geomorphically based channel design.

(1) 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 that would limit impervious area and disconnect imperviousness to avoid and minimize hydromodification impacts:

- **Site Design/Low Impact Development BMPs.** Site design/LID BMPs that help to reduce the increase in runoff volume include leaving areas of undeveloped open space; routing of stormwater runoff to vegetated areas and/or vegetated BMPs, permeable pavement and infiltration galleries; use of native or non-native/non-invasive plants in landscaped areas; and the use of efficient irrigation systems in common area landscaped areas.
- **Treatment Controls.** The project's treatment control BMPs would also serve as hydromodification source control BMPs. Vegetated swales, bioretention areas, permeable pavement and infiltration galleries would provide significant wet weather volume reduction through infiltration and evaporation. In addition, these facilities would also receive and eliminate dry weather flows.

(2) Geomorphically Referenced Channel Design

The hydromodification management approach for the Santa Clara River 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 of the Santa Clara River. This includes establishing areas 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 Santa Clara River stability include energy dissipation and geomorphically referenced 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 bank stabilization (soil cement) along the Santa Clara River. The proposed bank protection would consist of buried soil cement to provide scour and

freeboard flood control protection. Soil cement is a 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 be re-vegetated with native plant species, maintaining or improving the natural habitat presently found along the River.

(3) WRP

The WRP design is described in *Engineering Report for the Vista Canyon Water Factory* (Dexter Wilson Engineering Inc., 2010). The WRP is designed to produce disinfected tertiary recycled water meeting the requirements of Section 60304(a) of Title 22, including the reliability requirements of Title 22. No solids would be treated on site. The WRP also would be a scalping plant with waste activated sludge processed at the Santa Clarita Valley Sanitation District facilities downstream.

The treatment process would be a variation of the extended aeration activated sludge process, and selected during final design of the WRP. One of three processes would be used for secondary and tertiary treatment: (1) conventional extended aeration activated sludge with sand filters, (2) sequencing batch reactors with sand filters, or (3) membrane bioreactors. All of these technologies would produce disinfected tertiary recycled water meeting the requirements listed above.

The headworks would be designed to pump flow to the start of the treatment process and provide screening to protect downstream equipment. If a conventional system or sequencing batch reactor system is used, course screening or a comminutor would be installed upstream of the influent pump station and would provide protection for downstream processes. If the membrane bioreactor process is used, then a fine screen and screening compacter would be needed.

After the headworks and prior to the treatment process, a flow equalization basin may be installed. The purpose of this basin would be to balance out incoming flow variations such that a constant flow rate is conveyed through the treatment process portion of the plant. This equalization would only be needed if the peak flow cannot be accommodated in the secondary or tertiary process. A bypass line would be provided to allow the flow equalization tank to be taken off-line without shutting down the plant.

Disinfection would be accomplished through a combination of ultraviolet (UV) and chlorination. UV would be the primary disinfectant. UV is utilized to reduce the amount of chlorine being added to the system to reduce effluent chlorine levels. In order to provide continuous disinfection in the piping system, a small amount of chlorine would be added after the UV disinfection.

Excess recycled water and off-quality effluent would be percolated in percolation ponds at the WRP. Effluent that is directed to the percolation ponds would not be chlorinated to prevent chlorinated byproducts from being infiltrated. Additionally, stormwater may be diverted to the percolation ponds to dilute the recycled water. Pretreatment would be provided to the stormwater diverted to the percolation ponds to remove suspended sediment to prevent clogging.

6. PROJECT IMPACTS

a. Significance Threshold Criteria

The City of Santa Clarita Environmental Guidelines and Appendix G of the *State CEQA Guidelines* provide that a project would normally have a significant effect on the environment if it would:

- Violate any water quality standards or waste discharge requirements;[20]
- Create or contribute runoff water which would … provide substantial additional sources of polluted runoff;[21]
- Otherwise substantially degrade water quality;
- Impact stormwater management in any of the following ways:[22]

  (i) Potential impact of project construction and project post-construction activity on stormwater runoff;

  (ii) Potential discharges from areas for materials storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas;

  (iv) Significant and environmentally harmful increases in erosion of the project site or surrounding areas;[23]

  (v) Stormwater discharges that would significantly impair or contribute to the impairment of the beneficial uses of receiving waters or areas that provide water quality benefits (e.g., riparian corridors, wetlands, etc.).

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20 Water quality standards typically to receiving waters, not to "end-of-pipe" runoff discharges. Nevertheless, receiving water standards are used as benchmarks for assisting in determining significance, as described below.

21 Capacity issues are discussed and analyzed in **Section 4.2, Flood**.

22 These thresholds are components of the threshold stated above and combine standards from the State's General Construction Activity Storm Water Permit and the General MS4 Permit. These thresholds therefore constitute "triggers" for requiring implementation of BMPs to the MEP, as provided in those permits. The CEQA, MEP, and sizing criteria are legally enforceable requirements.

23 Potential erosion impacts during operation of the project are addressed in **Section 4.2, Flood**. This section therefore addresses potential erosion impacts on water quality during the construction phase.

To evaluate whether the project would cause impacts under these thresholds, the following analysis was employed:

- Qualitative and quantitative (where valid results could be obtained) analyses were performed to determine when increases of pollutant loads and concentrations could be expected to result from development of the project. Such increases are a potential indication of significant adverse impacts;

- If pollutant loads or concentrations are predicted to increase, the potential impacts are assessed on a pollutant-by-pollutant basis, by evaluating the compliance of the project with the requirements of applicable water quality requirements from the General MS4 Permit, NPDES Permit, LID Ordinance, and the General Construction Activity Storm Water Permit, as those requirements relate to the particular pollutant of concern. Pollutant-specific BMPs are thereby identified for inclusion in the project and its SUSMP.

- Further, for pollutants predicted to increase, post-development pollutant predictions are compared to benchmarks that do not apply to stormwater runoff, but do apply to the ultimate receiving water. These benchmarks include the Basin Plan beneficial uses and narrative and numeric water quality objectives, as well as California Toxics Rule criteria. In the event that post-development predictions were to show that end-of-pipe stormwater discharges would potentially exceed these receiving water benchmarks, further analysis would be necessary to determine the significance of these exceedances on the receiving water.

b. Water Quality Impacts During Construction

The site that would be disturbed for construction of the project would be larger than 1 acre. Therefore, during the construction phase, the project would be required to comply with the State General Construction Activity Storm Water Permit and the provisions in the General MS4 Permit addressing control of construction phase water impacts. Accordingly, the threshold question is whether or not the project complies with the State General Construction Activity Storm Water Permit and the provisions in the General MS4 Permit addressing control of construction phase water impacts.

During construction, pollutant export from the site could increase significantly as a result of soil disturbance and construction operations. Construction-related activities that expose soils to potential mobilization by rainfall/runoff and wind are primarily responsible for sediment releases. Such activities include removal of vegetation from the site, grading of the site, 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 are also of concern during construction. Unless adequate erosion controls are installed and maintained at the site during construction, significant quantities of sediment may be delivered to the downstream receiving waters resulting in a significant water quality impact.

Construction impacts due to project development would be minimized through compliance with the Construction General Permit. This permit requires the discharger to perform a risk assessment for the proposed development (with differing requirements based upon the determined level) and to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP), which must include erosion and sediment control BMPs that would meet or exceed measures required by the determined risk level of the Construction General Permit, as well as BMPs that control the other potential construction-related pollutants. A Construction Site Monitoring Program that identifies monitoring and sampling requirements during construction is a required component of the SWPPP. Preliminary analysis indicates that the proposed project would most likely be categorized as a Risk Level 2. BMPs required by the Construction General Permit would be incorporated assuming this level of risk; if final design analysis indicates that the proposed project would fall under Risk Level 3, the additional Level 3 permit requirements would be implemented as necessary.

Erosion control BMPs are designed to prevent erosion, whereas sediment controls are designed to trap or filter sediment once it has been mobilized. A SWPPP would be developed as required by, and in compliance with, the Construction General Permit and the City of Santa Clarita Standard Conditions. The General Permit requires the SWPPP to include BMPs to be selected and implemented based on the determined project risk level to effectively control erosion and sediment to the BAT/BCT. The following types of BMPs would be implemented as needed during construction:

(1) Erosion Control

- Physical stabilization through hydraulic mulch, soil binders, straw mulch, bonded and stabilized fiber matrices, compost blankets and erosion control blankets (i.e., rolled erosion control products).
- Limiting the area and duration (<14 days) 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.
- Vegetative stabilization through temporary seeding and mulching 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.

(2) Sediment Control

- Perimeter protection to prevent sediment discharges through silt fences, fiber rolls, gravel bag berms, sand bag barriers, and compost socks.
- Storm drain inlet protection.

- Sediment capture and drainage control through sediment traps, storm drain inlet protection, and sediment basins.
- Velocity reduction through check dams, sediment basins, and outlet protection/velocity dissipation devices.
- Reduction in off-site sediment tracking through stabilized construction entrance/exit, construction road stabilization, and entrance/exit tire wash.

Slope interruption at permit-prescribed intervals (fiber rolls, gravel bag berms, sand bag berms, compost socks, biofilter bags).

(3) Waste and Materials Management

Management of the following types of materials, products, and wastes: solid, liquid, sanitary, concrete, hazardous and equipment-related wastes. Management measures include covered storage and secondary containment for material storage areas, secondary containment for portable toilets, covered dumpsters, dedicated and lined concrete washout/waste areas, proper application of chemicals, and proper disposal of all manners of wastes.

- Protection of soil, landscaping and construction material stockpiles through covers, the application of water or soil binders, and perimeter control measures.

A spill response and prevention program would be incorporated as part of the SWPPP and spill response materials would be available and conspicuously located at all times on site.

(4) 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, and street sweeping. All such measures would be recorded and maintained as part of the project SWPPP.
- If construction dewatering or discharges from other specific construction activities such as water line testing, and sprinkler system testing are required, comply with the requirements of the LARWQCB's General Waste Discharge Requirements (WDRs) under Order No. R4-2008-0032 (NPDES No. CAG994004) governing construction-related dewatering discharges.

(5) Training Education

- Inclusion of General Permit defined "Qualified SWPPP Developers" (QSD) and "Qualified SWPPP Practitioners" (QSP). QSDs and QSPs shall have required certifications and shall attend SWRCB sponsored training.

- 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.).

(6) Inspections, Maintenance, Monitoring, and Sampling

- Performing routine site inspections and inspections before, during (for storm events >0.5 inch), and after storm events.
- Preparing and implementing Rain Event Action Plans (REAPs) prior to any storm event with 50 percent probability of producing 0.5 inch of rainfall, including performing required preparatory procedures and site inspections.
- Implementing maintenance and repairs of BMPs as indicated by routine, storm-event and REAP inspections.
- Implementation of the Construction Site Monitoring Plan for non-visible pollutants, if a leak or spill is detected.
- Sampling of discharge points for turbidity and pH, at minimum, three times per qualifying storm event and recording and retention of results.

During project construction, BMPs would be implemented in compliance with the Construction General Permit and the general waste discharge requirements in the Dewatering General WDRs. 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 in order to prevent or minimize environmental impacts and to ensure that discharges during the project construction phase would not cause or contribute to any exceedance of water quality standards in the receiving waters. All discharges from qualifying storm events would be sampled for turbidity and pH and results would be compared to Numeric Action Levels (250 NTU and 6.5–8.5, respectively) to ensure that BMPs are functioning as intended. If discharge sample results fall outside of these action levels, a review of causative agents and the existing site BMPs would be undertaken, and maintenance and repair on existing BMPs would be performed and/or additional BMPs would be provided to ensure that future discharges meet these criteria.

The construction-phase BMPs would assure effective control of not only sediment discharge, but also of pollutants associated with sediments, such as 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. Therefore, compliance with the BAT/BCT performance standard ensures mitigation of construction water quality impacts over time.

Prior to the issuance of preliminary or precise grading permits, the landowner or subsequent project applicant would provide the City Engineer with evidence that a Notice of Intent (NOI) has been filed with the SWRCB. Such evidence would consist of a copy of the NOI stamped by the SWRCB or RWQCB, or a letter from either agency stating that the NOI has been filed and a copy of the site's applicable Waste Discharge identification (WDID) number.

Construction on the project site may require dewatering. 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 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 III.C 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.

An additional Project Design Feature would be implemented to protect receiving waters from dewatering and construction related non-stormwater discharges. Such discharges would be implemented in compliance with the LARWQCB's General Waste Discharge Requirements (WDRs) under Order No. R4-2008-0032 (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. Compliance with these WDRs constitutes a PDF, further assuring that the impacts of these discharges are not significant.

On this basis, the impact of project construction-related runoff is considered less than significant.

c. Post-Development Water Quality Impacts

For the constituents of concern for which there is sufficient empirical data, post-development water quality impacts are estimated using a statistical model. The model is used to estimate the impact of the project both with and without the BMPs that have been incorporated into the project as PDFs. For the constituents that cannot be modeled (because of insufficient data), a qualitative assessment of the project's potential impacts is provided.

(1) Quantitative Assessment of Modeled Constituents

A water quality model was used to estimate certain stormwater constituent loads and concentrations. Results from the water quality model (described in the Water Quality Technical Report, Geosyntec, May 2010; **Appendix 4.8**) are reported as average annual values for loads and concentrations from the modeled project areas before and after treatment in the modeled treatment PDFs (see **Table 4.8.1-14, Predicted Average Annual Stormwater Runoff Volumes and Pollutant Loads**, and **Table 4.8.1-15, Predicted Average Annual Stormwater Pollutant Concentration**).

The model results are evaluated in relation to the following significance criteria: (1) comparison of post-development versus pre-development stormwater quality concentrations and loads; (2) comparison with MS4 Permit, Construction General Permit, and General Dewatering Permit requirements for new development; and (3) comparison to receiving water benchmarks. Pursuant to the third criterion, predicted runoff pollutant concentrations in the post-development condition, with runoff treatment PDFs, are compared with benchmark receiving water quality criteria as provided in the Basin Plan and the CTR and TMDL waste load allocations. The water quality criteria and waste load allocations are considered benchmarks for comparison purposes only, as they do not apply directly to runoff from the project, but the comparison provides useful information to evaluate potential impacts. A weight of evidence approach is employed in this analysis considering the various significance criteria and thresholds discussed in **6a**. above.

Table 4.8.1-14
Predicted Average Annual Stormwater Runoff Volumes and Pollutant Loads

Parameter	Units	On-Site Impacts Existing Conditions	On-Site Impacts Developed Conditions w/ PDFs	On-Site Impacts Change	Off-Site Impacts Existing Conditions	Off-Site Impacts Developed Conditions w/ PDFs	Off-Site Impacts Change	Total Project Existing Conditions	Total Project Developed Conditions w/ PDFs	Total Project Change
Volume	acre-ft	9	69	60	28	30	2	37	99	62
TSS	tons/yr	2.7	7.6	4.9	4.2	2.4	-1.8	6.9	10.1	3.2
Total Phosphorous	lbs/yr	3	62	59	29	35	6	33	97	64
Nitrate-N + Nitrite-N	lbs/yr	29	185	156	61	64	2	90	249	159
Ammonia-N	lbs/yr	4	77	73	32	22	-10	35	99	64
Total Nitrogen	lbs/yr	57	525	469	221	203	-18	278	728	450
Dissolved Copper	lbs/yr	0.1	1.6	1.5	1.1	0.9	-0.2	1.1	2.4	1.3
Total Lead	lbs/yr	0.1	1.1	1.0	0.5	0.5	0.0	0.6	1.6	1.0
Dissolved Zinc	lbs/yr	2	13	11	6	4	-2	8	17	9
Chloride	tons/yr	0.1	2.3	2.2	0.6	0.6	0.0	0.7	2.8	2.1

*Source: Geosyntec Consultants (August 2009) (**Appendix 4.8**)*

Table 4.8.1-15
Predicted Average Annual Stormwater Pollutant Concentration

Parameter	Units	On-Site Impacts Existing Conditions	On-Site Impacts Developed Conditions w/PDFs	On-Site Impacts Change	Off-Site Impacts Existing Conditions	Off-Site Impacts Developed Conditions w/PDFs	Off-Site Impacts Change	Total Project Existing Conditions	Total Project Developed Conditions w/PDFs	Total Project Change
TSS	mg/L	218	79	-139	108	57	-51	130	72	-58
Total Phosphorous	mg/L	0.16	0.34	0.18	0.38	0.43	0.05	0.34	0.37	0.03
Nitrate-N + Nitrite-N	mg/L	1.16	0.98	-0.18	0.80	0.78	-0.02	0.87	0.92	0.05
Ammonia-N	mg/L	0.03	0.10	0.07	0.09	0.09	0.00	0.08	0.10	0.02
Total Nitrogen	mg/L	2.4	2.8	0.4	2.9	2.5	-0.4	2.8	2.7	-0.1
Dissolved Copper	mg/L	2.9	8.0	5.1	13.9	10.3	-3.6	11.6	8.7	-2.9
Total Lead	mg/L	5.2	5.9	0.7	6.8	5.7	-1.1	6.4	5.9	-0.5
Dissolved Zinc	mg/L	91	64	-27	80	50	-30	79	60	-19
Chloride	mg/L	8	24	16	16	14	-2	14	21	7

*Source: Geosyntec Consultants (February 2010) (**Appendix 4.8**)*

(a) Stormwater Runoff Volume

Mean annual runoff volumes are expected to increase with development. The increase can be explained by the increase in imperviousness associated with development of the site, as well as by the decrease in infiltration capacity of existing site soils associated with the compaction of site soils during construction. For modeling purposes, the existing open space land use was assumed to have an imperviousness of 1 percent. In contrast, single-family residential land use is assumed to have an average imperviousness of 60 to 70 percent, multi-family residential land use is assumed to have an average imperviousness of 85 percent, and commercial land use and roads are assumed to have an average imperviousness of 90 percent.

Project design features include site design, source control, and treatment control BMPs in compliance with the SUSMP and LID Ordinance requirements. The site design PDFs, especially the provision of approximately 31 acres of trails, parks, and vegetated slopes and water quality BMPs within the project site, reduce the impacts of the proposed development on increases in stormwater runoff volume. In addition to water quality improvements, the treatment and volume control BMPs would also provide runoff volume reduction. These BMPs are predicted to reduce the post-developed runoff volume by 46 acre-feet per year on average.

(b) Total Suspended Solids

Comparison of Pre- and Post-Project Conditions: TSS load is predicted to increase with development due to increase in runoff volume. TSS concentration is predicted to decrease as a result of the project. This decrease can be attributed to higher EMCs observed in monitoring data from open space land uses (the existing condition for the site) compared with urban land uses (representative of post-development conditions).

Comparison with Water Quality Criteria: The predicted average annual TSS concentration in stormwater runoff is compared with receiving water objectives in **Table 4.8.1-16**, below. 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 instream transport and erosion. 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 under large storm flow conditions.

Table 4.8.1-16
Comparison of Predicted TSS Concentration with Water Quality Criteria

Total Project Predicted Average Annual TSS Concentration (mg/L)	Basin Plan Water Quality Objectives	California Toxics Rule Criteria
72	Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses	Not applicable

*Source: Geosyntec (February 2010) (**Appendix 4.8**).*

Based on the comprehensive site design, source control, and treatment control strategy, and comparison with the Basin Plan benchmark objectives, potential impacts associated with TSS are predicted to be less than significant.

(c) Total Phosphorus

Comparison of Pre- and Post-Project Conditions: Total phosphorous loads are predicted to increase due to increased runoff volume. Total phosphorous concentration is predicted to increase slightly post-development.

Comparison with Water Quality Criteria: There are no numeric objectives for total phosphorus 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 phosphorus concentrations in project stormwater discharges are not expected to promote (i.e., increase) algal growth and therefore comply with the narrative objective for biostimulatory substances in the Basin Plan. As shown in **Table 4.8.1-17**, below, the predicted total phosphorus concentration is at the low end of the range of the historical concentrations observed in Santa Clara River Reach 7.

Table 4.8.1-17
Comparison of Predicted Total Phosphorus Concentration with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 7

Total Phosphorus Concentration (mg/L)	Basin Plan Water Quality Objectives	California Toxics Rule Criteria	Range of Observed[1] Concentrations in Reach 7 (mg/L)
0.37	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	Not applicable	0.01–17

*Source: Geosyntec (February 2010) (**Appendix 4.8**).*
[1] *Range of concentrations observed in the Santa Clara River during wet weather (Lang, Ravenna, Bouquet Junction Stations).*

Based on the comprehensive site design, source control, and treatment control strategy and the comparison with available in-stream monitoring data and Basin Plan benchmark objectives, potential impacts associated with total phosphorus are less than significant.

(d) Nitrogen Compounds

Comparison of Pre- and Post-Project Conditions: Loads of nitrate- plus nitrite-nitrogen, ammonia, and total nitrogen for the total project are predicted to increase due to increased runoff volumes. Average concentrations of nitrate- plus nitrite-nitrogen and total nitrogen are predicted to decrease, while concentrations of ammonia-nitrogen are predicted to increase. The decrease in nitrate- plus nitrite-nitrogen and total nitrogen concentrations can be attributed to higher nitrogen compound EMCs observed in monitoring data from open/vacant land use versus urbanized land uses, along with nitrogen reductions in the treatment control PDFs.

Comparison with Water Quality Criteria: Predicted nitrogen compound concentrations are compared to Basin Plan objectives and observed concentrations in **Table 4.8.1-18,** below. The average annual stormwater concentration of ammonia is predicted to be considerably less than the concentration-based waste load allocation for Santa Clara River Reach 6 and the Basin Plan objective, and within the range of observed concentrations. Likewise, the average annual stormwater concentration of nitrate- plus nitrite-nitrogen is predicted to be considerably less than the TMDL waste load allocation and the Basin Plan water quality objective and within the range of historically observed concentrations for Santa Clara River Reach 7.

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, would comply with the narrative objective for biostimulatory substances in the Basin Plan. As shown in **Table 4.8.1-18**, the predicted total nitrogen concentration is within the range of historically observed concentrations in Santa Clara River Reach 7.

Table 4.8.1-18
Comparison of Predicted Nitrogen Compound Concentrations with Water Quality Objectives, TMDLs, and Observed Concentrations in Santa Clara River Reach 7

Nutrient	Predicted Average Annual Concentration (mg/L)	Basin Plan Water Quality Objectives[1] (mg/L)	Waste Load Allocations for MS4 Discharges into Reach 7 (mg/L)	Range of Observed[2] Concentrations in Reach 7 (mg/L)
Nitrate-N + Nitrite-N	0.92	5	6.8[3]	0.2–3.5
Ammonia-N	0.10	2.2	1.75	0.04–4.3
Total Nitrogen	2.7	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	Not applicable	0.2–12.5

*Source: Geosyntec (February 2010) (**Appendix 4.8**).*
[1] *There are no CTR criteria for nitrogen compounds.*
[2] *Range of concentrations observed in the Santa Clara River during wet weather (Lang, Ravenna, Bouquet Junction Stations).*
[3] *30-day average.*

Nitrate-N plus nitrite-N and ammonia-nitrogen concentrations in post-development runoff from the off-site project components are predicted to decrease compared to open space/vacant land use concentrations, although loads are predicted to increase due to the increase in runoff volume.

Based on the comprehensive site design, source control, and treatment control strategy, and the comparison with historical in-stream monitoring data and benchmark Basin Plan objectives and waste load allocations, potential impacts associated with nitrogen compounds are predicted to be less than significant.

(e) Metals

Comparison of Pre- and Post-Project Conditions: Except for lead, the projections are for the dissolved form of the metal, as it is the dissolved form to which the CTR criteria apply. 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, are typically not detected in urban runoff or are detected at very low levels (LACDPW 2000).

Post-development dissolved copper, total lead and dissolved zinc concentrations are projected to decrease compared to pre-development conditions. Total lead concentrations increase slightly, and total loads for dissolved copper, dissolved zinc, and total lead are predicted to increase compared to pre-development conditions due to increased runoff volumes. These results can be explained by the difference in EMC values observed in representative monitoring data from the pre-developed open/vacant space condition and the post-developed urban condition.

Project design features include site design/LID, 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 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 for property owners, BMP maintenance, and street sweeping private streets and parking lots. The treatment control BMPs would also reduce trace metals in the runoff from the proposed development. Only the effects of the treatment control PDFs are reflected in the model results.

Comparison with Water Quality Criteria: 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 (four-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 four 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 (270 mg/L as $CaCO_3$) observed in the Santa Clara River at the USGS Station 11107745 during wet weather was used as a conservative estimate.

Comparison of the predicted runoff metal concentrations and the acute CTR criteria for dissolved copper, total lead, and dissolved zinc are shown in **Table 4.8.1-19** below. The comparison of the post-developed with PDFs condition to the benchmark CTR values shows that all of the trace metal concentrations are below the benchmark water quality criteria.

Table 4.8.1-19
Comparison of Predicted Trace Metal Concentrations with Water Quality Criteria

Metal	Predicted Average Annual Concentration (μg/L)	California Toxics Rule Criteria[1] (μg/L)
Dissolved Copper	8.7	34
Total Lead	5.9	290
Dissolved Zinc	60	270

*Source: Geosyntec (February 2010) (**Appendix 4.8**).*
[1] *Hardness = 270 mg/L, based on minimum observed value at USGS Station 11107745. Lead criteria is for total recoverable lead.*

Based on the comprehensive site design/LID, source control, and treatment strategy and the comparison with benchmark water quality criteria, the project would not have significant impacts resulting from trace metals.

(f) Chloride

Comparison of Pre- and Post-Project Conditions: Due to the conversion from open/vacant to urban land-uses and the associated EMCs, annual chloride load and concentration are predicted to increase when compared to the existing conditions. The concentration increase is minimal and the load increase is caused by the predicted increase in runoff volume.

Comparison with Water Quality Criteria: The predicted chloride concentration in post-development project runoff is compared to the Basin Plan water quality objective and the range of historically observed concentrations in Santa Clara River Reach 7 in **Table 4.8.1-20,** below. The predicted average annual chloride concentration in stormwater runoff from the project area is well below the Santa Clara River Reach 7 Basin Plan water quality objective and the TMDL waste load allocation for Santa Clara River Reach 5 (100 mg/L for both).

Table 4.8.1-20
Comparison of Predicted Chloride Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 7

Pollutant	Predicted Average Annual Concentration (mg/L)	Reach 7 TMDL Waste Load Allocation & Basin Plan Water Quality Objective[1] (mg/L)	Range of Observed[2] Concentrations in Reach 7 (mg/L)
Chloride	21	100	35 - 117

*Source: Geosyntec (February 2010) (**Appendix 4.8**).*
[1] *There are no CTR criteria for chloride.*
[2] *Range of concentrations observed in the Santa Clara River during wet weather (Lang, Ravenna, Bouquet Junction).*

Based on the comprehensive site design, source control, and treatment control strategy, and comparison with benchmark receiving water criteria and instream monitoring data, the project would not have significant water quality impacts resulting from chloride.

(2) Qualitative Assessment of Constituents Not Modeled

(a) 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. In lakes or other waters existing under relatively quiescent conditions, most of the turbidity is due to colloidal and extremely fine dispersions. In rivers under flood conditions, most of the turbidity is due to relatively coarse dispersions. During high-energy storm events, erosion of clay and silt soils may contribute to in-stream turbidity (see discussion of hydromodification impacts below). Organic materials reaching rivers serve as food for bacteria, and the resulting bacterial growth and growth of 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 are primarily of concern during the construction phase of development. The 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 Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology (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.

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 (see also hydromodification impacts discussed below). Project design features, 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 discussed above, post-development nutrients in runoff are not expected to cause significant water quality impacts. Based on implementation of the PDFs and the construction-related controls outlined above, runoff discharges from the project would not increase turbidity, which would result in adverse affects to beneficial uses in the receiving waters. Based on these considerations, the water quality impacts of the project on turbidity are considered less than significant.

(b) Pathogens

Pathogens are viruses, bacteria, and protozoa that can cause gastrointestinal and other illnesses in humans through body contact exposure. Identifying pathogens in water is difficult as the number of pathogens is fairly small, requiring sampling and filtering large volumes of water to obtain a reliable result. Traditionally, regulators have used fecal indicator bacteria (FIB), such as total and fecal coliform, enterococci, and *E. coli*, as indirect measures of the presence of pathogens, and by association, human illness risk. Early epidemiological studies (i.e., studies that investigate human illness occurrence versus environmental factors such as water quality) that linked swimming-associated gastrointestinal symptoms to *E. coli* or enterococci in swimming waters for sewage-dominated receiving waters led to the development of the current recreational water quality criteria (U.S. EPA, 1986). In contrast to receiving waters subject to sanitary discharges, only a few epidemiological studies have evaluated the health effects of exposure to water bodies subject to discharges from storm drains and these studies focused on the effects of dry weather urban flows on recreational exposure (e.g., Haile et al, 1999 and Colford et al, 2005).

(1) Factors That Affect FIB Concentrations

There are various confounding factors that affect the reliability of FIB as pathogen indicators. One primary factor is that there are numerous natural or non-anthropogenic (or "zoonotic") sources of FIB in developed watersheds and their receiving water bodies, including birds and other wildlife, soils, and plant matter. Anthropogenic sources may include domesticated animals and pets, poorly functioning septic systems, sewer system overflows or spills, cross-connections between sewer and storm drains, and the utilization of outdoor areas or storm drains for human waste disposal by people without access to indoor sanitary facilities. All of these sources can contribute to the concentrations of FIB, but not all the sources may pose a comparable human health risk (U.S. EPA, 2009).

A second confounding factor is that FIB can multiply in the field if the substrate, temperature, moisture, and nutrient conditions are suitable (MEC, 2004). This is one potential reason that FIB concentrations do not always correlate with pathogens. For example, in a field study conducted by Schroeder *et al.* (2002), pathogens (in the form of viruses, bacteria, or protozoa) were found to occur in 12 of 97 soil samples, but the samples that contained pathogens did not correlate with the samples containing concentrations of FIB. Numerous other researchers have reported that bacteria presence and even regrowth was observed in various substrates such as beach sands, wrack line (accumulation of kelp in the inter-tidal area of beaches), inter/sub-tidal sediments, and material deposited in storm drains (MEC, 2004). FIB monitoring in the Santa Ana River indicate that the ubiquity of sources and potential regrowth far exceed the human sources of fecal bacteria generated by the entire population in the watershed (Surbeck et al, 2008). Regrowth of bacteria downstream of a package treatment plant utilizing ultraviolet (UV) radiation to disinfect dry weather flows in Aliso Creek was considered a prime factor in the rapid rebound of FIB concentrations downstream of the plant (Andersen, 2005).

A third confounding factor is that the persistence of FIB may differ from those of various pathogenic viruses, bacteria, protozoa. Viruses, for instance, are small, low in number, and difficult to inactivate, while protozoa may form protective cysts that are resistant to destruction and render them dormant but capable of reactivating in the future. Therefore, while some indicator bacteria may die off in the water column due to ultraviolet disinfection or other unfavorable environmental conditions (including predation and antagonism), pathogens occasionally may persist longer (Haile et. al., 1999). So while the previously two described factors may result in indicator bacteria resulting in false positive indications of public health risk, there may also be instances when indicator bacteria result in false negative indications.

(2) Current Research Efforts to Improve Recreational Water Quality Criteria

Given the concern about the adequacy of the current recreational water quality criteria, the U.S. EPA is undergoing a comprehensive evaluation and revision of their current FIB-based recreational water quality criteria, with completion scheduled for 2012. To help initiate this effort, EPA gathered 43 experts to identify research priorities needed to refine the existing criteria and transition to new methods (U.S. EPA, 2007b). The experts identified seven topics for research, including "scientifically defensible for applications in a wide variety of geographical locations and water types" and "protective of individuals exposed to recreational waters impacted by all sorts of pathogen sources including animal feces, stormwater, and sewage" (Boehm et al, 2009).

In a similar effort focused on inland waters, the Water Environment Research Federation (WERF) convened an expert panel to recommend a research program that would also support EPA's intended revision of the water quality criteria (WERF, 2009).

(3) Epidemiological Studies

Until recently, few epidemiological studies have tested the health effects of exposure to the receiving waters of direct and recent stormwater runoff, and these studies have found it difficult to link illness with stormwater sources. For instance, the Mission Bay epidemiological study (Colford *et al.*, 2005) found that "only skin rash and diarrhea were consistently elevated in swimmers versus non swimmers, the risk of illness was uncorrelated with levels of traditional water quality indicators, and State water quality thresholds were not predictive of swimming-related illnesses." Various other researchers, as part of EPA's pathogen research program, are now conducting epidemiological studies nationwide at fresh and salt water beaches that receive wastewater and/or stormwater discharges. In Southern California, the Southern California Coastal Water Research Project (SCCWRP) has been conducting a multi-year study of public health risks at marine beaches, with a final report that is scheduled for late 2010. Until these various studies are completed, however, there is no reliable documentation of the health effects caused by exposure to stormwater based on epidemiological studies.

(4) Effects of Land Use and Runoff on FIB Concentrations

Dry weather, non-storm stream flows from undeveloped watersheds tend to have lower concentrations of FIB than dry weather urban flows, although water quality standard exceedances still occur. For instance, a recent study by SCCWRP which monitored 15 unimpaired natural Southern California streams weekly during dry weather for a year showed that about 18 percent of the samples exceeded daily and monthly bacterial indicator thresholds, although concentrations from these unimpaired streams were one to two orders of magnitude lower than levels found in developed watersheds (Tiefenthaler, *et al.*, 2009). The study reported an average of the geometric means for *E. coli* in dry weather flows in each stream of 41 MPN/100 mL. In comparison, the Basin Plan objective is geometric mean *E. coli* density shall not exceed 126 MPN/100 mL.

During wet weather, stormwater runoff can mobilize indicator bacteria from a number of watershed and instream sources, and, therefore, indicator bacteria concentrations tend to increase. For example, median stormwater runoff monitoring results for the open space land use category, as summarized by Stein et. al. (2007), include *E. Coli* concentrations of about 5,400 MPN/100 mL from the 2001–2005 Los Angeles River Watershed Wet Weather Study, and 7,200 MPN/100 mL from the National Stormwater Quality Database (Pitt *et al.*, 2003). Similarly, median open space land use stormwater runoff monitoring results include *E. coli* concentrations of 5,400 MPN/100 mL from the Stein et al., (2007) study based on two flow-weighted average results, and 500 MPN/100 mL for fecal coliform from a 1994–2000 Los Angeles County (2000) study based on 21 grab samples.

Land use type and condition also affect runoff concentrations, and most studies show higher FIB concentrations in urban runoff than in open space runoff. Runoff from residential land uses from the Los Angeles River Watershed Wet Weather Study had a median *E. coli* concentration of about 6,300 MPN/100 mL and about 8,300 from the National Stormwater Quality Database (Table 5-2, Stein et. al, 2007). The median value of four flow-weighted average results from the Stein et. al. (2007) study was about 6,100 MPN/100mL for *E. coli* for the low density residential land use site. These data represent urban areas that in general do not have source and treatment controls, and therefore are not indicative of runoff from the proposed project.

Runoff from agricultural watersheds involving horticulture and row cropping is known to similarly contain relatively high concentrations of FIB. Data from a stormwater drain serving an agricultural watershed with predominantly row crops in Ventura County showed median fecal coliform levels (approximately 7,000 MPN/100 mL) similar to that found for general urban runoff (Ventura County, 2005). 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 FIB.

(5) Project Design Features that Address Pathogen Indicators

The primary sources of pathogen indicators from the project development 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 the proposed project would be reduced by source controls and treatment controls. The most effective means of controlling specific bacteria sources, such as pet and other animal wastes, is through source control, specifically education of pet owners, education regarding feeding (and therefore attracting) of waterfowl near water bodies, and providing products and disposal containers that encourage and facilitate cleaning up after pets. These BMPs are specified as project source controls in Table 5-1.

Although there are limited data on the effectiveness of different types of stormwater treatment to manage pathogen indicators, treatment processes that help reduce pathogen indicators include sunlight (ultraviolet light) degradation, sedimentation, and filtration.

Bioretention facilities that incorporate an amended soil media for filtration is an example of a type of stormwater treatment effective in addressing FIB. The City of Austin, Texas conducted a number of studies on the effectiveness of sedimentation/filtration treatment systems for treating stormwater runoff

(City of Austin, 1990; CWP, 1996). Most of the structures were designed to treat 0.5 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 (Kurz, 1999). 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.

Similarly, where soil conditions are conducive to infiltration, LID practices and stormwater treatment facilities that allow for infiltration can reduce runoff volume and treat FIB by infiltration, which in turn reduces FIB loads. In a literature summary, EPA reported typical pathogen removal for infiltration facilities as 65 to 100 percent (U.S. EPA, 1993). These types of BMPs are specified for incorporation into the project where feasible to meet the LID design standards specified in Section 5 of this report, which are based on achieving equivalent pollutant control and hydrologic control as specified the LID Ordinance and Manual and in the MS4 Permit/SUSMP Manual requirements for treatment of volume or flow of stormwater.

In summary, stormwater discharges from the proposed project could potentially exceed the Basin Plan standard for FIB and therefore impacts from FIB may be significant prior to mitigation. However, the FIB concentrations in runoff from the proposed project would be reduced through the implementation of source and treatment control PDFs. The project would incorporate a number of source controls specific to managing FIB, including education of pet owners, education regarding feeding (and therefore attracting) of waterfowl near water bodies, and providing products and disposal containers that encourage and facilitate cleaning up after pets. The project would not include septic systems and the sewer system would be designed to current standards, which minimizes the potential for leaks. The project development, consistent with the MS4 permit requirements, includes a comprehensive set of source, site design/LID, and treatment control PDFs, including treatment BMPs (i.e., infiltration facilities and bioretention), selected to manage pollutants of concern, including pathogen indicators. With these PDFs, the proposed project would not result in substantial changes in pathogen levels causing a violation of the water quality standards or waste discharge requirements, would not create runoff that would provide substantial additional sources of bacteria, or otherwise substantially degrade water quality in the receiving waters. Water quality impacts related to pathogens would be reduced to less than significant.

(c) Hydrocarbons

Hydrocarbons are a broad class of compounds, most of which are non-toxic. Various forms of hydrocarbons (oil and grease) are common in urban runoff; however, these constituents are difficult to measure and are typically measured with grab samples, making it difficult to develop reliable EMCs for modeling. Hydrocarbons are hydrophobic (low solubility in water), have the potential to volatilize, and most forms are biodegradable. A subset of hydrocarbons, Polynuclear Aromatic Hydrocarbons (PAHs), can be toxic depending on the concentration levels, exposure history and sensitivity of the receptor organisms. Of particular concern are those PAHs compounds associated with transportation related combustion products.

The current concentration of hydrocarbons in the runoff is likely to be relatively small, as the project site is generally vacant open space land. However, there may be some hydrocarbon-containing runoff from the construction storage yard located in the valley in the central portion of the site.

Although the concentration of hydrocarbons in runoff is expected to increase slightly under post-development conditions due to the increase in roadways, driveways, parking areas, and vehicle use, the 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. 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 (Ribes et al. 2003). For example, a stormwater runoff study by Marsalek et al. (1997) found that the dissolved-phase PAHs represented less than 11 percent of the total concentration of PAHs. Consequently, bioretention areas, and vegetated swales proposed as PDFs, which are designed to treat pollutants through settling, filtration, and infiltration, would be effective at treating PAHs.

Los Angeles County conducted PAH analyses on 27 stormwater samples from a variety of land uses in the period 1994–2000 (LACDPW 2000). 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 PDFs should result in a reduction in hydrocarbon concentrations inclusive of PAHs. Therefore, it is unlikely that impacts would 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.

During the construction phase of the project, hydrocarbons in site runoff could result from construction equipment/vehicle fueling or spills. However, pursuant to the Construction General Permit, the SWPPP 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 standards. PAH that are adsorbed to sediment during the construction phase would be effectively controlled via the erosion and sediment control BMPs. For these reasons, construction-related water quality impacts related to hydrocarbons are considered less than significant.

(d) 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. 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.

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 and Mumley 1997). 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 levels of chlorpyrifos were below detection limits for all land uses in all samples taken between 1994 and 2000 (LACDPW 2000). 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 U.S. EPA banned all indoor uses of diazinon in 2002 and stopped sales for all outdoor non-agricultural use in 2003 (U.S. EPA 2002). With no agricultural uses planned for the proposed project, diazinon would not be used at the proposed project site. The U.S. EPA has also 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.

Diazinon had long been one of the most commonly used pesticides (SFBRWQCB 2005) before its use was phased out. Although the U.S. 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.

A 2003 study, commissioned by the San Francisco Water Quality Control Board, evaluated pesticide use trends as they relate to water quality. 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; parathyroids (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 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 (SFBRWQCB 2005). 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 in 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 their 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 stabilized with development, or if eroded, would be settled or filtered out of the water column in the water quality treatment PDFs. Thus, treatment in the bioretention and vegetated swales should achieve some removal of pesticides from stormwater as TSS is reduced.

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. 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 would also remove sediment-adsorbed pesticides.

Based on the incorporation of site design, source control, and treatment control BMPs pursuant to SUSMP and LID requirements, the project's potential post-development impacts associated with pesticides are considered less than significant.

Transport of legacy pesticides adsorbed to existing site sediments may be a concern during the construction phase of development. The SWPPP must contain sediment and erosion control BMPs pursuant to the Construction General Permit, and those BMPs must effectively control erosion and the discharge of sediment along with other pollutants per the BAT/BCT standards. Based on these sediment controls, construction-related impacts associated with pesticides are considered less than significant.

(e) 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. 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. Sources of trash in developed areas can be both accidental and intentional. During wet weather events, gross debris deposited on paved surfaces can be transported to storm drains, where it eventually can be discharged to receiving waters. Trash and debris can also be mobilized by wind and transported directly into waterways, imposing an oxygen demand on the water body as organic matter decomposes.

Urbanization could significantly increase trash and debris loads if left unchecked. However, the 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/POA for investigation. The 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, post-development trash and debris would not significantly impact the receiving waters of the project.

During the construction phase, there is potential for an increase in trash and debris loads due to lack of proper contractor good housekeeping practices at the construction site. Per the Construction General Permit, the SWPPP for the site would include BMPs for trash control (catch basin inserts, good housekeeping practices, etc.). Compliance with the Permit Requirements and inclusion of these BMPs, meeting BAT/BCT, included in the SWPPP would reduce impacts from trash and debris to less than significant.

(f) Methylene Blue Activated Substances

Methylene Blue Activated Substances (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 project runoff would be controlled through the 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 are not expected to significantly impact the receiving waters of the project.

(g) 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 (U.S. 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 (U.S. 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 (Cole et al. 1984). In contrast to 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.

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.

A potential source of cyanide is from burnt catchments. For example, cyanide concentrations in runoff obtained from an area that had been burned in a wildfire that occurred in Tennessee and North Carolina averaged 49 μg/L (Barber et al. 2003). Higher cyanide concentrations were reported in runoff from a wild fire that occurred in New Mexico, with an average value of 80 μg/L.

In addition to the relatively low level of cyanide predicted 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 PDF. Therefore, cyanide would not significantly impact the receiving waters of the project.

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

PDFs include site design/LID, source control, and treatment control BMPs in compliance with the SUSMP and LID requirements, as described above. Treatment control PDFs would treat runoff from the entire urban portion of the project. Sizing criteria contained in the MS4 Permit and the SUSMP requirements would be met for all treatment control BMPs.

In summary, the proposed site design, source control, and treatment control PDFs have been selected based on:

- effectiveness for addressing pollutants of concern in project runoff, resulting in insignificant water quality impacts;
- sizing and outlet design consistent with the MS4 Permit and SUSMP requirements;

- additional design guidance consistent with the California BMP Handbook: New Development and Redevelopment, other literature, and best professional judgment;
- hydrologic and water quality modeling to verify performance;
- meeting LID requirements minimizing changes in stormwater volumes; and
- providing specific Operations and Maintenance (O&M) requirements to inspect and maintain the facilities.

On this basis, the proposed PDFs meet the MS4 Permit requirements for new development.

(4) Los Angeles County Low Impact Development Requirements for New Development as Defined in the Los Angeles County LID Ordinance and LID Standards Manual

As indicated previously, the applicant has committed to comply with the requirements of the Los Angeles County LID Ordinance to the maximum extent feasible. Chapter 12.84 of the Los Angeles County Code requires the use of low impact development (LID) standards in development projects. The proposed project's PDFs would mimic undeveloped stormwater runoff rates and volumes, prevent pollutants of concern from leaving the project site, and prevent hydromodification impacts to natural drainage systems. These PDFs would provide a stormwater management system that is highly sustainable because of the use of natural systems to control runoff rates and promote groundwater recharge. The following hydrologic source controls, included as PDFs, would limit impervious area and disconnect imperviousness to avoid and minimize water quality and hydromodification impacts:

- **Low Impact/Site Design BMPs.** Low impact/site design PDFs that promote infiltration and help to reduce runoff volumes include the routing of impervious area runoff to vegetated areas, use of permeable pavements, use of native and/or non-native/non-invasive vegetation in landscaped areas, and the use of efficient irrigation systems in common area landscaped areas.
- **Treatment Controls.** The project's treatment control PDFs have been selected to promote infiltration and evapotranspiration. The treatment control PDFs would incorporate vegetation and amended soil to promote pollutant removal and runoff volume reduction through infiltration and evapotranspiration. Treatment controls would be designed in accordance with the Los Angeles County LID Ordinance and Standards Manual to the maximum extent feasible in conformance with the Project Performance Standard. Collectively, these treatment facilities are expected to provide significant reduction in wet weather runoff volume and to eliminate dry weather flows.

Table 4.8.1-21, below, provides an estimate of the project area that will comply with the treatment and volume control performance standard (SUSMP and Delta V), the treatment control standard (SUSMP), and self-mitigating areas (such as vegetated slopes).

Table 4.8.1-21
Spatial Application of Treatment and Volume Control Performance Standards

		Area Achieving Performance Standard (Acre)		
	Total Area (Acre)	**SUSMP and Delta V**	**SUSMP**	**Self-Mitigating**
PA-1	12.0	12.0	-	-
PA-2	30.4	20.6	9.8	-
PA-3	44.0	43.0	1.0	-
PA-4	12.8	6.7	6.1	-
Public Roads (outside of PA)	8.8	-	8.8	-
River Bank Protection[1]	22.3	-	2.8	19.5
On-site Total	130.3	82.3	28.5	19.5
Off-site Areas	33.0	0.0	32.6	0.4
Project Total	163.3	82.3	61.1	19.9

[1] *The River Bank Protection area encompasses maintenance access roads (2.8 acres), buried bank stabilization (6.8 acres), and areas of the river bed that will be temporarily impacted by construction (12.7 acres), but does not include river corridor which will not be developed.*

(5) Pollutant Bioaccumulation

Certain pollutants have the potential to accumulate 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:

- 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;
- 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;
- Type of habitats, organisms attracted to these habitats, and their feeding habits; and
- System design and maintenance.

The primary pollutants of concern with regard to bioaccumulation are mercury and selenium. However, based on the water quality monitoring conducted by Los Angeles County at the downstream 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 project's treatment control facilities would be minimal. Since the tributary areas to the BMPs are largely impervious, very little coarse solids and associated pollutants are expected to be generated. The vegetation in the facilities would trap sediments and pollutants in the soils, which contain bacteria that metabolize and transform trace metals, thereby reducing the potential for these pollutants to enter the food chain. The facilities do not provide open water areas and are not likely to attract waterfowl.

Bioaccumulation of pollutants in the Santa Clara River would not be significant due to the low predicted concentrations of pollutants such as trace metals, which are predicted to be below the benchmark CTR criteria 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 is considered less than significant.

(6) Dry Weather Runoff

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 could also 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 are typically 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) are typically 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, multiple family residential areas, and in parks would use efficient irrigation technology utilizing 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, permeable pavement, and infiltration 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.

The treatment control PDFs would infiltrate or evapotranspire all expected dry weather runoff. 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.

(7) Groundwater Impacts

(a) Groundwater Quality Impacts

Discharge from the project's developed areas to groundwater would occur in four ways: (1) through infiltration of urban runoff in the proposed treatment control PDFs after pretreatment; (2) through infiltration of urban runoff, after treatment in the project PDFs, in the Santa Clara River, which is the primary recharge zone for groundwater in the Santa Clara Valley; (3) through general infiltration of irrigation water; and (4) through percolation of excess recycled water at the WRP.

Groundwater quality would be fully protected through implementation of the project's site design/LID, source control, and treatment control PDFs prior to discharge of project runoff to groundwater.

Per the LARWQCB Clarification Letter (LARWQCB 2006a), 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 one to 2 inches of rainfall in semi-arid areas like Southern California where there is a high rate of evapotranspiration presents minimal risks.

The stormwater 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. The predicted nitrate-nitrogen plus nitrite-nitrogen concentration in runoff after treatment in the PDFs is 0.92 mg/L, which is well below the groundwater quality objective. Therefore, infiltration of stormwater to groundwater would not result in a violation of any groundwater quality standards or otherwise substantially degrade water quality.

On this basis, the project's impact on groundwater quality is considered less than significant.

(1) Direct Groundwater Quality Impacts from Percolation of Recycled Water

The proposed Vista Canyon WRP would collect and treat municipal wastewater from the project and adjacent development. The treated effluent would be distributed to the proposed project for non-potable interior uses, such as toilet flushing, in commercial areas, and exterior uses, such as landscape irrigation. Treated effluent may also be made available to the CLWA to fulfill off-site demand for recycled water. Treated effluent that is not reused on-site or made available to CLWA would be discharged to on-site percolation ponds. Water balance calculations predict that in the absence of CLWA demand, excess reclaimed water would be generated (Dexter Wilson Engineering, 2010).

(2) Impacts to CLWA Water Supply Wells

The Santa Clarita Water Division of CLWA operates drinking water wells in the vicinity of the proposed project. The Specific Plan site includes two Santa Clarita Water Division potable water wells located on a small parcel owned in fee by the Castaic Lake Water Agency (CLWA), Santa Clarita Water Division. Implementation of the Specific Plan would result in the removal of one of the two wells. The purpose of this section is to evaluate potential impacts to groundwater quality at these downgradient production wells. Potential wells of interest include the Mitchell wells (Mitchell 5A and 5B), the Sierra well, and the North Oaks wells (East, Central, and West wells). The Mitchell wells are located approximately 0.3 mile upgradient from the proposed percolation ponds and, as they are upgradient, are not likely to be affected by the percolation ponds. The Sierra well is located approximately 1 mile downgradient of the percolation ponds. The North Oaks wells are located approximately 1.5 miles downgradient of the proposed percolation ponds. Based on proximity, the Sierra well has been selected as the “critical well” for this analysis.

(a) Analysis Approach

Potential impacts to downgradient water supply wells were evaluated using a simplified approach. The analysis assumed that the total mass of pollutants discharged to the aquifer from the percolation ponds would be extracted at the well. The analysis approach combined the estimated pollutant concentration and discharge rates from the percolation ponds and the production rate and existing water quality at the critical well to predict the post-project groundwater quality at the well. The entire quantity of percolated water was assumed to replace an equal quantity of groundwater during extraction. Average production rates were assumed to remain unchanged and the total mass of pollutants in the percolated recycled water was assumed to be withdrawn from the well. This approach conservatively overestimates the amount of pollutants that could be withdrawn at the critical well. The analysis approach has been applied on an average annual basis, consistent with the temporal resolution of the surface water quality impact analysis.

(b) Analysis Inputs

Table 4.8.1-22, below, provides estimated production of excess reclaimed water (RW) on a monthly basis in the absence of CLWA demand (Dexter Wilson Engineering, 2010). **Table 4.8.1-23** provides the estimated quality of excess reclaimed water that would be percolated (Dexter Wilson Engineering, 2010).

Table 4.8.1-22
Estimated Excess Reclaimed Water without CLWA Demand

Month	RW Available, MG	On-Site RW Demand, MG	Excess RW, MG
January	12.1	1.6	10.5
February	10.9	2.4	8.5
March	12.1	2.9	9.2
April	11.7	2.3	9.3
May	12.1	3.1	9
June	11.7	3.7	8
July	12.1	4.9	7.2
August	12.1	5.4	6.8
September	11.7	4.1	7.6
October	12.1	4.3	7.8
November	11.7	2.5	9.2
December	12.1	2.3	9.8
Annual Total, MG	142.4	39.5	102.9

Source: Dexter Wilson Engineering, 2010.

Table 4.8.1-23
Estimated WRP Effluent Concentration

Parameter	Estimated WRP Effluent Concentration, mg/L
Total Dissolved Solids, TDS	935
Chloride	116
Sulfate	146
NO_3-N + NO_2-N	<10
Boron	1.415
Aluminum	<1
Fluoride	1.3
Manganese	0.3

Source: Dexter Wilson Engineering, 2010.

Water quality data provided by the Santa Clarita Water Division of CLWA for the Sierra well is summarized in **Table 4.8.1-24**.

Table 4.8.1-24
Average Groundwater Quality of the Sierra Well

Parameter	Average Concentration from Sierra Well[1], mg/L
Total Dissolved Solids, TDS	763
Chloride	80
Sulfate	173
NO_3-N + NO_2-N	7.1
Boron	1.0
Aluminum	<DLR (0.05)
Fluoride	0.31
Manganese	<DLR (0.02)

1 *Based on arithmetic average of samples collected in 2001, 200,4 and 2007. Data provided by CLWA.*
DLR – Detection Levels for Purposes of Reporting (detection limit)

A summary of groundwater production for the Sierra well is provided in **Table 4.8.1-25,** below. Years without any production were removed for the purpose of computing average annual pumping for this analysis.

Based on the monthly production records, production tends to somewhat higher during summer months, correlating to increased irrigation demand.

Estimates of pollutant concentrations in the Sierra production well in the existing and proposed conditions are provided in **Table 4.8.1-26,** below. **Table 4.8.1-26** also provides a comparison of the estimated proposed condition concentration in the Sierra production well to applicable water quality benchmarks.

Table 4.8.1-25
Summary of Production Rates at Sierra Well

	Annual Production	
Year	**afy**	**MG/yr**
1980	2780	906
1981	2089	681
1982	1202	392
1983	1255	409
1984	1780	580
1985	1834	598
1986	856	279
1987	220	72
1988	459	150
1989	730	238
1990	772	252
1991	719	234
1992	1050	342
1993	1413	460
1994	1,433	467
1995	1,092	356
1996	1,034	337
1997	597	195
1998	814	265
1999	1,158	377
2000	640	209
2001	846	276
2002	87	28
2003	0	0

Year	Annual Production afy	MG/yr
2004	0	0
2005	1,384	451
2006	1,671	544
2007	1,652	538
2008	1,381	450
2009	446	145
Average 1980–2009 (excluding zero production years)	**1,121**	**365**

Source: data provided by CLWA.

Table 4.8.1-26
Comparison to Water Quality Benchmarks for Water Supply

Parameter	Units	Estimated Average Concentration in Sierra Well: Existing Condition [1]	Estimated Average Concentration in Sierra Well: Proposed Condition	Water Quality Benchmarks: Primary MCL	Water Quality Benchmarks: Secondary MCL, mg/L [2]
TDS	mg/L	763	812	-	500/1000
Chloride	mg/L	80	91	-	250/500
Sulfate	mg/L	173	165	-	250/500
NO_3-N + NO_2-N	mg/L	7.1	<7.9	10	-
Boron	mg/L	1.0	1.1	-	-
Aluminum	mg/L	<DLR (0.05)	<0.32	1	-
Fluoride	mg/L	0.31	0.60	2	-
Manganese	mg/L	<DLR (0.02)	<0.10	-	0.05

[1] *Based on arithmetic average of samples collected in 2001, 2004 and 2007.*
[2] *Recommended concentration/maximum concentration*
DLR – Detection Levels for Purposes of Reporting (detection limit)

In the proposed condition, the concentrations of TDS, chloride, boron, and fluoride are predicted to increase; nitrate-N plus nitrite-N, aluminum, and manganese may increase, although there is some uncertainty due to the uncertainty in the predicted WRP effluent concentration. All predicted concentrations are below the benchmark water quality objectives.

As stated above, the analysis assumed that the entire volume of recycled water that is percolated, and the associated pollutant loading, would be withdrawn at the Sierra well. This assumes that none of the constituent loading would bypass the wells and no natural attenuation of pollutants would occur in the aquifer. Consequently, the analysis methodology is highly conservative and the estimated proposed condition concentrations are likely to be much lower than those listed in **Table 4.8.1-26,** above.

Significant mixing of percolated water with native groundwater would be expected to occur between the percolation ponds and critical production wells. Based on the framework used in the Groundwater Surface Water Interaction Model (CH2MHill and HGL, 2008, Figure 3-26), the aquifer is approximately 1,200 feet wide and 100 feet thick over the 5,500 foot reach between the percolation ponds and the Sierra well. With an assumed porosity of 0.25, the total volume of water in this reach of the aquifer can be estimated to be approximately 1,200 MG. In comparison, the estimated volume of percolated water, assuming no demand for excess recycled water, is approximately 103 MG/yr. The actual volume of percolated recycled water would likely be much less than 103 MG/yr.

Significant bypass of percolated water around the critical well would also be expected to occur. Levels recorded in production wells show that high groundwater levels (which can be used as a surrogate for trends in groundwater flux) tend to occur during the wet season. These periods tend to have the lowest production rates. It is during these periods that it is more likely that constituent load associated with percolated recycled water would mix with the larger volume of the aquifer and bypass the production wells.

In conclusion, based on the comparison of the predicted groundwater quality at the critical production well to the water quality objectives for water supply, the proposed project would not adversely impact the water quality of downstream water supply wells.

(3) Impacts to Groundwater Pollutants of Concern

In addition to the percolated recycled water, stormwater percolation would occur in infiltration-based stormwater management PDFs, as described in Section 5 above. Percolated stormwater would have lower concentrations of the groundwater pollutants of concern than the recycled water, thus would improve the overall quality of percolated water from the proposed project. **Table 4.8.1-27** provides a summary of the volume and concentration of nitrate-N plus nitrite-N and minerals for the reclaimed water, stormwater, and the combined percolated water for the proposed project.

(4) Nutrients

The Basin Plan groundwater quality objective for nitrate-nitrogen plus nitrite-nitrogen is 10 mg/L. The expected nitrate-nitrogen plus nitrite-nitrogen concentration in combined percolated recycled water and stormwater is less than 8.9 mg/L as is demonstrated in **Table 4.8-1-27**. Therefore, percolation of recycled water and stormwater would not result in a violation of the groundwater quality standards for nitrate-nitrogen plus nitrite-nitrogen.

(5) Mineral Quality: TDS, Chloride, Sulfate, and Boron

The predicted average annual concentrations of TDS and boron in combined percolated water (140 mg/L and 1.3 mg/L, respectively) are greater than the Basin Plan standards (800 mg/L and 1.0 mg/L, respectively). The predicted average annual concentrations of chloride and sulfate are less than the Basin Plan groundwater quality objective as shown in **Table 4.8.1-27.**

Table 4.8.1-27
Estimated Average Annual Volume and Concentration of Percolated Water

Parameter	Units	Recycled Water [1]	Stormwater[2]	Combined Percolated Water (RW + SW)	Basin Plan Groundwater Quality Objective[3] (mg/L)	Average Concentration from 5 SCWD Wells[4] (mg/L)
Volume	ac-ft	315	43	358	--	--
NO3-N + NO2-N	mg/L	<10	0.9	<8.9	10	3.8
TDS	mg/L	935	144	840	800	670
Chloride	mg/L	116	21	105	150	79
Sulfate	mg/L	146	5	129	150	123
Boron	mg/L	1.4	0.2	1.3	1.0	1.4

1 *Source: Dexter Wilson Engineering, 2010.*
2 *Average annual water quality simulated in runoff from proposed project (including off-site impacts) in proposed condition with BMPs, except sulfate and boron. Source for sulfate and boron is LACDPW, 2000 (based on median values for mixed residential land use).*
3 *Upper Santa Clara-Mint Canyon*
4 *Includes Mitchell 5A, Mitchell 5B, Sand Canyon, Lost Canyon 2A and Lost Canyon 2. Values provided by CLWA.*

The LARWQCB first adopted a TMDL for chloride in the Upper Santa Clara River (Reaches 3, 5, and 6) in October 2002 (Resolution No. 2002-018). On May 6, 2004, the LARWQCB amended the Upper Santa Clara River chloride TMDL to revise the interim wasteload allocations and implementation schedule (Resolution 04-004). The amended TMDL became effective in May 2005. At the time the TMDL was adopted and approved, there were key scientific uncertainties regarding the sensitivity of crops to chloride and the complex interactions between surface water and groundwater in the Upper Santa Clara River watershed. The TMDL recognized the possibility of revised chloride water quality objectives and included mandatory reconsiderations by the LARWQCB to consider Site Specific Objectives (SSOs). The TMDL required the Santa Clarita Valley Sanitation District to implement special studies and actions to reduce chloride loadings from the Saugus and Valencia WRPs. The TMDL included the development of the Groundwater and Surface Water Interaction Study (GSWI) to determine chloride transport and fate from surface waters to groundwater basins underlying the Upper Santa Clara River. Additional measures included the development of conceptual compliance measures and costs based on different hypothetical water quality objectives and final wasteload allocation scenarios and the consideration of site-specific objectives for chloride based on the results of an agricultural chloride threshold study and the GSWI.

TMDL special studies were conducted in a facilitated stakeholder process in which stakeholders participated in scoping and reviewing the studies. This process has lead stakeholders to develop an alternative TMDL implementation plan that addresses chloride impairment of surface waters and degradation of groundwater. The alternative, termed AWRM, was first set forth by Upper Basin water purveyors and United Water Conservation District, the management agency for groundwater resources in the Ventura County portions of Upper Santa Clara River watershed. The GSWI linkage analysis conducted for the AWRM demonstrated that beneficial uses can be protected through a combination of SSOs for surface water and groundwater and reduction of chloride levels from the Valencia WRP effluent through advanced treatment (LARWQCB, 2008). The AWRM program would be implemented through NPDES permits for the existing WRPs.

To manage salts and nutrients, the Recycled Water Policy requires every groundwater basin or sub-basin in California to have a consistent salt/nutrient management plan. Each salt/nutrient plan must include a monitoring plan, which includes monitoring of emerging constituents/chemicals of emerging concern (CECs) consistent with CDPH recommendations; be protective of water sources; and encourage recycling to meet the Policy’s reuse goals.

Although not specifically adopted as a formal salt/nutrient management plan for the Santa Clara River watershed, the AWRM program does serve as a basis for a future salt/nutrient management plan. First, the AWRM program elements have many similarities to the required salt/nutrient management plan elements. Second, the AWRM program was developed using the GSWI model, which assessed the fate and transport of chloride from all sources in the surface waters and groundwater in the Santa Clara River watershed. While GSWI was developed specifically to assess the fate and transport of chloride, the evaluation and assessments largely apply to other salts in the region, which behave similarly to chloride. Third, the GSWI model also assessed water quality impacts associated with the planned recycled water uses in the future. The Vista Canyon WRP, although not specifically included in the GSWI model, would constitute a portion of the planned growth in that would have occurred at the Valencia WRP. Fourth, the facilities that would be implemented through the AWRM (i.e., advanced treatment of wastewater, salt export facilities) would also remove and manage other salts. More specifically, the AWRM program provides for (1) watershed-wide monitoring, (2) determination of all sources, loading, fate and transport of salts, (3) salt management measures and implementation, (4) an anti-degradation analysis, and (5) water recycling goals and objectives (LARWQCB, 2008). The specific salt management measures, as well as the implementation and funding of the specific facilities needed, have not been completed. However, the overarching purpose of the AWRM is effective and efficient salt/nutrient management; therefore, the necessary measures will be adopted and provided. The Vista Canyon project would participate in the AWRM by contributing, based upon its fair share to the cost of implementation.

In conclusion, through project participation in the AWRM (through annexation of the project site into the Santa Clarita Valley Sanitation District), percolation of recycled water and stormwater from the proposed project would not result in a violation of the groundwater quality standards for minerals (TDS, chloride, sulfate, and boron).

(a) Bacteria

The Basin Plan contains numeric criteria for bacteria in drinking water sources. Title 22 of the California Code of Regulations (Title 22) specifies California's Wastewater Reclamation Criteria (WRC) and all recycled water in California must meet or exceed these criteria to assure protection of receiving water quality. 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. Title 22 specifies bacteria treatment standards for recycled water. The WRP would incorporate disinfection with a combination of ultraviolet (UV) and chlorination to remove bacteria in compliance with the WRC. In addition, bacteria that may be present in the stormwater would be removed through filtration in soils (for example, as with septic tank discharges). Therefore, percolation of recycled water and stormwater from the proposed project would not result in a violation of the groundwater quality standards for bacteria.

(b) 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 would be fully controlled in compliance with Title 22 and the Waste Discharge Requirements adopted by the LARWQCB for the WRP. Therefore, percolation of recycled water and stormwater from the proposed project would not result in a violation of the groundwater quality standards for Title 22 chemical constituents and radioactivity.

(c) 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). Pollutants causing taste and odor issues would be controlled by the proposed WRP treatment processes in compliance with Title 22 and the Water Discharge Requirement adopted by the LARWQCB for the WRP. Therefore, percolation of recycled water and stormwater from the proposed project would not result in a violation of the groundwater quality standards for taste and odor.

(d) Contaminants of Emerging Concern (CECs)

Studies have shown good removal efficiencies of some CECs by wastewater treatment plants operating with conventional activated sludge processes, as much as 95 percent removal, although removal by conventional activated sludge processes has been found to be inconsistent for other CECs (Reemtsma, 2006; Gobel, 2007). Several studies have noted the importance of hydraulic retention time in the removal of CECs in activated sludge processes (Phillips, 2005; Reemtsma, 2006). The molecular complexity of emerging contaminants causes microbial degradation to occur over longer periods of time, thus increasing retention time may increase removal rates of many CECs. Additionally, the CECs with the highest removal rates tend to be those which biodegrade fastest (Snyder et al, 2007).

One of the alternative treatment processes proposed for the WRP employs a membrane bioreactor (MBR) process. This process includes conventional activated sludge followed by a membrane tank, which acts as secondary treatment (sedimentation), and tertiary treatment (filtration), providing solid/liquid separation. Studies generally indicate that MBRs provide good removal for a number of CECs, including estrogenic compounds, anionic detergents, herbicides, and others (Lyko, 2005; Melin, 2006; Kim 2007; Snyder 2007). Additionally, since MBR treatment results in fewer particles in effluent, greater removal rates are generally expected (Lyko, 2006). However, similar to conventional activated sludge performance, removal efficiencies by MBRs vary widely. A literature review by Onesios, 2009, showed that studies on lab and pilot scale MBRs had varying removal efficiencies for a wide range of CECs. High removal efficiencies were seen for a number of antibiotics and common over-the-counter drugs, including acetaminophen, ibuprofen, and caffeine, though low removal efficiencies were also seen, particularly for a variety of pharmaceuticals.

A combination of UV and chlorine residual is proposed for disinfection purposes. UV is effective in aiding removal of at least one class of CECs, nitrosamines. Notably, nitrosamines, including N-nitrosodimethlyamine (NDMA) are found in chlorinated water as a byproduct of the chlorination process, particularly when chlorination is conducted with chloramines. Additionally, nitrosamines are found in a number of industrial wastes and consumer products, including food and beverages. While chlorination can lead to harmful byproducts such as NDMA and other chlorinated compounds, it is effective in treating some CECs, as well as conventional wastewater pollutants, especially bacteria.

The Recycled Water Policy addresses control of CECs. Due to the lack of knowledge on the full effects of these relatively new pollutants of concern, the Recycled Water Policy emphasizes the need for more scientific research in regards to CECs. The Policy states that the regulatory requirements for recycled water should be updated regularly based on the best available peer-reviewed science. Additionally, the Policy sets forth a research program that includes a "blue-ribbon" advisory panel consisting of experts from all relevant fields of science. The panel is required to review all related scientific literature and to submit a report describing the current state of scientific knowledge and the actions that the State of California should take to improve current understanding of and human health protections against CECs.

In conclusion, based on the incorporation of best practicable treatment and control measures in the WRP treatment processes, which would be regularly maintained and optimally operated, and as supported by the research program set forth by the Recycled Water Policy, percolation of recycled water and stormwater from the proposed project would not result in water quality impacts to CECs.

The WRP's percolated water quality would have to comply with the permit requirements issued by LARWQCB. As required by the Porter-Cologne Act and the Basin Plan, this permit would include effluent limitations for percolated water that would be protective of groundwater quality and designated beneficial uses.

Based on the above analysis for the pollutants of concern in groundwater, the proposed project would not result in a violation of any groundwater quality standards or waste discharge requirements or otherwise substantially degrade water quality. On this basis, the proposed project's direct impact on groundwater quality is considered less than significant.

(b) Groundwater Recharge Impacts

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 CH2M Hill (2004) discusses the general effects of urbanization on groundwater recharge and the specific effects in the Santa Clarita Valley. The memorandum concludes that the majority of groundwater recharge in the Santa Clarita Valley occurs within the Santa Clara River and its major tributaries.

Currently, the project site is mostly open/vacant land. As a result, in the existing condition some recharge from precipitation occurs within portions of the project site outside of the River Corridor. On one hand, development of the site would introduce impervious surfaces over approximately 48 percent of the project site, which would reduce recharge in these areas. On the other hand, development of the site would increase runoff volume discharged after treatment to the Santa Clara River Corridor, which according to the CH2M Hill memorandum is where the majority of groundwater recharge in the Valley occurs. The Santa Clara River Corridor on-site would be predominantly natural, consist 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 and excess recycled water. Therefore, the project is not expected to 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.

The Vista Canyon WRP includes use of recycled water for irrigation purposes on site, potentially for irrigation purposes off site as part of CLWA's recycled water system, with any excess supply being discharged into adjacent percolation ponds/beds. Some local groundwater recharge would occur in irrigated areas and more substantially in the percolation ponds/beds.

(8) Hydromodification Impacts

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, termed "hydromodification" (SCCWRP 2005a) is addressed below.

Significant hydromodification impacts are presumed to occur if the proposed project would

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

All flows from those areas of the project that would be developed with impervious surface with potential for altering drainage patterns would be discharged, after treatment, 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 physical alteration of natural drainages, such as buried bank stabilization, 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 channel morphology, stream habitat, and species. These types of effects are analyzed in the *Vista Canyon Project (TTM #69164) EIR Flood Technical Report – Santa Clara River (PACE 2009)* and **Section 4.6, Biological Resources**.

(a) Wet Weather Flows

(1) Direct Impacts to the Santa Clara River

The project proposes development of approximately 41 percent (77 acres) of the approximately 185-acre project site; with the remaining 108 acres used for trails, parks, and vegetated slopes and water quality BMPs, or consisting of the Santa Clara River. The size of the project in comparison to both the approximate 191 square mile total watershed area at the project location (0.15 percent of the watershed area) and the expected total impervious area in the watershed in the existing conditions (7 square miles) and at buildout (15 square miles) is small. It is estimated, based on the land use data provided by LACDPW, that the proposed project would comprise 1.8 percent of the total impervious area in the watershed encompassing the project location at ultimate planned buildout for the watershed.

A series of progressive hydromodification control measures would be used in the project 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 implementation of stormwater volume-reducing BMPs (project-based hydrologic source control).
- Mitigate hydromodification impacts in-stream using a geomorphically based approach (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 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 preservation of open space, consisting of about 108 acres (58 percent of the project site) within the River Corridor, 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 mostly drought tolerant plants in landscaped areas; and the use of efficient irrigation systems in common area landscaped areas. The reduction in runoff volume attributable to some of these low impact/site design PDFs were not quantified in the runoff modeling, so these PDFs would further reduce the predicted increase in runoff volumes discussed below. These measures would help to protect the stability of the Santa Clara River and to avoid and minimize direct impacts to the River.

Treatment Controls. The project's treatment control BMPs would also serve as hydromodification source control BMPs. Vegetated swales, and bioretention areas can provide volume reduction on the order of 38 percent (Strecker et al. 2004). Collectively, these vegetated treatment facilities are expected to provide significant reduction in wet weather runoff. 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 94 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 46 acre-feet per year, which is a 67 percent reduction of the predicted average post-development stormwater runoff volume without the treatment control PDFs. In addition, these facilities would also receive and eliminate dry weather flows.

Geomorphically Referenced Channel Design. The hydromodification management approach for the Santa Clara River would 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.

The proposed drainage improvements would utilize innovative techniques to meet the requirements of flood control while maintaining the natural resources within the Santa Clara River (PACE 2009).

Traditional flood control techniques in use in Los Angeles County rely on reinforced concrete or grouted rock rip-rap to minimize erosion while maximizing the volume of flood flows carried by the drainage. While exceedingly efficient as a flood control technique, this approach retains none of the natural resource value. The Vista Canyon Drainage Plan utilizes several criteria that are to be implemented:

- Flood corridor must allow for the passage of Los Angeles County Capital Flood discharge without the permanent removal (maintenance) of natural river vegetation (except at bridge crossings);
- The banks of the River would generally be established outside of the "waters of the United States" as defined by federal laws and regulations and as determined by the delineation completed by the USACE in August 1993;
- Where the USACE delineation width is insufficient to contain the Capital Flood flow, the flood corridor would be widened by an amount sufficient to carry the Capital Flood flow without the necessity of permanently removing vegetation or significantly increasing velocity; and
- Soil cement and other bank protection would occur only where necessary to protect against erosion adjacent to the proposed development. Where bluffs are determined to be stable and there is no adjacent proposed development, no bank protection would be constructed.

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 and 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). 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. For these reasons, the wet weather direct hydromodification impacts of the project with PDFs on the Santa Clara River are considered less than significant.

(b) Dry Weather Runoff

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 (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.

While the exact suite of BMPs to be used on the project is not currently known, the Performance Standard established in this document can be used to estimate area of vegetated BMPs available to evapotranspire and infiltrate dry weather flows. A worst-case evaluation was made by considering vegetated swales designed only for SUSMP water quality treatment (i.e., no volume reduction required) accepting runoff from a portion of the project dominated by single-family residential (lowest imperviousness ratio, therefore smallest BMP footprint per developed area). Based on design storm and swale sizing calculations, it is anticipated that the minimum swale footprint would be approximately 0.5 percent of the developed area footprint. Based on design storm calculations and accepted rules of thumb, bioretention areas would tend to be larger in area than vegetated swales.

To consider this worst-case scenario, the total project area expected to contribute dry weather flows was used to generate monthly dry weather runoff volumes, and 0.5 percent of this area was considered to be available to evapotranspire and infiltrate this volume. Evapotranspiration rates were assumed to be 60 percent of reference rates from the California Irrigation Management Information System (CIMIS) Zone 14, in which the project is located. This assumption is believed to be conservative in representing a plant palate in continually moist conditions. An infiltration rate of 0.15 inch per hour was assumed consistent with post-development assumptions made for the project site in water quality modeling efforts. 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 removed by evapotranspiration or infiltrated in the treatment control PDFs, which also provide hydrologic source control. As a result, no change in seasonality of flows from the project is anticipated.

Based on the comprehensive site planning, source control, and treatment control strategy the impact of the project on dry weather water quality and seasonality of flow in the Santa Clara River is considered less than significant.

7. MITIGATION MEASURES ALREADY INCORPORATED INTO THE PROJECT

- A detailed list of Project Design Features have been incorporated into the project.

8. MITIGATION MEASURES PROPOSED BY THIS EIR

4.8.1-1 The project applicant shall be required to implement all Project Design Features (PDFs), as outlined in subsection 5 (Project Design Features) of this section.

9. CUMULATIVE IMPACTS

a. Cumulative Surface Water Quality Impacts

As discussed above, the anticipated quality of effluent 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 considered significant.

The Vista Canyon 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 LARWQCB 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 must also comply with these requirements. By extrapolating the results of the direct and cumulative impact analysis modeling done for this Water Quality Technical Report, 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 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 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 considered less than significant.

b. Cumulative Groundwater Impacts

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 groundwater. 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, is predicted to comply with adopted regulatory requirements that are designed by the LARWQCB 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 requirements, 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 considered less than significant.

c. Cumulative Groundwater Recharge Impacts

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 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 (CH2M Hill 2004). This long-term stability of groundwater levels is attributed in part to the significant volume of natural recharge that occurs in the Santa Clara River and its tributaries. 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 groundwater was used primarily for agriculture. Also, the importation of 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 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. Therefore, the cumulative impact on groundwater recharge is considered less than significant.

d. Cumulative Hydromodification Impacts

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 watershed would be reflected in adopted plans and projections would implement hydromodification controls to meet flow criteria that would 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.

As identified in the MS4 Permit, 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, has the potential to accelerate downstream erosion and impair stream habitat. Given the 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 size of watershed, channel slope and materials, and climatic and precipitation patterns (SCCWRP 2005a, Balance Hydrologics 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 10 percent or more, and a lower imperviousness of 5 percent was found to cause significant degradation in sensitive watersheds (Booth and Jackson 1997). The Center for Watershed Protection (Schuler and Holland 2000) described the impacts of urbanization on stream channels and established thresholds based on total imperviousness within the tributary drainage area. It states that "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 found similar results to those published by Booth and Schuler, where channel erosion was observed at approximately 6 to 9 percent imperviousness for two separate watershed systems. More recent studies conducted by Geosyntec in this same watershed area showed that levels as low as 2 to 3 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 3 and 5 percent, not all streams would respond in the same manner (SCCWRP 2005b). 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 in the Santa Clara River watershed upstream from the project area is projected to be about 9 percent at build out.

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 2 to 3 percent for streams with a catchment drainage area of less than 5 square miles (SCCWRP 2005a). 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 square miles), whereas the CDA of the Santa Clara River at the project area is 191 square miles. 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, based in part on the work of Zielinski (2002), suggests that smaller watersheds are more responsive and sensitive to changes in land use, whereas larger watersheds (>30 square miles) 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 square miles in size; however, this is still substantially smaller than the Santa Clara River watershed at the project site. 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). 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.

After studying the response of the River to several different anthropogenic and natural disturbances, the report concludes 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 "reset" events that occur within the watershed.

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 that 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 10 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 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.

e. Conclusion

In conclusion, all cumulative projects within the tributary watershed and within other undeveloped areas of the City are required to meet the same or similar general water quality requirements as the proposed project, and other site-specific requirements that the LACDPW Flood Control Division, Watershed Management Division, and the LARWQCB may specifically identify for those projects. These requirements serve to avoid the potential for water quality impacts in the Santa Clara River and its tributaries.

10. CUMULATIVE MITIGATION MEASURES

No significant cumulative water quality impacts would occur; therefore, no cumulative mitigation measures are recommended.

11. SIGNIFICANT UNAVOIDABLE IMPACTS

Implementation of the identified mitigation measure would reduce project-specific water quality impacts to less than significant levels. Because all development within the 191-square-mile tributary watershed to the Santa Clara River must comply with federal, SWRCB, LARWQCB, LACDPW Watershed Management Division, and City of Santa Clarita requirements to ensure that water quality impacts do not exceed thresholds of significance, no cumulatively considerable impacts would occur. Therefore, no unavoidable significant impacts are anticipated.