

2.2.2 Water Quality and Storm Water Runoff

2.2.2.1 Regulatory Setting

Section 401 of the Clean Water Act (CWA) requires water quality certification from the State Water Resources Control Board (SWRCB) or from a Regional Water Quality Control Board (RWQCB) when the project requires a CWA Section 404 permit. Section 404 of the CWA requires a permit from the United States Army Corps of Engineers to discharge dredged or fill material into waters of the United States.

Along with CWA Section 401, CWA Section 402 establishes the National Pollutant Discharge Elimination System (NPDES) permit for the discharge of any pollutant into waters of the United States. The federal Environmental Protection Agency has delegated administration of the NPDES program to the SWRCB and nine RWQCBs. The SWRCB and RWQCB also regulate other waste discharges to land within California through the issuance of waste discharge requirements under authority of the Porter-Cologne Water Quality Act.

The SWRCB has developed and issued a statewide NPDES permit to regulate storm water discharges from all Department activities on its highways and facilities. Department construction projects are regulated under the Statewide permit, and projects performed by other entities on Department right-of-way (encroachments) are regulated by the SWRCB's Statewide General Construction Permit. All construction projects over 1 ac require a Storm Water Pollution Prevention Plan (SWPPP) to be prepared and implemented during construction. Department activities less than 1 ac require a Water Pollution Control Program.

2.2.2.2 Affected Environment

A Water Quality Technical Study was prepared by the Department in November 2006 and was updated in March 2008 to address an additional alternative. A summary of the updated report is provided below. Detailed information regarding the water quality and storm water runoff is provided in the *Water Resources and Water Quality Technical Study* (March 2008).

Surface Water

The project area is located in the San Juan Creek Watershed. Runoff from the project site currently discharges into San Juan Creek via natural surface drainage and underground storm drain systems. San Juan Creek has a drainage area of

approximately 176 square miles. The proposed project is located within Reach 5 of San Juan Creek. The surrounding area within the project limits consists primarily of developed land with extensive areas of impervious surface and has few remaining natural drainage features.

San Juan Creek has been documented as having poor surface water quality. The SWRCB designated the lower portion of San Juan Creek, including the creek mouth, as impaired for bacteriological indicators under Section 303(d) of the CWA.

Surface water quality in the San Juan Creek watershed is primarily influenced by nonpoint sources of nonstorm water runoff from urban and residential developments. Contaminants affecting the watershed include various vehicle-related pollutants such as oil, grease, heavy metals, and other petroleum products from roadways. Other pollutants that also affect the watershed include illicit dumping, pesticides, herbicides, and fertilizers from parks, residential homes, and golf courses. Contaminated runoff from irrigated agricultural lands in the watershed also contributes to the poor surface water quality in San Juan Creek. Currently, wastewater treatment facilities do not contribute pollutants to the watershed because all effluents from these facilities are discharged directly into the Pacific Ocean.

Groundwater

Groundwater in the San Juan Creek Watershed exists unconfined in a generally narrow, shallow, alluvium-filled valley in the San Juan Canyon area and its tributaries. The depths of the alluvial fill range from 200 ft at the coast to 0 ft at the end of the main canyon tributaries in the Santa Ana Mountains.¹ The groundwater level at San Juan Creek is approximately 50 ft below the surface at an elevation of 111 ft above sea level.

The Cristianitos Fault is the main physical feature influencing the movement of groundwater within the watershed. Current total groundwater storage capacity is estimated at 63,220 acre-feet (af) (21,620 af for the Upper San Juan Basin and 41,600 af for the Lower San Juan Basin).

Recharge for the groundwater basins consists of subsurface inflow from the tributary alluvial riverbed areas, streambed percolation from San Juan and Trabuco Creeks; rainfall infiltration and percolation, and percolation from landscape and agricultural

¹ *SR-74 Lower Ortega Widening Project Water Resources and Water Quality Technical Study* (March 2008).

irrigation. The total basin inflow is estimated at 4,284 af per year. Outflow from the basins consists of well extractions, extractions from deep-rooted plants, and subterranean outflow at the river mouth. The total basin outflow of groundwater is estimated at 4,819 af per year.

Currently, only two water districts are actively pumping groundwater for supplemental domestic use. The Capistrano Valley Water District receives approximately 30 percent of its total water supply via groundwater, and the Trabuco Creek Water District receives approximately 15 percent of its total water supply via groundwater.

Groundwater in the San Juan Basin contains high levels of dissolved solids and salt. The problem is primarily related to the high salt content in the water-bearing sediments and not pollution from human sources. Therefore, local water agencies tend to favor the use of imported water for domestic needs, with pumped groundwater as the supplemental source.

2.2.2.3 Environmental Consequences

Temporary Impacts

No Build Alternative

The No Build Alternative does not contain construction elements; therefore, there will be no temporary water quality impacts.

Build Alternative 1

During construction, Build Alternative 1 would require approximately 4.54 ac of soil disturbance. Erosion and siltation in the drainage area may temporarily increase during project construction. The amount of sediments entering the San Juan Creek Watershed in the project area is expected to be minimal with the implementation of the SWPPP and temporary construction site Best Management Practices (BMPs) (Department Storm Water Quality Handbooks, Construction Site Best Management Practices Manual, March 2003).

Dewatering discharge could adversely impact surface water quality if the effluent is rich in sediment or contaminated with chemicals. Dewatering is a process of pumping out (dewatering) groundwater, if encountered, to form and construct the foundations for the construction of footings/foundations of noise barriers and retaining walls. Extracted groundwater may contain pollutants that may be a result of the decomposition of organic materials (e.g., hydrogen sulfide); leaking underground storage tanks; sewage; or the potential presence of nutrients (phosphorous and

nitrogen compounds). Geotechnical soil borings will determine the elevation of groundwater with respect to the elevations of the footings and/or foundations of the noise barriers and retaining walls. Based on information in the Revised Preliminary Geotechnical Report (August 2006), dewatering is unlikely. However, should dewatering be required for the project, it would only be temporary from construction activities. If construction-related dewatering is required, the project would be subject to the *General Waste Discharge Requirements for Groundwater Extraction Waste Discharges from Construction, Remediation, and Permanent Groundwater Extraction Projects to Surface Waters within the San Diego Region except for San Diego Bay* (Order No. 2001-96, NPDES No. CAG919002) or any subsequent permit/order at time of construction.

Potential temporary surface and groundwater water quality impacts associated with construction of Build Alternative 1 would be avoided or minimized through compliance with the existing Department NPDES permit and groundwater dewatering permit, as identified in the measures below, and are considered less than significant.

Build Alternative 2

As described in Chapter 1, Build Alternative 2 has the same improvements as in Build Alternative 1, with the addition of replacing the north sidewalk at the edge of the new curb. Even with this addition, temporary impacts to water quality beyond those outlined above for Build Alternative 1 are not expected since the impervious surface will be the same. Implementation of a SWPPP for the project and the application of construction site BMPs will be included as part of the proposed project. The construction site BMPs will address temporary erosion and siltation as well as management of construction related wastes associated with the construction of the sidewalk proposed for Build Alternative 2.

Potential temporary surface and groundwater water quality impacts associated with construction of Build Alternative 2 would be avoided or minimized through compliance with the Department NPDES Permit and groundwater dewatering permit identified as the *General Waste Discharge Requirements for Groundwater Extraction Waste Discharges from Construction, Remediation, and Permanent Groundwater Extraction Projects to Surface Waters within the San Diego Region except for San Diego Bay* (Order No. 2001-96, NPDES No. CAG919002) or any subsequent permit/order at time of construction.

Permanent Impacts

No Build Alternative

The No Build Alternative would not alter the existing roadway improvements on this segment of SR-74. All planned and approved maintenance work is included in the No Build Alternative. Currently, areas adjacent to the highway in the western portion of the project limits (Calle Entradero to Avenida Siega) are covered mostly by impervious surfaces such as asphalt and concrete, with some natural drainage features and little natural vegetation. As traffic increases, the length of time vehicles are stationary or moving slowly grows, this will lead to greater amounts of fluids from vehicles on the roadway. Therefore, this would lead to a slight increase in the amount of pollution in storm water runoff and a minor reduction in water quality. Slopes would not be cut or altered; therefore, an increase in long-term erosion and siltation would not occur. The rate of erosion would remain consistent with current conditions. The No Build Alternative would not implement any type of BMPs, and the existing levels of pollutants would continue to enter the watershed through off-site runoff. The No Build Alternative would have a less than significant impact to water quality.

Build Alternative 1

Surface Water

Build Alternative 1 would not substantially alter the existing pattern of natural surface drainage in the project area. In addition, it would not contribute to the exceedance of any adopted water quality standard or conflict with the objectives, plans, goals, policies, or implementation of the *San Diego Regional Water Quality Control Board's Basin Water Quality Control Plan* (1998).

The overall increase in road surface would be approximately 2.3 ac. Currently, areas adjacent to SR-74 within the western portion of the project limits (Calle Entradero to Avenida Siega) are covered primarily by impervious surfaces such as asphalt and concrete, with some natural drainage features and little natural vegetation. Build Alternative 1 would increase the percentage of impervious area in the project limits by 42 percent. The average runoff coefficient for the project limits would increase from 0.87 cubic feet per second (cfs) preconstruction to 0.88 cfs postconstruction, an increase of 1.1 percent.

Traffic projections conducted by the Department indicate that motor vehicle volume on SR-74 is expected to increase substantially in the future. This would occur with or without the proposed project. Consequently, the amount of motor vehicle-related pollutants discharged into the watershed and drainage channels

from the highway is expected to increase with or without implementation of the proposed project. The increase in the amount of motor vehicle-related pollutants associated with Build Alternative 1 is expected to have a less than significant impact on surface water quality with the minimization measures incorporated into the project plans. The amount of pollutants created from traffic congestion during peak periods may decrease due to the relief in current traffic congestion that the proposed project is expected to provide.

Postconstruction erosion can possibly occur from cut slopes. Loose sediment from these slopes may be carried to drainages and streams during a rain event or strong winds. Only the end of the slope (hillside) will be removed close to the highway on the north side. The south side of SR-74 would not be affected. Therefore, the amount of erosion and sediment from the slopes would be minimal. Vegetating the slopes and implementation of BMPs would greatly reduce the amount of erosion and siltation as identified in the Landscape Plan. Therefore, long-term permanent erosion impacts associated with Build Alternative 1 would be less than significant.

Groundwater

The increased areas of impervious surface associated with the proposed SR-74 improvements would divert runoff from pervious areas of natural drainages into constructed drainages. Less runoff would be allowed to percolate into the local portion of the groundwater basin. Although this amount of runoff may be available for recharge into the groundwater basin via streambed percolation during storm events, it is unlikely that this would occur due to the increased rate of streamflow. In addition, the recharge rate of streambed percolation, in comparison to the rate of streamflow, would ensure that only a minimal amount of runoff reaches the groundwater basin. As the increased area of impervious surface is extremely small in comparison to the local watershed, the impact on local groundwater resources and quality from Build Alternative 1 is considered less than significant.

Build Alternative 2

As described in Chapter 1, Build Alternative 2 has the same improvements as in Build Alternative 1, with the addition of replacing the north sidewalk at the edge of the new curb. However, the project impact area is the same as Build Alternative 1 and will not create any additional permanent water quality impacts beyond those already identified in the analysis of Build Alternative 1.

2.2.2.4 Avoidance, Minimization, and/or Mitigation Measures

Build Alternatives 1 and 2

Construction Period (Short-Term)

The following measures would be implemented during construction of Build Alternatives 1 or 2 to avoid or minimize temporary water quality impacts:

The Contractor will conform to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharges from the California Department of Transportation (Department), Order No. 99-06-DWQ, NPDES No. CAS000003, in addition to the Best Management Practices (BMPs) specified in the Department's *Storm Water Management Plan* (SWMP). When applicable, the Contractor shall also conform to the requirements of the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (General Permit), Order No. 99-08-DWQ, NPDES No. CAS000002, and any subsequent General Permit in effect at the time of project construction.

A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared by the Contractor and reviewed by the California Department of Transportation (Department) for approval prior to the commencement of any soil-disturbing activities. The SWPPP shall address all State and federal storm water control requirements and regulations. The SWPPP shall address all construction-related activities, equipment, and materials that have the potential to impact water quality. The SWPPP shall include Best Management Practices (BMPs) to control pollutants, sediment from erosion, storm water runoff, and other construction-related impacts. In addition, the SWPPP shall include the provisions of SWRCB Resolution No. 2001-046, which requires implementation of specific Sampling Analysis Procedures (SAP) to ensure that the implemented BMPs are effective in preventing exceedance of any water quality standards.

All work shall conform to the Construction Site Best Management Practices (BMPs) (Category II) requirements specified in the latest edition of the California Department of Transportation (Department) *Storm Water Management Plan* (SWMP) to control and minimize the impacts of construction and construction-related activities, materials, and pollutants on the watershed. These include, but are not limited to, temporary sediment control, temporary soil stabilization, scheduling, waste management, materials handling, and other nonstorm water BMPs. For a complete list, refer to Section 2 of the Department's SWMP (May 2003) and Appendix C of the

California Department of Transportation (Department) Storm Water Quality Handbook: Project Planning and Design Guide (May 2007).

If groundwater dewatering is required during construction, the Contractor shall comply with the *General Waste Discharge Requirements for Groundwater Extraction Waste Discharges from Construction, Remediation, and Permanent Groundwater Extraction Projects to Surface Waters within the San Diego Region except for San Diego Bay* (Order No. 2001-96, NPDES No. CAG919002) or any subsequent permit/order at time of construction.

Postconstruction Period (Long-term)

The Department's *Storm Water Management Plan* (SWMP) describes best management practices (BMPs) and practices to reduce the discharge of pollutants associated with the storm water drainage systems of state highways, facilities, and activities. The District 12 Storm Water Advisory Team will evaluate the project plans for the SR-74 widening before considering any BMP requirements. The completed project plans would incorporate all necessary Maintenance BMPs (Category IA), Design Pollution BMPs (Category IB), and Treatment BMPs (Category III) to meet the Maximum Extent Practical (MEP) requirements.

- **Maintenance BMPs.** This category includes routine maintenance work such as litter pickup, toxics control, street sweeping, drainage, and channel cleaning.
- **Design Pollution Prevention BMPs.** This category includes all permanent soil stabilization systems such as preservation of existing vegetation, concentrated flow conveyance systems (e.g., drainage ditches, dikes, berms, swales), and slope/surface protection systems that utilize either vegetated or hard surfaces. Final determination regarding the selection of Design Pollution Prevention BMPs would occur during the Plan's Specifications & Estimates (PS&E) Process.
- **Treatment BMPs.** This category includes all permanent treatment devices and facilities, such as biofiltration strips/swales, infiltration basins, detention devices, dry weather flow diversion, media filters, and Gross Solids Removal Devices (GSRDs). These treatment facilities and devices are explained in more detail below. Final determination regarding the selection of Treatment BMPs would occur during the PS&E process.
- **Biofiltration Strips/Swales.** These are vegetated areas that remove pollutants from storm water runoff as it flows through the vegetation.

- **Infiltration Basin.** This is a depression used to detain storm water for short periods until it percolates to the groundwater table. It functions as a BMP through filtration of runoff and absorption of pollutants using site vegetation and soils.
- **Detention Devices.** Storm water runoff is conveyed from freeways to these basins through the storm drain system. These basins are lined with either vegetated soil or concrete. Storm water collects in these basins and the outlet allows water to drain slowly while sediment and other particulate forms of pollutants settle out.
- **Dry Weather Flow Diversion.** This may consist of a berm or other means to divert low flows to the sanitary sewer system and bypass high storm flows to the storm drain system.
- **Media Filters.** Media filters remove fine sediment and particulate pollutants through two concrete-lined vaults. This is done through an initial sedimentation vault and a second filtering vault.
- **Gross Solids Removal Devices (GSRDs).** GSRDs are structural devices designed to remove trash, vegetative material, and other particles of relatively large, gross size from storm water runoff.

Department-approved treatment BMPs will treat highway runoff to the Maximum Extent Practicable (MEP) before discharging to the receiving water.

A complete list of all applicable BMPs is provided in the latest version of the Department's Storm Water Management Plan (May 2003) and the Department's Storm Water Quality Handbook: Project Planning and Design Guide (May 2007).

2.2.2.5 Level of Significance

The No Build Alternative would have a less than significant impact to water quality.

Potential temporary, permanent direct or indirect water quality and storm water runoff impacts as a result of Build Alternatives 1 and 2 are considered less than significant.

2.2.3 Geology, Soils, Seismic, Topography

This section is based on the Preliminary Geotechnical Report prepared for the project (California Department of Transportation [Department], August 2006) and the City General Plan. The Preliminary Geotechnical Report is on file and available for review at the City and the Department offices.

2.2.3.1 Regulatory Setting

This section discusses geology, soils, and seismic concerns as they relate to public safety and project design. Earthquakes are prime considerations in the design and retrofit of structures. The Department's Office of Earthquake Engineering is responsible for assessing the seismic hazard for Department projects. The current policy is to use the anticipated Maximum Credible Earthquake (MCE), from young faults in and near California. The MCE is defined as the largest earthquake that can be expected to occur on a fault over a particular period of time.

City of San Juan Capistrano General Plan

The City is located in the foothills of southern Orange County, near the southwestern edge of the Santa Ana Mountains and north of the San Joaquin Hills. The City General Plan states that due to the City's geographic location in a region that is considered seismically active, the City is subject to several types of geological hazards such as seismic activity, liquefaction, landslides, and erosion. Impacts can be reduced by implementing appropriate land use planning, development engineering, and building construction practices.

The City's General Plan identifies future development regulations for transportation arteries such as SR-74, which is classified as a critical use facility. Thus, detailed field and laboratory testing is required to establish the "survivability design and engineering requirements" for the proposed project. The activities to be undertaken for City projects include:

- Site-detailed geologic mapping and boring to determine that surface faulting and ground breakage has not occurred and is unlikely to occur in the future. Trenching is not an acceptable method for determining geologic conditions because of its adverse environmental effects.
- Adequate boring and field laboratory testing to determine accurately the subsurface profile and the static/dynamic properties of soil and rock materials.

- Calculation of design response spectra, based on repetition and structural properties (damping and ductility).
- Thorough inspection of the construction to ensure that designs are in compliance with the City's General Plan provisions, including a written certification by the contractor that all work has been done in strict accordance with plans and specifications.
- Periodic inspection of all structures and systems to determine that no detrimental modifications have been made, and that proper maintenance has been provided.

2.2.3.2 Affected Environment

Regional Geology

The project area is located in the Peninsular Ranges geomorphic province at the extreme southeastern margin of the Los Angeles Basin and lies between the Santa Ana Mountains and the San Joaquin Hills. The Peninsular Ranges geomorphic province is characterized by northwest to southeast-trending faults that are roughly parallel to the San Andreas Fault Zone. Underlying the project site area are Quaternary alluvium, terrace, and river deposits. Capistrano Formation bedrock is expected to underlie the alluvium and terrace deposits.

Topography

The topography within the Project Limits generally slopes down from the north to the south. The roadway is at a shallow grade and gradually increases in elevation from west to east. The general topographic gradient decreases gradually to the south and rises steeply to the north.

Steep slopes increasing in elevation are located along the north side of SR-74. These slopes are closer to the edge of SR-74 in the eastern portion of the proposed project. Gradual downslopes are located along the south side of SR-74.

Existing cut and fill slopes in the project area typically have slope ratios between 11:1 (horizontal:vertical [H:V]) and 1.2:1 (H:V). The elevation of the roadway increases from the west to the east.

Soil Conditions

The soils underlying the project site are underlain by alluvium, silty sands, and gravels derived from the San Joaquin Hills. The areas underlying the project site in the western portion of the project area are characterized by the Myford association soils. Myford associated soils are nearly level to moderately steep and are moderately well-drained sandy loams that have a strongly developed subsoil. The majority of the

areas south of SR-74 are classified under the Sorrento-Mocho association, which features nearly level to moderately sloping, well-drained sandy loams, loams, or clay loams on alluvial fans and floodplains. Areas within the project area to the north of SR-74 are comprised of the Cieneba-Anaheim-Soper association, which features strongly sloping to very steep, somewhat excessively drained and well-drained sandy loams, loams, clay loams, gravelly loams, and cobbly loams on coastal foothills. The expansion potential of these soil associations generally range from low to moderate, with the exception of a certain type of Myford association, which may have a high potential for expansion.¹ The depth to “bedrock-like” material and the corrosivity of soils at the site are not known at this time and would be determined during the final geotechnical investigation.

Groundwater

San Juan Creek is located south of SR-74 and runs parallel to the project site. The creek is a likely source for groundwater. According to the Preliminary Geotechnical Report, during previous investigations, groundwater was encountered at 111.7 ft below ground surface (bgs). However, groundwater well information obtained from the Prima Deshecha Landfill Site, located 0.6 mi from the eastern boundary of the project site, indicates that depth to groundwater may be encountered at depths as shallow as 8.29 ft bgs.²

Regional Faulting and Seismicity

The project is located in a seismically active area, and the geologic processes that have caused earthquakes in the past are expected to continue. A fault is considered active by the State of California if geologic evidence indicates that movement on the fault has occurred in the last 11,000 years, and potentially active if movement is demonstrated to have occurred in the last 2 million years. According to the Revised Preliminary Geotechnical Report, the closest active fault pursuant to the Alquist-Priolo Earthquake Fault Zoning Act (APEFZA) is the Whittier-Elsinore Fault Zone. This fault trends in a northwest-southeast direction. While not considered an active fault, the San Joaquin Hills Fault, located approximately 5.8 mi from the site, serves as the controlling fault for topographical landforms in this area. The San Joaquin Hills

¹ United States Department of Agriculture (USDA) Soil Conservation Service (SCS) and Forest Service, *Soil Survey of Orange County and Western Part of Riverside County, California*, September 1978.

² Web site geotracker.swrcb.ca.gov/reports Prima Deschecha Sanitary Landfill.

Fault is capable of producing a maximum credible earthquake (MCE) magnitude of 7.0. A magnitude 7.0 event would give a peak bedrock acceleration of about 0.5g and a peak ground acceleration of 0.42g.

Ground Surface Rupture

The closest active fault in the area surrounding the project site that has been zoned active under APEFZA is identified as the Whittier-Elsinore Fault Zone. However, this northwest to southeast trending fault is located approximately 25 mi from the project site. Therefore, the possibility of ground surface rupture at the project site is remote.

Seismic Shaking

Although the San Joaquin Hills fault could produce a magnitude 7.0 event that could cause peak bedrock acceleration of 0.5g and a peak ground acceleration of 0.42g. In addition, design features will be included specifically to address the potential effects of seismic shaking on the project structures.

Liquefaction

Soil liquefaction is a phenomenon that occurs during strong ground shaking, most commonly in generally low- to medium-density, saturated, low-cohesion soils, where the soils experience a temporary loss of strength and behave essentially as a fluid. Areas most susceptible to liquefaction-induced damage are underlain by loose, water-saturated, granular sediment generally within 40 ft of the ground surface. Saturated conditions reduce the effective normal stress, thereby increasing the likelihood of earthquake-induced liquefaction. One of the major types of liquefaction-induced ground failures is lateral spreading of mildly sloping ground. Lateral spreading involves movement of earth materials due to ground shaking and is evidenced by near-vertical cracks with horizontal movement of the soil. Liquefaction-induced ground failure has historically been a major cause of earthquake damage in Southern California. According to Figure S-2, Seismic Hazards dated 1999, in the City's General Plan, within the area of the project limits, SR-74 and areas south of the highway are located in an area identified as a potential liquefaction hazard. The State of California Seismic Hazard Zone map for the San Juan Capistrano Quadrangle (December 21, 2001) indicates historical occurrences of liquefaction along SR-74 and south of SR-74, within the project limits, or local geological, geotechnical, and groundwater conditions that may indicate a potential for permanent ground displacements. Such permanent ground displacements would require mitigation as defined by Public Resources Code (PRC) Section 2693(c).

Slope instability, in the form of landslides and mudslides, is a potential adverse impact associated with seismic shaking. According to the State of California Seismic Hazard Zones map of the San Juan Capistrano Quadrangle, areas north of SR-74 within the project limits have been identified as areas that have a potential for earthquake-induced landslides. This includes areas where previous landslides have occurred, or local topographic, geological, geotechnical, and subsurface water conditions have indicated a potential for permanent ground displacements. Such permanent ground displacement would require mitigation as defined in PRC Section 2693(c).

Tsunami and Seiches Potential

A tsunami is defined as a gravitational sea wave produced by any large-scale disturbance of the sea floor. The Pacific Ocean is located approximately 6 mi from the project site, and the approximate elevation at the project site is 112 ft amsl. Therefore, the probability of a tsunami occurring within the project area is considered remote.

A seiche is defined as a free or standing wave oscillation of the water surface of an enclosed body of water. This phenomenon is not expected at this project site due to the large distance from an enclosed body of water.

Rockfall and Landslide and Slope Instability

According to the Revised Preliminary Geotechnical Report, portions of the project area fall within zones that have been identified as being at an increased risk for rockfall and landslides. In the project area, the low height of existing slopes makes the likelihood of a rockfall minimal.

According to Figure S-1, Geological Hazards, under the Safety Element in the City's General Plan, SR-74 and the areas immediately south of the highway are located in an area of major alluvial valleys where liquefaction is considered potentially high. However, areas immediately north of SR-74 are located in upper drainage areas where liquefaction is considered potentially low.

The majority of the areas further north of the project site are composed of Capistrano and Monterey geological formations with small pockets of terrace deposits. While terrace deposits are considered generally stable, the Capistrano and Monterey formations are considered slide-prone formations.

According to the Safety Element of the City General Plan, the primary cause for nonseismic-related landslides is attributed to the abundance of shales and siltstones underlying the hills of San Juan Capistrano. An abundance of shales and siltstones allows the soils to become highly porous, causing them to not hold together well when saturated and potentially leading to slope instability and landslides. Secondary factors that may result in nonseismic-related slope instability and landslides include rainfall and the City's complex water distribution system.

2.2.3.3 Environmental Consequences

Temporary Impacts

No Build Alternative

The No Build Alternative does not involve construction activities and would not alter existing geologic or soil conditions; therefore, it would not affect geological, or soil resources and no temporary impacts would occur.

Build Alternatives 1 and 2

The project is expected to have a minimal impact on geologic and topographic conditions. However, temporary impacts related to construction activities would occur. Build Alternatives 1 and 2 would alter existing topography due to construction grading and construction of cut-and-fill slopes within the project limits. Given the limited nature of the modifications, potential topographic impacts are considered less than significant.

Temporary erosion effects could occur due to project construction. These effects are discussed in Section 2.2.2, Water Quality and Storm Water Runoff. The Build Alternatives would not increase exposure to geologic hazards such as erosion. Erosion control measures that are discussed in Section 2.2.2, Water Quality and Storm Water Runoff, would minimize the temporary increase in erosion as a result of construction. As discussed in Section 2.2.2, Water Quality and Storm Water Runoff, with implementation of erosion control Best Management Practices (BMPs) in the Storm Water Pollution Prevention Plan (SWPPP), potential erosion impacts are considered less than significant.

Permanent Impacts

No Build Alternative

The No Build Alternative does not alter the existing facility and would not increase exposure to geologic hazards such as erosion and earthquakes. The proposed project is, however, located in an area that may be subject to liquefaction, with or without

implementation of the proposed project, that could result in damage to the existing facility during a major seismic event. Therefore, the No Build Alternative will have a less than significant impact on geology, soil, seismic and topography.

Build Alternatives 1 and 2

Build Alternatives 1 and 2 are expected to have a minimal impact on geologic and topographic conditions. The primary geologic and geotechnical constraints affecting the design and construction of any of the Build Alternatives include:

- Seismic Hazards.
- Erosion and slope instability.

Seismic Hazards

As previously discussed, the project is located in a seismically active area where, south of the SR-74, liquefaction is considered potentially high. Therefore, the Build Alternatives would be constructed according to seismic design parameters used for the preliminary design of the proposed structures using the California Seismic Hazard Map 1996 (Mualchin 1996) and procedures outlined in the Department's Standard Seismic Design Criteria (SDC), Version 1.4 (2006), and the Department's Guidelines for Foundation Investigations and Reports (GFIR), Version 2.0 (2006).

As previously discussed, areas north of SR-74 within the project limits have been identified as having a potential for earthquake-induced landslides. To address the potential for landslides, a Geotechnical Design Report would be prepared as part of final design that would provide detailed analyses for the various design features, including, but not limited to, retaining walls and noise barriers. The preliminary geotechnical report analyzed four types of retaining walls. The types that were analyzed include: Type 1 retaining wall, soil nail wall, soldier pile wall, and secant/tangent wall. During the design phase, a detailed study would be conducted to finalize the selection for retaining walls. Regardless of the wall type, the walls shall include aesthetic treatment. Under Build Alternative 2, slope cuts are slightly greater due to the improvements on the north side of SR-74 to accommodate the relocated sidewalk.

Furthermore, the project is not located within an APEFZA area, and no well-defined fault traces have been mapped within the project limits. The possibility of surface rupture from an earthquake is considered low. The Build Alternatives are, however, located in an area that may be subject to liquefaction. However, the

Department considers the possibility of seismic activity and includes design standards to minimize and avoid potential adverse impacts from seismic events. In addition, since liquefaction is a factor in certain areas within the project limits, the project design would incorporate deepened foundations and/or increased depth of piles as needed, as outlined in the Preliminary Geotechnical Report. With implementation of the recommendations of the Final Design Report, as identified in Section 2.2.3.5, potential seismic impacts associated with the Build Alternatives are considered less than significant.

Erosion

Permanent erosion impacts can possibly occur from cut slopes. Loose sediment from these slopes may be carried to drainages and streams during a rain event or strong winds. As discussed in Section 2.2.2, only the end of the slope (hillside) would be removed close to the highway on the north side. The south side of SR-74 would be limited. Therefore, the amount of erosion and sediment from the slopes would be . Vegetating the slopes and implementation of permanent BMPs (outlined in Section 2.2.2) would greatly reduce the amount of erosion and siltation as identified in the Landscape Plan. In addition, the natural slopes within the project site are covered with material that is granular in nature (i.e., sand and gravel). Slopes are typically covered with vegetation. Where cuts are proposed, the slope faces will be protected and held in place by retaining walls. Considering that the area impacted is limited and the measures have been incorporated into the project design, potential long-term erosion impacts would be less than significant.

Soils

Expansive and collapsing soils are characterized by their ability to undergo significant volume changes (shrink or swell) due to variations in moisture content even without an increase in external loads. Changes in soil moisture content can result from precipitation, landscape irrigation, utility leakage, roof drainage, perched groundwater, drought, or other factors and may result in unacceptable settlement or heave of structures or concrete slabs supported on grade. As previously discussed, soils underneath the project area generally have only a low to moderate likelihood of expansion. Further testing during the Final Geotechnical Design Report would evaluate soil conditions existing within the project area and identify appropriate remedial actions, as needed. With implementation of the recommendations of the Final Geotechnical Design Report, it is anticipated that Build Alternatives 1 and 2 would have a less than significant impact on soils.

Landslides

Landslides are rock, earth, or debris flows on slopes due to gravity. They can occur on any terrain given the right conditions of the soil, moisture, and angle of slope as result of seismic and/or nonseismic activity. According to Figure S-1, Geological Hazards, referenced in the Safety Element of the San Juan Capistrano General Plan, SR-74 is not located in an area where there confirmed, known, or highly suspected landslides. Therefore, potential landslide impacts associated with Build Alternatives 1 and 2 are considered less than significant.

2.2.3.4 Avoidance, Minimization, and/or Mitigation Measures

The following minimization measure would minimize potential geological, seismic, and soil impacts.

During final design, the Department shall prepare a *Final Geotechnical/Structures Design Report* for the project, refining the existing *Preliminary Design Report*. The *Final Design Report* shall include detailed site testing and design recommendations based on the recommendations in the *Preliminary Design Report*. The recommendations of the *Final Design Report* shall be incorporated into the final design for the project. Since liquefaction is a factor in certain areas within the project limits, the project shall incorporate deepened foundations and/or increased depth of piles as needed.

Implementation of erosion control Best Management Practices (BMPs) in the Storm Water Pollution Prevention Plan (SWPPP) is required, as discussed in Section 2.2.2, Water Quality and Storm Water Runoff.

2.2.3.5 Level of Significance

The No Build Alternative will have no impact associated with liquefaction, landslides, seismic shaking, and erosion.

With implementation of the measure described above, potential temporary, permanent, direct or indirect impacts associated with liquefaction, landslides, seismic shaking, and erosion are less than significant under Build Alternatives 1 and 2.

2.2.4 Paleontology

2.2.4.1 Regulatory Setting

Paleontology is the study of life in past geologic time based on fossil plants and animals. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized or funded projects (e.g., Antiquities Act of 1906 [16 United States Code (USC) 431-433], Federal-Aid Highway Act of 1935 [20 USC 78]). Under California law, paleontological resources are protected by the California Environmental Quality Act (CEQA); the California Code of Regulations (formally known as the California Administrative Code), Title 14, Division 3, Chapter 1, Sections 4307 and 4309; and Public Resources Code (PRC) Section 5097.5.

2.2.4.2 Affected Environment

A *Paleontology Report* for the SR-74 Widening project was prepared by the Department's Central Coast Technical Studies Branch in November 2006 (Mills 2006). Subsequently, a Paleontological Identification Report and Paleontological Evaluation Report (PIR/PER) was prepared for the Lower 74 Widening project in May 2008 (Smith 2008), to meet the Department's current Paleontological Guidelines as outlined in Volume 1, Chapter 8, of the Standard Environmental Reference (SER). A summary of these reports is provided below. For more detailed information regarding paleontology, refer to either Mills (2006) or Smith (2008). In addition, in 2002 a report, *Final Report Development of a Model Curation Program for Orange County's Archaeological & Paleontological Collections*, was prepared for the County that rated the paleontological sensitivity for all geologic units and formations within the County and detailed some of the fossils (if any) that have been recovered from each.

The project study area in both Mills (2006) and Smith (2008) was larger than the proposed ADI by approximately 328 ft (100 meters [m]) on all sides in order to ensure that any design changes would be included in the study. The project study area is set in San Juan Canyon, a northeast-southwest trending canyon formed by San Juan Creek. The SR-74 in the project area is set against the hills that border the northern side of the canyon. Throughout the project area, the elevation ranges from 140 to 283 ft (45 to 86 m). The current road bed elevation ranges from 149 to 162 ft (45 to 49 m).

The following formations underlie the project area according to the geologic map of Orange County, California:

- Quaternary alluvium and colluvium.
- Pleistocene nonmarine terrace deposits.
- Upper Miocene Capistrano Formation.
- Miocene Monterey Formation.

2.2.4.3 Environmental Consequences

Temporary Impacts

No Build Alternative

Since the No Build Alternative does not involve a construction element and there would be no excavation activities, there is no potential for encountering paleontological resources. Therefore, there would be no temporary impact to paleontological resources.

Build Alternatives 1 and 2

There are no temporary impacts to paleontological resources. Any impacts to such resources during construction are considered permanent impacts and are discussed under the permanent impacts heading.

Permanent Impacts

No Build Alternative

Since the No Build Alternative does not involve a construction element and there would be no excavation activities, there is no potential for encountering paleontological resources, and there will be no permanent impacts.

Build Alternative 1 and 2

The potential for sensitive resources to be found in the project area varies depending on the geological unit or formation that will be excavated. Build Alternative 2 would excavate farther into the hillside in areas where two additional retaining walls are required to accommodate the road widening and the replacement sidewalk between Calle Entradero and Via Cordova. Therefore, Build Alternative 2 has a slightly higher probability for encountering sediments that may contain paleontological resources than with Build Alternative 1.

According to Mills (2006), there is low potential for sensitive paleontological resources in the Quaternary alluvium and colluvium as well as the Pleistocene nonmarine terrace deposits. This report also states that there is a high potential for

encountering sensitive resources within the Upper Miocene Capistrano Formation and the Miocene Monterey Formation.

However, according to the Final Report—Development of a Model Curation Program for Orange County’s Archaeological & Paleontological Collections (Eisentraut and Cooper, 2002), sensitivity for the nonmarine terrace deposits in Orange County is high. Therefore, all geologic units with the exception of the Quaternary alluvium and colluvium have a high potential for containing paleontological resources. In addition, the results of the Paleontological Investigation Report/Paleontological Evaluation Report (PIR/PER) (Smith 2008) indicated that the sensitivities as reported by Eisentraut and Cooper (2002) are correct, and all sediments except the Quaternary alluvium and colluvium have high paleontological sensitivities.

According to Eisentraut and Cooper (2002) and Smith (2008), Pleistocene nonmarine terrace deposits have produced a variety of terrestrial Ice-Age mammal fossils such as mammoth, bison, horse, camel, sloth, and a variety of birds. Grading in such deposits routinely turns up important Pleistocene fossils. Eisentraut and Cooper (2002) and Smith (2008) report that the Capistrano Formation can contain a diverse collection of marine vertebrates, including fish, shark, whale, dolphin, porpoise, sea lion, sea cow, and sea-going birds, as well as invertebrate remains such as clams, gastropods, sand dollars, and crabs. Finally, Eisentraut and Cooper (2002) and Smith (2008) state that numerous fossil fish, sharks, and marine mammal remains (whales, dolphins, seals, and sea cows) have been recovered from the Monterey Formation. In addition, some areas contain invertebrate remains such as clams, gastropods, sand dollars, and crabs.

All vertebrate fossils are significant, and there is a potential to excavate into several geologic units and formations that contain these significant remains. As the proposed project involves excavating into the hillside on the north side of the SR-74 to build retaining walls, there is no way to avoid excavation into potentially sensitive sediments.

If resources are impacted during construction, those impacts would be considered permanent. In addition, a mitigation plan will be developed to address any significant resources that are encountered during grading activities that would result in permanent impacts. Therefore, the Build Alternatives’ permanent impacts to paleontological resources are considered less than significant.

2.2.4.4 Avoidance, Minimization, and/or Mitigation Measures

The Paleontological Mitigation Plan (PMP) must be completed prior to the beginning of construction. Since there is potential to find significant resources within the project limits, the PIR and PER recommended that a PMP needs to be prepared by a qualified Principal Paleontologist. A full list of sections of the PMP is included in the Department's SER Environmental Handbook, Volume 1, Chapter 8.

The following minimization measures would be implemented.

Attendance at the pregrade meeting by a qualified paleontologist or his/her representative. At this meeting the paleontologist will explain the likelihood for encountering paleontological resources, what resources may be discovered, and the methods that will be employed if anything is discovered (see below).

All employees, subcontractors, and Contractor's representatives on the project site involved in subsurface disturbing activities must receive a one-hour paleontological resource awareness training program provided by the Paleontological Salvage Team prior to performing on-site work.

During construction excavation, a qualified vertebrate paleontologic monitor shall initially be present on a full-time basis whenever excavation will occur within the sediments that have a high sensitivity rating and on a spot-check basis in sediments that have a low sensitivity rating. Monitoring may be reduced to a part-time basis if no resources are being discovered in sediments with a high sensitivity rating (monitoring reductions and when they occur will be determined by the qualified Principal Paleontologist). The monitor shall inspect fresh cuts and/or spoils piles to recover paleontological resources. The monitor shall be empowered to temporarily divert construction equipment away from the immediate area of the discovery. The monitor shall be equipped to rapidly stabilize and remove fossils to avoid prolonged delays to construction schedules. If large mammal fossils or large concentrations of fossils are encountered, the Department shall consider using heavy equipment on site to assist in the removal and collection of large materials.

Localized concentrations of small (or micro-) vertebrates have the potential to be found in all native sediments. Therefore, it is recommended that these native sediments occasionally be spot-screened through one-eighth to one-twentieth-inch mesh screens to determine whether microfossils are present. If microfossils are encountered, additional sediment samples (up to 3 cubic yards or 6,000 pounds) shall

be collected and processed through one-twentieth-inch mesh screens to recover additional fossils.

Any recovered specimens shall be prepared to the point of identification and permanent preservation. This includes the picking of any washed mass samples to recover small invertebrate and vertebrate fossils, the removal of surplus sediment from around larger specimens to reduce the volume of storage for the repository and the storage cost, and the addition of approved chemical hardeners/stabilizers to fragile specimens.

Specimens shall be identified to the lowest taxonomic level possible and curated into an institutional repository with retrievable storage. The repository institutions usually charge a one-time fee based on volume, so removing surplus sediment is important. The repository institution may be a local museum or university that has a curator who can retrieve the specimens on request. The Department requires that a draft curation agreement be in place with an approved curation facility prior to the initiation of any paleontological monitoring or mitigation activities.

Preparation of a report of findings with an appended, itemized inventory of specimens is required following construction. When submitted to the Lead Agency, the report and inventory would signify completion of the program to mitigate impacts to paleontological resources. The report should also be submitted to the museum repository along with the fossil specimens.

The above listed measures are standard mitigation measures for projects that have the potential to encounter sensitive sediments. During the development of the PMP, additional measures may be added; this list is only meant to provide a summary of what may be involved, as additional documentation is often needed on projects that involve the Department.

2.2.4.5 Level of Significance

The No Build Alternative would have no temporary or permanent paleontological impacts.

The Build Alternatives would have no temporary direct, or indirect impacts and a less than significant permanent direct or indirect impact on paleontological resources.