

4.5 WATER QUALITY

Information presented in this section is based on the *Mountain Park Development Project Water Quality Technical Report* prepared by GeoSyntec Consultants (February 2005) (Appendix D), and the *SR-241/Weir Canyon Road Interchange Water Quality Assessment* prepared by GeoSyntec Consultants (January 2005) (Appendix Q of this EIR). Information is also based on the *Report on Ground Water-Related Issues for the Proposed Mountain Park Development* prepared by Geoscience Support Services, Inc. (March 2005) and included in Appendix C to this EIR. These studies are available for review as outlined in Section 2.5, Review of the Draft EIR.

Elements of the *Water Quality Technical Report* and this section would be utilized in the future development of a project Water Quality Management Plan (WQMP). A final project WQMP would be prepared for each Development Area or Tract in conjunction with the rough grading plan or final subdivision map, whichever occurs first.

4.5.1 EXISTING CONDITIONS

Watershed Description

The Mountain Park project site is located entirely within the Santa Ana River regional watershed and within the jurisdiction of the Santa Ana Regional Water Quality Control Board. It incorporates 2,686 acres of the approximately 3,379-acre Gypsum Canyon Creek local watershed, as well as a 146-acre West drainage area and a 155-acre East drainage area, and several off-site drainage areas that ultimately drain into the Lower Santa Ana River.

The Gypsum Canyon local watershed, which comprises the majority of the project site, is primarily undeveloped, with the exception of some modifications made by the sand and gravel extraction operations in the northeast corner of the site and the construction of SR-241. The main, central floor slopes gently upward at approximately two percent from north to south. The eastern and western sides, along with the southern walls of the canyon, mostly consist of steep slopes ranging from 30 to 75 percent. Gypsum Canyon Creek is ephemeral and expected existing peak flow rates range from 1,030 cfs for the 2-year storm to 3,230 for the 25-year storm.

The West drainage area comprises approximately 146 acres west of SR-241. The West drainage area includes two sub-drainage areas that fall outside the Gypsum Canyon watershed boundary. The southern sub-drainage area (West A) is an undeveloped area of approximately 114 acres adjacent to The Summit of Anaheim Hills property that drains into the existing storm drain system of The Summit. This residential development ultimately drains into Reach 2 of the Santa Ana River, downstream of Gypsum Canyon Creek via Weir Canyon Road. The northern sub-drainage area (West B) is an undeveloped approximately 32-acre area north of West A and adjacent to The Summit that drains north via a concrete lined drainage channel parallel to SR-241 and ultimately discharges into the Santa Ana River, Reach 2 under Santa Ana Canyon Road. The existing storm drain systems that receive drainage from both of the West sub-drainage areas are concrete-lined and do not include naturally-occurring drainage courses.

The East drainage area is comprised of approximately 155 acres and is located at the northeastern portion of the project site. It includes a 37-acre sub-drainage area (East A) tributary to the Santa Ana River through a culvert under SR-91, while the remaining sub-drainage area (East B – 118 acres) drains northeast towards Coal Canyon and discharges through a different culvert under SR-91 to the Santa Ana River. The existing quarry site extends approximately six acres into the East drainage area, thereby disturbing the watershed

boundary between Gypsum Canyon and the East drainage area, but not diverting East drainage area flows to Gypsum Canyon.

There are also three primary freeway drainage areas that fall outside the Gypsum Canyon watershed and collect flows within the project boundary and adjacent off-site areas including the SR-91/SR-241 drainage area, the SR-91/Gypsum Canyon Road drainage area, and the East SR-91 frontal slope drainage area. The existing north and south-bound lanes of the SR-241 drain towards a series of catch basins and/or concrete swales that eventually drain into the natural drainage courses on the eastern side of SR-241 before being discharged to a culvert.

Beneficial Uses of Receiving Waters

Receiving waters for the project include Gypsum Canyon Creek and the Santa Ana River. The Water Quality Control Plan for the Santa Ana River Basin (the Basin Plan) lists beneficial uses of major water bodies within this region, which are listed in Table 4.5-1. The Santa Ana River is divided into six reaches in the Basin Plan and flows from the project site enter the Santa Ana River at Reach 2. Gypsum Canyon Creek is not specifically designated with beneficial uses in the Basin Plan, but the Santa Ana River is listed and has specific beneficial uses assigned to it.

**TABLE 4.5-1
BENEFICIAL USES OF RECEIVING WATERS**

Water Body	Beneficial Uses							
	MUN	AGR	GWR	REC1	REC2	WARM	WILD	RARE
Santa Ana River Reach 2	E	P	P	P	P	P	P	P
P – Present or potential beneficial use E – Excepted from municipal drinking water source (MUN) designation Source: GeoSyntec, 2005.								

As identified in Table 4.5-1 above, the beneficial uses of Reach 2 of the Santa Ana River include the following:

- AGR – Agricultural supply waters used for farming, horticulture, or ranching
- GWR – Groundwater recharge for natural or artificial recharge of groundwater
- 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

Existing Receiving Water Quality

Water quality data at two monitoring stations in the Santa Ana River provided by the Orange County Water District (OCWD) are summarized in Table 4.5-2. These two monitoring stations include the following:

- Santa Ana River 0.9 mile below the Prado Dam (SAR-BELOWDAM-01) (5 miles upstream of the project site); and

- Santa Ana River at the Imperial Highway (SAR-IMPERIAL-01) (5.3 miles downstream of the project site).

**TABLE 4.5-2
MONITORING DATA FOR SANTA ANA RIVER REACH 2**

Parameter	Santa Ana River below Prado Dam (SAR-BELOWDAM-01)			Santa Ana River at Imperial Highway (SAR-IMPERIAL-01)		
	# of samples	Mean	Range	# of samples	Mean	Range
TSS (mg/L)	6	61	7.5 - 77	4	101	53 - 140
Turbidity (NTU) ¹	51	19	1 - 180	48	20	0.7 - 78
Nitrate (mg/L as N)	62	5.2	1.4 - 14	51	3.8	0.5 - 8.4
TKN (mg/L as N)	62	0.8	0.02 - 2.1	51	0.8	0.02 - 2.2
Orthophosphate ² (mg/L as P)	56	0.8	0.3 - 1.5	47	0.7	0.4 - 1.7
Dissolved Copper (µg/L)	10	6.5	2 - 16	10	10.5	2.1 - 35
Total Copper (µg/L)	5	10.2	4.1 - 14	7	11.6	5 - 22
Total Lead (µg/L)	5	0.7	0.1 - 2	6	0.5	0.1 - 2.2
Total Zinc (µg/L)	5	10	5 - 19	6	18	5 - 70
Hardness (mg/L as CaCO ₃)	56	240	81 - 281	48	266	193 - 515

¹ Turbidity is measured as "nephelometric turbidity units", which is a comparison of the intensity of light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions.
² Orthophosphate is the readily bioavailable portion of total phosphorous.

Source: GeoSyntec, 2005.

The data in Table 4.5-2 above were taken from January 2000 through June 2003, at least once per month, but occasionally more frequently. Monitoring occurred on 73 dates at the Prado Dam location and on 61 dates at the Imperial Highway location during this period; however, the number of samples for each constituent was generally less than the total number of sampling dates and varied depending on the constituent. These data include both wet weather and dry weather sampling. The monitoring data reflects the effect of managed flows from the Prado Dam. For instance, TSS concentrations are much lower than those typically observed in uncontrolled river systems in Southern California. TSS does increase slightly from the Prado Dam monitoring station downstream to the Imperial Highway station. The relatively high nitrate levels (on average from 3.8 to 5.2 mg/L as N) reflect that the flows in the river above Prado Dam are dominated by tertiary treated wastewater. OCWD manages an extensive network of constructed wetlands behind the Prado Dam to reduce nitrate levels in the river to below drinking water standards (10 mg/L as N). The ratio of dissolved copper to total copper shows that most of the copper is in the dissolved phase, which reflects the low TSS and turbidity concentrations. The high hardness values (averages ranging from 240 to 266 mg/L as CaCO₃) are typical of streams in Orange County.

Water quality data were also collected by the Orange County Environmental Management Agency (OCEMA) at a monitoring station in the Santa Ana River in close proximity to the project. These data are outdated, as they were taken in the late 1970s and early 1980s, and do not appear to reflect current conditions in the Santa Ana River as affected by the operation of the Prado dam.

Water quality data were also collected by OCEMA at a monitoring station in Gypsum Canyon Creek once in March 1992 and once in March 1995 during low flow conditions. Hardness was measured at 230 mg/L as CaCO₃ in 1992 and 450 mg/L as CaCO₃ in 1995. Measurements of trace metals indicated a total copper concentration of 5 µg/L, a total lead concentration of

5 µg/L, a total zinc concentration of 20 µg/L in 1992 and a dissolved copper concentration of 50 µg/L in 1995. Nitrate-nitrogen was not detected at the detection limit of 1 mg/L.

Existing Ground Water Quality

Historical land uses within Gypsum Canyon have been limited to cattle grazing, rocket testing, and clay, sand, and gravel mining. Mining operations have included Robertson's Ready Mix Sand and Gravel surface mine (gravel mining for cement and asphalt, formerly the Owl Rock Products facility) and several individual clay mining operations associated with Pacific Clay Products. Ground water in the project site is not currently used for drinking water or irrigation.

Several underground storage tanks (USTs) have been associated with the Robertson's Ready Mix site. These include USTs for the storage of gasoline, waste oil, and diesel fuel. The majority of the USTs have been removed under oversight by the City of Anaheim and/or the Orange County Healthcare Agency (OCHCA) and/or the Santa Ana Regional Water Quality Control Board (RWQCB). All remaining USTs would be removed by Robertson's during quarry reclamation under supervision by OCHCA. Trace concentrations of hydrocarbons have been observed in ground water near the UST sites, but no constituents have been detected above their Maximum Contaminant Levels (MCLs) in ground water.¹ Quarry reclamation activities by Robertson's will include additional site assessment and remediation, where applicable, of residual hazardous substances associated with USTs in the quarry area. Refer to Section 4.10, Hazards and Hazardous Materials, for additional information.

Ground water quality impacts have also been detected in the project site in association with the McDonnell Douglas rocket fuel test site, which occupied the central portion of Gypsum Canyon and a major tributary drainage to the east (shown on Exhibit 4.10-1). The site operated under the name of Astropower from 1966 to 1979 and tested various types of hydrazine, pentaborine and fluorine fuels at several test pads throughout the site. Activities included melting and forming solid propellants, testing solid propellants, and cleaning parts with chlorinated solvents. No underground storage tanks or pipelines were located at the facility with the exception of three septic tanks and leach lines.

In 1984, the Earth Technology Corporation collected ground water samples from six monitoring wells at the former McDonnell Douglas test site. The samples were analyzed for basic water quality parameters and total halogenated organic compounds. Halogenated compounds were detected in samples from two of the monitoring wells located downgradient of the test facility. Further sampling detected the following contaminants in the downgradient monitoring wells: methylene chloride, benzothiazole, carbon disulfide, isobutene, benzene, toluene, phenol, dimethylphthalate, trichloroethene (TCE), 1,1,1 trichloroethane (1,1,1-TCA), 1,1-dichloroethene (1,1-DCE), and 1,1-dichloroethane (1,1-DCA). Perchlorate has not been detected in any samples collected from monitoring wells within the project site.

Recent ground water samples were collected from five wells in the vicinity of the former McDonnell-Douglas site, in November and December 2003. With one exception, no volatile organic compounds (VOCs), petroleum hydrocarbons, or perchlorate were detected. Samples from Monitoring Well GB-8 were found to contain TCE at concentrations of 18 ppb (November 2003) and 19 ppb (December 2003). These concentrations are in excess of the 5 ppb MCL for this compound. Recent samples collected from two additional wells downgradient of the former McDonnell-Douglas site, however, did not contain detectable levels of TCE. At no time have

¹ The toxicity standard contained in the Basin Plan is a narrative standard, absent of numerical values. The MCLs are used as benchmarks in the absence of numerical standards.

any constituents other than TCE been detected in excess of their MCLs in any ground water within the project site.

Regulatory Setting

Surface Water Quality

Clean Water Act

In 1972, the Federal Water Pollution Control Act (later referred to as the Clean Water Act [CWA]) was amended to require National Pollutant Discharge Elimination System (NPDES) permits for the discharge of pollutants to waters of the United States from any point source. In 1987, the CWA was amended to require that the United States Environmental Protection Agency (EPA) establish regulations for permitting under the NPDES permit program of municipal and industrial stormwater discharges. The EPA published final regulations regarding stormwater discharges on November 16, 1990. The regulations require that municipal separate storm sewer system (MS4) discharges to surface waters be regulated by a NPDES permit. MS4s are a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains); and are owned or operated by a public body having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes. The MS4s are designated or used for collecting or conveying stormwater not wastewater or combined sewage.

In addition the CWA requires states to adopt water quality standards for water bodies and have those standards approved by the EPA. Water quality standards consist of designated beneficial uses for a particular water body (e.g., wildlife habitat, agricultural supply, fishing), along with water quality criteria necessary to support those uses. Water quality criteria are prescribed concentrations or levels of constituents – such as lead, suspended sediment, and fecal coliform bacteria, or narrative statements which represent the quality of water that supports a particular use. Because California had not established a complete list of acceptable water quality criteria, EPA established numeric water quality criteria for certain toxic constituents in the form of the California Toxics Rule (CTR) (40 CFR 131.38).

Water bodies not meeting water quality standards are deemed “impaired” and, under CWA Section 303(d), are placed on a list of impaired waters for which a Total Maximum Daily Load (TMDL) must be developed for the impairing pollutant(s). A TMDL is an estimate of the total load of pollutants, from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a “factor of safety” included). Once established, the TMDL is allocated among current and future pollutant sources to the water body. Neither Gypsum Canyon Creek nor the Santa Ana River below the confluence with Gypsum Canyon Creek (Reaches 1 and 2) are included on the 2002 303(d) list of impaired waterbodies or proposed for listing. There are no TMDLs established or in process for Gypsum Canyon Creek or Reaches 1 and 2 of the Santa Ana River.

California Porter–Cologne Act

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

California’s primary statute governing water quality and water pollution issues is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act). The Porter–Cologne Act grants the State Water Resource Control Board (SWRCB) and the RWQCBs broad powers to

protect water quality and is the primary vehicle for implementation of California's responsibilities under the federal Clean Water Act. The Porter-Cologne Act grants the SWRCB and the RWQCBs authority and responsibility to adopt plans and policies, to regulate discharges 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 plan (or Basin Plan) for its region. The regional plans are to conform to the policies set forth in the Porter-Cologne Act and established by the SWRCB in its state water policy. The Porter-Cologne Act also provides that a RWQCB may include within its region plan water discharge prohibitions applicable to particular conditions, areas or types of waste. The RWQCBs are also authorized to enforce discharge limitations, take actions to prevent violations of these limitations from occurring and conduct investigations to determine the status of the quality of any of the waters of the state. Civil and criminal penalties are also applicable to persons who violate the requirements of the Porter-Cologne Act or SWRCB/RWQCB orders.

MS4 Permit

The Santa Ana Regional Water Quality Control Board (SARWQCB) issued the third term NPDES permit (Order No. R8-2002-0010) governing the public storm drain system discharges in northern Orange County from the storm drain systems owned and operated by the northern Orange County cities (collectively "the Co-permittees") in January 2002. This permit will regulate storm water and urban runoff discharges from proposed development to constructed storm drain systems in the project area dedicated to the City of Anaheim. The NPDES permit specifies requirements for managing runoff water quality from new development and significant redevelopment projects, including specific sizing criteria for treatment Best Management Practices (BMPs).

To implement the requirements of the NPDES permit, the Co-permittees have developed a 2003 Drainage Area Management Plan (DAMP) that includes a New Development and Significant Redevelopment Program. This New Development and Significant Redevelopment Program provides a framework and a process for following the NPDES permit requirements and incorporates watershed protection/storm water quality management principles into the Co-permittees' General Plan process, environmental review process, and development permit approval process. The New Development and Significant Redevelopment Program includes a Model Water Quality Management Plan (WQMP) that defines requirements and provides guidance for compliance with the NPDES permit requirements for project specific planning, selection, and design of BMPs in new development or significant redevelopment projects.

Per the requirements in the DAMP and MS4 Permit, local jurisdictions, including the City of Anaheim, have adopted a Local Implementation Plan (LIP) containing policy and implementation documents for compliance with the DAMP/MS4 Permit. Section A.7 of the LIP contains the new development and redevelopment component based upon the model program contained in the DAMP. Using the local LIP as a guide, the City would consider a project-specific WQMP as part of the development plan and entitlement approval process. The information in this report would serve as a conceptual planning level WQMP for the Mountain Park Specific Plan project. This conceptual WQMP would provide the direction and framework for later preparation of the project level WQMP(s) prior to issuance of grading permits.

One of the requirements for WQMPs pursuant to the City's program is that all priority new development and significant redevelopment projects are required to develop and implement a project WQMP that addresses the following:

- Regional or watershed programs (if applicable)
- Routine structural and non-structural Source Control BMPs
- Site Design BMPs (as appropriate)
- Treatment Control BMPs (Treatment Control BMP requirements may be met through either project specific (on-site) controls or regional or watershed management controls that provide equivalent or better treatment performance)
- The mechanism(s) by which long-term operation and maintenance of all structural BMPs would be provided

The LIP requires treatment controls to be implemented for all priority projects in addition to other BMPs to meet requirements of the MS4 Permit to control the discharge of pollutants to the storm drain system or receiving water. The project-based treatment BMPs in the WQMP must meet certain criteria as per the LIP including specified design criteria and other selection factors based on the pollutants of concern expected from a project site. The sizing criteria options for volume-based BMPs in the MS4 Permit are as follows.

1. The volume of runoff produced from a 24-hour, 85th percentile storm event, as determined from the local historical rainfall record; or,
2. The volume of annual runoff produced by the 85th percentile, 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87 (1998); or,
3. The volume of annual runoff based on unit basin storage volume, to achieve 80 percent or more (Santa Ana Regional Board region) volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial (1993); or,
4. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile, 24-hour runoff event.

For this project, water quality basins sizes were estimated consistent with Option 2, the WEF Manual of Practice Method. This method was chosen because it takes into account drain time, which affects the level of treatment, and usually provides for treatment of a larger runoff volume.

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

1. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour for each hour of a storm event.
2. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two.

3. The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

Biofiltration BMP sizes for the proposed project were assumed for modeling purposes to be consistent with Option 2, or two times the 85th percentile hourly rainfall intensity as determined from the historical rainfall record at the Prado Dam rain gage, which was determined to be 0.21 inch per hour. This method was chosen because it would provide for treatment of a larger runoff volume.

NPDES General Construction Permit

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

Under this Construction General Permit, discharges of stormwater from construction sites with a disturbed area of one or more acres (effective March 2003) 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 completing and filing a Notice of Intent with the SWRCB. Each applicant under the Construction General Permit must ensure that a Stormwater Pollution Prevention Plan (SWPPP) is prepared prior to grading and implemented during construction. The primary objective of the SWPPP is to identify, construct, implement, and maintain BMPs to reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the construction site during construction.

General Waste Discharge Requirements for Construction Non-Storm Water Discharges

The Santa Ana Regional Water Quality Control Board has issued General Waste Discharge Requirements (WDRs) under Order No. R8-2003-0061, NPDES No. CAG 998001 (Dewatering General Permit) governing non-storm water construction-related discharges from activities associated with project development within the proposed project development areas. This permit addresses discharges from activities such as dewatering, water line testing, and sprinkler system testing. The discharge requirements include provisions mandating notification, testing, and reporting of dewatering and testing-related discharges. The General WDRs authorize such construction-related discharges so long as all conditions of the permit are fulfilled.

Caltrans NPDES Permit

The project is also subject to the requirements of the Caltrans NPDES Storm Water Permit (NPDES No. CAS000003) for the off-site impact areas within the State right-of-way. In addition, a Caltrans Encroachment Permit would be obtained prior to any work within the State right-of-way.

Basin Plan

The Water Quality Control Plan for the Santa Ana River Basin (Santa Ana Basin Plan) (SARWQCB, 1995 as amended) designates beneficial uses and water quality objectives for waterbodies in the region. Specific objectives are provided for the larger water bodies within the

region as well as general objectives for ocean waters, bays and estuaries, inland surface waters, and ground waters. In general, narrative objectives require that degradation of water quality does not occur due to increases in pollutant loads that would impact the beneficial uses of a water body. For example the Santa Ana 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 and do not apply directly to runoff; therefore, water quality criteria from the Basin Plan are utilized as benchmarks for comparison in the quantitative assessments and are also examined in the qualitative assessments in the Impacts Analysis section below. Table 4.5-1 above lists the beneficial uses of applicable receiving waters.

California Toxics Rule (CTR)

The CTR is a federal regulation issued by the USEPA providing water quality criteria for potentially toxic constituents in waters with human health or aquatic life designated uses in the State of California. Although not all waters receiving flow from the proposed project, such as Gypsum Canyon Creek, are designated with human health or aquatic life criteria, making the CTR inapplicable, other waters such as the Santa Ana River do have such designated uses making CTR applicable to them. CTR criteria are applicable to the receiving water body and therefore must be calculated based upon the probable hardness values of the receiving waters for evaluation of acute (and chronic) toxicity criteria. At higher hardness values for the receiving water, copper, lead, and zinc are more likely to be complexed (bound with) components in the water column. This in turn reduces the bioavailability and resulting potential toxicity of these metals. Monitoring data at two locations in the Santa Ana River near the project site (see Table 4.5-2 above) were evaluated for hardness. The 10th percentile hardness value of 221 mg/L as CaCO₃ was used to approximate CTR criteria and Basin Plan Site Specific Objectives for metals. The 10th percentile value is appropriate because it reduces the influence of low-range outliers, but is a more conservative estimate of hardness than the mean (253 mg/L as CaCO₃).

The CTR establishes acute and chronic surface water quality standards for certain waterbodies as discussed above. 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 storm water runoff (especially in Southern California), the acute criteria are considered to be more applicable to storm water conditions than chronic criteria and therefore are used in assessing project impacts. For example, the average storm duration in the Prado Dam rainfall record is 12.9 hours. The Basin Plan objectives and the CTR criteria do not apply directly to discharges of urban runoff, but rather apply within the specified receiving waters. Nonetheless, these criteria can provide useful benchmarks to assess the potential for project discharges to affect the water quality of receiving waters. In this document, these criteria are used as benchmarks to evaluate the potential environmental impacts of storm water runoff to the receiving waters of the project.

Ground Water Quality

Gypsum Canyon is located east of the Orange County Ground Water Basin and southwest of the Chino-Riverside Ground Water Basin, in the Gypsum Creek local watershed of the Santa Ana River regional watershed. The shallow bedrock and thin alluvial aquifers in the project area do not yield appreciable amounts of water to wells and, accordingly, are not considered a major source of ground water supply. Water supply to the Robertson's Ready Mix (Robertson's) sand and gravel mining operation has come from a well located near the Santa Ana River, to the north of Gypsum Canyon.

Ground water quality in the study area is under the jurisdiction of the SARWQCB. Specific ground water quality objectives have been established by the SARWQCB and are summarized in the Santa Ana River Basin Plan. Basin-specific objectives have been established for constituents such as total dissolved solids (TDS) and nitrate. Water quality constituents for which basin plan objectives are not specifically identified in this plan are regulated according to their respective maximum contaminant levels (MCLs) or State of California Department of Health Services Action Levels. For water quality standards in the Basin Plan, such as the toxicity standard, MCLs may be used as an alternative numeric benchmark in this chapter in the absence of a numeric standard.

Related Planning Programs

City of Anaheim General Plan

Green Element

The Green Element is a single, comprehensive plan to add more green areas throughout the City and protect and enhance its natural and recreational resources. In doing so, the Green Element combines two required elements of the General Plan—Open Space and Conservation—with an optional element, Parks, Recreation and Community Services. Conserving natural resources/natural open space is a fundamental part of the Green Element. Goals and policies of the Green Element related to water quality which are applicable to the project as well as an analysis of the consistency of the project with these goals and policies is provided in Table 4.5-22.

SCAG Regional Comprehensive Plan and Guide

The Water Quality Chapter core recommendations and policy options relate to the two water quality goals: to restore and maintain the chemical, physical, and biological integrity of the nation's water; and, to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of all waters. The project's consistency with relevant policies is provided in Table 4.5-22.

4.5.2 PROJECT IMPACT ANALYSIS

Thresholds of Significance

The criteria used to determine the significance of potential impacts related to water quality are based on the City's Initial Study and the Initial Study checklist form in Appendix G of the State CEQA Guidelines. The project would result in a significant impact related to water quality if it will:

1. Violate any water quality standards or waste discharge requirements.
2. Otherwise substantially degrade water quality.
3. Result in a potential for discharge of pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling, or storage, delivery areas, loading docks or other outdoor work areas.
4. Result in the potential for discharge which affects the beneficial uses (i.e., swimming, fishing, etc.) of the receiving waters.

5. Conflict with any applicable plan, policy or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect.

Impact Analysis

Project Methodology

Exhibit 4.5-1 indicates the project boundaries, impact areas, and drainage areas of the Mountain Park project site. The “project impact area” includes all area needed for project grading to accommodate proposed residential uses, infrastructure, and amenities, as well as additional area required for fuel modification beyond the grading limits. The four sub-drainage areas modeled for the *Water Quality Technical Report* (sub-drainage areas I, F, and E, and drainage area W from the draft Runoff Management Plan Volume I in Appendix C) are depicted in Exhibit 4.5-1 and encompass the total development area within the primary impact area; and the open space that surrounds the primary impact area within each sub-drainage area.

An analysis of the potential water quality impacts from implementation of the SR-241/Weir Canyon Road Interchange is also provided in this section. Potential water quality impacts associated with surface runoff from the Mountain Park Drive bridge overcrossing have been assumed in the analysis for the proposed project as the bridge surface was assumed in the calculations of impervious surfaces for the proposed project since Mountain Park Drive is included in the analysis. Additionally, the natural area to be disturbed during grading for the bridge overcrossing is within the project impact area.

The drainage areas modeled and assessed qualitatively for the *Water Quality Technical Report* do not include the reserve open space areas within the project boundary (sub-drainage areas A, B, C, D, G, and H in the draft Runoff Management Plan Volume I included in Appendix C). Since no development is proposed in the reserve open space areas, loads and concentrations of pollutants of concern in runoff from these areas would not be affected by the proposed project. The projected changes in loads associated with the project are captured by modeling the drainage basins containing the primary impact area. By disregarding the runoff volume and pollutant loads from the reserve open space, changes in concentrations for most constituents would be higher than would be the case if the total project area were modeled. In this respect, the projected changes in pollutant concentration are conservative (i.e., higher).

Approximately 808 acres within sub-drainage areas I, F, and E are tributary to Gypsum Canyon Creek in the existing site condition, as depicted in Exhibit 4.5-1. The proposed development within these drainage areas includes Development Areas 1, 2, 4, and 5; the City fire station, store concession, and adjacent public trail staging area (Development Area 6); a private recreation center; water reservoirs in Sectors 1 and 5; a pump station and a potential lift station in Development Area 5; and riding and hiking trails. The proposed grading plan would increase the Gypsum Canyon Creek drainage area by approximately 23 acres from portions of the East drainage area and the freeway drainage areas. The proposed grading plan for sub-drainage area F (Development Area 4) would incorporate approximately 22 acres that drain to the north to SR-91. This increase in area would be offset by the loss of 22 acres to the West drainage area from Development Area 4. These changes in area are illustrated in the Watershed Key Map on Exhibit 4.5-1.

Proposed development within the drainage area W (West A plus West B) includes Development Areas 3 and 7 and a water reservoir. The proposed grading plan would increase the drainage area W area by approximately 21 acres. The proposed boundary of Development Area 5 would extend east and north beyond the existing Gypsum Canyon watershed boundary into the East drainage area and the East SR-91 frontal slope drainage area. Approximately 10 acres within

the East drainage area would be graded to drain back towards the project's drainage facilities within Gypsum Canyon. Approximately seven acres of East A sub-drainage area would drain to Gypsum Canyon, while approximately three acres of East B sub-drainage area would drain to Gypsum Canyon. Of these 10 acres, approximately six acres are currently disturbed by the existing sand and gravel operations. The remaining acreage increase to Development Area 5 is due to a reduction in drainage area of the East SR-91 frontal slope drainage area.

Off-Site Project Features

Modeling and qualitative assessment was also conducted for the off-site project features that would add new impervious surface: the realignment and improvements to Gypsum Canyon Road, the improvements to Santa Ana Canyon Road, and the proposed Weir Canyon Road/SR-241 interchange. The locations of the off-site project features are depicted in Exhibit 4.5-1. The off-site project features are listed as sites A through I, and are thoroughly described in Section 3.0, Project Description. In summary, these features include the following: (1) removal of pavement at the eastern terminus of Weir Canyon Road at the western project boundary; (2) a sewer connection on the northern side of Santa Ana Canyon Road, west of Gypsum Canyon Road; (3) encroachment in the SR-91 right-of-way north of Development Area 5 for remedial fill slopes; (4) drainage improvements within Featherly Regional Park; (5) realignment and improvements to Gypsum Canyon Road between Santa Ana Canyon Road and Featherly Regional Park; (6) improvements to Santa Ana Canyon Road immediately west of Gypsum Canyon Road and the entry to the project site; (7) on-ramp and off-ramp improvements to the Gypsum Canyon Road/SR-91 interchange; (8) roadway improvements at the current terminus of Oak Canyon Road; and (9) the proposed Weir Canyon Road/SR-241 interchange.

Of these off-site project features, the realignment and improvements to Gypsum Canyon Road, the improvements to Santa Ana Canyon Road, and the proposed Weir Canyon Road/SR-241 interchange would add more than 5,000 square feet of new impervious surface area in the post-developed condition and therefore would require runoff treatment per the City's LIP.

Pollutants of Concern and Assessment Methodology

List of Pollutants of Concern

The pollutants of concern for the water quality analysis have been chosen based upon the regulations described above and the pollutants that are anticipated or potentially could be generated by the project (based on the proposed land uses) that have been identified by regulatory agencies as potentially adversely affecting receiving water quality.

As mentioned above, the receiving waters for the project are not identified as impaired and thus have no 303(d) listed constituents that would lead to primary pollutants of concern. The following pollutants were chosen as pollutants of concern for purposes of evaluating water quality impacts based on three jointly applied criteria: (1) pollutants that have impaired urban surface receiving waters in other areas; (2) prevalence in urban runoff; and (3) regulatory requirements and guidance, including the CTR, MS4 Permit, and DAMP/LIP. The pollutants of concern are as follows:

- *Sediments (TSS and Turbidity)* – Excessive erosion, transport, and deposition of sediment in surface waters can be a significant form of pollution resulting in major water quality problems. Sediment imbalances impair waters' designated uses. Excessive sediment can impair aquatic life by filling interstitial spaces of spawning gravels, impairing fish food sources, filling rearing pools, and reducing beneficial

- habitat structure in stream channels. In addition, excessive sediment can block water intake structures.
- *Nutrients (Nitrogen and Phosphorus)* – Nutrients are inorganic forms of nitrogen and phosphorus. There are several sources of nutrients in runoff from urban areas, mainly fertilizers in runoff from lawns, pet wastes, failing septic systems, atmospheric deposition from industry and automobile emissions. Nutrient over-enrichment is especially prevalent in agricultural areas, such as the agricultural areas upstream of Prado Dam, where manure and fertilizer inputs significantly contribute to nitrogen and phosphorus levels in streams and other receiving waters. Wastewater treatment plant discharges can also contribute significant nutrient loads to receiving streams. Eutrophication due to excessive nutrient input can lead to changes in periphyton, benthic, and fish communities; extreme eutrophication can cause hypoxia or anoxia, resulting in fish kills. As a result of eutrophication, algal scum, water discoloration, and the release of toxic metals from sediment can also occur.
 - *Trace Metals (Copper, Lead and Zinc)* – The primary sources of trace metals in storm water are typically commercially available metals used in transportation, buildings, and infrastructure. Metals are also found in fuels, adhesives, paints, and other coatings. Copper, lead, and zinc are the most prevalent metals typically found in urban runoff. Other trace metals, such as cadmium, chromium, and mercury, are typically not detected in urban runoff or are detected at very low levels; therefore, copper, lead, and zinc are used in this analysis to represent all metals potentially present in stormwater runoff from the project site. Metals are of concern because of toxic effects on aquatic life and the potential for ground water contamination. High metal concentrations can bioaccumulate in fish and shellfish and affect beneficial uses of a waterbody.
 - *Pathogens (Bacteria, Viruses, and Protozoa)* – Urban runoff may contain elevated levels of pathogenic organisms. Natural areas also have pathogens due to wildlife. The presence of pathogens in runoff may result in waterbody impairments. Elevated pathogens may be caused by the transport of animal or human fecal wastes or from plant matter or soils from the watershed. An indicator organism such as fecal coliform or fecal Enterococcus is used for pathogens due to the difficulty of monitoring for pathogens directly.
 - *Petroleum Hydrocarbons (Oil and Grease and PAHs)* – The sources of oil, grease, and other petroleum hydrocarbons in urban areas include spillage of fuels and lubricants, discharge of domestic and industrial wastes, atmospheric deposition, and runoff. Runoff can be contaminated by leachate from asphalt roads, wearing of tires, and deposition from automobile exhaust. Some petroleum hydrocarbons are biodegradable and non-toxic, but some hydrocarbons, such as polycyclic aromatic hydrocarbons (PAHs), can accumulate in aquatic organisms from contaminated water, sediments, and food and are toxic to aquatic life at low concentrations. Hydrocarbons can persist in sediments for long periods of time and result in adverse impacts on the diversity and abundance of benthic communities. Hydrocarbons can be measured as total petroleum hydrocarbons (TPH), oil and grease, or as individual groups of hydrocarbons, such as PAHs.
 - *Pesticides* – Pesticides (including herbicides, insecticides, and fungicides) are chemical compounds commonly used to control insects, rodents, plant diseases, and weeds. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

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

Other Pollutants

The DAMP/LIP includes two additional categories of pollutants of concern that are associated with urban runoff – organic compounds and oxygen-demanding compounds. The pollutants in these two categories are subsumed by the categories above.

Organic compounds include a wide range of chemicals such as pesticides, hydrocarbons, and solvents. Industrial land uses are not proposed for the project and therefore industrial chemicals such as solvents are not expected to be present in the runoff from the project at detectable levels. Hydrocarbons and pesticides are potential sources of pollution for the project and are believed to be the primary types of organic compounds likely to be present. As hydrocarbons and pesticides are addressed individually in this document, the general category of organic compounds is addressed through assessment of these constituents.

Oxygen demanding substances are compounds that can be biologically degraded by microorganisms in receiving waters. Compounds such as organic food wastes in trash and anhydrous ammonia in fertilizer are examples of the oxygen demanding compounds that may be present in urban runoff. Ammonia is typically detected at very low levels in urban runoff, likely due to the oxidation of ammonia to nitrate by bacteria in soil (nitrates are typically detected at higher concentrations than ammonia in urban runoff and do not exert an oxygen demand). Oxygen demand can be measured as “five-day biochemical oxygen demand” (BOD₅). This test involves the measurement of the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter. The mean BOD₅ reported in the LA County database in runoff from open space and high density single family residential land uses was 12 mg/L and 16 mg/L, respectively. In contrast, the typical BOD₅ concentration in a medium strength untreated domestic wastewater is 220 mg/L and, after secondary treatment, is 30 mg/L. As nutrients and trash are addressed individually in this document, the general category of oxygen demanding substances is addressed through assessment of these constituents.

Other pollutants that are listed in the Basin Plan, but are not of concern in urban runoff include un-ionized ammonia, cadmium, and boron. Un-ionized ammonia is a pollutant typical of wastewater treatment plant discharges but not of urban runoff. Cadmium, as mentioned above, was detected in only three percent of the monitoring data collected by Los Angeles County for residential land uses and thus is not expected to be found at levels of concern in project runoff. Boron is not considered a problem in drinking water until concentrations of 20 to 30 mg/L are reached. The Basin Plan objective for boron is 0.75 mg/L in surface waters to protect irrigation supplies for citrus crops. The mean boron concentration in residential runoff measured by Los Angeles County was 0.13 mg/L and is expected to be similarly low in project runoff. Thus, it is not a pollutant of concern for the project. Therefore, these constituents are not considered a pollutant of concern for this project.

Santa Ana River flows are a significant source of groundwater recharge which provides domestic supplies for the Orange County Water District. Total dissolved solids (TDS) are of concern in drinking water supplies; the Department of Health recommends that the concentration of TDS in drinking water be limited to 1,000 mg/L due to taste considerations. The TDS Basin Plan water quality objective for Santa Ana River Reach 2 is 580 mg/L. In comparison, the average TDS concentration in runoff from single family residential land use measured by LA County is 58 mg/L. Further, TDS typically declines with increases in impervious surface associated with development since TDS is often a product of runoff accumulating salts from exposed soils. Therefore, TDS is not considered a pollutant of concern for this project.

Assessment Methodology

The assessment methodology utilized for the surface water quality analysis contained in Chapter 7 of the *Water Quality Technical Report* (GeoSyntec, 2005) is summarized below. The application of the criteria to a decision regarding significance requires an integrated or “weight of evidence” approach, rather than a decision based on any one of the individual criterion.

Pollutant Loads and Water Quality Criteria

CEQA requires that any potentially substantial increases to pollutant concentrations and/or loads resulting from development must be evaluated for significant adverse impacts to receiving water quality by comparing pre-development and post-development water quality concentrations and loads. The Water Quality Technical Report analyzes the significance of potential impacts based on the results of water quality modeling and qualitative analysis that takes into account water quality controls or BMPs that are considered Project Design Features; such analyses are summarized in this Section 4.5.2.

Any increases of pollutant concentrations or loads resulting from development of the project are considered to be a potential indication of a significant adverse impact. If post-development pollutant loads and concentrations, with treatment in the BMPs specified as PDFs (including water quality basins), are predicted to remain the same or to be reduced compared to existing conditions, then it is concluded that the project would not cause a significant adverse impact to the ambient water quality of the receiving waters for that constituent. If pollutant loads or concentrations are predicted to increase, the potential impacts are assessed by (1) evaluating compliance of the project including PDFs with the MS4 Permit, DAMP/LIP, and General Construction Permit requirements, and (2) by evaluating the magnitude of the potential increase in pollutant load and/or concentration and through comparison to relevant benchmarks including water quality objectives and criteria.

Comparison of post-development water quality concentrations in the runoff discharge with benchmark receiving water quality criteria as provided in the Basin Plan and the CTR facilitates analysis of the potential for runoff to cause or contribute to exceedances of receiving water quality standards or adversely affect beneficial uses. The water quality criteria are considered benchmarks for comparison purposes only, as such criteria apply within receiving waters as opposed to applying directly to runoff discharges. However, as water quality criteria are established to protect beneficial uses of receiving waters, assessments that predict no violation of water quality criteria from project runoff also indicate that runoff from the project would not adversely affect beneficial uses of receiving waters.

Narrative and numeric water quality objectives contained in the Santa Ana Basin Plan apply to the project's receiving waters. Water quality criteria contained in the CTR provide concentrations that are not to be exceeded in receiving waters more than once in a three year

period for those waters designated with aquatic life or human health related uses. Projections of runoff water quality are compared to the acute CTR criteria (as discussed above), as stormwater runoff is associated with episodic events of limited duration, whereas chronic criteria apply to 4-day exposures which do not describe typical storm events in the project area, which last 13 hours on average.

Permit Requirements

Satisfaction of MS4 NPDES Permit requirements for new development, as defined in the DAMP/LIP, and construction-related requirements of the General Construction Permit establishes compliance with water quality regulatory requirements applicable to stormwater runoff.

Under the DAMP/LIP, the effectiveness of storm water quality controls are primarily based on two factors: (1) the amount of runoff that is captured by the controls; and (2) the selection of BMPs to address identified pollutants of concern. Selection and numerical sizing criteria for new development treatment controls are included in the MS4 Permit and the DAMP/LIP. If the project PDFs meet these criteria, it is concluded that no significant impacts would occur as the result of non-compliance with the MS4 NPDES permit.

The Construction General Permit requires the development and implementation of a SWPPP that describes BMPs meeting the Permit's technology-based standards. Compliance with these requirements during the construction phase of the project, including implementation of BMPs, as required by the Construction General Permit and Section 8 of the DAMP, is assessed to determine potential significance of impacts.

Water Quality Project Design Features

Site Design BMPs and Source Controls

Effective management of wet and dry weather water quality begins with limiting pollutant sources. Site design BMPs are practices designed to minimize runoff and the introduction of pollutants in storm water runoff. Site design principles that would be taken into account for the Mountain Park Specific Plan project are outlined in Section 4.5.3, Mitigation Program, and are discussed in greater detail in Section 5.1 of the *Water Quality Technical Report*. They include the following:

- Minimize Impervious Area and Impervious Areas Directly Connected to Storm Drains
- Selection of Construction Materials and Design Practices
- Conserve Natural Areas
- Protect Slopes and Channels

Structural and non-structural source control BMPs that would be implemented are discussed in greater detail in Section 4.5.3, Mitigation Program and in Section 5.2 of the *Water Quality Technical Report*. These source control BMPs were selected based on the land uses included in the project: single family attached and detached residential uses, roadways, parks, a fire station, a school, and open space. Non-structural source control BMPs include:

- Education for property owners, tenants and occupants
- Activity restrictions (Conditions, Covenants, and Restrictions)
- Common area landscape management
- Structural BMP maintenance
- Common area litter control
- Common area drainage facility inspection
- Street sweeping private streets and parking lots

Structural source control BMPs include:

- Storm Drain Stenciling and Signage
- Trash Area Design
- Efficient Irrigation
- Protect Slopes and Channels
- Hillside Landscaping
- Fire Station catch basin protection

Treatment Control BMPs

Storm water runoff from the majority of the disturbance area would be routed to one of nine water quality basins. Exhibit 3-10, Proposed Water Quality Implementation Plan, in Section 3, Project Description, depicts the drainage areas and proposed locations of the water quality basins. Collectively, the water quality basins would treat runoff from 488 acres within the disturbance area. The water quality basins would incorporate dry extended detention to provide water quality treatment for storm flows. Trash racks would be installed on the inlets into the water quality basins to aid in capturing trash and debris. Dry extended detention basins are designed with outlets that detain the runoff volume from the water quality design storm (e.g., the 85th percentile 24-hour event) for up to 48 hours to allow particles and associated pollutants to settle out. The water quality basin would also incorporate wetland vegetation in a low flow channel in the bottom of the basins for the treatment of dry weather flows and small storm events. Wetland vegetation provides one of the most effective methods for pollutant removal. As runoff flows through the wetland vegetation, pollutant removal would be achieved through settling and biological uptake of nutrients and dissolved pollutants within the wetland. These basins are not designed or anticipated to contain ponded, standing water for periods in excess of 48 hours. A conceptual illustration of an extended detention basin is provided in Exhibit 4.5-2.

As shown on the proposed grading plan, approximately 4.1 acres of roadway would be located down gradient of the proposed water quality basins and therefore would not drain to the basins. Runoff from this roadway area would be treated with filter strips (a type of biofilter) designed per the MS4 permit and DAMP/LIP requirements. Runoff from the water tank area located in

Development Area 7 would also be treated using a filter strip or a bioswale designed per MS4 requirements. A conceptual illustration of a filter strip is provided in Exhibit 4.5-3.

Development Area 3 includes a school site and adjacent community park. Modeling results assume implementation of PDF 5-1, requiring that an extended detention water quality basin sized per the MS4 permit and DAMP/LIP, or a different best management practice achieving equivalent treatment, would be provided for this area. BMP selection for the school and park would be finalized at the time of WQMP preparation for the school/park project subject to the requirement that the final treatment BMP selected for this area shall meet or exceed the treatment performance assumed in this report for the pollutants of concern.

Off-Site Project Features Water Quality Treatment

As previously discussed, the off-site project features are described in Section 3.3.4 of the Project Description. Offsite features receiving water quality treatment controls per regulatory requirements are those adding impervious surfaces, namely the improvements in Santa Ana Canyon Road, the proposed Weir Canyon Road/SR-241 interchange, and realignment and improvements to Gypsum Canyon Road. The treatment control BMPs provided for these off-site project features would be sized to include the drainage from the existing impervious area within the impacted area, as well as from the new impervious area, because the new impervious surface would result in an increase of more than 50 percent of the existing impervious surface area (as required by the DAMP/LIP).

Modeling results assume that biofiltration (either filter strips or bioswales) or BMPs achieving equivalent treatment would be provided for the off-site roadway improvements, which would be under the jurisdiction of Caltrans or the City of Anaheim, and that a water quality basin or BMP achieving equivalent treatment would be used for the school site, which would be under the jurisdiction of the school district and City. Final BMP selection for the off-site features would be finalized at the time of WQMP preparation in coordination with Caltrans, the School District, or the City who would assume ownership. Because the water quality basin and the bioswale were included in the modeled water quality analysis, the performance standards obtained by these BMPs must be met by whichever water quality treatment BMP is ultimately incorporated into the off-site features. The final treatment BMPs selected for these areas shall meet or exceed the treatment performance assumed in this report for the pollutants of concern.

Pollutants Modeled

A water quality model was used to estimate pollutant loads and concentrations for certain pollutants of concern for pre-development conditions, post-development conditions, and post-development conditions with PDFs for each stage of the project. The model is one of the few models that takes into account the observed variability in storm water hydrology and water quality. This is accomplished by characterizing the probability distribution of observed rainfall event depths, the probability distribution of event mean concentrations, and the probability distribution of 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.

The appropriate form of data used to address water quality are flow composite storm event samples, which are measures of the average water quality during the event. To obtain such data usually requires automatic samplers that collect data at a frequency that is proportionate to flow rate. Please refer to Appendix B of the Water Quality Technical Report (Appendix D of this

EIR) for a discussion of the data used for modeling this project². The pollutants for which there are sufficient flow composite sampling data are for modeling purposes:

- Total Suspended Solids (sediment)
- Total Phosphorus
- Nitrate Nitrogen
- Total Kjeldahl Nitrogen
- Dissolved Copper
- Total Lead
- Dissolved Zinc

Pollutants Addressed Without Modeling

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

Human pathogens are usually not directly measured in storm water 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 storm water, in part because storm water 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 storm water 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 event mean concentrations (EMCs); therefore, there is no reliable data for numerical assessments. Total coliform and fecal bacteria (fecal coliforms, fecal streptococcus, and fecal enterococcus) were detected in stormwater samples tested in Los Angeles County at highly variable densities (or most probable number, MPN) ranging between several hundred to several million cells per 100.

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. Therefore, there are limited statistically reliable data available on pesticides in urban runoff and no numerical assessment is possible. 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. Trash and debris sampling is not typically included in routine storm water 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 making the data unsuitable for modeling purposes.

² L.A. County data were used for modeling purposes as they are the most robust, land use-specific data base available.

Threshold 1: Would the project violate any water quality standards or waste discharge requirements?

Threshold 4: Would the project result in the potential for discharge which affects the beneficial uses (i.e., swimming, fishing, etc.) of the receiving waters?

On-Site Project Impacts

Impact Assessment for Modeled Pollutants of Concern

Only development areas of the project were modeled for water quality purposes. Areas that were not modeled within the project boundary are the areas that would be preserved as open space. Although the absolute values of the loads from the entire project area (inclusive of open space) are not provided, the predicted change in pollutant loads is representative of the entire project area because the loads from the open space areas remain unchanged. In general, the pollutant concentrations are not representative of the runoff from the entire project area, as the quantitatively assessed pollutant concentrations are lower in the runoff from open space than from the other land uses for all of the pollutants of concern except for TSS (which is higher in runoff from open space). The concentrations presented in this section for nutrients and trace metals are therefore conservative (i.e., higher than would actually occur after mixing with runoff from open areas). Also note that the modeling results account for pollutant reductions in the treatment PDFs only and do not account for the pollutant reductions that would occur due to the site design and source control PDFs making reported loads and concentrations conservative.

In general, the effects of runoff on receiving water quality depend on the receiving water type. Pollutant loads are important considerations for discharges to reservoirs or lakes, where pollutants tend to settle, accumulate, and perhaps be recycled. By contrast, discharges to streams, such as with the project site, result in pollutants that tend to be mixed and transported by high flows; therefore, the change in pollutant concentration is a more important measure of impact than changes in loads.

Storm Water Runoff Volumes

Stormwater runoff volume predictions are used to calculate the runoff pollutant loads (i.e., runoff volume x pollutant concentration = pollutant load). Table 4.5-3 shows the predicted changes in stormwater runoff mean annual volumes for the various drainage areas. Mean annual runoff volumes are expected to increase substantially with development.³ The increase can be explained by the change in percent imperviousness associated with urbanization. The percent imperviousness used in the water quality model for open space is zero percent (a conservative figure) and for parks is 15 percent, in contrast to a value of 40 percent to 55 percent for single family residential (depending on density) and 80 percent for multi-family residential. Runoff volume is directly proportional to percent imperviousness.

As illustrated in Table 4.5-3, mean annual runoff volumes are expected to increase substantially with development due primarily to increases in impervious surfaces. PDFs would include site design, source control and treatment control BMPs outlined in Section 4.5.3, Mitigation Program, in compliance with the requirements of the MS4 Permit and the DAMP/LIP. Most of the site design PDFs, especially the minimization of impervious area and the conservation of approximately 2,163 acres of natural areas within the project site, would reduce the impacts of

³ It should be understood that the calculation of mean annual runoff volumes for purposes of assessing runoff water quality differs in method and purpose from the calculation of peak runoff volumes for flood control analyses and storm drainage facility design.

the proposed development on increases in storm water runoff volume. The treatment control BMPs would allow for some runoff volume reduction as well. Based on BMP monitoring data in the International Stormwater BMP Database, a 20 percent reduction in storm water runoff volume was assumed to occur in the water quality basins. The effects of increased runoff volumes on drainage, flooding, and stream channel erosion are addressed in the *Runoff Management Plan* Volume I prepared by Fuscoe Engineering, summarized in Section 4.4, Hydrology, of this EIR, and included in Appendix C.

**TABLE 4.5-3
PREDICTED MEAN ANNUAL STORM WATER RUNOFF VOLUMES**

Drainage Area	Average Annual Runoff Volume (acre-ft)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	101	254	153
Drainage Area W	15	35	20
Off-site Project Features	4	5	1
Total Modeled Area	120	294	174
Source: GeoSyntec, 2005.			

Total Suspended Solids

Table 4.5-4 shows the predicted average annual total suspended solids (TSS) loads. Average annual TSS concentration results are shown in Table 4.5-5.

**TABLE 4.5-4
PREDICTED AVERAGE ANNUAL TSS LOADS**

Drainage Area	Average Annual TSS Loads (tons)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	36.0	26.0	-10.0
Drainage Area W	4.8	4.6	-0.2
Off-site Project Features	0.2	0.2	0.0
Total Modeled Area	41.0	30.0	-11.0
Source: GeoSyntec, 2005.			

**TABLE 4.5-5
PREDICTED AVERAGE ANNUAL TSS CONCENTRATIONS**

Drainage Area	Average Annual TSS Concentrations (mg/L)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	261	74	-187
Drainage Area W	239	97	-142
Off-site Project Features	40	23	-17
Total Modeled Area	251	76	-175
Source: GeoSyntec, 2005.			

Post-development, both TSS loads and concentrations are predicted to be much less than pre-development concentrations as urbanized landscaping, impervious surfaces, and PDFs would

tend to reduce sediment delivery compared to existing conditions, especially for the quarry area. Project PDFs include site design, source control and treatment control BMPs in compliance with the requirements of the MS4 Permit and the DAMP/LIP, but only treatment control BMPs have been modeled. Site design PDFs include the preservation of large amounts of natural areas, which would continue to provide higher levels of sediment to receiving waters than the permanently stabilized development areas. The treatment control water quality basins would reduce TSS in the runoff from the proposed development.

The predicted average annual TSS concentration in storm water runoff from the total modeled area with PDFs is compared to water quality criteria and the range of observed concentrations in the Santa Ana River in Table 4.5-6.

**TABLE 4.5-6
COMPARISON OF PREDICTED TSS CONCENTRATIONS WITH WATER
QUALITY CRITERIA AND OBSERVED CONCENTRATIONS IN SANTA ANA
RIVER**

Predicted Average Annual TSS Concentration: Total Modeled Area ¹ (mg/L)	Santa Ana Basin Plan Water Quality Objectives	California Toxics Rule Criteria	Range of Observed ² Concentrations in Santa Ana River Reach 2 (mg/L)
76	TSS levels shall not cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors	NA	7.5 - 140
¹ Modeled concentration for total modeled area, developed condition with PDFs. ² Includes both dry and wet weather data. NA not applicable Source: GeoSyntec, 2005.			

The predicted TSS concentration declines with development and is within the range of observed concentrations in Santa Ana River Reach 2 which is not presently impaired with regard to TSS, sediment or turbidity. Therefore, the storm water runoff from the proposed project should not cause a nuisance or adversely affect beneficial uses in the receiving waters. Based on the above impact analysis, the effect of the project on TSS loads and concentrations would be less than significant.

Nutrients

Post-development nitrogen concentrations are particularly important for the inorganic species of nitrogen, namely ammonia, nitrite, and nitrate, as these species are more available for photosynthesis by algae and other plants, which can lead to low dissolved oxygen conditions. Of these species, nitrogen is usually most prevalent in the nitrate form. Table 4.5-7 shows that mean annual nitrate-nitrogen loads are predicted to increase when compared to existing loads from the modeled area, although the model results predict a decrease in nitrate-N concentrations in the post-developed condition, depicted by Table 4.5-8. This difference between loads and concentrations is due to the increase in runoff volume in the post-developed condition.

Mean annual total Kjeldahl nitrogen (ammonia nitrogen plus organic nitrogen) (TKN) loads and mean annual TKN concentrations (Table 4.5-9 and Table 4.5-10) are predicted to increase in the post-developed condition with PDFs.

**TABLE 4.5-7
PREDICTED AVERAGE ANNUAL NITRATE LOADS**

Drainage Area	Average Annual Nitrate-Nitrogen Loads (lbs)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	269.0	420.0	151.0
Drainage Area W	46.0	63.0	17.0
Off-site Project Features	3.5	3.8	0.3
Total Modeled Area	319.0	486.0	167.0
Source: GeoSyntec, 2005.			

**TABLE 4.5-8
PREDICTED AVERAGE ANNUAL NITRATE CONCENTRATIONS**

Drainage Area	Average Annual Nitrate-Nitrogen Concentrations (mg/L)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	1.0	0.6	-0.4
Drainage Area W	1.2	0.7	-0.5
Off-site Project Features	0.3	0.3	0.0
Total Modeled Area	1.0	0.6	-0.4
Source: GeoSyntec, 2005.			

**TABLE 4.5-9
PREDICTED AVERAGE ANNUAL TKN LOADS**

Drainage Area	Average Annual TKN Loads (lbs)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	273	991	718
Drainage Area W	39	133	94
Off-site Project Features	12	15	3
Total Modeled Area	324	1138	814
Source: GeoSyntec, 2005.			

**TABLE 4.5-10
PREDICTED AVERAGE ANNUAL TKN CONCENTRATIONS**

Drainage Area	Average Annual TKN Concentrations (mg/L)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	1.0	1.4	0.4
Drainage Area W	1.0	1.4	0.4
Off-site Project Features	1.1	1.0	-0.1
Total Modeled Area	1.0	1.4	0.4
Source: GeoSyntec, 2005.			

Table 4.5-11 and Table 4.5-12 show the mean annual total phosphorus loads and concentrations for each of the drainage areas, as well as the total modeled area, respectively. The loads and concentrations in the post-developed condition with PDFs are predicted to increase when compared to existing loads and concentrations.

**TABLE 4.5-11
PREDICTED AVERAGE ANNUAL TOTAL PHOSPHORUS LOADS**

Drainage Area	Average Annual Total Phosphorus Loads (lbs)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	47.0	155.0	108.0
Drainage Area W	5.5	21.0	15.5
Off-site Project Features	3.4	3.8	0.4
Total Modeled Area	56.0	181.0	125.0
Source: GeoSyntec, 2005.			

**TABLE 4.5-12
PREDICTED AVERAGE ANNUAL TOTAL PHOSPHORUS CONCENTRATIONS**

Drainage Area	Average Annual Total Phosphorus Concentrations (mg/L)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	0.2	0.2	0.0
Drainage Area W	0.1	0.2	0.1
Off-site Project Features	0.3	0.3	0.0
Total Modeled Area	0.2	0.2	0.0
Source: GeoSyntec, 2005.			

Various factors can affect phosphorous loads. For example, urbanization would tend to reduce natural sources; however pet waste, landscape fertilization, and other human activities can increase phosphorous loadings. Examination of the LA County data and the Caltrans data⁴ indicates that total phosphorus concentrations are significantly higher in runoff from the quarry

4 Caltrans data were used for modeling of water quality related to quarry run-off as it is viewed as the best available and appropriate data.

(mean of 2.6 mg/L) than high density residential areas (mean of 0.39 mg/L), which is in turn higher than that from vacant areas (mean of 0.16 mg/L). The LA County data for vacant areas are used to represent open space in the water quality model.

Project PDFs include site design, source control and treatment control BMPs in compliance with the requirements of the MS4 Permit and the DAMP/LIP, but only treatment control BMPs are included in the model. Site design PDFs would minimize increases in nutrients through the preservation of natural areas and the use of native or drought tolerant plants in development area plant palettes. Source control PDFs that target nutrients include educational materials on the proper handling of fertilizers and pet waste management, common area landscape management consistent with DAMP Section 5.5 and the LIP, and the use of efficient irrigation systems in common areas. The treatment control water quality basins would also reduce nutrients in the runoff from the proposed development. The treatment control methods are discussed above in more detail under the heading Water Quality Project Design Features.

Nitrate-nitrogen concentrations predicted by the model are within the low end of the range of concentrations measured in Santa Ana River Reach 2 in Table 4.5-13.

**TABLE 4.5-13
COMPARISON OF PREDICTED NUTRIENT CONCENTRATIONS WITH
WATER QUALITY CRITERIA AND OBSERVED CONCENTRATIONS IN
SANTA ANA RIVER**

Nutrient	Modeled Average Annual Concentration: Total Modeled Area¹ (mg/L)	Santa Ana Basin Plan Water Quality Objectives²	Range of Observed Concentrations³ in Santa Ana Reach 2 (mg/L)
Nitrate-N	0.6	Narrative objective for algae in the Basin Plan: "Waste discharges shall not contribute to excessive algal growth in inland surface receiving waters."	0.5 – 14
TKN	1.4		0.02 – 2.2
Total Phosphorus	0.2		NA ⁴
¹ Modeled concentration for total development area, developed conditions with PDFs. ² There are no CTR criteria for Nutrients. The algae water quality objective is included because excessive nutrients can contribute to excessive algal growth. ³ Includes both dry and wet weather data. ⁴ Not available. Observed concentrations for orthophosphate ranged from 0.3 – 1.7 mg/L as P.			
Source: GeoSyntec, 2005.			

Predicted nitrate-nitrogen concentrations are well below the drinking water quality criteria of 10 mg/L as N. (Note that this criteria is referenced as a benchmark for comparative purposes only and does not apply to Santa Ana River Reach 2, as this reach is exempted from the municipal drinking water beneficial use). TKN concentrations predicted by the model are in the middle of the range of concentrations measured in Santa Ana River Reach 2. Predicted total phosphorus concentrations are below the range of measured orthophosphate concentrations, which represents the readily bioavailable portion of total phosphorus.

TKN consists of dissolved and particulate organic nitrogen and inorganic nitrogen in the form of ammonia (NH₃-N). Ammonia is a relatively bioavailable form of nitrogen but tends to be a small fraction of TKN in urban runoff. For example, data from mixed and multifamily residential areas in Los Angeles County indicate that NH₃-N is about 20 percent of TKN. The remaining approximately 80 percent of TKN is dissolved or particulate organic nitrogen and may include plant and animal proteins and animal urine and fecal matter. The organic portion of TKN is generally considered less bioavailable than the inorganic forms of nitrogen, and therefore the

significance of the increase in TKN loading is dependent on the extent to which this form of nitrogen accumulates in the sediments and is either sequestered there or is transformed into a more bioavailable form and recycled back into the water column. Since the receiving waters are streams, significant accumulation of TKN is not expected to occur in the sediments given the continuous movement of water. TKN concentrations predicted by the model are in the middle of the range of concentrations measured in Santa Ana River Reach 2.

Elevated loads of nutrients in the project runoff are caused by the increase in runoff volume in combination with the runoff concentrations. However, nutrient concentration in the receiving water is the most important indicator. Laboratory flume experiments demonstrate that changes in nutrient concentrations can affect the species composition of algae as well as total biomass produced. Since the predicted nutrient concentrations are within or below the observed range of nutrient concentrations in the Santa Ana River and these concentrations are not currently causing impairment due to algae growth, the predicted nutrient concentrations in runoff from the proposed development with PDFs should also not contribute to excessive algal growth. Therefore, the predicted nutrient concentrations in runoff from the project site would not affect the dissolved oxygen concentration in the receiving waters.

Based on the comprehensive site design, source control, and treatment control strategy and the comparison with available in-stream monitoring data, potential impacts associated with nutrients would be less than significant.

Copper, Lead, & Zinc

Projected loads and concentrations for the trace metals copper, lead, and zinc are presented in Table 4.5-14 through Table 4.5-19. Where possible the projections are for the dissolved form of the metal, as it is the dissolved form to which the CTR criteria apply. However, due to consistently low concentrations of dissolved lead in the available storm water 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. Based on LA County data, other trace metals, such as cadmium, chromium, and mercury, are typically not detected in urban runoff or are detected at very low levels.

**TABLE 4.5-14
PREDICTED AVERAGE ANNUAL DISSOLVED COPPER LOADS**

Drainage Area	Average Annual Dissolved Copper Loads (lbs)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	1.8	6.0	4.2
Drainage Area W	0.1	0.8	0.7
Off-site Project Features	0.3	0.1	-0.2
Total Modeled Area	2.2	6.9	4.7

Source: GeoSyntec, 2005.

**TABLE 4.5-15
PREDICTED AVERAGE ANNUAL DISSOLVED COPPER CONCENTRATIONS**

Drainage Area	Average Annual Dissolved Copper Concentrations (µg/L)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	6.7	8.7	2.0
Drainage Area W	2.0	8.1	6.1
Off-site Project Features	24	6.2	-17.8
Total Modeled Area	6.8	8.6	1.8
Source: GeoSyntec, 2005.			

**TABLE 4.5-16
PREDICTED AVERAGE ANNUAL DISSOLVED LEAD LOADS**

Drainage Area	Average Annual Total Lead Loads (lbs)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	1.0	3.5	2.5
Drainage Area W	0.1	0.5	0.4
Off-site Project Features	0.1	0.1	0
Total Modeled Area	1.2	4.1	2.9
Source: GeoSyntec, 2005.			

**TABLE 4.5-17
PREDICTED AVERAGE ANNUAL DISSOLVED LEAD CONCENTRATIONS**

Drainage Area	Average Annual Total Lead Concentrations (µg/L)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	3.7	5.1	1.4
Drainage Area W	3.3	5.3	2.0
Off-site Project Features	5.4	5.0	-0.4
Total Modeled Area	3.7	5.2	1.5
Source: GeoSyntec, 2005.			

**TABLE 4.5-18
PREDICTED AVERAGE ANNUAL DISSOLVED ZINC LOADS**

Drainage Area	Average Annual Dissolve Zinc Loads (lbs)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	14	34	20
Drainage Area W	1.3	3.9	2.6
Off-site Project Features	1.5	0.5	-1.0
Total Modeled Area	17	38	21
Source: GeoSyntec, 2005.			

**TABLE 4.5-19
PREDICTED AVERAGE ANNUAL DISSOLVED ZINC CONCENTRATIONS**

Drainage Area	Average Annual Dissolved Zinc Concentrations (µg/L)		
	Existing	Developed w/ PDFs	Change
Sub-drainage Areas I, F, & E	52	49	-3
Drainage Area W	32	41	9
Off-site Project Features	126	33	-93
Total Modeled Area	52	47	-5

Source: GeoSyntec, 2005.

Post-development dissolved copper, lead, and zinc loads are projected to increase compared to pre-development conditions, mainly due to the increase in runoff volumes. Post-development dissolved copper and lead concentrations are also predicted to increase compared to pre-development conditions, while total zinc concentrations are predicted to decrease for the total modeled area. Total zinc concentration is predicted to decrease for the Gypsum Canyon Creek drainage area and the off-site features, to increase for drainage area W, and to decrease overall. This result can be explained by the assumed effluent value for the biofiltration that would be used to treat roadways that do not drain to a water quality treatment basin within sub-drainage areas I, F, and E and the off-site project features. The assumed biofiltration effluent value, based on the median value of available effluent monitoring data for bioswales in the ASCE International Stormwater BMP Database, is 32.7 mg/L, while the assumed effluent value for detention basins is 53.8 mg/L. The assumed biofiltration effluent value is very close to the open space EMC model input for dissolved zinc (22 mg/L), so areas treated with biofiltration would exhibit zinc concentrations that are closer to existing condition concentrations than areas treated with water quality basins.

The proposed project includes site design, source control, and treatment control BMPs in compliance with the requirements of the MS4 Permit and the DAMP/LIP. Specific site design PDFs that would minimize increases in trace metals include directing drainage from impervious areas to landscaped areas or bioretention facilities and the selection of building material for roof gutters and downspouts that do not include copper or zinc. Source control PDFs that target metals include education for property owners, BMP maintenance, and street sweeping private streets and parking lots. The treatment control water quality basins and biofiltration areas would also reduce trace metals in the runoff from the proposed development when compared to the developed condition without PDFs. The treatment control methods are described in more detail in Section 4.5.3, Mitigation Program, under the discussion of Project Design Features.

Although the trace metal loadings and concentrations (excluding dissolved zinc) are predicted to increase overall, the comparison of post-development with PDFs condition to the Basin Plan site specific objectives and the CTR values shows that all trace metal concentrations are below the water quality objectives and criteria. A comparison of the post-developed with PDFs condition to the Santa Ana River Basin Plan, site-specific objectives, and the CTR values are depicted in Table 4.5-20.

The Basin Plan site specific objectives and the CTR criteria are based on hardness values observed in the receiving water. The 10th percentile hardness value (221 mg/L as CaCO₃) was used in the modeling as a conservative estimate that excludes the lowest outlier values; the mean observed hardness value was 253 mg/L as CaCO₃. The CTR criteria is considered to be the more appropriate measure of toxicity and provides the most valuable objective for comparison to the predicted modeled concentration. The predicted average annual

concentrations of dissolved copper, lead, and zinc are well below the CTR criteria for toxicity. Furthermore, toxicity testing performed as part of the Santa Ana River Use-Attainability Analysis (UAA) demonstrated that concentrations of dissolved copper of 37 µg/L and dissolved lead of 28 µg/L are non-toxic in Santa Ana River Water. The predicted concentrations for dissolved copper and lead from the proposed development with PDFs are well below the UAA benchmark values, as well as the Basin Plan values. As depicted in Table 4.5-20, predicted dissolved copper, lead, and zinc are within the range of observed values in Santa Ana River Reach 2.

**TABLE 4.5-20
COMPARISON OF PREDICTED TRACE METALS CONCENTRATIONS WITH WATER
QUALITY CRITERIA AND OBSERVED CONCENTRATIONS IN SANTA ANA RIVER**

Trace Metal	Predicted Average Annual Concentration: Total Modeled Area ¹ (µg/L)	Basin Plan Site-Specific Objective ² (µg/L)	California Toxics Rule Criteria ³ (µg/L)	Range of Observed Concentrations ⁴ in Santa Ana River Reach 2 (µg/L)
Dissolved Copper	8.6	19.8	28.4	2 – 35
Dissolved Lead	1.8 ⁵	4.6	152	0.1 – 1.7
Dissolved Zinc	47	NA	230	5 – 70 ⁶

¹ Modeled concentration for total modeled area, developed conditions with PDFs.
² Hardness = 221 mg/L as CaCO₃, based on 10th percentile SAR monitoring data. These criteria are very conservative; concentrations of dissolved copper of 37 µg/L and dissolved lead of 28 µg/L are non-toxic in Santa Ana River Water (SARWQCB, 1995).
³ Hardness = 221 mg/L, based on 10th percentile SAR monitoring data. Lead criteria is for total recoverable lead. These criteria are more recent standards than the Basin Plan objectives and are currently used by the SARWQCB in lieu of the Site Specific Objectives.
⁴ Includes both dry and wet weather data.
⁵ Dissolved lead was calculated by applying a partitioning coefficient (*f_d*) of 0.35 to modeled total lead concentration. The *f_d* value was determined by comparing total and dissolved lead concentrations for each land use (LA County, 2000; NSQD, 2003).
⁶ Observed values are as total zinc.
 NA - not applicable.

Source: GeoSyntec, 2005.

Similar to nutrients, increases in trace metal loadings are not of great concern in the receiving water aside from their effect on in-stream concentration due to the flowing nature of the receiving water. Trace metals are not expected to accumulate in the receiving waters due to the flushing effect of high flows in stream systems. Based on the comprehensive site design, source control, and treatment strategy and the comparison with the water quality benchmark values, the project is not expected to have significant impacts resulting from trace metals and potential impacts would be less than significant.

In summary, with the exception of TSS, loads of modeled constituents are predicted to increase under proposed conditions when compared to existing conditions. The increase in pollutant loads is primarily the result of the predicted increases in storm water runoff volumes resulting from increases in impervious area with development. Increases in pollutant loads in streams are important impacts in that they affect in-stream pollutant concentrations. Mean concentrations are predicted to decrease for total suspended solids, nitrates, and dissolved zinc. The modeled concentrations in runoff from developed areas with PDFs are below all applicable benchmark water quality objectives and criteria for the receiving waters and potential water quality impacts would be less than significant.

Impact Assessment for Pollutants and Basin Plan Criteria Addressed Without Modeling

Turbidity

Turbidity is a measure of suspended matter that interferes with the passage of light through the water or in which visual depth is restricted. The turbidity may be caused by a wide variety of suspended materials, which range in size from colloidal to coarse dispersions, depending upon the degree of turbulence. In lakes or other waters existing under relatively quiescent conditions, most of the turbidity would be due to colloidal and extremely fine dispersions. In rivers under flood conditions, most of the turbidity would be due to relatively coarse dispersions.

Turbidity may be caused by a wide variety of materials. Erosion of clay and silt soils may contribute to in-stream turbidity. Organic materials reaching rivers serve as food for bacteria, and the resulting bacterial growth and other microorganisms that feed upon the bacteria produce additional turbidity. Nutrients in runoff may stimulate the growth of algae, which also contribute 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 General Construction Activities permit, and those BMPs would control sediment and erosion along with other pollutants per the BAT/BCT standards (see discussion on Construction Activities under Threshold 2, below, and Section 7.6 of the *Water Quality Technical Report*). Additionally, fertilizer control and non-visible pollutant monitoring and trash control BMPs in the SWPPP would combine to help control turbidity.

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, especially from the existing quarry area, during storm events and would therefore decrease turbidity in the runoff from the project area. Project PDFs include source control (such as common area landscape management and common area litter control) and treatment control BMPs in compliance with the requirements of the MS4 Permit and the DAMP/LIP that would prevent or reduce the release of organic materials and nutrients to receiving waters. Based on implementation of the project PDFs and the construction-related controls, runoff discharges from the project should not cause increases in turbidity which would result in adverse affects to beneficial uses in the receiving waters. Based on these considerations, the impacts of the project on turbidity are less than significant.

Pathogens

Pathogens are viruses, bacteria, and protozoa that can cause illness in humans. Identifying pathogens in water is difficult as the number of pathogens is exceedingly small, thus requiring sampling and filtering large volumes of water. Traditionally, water managers have relied on measuring “pathogen indicators”, such as total and fecal coliform, as an indirect measure of the presence of pathogens. Although such indicators were considered reliable for sewage samples, indicator organisms are not necessarily reliable indicators of viable pathogenic viruses, bacteria, or protozoa in stormwater. See further Section 7.2.2 of *Water Quality Technical Report* (GeoSyntec, 2005).

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

There are extensive studies in which samples have been collected and analyzed for bacteria. Almost all of these data do not distinguish bacteria that may result from new development versus bacteria from other sources. Runoff from new development is just one of many potential sources of bacteria in urban runoff. Urban runoff reflects both anthropogenic and natural sources, and consists of runoff from existing development, new development, and open space or vacant land. The large majority of development areas monitored (including areas monitored by USEPA and other local regulatory agencies) do not have the myriad of project design features that have been incorporated into the proposed project. Consequently it is likely that runoff from the proposed project would not contain the same elevated levels of bacteria found in other urban runoff studies.

It is recognized that natural levels of bacteria are present in the project area receiving waters and that control of such natural sources of bacteria is neither required nor desired by regulatory authorities. Furthermore, available studies do not uniformly suggest that development increases indicator bacteria in runoff. For example, data collected by the City of San Diego (7,300 samples collected between 1987 and 1994) indicates that indicator bacteria densities were as high from open space at the head of the watershed as at the mouth of the bay, indicating similar indicator bacteria contributions from urban and non-urban sources. Another study conducted on coastal watersheds in Orange County found that bacteria concentrations in receiving waters downstream from urban/developed watershed are essentially the same as in receiving waters downstream from undeveloped watersheds. These and other studies (discussed further in section 7.2.2 of the Water Quality Technical Report) support the conclusion that the development of the proposed project is not expected to result in higher indicator bacteria levels in receiving waters relative to undeveloped conditions.

Fecal coliform standards contained in the Santa Ana Basin Plan were recommended in 1968 based upon epidemiological studies conducted in 1948, 1949, and 1950. Several studies since 1968 have questioned these criteria, recognizing that high levels of pathogen indicators due to natural sources of pollution do occur, and recommended use of alternatives. As an example of high naturally-occurring local pathogen levels, data obtained by Serrano Water District in Santiago Creek Reach 3 (upstream of Irvine Lake and largely undeveloped)⁵ on 3/17/03 shows a total coliform concentration of 80,000 MPN/100 mL (compared to MUN water quality criteria of 100 MPN/100 mL) and a corresponding concentration of fecal coliform of 700 MPN/100 mL (compared to REC 1 water quality criteria of 400 MPN/100 mL). Several studies indicate that public health risk (relevant to human-contact-related beneficial uses) does not correlate with elevated levels of bacterial indicators in receiving waters, even in waters impacted by urban runoff. USEPA has also indicated that non-human sources of fecal contamination need not be considered in determinations of water quality attainment, meaning that if non-human bacteria sources are shown to be minimal and exposure to such sources based on epidemiological studies do not appear to result in human health risks, bacteria standards may be interpreted to relate only to human-derived bacteria.

Because state agencies have recognized that it is neither required nor desirable to remove bacteria from natural sources from area waterways, the focus of assessment and of project PDFs is on anthropogenic sources of pathogens. Furthermore, the project, by converting some open land use to urban land use, would potentially reduce the pathogen contribution associated with such open spaces, including terrestrial wildlife, plant matter and soils. Therefore, the primary sources of fecal coliforms from the project would likely be pet wastes, and wildlife or vectors living inside the storm drain. Other sources of pathogens and pathogen indicators, such

⁵ Santiago Creek is nearby the proposed project but in a different watershed. Because the Santiago Creek watershed is not heavily developed, data from the area is informative for assessing conditions in the proposed project watershed.

as cross connections between sanitary and storm sewers and other human-derived bacteria, are unlikely given the new systems to be installed with the project, modern sanitary sewer installation methods, and inspection and maintenance practices.

The levels of bacteria in runoff from the proposed project would be reduced by virtue of:

- Source Controls, and
- Water Quality Basins.

The most effective means of controlling pet wastes as a source of pathogens is through source control, specifically education of pet owners, and providing products and disposal containers that encourage and facilitate cleaning up after pets. Storm drain cleaning practices help to remove pathogens that may have accumulated in the storm drain system. These and other litter control BMPs are described in Section 5 of the *Water Quality Technical Report* and Section 4.5.3 below.

There is some data on the effectiveness of water quality basins to treat pathogen indicators. The treatment processes known to be occurring in the extended detention basins involve sunlight (ultraviolet light) degradation, sedimentation of bacteria attached to particulates, and infiltration, all of which reduce pathogen levels. A study of microbial removals in various BMPs conducted in Florida indicated that shallow wet basins with a five day drain time achieved an approximately 98 percent removal efficiency for fecal coliform. The water quality basins proposed for the project would drain in two days or less, therefore the expected pathogen removal would be somewhat less than 98 percent. According to the California State Stormwater BMP Handbook for New Development and Redevelopment, water quality basins are considered to have a “medium” removal effectiveness. The Center for Watershed Protection maintains a National Pollutant Removal Performance Database that indicates that removal performance for various types of water quality basins ranges between 70 to 80 percent (CWP, 2000). The database indicated a removal of about 78 percent for dry extended detention basins. Data on wetponds (similar to the proposed design of the water quality basins) from the International Best Management Practice Database demonstrate an almost 80 percent reduction in median fecal coliform concentrations when comparing inlet to outlet concentrations. In addition, some PDFs, including the water quality basins, bioretention areas, and site design features, will also have the effect of reducing the volume of stormwater from the proposed project area, thereby reducing any associated bacteria. In summary, the PDFs would include source and treatment type controls which in combination would reduce pathogen indicator levels in stormwater runoff.

In summary, the proposed project, consistent with the DAMP/LIP requirements, includes a comprehensive set of source and treatment control PDFs selected to manage pathogen indicators. With this series of PDFs, the project would not result in appreciable changes in pathogens in the receiving waters compared to existing conditions, and potential water quality impacts related to pathogens are considered less than significant.

Hydrocarbons

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

Hydrocarbons are a broad class of compounds, most of which are non-toxic. Hydrocarbons are hydrophobic (low solubility in water), have the potential to volatilize, and most forms are biodegradable. A subset of hydrocarbons, 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 sources.

The concentration of hydrocarbons is expected to increase slightly under post-development project conditions with treatment of stormwater runoff in the PDFs. This predicted increase results from the increase in roadways, driveways, parking areas and associated vehicle use in the project area associated with the proposed residential development. The project PDFs are expected to prevent appreciable increases in hydrocarbon concentrations from occurring through removal of this pollutant. 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 and parking lots. Catch basin inserts with hydrocarbon absorption mats would be provided for the fire station and vehicle maintenance would be performed indoors. Although vehicle emissions and leaks are the primary source of hydrocarbons in urban areas, it is anticipated that vehicles in the proposed development would in general be well maintained and newer models which would help to limit emissions and leaks. Lastly, the vegetation and soils within the treatment control PDFs, including biofilters, would adsorb the low levels of emulsified oils in stormwater runoff, preventing visible film in the discharge or the coating of objects in the receiving water.

The majority of PAHs in storm water adsorb to the organic carbon fraction of particulates in the runoff, including soot carbon generated from vehicle exhaust. For example, a 1997 storm water runoff study by found that the dissolved phase PAHs represented less than 11 percent of the total concentration of PAHs.

Los Angeles County conducted PAH analyses on 27 stormwater samples from a variety of land uses in the period 1994-2000. 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. Moreover, the Los Angeles County data do not account for any treatment, whereas the treatment in the project's PDFs should result in a reduction in hydrocarbon concentrations inclusive of PAHs. The water quality basins and vegetated swales proposed as PDFs, which are designed to treat pollutants through settling and infiltration, would be effective at treating PAHs. This makes it very unlikely that impacts would occur to the receiving water due to hydrocarbon loads or concentrations. On this basis, the effect of the proposed project on petroleum hydrocarbon levels in local water bodies would be less than significant and the project would comply with MS4, DAMP and LIP requirements.

Pesticides

Pesticides can be of concern where past farming practices involved the application of persistent organochlorine pesticides, including DDT. Past land use in this project area consist primarily of gravel mining and did not include farming so would not likely have involved intensive pesticide applications. The focus therefore is on the post-development condition, where 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.

EPA has recently banned the pesticides diazinon and chlorpyrifos (commonly used urban pesticides) for most urban applications. EPA phased out the sale of chlorpyrifos in 2001 and the applications of diazinon to lawns, gardens, and turf was discontinued in December 2003. Per the EPA mandate, these pesticides would not be used for landscape maintenance in the

post-development conditions of the proposed project. Furthermore, data collected by L.A. County indicated that pesticides in urban runoff were seldom measured above detection limits.

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 controls are typically not as effective due to the persistent nature of many pesticides; also these compounds generally exhibit varied potential for biodegradation. However, most pesticides are relatively insoluble in water and therefore tend to adsorb to the surfaces of sediment, which would settle out of the water column in the water quality basins and biofiltration areas. Sedimentation therefore should achieve some removal of pesticides from stormwater in the PDFs 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 by-products, 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. Careful consideration would be made as to the appropriate type of pesticides for use on and around common areas within the project site. While some increase in pesticide use is likely to occur as the result of development 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 significant water quality impacts from occurring. Additionally, 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 recommended by the DAMP/LIP and included as PDFs, potential impacts associated with pesticides would be less than significant.

Trash and Debris

Urban development can generate 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 storm water, including leaves, twigs, and grass clippings. Debris can be associated with the natural condition. Trash and debris is often characterized as material retained on a five-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 can be eventually discharged to receiving waters. Trash and debris can also be mobilized by wind and transported directly into waterways. Trash and debris can impose an oxygen demand on the water body as organic matter decomposes.

Urbanization could significantly increase trash and debris loads if left unchecked. However, the project PDFs, including source control and treatment BMPs recommended by the DAMP/LIP, would minimize the adverse impacts of trash and debris. Source controls such as street sweeping, public education, fines for littering, and storm drain stenciling can be effective in reducing the amount of trash and debris that is available for mobilization during wet and dry weather events. Common area litter control would include a litter patrol, covered trash receptacles, emptying of trash receptacles in a timely fashion, and noting trash violations by tenants/homeowners or businesses and reporting the violations to the owner/HOA for investigation.

Catch basin inserts would be provided for parking lots. The water quality basins would have trash racks to prevent entry of larger materials into the structural BMPs in order keep maintenance costs in check (i.e., trash is easier to remove from racks as opposed to the water quality basins themselves). The project's PDFs would prevent the release of or remove floating materials, including solids, liquids, foam, or scum, from runoff discharges and would prevent impacts on dissolved oxygen in the receiving water due to decomposing debris. Based on these considerations, trash and debris would not significantly impact the receiving waters of the project.

In summary, concentrations of hydrocarbons and pesticides are expected to increase, concentrations of trash and debris may increase, and concentrations of pathogens are not expected to appreciably change in the receiving waters under proposed conditions when compared to existing conditions, but none of the qualitatively assessed constituents are expected to significantly impact receiving waters due to the implementation of the project PDFs in compliance with the MS4 Permit and the DAMP/LIP. Therefore, potential impacts from the project on water quality would be less than significant.

MS4 Permit Requirements for New Development as Defined in the DAMP/LIP

Project PDFs include site design, source control and treatment control BMPs in compliance with the requirements of the Orange County NPDES Permit (Order No. R8-2002-0010) and the DAMP/LIP. Treatment control PDFs include eight water quality basins that would treat runoff from all urban areas of the project. Sizing criteria contained in the MS4 Permit would be met for all treatment control BMPs, including biofiltration PDFs.

Per the MS4 permit, the water quality basins within the proposed project would be designed to contain a "water quality pool" sized to meet the maximized storm water capture volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87. The mean depth of storms greater than or equal to 0.1 inches depth (a 6 hour dry period is used to define storms) measured at Prado Dam used to size the detention facilities is 0.75 inches. The water quality pool is designed to drain in 36 hours. Table 4.5-21 lists the estimated water quality basin sizes to be incorporated into the developed portion of the project as a project design feature. Appendix C of the *Water Quality Technical Report* (Appendix D of this EIR) provides further detail on the treatment BMP sizing per the criteria contained in the MS4 Permit and the DAMP/LIP.

According to the proposed grading plan, approximately 4.1 acres of roadway would be located downgradient of the proposed water quality basins and therefore would not drain to the basins. Runoff from this roadway area would be treated with filter strips (a type of biofilter) designed per the MS4 permit and DAMP/LIP requirements. Runoff from the water tank located in Development Area 7 would also be treated using a filter strip or a bioswale designed per MS4 requirements.

Development Area 3 includes an elementary school site and an adjacent community park. Modeling results presented in Chapter 6 assume that an extended detention water quality basin sized per the MS4 permit and the DAMP/LIP, or a different BMP achieving equivalent treatment, would be provided for this area. BMP selection for the school and park would be finalized at the time of WQMP preparation for the school/park project subject to the requirement that the final treatment BMP selected for this area shall meet or exceed the treatment performance assumed in this report for the pollutants of concern.

**TABLE 4.5-21
SIZE ESTIMATIONS FOR WATER QUALITY BASINS**

Water Quality Basin Name	Tributary Area (acres)	Percent Imperviousness (percent)	WEF Rv ¹	Water Quality Basin Volume (acre-ft) ²
1	95.6	32.2	0.24	2.5
2	45.4	30.7	0.23	1.2
3a	19.2	42.3	0.29	0.6
3b	33.8	39.4	0.28	1.0
3c	2.5	72.0	0.51	0.14
4a	35.0	52.7	0.36	1.4
4b	38.8	47.8	0.33	1.4
5a	147	65.9	0.46	7.4
5b	52.9	58.1	0.39	2.3
5c	37.9	46.9	0.32	1.3
¹ Runoff coefficient estimate from the WEF Manual of Practice maximized storm water capture volume. ² Detention basin sizing based on WEF Method with mean storm depth of 0.75 inch and 36-hour drain time. Source: GeoSyntec, 2005.				

The site design, source control, and treatment control BMP PDFs would work in concert to control all of the pollutants of concern in runoff from the project, resulting in less than significant water quality impacts.

Dry Weather Impacts

The above discussion focused on the changes in water quality during storm events. However, water quality effects during dry weather conditions also are important, especially given that much of the dry weather flows in this region originate from human activity. As discussed in Section 4.4, Hydrology, it is not expected that there would be any appreciable dry weather flows out of the water quality basins. Infiltration and evapotranspiration within the PDFs would adequately reduce the potential for dry-weather flow discharges from the project to downstream areas, and therefore potential impacts to habitat due to dry-weather flows are considered insignificant. The following discussion addresses water quality in the dry weather flows into the PDFs.

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 this 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 would be controlled utilizing evapotranspiration sensors to minimize excess watering. In addition, educational programs and distribution of materials (source controls) would emphasize appropriate car and equipment washing locations (on pervious surfaces) and techniques (minimizing usage of soap and water), encourage low impact landscaping and appropriate

watering techniques, and discourage driveway and sidewalk washing. Fertilizer and pesticide usage in common areas, the recreation center, the fire station, and other public areas would be consistent with County Management Guidelines for Use of Fertilizers (DAMP Section 5.5). 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 water quality basins would also incorporate wetland vegetation in a low flow channel along the bottom of the basin for the treatment of dry weather flows and small storm events. Water cleansing is a natural function of wetland 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 solar degradation. Any oil and grease would be effectively adsorbed by the vegetation and soil. Dry weather flows and small storm flows would infiltrate into the bottom of the basin after receiving treatment. The water quality basins would not be designed to have open pools of standing water.

The principal human-activity sources of pathogens in dry weather flows is leaking septic systems, cross-connections between sanitary sewers and storm drains, or leakage from the sanitary sewer system into groundwater, which feeds the dry and non-storm flows. However, the proposed project would be new development with new storm drains and sanitary sewer systems, which is expected to have minimal, if any, leakage. Based on the factors discussed above, the impact of the project on dry weather water quality would be less than significant.

Off-site and Caltrans-related Project Feature Impacts

Off-site features, including roadway improvements within Caltrans right-of-way requiring water quality treatment controls per regulatory requirements are those adding impervious surfaces, namely the improvements in Santa Ana Canyon Road, and realignment and improvements to Gypsum Canyon Road. The treatment control BMPs provided for these off-site project features would be sized to include the drainage from the existing impervious area within the impacted area, as well as from the new impervious area. These facilities would be required to incorporate BMPs that meet or exceed the modeled performance standards included in the Water Quality Technical Report. With incorporation of BMPs and based on comparison with receiving water quality benchmarks, off-site water quality impacts from these facilities would be less than significant. The proposed SR-241/Weir Canyon Road interchange and Mountain Park Drive bridge overcrossing are discussed below.

It should be noted that other off-site project features, and other project features within Caltrans right-of-way described in Sections 3.3.4 and 3.3.5, would not add new impervious surface area in the post-development condition and would not require runoff treatment.

Unlike other off-site project features which primarily involve improvements to existing roadway facilities, the construction of the SR-241/Weir Canyon Road interchange and Mountain Park Drive bridge overcrossing introduce new transportation facilities into the project area. Following is an analysis of potential water quality-related impacts associated with these facilities based on the *Water Quality Assessment* prepared by GeoSyntec (January 2005) and included in Appendix Q to this EIR.

Storm Water Runoff Volumes

The SR-241/Weir Canyon Road interchange and Mountain Park Drive bridge overcrossing are transportation improvements associated with the existing SR-241 that would be implemented as part of the proposed project. Runoff volumes are expected to increase with development due to the increase in impervious area. This increase can be explained by the change in percent imperviousness associated with the proposed interchange and bridge crossing.

As previously noted, the increase in impervious area for the bridge overcrossing was assumed in the analysis for the project. Following is an analysis of potential impacts from the interchange. The percent imperviousness for open space is zero percent compared to a percent imperviousness of 90 and 100 for roadway and ramps, respectively. Runoff volume is directly proportional to percent imperviousness.

Total Suspended Solids and Nutrients

TSS loads are expected to decrease between existing conditions and developed conditions with PDFs. Post-development TSS concentrations (67 mg/L) are predicted to be much less than pre-development concentrations (234 mg/L) because impervious surfaces would reduce sediment delivery when compared to existing conditions. The predicted TSS concentration in storm water runoff from the total modeled area with PDFs is within the range of observed concentrations in Santa Ana River Reach 2 (7.5 – 140 mg/L). Therefore, TSS in the storm water runoff from the proposed interchange is expected to decline with development and should not cause a nuisance or adversely affect beneficial uses in the receiving waters.

Post-development nitrogen concentrations are particularly important for the inorganic species of nitrogen, namely ammonia, nitrite, and nitrate, as these species are more available for photosynthesis by algae and other plants. This can lead to low dissolved oxygen conditions. Of these species, nitrogen is usually most prevalent in the nitrate form. Mean annual nitrate-nitrogen loads are predicted to slightly increase when compared to existing loads from the modeled area. However, the model results predict a decrease in the existing nitrate-N concentrations of 1.2 mg/L to 0.4 mg/L in the post-developed condition. This is due to the increase in runoff volume in the post-developed condition. Predicted nitrate-nitrogen concentrations are within the low end of the range of concentrations measured in Santa Ana River Reach 2 (0.5 – 1.4 mg/L) and are well below the drinking water quality criteria of 10 mg/L as N.⁶

Mean annual total Kjeldahl nitrogen (ammonia nitrogen plus organic nitrogen) (TKN) loads are predicted to increase from 1.6 lbs/yr to 5.5 lbs/yr with project PDFs in place, while mean annual TKN concentrations are expected to remain unchanged in the post-developed condition with PDFs at 1.0 mg/L. TKN concentrations predicted by the model are in the middle of the range of concentrations measured in Santa Ana River Reach 2 (0.02 – 2.2 mg/L).

The mean annual total phosphorus loads (1.3 lbs/yr) and concentrations (0.2 mg/L) in the post-developed condition with PDFs are predicted to increase when compared to existing loads (0.2 lb/yr) and concentrations (0.1 mg/L). Examination of the LA County data used to estimate the water quality runoff indicates that total phosphorus concentrations are slightly higher in runoff from roadways than from vacant areas. The LA County data for vacant areas are used to represent open space in the water quality model. Predicted total phosphorus concentrations are

⁶ Note that this criteria is referenced as a benchmark for comparative purposes only and does not apply to Santa Ana River Reach 2, as this reach is exempted from the municipal drinking water beneficial use.

below the range of measured orthophosphate concentrations, which represents the readily bioavailable portion of total phosphorus.

Elevated loads of nutrients in the project runoff are caused by the increase in runoff volume in combination with the runoff concentrations. The nutrient concentration in the receiving water is the important factor as the receiving waters for the interchange are stream systems with moving flows as opposed to lake or pond systems where pollutants may more readily accumulate. Based on a study by Cushing and Allan (2001), laboratory flume experiments demonstrate that changes in nutrient concentrations can affect the species composition of algae as well as total biomass produced. Since the predicted nutrient concentrations are within or below the observed range of nutrient concentrations in the Santa Ana River and these concentrations are not currently causing impairment due to algae growth, the predicted nutrient concentrations in runoff from the proposed interchange with PDFs would not contribute to excessive algal growth and therefore would not lower the dissolved oxygen concentration in the receiving waters.

Based on the above impact analysis, the effect of the proposed interchange on TSS loads and concentrations is less than significant. The potential impacts associated with nutrients are predicted to be less than significant due to treatment control strategies and comparisons with available in-stream monitoring data.

Copper, Lead, & Zinc

Post-development dissolved copper, lead, and zinc loads (0.03 lbs, 0.03 lbs, and 0.2 lbs, respectively) are projected to increase compared to pre-development conditions (0 lbs, 0.005 lbs, and 0.05 lbs, respectively) due to the increase in runoff volume and the higher metal concentrations associated with runoff from roadways. Post-development dissolved copper and lead concentrations (5 mg/L each) are predicted to increase compared to pre-development conditions (2 mg/L and 3 mg/L, respectively), while total zinc concentrations are not expected to significantly change (33 mg/L in the post-development condition versus 32 mg/L in the pre-development condition).

The proposed interchange area incorporates less than one percent of the total area draining to Gypsum Canyon Creek. Although the concentrations of total lead and dissolved copper increase for development with PDFs, the impacts are not significant when considered in the context of the total drainage to Gypsum Canyon Creek. The project would incorporate PDFs including site design, source control and treatment control BMPs in compliance with the requirements of the MS4 Permit and the DAMP/LIP.

Predicted trace metals concentrations are within the range of observed values in Santa Ana River Reach 2 and meet Basin Plan site-specific objectives and CTR values. (Refer to Table 6-7 in the *Water Quality Technical Report*). Similarly to nutrients, increases in trace metal loadings are not of concern in the receiving water aside from their effect on in-stream concentration. Trace metals are not expected to accumulate in the receiving waters due to the flushing effect of high flows in stream systems.

Based on the comprehensive site design, source control, and treatment strategy incorporated into the project as a whole and the comparison with the water quality benchmark values, the proposed interchange is not expected to have significant impacts resulting from trace metals.

Turbidity

In the post-development condition, placement of impervious surfaces would serve to stabilize soils and to reduce the amount of natural erosion that may occur from the project area during

storm events and would therefore decrease turbidity in the runoff from the project area. Upon implementation of the PDFs, runoff discharges from the proposed interchange should not cause increases in turbidity which would result in adverse affects to beneficial uses in the receiving waters. Based on these considerations, the impacts of the project on turbidity are considered less than significant.

Pathogens

Since the proposed interchange is primarily roadway, sources such as septic systems and pet wastes are not expected to be a contributing factor. Development of the site into roadway could reduce natural sources of pathogens by eliminating some habitat, which attracts birds and terrestrial wildlife. Therefore, the proposed interchange is predicted to decrease pathogen levels primarily by reducing natural source through conversion of open space to roadway. Based on these considerations, the impacts of the project on pathogens are not expected to significantly impact the receiving waters of the project.

Hydrocarbons

The proposed interchange is expected to increase the concentration of hydrocarbons in stormwater runoff. This predicted increase results from the increase in roadways and vehicle use in the project area. The PDFs are expected to prevent appreciable increases in hydrocarbon concentrations from occurring through removal of this pollutant. Source control PDFs that address petroleum hydrocarbons include BMP maintenance and educational materials on carpooling, public transportation alternatives to driving. Although vehicle emissions and leaks are the primary source of hydrocarbons in urban areas, it is anticipated that vehicles in the proposed development would in general be well maintained and newer models which would help to limit emissions and leaks. Lastly, the vegetation and soils within the treatment control PDFs, (such as biofilters), would adsorb the low levels of emulsified oils in stormwater runoff, preventing visible film in the discharge or the coating of objects in the receiving water. On this basis, the effect of the proposed project on petroleum hydrocarbon levels in local water bodies is considered less than significant.

Pesticides

Source control measures such as common area landscape management and efficient irrigation are the most promising strategies for controlling the pesticides that would be used post-development. In order to minimize the potential generation and transport of dissolved constituents, landscaped areas of the interchange would utilize drought tolerant vegetation that requires little watering and chemical application.

Structural controls are typically not as effective due to the persistent nature of many pesticides. In addition, these compounds generally exhibit varied potential for biodegradation. However, most pesticides are relatively insoluble in water and therefore tend to adsorb to the surfaces of sediment, which would settle or be filtered in the biofiltration BMPs. Sedimentation and filtration therefore should achieve some removal of pesticides from stormwater in the PDFs. On this basis, the potential impacts associated with pesticides are not expected to significantly impact the receiving waters of the project.

Trash and Debris

The development of the proposed interchange could potentially increase the amount of litter being deposited on the roadway shoulders. However, the project PDFs, including treatment BMPs recommended by the DAMP, would minimize the adverse impacts of trash and debris.

Based on these considerations, trash and debris are not expected to significantly impact the receiving waters of the project.

Dry Weather Impacts

In order to minimize the potential generation and transport of dissolved constituents, landscaped areas of the interchange would utilize drought tolerant vegetation that requires little watering and chemical application.

Filtration and sedimentation of particulates are the major removal mechanisms in the biofiltration BMPs. However the performance is enhanced as the biofiltration BMP allows the more mobile pollutants to come into contact with vegetation and soils containing bacteria that adsorb, metabolize and transform pollutants, especially oil and grease, nutrients and trace metals. The biofiltration vegetation would also take up nutrients in any low flows in their root system. Dry weather flows and small storm flows would infiltrate into the subsurface after receiving treatment in the biofiltration BMP. Furthermore, since the proposed interchange is primarily roadway, sources such as septic systems and pet wastes are not expected to be a contributing factor. On this basis, the impact of the project on dry weather water quality is considered less than significant.

Protection of Beneficial Uses

As discussed above, the proposed project would have a less than significant impact on water quality because of compliance with water quality standards and applicable permits and implementation plans. The project would not exceed water quality objectives established to protect beneficial uses; therefore, beneficial uses would be protected. This is because water quality objectives and compliance criteria are established for the purpose of protecting beneficial uses.

Threshold 2: Would the project otherwise substantially degrade water quality?

On-Site Project Impacts

Construction Activities

The potential impacts of construction activities, construction materials, and non-stormwater runoff on water quality focus primarily on sediment (TSS and turbidity). Construction-related activities that are primarily responsible for sediment releases are related to exposing soils to potential mobilization by rainfall/runoff and wind. 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 that are also of concern during construction relate to construction materials and non-stormwater flows and include waste construction materials; chemicals, liquid products, and petroleum products used in building construction or the maintenance of heavy equipment; and concrete-related waste streams. These non-sediment related pollutants have the potential to be released during various construction-related activities, including material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas, loading docks or other outdoor work areas.

Construction impacts would be minimized through compliance with the General Construction Permit. This permit requires the development and implementation of a SWPPP, which must include erosion and sediment control BMPs that would meet or exceed measures required by

the General Construction Permit, as well as BMPs that control the other potential construction-related pollutants. A SWPPP would be developed as required by, and in compliance with, the General Construction Permit and City of Anaheim Standard Conditions. Erosion control BMPs are designed to prevent erosion, whereas sediment controls are designed to trap sediment once it has been mobilized. The General Permit requires the SWPPP to include a menu of BMPs to be selected and implemented based on the phase of construction and the weather conditions. BMPs to be included in this menu include, among others: slope stabilization using rock or vegetation, re-vegetation, hydro-seeding or using tackifiers on exposed areas, installation of energy dissipators, drop structures, catch basin inlet protection, construction materials management, and cover and containment of construction materials and wastes. This permit requires BMP selection, implementation, and maintenance during the construction phase of development.

The construction phase of the project would involve implementation of BMPs consistent with the technology-based standards of the Construction General Permit, and as required by Section 8 of the DAMP/LIP, and the general waste discharge requirements in the Dewatering General Permit. Erosion and sediment transport and transport of other potential pollutants from the project site during the construction phase would be reduced or prevented through implementation of the two General Permits and preparation of the SWPPP that include BMPs meeting the General Permit's technology standards in order to prevent or minimize environmental impacts and to ensure that discharges during the construction phase of the project would not cause or contribute to any exceedance of water quality standards in the receiving waters.

Construction on the proposed 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. Given the relatively shallow ground water conditions in some portions of the proposed development area, an evaluation of the relationship of proposed excavation activities to the ground water table was conducted. Ground water encounters and associated dewatering are expected during construction in three areas, one in Development Area 4 and two in Development Area 5.

In general, the General Construction Activity Permit issued by the State Water Resources Control Board authorizes construction dewatering activities and other construction related non-storm water discharges as long as they: (a) comply with Section A.9 of the General Permit; (b) do not cause or contribute to violation of any water quality standards; (c) do not violate any other provisions of the General Permit; (d) do not require a non-storm water permit as issued by some RWQCBs; and (e) are not prohibited by a Basin Plan provision. In the areas where ground water dewatering is expected, ground water quality is not anticipated to be in violation of any water quality standards. Full compliance with applicable local, State, and Federal water quality standards by the applicant would assure that potential impacts from dewatering discharges would be fully mitigated.

For the Mountain Park development, an additional project design feature would be implemented to protect receiving waters from dewatering and construction related non-storm water discharges. Such discharges would be implemented in compliance with the Dewatering General Permit. This permit includes provisions requiring notification, testing and reporting of construction related non-storm water discharges associated with dewatering and other construction activities. Compliance with these WDRs constitutes a standard condition and requirement, further assuring that the impacts of these discharges would be fully mitigated.

Ground Water

Ground water elevations would have no impact on the post-construction phase of the development. In all instances, the proposed grade elevations are greater than the existing ground water elevation, as discussed in the *Runoff Management Plan* prepared by Fusco Engineering (2005) and included in Appendix C.

The Maximum Contaminant Level (MCL) per California Title 22 regulations is a regulatory standard designed to minimize health risks from drinking water. Ground water in the Study Area is not currently used for drinking water or irrigation, and would not be used as a water supply for the proposed development. As previously discussed, recent ground water collected from Monitoring Well GB-8, were found to contain TCE at concentrations of 18 ppb (November 2003) and 19 ppb (December 2003). These concentrations are in excess of the 5 ppb MCL for this compound. However, construction activities in the vicinity of well GB-8 are not expected to encounter ground water. Therefore, existing ground water quality as described in Section 4.5.1 above, would not significantly impact the proposed development.

As the former McDonnell-Douglas site is no longer in operation, associated concentrations of TCE are expected to decrease gradually with time due to the natural decomposition of TCE and the natural diffusion of ground water within the aquifer. The proposed development would not have any significant impact on these processes, because the anticipated reduction in ground water recharge would occur entirely downgradient of the impacted area.

Chemical constituents associated with urban development that impact ground water quality are typically those compounds that leach through permeable portions of the development (i.e., lawns) as a result of natural recharge or irrigation return flow. The primary constituents of concern for ground water related to residential development are pesticides, herbicides and nitrate (via fertilizer) that are typically applied to maintain lawns and gardens.

The areas most vulnerable to potential pesticide/herbicide and nitrate impacts from development are near or within the alluvial drainage channels where soils typically consist of more permeable sediments (sand and gravel) and the depth to ground water is relatively shallow. In the proposed Mountain Park project, the only place that this condition occurs is at the north end of Gypsum Canyon.

Although fertilizers, pesticides, and herbicides could reach the shallow ground water beneath areas near or within the alluvial drainage channels, concentrations would not likely exceed Basin Plan objectives for nitrate or MCLs for pesticides and herbicides. Recent studies have shown that, while pesticides and herbicides are commonly detected in shallow ground water beneath urban areas throughout the United States, they are not typically detected at concentrations exceeding their MCLs. Therefore, it is anticipated that pesticide/herbicide impacts to ground water related to the proposed development would be less than significant.

Furthermore, pesticide, herbicide and nitrate impacts would be minimized through BMPs and PDFs that include:

- Encouraging landscape practices that minimize irrigation (i.e., use of drought tolerant and efficient irrigation);
- Implementation of best management practices for the storage and application of fertilizers and pesticides (according to manufacturer guidelines), particularly during construction and common areas; and

- Community education programs that emphasize the importance of appropriate irrigation techniques, proper application of pesticides, herbicides and fertilizers, and the benefits of appropriate landscaping practices.

Construction activities are expected to encounter groundwater in Development Areas 4 and 5. Water quality in these areas is not expected to exceed regulatory requirements for NPDES General Construction Permit permitted discharge to surface water or storm drains and no impacts to groundwater quality are anticipated as long as all applicable permit requirements (as described under Threshold 3), including the General Dewatering Permit, are followed during dewatering.

Bioaccumulation

Certain pollutants have the potential to accumulate in water quality treatment basins, increasing the risk of exposure to wildlife and the food chain. Factors that would affect the extent of bioaccumulation, if any, would include:

- Design and maintenance considerations that would prevent the accumulation of pollutants,
- The type of pollutants and their potential for bioaccumulation,
- The size and extent to which the wetlands/vegetation would be attractive to waterfowl, and other species,
- The efficiency by which pollutants in the soils enters the plant community, and the utilization of the plants as a food source by the waterfowl.

The potential for bioaccumulation impacts from the proposed water quality basins would be minimized through the design of the treatment facilities. Each water quality basin would contain an energy dissipation and sedimentation area designed to capture coarse solids and associated pollutants, and designed to facilitate routine removal of sediments. Such procedures would limit the accumulation of pollutants in the soils and the potential for those pollutants to enter the food chain. The extent of the wetland vegetation also would be limited to the low flow portion in the bottom of the water quality basins, and the design would not include open water areas. Therefore, the wetland vegetation would not likely attract large numbers of waterfowl.

In the literature, the primary pollutants that are of concern with regard to bioaccumulation are mercury and selenium as opposed to copper, lead, and zinc. However, selenium is not of concern in this watershed because there are not high levels of selenium in the underlying soils. Accordingly, bioaccumulation of selenium is not an issue. Similarly, mercury is not expected to be present in these watersheds, so bioaccumulation of mercury is also not an issue. On this basis, the potential for bioaccumulation and adverse effects on waterfowl and other species would be less than significant.

Operation/Maintenance

Operation and maintenance (O&M) activities are a critical component of ensuring that the water quality effectiveness of the treatment control PDFs would be sustainable in the long-term. Therefore, O&M activities for the treatment control PDFs would include the following:

- Site Inspections
- Trash & Debris Removal

- Irrigation System Inspection & Adjustment
- Minor Vegetation Removal/Thinning
- Snag Removal
- Integrated Pest/Plan Management

The treatment basins would periodically require major maintenance and possibly repairs to ensure that the PDFs operate at their maximum efficiency and treatment capacity. Major activities would include the following:

- Structural Modifications / Repairs
- Major Vegetation Removal & Planting
- Major Sediment Removal

O&M activities that could harm sensitive species or disturb avian species during nesting season would be avoided. No significant flooding/drying, sediment or vegetation removal, or major construction activities would be performed during the breeding and nesting season.

With the incorporation of the long-term O&M activities for the treatment control PDFs, potential water quality impacts would remain less than significant.

Off-site and Caltrans-related Project Feature Impacts

Construction impacts from off-site project features and project features within Caltrans right-of-way would be minimized through compliance with the General Construction Permit (see Section 7.6 of Appendix C, GeoSyntec's *Water Quality Technical Report* for additional information) as well as the Caltrans construction permit and SWPPP requirements for any construction in the Caltrans right-of-way (refer to SC 5-2, SC 5-3, SC 5-4, and SC 5-5). These permits require the development and implementation of a SWPPP, which must include erosion and sediment control BMPs that would meet or exceed measures required by the General Construction Permit, as well as BMPs that control the other potential construction-related pollutants. A SWPPP would be developed as required by, and in compliance with, the General Construction Permit, Caltrans Construction Permit, and City of Anaheim Standard Conditions. On this basis, the impact of construction-related runoff from off-site project features and project features within Caltrans right-of-way is considered less than significant.

Threshold 3: Would the project result in a potential for discharge of pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling, or storage, delivery areas, loading docks or other outdoor work areas?

On-Site Project Impacts

The proposed project's on-site land uses do not include activities that involve equipment fueling, outdoor hazardous materials handling or storage, or delivery areas/storage docks. As previously discussed, catch basin inserts with hydrocarbon absorption mats would be provided for the fire station and vehicle maintenance would be performed indoors and would therefore not enter into the storm drain system because all indoor drains would flow to the sanitary sewer system. Operational activities on the site would not include any industrial or heavy commercial uses that might provide opportunities for pollutant discharge from activities such as material storage, vehicle or equipment fueling, vehicle or equipment maintenance, waste handling, hazardous materials handling, or storage, delivery areas, loading docks or other outdoor work

areas. Therefore, there would be no potential impacts associated with these activities during the operation of the project site.

On-site material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, and hazardous materials handling during construction activities would be required to comply with NPDES General Construction Permit and City of Anaheim Standard Conditions, including the completion of a SWPPP. Compliance with these regulations would ensure that potential on-site construction impacts from these activities would be less than significant.

Vehicle car washing activities may occur on the project site through individual residential activities. The City of Anaheim Municipal Code does not contain any requirements or restrictions on residential vehicle washing activities for projects such as Mountain Park. In fact, the City's Municipal Code contains a general exemption for discharges of wash water from individual car washing at residences (such water is allowed to enter into the storm drain system). According to the Model WQMP prepared by the County and approved by the Cities, the WQMP prepared for attached residential projects (defined as providing ten or more residential units that share an interior/exterior wall such as apartments) must address the community car wash rack requirement. However, that provision is limited to complexes of 100 or more units, which are not included in the proposed project. Therefore, car wash racks and/or designated car wash areas are not required for the proposed project and potential impacts associated with vehicle washing activities would be less than significant.

Off-site Project Feature Impacts

The off-site project features would not involve industrial or commercial activities; therefore, off-site activities would not result in a potential for discharge of pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling, or storage, delivery areas, loading docks or other outdoor work areas.

Off-site material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, and hazardous materials handling during construction activities would be required to comply with NPDES General Construction Permit and City of Anaheim Standard Conditions, including the completion of a SWPPP. Compliance with these regulations would ensure that potential off-site construction impacts would be less than significant.

Caltrans-related Project Feature Impacts

Construction activities within Caltrans right-of-way would be required to comply with the Caltrans Construction Permit and Encroachment Permit requirements (refer to SC 5-4 and SC 5-5). Compliance with these permit requirements would ensure that potential material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, and hazardous materials handling during construction impacts would be less than significant.

Threshold 5: Would the project conflict with any applicable plan, policy or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect?

Table 4.5-22 addresses the consistency of the proposed project with the relevant goals and policies outlined in the City of Anaheim General Plan and SCAG RCPG. As identified in Table

4.5-22, the proposed project is consistent with the relevant goals and policies related to water quality.

**TABLE 4.5-22
CONSISTENCY OF THE PROPOSED PROJECT WITH WATER QUALITY
RELATED GOALS AND POLICIES**

Goals and Policies	Consistency Analysis
City of Anaheim General Plan	
Green Element	
<p>GOAL 7.1: Reduce urban runoff from new and existing development.</p> <p>Policy 1: Ensure compliance with the Federal Clean Water Act requirements for National Pollutant Discharge Elimination System (NPDES) permits, including developing and requiring the development of Water Quality Management Plans for all new development and significant redevelopment in the City.</p> <p>Policy 2: Continue to implement an urban runoff reduction program consistent with regional and federal requirements, which includes requiring and encouraging the following:</p> <ul style="list-style-type: none"> • Increase permeable areas and install filtration controls (including grass-lined swales and gravel beds) and divert flow to these permeable areas to allow more percolation of runoff into the ground; • Use natural drainage, detention ponds or infiltration pits to collect runoff; and, • Prevent rain fall from entering material and waste storage areas and pollution-laden surfaces. <p>Policy 4: Require new development and significant redevelopment to utilize site preparation, grading, and best management practices that provide erosion and sediment control to prevent construction-related contaminants from leaving the site and polluting waterways.</p>	<p>The proposed project includes project design features which incorporate site design, source control and treatment control BMPs in compliance with the requirements of the Orange County NPDES Permit (Order No. R8-2002-0010) and the DAMP/LIP. Treatment control PDFs include nine water quality basins and biofiltration areas that would treat runoff from all urban areas of the project.</p> <p>The proposed project would be in compliance with the General Construction Activity Permit and Caltrans construction requirements (as appropriate) which require the development and implementation of a SWPPP. The SWPPP must include erosion and sediment control BMPs that would meet or exceed measures required by the General Construction Permit, as well as BMPs that control the other potential construction-related pollutants. Implementation of the SWPPP would reduce and/or eliminate construction-related contaminants from leaving the site consistent with the permit's technology-based standards. Additionally, any construction dewatering activities would be conducted in compliance with the General Dewatering Permit and the effluent limitations and other requirements contained therein.</p>
SCAG Regional Comprehensive Plan and Guide	
<p>11.07 Encourage water reclamation throughout the region where it is cost-effective, feasible, and appropriate to reduce reliance on imported water and wastewater discharges. Current administrative impediments to increased use of wastewater should be addressed.</p>	<p>There are currently no water reclamation facilities in the vicinity of the project site. A Water Quality Management Plan would be prepared for the proposed project which requires compliance with Orange County water conservation requirements. Additionally, the project includes implementation of water quality basins that would act as a source of reclamation for the groundwater table.</p>

4.5.3 MITIGATION PROGRAM

Project Design Features

PDF 5-1 In furtherance of the Orange County Drainage Area Management Plan/City of Anaheim Local Implementation Plan (DAMP/LIP) requirements, the Mountain Park Specific Plan includes the following project design features that shall be incorporated into the final project Water Quality Management Plan (WQMP). These design features meet or exceed the requirements of the DAMP/LIP. Prior to approval of each mass or rough grading plan, the property owner/developer shall submit the Final WQMP to the Department of Public Works incorporating the following measures:

- a. **Site Design BMPs:** The following site design BMPs are practices designed to minimize runoff and the introduction of pollutants in storm water runoff.

Minimize Impervious Area and Impervious Areas Directly Connected to Storm Drains

- Minimize impervious areas by incorporating landscaped areas over substantial portions of the project area consistent with the Development Plan and Concept Landscape Plans. Single family residential landscape areas shall be determined by zoning development standards, including setbacks, lot coverage, street parkway standards, and design objectives;
- Minimize directly connected impervious area by draining parking lots to landscaped areas or bioretention facilities to promote filtration and infiltration of storm water, if landscaping slopes are less than 2 percent and the project is not adjacent to steep slopes;
- Utilize vegetated areas, e.g., setbacks, swales, end islands, and median strips, for biofiltration and bioretention of nuisance and storm runoff flows from parking lots and other impervious areas;
- Design sidewalks to drain into landscaping and swales prior to discharging to the storm water conveyance system;

Selection of Construction Materials and Design Practices

- Select building material for roof gutters and downspouts that do not include copper or zinc;
- Construct streets, sidewalks, and parking lot aisles to the minimum widths specified in the Anaheim Municipal Code or adopted Specific Plan and in compliance with the Development Plan and regulations for the Americans with Disabilities Act and safety requirements for fire and emergency vehicle access. Incorporate landscaped buffer areas between sidewalks and streets in compliance with the Development Plan and Anaheim Municipal Code;

Conserve Natural Areas

- Preserve existing riparian areas along Gypsum Canyon Creek and protect with buffer zones per the Development Plan;
- Preserve 2,163 acres of open space within the project boundary outside of the development area, including NCCP open space areas, open space devoted to conservation easements, and other open space;
- Concentrate or cluster development on the least environmentally sensitive portions of the project site (e.g., the quarry site) while leaving the remaining land in a natural, undisturbed condition;
- Use natural drainage systems to the maximum extent practicable or create drainages (e.g., vegetated swales) that mimic natural conveyances and allow for storm water infiltration as well as pollutant removal;
- Maximize canopy interception and water conservation by preserving existing native trees and shrubs in natural open space areas outside of the development area, incorporating new trees into project design pursuant to landscape and reforestation plan, and including native or drought resistant plants in development plant palettes;

Protect Slopes and Channels

- Protect slopes: minimize erosion potential with vegetative cover, route flows safely away from steep and/or sensitive slopes, stabilize disturbed slopes; and
 - Protect channels: control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems, stabilize channel crossings, ensure that increases in runoff velocity and frequency caused by the project do not erode the channel, install energy dissipaters, such as riprap, at the outlets of storm drains or conveyances.
- b. **Source Control BMPs:** The following source control BMPs shall be implemented in order to minimize the amount of pollutants in dry weather (nuisance) flows and in storm water runoff from the project.

Non-Structural Source Control BMPs

N1 Education for property owners, tenants and occupants – practical information materials shall be provided to the first residents/occupants/ tenants on general housekeeping practices that contribute to the protection of storm water quality. The Homeowner's Association (HOA) shall have an ongoing educational material distribution program. At a minimum, these materials shall cover the following topics:

1. The use of chemicals (including household type) that should be limited to the property, and avoidance of discharge of specified wastes via hosing or other means to gutters, catch basins, and storm drains.

2. The proper importance of appropriate irrigation techniques and proper handling/application of material such as fertilizers, herbicides, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals, and swimming pool drainage.
3. The environmental and legal impacts of illegal dumping of harmful substances into storm drains and sewers.
4. Alternative household products that are safer to the environment.
5. Household hazardous waste collection programs.
6. Used oil-recycling programs.
7. Proper procedures for spill prevention and clean up.
8. Proper storage of materials that pose pollution risks to local waters.
9. Carpooling programs and public transportation alternatives to driving.

N2 Activity restrictions (Conditions, Covenants, and Restrictions) – Conditions, Covenants, and Restrictions (CC&Rs) shall be prepared as necessary and shall address surface water quality protection, or, alternatively, use restrictions shall be developed through lease terms.

N3 Common area landscape management – ongoing maintenance shall be consistent with City of Anaheim Landscape Water Efficiency (Chapter 10.19 of the Anaheim Municipal Code), plus fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (DAMP Section 5.5). See also, efficient irrigation systems under structural controls.

N4 BMP maintenance – Homeowners Associations (HOAs) shall be responsible for the inspection and maintenance of structural BMPs (including treatment controls) located within the HOA boundaries. These BMPs are outlined below.

N11 Common area litter control – HOA shall conduct litter patrol; provide for covered trash receptacles, trashcans with lids, and emptying of trash receptacles in common areas; note trash disposal violations by tenants/homeowners or businesses and report the violations to the owner/HOA for investigation shall be conducted.

N14 Common area drainage facility inspection – Privately-owned drainage facilities shall be inspected each year and, if necessary, cleaned and maintained prior to the storm season, no later than October 1st each year. Drainage facilities include catch basins and inlets, catch basin inserts, water quality basins, detention basins, other treatment facilities, and open drainage channels.

N15 Street sweeping private streets and parking lots – Streets shall be swept prior to the storm season in late summer/early fall, no later than October 1st of each year. Parking lots at the private community center shall be swept weekly at a minimum, weather permitting.

Structural Source Control BMPs

- Provide Storm Drain Stenciling and Signage – all storm drain inlets and catch basins, constructed or modified, within the project area shall be stenciled or labeled. Signs, which prohibit illegal dumping, shall be posted at public access points along channels and creeks within the project area. Legibility of stencils and signs shall be maintained.
 - Trash Area Design – trash areas shall be paved, designed not to allow run-on, screened or walled to prevent off-site transport of trash; and covered to minimize direct precipitation. Common area litter control shall include a litter patrol, covered trash receptacles, emptying of trash receptacles in a timely fashion, and noting trash violations by tenants/homeowners and reporting the violations to the owner/HOA for investigation. Connection of trash area drains to the municipal storm drain system shall be prohibited.
 - Efficient Irrigation – the timing and application methods of irrigation water in common areas shall minimize the runoff of excess irrigation water into the storm water conveyance system.
 - Protect Slopes and Channels – storm water BMPs shall be included to decrease the potential for erosion of slopes and/or channels, and may include appropriate conveyance structures, landscaping, etc.
 - Hillside Landscaping – Hillside areas that are disturbed by project development shall be landscaped with deep-rooted, drought tolerant plant species selected for erosion control.
 - Fire Station – Catch basin inserts with hydrocarbon absorption mats shall be provided for the fire station and vehicle maintenance shall be performed indoors and shall therefore not enter into the storm drain system because indoor drains flow to the sanitary sewer system.
- c. **Treatment Control BMPs:** The following treatment control BMPs are a part of the conceptual water quality treatment program included in the Mountain Park Specific Plan (refer to Exhibit 3-10). Prior to the issuance of grading permits, the property owner/developer shall include the following features in the final WQMP submitted to the Department of Public Works for review and approval.
- Storm water runoff from the disturbance area shall be routed to nine water quality basins. Collectively, the water quality basins shall treat runoff from approximately 488 acres within the disturbance area. The water quality basins shall incorporate dry extended detention to provide water quality treatment for storm flows. Dry extended detention basins are designed with outlets that detain the runoff volume from the water quality design storm (e.g., the 85th percentile 24-hour event) for some minimum time (36 hours) to allow particles and associated pollutants to settle out.
 - The water quality basins shall incorporate wetland vegetation along the low flow channel in the bottom of the basin for the treatment of dry weather flows and small storm events. These basins shall not contain ponded or standing water for periods in excess of 48 hours.

- The park and school site shall have a water quality basin or BMP with equivalent treatment effectiveness with the sizing of the treatment based on the DAMP/LIP requirements.
- Per the MS4 permit, the water quality basins within the proposed project shall be designed to contain a “water quality pool” sized to meet the maximized storm water capture volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87 (1998). The water quality pool is designed to drain in 36 hours.
- Approximately 4.1 acres of roadway that does not drain to the basins shall be treated with filter strips (a type of biofilter) designed per the MS4 permit and DAMP/LIP requirements treating a flow rate two times the 85th percentile hourly rainfall as determined by historical rainfall. The water tank located in Development Area 7 shall also be treated using a filter strip or a bioswale, designed per DAMP/LIP requirements.
- Offsite roadway improvements shall be treated by BMPs providing treatment equivalent to that provided by biofiltration (bioswales or filter strips) sized pursuant to the criteria in the MS4 permit.

Existing Regulations and Standard Conditions

- SC 5-1 Prior to approval of each mass or rough grading plan, the property owner/developer shall submit a project water quality management plan (WQMP) to the Department of Public Works for review and approval. The WQMP shall demonstrate compliance with the implementation plans under the MS4 Permit, namely the Drainage Area Management Plan/Local Implementation Plan (DAMP/LIP).
- SC 5-2 Prior to the approval of grading plans, the property owner/developer shall provide written evidence to the Department of Public Works that it has filed a Notice of Intent with the Regional Water Quality Control Board in order to obtain coverage under the Construction General Permit (CGP) (NPDES No. CAS000002, Resolution No. 2001-046, or the latest approved CGP). Pursuant to the permit requirements, the property owner/developer shall develop a Stormwater Pollution Prevention Plan (SWPPP) that incorporates Best Management Practices for reducing or eliminating construction related pollutants in the site runoff.
- SC 5-3 Prior to approval of a grading plan, the Department of Public Works shall verify that the General Waste Discharge Requirements issued by the Santa Ana Regional Water Quality Control Board (RWQCB) Order No. R8-2003-0061, and NPDES No. CAG998001 (or latest approved equivalent) are in effect and shall govern discharges from construction dewatering and water line/sprinkler line testing should they occur during construction. The property owner/developer shall comply with these regulations including provisions requiring notification, testing and reporting of dewatering and testing-related discharges, which shall mitigate any impacts of such discharges.
- SC 5-4 Prior to issuance of an Encroachment Permit by Caltrans for construction within Caltrans right-of-way, the property owner/developer shall prepare a Water Pollution Control Program (WPCP) or Storm Water Pollution Prevention Plan (SWPPP), as

required, in conformance with Caltrans Standard Plans and Standard Specifications for Water Pollution Control. The property owner/developer shall provide Caltrans Permits Branch with a copy of the WPCP or SWPPP, including BMPs to be implemented for construction activities, as required by the NPDES Statewide Storm Water Permit for General Construction activities.

- SC 5-5 Prior to issuance of an Encroachment Permit by Caltrans for construction within Caltrans right-of-way, a note shall be added to the grading plan requiring that any construction activities within Caltrans right-of-way shall be in compliance with the requirements of the Caltrans Statewide NPDES Storm Water Permit, Order No. 99-06-DWQ, NPDES No. CAS000003, in addition to the BMPs specified in the Caltrans Storm Water Management Plan. When applicable, the property owner/developer shall also conform to the requirements of the General NPDES Permit for Construction Activities, Order N. 99-08-DWQ, NPDES No. CAS 000002, and any subsequent General Permit in effect at the time of issuance of an Encroachment Permit

4.5.4 CUMULATIVE IMPACTS

The qualitative and quantitative impact assessments for the project discussed above demonstrate that there would be no significant adverse water quality impacts associated with the project (inclusive of both surface water and groundwater issues). The project would not contribute considerably to impacts with the Gypsum Canyon or West watershed areas because 1) all impacts would be less than significant with incorporation of project design features, and 2) the project represents substantial buildout of the Gypsum Canyon watershed and complete buildout of the West watershed. Past projects were therefore considered in the existing condition, and there would be no substantial future development in the area that would add to the less than significant impacts associated with the proposed project.

Furthermore, the post-project condition as analyzed would comply with all requirements of the General Construction Permit, the MS4 Permit, and its implementation plans, the DAMP and LIP. The DAMP/LIP constitute a watershed-wide program to address cumulative impacts of development in the watershed. Stormwater discharges would not increase any pollutants in excess of receiving water quality standards. In addition, all new developments within the Santa Ana River watershed and communities surrounding the project site would be required to implement BMPs in order to satisfy these same regulatory requirements. These regulatory requirements are designed to address cumulative water quality impacts within the overall watershed, and project stormwater discharge compliance with these receiving water standards further assures no significant cumulative impact. Since the proposed project would not adversely impact water quality and other projects would also need to comply with all requirements of the General Construction General Permit and the MS4 Permit and its implementing programs, no cumulative impacts are anticipated.

4.5.5 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With the incorporation of the project PDFs and standard conditions identified above, potential impacts to water quality would be less than significant.