# SOURCE MATERIAL EXCERPT

## Hydrology and Water Quality

Antonio Parkway Roadway Alignment and Land Use Plan — Ladera Ranch
County of Orange • Final Environmental Impact Report No. 555
State Clearinghouse No. 94031075 • Certified October 17, 1995

**Section 3.2 in its entirety** — report pages 3.2-1 through 3.2-15
(EIR volume 1, production pp. 946–963)

**Contents of this compilation**

- **3.2.1 Existing Conditions** — drainage methodology from the Master Plan of Drainage prepared by Williamson & Schmid; watershed and subarea description; Trabuco Creek, San Juan Creek and Horno Creek; existing surface water quality; groundwater and the San Juan Basin; flooding
- **3.2.2 Project Impacts** — surface water patterns and volumes; detention requirements; the five categories of urban runoff pollutants of concern; flooding; groundwater
- **3.2.3 Mitigation Measures** — Measures 4 through 8, including the urban runoff management plan required for Trabuco, San Juan and Horno creeks
- **3.2.4 Level of Significance After Mitigation**
- Exhibits and tables reproduced within the section, including the drainage and watershed exhibits

**Key language in these pages**

> *"Grading of the site would modify Horno Creek by infilling the existing channel and recreating the streambed."*
>
> *"There appears to be no historical water quality monitoring data available for Horno and Trabuco creeks within the study area."*
>
> *"The project's contributions of the pollutants discussed above are expected to have a significant impact on water quality."*
>
> *"The project would be in full compliance with federal, state and local water quality programs; however, the incorporation of the mitigation measures listed above would not ensure that all potential water quality impacts to those three streams would be reduced to a level considered less than significant."*

**Note.** Section 3.2.2 identifies five categories of pollutants expected in urban runoff from the developed project: solids, nutrients and organic matter; heavy metals, described as by far the most prevalent priority pollutants found in urban runoff; hydrocarbons; **pesticides and trace organics**; and bacteria. The section's treatment of pesticides relies on the U.S. EPA Nationwide Urban Runoff Program study of 1983. Water quality impacts to Trabuco, San Juan and Horno creeks were adopted as significant and unavoidable, which required the Board of Supervisors to adopt a Statement of Overriding Considerations in order to approve the project. Mitigation Measure 7, appearing at report page 3.2-14, required an urban runoff management plan

## 3.2 *HYDROLOGY AND WATER QUALITY*

Williamson & Schmid prepared a *Master Plan of Drainage* for the proposed project. The drainage study provides information, technical data, and results for both the existing condition and the developed condition. Hydrologic data and calculations were performed in accordance with the Orange County Environmental Management Agency's (OCEMA) procedures outlined in their 1986 Hydrology Manual. Based upon these procedures, the drainage study defines the conceptual configuration of the master planned drainage facilities necessary to accommodate the proposed land development and roadway extension. This section summarizes the results of the drainage study, which is contained in Appendix D of this draft EIR (bound separately). The results of the drainage study are not intended to be used for design purposes but, rather, are for planning and phasing; further analysis will be necessary to determine final alignments, sizes, and discharge rates of drainage facilities.

### 3.2.1 EXISTING CONDITIONS

The study area is located in the foothills of the Santa Ana Mountains below Santiago Peak. Prominent landform features that define the topographical character of the project study area include valleys formed by Horno Creek and Arroyo Trabuco, and the gently rolling and steeply contoured hillsides of the Chiquita Ridge. The study area generally drains southwesterly towards Trabuco Creek and southerly towards San Juan Creek. Runoff from the majority of the proposed land development area drains to Horno Creek, which extends northward through the center of the study area. Whereas Trabuco Creek and San Juan Creek are considered to be major drainages within southern Orange County, Horno Creek is not because of its relatively short extent. San Juan Creek lies along the southern edge of the study area, and Trabuco Creek lies to the west, outside the proposed development area.

#### *Surface Drainage Patterns and Volumes*

The study area lies within the three watersheds of Trabuco, Horno, and San Juan creeks (see Exhibit 3.2-1). Approximately 200 acres of the land development area currently drain to Trabuco Creek and 2,140 acres drain to Horno Creek. The flows from Horno Creek and Trabuco Creek, which include runoff from the study area, eventually converge with flows in San Juan Creek, which ultimately flows to the Pacific Ocean. As a result of onsite topography, runoff from the land development area does not drain directly into San Juan Creek. The onsite drainages are currently in a natural condition; there are no flood control facilities or improvements on the study area.

Rainfall (inches per hour) is measured as the depth to which water will accumulate in a flat-bottomed, straight-sided container. Infiltration can be thought of as the rate (inches per hour) at which the water level in the same container might drop if the water were leaking through a porous base. Runoff is

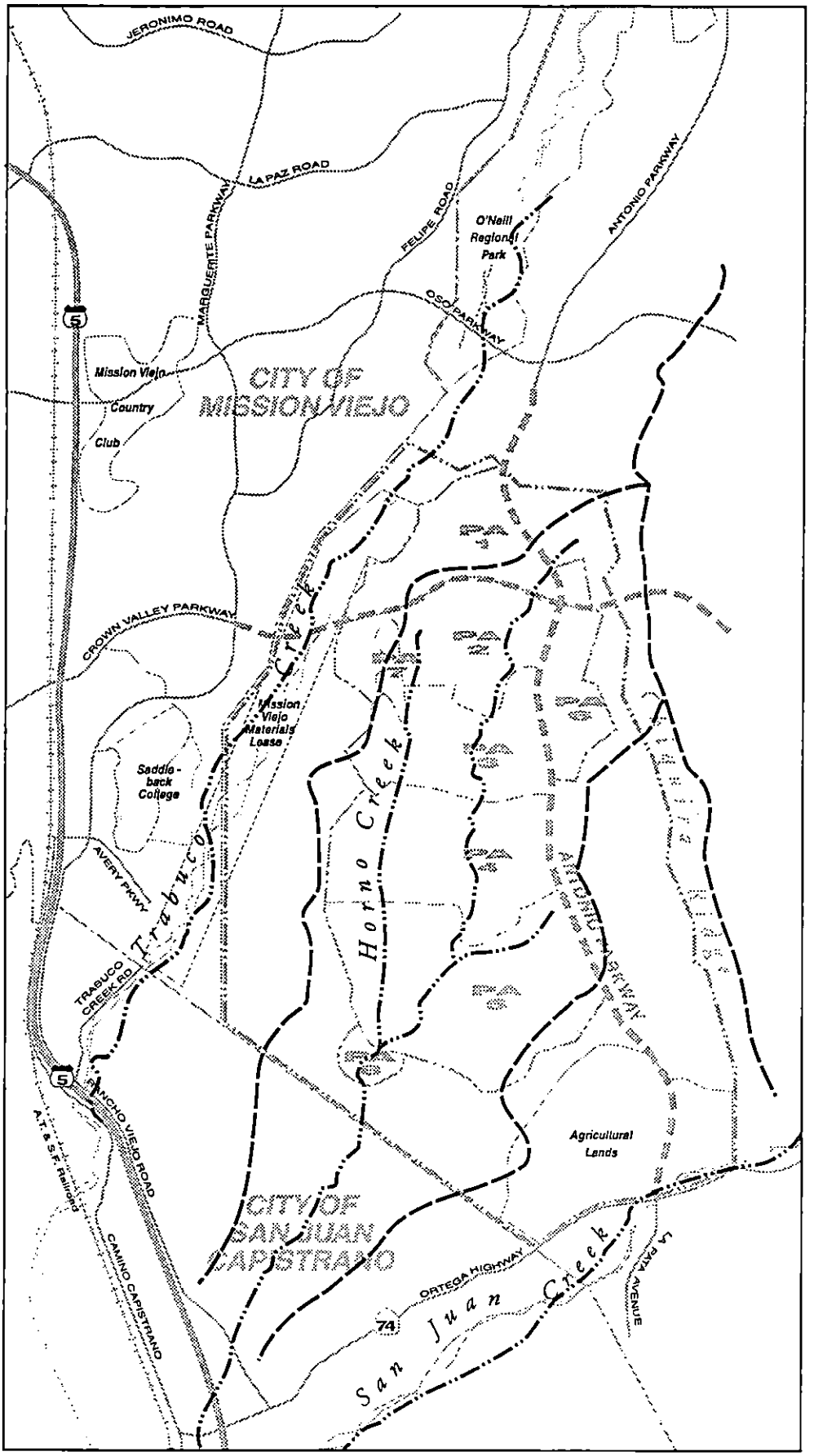
the amount of overflow of the container per hour when the rain falls too fast to be disposed of by leaking through the base. For design purposes, runoff is calculated in cubic feet per second (cfs), which is the volume of overflow entering an open stream channel. If the amount of surface runoff is greater than the hydrocapacity of the channel, water will spill over the sides of the channel, or pond at the opening of a drainage pipe, and flood surrounding land uses.

Williamson & Schmid conducted a hydrology study for the proposed project based upon OCEMA's standard hydrology procedures. Specifically, pre- and post-development runoff rates were calculated by applying the Modified Rationale Method. Simply stated, under the Modified Rationale Method, the study area is divided into subareas based upon like topography and soil types. All surface runoff within a single subarea flows towards a single point; the velocity (cfs) and volume (acre-feet) of flow at this point can be calculated. The flow from a subarea either (1) leaves the study area and continues downstream, or (2) flows into a second subarea where it is aggregated into the runoff volume and velocity. The OCEMA hydrology procedures are based on a theoretical storm constructed from historic rainfall values of large storms and patterned after events commonly observed during major storms in the Orange County region.

Descriptions of Trabuco and Horno creeks, which currently receive runoff flows from the land development area, are provided below.

**Trabuco Creek.** Trabuco Creek is entirely natural from its headwaters to a point just north of its crossing under the I-5, with the exception of the area used for sand and gravel extraction. Approximately 200 acres of the northwestern portion of the proposed land development area lie within the Trabuco Creek watershed. In the undeveloped condition, runoff within this 200-acre area drains into three small tributaries which continue in a westerly direction from the land development boundary until they converge with flows in the Trabuco Creek (see Exhibit 3.2-2). Where these tributaries exit the land development area, existing peak flows are estimated at 240 cfs, 34 cfs, and 185 cfs (Table 3.2-1 and Exhibit 3.2-2) during a 100-year storm, and 181 cfs, 26 cfs, and 140 cfs during a 25-year storm. A 100-year frequency storm is a storm that has a 1-percent chance of occurring each year. Likewise, a 25-year frequency storm has a 4-percent likelihood of occurring and a 2-year frequency storm has a 50-percent chance of occurring.

**Horno Creek.** In the undeveloped condition, approximately 2,140 acres of the land development area lie within Horno Creek watershed. Runoff from this area drains into Horno Creek, which extends through the central portion of the development area. Horno Creek flows in a southerly direction, eventually exiting at the southerly tip of the proposed development area (Planning Area 8), just northeast of the Stone Ridge development. At this point, the total volume of existing runoff is estimated at 886 acre-feet during a 100-year storm event and 499 acre-feet during a 25-year storm event. Existing peak flow rates are estimated to be 2,331 cfs and 1,531 cfs during the 100- and 25-year storm, respectively.



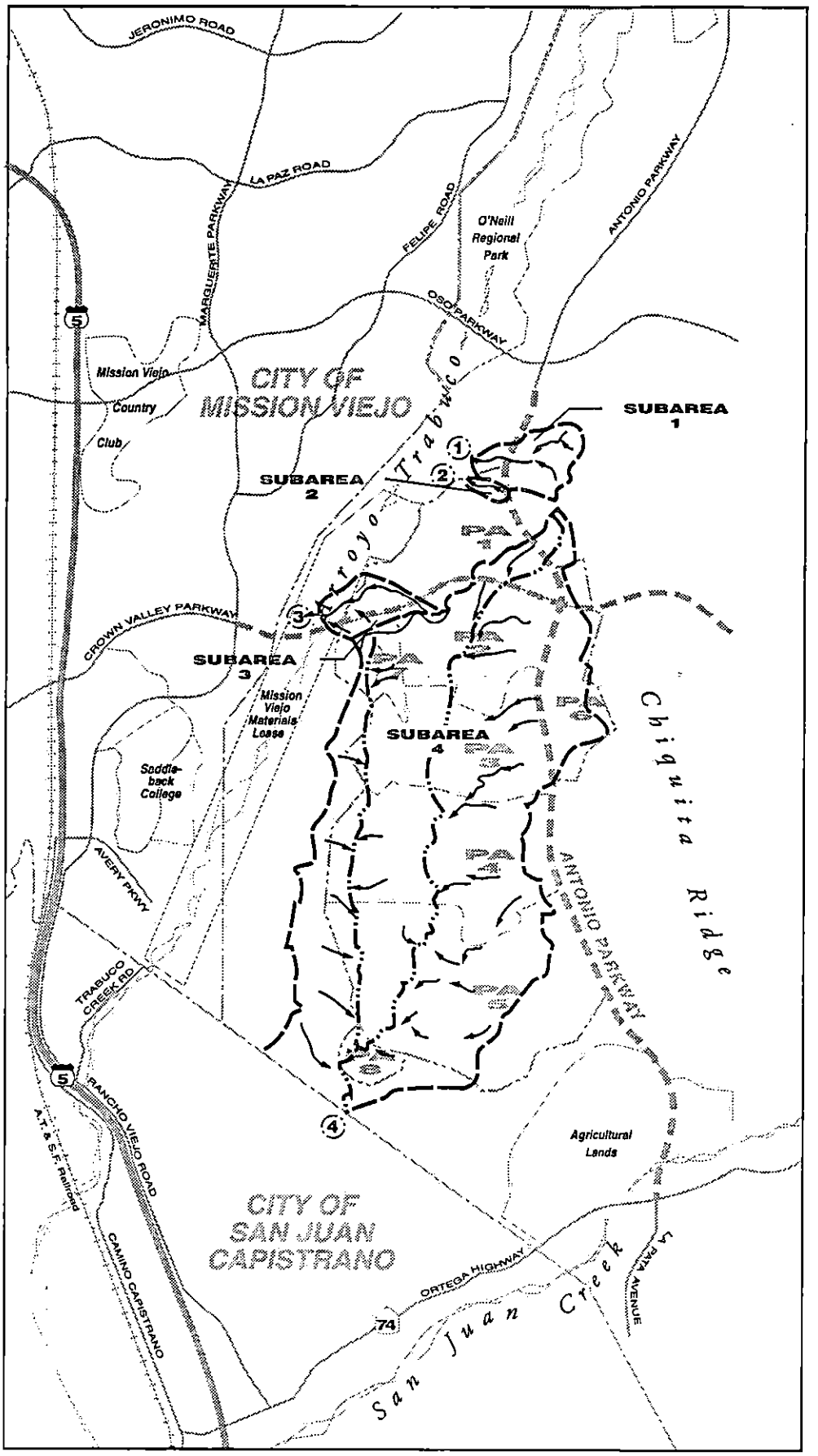

**LEGEND**

- Primary Road Alignment
- Land Use Study Area Boundary
- Proposed Development Area Boundary
- Proposed Planning Area
- Proposed Road
- Existing Feature
- City Boundary
- Watershed Boundaries
- Creek

4000' 2000' 0'

Michael Brandman Associates

Exhibit **3.2-1**
Onsite Watersheds




**LEGEND**

- Primary Road Alignment
- Land Use Study Area Boundary
- Proposed Development Area Boundary
- Proposed Planning Area
- Proposed Road
- Existing Feature
- City Boundary
- Drainage Subarea Boundary
- Direction of Flow
- Stream Channel
- (1) Discharge Point Corresponds to Table 3.2-1

Michael Brandman Associates

Exhibit **3.2-2**

# Existing (Pre-Development) Drainage Patterns

*Antonio Parkway Road Alignment and Land Use Plan EIR*

**TABLE 3.2-1**
**EXISTING PEAK FLOWS**
**EXITING THE LAND DEVELOPMENT AREA**

| Discharge Point (Corresponds to Discharge Points on Exhibit 3.2-2) | Subarea Drainage Area (acres) | Existing Peak Flows (cfs) | |
|---|---|---|---|
| | | 100-year storm | 25-year storm |
| **Flows to Trabuco Creek** | | | |
| 1 | 99 | 240 | 181 |
| 2 | 11 | 34 | 26 |
| 3 | 91 | 185 | 140 |
| **Flows to Horno Creek** | | | |
| 4 | 2,138 | 2,331 | 1,531 |
| Source: Williamson & Schmid 1994. | | | |

***Surface Water Quality***

Water quality in the natural receiving waters downstream of the study area is affected by discharges of stormwater runoff from surrounding urban development. There appears to be no historical water quality monitoring data available for Horno and Trabuco creeks within the study area. Because the study area is mostly undeveloped, such data, with some limited agricultural nonpoint source contributions, should reflect good water quality in terms of mineral content, organic and nutrient load, and toxic contaminants. The primary pollutants of concern in rural/agricultural runoff include fine suspended solids, pesticides, herbicides, and nutrients, notably nitrogen and phosphorous compounds. Erosion of agricultural land may also have a direct effect on the levels of dissolved salts and metals in runoff and affect the pH of downstream receiving waters. Onsite cattle grazing, and construction and maintenance activities associated with the electric substation, are not expected to have resulted in elevated levels of pollutants in downstream areas.

South of the study area, Trabuco Creek and San Juan Creek receive urban stormwater runoff from residents along Ortega Highway, especially during the rainy season. Throughout the year, the urbanized areas may contribute "nuisance" flows from the storm drain system to San Juan Creek resulting from excess irrigation water loss and various incidental human uses (e.g., vehicle washing, pavement cleaning, etc.). Nuisance flows consist of ambient water quality ranging from nearly

drinking water quality to highly contaminated with oil and grease, surfactants, and pesticides; however, no monitoring data are available for the study area.

A large portion of the Trabuco and San Juan watersheds is contained within the Cleveland National Forest. The steep hillsides and higher rainfall intensities provide a relatively high erosion potential, allowing runoff to transport relatively large sediment loads downstream. Because this sediment source lies within lands administered by the U.S. Forest Service, a future change in land use is unlikely. Therefore, natural systems will continue to erode slopes and carry fine sediments down existing tributaries into the Arroyo Trabuco watershed.

The project site lies within the San Juan hydrographic subunit as defined within the San Diego Water Quality Control Plan (Regional Water Quality Control Board, San Diego Region and State Water Resources Control Board 1979). The existing potential beneficial uses of surface water from this watershed are (1) agricultural water supply, (2) industrial water supply, (3) contact and non-contact recreation, (4) warm and cold water fish habitat, (5) wildlife habitat, and (6) preservation of rare and endangered species. Beneficial uses of the groundwater include municipal, industrial, and agricultural uses and potential groundwater recharge.

In order to achieve these designated uses, the Water Quality Control Plan specifies numerical criteria for selected water quality constituent(s), i.e., concentrations that are not to be exceeded more than 10 percent of the time during any 1-year period. The appropriate surface water characteristics for the San Juan hydrographic subunit are:

- Total dissolved solids - 500 mg/l
- Chloride - 250 mg/l
- Odor - none
- Iron - 0.3 mg/l
- Methylene blue active substances (detergents - 0.5 mg/l, boron - 0.5 mg/l)
- Sodium - 60 mg/l
- Sulfate - 250 mg/l
- Fluoride - 1.0 mg/l
- Manganese 0.05 mg/l

Total nitrogen and total phosphorous are regulated under various numerical criteria or chemical ratios, depending upon the receiving stream characteristics and the nutrient value of the substances in causing undesirable plant growth. Other water quality constituents, such as heavy metals, pesticide, pH, dissolved oxygen, and bacteria, are currently regulated under general criteria standards applicable to waters with specific designated beneficial uses.

*Flooding*

As discussed above, the surface water drainages within the study area are in a natural condition. Trabuco Creek is entirely natural from its headwaters to a point just north of its crossing under the I-5, with the exception of the portion of the channel within the sand and gravel extraction area. South of the study area, Horno Creek continues through an existing development, an existing freeway culvert, and ultimately to San Juan Creek. The culvert under the I-5 has a capacity of 3,100 cfs and is approximately 1.5 miles downstream of the study area.

Because the creek channels within the study area are predominantly deeply incised arroyos, they can generally hold flood waters within their banks so that flood hazards associated with these water courses are considered minimal. According to the Safety Element of the Orange County General Plan, San Juan and Trabuco creeks have the potential to create localized flooding during storm events; the extent of inundation would be limited. As discussed above, Horno Creek is not considered a significant drainage and, therefore, is not identified in the Safety Element.

According to the Orange County Safety Element, the hazard of inundation within the study area from dam failure is limited. The study area lies outside the flood inundation areas of the Prado Dam, Santiago Reservoir, and Villa Park Reservoir.

*Groundwater*

The study area lies within the Orange County Groundwater Basin which is managed by the Orange County Water District (OCWD). A large portion of northern Orange County is underlain by a large groundwater basin which is primarily supplied by the Santa Ana River watershed. Other Orange County streams provide some additional water supply, including San Juan Creek.

According to the Resource Element of the Orange County General Plan, San Juan Creek is a valuable asset to local water resources. Water is withdrawn from this aquifer for municipal water use. The natural safe yield of this basin is approximately 15,000 acre-feet (4.8 billion gallons) per year, with the potential for additional groundwater storage.

Some groundwater occurs in the upper layers of the alluvium within the onsite stream channels. Perched groundwater, in the form of subsurface stream flow, is expected within the major tributary drainage courses crossing the study area; substantial surface and subsurface flow is present within the San Juan Creek drainage course.

### 3.2.2 PROJECT IMPACTS

Both the proposed extension of Antonio Parkway and implementation of the land use plan would result in landform alterations which would modify natural drainage courses and their tributary areas within the study area. The major changes in watershed runoff process in urbanizing areas are due to two principal factors: the increase in impervious surfaces due to development and the increase in hydraulic conveyance capacity due to the construction of flood control channels and pipe systems. These factors influence both runoff quantity and quality from urbanized areas. The type of impacts to hydrology and water quality from the proposed roadway extension and the land use plan would be similar; therefore, the discussion of impacts from both of the project components is combined. However, it should be noted that, due to the greater surface area that would be affected, the magnitude of impacts to hydrology and water quality from implementation of the land use plan would be greater than those associated with the Antonio Parkway extension.

The drainage study prepared for the project by Williamson & Schmid, contained in Appendix D, identifies several impacts associated with the proposed project. These impacts include changes in runoff volumes, runoff velocities, and drainage patterns; increases in the potential for erosion and discharge of sediment to Trabuco and San Juan creeks during construction activities; a decrease in the quality of runoff discharge as a result of agricultural and urban pollutants; and reductions of stormwater percolation to the groundwater table underlying the site. These impacts are discussed below.

*Thresholds of Significance*

The landform alterations associated with the proposed land use plan and roadway extension, and the subsequent placement of structures, streets, and landscaped areas, would modify natural drainage courses and would have potential impacts on surface water quality, flooding, and groundwater. Thresholds of significance for each of these potential impacts are provided below.

Significant impacts on surface water resources would occur if uncontrolled runoff results in erosion and subsequent sedimentation of downstream water bodies. Significant impacts may also result if the increase in runoff is in excess of downstream capacity.

Impacts on water quality would be considered significant if they resulted in human health and safety impacts. Changes in water quality that affect biological communities would also be considered significant.

Significant impacts would result if the project would impose a flood hazard onsite or on adjacent properties, or expose people or property to risk.

The project would be considered to have a significant impact on groundwater if it resulted in groundwater withdrawals in excess of the safe yield of the groundwater basin or if it significantly reduced the amount of recharge to an aquifer. Significant impacts on groundwater quality may also occur if the project results in an increased risk to human health and safety.

*Surface Water Patterns and Volumes*

As discussed in Section 3.2-1, the Williamson & Schmid drainage study calculates runoff rates by applying the Modified Rationale Method. The Modified Rationale Method divides the land development area and roadway extension into subareas based upon like topography and soil types. Because implementation of the land use plan and roadway extension would result in landform alterations and new surface areas, including compacted fills, landscaping, and impervious surfaces, the boundaries of the subareas are different between the pre- and post-development condition. Also, the total area contributing runoff to the land development area would increase in the post-development condition because, with the change of topography, offsite areas would provide surface runoff to the study area. Changes to the drainages within the study area are discussed below.

Grading of the site would modify Horno Creek by infilling the existing channel and recreating the streambed. The proposed drainage plan includes placing storm drain facilities in general alignment with the current location of the creek. Additionally, grading for the project would infill minor tributary drainages that traverse the study area and discharge into San Juan, Trabuco, and Horno creeks. The effects of these, and other landform alterations, to surface flows are enumerated below.

**Trabuco Creek.** Three drainage subareas (subareas 1, 2, and 3) in the northern portion of the proposed land development area drain to Trabuco Creek (see Exhibit 3.2-3). Two of these subareas (subareas 1 and 2), comprising a total of 113 acres, are proposed to remain in their natural condition after development. Subarea 3 would collect runoff from approximately four times as much land area; as a result, the volume and velocity of direct flows to Trabuco Creek would substantially increase with full implementation of the development plan. Table 3.2-2 shows the expected flow after development. As indicated in the table, flows from this subarea would be 958 cfs during a 100-year storm and 735 during a 25-year storm. The drainage plan proposes to direct surface runoff from this subarea to storm drains within Crown Valley Parkway and unnamed interior roadways. These roadways would carry surface flows to a culvert north of the future extension of Crown Valley Parkway. Without mitigation, the increase in flows from subarea 3 associated with the project would be considered significant.

**Horno Creek.** In the post-development condition, three drainage subareas within the land development area and roadway extension would provide runoff to Horno Creek (subareas 4, 5, and 6). The combined acreage of these subareas would be slightly more than the amount of land contributing runoff to Horno Creek in the undeveloped condition; however, the development process would substantially increase runoff in these drainage subareas due to an increase in impervious surfaces. The volume of runoff produced by the land development area and the roadway extension and discharged into Horno Creek

is anticipated to be approximately 571 acre-feet during a 25-year event and 865 acre-feet during a 100-year event.

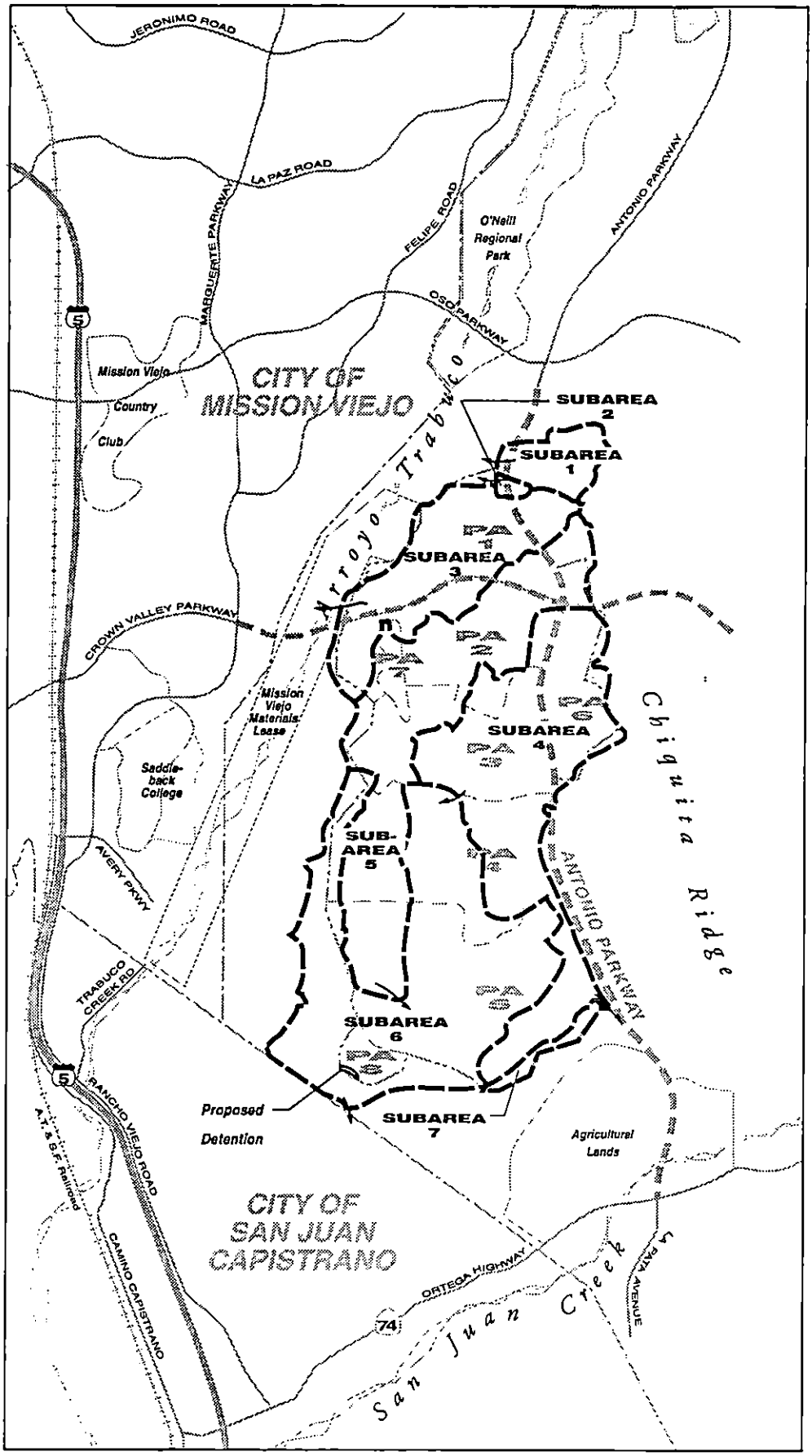
**TABLE 3.2-2**
**POST-DEVELOPMENT PEAK FLOWS**

| Map location No. (Exhibit 3.2-3) | Subarea Drainage Area (acres) | Peak Flows (cfs) | |
|---|---|---|---|
| | | 100-year storm | 25-year storm |
| **Flows to Trabuco Creek** | | | |
| 1 | 101 | 244 | 185 |
| 2 | 12 | 36 | 28 |
| 3 | 378 | 958 | 735 |
| **Flows to Horno Creek** | | | |
| 4 | 645 | 1,458 | 1,106 |
| 5 | 595 | 1,399 | 1,072 |
| 6[a] | 2,144 | 4,817 | 3,691 |
| w/detention[a] | 2,144 | 2,325 | 2,325 |
| **Flows to San Juan Creek** | | | |
| 7 | 94 | 257 | 198 |

[a] Includes runoff and acreage within subareas 4, 5, and 6.

Source: Williamson & Schmid 1994.

Runoff within drainage subareas 4 and 5 would drain toward the north-south extending roadways and then flow southerly into subarea 6. Drainage from subareas 4 and 5 would combine with runoff generated in subarea 6 and eventually exit the land development area at the same location as runoff in the undeveloped condition (i.e., the southerly tip of Planning Area 8). Peak flows at this discharge point are expected to be 4,817 cfs during a 100-year event and 3,691 cfs during a 25-year event. After exiting the land development area, the creek would continue through an existing development (Stone Ridge), an existing I-5 culvert, and ultimately to San Juan Creek. The culvert under the I-5 has limited capacity (3,100 cfs); therefore, a detention basin is proposed within the land development area to reduce the developed peak flow rate from the land development area to its existing level. The detention basin would be designed for a 100-year event. The design of the basin would be governed by the reduction of the peak flow rate from 4,817 cfs (developed condition) to 2,325 cfs (natural condition). It is anticipated that




**LEGEND**

- Primary Road Alignment
- Land Use Study Area Boundary
- Proposed Development Area Boundary
- Proposed Planning Area
- Proposed Road
- Existing Feature
- City Boundary
- Drainage Subarea Boundary
- Direction of Surface Flow

4000' 2000' 0' 4000'

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Exhibit **3.2-3**

Ultimate (Post-Development) Drainage Patterns

approximately 52 acre-feet of storage would be needed to reduce the proposed flows to an acceptable level. With implementation of the detention basin, flows from the land development area would be reduced to a less than significant level. The proposed Antonio Parkway extension would contribute to the increases in surface runoff flows to Horno Creek from the study area. However, the roadway extension would result in small increases of flow relative to the increases associated with the land use plan. Runoff from Antonio Parkway could be accommodated by culverts and velocity reducers alone; no onsite retention would be required.

**San Juan Creek.** Runoff from the drainage subarea in the southern portion of the study area ultimately flows into San Juan Creek (subarea 7). Flows from several small drainage areas would be intercepted and directed along the southerly limit of the land development area to the proposed Antonio Parkway. The flows would then be conveyed in a proposed storm drain in Antonio Parkway to San Juan Creek. Subarea 7 comprises approximately 94 acres, including Antonio Parkway, and would generate approximately 257 cfs of runoff during a 100-year event after development and 198 cfs during a 25-year event. If not mitigated, this increase in flows would be significant.

In accordance with OCEMA standards, master planned storm drain facilities for the development area would be designed for the 25-year return frequency storm event; facilities for the Antonio Parkway extension would be designed for the 100-year storm. Runoff collected from the study area would be piped to various outlet structures and ultimately to natural canyons tributary to Trabuco and San Juan creeks. As discussed above, runoff from the project area would be expected to increase with development, and these pipeflows would be expected to have an associated high velocity and kinetic energy which would likely initiate erosion. To prevent high erosion conditions, structures and energy reducer rings may be proposed for outlet facilities. These would aid in reducing storm flows to a non-erosive, pre-development rate. These controls or their alternatives would be evaluated by OCEMA prior to the issuance of grading permits for Antonio Parkway or the approval of area plans and/or tentative maps for the proposed land use plan (see the discussion of mitigation measures in Section 3.2.3). Additionally, the proposed storm drain outlets would be located near the flowline of Trabuco Creek to minimize disturbance to hillside and canyon terrain. With implementation of outlet controls, impacts associated with storm flow would be reduced to a level considered less than significant.

***Surface Water Quality***

Construction activities may increase the amount of erosion onsite which could increase the sedimentation in Trabuco and San Juan creeks. Additionally, construction equipment may also increase the chance of toxins, such as oil, gas, and solvents, entering the creeks. Urban contamination within stormwater discharges is a primary concern for the National Pollutant Discharge Elimination System (NPDES) stormwater discharge regulations that affect new construction sites (over 5 acres in size). Implementation of the land use plan and roadway extension, either individually or in combination, would require a permit from the state Regional Water Quality Control Board (RWQCB);

most likely a "general" permit would be sufficient for the construction process. General permits are available for development projects in California and must be applied for by filing a Notice of Intent (NOI) with the RWQCB at least 90 days prior to the onset of grading. Stormwater pollution prevention plans must be developed that use structural and nonstructural Best Management Practices (BMPs) to obtain reductions in urban pollutant loading to the "maximum extent practicable." BMPs, such as sand bag dikes, temporary desilting basins, and spillways, can reduce impacts during project construction to a level considered less than significant. An erosion control plan for the roadway extension and land use plan would be developed based on the use of temporary onsite detention basins in accordance with OCEMA criteria.

Upon completion of the project, land surface erosion would be significantly reduced due to the increase in pavement and other non-erodible surfaces. However, development activities, particularly commercial and industrial structures and roads, would increase the potential for stormwater runoff to transport surface water quality contaminants from roadway surfaces, lawns, driveways, parking lots, and other exposed structural and landscape surfaces into the storm drain system. Typical urban runoff contaminants (e.g., oil and grease, surfactants, heavy metals, solvents, pesticides, nutrients, or fecal coliform bacteria) could be expected within runoff reaching San Juan, Trabuco, and Horno creeks. Potential water quality effects resulting from urban runoff can best be discussed by examining the major types of pollutant constituents. The primary pollutant categories of concern include solids, nutrients, and organic matter; heavy metals; hydrocarbons; pesticides and trace organics; and bacteria.

**Solids, Nutrients, and Organic Matter.** Suspended solids, nutrients (nitrogen and phosphates), and oxygen-demanding organic matter are commonly present in urban runoff in high concentrations. The impact from these pollutants on the water quality in the receiving waters downstream of the project area would depend on the relative volume of urban runoff from the proposed development area and roadway in addition to the urban runoff from other existing and proposed developments upstream on the Trabuco, Horno, and San Juan creeks, in comparison with background flows from the remainder of the watershed.

**Heavy Metals.** Heavy metals (especially copper, lead, and zinc) are by far the most prevalent priority pollutants found in urban runoff. End-of-pipe stormwater concentrations may exceed U.S. Environmental Protection Agency (U.S. EPA) surface water quality criteria (e.g., freshwater acute and chronic toxicity levels) and drinking water standards in many instances throughout the U.S., according to results of the Nationwide Urban Runoff Program Study (U.S. EPA 1983). High instantaneous concentrations in themselves do not necessarily imply that the receiving water quality standards would be violated, since the comparison is typically made at the end of a site-specific mixing zone.

The impact of the proposed land development plan and the roadway on the ambient stormwater quality downstream of the study area is dependent upon upstream pollutant loadings and the relative amount of in-stream flow at the inflow points. It is anticipated, given the types of land uses proposed, that heavy metal concentrations, such as iron, lead, and selenium, would continue to be elevated in relation to drinking water criteria during

storm conditions and would add to an incremental water quality impact to regional cumulative conditions.

**Hydrocarbons.** Concentrations of hydrocarbons as a result of the proposed development and roadway are expected to increase over background conditions.

**Pesticides and Trace Organics.** The presence of pesticides and other trace organic chemical pollutants in typical urban runoff appears to be very site specific. Water quality standards, as defined in the applicable Basin Plans, are exceeded for individual pesticides and trace organics less frequently than for heavy metals in typical urban runoff. In the Nationwide Urban Runoff Program Study (U.S. EPA 1983) all pesticide measurements in urban runoff were substantially within drinking water criteria.

**Bacteria.** Coliform bacteria (indicators of pathogenic bacteria presence) are present at high levels in urban runoff and can be expected to exceed water quality standards for contact recreation during and immediately following storms in many surface waters, even where high degrees of dilution are provided (U.S. EPA 1983). Bacteria concentrations may be as much as two orders of magnitude (100 times) higher than those occurring in small rural streams (Davis 1979). Fecal coliform counts in urban runoff are typically in the tens to hundreds of thousands per 100 milliliter (ml) during warm weather conditions, with the national median being approximately 21,000 per 100 ml (U.S. EPA, 1983). During cold weather, fecal coliform counts are typically in the 1,000 per 100 ml range.

The project's contributions of the pollutants discussed above are expected to have a significant impact on water quality.

It is anticipated that suspended solids loading would decrease with development. Open space areas, such as agricultural areas and pastureland, typically produce more suspended solids on a per-acre basis than developed areas due to stabilization of the land by pavement and landscaping. Solids in urban runoff, however, are more likely to be higher in mineral and manmade products and may also contain other contaminants.

The proposed project would result in a short-term significant increase in the potential for erosion of the land surface and increase the potential for transport of the eroded soils into the stream systems. These impacts would result primarily from construction activities.

Associated with development of the land use plan is the potential reduction in the conveyance of sands downstream that provide for beach sand replenishment. As the land use plan is developed the site would drain as overland flow over the landscape or within the proposed streets and storm drains. Natural erosion that would otherwise occur, would be controlled with the engineered streets and storm drains. Thus, although the onsite runoff flow rates and volumes would increase because of the project, the ability of this runoff to contribute to onsite-generated erosion and sedimentation processes would be reduced. The significance of this reduced sedimentation and its effect on beach sand replenishment is dependent on the level of contribution the project site would have on overall beach

sand replenishment. Based on studies conducted by Simons, Li and Associates in 1984 and 1987 for the County of Orange, on the Arroyo Trabuco, it was found that the Cleveland National Forest was the main contributor for fine sediments. Even the Plano Trabuco, which has alluvial soil, was not identified as a significant contributor to the erosion and sedimentation processes in the Arroyo Trabuco. This was also the conclusion of the Plano Trabuco Urban Runoff Management Plan (URMP) approved by the Orange County Board of Supervisors in September 1984.

The findings related to the Plano Trabuco are relevant to the evaluation of the potential significance of this project on beach sand replenishment. Even though the Plano Trabuco which is characterized as being primarily alluvial deposits which would ultimately contribute to creation of sands, it was not found to be a major contributor. The project site is underlain by the Capistrano and Monterey formation, or older alluvium and landslide debris derived from those formations. These materials consist primarily of clay and silt with only minor amounts of sand or gravel. Approximately 150 acres (3 percent) of the development site is underlain by more granular terrace deposits. Runoff from this area located along the extremely northerly edge of the site is via a number of small tributaries on the east side of the Arroyo Trabuco, upstream from an area of extensive sand and gravel mining operations which includes extensive desilting facilities. Based on these findings the project is not expected to have significant impacts with regards to beach sand replenishment (personal communication, Andrew Stone, May 3, 1995).

However, of concern with the reduction in sediment transport from the study area is the potential increase in clean water to the accepting streams, which would increase the erosive potential of the runoff. However, downstream of the project site, the San Juan Creek is controlled. Therefore the potential for downstream erosion is remote.

***Flooding***

Because the development area and the roadway extension would include stormwater facilities to maintain flood flows at their natural volumes and velocities (e.g., detention basins, ring reducers, etc.), no impacts on downstream developments from flooding are anticipated.

The proposed development area lies outside the flood limits of Trabuco and San Juan creeks; however, the land use plan would place development adjacent to Horno Creek. The residential and commercial land uses proposed within the existing floodplain would be protected from flood inundation by the implementation of proposed channel improvements. As a result, no impacts on the project are anticipated from flood inundation by the San Juan, Horno, or Trabuco creeks.

*Groundwater*

As the project would not directly extract groundwater, remove an important groundwater recharge area, or contribute pollutants to the groundwater, it is not expected to have a significant impact on groundwater resources. Additionally, stormwater runoff from the study area would continue to discharge to San Juan Creek, recharging the basin, in the post-development condition.

### 3.2.3 MITIGATION MEASURES

*Surface Water Patterns and Volumes*

The following measures shall be implemented to ensure that all increases in runoff flows are controlled.

4. Prior to the recordation of a final tract/parcel map or prior to the issuance of any grading permits for the Antonio Parkway extension or the land use plan, whichever comes first, the following drainage studies shall be submitted to and approved by the Manager, Development Services:

    a. A drainage study of the roadway alignment or subdivision including diversions, offsite areas that drain onto and/or through the affected area(s), and justification of any diversions; and

    b. When applicable, a drainage study evidencing that proposed drainage patterns will not overload existing storm drains; and

    c. Detailed drainage studies indicating how the tract map grading, in conjunction with the drainage conveyance systems including applicable swales, channels, street flows, catch basins, storm drains, and flood water retarding, will allow building pads to be safe from inundation from rainfall runoff which may be expected from all storms up to and including the theoretical 100-year flood.

5. Prior to the recordation of a final tract/parcel map or prior to the issuance of any grading permits for development of the land use plan, whichever comes first, the landowner shall, in a manner meeting the approval of the Manager, EMA/Development Services:

    a. Design provisions for surface drainage; and

    b. Design all necessary storm drain facilities extending to a satisfactory point of disposal for the proper control and disposal of storm runoff; and

    c. Dedicate the associated easements to the County of Orange, if determined necessary.

Prior to the recordation of a final tract/parcel map, said improvements shall be constructed or financial security posted in a manner meeting the approval of the Manager, EMA/Development Services or his designee.

*Surface Water Quality*

The following mitigation measures will reduce the level of impact on water quality resulting from project implementation.

6. Prior to issuance of a grading permit for the development of the land use plan and the roadway extension compliance with the requirements of NPDES stormwater permits, the Orange County Drainage Area Management Plan, and the specific requirements of the county's stormwater permits (No. CA 8000180 and No. CA 0108740) for both construction and operation shall be demonstrated to the satisfaction of Manager, EMA/Development Services.

7. Concurrent with the preparation of the Area Plans for the land development area, the applicant shall design, and receive approval by the Director, OCEMA for, an urban runoff management plan. The urban runoff management plan shall contain, at a minimum, the following measures to mitigate stormwater runoff quality into Trabuco, San Juan, and Horno creeks:

   a. Incorporate applicable construction notes recommended in the Countywide Drainage Area Management Plan (DAMP) New Development Appendix.

   b. Incorporate other applicable measures from the State Municipal Best Management Practices (BMP) Manual, as necessary.

   c. Develop a long-term, post-construction water quality management plan, describing commitments to install and maintain structural facilities and to conduct non-structural BMPs consistent with the DAMP New Development Appendix.

   d. Include flood control improvements whose design is sensitive to surface water quality management.

8. Prior to issuance of grading permit for the land development area a Stormwater Pollution Prevention Plan (SWPPP) shall be prepared and approved by the RWQCB in accordance with the state's NPDES requirements.

*Flooding*

Mitigation Measures 4 and 5, listed above, address impacts associated with flooding.

*Groundwater*

No mitigation is required.

### 3.2.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed land use plan has the potential to significantly affect water quality downstream of the project area. The state's NPDES program requires that projects implement BMPs to reduce pollutant loading to the "maximum extent feasible," though not necessarily to a level considered less than significant. The project would be in full compliance with federal, state and local water quality programs; however, the incorporation of the mitigation measures listed above would not ensure that all potential water quality impacts to those three streams would be reduced to a level considered less than significant.