2.2 Physical Environment

2.2.1 Hydrology and Floodplain

Regulatory Setting

Executive Order 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. The Federal Highway Administration requirements for compliance are outlined in 23 Code of Federal Regulation 650 Subpart A, which defines significant encroachments and risks for the base floodplain. An encroachment is any work done within the limits of the floodplain. A significant encroachment is one that could significantly interrupt a route required for emergency operations, pose a significant risk, or significantly affect natural and beneficial floodplain values. Risks are consequences of encroachments that could lead to flooding that would cause property loss or hazard to life.

Chapter 1 in section 60.3 of the 44 Code of Federal Regulation places requirements on development within Federal Emergency Management Agency base floodplains and regulatory floodways. Development is allowed in the floodplain only if it does not cause flood elevations to rise more than 1 foot. Development in a floodway is prohibited unless it would not result in any increase to base flood elevations.

To comply, the following must be analyzed:

- The practicability of alternatives to any longitudinal encroachments
- Risks of the action
- Impacts on natural and beneficial floodplain values
- Support of incompatible floodplain development
- Measures to minimize floodplain impacts and to preserve/restore any beneficial floodplain values affected by the project

The base floodplain is defined as “the area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year.” An encroachment is defined as “an action within the limits of the base floodplain.”

Affected Environment

This section discusses findings in the Location Hydraulic Study and Floodplain Evaluation (July 2011) and the Addendum to the Location Hydraulic Study (December 10, 2012).

Five significant storms over the last 50 years have caused considerable damage throughout the area due to flooding, erosion and debris deposition. The two largest storms occurred in 1966 and 1969. The Santa Monica and Franklin creek channels were lined after these storms caused widespread flooding.

Within the 11-mile stretch of the project, the Federal Emergency Management Agency defines floodplains for Carpinteria, Franklin, Santa Monica, Arroyo Paredon, Garrapata, Toro, Romero (Picay), San Ysidro, Oak, Montecito and Sycamore creeks. In addition to the creeks, there is a floodplain defined for the Arroyo Paredon Overflow and an unnamed watershed at Cravens Lane. Since release of the draft environmental document, the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps were revised on December 4, 2012, modifying the floodway at Romero Creek.

Floodways are defined as the channel of a stream, plus any adjacent floodplain area, that must be kept free of encroachment so that 100-year floods can be carried without substantial floodway elevations. The Federal Emergency Management Agency defines floodways at U.S. 101 for Romero (Picay), San Ysidro, Oak, Montecito and Sycamore creeks.

Carpinteria Creek

Carpinteria Creek is at the southern end of the project limits in Carpinteria and crosses under U.S. 101 at the Carpinteria Creek Bridge. According to the Location Hydraulic Study prepared for the Linden and Casitas Pass Road Interchanges project, currently the bridge does not have the capacity to pass the volume of water associated with a 100-year storm. Under such conditions, the bridge would be overtopped and a portion of the flow would escape onto the highway. This bridge is proposed for replacement under the Linden Avenue and Casitas Pass Road Interchanges project. The final environmental document for that project was approved in July 2010. The project is planned to begin construction prior to construction of the South Coast 101 HOV Lanes project. The Location Hydraulic Study and the Water Quality Report prepared for the South Coast 101 HOV Lanes project assumes the bridge work will be completed before construction of the South Coast 101 HOV Lanes project begins.

The Linden Casitas bridge replacement is designed to allow the bridge to pass the 100-year flood.

Franklin and Santa Monica Creeks

In Carpinteria, the Franklin and Santa Monica creeks are flood control channels that were designed to pass the 100-year flow. The Federal Emergency Management Agency Flood Insurance Rate Map (see Appendix F) shows the100-year flow contained within its channel for both creeks, except for the flooding next to Franklin Creek caused by the overflow from Carpinteria Creek. The replacement of the U.S. 101 bridge at Carpinteria Creek, which is part of the Linden Avenue and Casitas Pass Road Interchange project, would eliminate this flooding, leaving the Franklin Creek floodplain entirely confined within its channel near U.S. 101.

Cravens Lane Watershed

The Federal Emergency Management Agency Flood Insurance Rate Map (see Appendix F) shows a floodplain that develops from an unnamed watershed in the vicinity of Cravens Lane near the north limit of the City of Carpinteria. There is no defined swale for the watershed, and the Federal Emergency Management Agency has no detailed study for it. Floodwaters sheet-flow through the neighborhood upstream of U.S. 101, then cross at a low point near Cravens Lane.

Arroyo Paredon Creek and Overflow

The 100-year flow for Arroyo Paredon Creek overtops its banks upstream of U.S. 101 at Foothill Road. The overflow takes a separate route from the main channel and does not return to it. The Federal Emergency Management Agency Flood Insurance Rate Map (see Appendix F) shows the 100-year floodplains for the main channel and its overflow. The floodplain for the main channel is about 1,000 feet wide at U.S. 101 and has defined base flood elevations. No detailed study was done for the overflow.

Toro and Garrapata Creeks

The floodplains for Toro and Garrapata creeks are both based on detailed studies by the Federal Emergency Management Agency. The Flood Insurance Rate Map for the creeks (see Appendix F) states that the 100-year flow for Garrapata Creek is contained in the culvert under U.S. 101 and shows a floodplain about 600 feet wide at the highway for Toro Creek.

Romero (Picay), San Ysidro and Oak Creeks

The Romero (Picay), San Ysidro and Oak creeks overtop their banks well upstream of U.S. 101, and their combined flows flood a large portion of the developed areas upstream and downstream of the highway. The Federal Emergency Management Agency performed detailed analyses that defined floodways for all three creeks. The Flood Insurance Rate Map (see Appendix F) shows the combined floodplain extending for about 0.5 mile along the highway from the Romero Creek bridge to Miramar Avenue. The floodway for Romero (Picay) Creek and the combined floodway for San Ysidro and Oak creeks are about 300 feet and 1,000 feet wide, respectively, at the highway. The revised Federal Emergency Management Agency Flood Insurance Rate Map (December 2012) modified the floodway at Romero Creek. The westerly limit of the revised floodway shifted to the east.

Montecito Creek

Montecito Creek overtops its banks upstream of U.S. 101 during a 100-year storm, flooding the neighborhood west and south of the main channel. A portion of the flow runs down Olive Mill Road to the ocean. The Federal Emergency Management Agency Flood Insurance Rate Map (see Appendix F) shows the floodplain extending along the highway from the Montecito Creek Bridge to Olive Mill Road. A floodway is defined at the highway near the bridge.

Sycamore Creek

The Federal Emergency Management Agency Flood Insurance Rate Map (see Appendix F) for Sycamore Creek shows the 100-year floodplain extending for half a mile along U.S.101. Most of the 100-year flow for Sycamore Creek escapes from the main channel before it reaches the highway. The escaped flow floods the neighborhood east of the creek and flows across the highway between Los Patos Way and the Sycamore Creek Bridge. A floodway is defined at U.S. 101 between Canada Street and the bridge.

Environmental Consequences

All build alternatives would include the following that could affect base flood flows:

- Replace bridge structures at Arroyo Paredon, Toro, Romero (Picay), Oak, and San Ysidro creeks.
- Widen bridge structures at Franklin and Santa Monica creeks.
- Rebuild the interchange at the Cabrillo Boulevard/Hot Springs Road interchange with the F Modified configuration. Configurations J, M and M

Modified would have changed the existing railroad elevation by about 4 feet for 0.67 mile within the limits of the Sycamore Creek floodplain. With elimination of the three interchange configurations that would have raised the elevation of the Union Pacific Railroad tracks, work is no longer proposed in the Sycamore Creek watershed or its floodplain.

- Build soundwalls within the floodplain limits for Santa Monica, Arroyo Paredon, Romero (Picay), San Ysidro, Oak, and Montecito creeks and an unnamed watershed at Cravens Lane.

Developments are allowed in the floodplain only if it does not cause flood elevations to rise more than 1 foot. Development in a floodway is prohibited unless it would not result in any increase to base flood elevations. The proposed improvements do not constitute a longitudinal encroachment on any of the identified floodplains. Locations where the project would encroach are noted below.

Franklin and Santa Monica Creeks

The bridges would be widened at Franklin and Santa Monica creeks. Both creeks are carried by flood control channels designed for their 100-year flows near U.S. 101. The 100-year floodplain for Santa Monica Creek is contained in its main channel. At Franklin Creek, the current floodplain extends beyond the main channel only due to overflow from Carpinteria Creek. That overflow will be addressed by the Linden Avenue and Casitas Pass Road Interchanges project, which will be built prior to the South Coast 101 HOV Lanes project. The floodplain for Franklin Creek would then be contained in its main channel as well. The proposed widened bridges would have a greater waterway area than the main creek channels and would not encroach on their base floodplains. The soundwalls proposed at Santa Monica Creek as part of the HOV project would be placed on the bridge and therefore would not encroach into the floodplain.

Cravens Lane Watershed

Two soundwalls (S210 and S210B) are proposed within the limits of the floodplain at the Cravens Lane watershed on the northbound side of U.S. 101. The western wall would encroach only a short distance into the floodplain and have no effect on base flood elevations. The eastern wall is staggered to convey flood flows and not raise base flood elevations.

Arroyo Paredon Creek

The project would replace the existing freeway bridges crossing Arroyo Paredon Creek. The design of a replacement bridge has changed since the draft environmental document was released as a result of coordination with the National Oceanic and Atmospheric Administration Fisheries relative to fish passage. There are two existing bridges for the creek at U.S. 101, one each for the southbound and northbound lanes. Each bridge is a one-span structure separated by a gap of about 40 feet. These two structures can accommodate about half the flow of a 25-year flood flow event. The proposed replacement bridge would be one structure that would have two spans and double the hydraulic capacity compared to the existing bridges. Due to adjacent development constraints, the 100-year flood flow cannot be accommodated at this location; therefore, the Santa Barbara County Flood Control Agency has agreed to conveyance of close to a 25-year flood flow. However, due to existing stream channel capacity restrictions, including smaller capacity bridges upstream and downstream of the U.S. 101 bridge, the channel cannot contain a 25-year flood flow either. Santa Barbara County Flood Control has no imminent plans to improve capacity at this creek; therefore, in order to prevent exacerbating the current flooding patterns with higher capacity flood flow passage of the new bridge, one of the proposed spans would be temporarily blocked off. This will allow the new bridge to maintain the existing capacity until future channel and bridge capacity improvements can be made by Santa Barbara County Flood Control, Santa Barbara County and Union Pacific Railroad. At that time, Caltrans would open the second span.

The project also proposes construction of a soundwall within the Arroyo Paredon Creek floodplain pending the results of the soundwall voting process and local permitting requirements. The soundwall would be designed so that flood flows would be passed using floodgates of a design similar to those near Salinas Street in Santa Barbara.

Toro and Garrapata Creeks

The project proposes to replace the bridge at Toro Creek. The bridge would be designed to pass the 100-year flow and would not raise base flood elevations. No work is being proposed at Garrapata Creek.

Romero (Picay), San Ysidro and Oak Creeks

The project proposes to replace the bridges at Romero (Picay), Oak, and San Ysidro creeks and build soundwalls on the north side of U.S. 101 within the limits of the combined floodplain and floodways for the creeks. The proposed bridges would

maintain the capacity of the existing creeks and not increase base flood elevations. The noise study recommended soundwalls at this location; however, because these walls would have raised the base flood elevations within both floodways, the walls were dropped from consideration. This decision came after the hydraulic engineer determined the soundwalls would raise base flood elevations within both floodways even when the maximum possible flood conveyance through the wall is provided for with floodgates (see Figure 2.28). It should be noted that the proposed soundwall to the west of the floodway has been extended to the revised floodway limit. The extended portion of the wall would incorporate floodgates to convey flood flows and would not raise base flood elevations.

Montecito Creek

The project proposes to build two soundwalls within the limits of the floodplain and floodway at Montecito Creek. The soundwalls would sit between the frontage road and U.S. 101 on the northbound and southbound sides of the highway. The walls would encroach on the floodplain. Both soundwalls have been extended 40 feet from what was originally proposed in the draft environmental document. Hydraulics modeling and field reviews of the area show, due to the local topography, most of the 100-year flow that escapes the main channel does not reach the highway at the soundwall locations. Both soundwalls would be designed to pass any flood flows that might reach them and would not increase base flood elevations.

Sycamore Creek

The project proposes to rebuild the Cabrillo Boulevard/Hot Springs Road interchange with the F Modified configuration. Interchange configurations J, M, and M Modified included raising the elevation of the Union Pacific Railroad tracks by as much as 4 feet within the limits of the Sycamore Creek floodplain from the Los Patos underpass to the low point in the railroad line next to Salinas Street. With elimination of the three interchange configurations that would have raised the elevation of the Union Pacific Railroad tracks, work is no longer proposed in the Sycamore Creek watershed or its floodplain.

The work proposed by this project would not create significant encroachments on the base floodplain at any location except for the combined floodplain for Romero (Picay), San Ysidro and Oak creeks. However, impacts of the proposed project would not be significant with implementation of the measures listed below.

Avoidance, Minimization, and/or Mitigation Measures

- Based on the hydraulic engineer's recommendation, portions of the proposed soundwalls crossing the Romero (Picay) Creek floodway and the combined floodway for San Ysidro and Oak creeks were dropped from consideration to avoid raising the base flood elevations. This decision was based on the hydraulic engineer's determination that soundwall modifications would not prevent a significant impact to flood flows expected within the floodway.
- Soundwalls within the combined floodplain for Romero, San Ysidro and Oak creeks, and the extended portion of the soundwall in the Romero Creek floodway, would incorporate floodgates to convey flood flows and would not raise base flood elevations.
- The eastern proposed soundwall at Cravens Lane would have floodgates or be staggered to convey flood flows. The wall would not raise base flood elevations.
- The soundwall in the Arroyo Paredon Creek floodplain would include flood passage measures to accommodate flood flows.
- Both soundwalls in the Montecito Creek floodplain would be designed to pass flood flows.

2.2.2 Water Quality and Storm Water Runoff

Regulatory Setting

Federal Requirements: Clean Water Act

In 1972, the Federal Water Pollution Control Act was amended, making the discharge of pollutants to the waters of the United States from any point source unlawful, unless the discharge is in compliance with a National Pollutant Discharge Elimination System permit. The Federal Water Pollution Control Act was amended in 1977 and renamed the Clean Water Act. The Clean Water Act, as amended in 1987, directed that storm water discharges are point source discharges. The 1987 Clean Water Act amendment established a framework for regulating municipal and industrial storm water discharges under the National Pollutant Discharge Elimination System program. Important Clean Water Act sections are as follows:

- Sections 303 and 304 provide for water quality standards, criteria and guidelines.

- Section 401 requires an applicant for any federal project that proposes an activity that may result in a discharge to waters of the United States to obtain certification from the state that the discharge would comply with other provisions of the act. This is most frequently required in tandem with a Section 404 permit request (see below).
- Section 402 establishes the National Pollutant Discharge Elimination System, a permitting system for the discharges (except for dredge or fill material) into waters of the United States. Regional Water Quality Control Boards administer this permitting program in California. Section 402(p) requires permits for discharges of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).
- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the United States. This permit program is administered by the U.S. Army Corps of Engineers.

The goal of the Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

State Requirements: Porter-Cologne Water Quality Control Act (CA Water Code)

The California Porter-Cologne Act (1969) provides the legal basis for water quality regulation within California. This act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid or otherwise) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the state. The Porter-Cologne Act predates the Clean Water Act and regulates discharges to waters of the state. Waters of the state include more than just waters of the United States such as groundwater and surface waters not considered waters of the United States. The Porter-Cologne Act prohibits discharges of "waste" as defined, and this definition is broader than the Clean Water Act definition of "pollutant." Discharges under the Porter-Cologne Act are permitted by waste discharge requirements and may be required even when the discharge is already permitted or exempt under the Clean Water Act.

The State Water Resources Control Board and Regional Water Quality Control Boards are responsible for establishing the water quality standards (objectives and beneficial uses) required by the Clean Water Act and regulating discharges to ensure that the objectives are met. Details on water quality standards in a project area are

contained in the applicable Regional Water Quality Control Boards Basin Plan. States designate beneficial uses for all water-body segments and then set criteria necessary to protect these uses. Consequently, water quality standards developed for particular water segments are based on the designated use and vary depending on such use.

In addition, each state identifies waters failing to meet standards for specific pollutants, which are state listed in accordance with Clean Water Act Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source controls, the Clean Water Act requires establishing Total Maximum Daily Loads, which determine allowable pollutant loads from all sources (point, non-point and natural) for a given watershed.

State Water Resources Control Board and Regional Water Quality Control Boards

The State Water Resources Control Board administers water rights, water pollution control, and water quality functions throughout the state. Regional Water Quality Control Boards are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

- **National Pollutant Discharge Elimination System Program**—

  Municipal Separate Storm Sewer Systems (MS4)

  Section 402(p) of the Clean Water Act requires the issuance of National Pollutant Discharge Elimination System permits for five categories of storm water discharges, including municipal separate storm sewer systems (MS4s). The U.S. Environmental Protection Agency defines an MS4 as "any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that are designed or used for collecting or conveying storm water." The State Water Resources Control Board has identified Caltrans as an owner/operator of municipal separate storm sewer systems under federal regulations. The Caltrans Municipal Separate Storm Sewer Systems (MS4) permit covers all Caltrans rights-of-way, properties, facilities, and activities in the state. The State Water Resources Control Board or the Regional Water Resources Control Board issues National Pollutant

Discharge Elimination System permits for five years. Permit requirements remain active until a new permit has been adopted.

The Caltrans Municipal Separate Storm Sewer Systems permit (Order No. 2012-0011-DWQ) was adopted on September 19, 2012 and became effective on July 1, 2013. The proposed project will adhere to the requirements found in the previous Municipal Separate Storm Sewer Systems permit (Order No. 99-DWQ-06). The updated permit applies to projects that did not complete the Project Initiation Document before July 1, 2013. The MS4 permit contains three basic requirements:

1. Caltrans must comply with the requirements of the Construction General Permit (see below).
2. Caltrans must use a year-round program in all parts of the state to effectively control storm water and non-storm water discharges.
3. Caltrans storm water discharges must meet water quality standards through the use of permanent and temporary (construction) best management practices, to the maximum extent practicable, and other measures as the State Water Resources Control Board determines necessary to meet water quality standards.

To comply with the permit, Caltrans developed the Statewide Storm Water Management Plan to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The Statewide Storm Water Management Plan assigns responsibilities within Caltrans for storm water management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The Statewide Storm Water Management Plan describes the minimum procedures and practices Caltrans uses to reduce pollutants in storm water and non-storm water discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of best management practices. The proposed project will be programmed to follow the guidelines and procedures outlined in the latest Statewide Storm Water Management Plan to address storm water runoff.

Construction General Permit

The Construction General Permit (Order No. 2009-009-DWQ, as amended by 2010-0014-DWG), adopted on November 16, 2010, became effective on February 14, 2011. The permit regulates storm water discharges from construction sites that result in a disturbed soil area of 1 acre or greater, and/or are smaller sites that are part of a larger common plan of development. By law, all storm water discharges associated with construction activity where clearing, grading, and excavation results in soil disturbance of at least 1 acre must comply with the provisions of the Construction General Permit. Construction activity that results in soil disturbances of less than one acre is subject to this Construction General Permit if there is potential for significant water quality impairment resulting from the activity as determined by the Regional Water Quality Control Board. Operators of regulated construction sites are required to develop storm water pollution prevention plans; implement sediment, erosion, and pollution prevention control measures; and obtain coverage under the Construction General Permit.

The 2009 Construction General Permit separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases and are based on potential erosion and transport to receiving waters. Requirements apply according to the risk level. For example, a Risk Level 3 (highest risk) project would require compulsory storm water runoff pH and turbidity monitoring and before construction and after construction aquatic biological assessments during specified seasonal windows. For all projects subject to the permit, applicants are required to develop and implement an effective Storm Water Pollution Prevention Plan. In accordance with Caltrans' Standard Specifications, a Water Pollution Control Plan is necessary for projects with disturbed soil areas less than 1 acre.

Section 401 Permitting

Under Section 401 of the Clean Water Act, any project requiring a federal license or permit that may result in a discharge to a water of the U.S. must obtain a 401 Certification, which certifies that the project will be in compliance with state water quality standards. The most common federal permits triggering 401 Certification are Clean Water Act Section 404 permits issued by the U.S. Army Corps of Engineers. The 401 permit certifications are obtained from the appropriate Regional Water Quality Control Board, depending on the project

location, and are required before the U.S. Army Corps of Engineers issues a 404 permit.

In some cases, the Regional Water Quality Control Board may have specific concerns with discharges associated with a project. As a result, the Regional Water Quality Control Board may issue a set of requirements known as Waste Discharge Requirements under the State Water Code (Porter-Cologne Act) that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. Waste Discharge Requirements can be issued to address both permanent and temporary discharges of a project.

Affected Environment

The following Water Quality Assessments were prepared for the project: Water Quality Assessment Report (Amended) - January 31, 2012 and Addendum to Water Quality Assessment Report - September 2013.

Surface Water

The project sits within the South Coast Hydrologic Unit that is made up of small coastal watersheds originating in the southern Los Padres National Forest and draining to the Santa Barbara coast (see Figure 2-17).

For geomorphological purposes, waters of the United States delineated in this project fall into three general categories: human-made drainage features, highly altered creek channels, and partially altered creek channels.

Human-made Drainage Features

These include roadside drainage ditches and associated culverts. More than half of the constructed drainage features that would be impacted are concrete lined. These lined channels provide storm water control benefits, but do not provide significant groundwater recharge or wildlife services.

Highly Altered Channels

Channelization (concrete-lined bed and/or banks) is common to watersheds in the area, as many creeks in the project area flow through urbanized floodplains. Within the state right-of-way, Franklin and Santa Monica Creeks consist of open concrete box channels and Garrapata Creek is completely contained in a culvert. These altered channels provide storm water control benefits, but do not provide significant biological diversity, groundwater recharge, or wildlife habitat. Franklin and Santa

Monica creeks are contained in concrete box channels as they flow through intensive multi-use agriculture in the form of greenhouses and nurseries, residential areas, and light commercial development. The lowest reaches of several of these creeks flow through county and state park campgrounds.

Partially Altered Channels

These creeks that cross the route contain areas of natural substrates. Channel banks typically consist of concrete walls, and in most cases there are county or railroad bridge structures and modified channel conditions immediately up and/or downstream. These natural-bottom creek channel sections provide storm water control, groundwater recharge, biological diversity, and wildlife habitat. Partially altered creeks within the project limits include Carpinteria Creek, Arroyo Paredon Creek, Toro Canyon Creek, Greenwell Creek, Romero (Picay) Creek, San Ysidro Creek, Oak Creek, Montecito Creek, and Sycamore Creek.

Groundwater

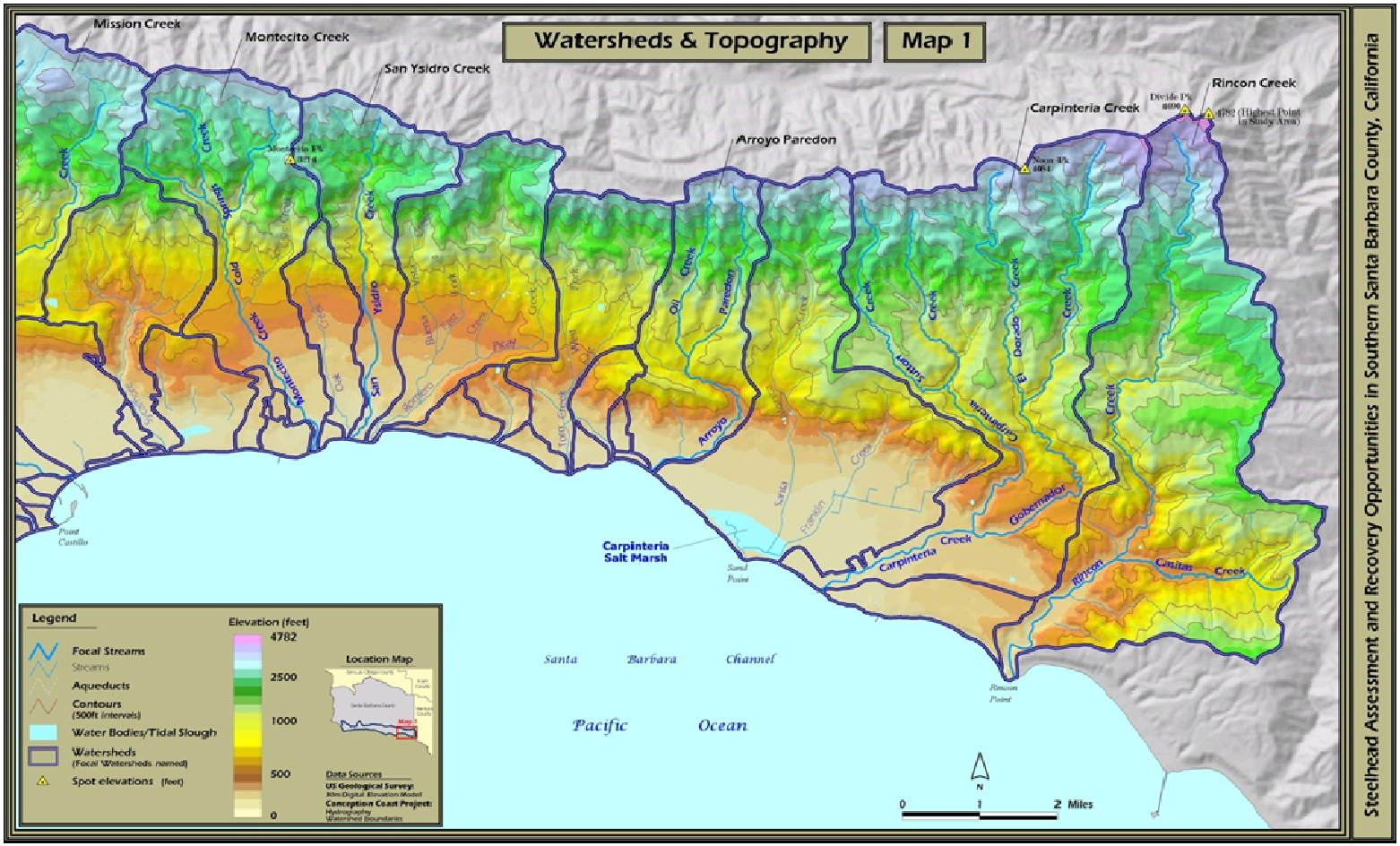
Groundwater throughout the project area is generally high (2-18 feet below the ground surface) and may contain agricultural chemicals, including fertilizers, herbicides and pesticides. Arroyo Paredon Creek is just north of the city of Carpinteria and flows through rural residential and greenhouse areas. The groundwater in this watershed is known to have extremely elevated levels of nitrates.

Watersheds

For the purposes of this discussion, the South Coast Hydrologic Unit is further divided into the hydrologic sub-areas of Carpinteria, Montecito, and Santa Barbara (see Figure 2-18). The Santa Barbara County Flood Control District performs regular maintenance in most if not all of the creeks in the project limits.

Carpinteria Hydrologic Sub-area

Substantial alteration of the hydrology has already occurred in the Carpinteria hydrologic sub-area due to drainage of farmlands, addition of impervious surface, concrete lining of Franklin and Santa Monica creeks, changes made to the Carpinteria Marsh, and installations of debris basins in the upper watershed areas.



Stoecker, M.W. and Conception Coast Project (2002). Conception Coast Project, Santa Barbara, California.

Figure 2-18 South Coast Hydrologic Unit

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Carpinteria Creek—Carpinteria Creek drains a watershed of about 15 square miles and has two major tributaries: upper Carpinteria Creek and Gobernador Creek. The peak elevation in the watershed is 4,690 feet. Land uses in the upper watershed are mainly rural residential and orchards. Below Highway 192, Carpinteria Creek passes through agricultural and urban areas before it empties into the ocean at Carpinteria State Beach. Floodwaters have flowed down U.S. 101 to Franklin Creek.

The water quality is considered impaired (303[d] listed for pathogens) due to urban and agricultural runoff. E. coli, fecal coliform, and sodium have been measured routinely at this location (see Table 2.24).

The Linden Avenue and Casitas Pass Road Interchanges project includes the following listed improvements to Carpinteria Creek:

- Build a new bridge that would improve the flood capacity of the channel.
- Relocate the bike path to the north side of the creek (only the on-grade low water bike/pedestrian crossing, located in the stream, would be removed as part of this project).
- Remove any of the Arundo (giant reed grass) that may inhibit floodwater flow.
- Enhance the water quality and geomorphologic function of Carpinteria Creek. The Linden and Casitas Pass project would include construction of several permanent storm water treatment best management plans in this watershed at Carpinteria Creek and the Bailard interchange.

Alternative 1 (the preferred alternative) for the South Coast 101 HOV Lanes project does not include work in Carpinteria Creek. The Carpinteria Creek bridge is proposed for replacement under the Linden Avenue and Casitas Pass Road Interchanges project. The final environmental document for that project was approved in July 2010. The project is planned to begin construction prior to the South Coast 101 HOV Lanes project. The Location Hydraulic Study and the Water Quality Report prepared for the South Coast 101 HOV Lanes project assumes the bridge work will be completed before construction of the South Coast 101 HOV Lanes project begins. The Linden Casitas bridge replacement is designed to allow the bridge to pass the 100-year flood.

Table 2.24 303(d) Listed Water Bodies HSA 315.34 (2010 List)

Name	Pollutant
Sycamore Creek (outside of project limits)	Chloride, Fecal Coliform, Sodium
Pacific Ocean at East Beach (Mouth of Sycamore Creek)	Enterococcus
Pacific Ocean at Hammonds Beach (Mouth of Montecito Creek)	Fecal Coliform, Total Coliform
Romero Creek	pH
Toro Canyon Creek	Fecal Coliform
Arroyo Paredon	Boron, Chloride, Diazanon, Fecal Coliform, Nitrate, Sodium, Unknown Toxicity
Santa Monica Creek	Fecal Coliform, pH
El Estero (Carpinteria) Marsh	Nutrients, Organic Enrichment (Low Dissolved Oxygen), Priority Organics
Franklin Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Nitrate, Sodium, pH
Carpinteria Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Low Dissolved Oxygen, Sodium
Pacific Ocean at Carpinteria State Beach (Carpinteria Creek mouth, Santa Barbara County)	Fecal Coliform

Pacific Ocean—Most of the creeks in the project limits ultimately drain to the Pacific Ocean. There will be minimum impacts to this water body because the proposed project has few impacts to the creeks within the project limits.

Franklin Creek—The watershed is about 4 square miles and has a peak elevation of 1,746 feet. The creek was channelized and concrete lined during the late 1960s to mid-1970s as a response to flooding that occurred in that period. Franklin Creek empties into the 230-acre Carpinteria Salt Marsh, an important coastal wetland. The water quality of Franklin Creek and Carpinteria Salt Marsh are degraded. Franklin Creek is on the 303(d) list of impaired waters for E. coli, fecal coliform, nitrate, sodium, and pH (see Table 2.24).

Riparian shade canopy is important to maintain cool water temperatures for “cold” beneficial uses of Franklin Creek. Most beneficial uses are affected to some degree at all sites monitored by the Central Coast Ambient Monitoring Program.

The concrete lining of Franklin Creek is considered a fish passage barrier. Tidewater gobies are present in the Carpinteria Salt Marsh. The Carpinteria Creeks Preservation

Program includes a proposed restoration goal that will remove the concrete lining from the creek and restore a limited riparian corridor.

Santa Monica Creek—Santa Monica Creek drains a watershed of 3.8 square miles and is less affected by groundwater and nursery discharges. This drainage originates in the steep slopes of the Santa Ynez Mountains before it is channelized to flow through the urban areas of Carpinteria. This creek was also lined in the 1970s. This watershed empties into the Carpinteria marsh, which is one of the few remaining estuaries and coastal wetland habitats in the southern part of the state. This watershed is heavily influenced by agricultural (mainly greenhouses and nurseries) as well as groundwater discharges.

This creek does not have annual year-round flows in the lower watershed, although in wetter years the lower watershed does maintain a small low-flow channel. The elevated coliform and pH levels are problematic for multiple beneficial uses in this watershed. Santa Monica Creek is listed on the 303(d) list of impaired waters for elevated fecal coliform and pH levels (refer to Table 2.24).

Arroyo Paredon Creek—The upper watershed is mostly made up of Los Padres National Forest land. Arroyo Paredon flows from the southern face of the Santa Ynez Mountains to the ocean just northwest of Carpinteria, draining a 4.7-square-mile watershed. After crossing Highway 192, adjacent land use is mainly agriculture, nurseries, urban areas, and greenhouses with several access roads and trails along the banks. During the summer months, the creek generally dries up except for flow supported by the spring that keeps the creek wet from the coastline up to a seasonal lagoon about 300 feet upstream of the Via Real crossing. The bridge on Arroyo Paredon Creek at Via Real is susceptible to plugging causing significant flooding of the adjacent agricultural areas as well as Via Real and U.S. 101.

This waterway has a natural stream bottom and is known to support steelhead trout and tidewater gobies. The creek features an intact riparian canopy (though not within the Caltrans right-of-way at U.S. 101 where there are concrete-lined vertical banks), while the creek channel is covered in fine sediment deposits overlying cobbles and boulders. Recent high flood flows have left debris entangled in the upstream access road bridge railing. Federal Emergency Management Agency maps also indicate that floodwaters back up against U.S. 101 and flood across the northbound and southbound lanes.

Arroyo Paredon is on the 303(d) list of impaired waters for fecal coliform, nitrate, and several other pollutants (refer to Table 2.24).

Montecito Hydrologic Sub-area (HSA 315.34)

In the Montecito hydrologic sub-area, there is evidence indicating all beneficial uses are impaired in various watersheds. Garrapata, Toro, Romero (Picay), San Ysidro, and Montecito creeks are in the lower watersheds near U.S. 101.

Garrapata Creek—This creek flows along the edge of the polo fields before entering a culvert under U.S. 101. During floods, Garrapata overtops its small banks and floods to Toro Creek well upstream of U.S. 101. This is a relatively small creek with no fish. Within the study limits, Garrapata Creek provides very little riparian or intact natural wildlife habitat.

Toro Creek—Toro Creek flows from the Santa Ynez Mountains to the ocean at Loon Point. Toro Creek drains a roughly 3.7-square-mile area. The upper watershed is mostly within forested areas of the Los Padres National Forest. The lower reaches of this watershed are channelized, and the creek flows through rural residential and some urban areas on the outskirts of Montecito. The hydrology of Toro and Garrapata creeks is very complex (maps from different sources—Federal Emergency Management Agency versus U.S. Geological Survey—show the creeks interacting differently). This assessment uses the Federal Emergency Management Agency assumptions and hydrology because that is the regulatory standard addressed.

Toro Creek flows under five parallel bridges within county, state, and Union Pacific Railroad rights-of-way. The oldest bridge is an arch with climbing gear mounted on its surface. In the vicinity of the arch bridge, the creek channel is concrete lined in a way that would likely be considered a fish passage barrier. The channel bed and bank are lined from downstream of Union Pacific Railroad to upstream of the U.S. 101 southbound lanes. There is a 4-foot-drop structure between them. The undersides of some of the bridges are mud smeared and have trapped debris from recent flood flows. There is also debris on top of the Via Real Bridge. The creek overtopped Via Real and U.S. 101 in 1971 (see Figure 2-19).

Central Coast Ambient Monitoring Program-monitoring data collected in lower Toro Creek (at Via Real) show that water quality is affected by fecal coliform, algal growth, and salts. In the summer months, dissolved oxygen is typically depressed as the creek begins to dry up. Toro Creek is currently on the 2010 303(d) list of impaired waters for fecal coliform (see Table 2.24).

Figure 2-19 Toro Creek Flooding, Circa 1971

Greenwell Creek—Greenwell Creek currently flows under U.S. 101 at about post mile 7.7 through a 72-inch corrugated metal pipe culvert that is next to the southbound lanes. A scour pool has formed at the culvert outlet, which measures about 12 feet deep.

Montecito Area Proper

All four of the following creeks in Montecito Area Proper have concrete-lined banks or beds or both in some areas within their lower reaches. All but San Ysidro Creek are fully lined rectangular concrete flumes for several hundred feet near their outlets at the beach.

All but Oak Creek appear to have undergone significant channel realignments. All but Montecito Creek have multiple parallel (or at least closely spaced) crossings within the transportation corridor composed of county roads, U.S. 101 and the Union Pacific Railroad.

Romero (Picay) Creek—Headwaters for Romero Creek are in the Los Padres National Forest and flow to the ocean west of Summerland at Fernald Point. Romero (Picay) Creek drains about a 6-square-mile watershed. Like other creeks in this area, Romero Creek is channelized in the lower reaches as it flows through the urbanized areas of Montecito and the Birnam Wood Golf Club. However, natural substrate is still present. Data collected by the Central Coast Ambient Monitoring Program located at North Jameson Lane shows that elevated pH and sodium levels are persistent in the lower watershed. Fecal coliform and some high levels of in-stream algal conditions indicate that additional problems may exist at this site. Romero Creek is on the updated 2010 303(d) list of impaired waters for pH levels (see Table 2.24). This creek is considered critical habitat for southern steelhead trout (see the Regional Water Quality Control Board Basin Plan).

San Ysidro Creek—San Ysidro Creek originates in the Los Padres National Forest and flows through the urban areas of Montecito and some orchards to the ocean west of Fernald Point. Although past monitoring data did not show that any beneficial use was clearly impaired, there is evidence that all beneficial uses may be somewhat impaired. For example, fecal coliform in one sample from this site measured 4,900 “most probable number” of bacteria per 100 milliliters. However, limited data is available for this site as the stream bed typically dries up in April or May and remains dry until November. San Ysidro Creek is not on the 2010 303(d) list of impaired waters. San Ysidro Creek is considered critical habitat for the southern steelhead trout as listed in the Regional Water Quality Control Board Basin Plan.

Oak Creek—Oak Creek consists of about 2.7 stream miles that originate from the steep southern face of the Santa Ynez Mountains and then flows south where it enters the Pacific Ocean near Montecito. Past surveys of the creek have found that it routinely goes dry in the late spring to early summer months, indicating an absence of steelhead trout. The channel of this creek consists of a cobble and sandy bottom with concrete-lined vertical banks in the lower reaches near U.S. 101. Near the study area, wetlands and native vegetation are not present. The little vegetation that is present is found next to the creek and is limited to exotic species (castor bean and figwort). There are no existing 303 (d) listings for this water body.

Montecito Creek—Montecito Creek originates in the Los Padres National Forest areas and flows through Montecito to the ocean. Montecito Creek drains a 6.1-square-mile area and is channelized in the lower reaches, but maintains its boulder and cobble substrate at Jameson Lane. In the summer months, this creek is typically dry. Like many of the creeks throughout this corridor, Montecito Creek has a debris basin off Mountain Drive upstream of the bridge at U.S. 101. At this point, the creek enters a concrete-lined channel. Montecito Creek through this region is relatively steep, with large boulders and step-pools. Surrounding land uses consist of large estates, trails, and landscapes. The riparian corridor is mostly intact, with large sycamore, bay, alder, willow, and ash trees.

Available data show that water quality was generally good. However, high pH levels are of concern for several beneficial uses. Elevated coliform levels have occurred during rains. As this creek goes dry, algae create large mats that may be a concern for aquatic life and aesthetic uses. Montecito Creek is not on the 2010 303(d) list of impaired waters. Montecito Creek is considered critical habitat for the southern steelhead trout as listed in the Regional Water Quality Control Board Basin Plan.

Santa Barbara Hydrologic Sub-area (HSA 315.32)

Sycamore Creek—Sycamore Creek, the smallest of three Santa Barbara city watersheds, originates in the foothills of the Santa Ynez Mountains and drains a 3.3-square-mile watershed. Upstream, Sycamore Creek is characterized by a relatively deep channel with well-vegetated banks. The lower creek reaches are fairly flat, and the channel is mostly unvegetated with weedy species dominating creek banks. The creek bed consists of boulders, cobbles, and silt. During most years, the lower portion of Sycamore Creek dries up from about Cacique Street on downstream. At U.S. 101, Caltrans recently replaced the box culvert at Sycamore Creek with a bridge, allowing natural creek bottom to be restored at this location. As listed in the Regional Water Quality Control Board Basin Plan, Sycamore Creek is considered critical habitat for southern steelhead trout.

The Central Coast Ambient Monitoring Program monitored a site at Punta Gorda Street near U.S. 101 in Santa Barbara. At this site, water quality is impaired by fecal coliform levels, having more than 50 percent of samples exceed 400 MPN/100mL and two samples exceed 4000 MPN/100mL. Central Coast Ambient Monitoring Program staff found human feces on the banks of this urban channel on multiple occasions, and it was noted that furniture, appliances, and litter were frequently dumped into the channel at this location. High pH levels contribute to partial impairment of several beneficial uses in this creek. In addition, low dissolved oxygen, algal growth in summer months and high levels of sodium and chloride are problematic for aquatic life and agricultural uses.

Hydromodification and Geomorphology

Hydromodification is generally defined as changes in channel form associated with alterations in flow and sediment due to past or proposed future land-use alteration. Although most stream channels naturally change over time, activities such as road building, land development, and farming can directly (through bank stabilization) or indirectly (such as changing storm water discharge velocities, volumes, and location) alter stream channels. The study of stream channel changes over time is referred to as "fluvial geomorphology."

The geomorphology of streams in or near the project area was studied by reviewing historic aerial photographs, hydrology information, past land development projects, agricultural practices, and past highway project records. When stream channels are altered by human activity, there is potential for water quality impacts and associated degradation of identified beneficial uses. One project goal avoids changing stream geomorphologic processes, keeping the project as hydraulically invisible as possible. When a highway interferes with a meandering stream, inhibits the flow of floodwaters, and/or changes the hydrograph of the stream, the project is not invisible to the watershed. Therefore, bridges that fully span the active stream channel are preferred, as opposed to culverts, where substantial flows are anticipated. Full-span structures would minimally influence stream meandering and flood flows.

Although there are bridges that fully span the active stream channel, this is not entirely true for many of the creeks in the project area that are constricted and lined to a large extent upstream and downstream of bridge structures near U.S. 101. When a creek is fairly consistent in size and roughness within a reach, regardless of the ideal size and roughness that nature intended, it could turn out to be detrimental, geomorphologically speaking, to change the conditions at one spot location such as in highway construction.

The efforts of the Santa Barbara County Flood Control and Water Conservation District are closely associated with conditions of runoff and sedimentation within the project area. As the result of urbanization, flood control work is vital to the protection of lives and property. However, it is urbanization, especially in the areas of the creeks, which causes many of the problems faced by the Flood Control District. The natural creek beds have been altered and narrowed to allow for development. Instead of rainwater percolating down to recharge aquifers, it runs off impervious surfaces into the creeks. During unusually heavy rains, floods can damage buildings and walls located too close to the creek banks. A major task in recent years has been the dredging of sediment and debris,

and extensive vegetation clearing from several creeks in the project area. Without the removal of these materials, the potential for flooding increases.

Environmental Consequences

Possible Highway Pollutants Affecting Water Quality

Based on highway storm water runoff data collected by the Caltrans Storm Water Research and Monitoring Program, typical pollutants from California highways include heavy metals, sediment, and litter. As traffic increases, the amount of pollutants originating from cars and trucks (tire and brake lining wear, litter, and spills during vehicle accidents) is also expected to increase. All constituents and parameters in nearby surface water bodies found to be elevated or exceeding published water quality standards are potential concerns for the proposed project.

Since the project would incorporate permanent design best management practices and treatment best management practices to minimize the direct discharge of highway storm water to adjacent waterways, the amount of pollutants discharged to surface waters from the proposed project area should be lower in certain areas than the existing highway where there are currently no treatment best management practices in place.

Alternative 1 (the preferred alternative) would increase impervious surfaces by less than 50 percent of the existing coverage. Still, the goal is that 100 percent of all the water quality volume, or water quality flow, from all impervious surfaces would be treated. Due to available treatment areas, however, not all treatment would be incorporated where new impervious areas are built: site constraints include high ground water levels in certain locations, slow percolating soils, terrain, and lack of available space. Therefore, the project could have more treatment best management practices in one watershed than in another. For example, at the Bailard interchange, no widening would occur, yet drainage improvements would treat water flowing into Carpinteria Creek.

Permanent Impacts

A water quality impact analysis assessed short-term and long-term water quality impacts from construction activities. Impacts were assessed by looking at beneficial uses, 303(d) impairments, water quality monitoring data for highway facilities, and increases in impervious surfaces. The analysis also evaluated potential impacts caused by hydromodification of the stream channels.

For geomorphological purposes, waters of the United States in this project fall into three general categories: human-made drainage features, highly altered creek channels, and partially altered creek channels.

Human-made Drainage Features

These include roadside drainage ditches and associated culverts. More than half of the constructed drainage features that would be affected are concrete lined. These lined channels provide storm water control benefits, but do not provide significant groundwater recharge or wildlife services.

Highly Altered Creek Channels

Channelization (concrete-lined bed and/or banks) is common to watersheds in the area, as many creeks in the project area flow through urbanized floodplains. Within the state right-of-way, Franklin and Santa Monica Creeks consist of open concrete box channels and Garrapata Creek is completely contained in a culvert. These altered channels provide storm water control benefits, but do not provide significant biological diversity, groundwater recharge, or wildlife habitat.

Franklin Creek

Franklin Creek is confined to a concrete-box channel with the channel lining extending about 1,000 feet downstream of the highway bridge. Because no permanent structures would be placed in the channel, the creek shape or substrate would not be permanently affected.

Santa Monica Creek

Santa Monica Creek is confined to a concrete-box channel within and next to the project limits. About 1,000 feet downstream of the U.S. 101 bridge, Santa Monica Creek crosses under the Union Pacific Railroad bridge and drains into the Carpinteria Salt Marsh. Because no permanent structures would be placed in the channel, the creek shape or substrate would not be permanently affected.

Garrapata Creek

Garrapata Creek enters the highway culvert north of Via Real on the north side of the highway and comes out directly south of the highway. Most of the drainage is in a culvert beneath U.S. 101. Because the build alternative would avoid Garrapata Creek, no impacts are anticipated.

Partially Altered Creek Channels

These creeks contain areas of natural substrates. Their channel banks typically consist of concrete walls and, in most cases, there are county or railroad bridge structures and modified channel conditions immediately up- and/or downstream. These natural-bottom creek channel sections provide storm water control, groundwater recharge, biological diversity, and wildlife habitat.

Carpinteria Creek

Work would occur at Carpinteria Creek as part of the Linden and Casitas Interchanges project. Because no work is planned in the bed or banks of the creek, no impacts would occur. The Linden and Casitas Interchange project would be completed prior to the South Coast 101 HOV Lanes project.

Arroyo Paredon Creek

The project would replace the existing freeway bridges crossing Arroyo Paredon Creek. The design of a replacement bridge has changed since the draft environmental document was released as a result of coordination with the National Oceanic and Atmospheric Administration Fisheries relative to fish passage. There are two existing bridges for the creek at U.S. 101, one each for the southbound and northbound lanes. Each bridge is a one-span structure separated by a gap of about 40 feet. These two structures can accommodate about half the flow of a 25-year storm event. The proposed replacement bridge is one structure that would have two spans and double the hydraulic capacity compared to the existing bridges. Due to adjacent development constraints, the 100-year flow cannot be accommodated at this location; therefore, the Santa Barbara County Flood Control Agency has agreed to conveyance of close to a 25-year flood flow. However, due to existing stream channel capacity restrictions, including smaller capacity bridges upstream and downstream of the U.S. 101 bridge, the channel cannot contain a 25-year flow either. Santa Barbara County Flood Control has no imminent plans to improve capacity at this creek; therefore, to prevent exacerbating the current flooding patterns with higher capacity flood flow passage of the new bridge, one of the proposed spans would be temporarily blocked off. This will allow the new bridge to maintain the existing capacity until future channel and bridge capacity improvements can be made by Santa Barbara County Flood Control, Santa Barbara County and Union Pacific Railroad. At that time, Caltrans would open the second span.

Because the new span would be 3 feet wider than the existing bridge, the proposed project would result in a minor channel widening. Vertical concrete walls (abutments) currently line the channel banks. The creek bed consists of cobble and silt. The new bridge would also have vertical concrete walls and a cobble and silt-substrate streambed. The wider channel would gain 0.012 acre of natural creek bed.

Toro Canyon Creek

Toro Canyon Creek consists mostly of a concrete-lined channel that conveys water beneath U.S. 101. The natural-bottom channel transitions to a concrete-lined channel between northbound and southbound U.S. 101 and remains concrete lined through the remainder of the state right-of-way. The channel bed and banks consist of natural cobbles and soil to the north of the northbound highway bridge. The northbound and southbound bridges would be replaced with a single structure. The new structure would enclose the open channel between the two bridges. Up to 0.105 acre of concrete streambed lining would be removed within the state right-of-way to restore the creek bottom.

Greenwell Creek

Greenwell Creek currently flows under U.S. 101 in a corrugated pipe culvert. The culvert invert (flow line of the culvert or inside bottom) would be repaired, possibly resulting in temporary impacts along 20 linear feet of creek bed at the north end. Next to the southbound lanes of U.S. 101, the culvert outlet is about 12 feet above a plunge pool. Water then flows along a disturbed open channel culvert before draining into the Pacific Ocean. The channel consists of a natural earthen bottom. To help prevent further erosion and dissipate flow, the remains of concrete-sack check-dams occur at varying intervals downstream of the pool. Rock-slope protection would be used to line the basin and side slopes immediately downstream of the culvert outlet. Bioengineering techniques such as brush-layering with willows would be used to stabilize the banks downstream.

Romero Creek

The Romero Creek channel is a natural-bottom drainage that conveys water beneath U.S. 101. The channel substrate consists of cobbles and boulders. Banks are vertical gabions (earth-and-rock-filled cages) and concrete walls from the county bridge inlet to the railroad bridge outlet downstream of the highway. Romero Creek is channelized where it flows through the urban areas of Montecito. To handle a wider channel, the proposed Romero Creek Bridge would have a longer span than the existing structure, resulting in a gain of 0.13 acre of unlined creek bed. The creek bed would remain a natural bottom. Banks would be concrete walls that support the bridge deck. The longer bridge span at

Romero Creek would be partially blocked to maintain its current flow capacity until constraints upstream and downstream of U.S. 101 are improved.

San Ysidro Creek

San Ysidro Creek is a moderate-sized drainage consisting of vertical concrete banks and a natural bottom (mostly cobble) that conveys water beneath U.S. 101 and drains to the Pacific Ocean west of Fernald Point. Upstream, the creek is highly channelized with concrete-sack walls. Downstream of the highway bridge, unlined channel banks extend about 300 feet to the Union Pacific Railroad bridge. The proposed San Ysidro Creek Bridge would have a longer span than the existing bridge. The longer bridge span would accommodate a wider channel, resulting in a gain of 0.11 acre of unlined creek bed. The creek bed and banks would continue to be a natural bottom, with concrete walls that support the bridge deck. The longer span at San Ysidro Creek would be partially blocked to maintain its current capacity until constraints upstream and downstream of U.S. 101 are improved.

Oak Creek

Oak Creek is a small drainage that crosses under U.S. 101 at post mile 9.66. The channel consists of vertical concrete banks and a natural bottom (mostly cobble) that conveys water beneath U.S. 101, draining to the Pacific Ocean. The proposed Oak Creek Bridge would have a longer span than the existing span. The longer bridge span would handle a wider channel, resulting in a gain of 0.03 acre of unlined creek bed. The creek bed and banks would continue to be a natural bottom, with concrete walls that support the bridge deck. The longer span at Oak Creek would be partially blocked to maintain its current capacity until constraints upstream and downstream of U.S. 101 are improved.

Montecito Creek

No work is planned in the bed or on the banks of Montecito Creek.

Potential Benefits

While the project would have permanent impacts to water quality, the project would also provide certain benefits at some creek locations. Removal of the concrete channel lining in Toro Canyon Creek would allow restoration of up to 0.105 acre of creek bottom. The longer bridge spans at Arroyo Paredon Creek would result in a gain of about 0.012 acre of natural creek bed. Restored and expanded channels would increase filtration capacity and groundwater recharge in these creeks.

At Greenwell Creek, impacts to other waters of the United States would be offset by the enhancement of 0.145 acre of the creek south of U.S. 101. Concrete-sack revetment (sloping structures placed on banks to absorb the energy of incoming water) and other fill material would be removed from the channel bed. Bioengineering techniques incorporating arroyo willows and other native plants would be applied in and above rock slope protection along creek banks to reduce erosion and enhance riparian habitat available for wildlife.

Hydromodification

By encouraging the storage of storm water within the project footprint and encouraging sheet flow of storm water runoff, hydromodification may be minimized or prevented. Again, the design goal for the project is to infiltrate 100 percent of the water quality flow/water quality volume based on the 85th percentile 24-hour storm. This would reduce the hydromodification impacts to less than significant.

Note that water quality flow refers to flow-based permanent storm water treatment best management practices (BMPs) such as bio-filtration (strips/swales). Water quality volume refers to volumetric-based treatment best management practices such as media filters, infiltration trenches/ponds, and multi-chambered treatment trains (three treatment mechanisms in three different chambers, typically used for treating storm water at critical source areas with limited space, such as parking areas).

Impacts to water quality could occur over months or years following construction of the project. The main causes of these impacts would be increased storm water runoff rates and volumes; increased storm water pollutant loads; changes in riparian and wetland areas; erosion; and spreading of invasive plant species that could adversely affect riparian areas.

To the maximum extent practical, the proposed highway realignment would be constructed to be as hydraulically disconnected from the watersheds it crosses as possible. However, there are several potential ways a highway can permanently affect water quality if not designed to minimize and mitigate for these potential impacts.

- Highway Pollutants: Potential pollutants include those listed in Table 2.25.

Table 2.25 Transportation Infrastructure Operation Pollutant Sources and Pollutants (Permanent Impacts)

Pollutant Source	Pollutant
Motor Vehicles	Oil
	Grease
	Petroleum
	Coolants
	Nitrite
	Metals
Highway Maintenance	Asphalt
	Sediment
	Mineralized Organic Matter
	Thermoplastics
	Treated Wood
	Tree/Shrub Clippings
Landscaping	Aluminum Sulfate
	Sulfur-Elemental
	Fertilizers—Inorganic
	Fertilizers—Organic
	Natural Earth (Sand Gravel and Topsoil)
	Herbicide
	Pesticide
	Lime
Illegal Dumping	Trash
	Oil/Grease
Spills	Includes Hazardous and Non-Hazardous Chemicals

Source: Caltrans 2003a.

- Erosion/Sediment: Wherever concentrated flow from the highway surface cannot be adequately controlled, erosion may occur. Erosion from concentrated flow can cause gullies, alter creek geomorphology, change the hydrology of wetlands, and discharge sediment above background levels to waterways. The project area, when disturbed, is expected to have a moderate to severe erosion hazard potential.

- Shade Canopy: Riparian vegetation within and next to creeks in the project limits is routinely cleared as part of the Santa Barbara County Flood Control District Annual Maintenance Plan. Maintenance, in combination with channel modifications such as concrete and/or sack-crete lined walls, results in limited opportunity for riparian communities to become established within the state right-of-way. At most creek crossings in the project area, riparian shade canopy at the U.S. 101 bridge sites is minimal. An exception is San Ysidro Creek, which supports a mature riparian canopy downstream of the U.S. 101 bridge. At San Ysidro Creek, the large sycamore trees to the south of the bridge will be retained, preserving the major portion of riparian shade canopy within the state right-of-way.
- Groundwater Hydrology: During construction, there can be a short-term change in groundwater flow paths, lowering of the groundwater table (de-watering), change in surface water flow rates and volumes, and domestic water uses (stream diversions and wells). These all can significantly influence groundwater hydrology. Due to elevated levels of pollutants, groundwater at certain locations would need to be tested, if de-watering is needed, to determine how it can be disposed of. For example, out of all of the samples taken so far, none meets drinking water standards, a beneficial use of all surface water bodies. Groundwater may be used to irrigate and control dust during construction of the project.
- Impervious Surface (pavement): Alternative 1 (the preferred alternative) would add 42 acres of impervious surface to the project area. Combined with the existing impervious surface area of 95 acres, there would be a post-construction total of 137 acres of impervious surface. The additional impervious surface coverage would potentially increase the volume and velocity of storm water flow to downstream water bodies. The project would be designed to meet post-construction runoff requirements in the Construction General Permit and the Caltrans National Pollutant Discharge Elimination System Permit as applicable. (Note: Alternative 1 (the preferred alternative) adds an overall total of 42 acres of impervious surface. This total amount is different than what is indicated in Table 2.51 because the 42 acres apply to the entire project, while Table 2.51 considers impervious surface for large watersheds only.)
- Bridge Replacement and Culvert Extensions: To accommodate the widened highway, certain culverts and bridges would require extensions or replacements. Culvert extensions can exacerbate scouring of creek beds at both the downstream and upstream ends. Localized scouring of the waterways may also be worsened by

localized increases in impervious surfaces that result is greater water volume and flow rates.

Installation of larger culverts, flared end sections and deep-rooted vegetation are common ways of preventing scour. As a last resort, rip rap may be placed at the culvert inlets and outlets. Changes to a stream's geomorphology caused by scouring could cause significant sedimentation (bank and bed erosion) and damage riparian vegetation. Willow and riparian plantings are being incorporated as part of the revegetation plans.

Bridge replacement could result in significant changes to a particular creek's geomorphology. In general, this project presents an opportunity to improve the geomorphology at each replaced bridge. Bridges at Arroyo Paredon, Toro Canyon, Romero (Picay), San Ysidro, and Oak creeks would be designed to pass floodwaters and allow unimpeded flow of the creek. Bridges would be designed to match upstream and downstream channel conditions based on discussions with the National Oceanic and Atmospheric Administration (see Appendix H for the Biological Opinion).

While four of the bridges (at Toro, Romero, San Ysidro and Oak creeks) would be able to pass the 100-year flood flows, the proposed U.S. 101 bridge at Arroyo Paredon Creek would pass close to a 25-year flow. The North Jameson Lane bridges at Romero, San Ysidro, and Oak creeks, immediately upstream of U.S. 101, were rebuilt in 2007 by the County of Santa Barbara. The bridges are designed to pass the 100-year flow and have much larger spans than the original county-built bridges or the highway bridges downstream. Gabions (earth-and-rock-filled cages) have been installed under these bridges to maintain their original capacity. The proposed U.S. 101 bridges at Romero (Picay), San Ysidro, and Oak creeks would match the ultimate capacity of the North Jameson Lane bridges. Following construction, however, the U.S. 101 bridges would temporarily be partially blocked to maintain their current flow capacity. One of the spans for the proposed Arroyo Paredon Bridge would also be blocked to maintain its current capacity. The bridges would be opened up to their full span when the stream channel and bridge capacities are improved up and downstream.

- Invasive Species: Invasive species that spread along waterways and wetlands can affect the beneficial uses of these waterways by changing the water quantity or quality in the vicinity of the invasive species. Invasive species are also known to

cause ecological fragmentation along riparian corridors. With Executive Order 13112 (Prevention and Control of Invasive Species), specific non-native species would be removed or controlled as determined necessary for any immediate disturbance within localized work areas as part of this project (see Section 2.3.5).

Avoidance, Minimization, and/or Mitigation Measures

Permanent Design Measures

- **Riparian Shade Canopy**—Revegetation along affected creeks would be designed to optimize shade canopy where feasible and not conflict with current flood control practices.

- **Permanent Storm Water Treatment Best Management Practices—**Because this project proposes to add more than 1 acre of new impervious surfaces permanent storm water treatment best management practices will be incorporated into this project to the maximum extent practicable. Treatment best management practice techniques would concentrate on the use of biofiltration swales (stable grass-lined ditches) to convey surface runoff, and biofiltration strips to intercept overland flow. Currently, infiltration devices are not proposed as part of the project due to high groundwater levels in most locations. If site specific locations indicate low groundwater and soils are determined to be appropriate for infiltration, infiltration devices would then be evaluated for installation.

  - All existing vegetated locations to remain along the project limits would be evaluated for viability as biostrips and documented to quantify effectiveness of reductions of particulate runoff. In addition, the following locations would be used for constructing new biostrips and bioswales to intercept runoff. If subsurface conditions are appropriate, these same locations would be used additionally for infiltration purposes. Preliminary locations are shown in Table 2.26.

Table 2.26 Preliminary Locations for Biostrips and Bioswales

Biostrip	Bioswale	Treatment Begin (post mile)	Treatment End (post mile)	Treatment Location	Impervious Tributary Area (Acres)	Tributary Watershed	Water Quality Flow from Impervious Area (cfs)	Tributary Begin	Tributary End	Tributary Shed
	X	1.60	1.70	Southbound	8.19	Carpinteria Creek	2.023	1.27	1.74	NB & SB
	X	2.30	2.40	Northbound	9.94	Carpinteria Creek	2.455	1.74	2.44	NB & SB
X		3.31	3.48	Southbound	1.07	Franklin Creek	0.264	3.31	3.48	SB
X		3.31	3.53	Northbound	1.39	Franklin Creek	0.343	3.31	3.53	NB
X		3.55	3.60	Southbound	0.32	Franklin Creek	0.079	3.55	3.60	SB
X		3.66	3.76	Southbound	0.63	Santa Monica Creek	0.156	3.66	3.76	SB
X		3.68	3.92	Northbound	1.63	Santa Monica Creek	0.403	3.68	3.92	NB
X		3.77	3.94	Southbound	1.07	Salt Marsh	0.264	3.77	3.94	SB
X		3.95	4.28	Northbound	2.24	Salt Marsh	0.553	3.95	4.28	NB
X		4.32	4.62	Northbound	2.04	Salt Marsh	0.504	4.32	4.62	NB
X		4.18	4.33	Southbound	0.95	Salt Marsh	0.235	4.18	4.33	SB
X		4.70	5.10	Northbound	2.72	Salt Marsh	0.561	4.70	5.10	NB
X		5.71	6.24	Southbound	3.34	Pacific Ocean	0.825	5.71	6.24	SB
X		5.96	6.24	Northbound	1.90	Pacific Ocean	0.469	5.96	6.24	NB
	X	6.70	6.80	Northbound	2.27	Toro Creek	0.561	6.9	7.26	NB
X		6.91	7.10	Southbound	1.20	Toro Creek	0.296	6.91	7.10	SB
X		7.05	7.22	Southbound	1.07	Toro Creek	0.264	7.05	7.22	SB
X		7.26	7.46	Southbound	1.26	Pacific Ocean	0.311	7.26	7.46	SB
X		7.50	7.73	Southbound	1.45	Greenwell Creek	0.358	7.50	7.73	SB
					Total 44.68 acres					

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Bridge(s)—For all creeks requiring replacement or widening of existing bridges (replace bridge structures at Arroyo Paredon, Toro Canyon, Romero (Picay), Oak, and San Ysidro creeks, widen bridge structures at Franklin and Santa Monica creeks), new bridges would be designed to maintain or reduce the existing water velocity under the bridge. The Toro Canyon Creek Bridge would be designed to handle the 100-year flood. At Romero, San Ysidro and Oak creeks, the 100-year flow is not carried by the channel or the bridges upstream and downstream of the highway. Santa Barbara County Flood Control has plans to improve the capacity of the channel and bridges from North Jameson Lane to the ocean at these creeks. These three U.S. 101 bridges would be designed to pass the 100-year flow, but would be blocked to match current capacities within the creek channel until the capacity upstream and downstream has been improved. Due to nearby constraints at Arroyo Paredon Creek, the 100-year flow cannot be handled. The county has no imminent plans to improve capacity at this creek. Consequently, the bridge would be designed to pass the maximum flow possible, which is close to a 25-year flow. The proposed bridge would have one of its two spans blocked to maintain existing conditions until capacity improvements are made upstream and downstream.

- **Hydrology—**Storm water runoff from the highway would be managed to maintain sheet flow to adjacent grasslands and wetlands, to the maximum extent feasible. The concentration of storm water flow would be minimized where feasible. Dikes and the concrete lining of drainage swales would be eliminated if feasible after considering the necessary function of each facility.
- **Litter—**During construction, litter on the highway would be removed periodically as part of regular maintenance procedures.
- **Culverts—**The size and alignment of culverts, for all areas requiring culvert installation, will be designed to minimize influencing the hydrology of the project site to the maximum extent practicable.
- **Riparian Corridors—**The project will be designed to minimize impacts to riparian areas, preserve channel length, and preserve shade canopy. Where impacts to riparian areas are unavoidable, mitigation onsite or offsite will be proposed.
- **Wetlands—**For wetlands that cannot be avoided, mitigation wetlands would be created onsite or offsite to ensure no net loss of wetlands. See Section 2.3.2 (Wetlands and Other Waters) for more details.

- **Design Best Management Practices—**Storm water best management practices would be selected and designed during the design phase of this project. Best management practices would be selected to minimize pollutant discharges to surface waters, minimize storm water discharge rates and volumes, and recharge groundwater. A formal storm water drainage plan would be developed after the project enters the design phase.
- **Invasive Plants—**All invasive plants that could adversely affect water quality and associated beneficial uses would be removed from specific work areas within creek channels and prevented from spreading, to the extent feasible. Invasive vegetation may also be removed from restoration and mitigation areas.

Also see Section 2.4 (Construction Impacts) for minimization measures listed under temporary water quality impacts.

2.2.3 Geology/Soils/Seismic/Topography

Regulatory Setting

For geologic and topographic features, the key federal law is the Historic Sites Act of 1935, which establishes a national registry of natural landmarks and protects "outstanding examples of major geological features." Topographic and geologic features are also protected under the California Environmental Quality Act.

This section also 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. Caltrans' Office of Earthquake Engineering is responsible for assessing the seismic hazard for Caltrans projects. The current policy is to use the anticipated Maximum Credible Earthquake, from young faults in and near California. The Maximum Credible Earthquake is defined as the largest earthquake that can be expected to occur on a fault over a particular period of time.

Affected Environment

A Preliminary Geotechnical Report was completed for the full project in September 2009. Preliminary geotechnical studies associated with the various structures proposed for the project were also done. A final Geotechnical Report will be completed during the project design phase.

The project area is in the Transverse Ranges Geomorphic Province of California, which is characterized by east-west trending mountain ranges, faults, and folds. The project lies within the Santa Barbara Fold, which is between the mountains and the ocean from east

of Carpinteria to west of Goleta. Active folding has deformed the late Pleistocene to Holocene-aged marine terraces, terrace deposits, and alluvial fans. The local topographic features in the area are believed to be the result of these tectonic forces.

Rocks surrounding the Carpinteria Valley are composed of the Quaternary-aged Casitas and Santa Barbara formations and the Tertiary-aged Monterey, Rincon, Sespe, and Coldwater Sandstone formations. Surface deposits within the valley consist of Holocene-aged stream channel, floodplain, and alluvial fan deposits of gravels, sands, and silt.

Groundwater

Regional groundwater in the project area is high. Test borings for the structures in the project area indicate that groundwater is present within 2 feet of the ground surface near some of the creek crossings to about 30 feet below ground surface at a few of the local road overcrossings. Groundwater elevations do vary over time and depend on factors such as seasonal precipitation, irrigation, and land use. A more detailed assessment of the existing groundwater conditions in the project area would be performed during the design phase of the project.

Seismicity

The project lies in a seismically active region of California. Two faults have the greatest potential to affect the project: the More Ranch-Mission Ridge-Arroyo Parida-Santa Ana Fault (these were originally identified separately, but have now been lumped together as one fault) and the Mesa-Rincon Creek Fault.

The More Ranch-Mission Ridge-Arroyo Parida-Santa Ana Fault lies north of U.S. 101 in the project area, with the closest distance being 0.84 mile at post mile R6.0 and the farthest being 2.27 miles at post mile 2.0. The maximum credible moment magnitude for an earthquake on this fault is 7.5 (a logarithmic scale of 1 to 10, a successor to the Richter scale).

The Mesa-Rincon Creek Fault lies about 0.98 mile to the north of U.S. 101 at post mile 2.0. It crosses the highway close to post mile 4.36, dips as far as 1.7 miles south of the highway alignment near post mile 8.6, and crosses the highway again near post mile 13.8. The maximum credible moment magnitude for an earthquake on this fault is 7.0.

Liquefaction

Liquefaction is the sudden loss of soil strength from a rapid increase in soil-pore water pressure resulting from seismic ground-shaking. Potential for liquefaction depends on factors including soil type and density, depth to groundwater, and the intensity of the

seismic shaking. Loose soils with minimal cohesion such as sands and gravel soils can become saturated by a high water table. These soils are prone to liquefy during earthquake activity. Embankments built on liquefiable soils may settle during a seismic event. Structures may settle or overturn if the soils beneath them liquefy.

Liquefaction hazards can be addressed by constructing structures on deep foundations or by using ground improvement techniques.

Corrosion

Soils and groundwater may be corrosive to metallic foundation elements and drainage structures. Representative soil and groundwater samples would be tested for corrosion potential as part of the geotechnical investigation for the project. If the soils and/or groundwater are found to be corrosive, protective measures would be undertaken to ensure an adequate service life for the highway. Based solely on close proximity (within 1,000 feet) to the Pacific Ocean, segments of the project area are considered corrosive.

Environmental Consequences

Potential seismic hazards may arise from three sources: surface fault rupture, ground shaking, and liquefaction.

Retaining walls, soundwalls, and bridge structures are part of the project for all build alternatives. Caltrans requires a fault rupture evaluation if a bridge is within an Alquist-Priolo Earthquake Fault Zone or within 1,000 feet of an un-zoned fault younger than 15,000 years old. If there is the potential for surface rupture, the bridge either has to be designed to handle the anticipated maximum displacement or, where possible, the structure may be relocated to avoid the area of potential displacement. Liquefiable soils (shake loosened water-soaked soils) are of particular concern with respect to structure foundations. In general, if a bridge site is found to have liquefiable soils, deep foundations would be required. Liquefiable soils can also compromise slope stability. If the foundation soils of a tall embankment are found to be liquefiable, some form of ground improvement may be necessary.

- Liquefaction—Potential may be high in the project limits because this area contains groundwater at shallow depths, is underlain by unconsolidated or poorly consolidated alluvial soils, and there is a likelihood for strong ground-shaking due to nearby potentially active earthquake faults in the area.

- Slopes—Newly constructed cut and fill created as part of the project could increase potential for erosion due to erodible materials that may underlie certain areas of the project.

Avoidance, Minimization, and/or Mitigation Measures

- Slopes—All new cut slopes would be excavated at a ratio of 2 to 1 or flatter whenever feasible. Any affected existing paved top-of-cut ditches would be replaced in kind. Top-of-cut ditches are used to minimize the potential for erosion by intercepting offsite drainage that would otherwise flow down the slope face. No new cut slopes are proposed that would intercept any large offsite areas draining toward the slopes.
- Embankments—New embankments and widened embankments would be built with slopes of 2 to 1 or flatter if feasible. Steeper slopes could be considered if the embankments are built of select materials that meet the geotechnical unit specifications. The embankment material, regardless of slope steepness, must also meet the landscape architecture unit criteria for erosion control.
- The project design would incorporate Caltrans standards and construction methods to minimize potential risks associated with strong ground shaking and potential liquefaction hazards.

2.2.4 Paleontology

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 (Antiquities Act of 1906 [16 U.S. Code 431-433], Federal-Aid Highway Act of 1956 [23 U.S. Code 305]). Under California law, paleontological resources are protected by the California Environmental Quality Act.

Affected Environment

Scientifically sensitive paleontological resources are geologic deposits or identified sites containing individual fossils or assemblages of fossils that are unique or unusual, diagnostically or stratigraphically important and add to the existing body of knowledge.

An initial paleontology survey was completed for this project in February 2009. This survey determined there was potential high sensitivity for paleontological resources in the

project area. Subsequently, a Paleontology Evaluation Report was prepared in April 2011 and updated in September 2011.

The Paleontology Evaluation Report documents three geologic units that lie within or next to the project limits that contain paleontological resources (see Table 2.27).

Table 2.27 Soil Excavation with the Potential to Encounter Paleontological Resources within Sensitive Geologic Units

Structure/ Feature Type	Geologic Unit and Age	Sensitivity	Known Fossil Type
Soundwall	Marine Terrace Deposits (Qmt) Middle to Upper Pleistocene	High	Coral–*Balanophyllia elegans* Mammoth–*Archidiskodon imperator*
Retaining Wall	*Casitas Formation (Qca) Santa Barbara Formation (Qsb)	High	*Mollusks, bryozoans, and foraminifera*
Cut	Qmt–Marine Terrace Deposits. Middle to Upper Pleistocene	High	Coral–*Balanophyllia elegans* Mammoth–*Archidiskodon imperator*
Interchange at Cabrillo Boulevard/Hot Springs Road	Qmt–Marine Terrace Deposits. Middle to Upper Pleistocene	High	Coral–*Balanophyllia elegans* Mammoth–*Archidiskodon imperator*
Soundwall	Tr–**Rincon Formation, Lower Miocene	High	Rodentia–*Cricetidea* *Chondrichthyes* *Elasmobranchii*

** The Casitas Formation typically does not contain sensitive fossil resources but has been known to have facies (inter-fingering), including clastic remnants of the Santa Barbara and Sespe Formation that have known sensitive fossil resources.*
*** The Rincon Formation is not present in surface exposures within the project limits, yet is in close proximity to the other formations in the table and may be impacted by project excavation.*

Two of the units are Quaternary: Marine-terrace deposits (Qmt) and the Casitas Formation (Qca). The third geologic unit, known as the Rincon Formation (Tr), is Miocene in age.

The two Quaternary geologic units within the project limits and bisected by U.S. 101 are known to have sensitive paleontological resources. The upper Pleistocene Marine-terrace deposits (Qmt) in the basal sections (<=1m thick) has produced 102 species of mollusks and a rare species of fossil coral. Also, presence of a late Pleistocene mammoth (Archidiskodon imperator) jawbone in alluvium within marine terrace deposits near the western edge of the City of Goleta was also documented. This location is outside the

proposed project limits, but the probability of encountering sensitive fossil resources like those above within the project limits is high.

The Casitas Formation typically does not contain sensitive fossil resources, but has been known to inter-finger with the Santa Barbara Formation (Qsb) that has known sensitive fossil resources. The Santa Barbara Formation contains diverse marine invertebrate assemblages of mollusks, bryozoans, and foraminifers concentrated in multiple stratigraphic intervals, ranging in thickness from less than 1 meter to several tens of meters, distributed throughout all but the uppermost parts of the unit.

The Miocene Rincon Formation is right next to the project limits, along Via Real Road, north of U.S. 101, between post miles 7.7 and 8.1. This formation is known to contain sensitive vertebrate and invertebrate fossils, including rodents and fish.

Environmental Consequences

The uppermost few feet of sediment in the project area is mostly covered by younger alluvial and fluvial deposits and is unlikely to contain fossils with scientific significance. But deeper excavation for proposed walls and structures are expected to encounter formations that contain scientifically significant fossils. U.S. 101 through the project limits bisects a number of Quaternary units, including the middle to upper Pleistocene sedimentary rocks of the Marine-terrace deposits and the Santa Barbara Formation within the Casitas Formation, which contain sensitive paleontological resources that could be exposed during construction excavation. Maps showing Potential Paleontological Sensitive Areas are shown in Appendix G, Volume II of this document.

The Miocene Rincon Formation, which also contains sensitive paleontological resources, is next to the project limits. This formation is not exposed at the surface within the project limits, but adequate data are not available on the vertical extent and orientation of the formation. Therefore, a possibility exists for exposing fossils associated with the Rincon Formation during construction excavation.

Ground-disturbing construction activities such as excavation have the potential to encounter scientifically significant paleontological resources. This could result in the destruction of unique and valuable scientific specimens and data.

Avoidance, Minimization, and/or Mitigation Measures

The proposed build alternatives could have the potential to adversely affect paleontological resources that cannot be avoided. The proposed build alternatives are all constrained by the existing right-of-way and the fact that geologic formations of concern

are laterally extensive. As a result, impacts to paleontological resources cannot be avoided or effectively minimized. However, mitigation would reduce impacts and could actually result in the discovery of fossils that would not have been exposed without construction and, therefore, would not have been available for study. Mitigation for the proposed build alternatives would include proper paleontological monitoring, salvage, and data recovery.

Due to the possibility of encountering scientifically sensitive specimens during excavation into middle to upper Pleistocene sedimentary rocks of the Marine-terrace deposits, and inter-fingerings of the Santa Barbara Formation into the Casitas Formation, paleontological mitigation in the form of monitoring, salvage, and data recovery is indicated where excavation would disturb in-situ deposits of these strata. The uppermost few feet of sediment in the project area is mostly covered by younger alluvial and fluvial fan deposits and is less likely to yield significant fossil remains, but deeper excavation for the proposed walls and structures has a chance of encountering fossils. Because the Rincon Formation is next to proposed excavation sites, mitigation in the form of monitoring, salvage, and data recovery may also be necessary in this formation.

Based on field reviews and the paleontological literature available, it does not appear that full-time monitoring would be required at the proposed excavation sites within the project. It is anticipated that only minor monitoring and spot checks would be necessary where soil disturbance would occur. However, the actual extent of monitoring would be dictated by the design details of the selected alternative and be determined during the Plans, Specifications and Estimate design phase by a qualified Principal Paleontologist (who holds an M.S. or Ph.D. in paleontology or geology, and is familiar with paleontological procedures and techniques).

Prior to submittal of design plans for the Coastal Development Permit process, a qualified Principal Paleontologist (who holds an M.S. or Ph.D. in paleontology or geology, and is familiar with paleontological procedures and techniques) must be retained to review the plans. The Principal Paleontologist would review the construction plans with proposed excavation sites and the Paleontology Evaluation Report to determine which, if any, project components would involve earth-moving activities at depths sufficient to warrant development of a Paleontological Mitigation Plan (PMP) consistent with Caltrans' Standard Environmental Reference (SER). The Principal Paleontologist would review the construction schedule to develop the monitoring schedule and compile accompanying costs. A nonstandard special provision to address paleontological resources would also be incorporated into the construction contract to notify the construction contractor to

cooperate with the paleontological monitoring and salvage activities. Paleontological resources should also be discussed at the pre-bid meeting.

Based on currently available information, the specific mitigation measures contemplated for possible incorporation into this project's Paleontological Mitigation Plan if it becomes necessary are included in Section 2.4, Construction Impacts (Paleontology).

2.2.5 Hazardous Waste or Materials

Regulatory Setting

Hazardous materials and hazardous wastes are regulated by many state and federal laws. These include not only specific statutes governing hazardous waste, but also a variety of laws regulating air and water quality, human health and land use.

The main federal laws regulating hazardous wastes/materials are the Comprehensive Environmental Response, Compensation and Liability Act of 1980 and the Resource Conservation and Recovery Act of 1976. The purpose of the Comprehensive Environmental Response, Compensation and Liability Act, often referred to as Superfund, is to clean up contaminated sites so that public health and welfare are not compromised. The Resource Conservation and Recovery Act provides for "cradle to grave" regulation of hazardous wastes. Other federal laws include the following:

- Community Environmental Response Facilitation Act of 1992
- Clean Water Act
- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety and Health Act (OSHA)
- Atomic Energy Act
- Toxic Substances Control Act
- Federal Insecticide, Fungicide, and Rodenticide Act

In addition to the acts listed above, Executive Order 12088, Federal Compliance with Pollution Control, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.