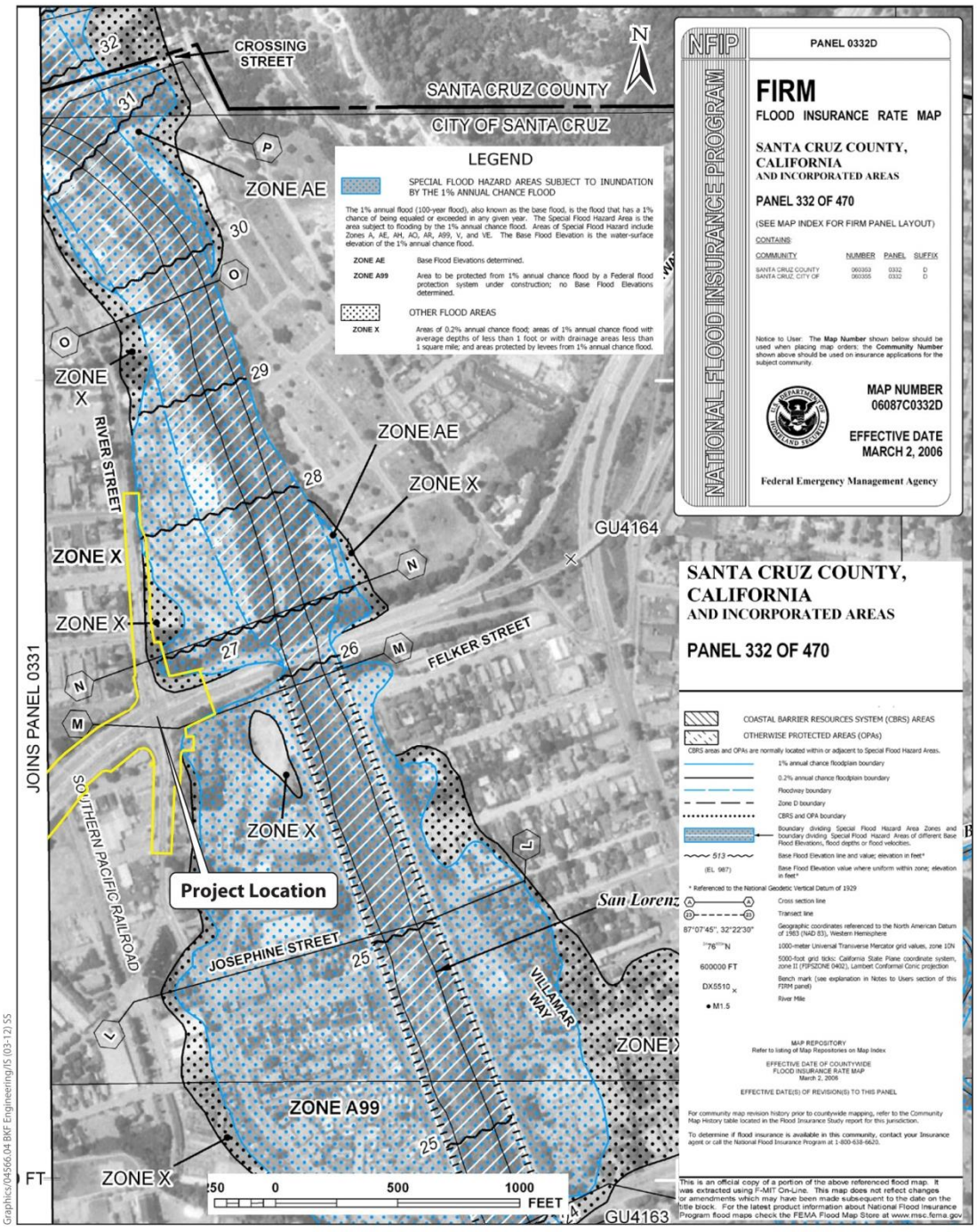

Figure 2-7 Flood Rate Insurance Map for the Project Area

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2.2.2 Water Quality and Storm Water Runoff

Regulatory Setting

Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 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 gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the state. It predates the Clean Water Act and regulates discharges to waters of the state. Waters of the state include more than just waters of the U.S., like groundwater and surface waters not considered waters of the U.S. Also, it 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 compliance with the water quality standards. Details on water quality standards in a project area are contained in the applicable Regional Water Quality Control Board Basin Plan. In California, Regional Boards designate beneficial uses for all water body segments in their jurisdictions and then set criteria necessary to protect these uses. Consequently, the water quality standards developed for particular water segments are based on the designated use and vary depending on such use. In addition, the State Water Resources Control Board identifies waters failing to meet standards for specific pollutants, which are then 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 or non-point source controls (National Pollutant Discharge Elimination System permits or Waste Discharge Requirements), the Clean Water Act requires the establishment of Total Maximum Daily Loads. Total Maximum Daily Loads specify 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, sets water pollution control policy, and issues water board orders on matters of statewide

application, plus oversees water quality functions throughout the state by approving Basin Plans, Total Maximum Daily Loads, and National Pollutant Discharge Elimination System permits. 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.

Affected Environment

This section is based on the Water Quality Technical Memorandum (September 13, 2011) prepared for the project.

The project lies in the San Lorenzo Hydrologic Unit. The drainage channel, historically known as the Arroyo de San Pedro Regaldo Creek (Figure 1-3), extends from a 72-inch reinforced concrete pipe storm drain beneath Route 9 east to the San Lorenzo River. The channel drains an industrial area of about 200 acres on the west side of Route 9. The size of the drainage channel ranges from 6 feet to 9 feet wide and 2 feet to 3 feet deep. The channel is about 500 feet long between the culvert opening and the San Lorenzo River.

The Central Coast Regional Water Quality Control Board has set water quality objectives for surface waters in its region. Specific objectives for concentrations of chemical constituents are identified for bodies of water based on the surface water's designated "beneficial uses" that are established to preserve existing and potential future uses of the water bodies. These objectives, consisting of both narrative and numerical goals are listed in the region's basin plan. The Beneficial Uses of the San Lorenzo River include municipal, agricultural, industrial, groundwater recharge, recreation, wildlife habitat, cold freshwater habitat, migration of aquatic organisms, spawning habitat, biological habitats of special significance, rare or endangered species, freshwater replenishment, and commercial fishing.

The State Water Board developed a statewide 2010 California Integrated Report based on the Integrated Reports from each of the nine Regional Water Quality Control Boards that was approved by the U.S. Environmental Protection Agency on November 12, 2010. According to the 2010 Integrated Report, the San Lorenzo River is impaired for pathogens, chlordane, chlorpyrifos, nutrients, polychlorinated byphenyls (PCBs), and sedimentation/siltation. Potential sources of the pathogen impairment are considered to be natural sources, urban runoff, onsite wastewater systems (septic tanks), transient encampments, and unknown nonpoint sources. The sources of chlordane and chlorpyrifos are unknown according to the list, but

chlorpyrifos is typically associated with agricultural operations. Nutrients are sourced to pasture grazing—riparian and/or upland, natural sources, septage disposal, and nonpoint sources. The source of polychlorinated biphenyls is unknown, and the sedimentation impairment can be sourced to construction/land development, silviculture, and urban runoff/storm sewers. The San Lorenzo River watershed has Total Maximum Daily Loads set for nutrients, pathogens, and sedimentation siltation. Caltrans is a named stakeholder in the sediment/siltation Total Maximum Daily Load. Therefore, Caltrans District 5 submits a Work Plan, which contains all the National Pollutant Discharge Elimination System Permit-related goals, to the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Board (RWQCB) annually. In accordance with the Work Plan, all projects within the San Lorenzo River watershed will consider incorporation of design pollution prevention best management practices (BMPs) to reduce or eliminate the potential for sediment loading to the San Lorenzo River or its tributaries.

Environmental Consequences

The project would require work within the Arroyo de San Pedro Regaldo drainage channel by extending the channel's outfall. In-water construction would occur during the dry season (July 1 through October 15). Because the creek appears to be perennial, water may still be present. Although in-water construction activities would occur during the dry season, dewatering of the portion of the channel to be filled may be implemented through small check dams and bypass pipes to stop sedimentation.

With implementation of the project, the increase in impervious surface area is expected to be 0.34 acre. (The current impervious area is about 4.03 acres; after construction the impervious area would be about 4.37 acres.) The total disturbed soil area for construction of the project is estimated to be 0.81 acre. Potential effects of the project are limited to construction-related impacts such as erosion, sedimentation, and the potential release of hazardous construction-related materials. Grading activities could result in sedimentation of nearby surface waters, and trenching and excavation may expose the groundwater table and provide a direct path for contamination of groundwater. Improper use of fuels, oils, and other construction-related hazardous materials may also pose a threat to surface or groundwater quality.

No-Project Alternative

The No-Project Alternative would not result in any water quality impacts. Therefore, no avoidance or minimization measures are required.

Avoidance, Minimization, and/or Mitigation Measures

1. To minimize the mobilization of sediment and construction-related contaminants to the adjacent water body, Caltrans/City would require that erosion and sediment control measures be specified in the construction and project performance specifications based on standard Caltrans/City requirements. These may include, but are not be limited to, the following:

   – To prevent fertilizers used on landscaped areas from contributing nutrients to the impaired San Lorenzo River, contain runoff from onsite landscaped areas. This containment can be achieved by irrigating at a rate that does not cause substantial runoff.

   – Develop a hazardous material spill prevention control and countermeasure plan before construction begins that would minimize the potential for and the effects of hazardous or toxic substances spills during construction. The plan would include storage and containment procedures to prevent and respond to spills, and would identify the parties responsible for monitoring the spill response. During construction, any spills would be cleaned up immediately according to the spill prevention and countermeasure plan. The City/Caltrans would review and approve the contractors' toxic materials spill prevention control and countermeasure plan before allowing construction to begin. The City/Caltrans would routinely inspect the construction site to verify that Best Management Practices specified in the plan are properly implemented and maintained. The City/Caltrans would notify the contractor immediately if there is a noncompliance issue and would require compliance.

   – Cover or apply nontoxic soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more) that could contribute sediment to waterways.

   – Enclose and cover exposed stockpiles of dirt or other loose, granular construction materials that could contribute sediment to waterways.

   – Contain soil and filter runoff from disturbed areas by berms, vegetated filters, sediment control Best Management Practices, straw wattle, catch basins, or other means necessary to prevent escape of sediment from the disturbed area.

   – Use other temporary sediment control measures (such as large sediment barriers, staked straw wattles, silt/sediment basins and traps, check dams, geofabric, sandbag dikes), and install permanent erosion control or other ground cover as soon as soil-disturbing activities are complete to control

erosion from disturbed areas as necessary.

- Avoid earth or organic material from being deposited or placed where it may be directly carried into the channel.
- Prohibit the following types of materials from being rinsed or washed into the streets, shoulder areas, or gutters: concrete; solvents and adhesives; thinners; paints; fuels; sawdust; dirt; gasoline; asphalt and concrete saw slurry and wash water; heavily chlorinated water.
- Measure baseline turbidity, pH, specific conductance, and temperatures in the channel when flow is present, and sample water from dewatering activities. As required by the Regional Water Quality Control Board, avoid exceeding water quality standards specified in the Basin Plan standards over the natural conditions.
- The following temporary construction site Best Management Practices, that will address the above concerns, to be included as contract bid items are anticipated to be: Prepare Water Pollution Control Program (WPCP), Job Site Management, Temporary Check Dam, Temporary Gravel Bag Berm, Temporary Drainage Inlet Protection, Temporary Hydraulic Mulch (BFM), Temporary Large Sediment Barrier, Street Sweeping, Temporary Concrete Washout, and Temporary Fence (type ESA).The City/Caltrans shall perform routine inspections of the construction area to verify that the Best Management Practices are properly implemented and maintained. The City/Caltrans will notify contractors immediately if there is a noncompliance issue and will require compliance.

2. As this project does not add an acre or more of net new impervious surfaces, it is not required to consider incorporation of permanent storm water treatment Best Management Practices. Per the Caltrans Work Plan for compliance with the San Lorenzo River Total Maximum Daily Loads, the project will incorporate design pollution prevention Best Management Practices (DPPBMPs) to reduce or eliminate the potential for sediment discharge to the San Lorenzo River and its tributaries. DPPBMPs under consideration are: compost-based soil modification to reduce runoff and increase infiltration, reduction of paved surfaces as much as feasible, use of an open vegetated storm water conveyance system where feasible, flared culvert end sections, outlet protection/velocity dissipation devices, preservation of existing vegetation, and stabilization of disturbed soil with erosion and sediment control Best Management Practices when soil-disturbing activities stop.

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. The Department's 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

This section is based on the Preliminary Geotechnical Information Memorandum (March 13, 2012) prepared for this project.

Geology and Subsurface Conditions

A geologic map of the project area is shown in Figure 2-8. Subsoils at the project site sit on alluvial deposits (undifferentiated Holocene [Qal] in Figure 2-8) from the San Lorenzo River. These deposits are generally overbank deposits of clay, silt, and fine sand intermixed with unconsolidated course sands and gravel to a depth of about 25 feet. Based on borings drilled about 600 feet east of the project site, the subsurface conditions consist of mostly medium dense to very dense sand and gravel. Groundwater near the project site is found at depths from 12 feet to 14 feet and flows southeasterly toward the San Lorenzo River.

Topography and Drainage

The project sits along the northern coast of Monterey Bay. The regional terrain trends toward the south, sloping downward from the crest of the Santa Cruz Mountains to the northern coast of Monterey Bay. Surface water runoff is collected through local drainage systems and flows toward Monterey Bay.

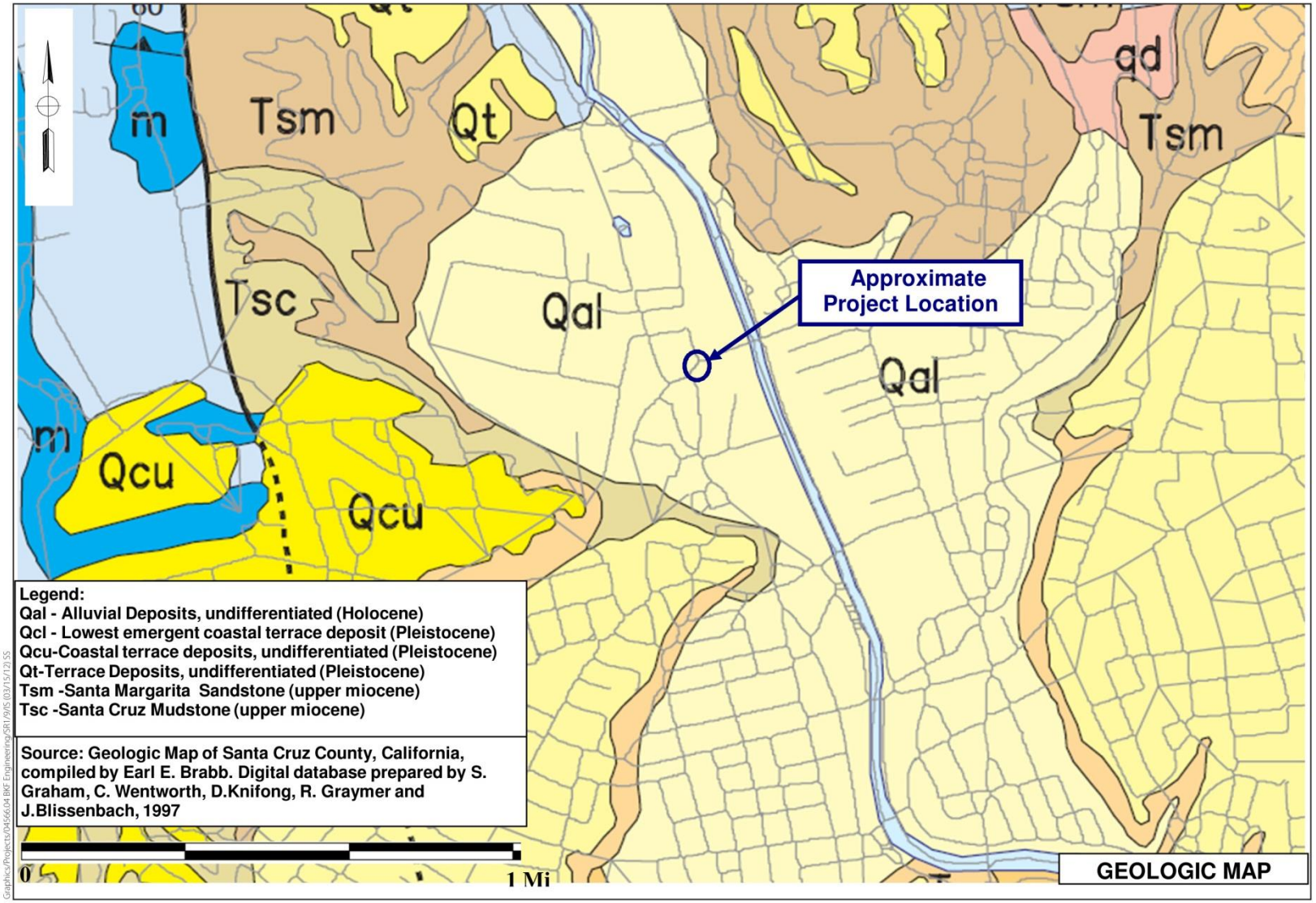

Figure 2-8 Geology of Project Area

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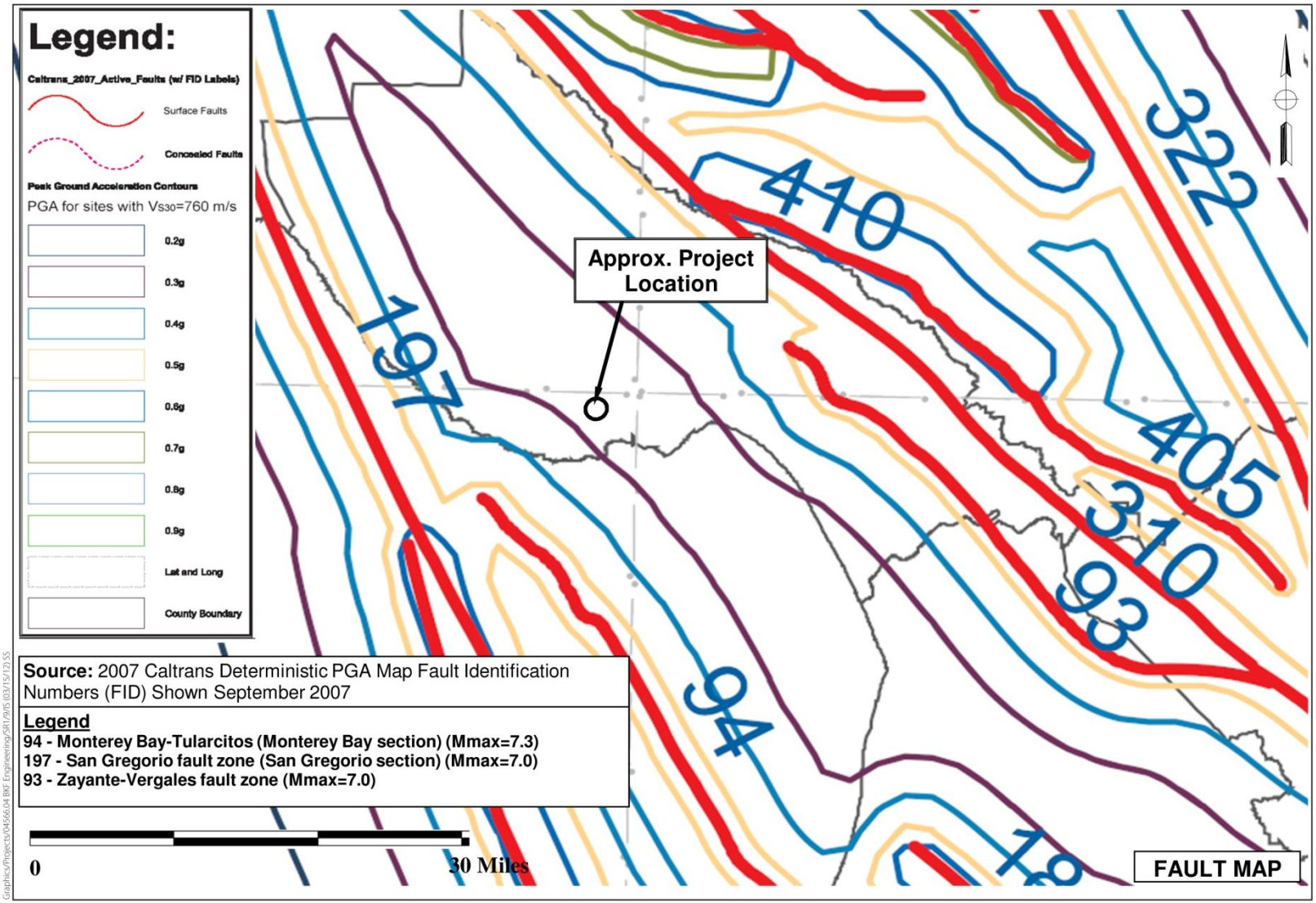

Figure 2-9 Faults in Project Area

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Earthquake Considerations

The site is about 7.1 miles northeast of the nearest active fault, the Monterey Bay-Tularcitos (Monterey Bay section) fault with a Maximum Moment Magnitude (M_{max}) of 7.3 (see Figure 2-9). The site is also about 9.1 miles west of the Zayante-Vergales Fault Zone (M_{max}=7.0), 10.3 miles east of the San Gregorio Fault Zone (San Gregorio section) (M_{max}=7.0), and 10.7 miles west of the San Andreas Fault Zone (Santa Cruz Mountains section) (M_{max}=7.9).

The project site lies in a seismically active part of Northern California. The San Andreas Fault has a 21% probability of one or more major earthquakes over the next 30 years. There is a 62% probability of at least one magnitude 6.7 or greater earthquake striking the San Francisco Bay region before 2031.

Liquefaction

Liquefaction is a phenomenon in which saturated sediments are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking; in such a situation, the soil turns jellylike. Submerged, cohesionless sands and non-plastic silts of low to medium density are the types of soils susceptible to liquefaction.

Environmental Consequences

Potential seismic hazards may arise from three sources: surface fault rupture, ground shaking and liquefaction. The site is not located within the Alquist-Priolo Earthquake Fault Zone. Therefore, fault rupture is not considered a substantial hazard and should have no impact on the project. Many faults in the area are capable of producing earthquakes that may cause strong ground shaking at the site. Liquefaction potential at the project site is moderate.

No-Project Alternative

Under this alternative, site geology would not be altered. Therefore, avoidance, minimization, and mitigation measures are not needed.

Avoidance, Minimization, and/or Mitigation Measures

1. Normal maintenance of surface drainage and slope maintenance would be incorporated into the project plans. Sloped areas that would be disturbed during construction would be revegetated after completion of construction. New sloped areas would also be planted. Construction of sediment ponds or siltation basins would be considered to retain water during heavy rainfall periods. These basins would be connected to the storm drainage system.

2. The project design would incorporate Caltrans standards and construction methods to minimize the potential risks associated with strong ground shaking.
3. The project design would incorporate Caltrans standards and construction methods to minimize the potential risks associated with potential liquefaction hazards.

2.2.4 Hazardous Waste or Materials

Regulatory Setting

Hazardous materials, including hazardous substances and wastes are regulated by many state and federal laws. Statutes govern the generation, treatment, storage and disposal of hazardous materials, substances, and waste, and also the investigation and mitigation of waste releases, 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 identify and clean up abandoned 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 waste generated by operating entities. 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
- 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 Standards, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.

California regulates hazardous materials, waste, and substances under the authority of the California Health and Safety Code and is also authorized by the federal government to implement the Resource Conservation and Recovery Act in the state. California law also addresses specific handling, storage, transportation, disposal, treatment, reduction, cleanup and emergency planning of hazardous waste. The Porter-Cologne Water Quality Control Act also restricts disposal of wastes and requires cleanup of wastes that are below hazardous waste concentrations but could affect groundwater and surface water quality. California regulations that address waste management and prevention and cleanup contamination include Title 22 Division 4.5 Environmental Health Standards for the Management of Hazardous Waste, Title 23 Waters, and Title 27 Environmental Protection.

Worker and public health and safety are key issues when addressing hazardous materials that may affect human health and the environment. Proper management and disposal of hazardous material is vital if it is encountered, disturbed or generated during project construction.

Affected Environment

This section is based on the Initial Site Assessment (March 13, 2012) prepared for this project.

An Initial Site Assessment was done in March 2008 and updated in March 2012. This assessment included a review of the historical land uses at the project site.

The site and vicinity, including the Route 9 roadway, have been developed since at least the mid-1800s. The area of the current Route 1/9 intersection was developed with residences from at least 1905 until about 1955. The current Route 1/9 alignment was constructed in about 1956. Adjacent properties have been developed for residential and commercial uses since at least 1902. The Salz Leathers, Inc. property at 1040 River Street, northeast of the site, operated as a leather manufacturing facility/tannery from 1855 until 2001. A portion of the Union Pacific Railroad crossed the western portion of the area since at least 1902. The residential property at 744 River Street was built prior to 1931, and the Central Home Supply office/warehouse building was built in 1970.

The site sits next to the former Salz Leathers, Inc. facility, which had well-documented impacts to soil, groundwater, surface water, and sediment resulting from historical tannery operations. The California Department of Toxic Substances issued a *No Further Action Required* letter for the property on July 27, 2007. The letter

stated that response actions other than long-term operations and maintenance activities have been completed.

Three properties with open leaking underground storage tank cases were identified in the site vicinity. Environmental conditions found at the properties present a low risk for affecting project construction activities. These conditions include distance from the project site, the extent of affected groundwater collected near the storage tanks, and groundwater flow directions from the storage tanks.

Environmental Consequences

The Initial Site Assessment indicated the following potential impacts related to the proposed project:

- Shallow soil within the Route 1 and Route 9 right-of-way within the project footprint may be affected by aerially deposited lead from historical vehicle emissions and traffic.
- Shallow soil next to the existing Union Pacific Railroad tracks may be affected by metals, herbicides, and polycyclic aromatic hydrocarbons from historical railroad operations.
- Structures on properties proposed for partial acquisition may contain asbestos-containing material and lead-containing paint.
- Construction workers may encounter thermoplastic paint striping that may have special handling and disposal requirements unless combined with sufficient asphalt grindings per Caltrans' Special Provisions.
- Results of the site reconnaissance, historical and regulatory file research, and prior field investigations have indicated the potential presence of closed underground storage tanks at and near the properties proposed for partial acquisition (see Figure 1-3).

No-Project Alternative

This alternative would not expose people to hazardous materials.

Avoidance, Minimization, and/or Mitigation Measures

1. A soil investigation would be performed to determine the potential presence of lead in site soils in the vicinity of any project improvement excavations. Also, if the project requires soil excavation at the existing Union Pacific Railroad right-of-way, a soil investigation would be conducted to determine the presence of metals,

herbicides, and polycyclic aromatic hydrocarbons in site soil. If proposed construction activities extend to the depth of groundwater, sampling of groundwater would be included in the environmental investigation. These investigations would be conducted to evaluate potential environmental impairments, and soil and groundwater material management and possible disposal requirements.

2. An asbestos-containing material and lead-containing paint survey would be conducted at buildings proposed for demolition as part of the project to satisfy Monterey Bay Unified Air Pollution Control District requirements (asbestos) and demolition waste disposal characterization (asbestos and lead).
3. If construction workers encounter thermoplastic paint striping during construction, Caltrans' Special Provisions for handling this material would be implemented.
4. If encountered during construction activities, undocumented underground storage tanks, septic systems and domestic/agricultural/oil wells would be properly removed or abandoned in accordance with Santa Cruz County requirements.

2.2.5 Air Quality

Regulatory Setting

The Federal Clean Air Act (FCAA), as amended in 1990 is the federal law that governs air quality, while the California Clean Air Act of 1988 is its companion state law. These laws, and related regulations by the U.S. Environmental Protection Agency (U.S. EPA) and California Air Resources Board (ARB), set standards for the quantity of pollutants that can be in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS).

National ambient air quality standards and state ambient air quality standards have been established for six transportation-related criteria pollutants that have been linked to potential health concerns: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), and sulfur dioxide (SO_2), and particulate matter (PM), broken down for regulatory purposes into particles of 10 micrometers or smaller (PM_{10}) and particles of 2.5 micrometers and smaller ($PM_{2.5}$). In addition, state standards exist for visibility-reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride.

The National Ambient Air Quality Standards and state standards are set at a level that protects public health with a margin of safety and are subject to periodic review and

revision. Both state and federal regulatory schemes also cover toxic air contaminants (air toxics). Some criteria pollutants are also air toxics or may include certain air toxics within their general definition.

Federal and state air quality standards and regulations provide the basic scheme for project-level air quality analysis under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). In addition to this type of environmental analysis, a parallel "conformity" requirement under the Federal Clean Air Act also applies.

Conformity

The conformity requirement is based on the Federal Clean Air Act Section 176(c). The Federal Clean Air Act Section 176(c) prohibits the U.S. Department of Transportation (USDOT) and other federal agencies from funding, authorizing, or approving plans, programs or projects that are not first found to conform to State Implementation Plan (SIP) for achieving the goals of Clean Air Act requirements related to the National Ambient Air Quality Standards. "Transportation conformity" takes place on two levels: the regional—or, planning and programming—level and the project level. The proposed project must conform at both levels to be approved. Conformity requirements apply only in nonattainment and "maintenance" (former nonattainment) areas for the National Ambient Air Quality Standards, and only for the specific National Ambient Air Quality Standards that are or were violated. U.S. EPA regulations at 40 Code of Federal Regulations (CFR) 93 govern the conformity process. Conformity requirements do not apply in unclassifiable/attainment areas for National Ambient Air Quality Standards and do not apply at all for state standards regardless of the status of the area.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the standards set for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), and in some areas sulfur dioxide (SO_2). California has attainment or maintenance areas for all of these transportation-related "criteria pollutants" except SO_2, and also has a nonattainment area for lead (Pb). However, lead is not currently required by the Federal Clean Air Act to be covered in transportation conformity analysis.

Regional conformity is based on Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (TIPs) that include all of the transportation projects planned for a region over a period of at least 20 years for the Regional

Transportation Plan) and 4 years (for the Federal Transportation Improvement Program). Regional Transportation Plan and Federal Transportation Improvement Program conformity is based on use of travel demand and air quality models to determine whether or not the implementation of those projects would conform to emission budgets or other tests showing that requirements of the Clean Air Act and the State Implementation Plan are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), Federal Highway Administration, and Federal Transit Administration (FTA), make determinations that the Regional Transportation Plan and Federal Transportation Improvement Program are in conformity with the State Implementation Plan for achieving the goals of the Federal Clean Air Act. Otherwise, the projects in the Regional Transportation Plan and/or Federal Transportation Improvement Program must be modified until conformity is attained. If the design concept, scope, and "open to traffic" schedule of a proposed transportation project are the same as described in the Regional Transportation Plan and Federal Transportation Improvement Program, then the proposed project is deemed to meet regional conformity requirements for purposes of project-level analysis.

Conformity at the project-level also requires "hot spot" analysis if an area is "nonattainment" or "maintenance" for carbon monoxide (CO) and/or particulate matter (PM_{10} or $PM_{2.5}$). A region is "nonattainment" if one or more of the monitoring stations in the region measures violation of the relevant standard and officially designates the area nonattainment. Areas that were previously designated as nonattainment areas but subsequently meet the standard may be officially redesignated to attainment by U.S. EPA and are then called "maintenance" areas.

"Hot spot" analysis is essentially the same, for technical purposes, as carbon monoxide or particulate matter analysis performed for National Environmental Policy Act purposes. Conformity does include some specific procedural and documentation standards for projects that require a hot spot analysis. In general, projects must not cause the hot spot-related standard to be violated and must not cause any increase in the number and severity of violations in nonattainment areas. If a known carbon monoxide or particulate matter violation is in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

Affected Environment

This section is based on the Air Quality Technical Memorandum (August 30, 2011) prepared for this project.

The U.S. Environmental Protection Agency has classified Santa Cruz County as an unclassified/attainment area for the 1-hour ozone, carbon monoxide, particulate matter 10 microns or less in diameter, and particulate matter 2.5 microns or less in diameter standards. The California Air Resources Board has classified Santa Cruz County as a moderate nonattainment area for the 8-hour ozone standard. For the carbon monoxide standard, the California Air Resources Board has classified Santa Cruz County as an unclassified area. The California Air Resources Board has classified Santa Cruz County as a nonattainment area for the particulate matter 10 microns or less in diameter standard and an attainment area for the particulate matter 2.5 microns or less in diameter standard.

Santa Cruz County's attainment status for each of these pollutants relative to the National Ambient Air Quality Standards and California Ambient Air Quality Standards is summarized in Table 2-8.

Table 2-8 Ambient Air Quality Standards Applicable in California and the Attainment Status of Santa Cruz County

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria		Attainment Status of Santa Cruz County	
			California	National	California	National	California	National	California	National
Ozone	O_3	1 hour	0.09	–	180	–	If exceeded	–	Moderate Nonattainment	NA
		8 hours	0.070	0.075	137	147	If exceeded	If fourth-highest 8-hour concentration in a year, averaged over 3 years, is exceeded at each monitor within an area	Nonattainment	Unclassified/attainment
Carbon monoxide	CO	8 hours	9.0	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year	Unclassified	Unclassified/attainment
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year	Unclassified	Unclassified/attainment
(Lake Tahoe only)		8 hours	6	–	7,000	–	If equaled or exceeded	–	–	–
Nitrogen dioxide	NO_2	Annual arithmetic mean	0.030	0.053	57	100	If exceeded	If exceeded on more than 1 day per year	Attainment	Attainment
		1 hour	0.18	0.100	339	188	If exceeded	–	Attainment	Attainment
Sulfur dioxide	SO_2	24 hours	0.04	0.14	105	–	If exceeded	If exceeded on more than 1 day per year	Attainment	–
		1 hour	0.25	0.075	655	196	If exceeded	–	Attainment	Unclassified/attainment
		3 hour	–	0.5[a]	–	1,300[a]	If exceeded	–	–	–
		Annual arithmetic mean	–	0.030	–	–	–	If exceeded on more than 1 day per year	–	–
Hydrogen sulfide	H_2S	1 hour	0.03	–	42	–	If equaled or exceeded	–	Unclassified	–
Vinyl chloride	C_2H_3Cl	24 hours	0.01	–	26	–	If equaled or exceeded	–	No designation	–

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria		Attainment Status of Santa Cruz County	
			California	National	California	National	California	National	California	National
Inhalable particulate matter	PM10	Annual arithmetic mean	–	–	20	–	–	–	Nonattainment	–
		24 hours	–	–	50	150	If exceeded	If exceeded on more than 1 day per year	Nonattainment	Unclassified/attainment
	PM2.5	Annual arithmetic mean	–	–	12	15	–	If 3-year average from single or multiple community-oriented monitors is exceeded	Attainment	Unclassified/attainment
		24 hours	–	–	–	35	–	If 3-year average of 98th percentile at each population-oriented monitor within an area is exceeded	–	Unclassified/attainment
Sulfate particles	SO_4	24 hours	–	–	25	–	If equaled or exceeded	–	Attainment	–
Lead particles	Pb	Calendar quarter	–	–	–	1.5	–	If exceeded no more than 1 day per year	–	Unclassified/attainment
		30-day average	–	–	1.5	–	If equaled or exceeded	–	Attainment	–
		Rolling 3-month average	–	–	–	0.15	If equaled or exceeded	Averaged over a rolling 3-month period	–	–

Source: California Air Resources Board 2012 and 2010a; U.S. Environmental Protection Agency 2010a.

[a] Refers to a secondary standard only.

The project site is in Santa Cruz County, within the North Central Coast Air Basin, which includes 5,159 square miles along the Central Coast and includes Monterey, Santa Cruz, and San Benito counties. A semi-permanent high-pressure cell is the main controlling factor in the climate there.

In summer, the high-pressure cell is dominant and causes persistent west and northwest winds over the entire California coast and a stable temperature inversion of hot air over a cool coastal layer of air. Onshore air currents pass over cool ocean waters to bring fog and relatively cool air into the coastal valleys. Warmer air aloft acts as a lid to inhibit vertical air movement.

In fall, surface winds become weak, and the marine layer grows shallow, dissipating altogether on some days. The airflow sometimes reverses in a weak offshore flow, and the relatively stationary air mass is held in place by the high-pressure cell, which allows pollutants to build up over a period of a few days. It is usually during this season that north or east winds develop to transport pollutants from either the San Francisco Bay area or the Central Valley into the air basin. In winter, the general absence of deep, persistent inversions and the occasional storm systems usually result in good air quality for the basin as a whole through winter and early spring.

Sensitive receptors in the project area include a single-family residence (at 744 River Street) in the northeast quadrant of the intersection, but this residence would be removed as part of the project. The northwest quadrant contains the Homeless Services Center complex, including the Rebele Family Shelter at the corner of Route 9/Coral Street that contains emergency housing for the homeless. Refer to Figure 2-5.

Environmental Consequences

Regional Conformity

The project is included in the Association of Monterey Bay Area Government's (AMBAG's) 2010 Metropolitan Transportation Plan (MTP), *Monterey Bay Area Mobility 2035*, and AMBAG's 2012-2013 to 2015-2016 Metropolitan Transportation Improvement Plan (MTIP) (ID #SC025). The Metropolitan Transportation Plan (as amended) and the Metropolitan Transportation Improvement Plan were found to conform by the Federal Highway Administration and Federal Transit Administration on December 14, 2012. Air quality modeling showed that emissions associated with the Metropolitan Transportation Improvement Plan are within the allowable emission budgets for ozone precursors. Therefore, the proposed project is considered a conforming transportation project for this regional pollutant.

Ozone Precursors, Carbon Monoxide, and Particulate Matter Operation-Related Emissions

The Monterey Bay Unified Air Pollution Control District has established significance thresholds within its California Environmental Quality Act Air Quality Guidelines (2008) to determine whether project-related air quality impacts need mitigation. Table 2-9 shows the applicable thresholds used in the analysis of significant air quality impacts.

Table 2-9 Monterey Bay Unified Air Pollution Control District Thresholds of Significance

Pollutant	Construction (pounds per day)	Operation (pounds per day)
Reactive organic gases	NA	137
Nitrogen oxides	NA	137
Carbon monoxide	NA	550
Particulate matter 10 microns or less in diameter	82	82
Particulate matter 2.5 microns or less in diameter	NA	NA
Sulfur oxides	NA	150

Source: Monterey Bay Unified Air Pollution Control District, 2008.

The project's long-term effects on air quality are associated with motor vehicles operating on the roadway network, predominantly in the project vicinity. The main operational emissions associated with the project are reactive organic gases, oxides of nitrogen, carbon monoxide, particulate matter 10 microns or less in diameter, and particulate matter 2.5 microns or less in diameter.

Table 2-10 summarizes the modeled yearly emissions based on peak hour traffic estimates for the study area intersections. The estimates in the Project minus No-Project row represent emissions generated directly by the project.

Table 2-10 Operational Emission Estimates

Condition	Daily Vehicle Miles Traveled	Reactive Organic Gases (pounds per day)	Nitrogen Oxides (pounds per day)	Carbon Monoxide (pounds per day)	Particulate Matter 10 Microns or Less in Diameter (pounds per day)	Particulate Matter 2.5 Microns or Less in Diameter (pounds per day)
Baseline	173,497	559	814	5,735	26	24
No-Project (2030)	178,769	64	130	676	6	6
Project (2030)	197,331	70	142	745	7	6
Project Minus No-Project	*18,562*	*6*	*12*	*69*	*1*	*1*
Monterey Bay Unified Air Pollution Control District Thresholds	–	137	137	550	82	–

Source: Santa Cruz Route 1/9 Intersection Improvement Project, Air Quality Technical Memorandum, August 30, 2011.

Notes: Vehicular emission rates, in general, are expected to decrease in future years due to continuing improvements in engine technology and the retirement of older, higher-emitting vehicles.

Daily vehicle miles traveled was calculated by multiplying peak hour volumes in Table 2-6 by 4.5 and then by the total length of each intersection (sum of north-south and east-west segments). The conversion factor is based on the ratio of peak to off-peak traffic.

Emissions are based on morning peak hour speeds. Because vehicle emissions decrease as a function of speed and peak hours are typically the most congested periods, this assumption likely overestimates daily emissions.

Implementation of the project would result in improved traffic operations that would decrease congestion. The project may attract vehicles from the surrounding network to the study intersections that would have otherwise used alternative travel routes. As shown in Table 2-10, vehicle miles traveled would increase with the project, relative to no-project, resulting in slight increases in all criteria pollutants. Note that the emissions results presented in Table 2-10 represent a worst-case scenario as they are based on peak hour traffic estimates for study area intersections. The emissions results do not capture potential improved traffic operations and decreased congestion on local roadways in the project area that experience less traffic that is diverted to the study intersections. Regardless, the emissions increases would not be in excess of Monterey Bay Unified Air Pollution Control District standards.

Construction Impacts

Implementation of the project would result in construction of a widened intersection and construction of an embankment to accommodate the widened roadways. Temporary construction emissions would result from grubbing and land clearing; grading and excavation; drainage, utilities, subgrade, and paving activities; and construction worker commuting patterns. Pollutant emissions would vary daily, depending on the level of activity, specific operations, and prevailing weather. Construction activities are expected to begin in 2015 and take 9 months.

The Road Construction Emissions Model (Version 6.3) was used to estimate construction-related ozone precursors (reactive organic gases and nitric oxides), carbon monoxide, and particulate matter emissions from construction activities assuming a total of 4,200 cubic yards of soil would be imported and exported and about 58 cubic yards would be moved daily. The results of modeling for construction activities are summarized in Table 2-11. Table 2-11 indicates construction activities would not exceed Monterey Bay Unified Air Pollution Control District standards of 82 pounds per day of particulate matter less than or equal to 10 microns.

Table 2-11 Construction Emission Estimates (pounds per day)

	Reactive Organic Gases	Carbon Monoxide	Nitrogen Oxides	Particulate Matter 10 Microns or Less in Diameter			Particulate Matter 2.5 Microns or Less in Diameter			Carbon Dioxide[a]
				Total	Exhaust	Dust	Total	Exhaust	Dust	
Grubbing/ land clearing	3.3	14.2	28.1	3.6	1.1	2.5	1.6	1.0	0.5	26
Grading/ excava-tion	3.9	20.6	31.7	4.0	1.5	2.5	1.9	1.4	0.5	129
Drainage/ utilities/ sub-grade	3.2	14.0	25.5	3.8	1.3	2.5	1.7	1.2	0.5	84
Paving	1.9	7.9	11.4	1.0	1.0	–	0.9	0.9	–	14

Source: Santa Cruz Route 1/9 Intersection Improvement Project, Air Quality Technical Memorandum, August 30, 2011.
Note: Emissions calculations based on Road Construction Emissions Model (Version 6.3).
[a] Emissions presented in metric tons per phase.

Cumulative Impacts

The impact analysis above is a cumulative analysis because future traffic conditions are evaluated based on expected future growth in 2030, as adopted by the City of Santa Cruz General Plan. The project would not result in a cumulatively considerable impact on air quality because the project is not expected to exceed Monterey Bay Unified Air Pollution Control District standards.

No-Project Alternative

The No-Project Alternative would not result in the congestion-relief benefits of the project. Congestion would worsen, and related emissions benefits would not occur.

Avoidance, Minimization, and/or Mitigation Measures

Construction activities are subject to Caltrans Standard Specifications, Section 14-9.01, "Air Pollution Control," and Section 14.02, "Dust Control." The following measures would be used:

14-9.01 Air Pollution Control:

- Comply with air pollution control rules, regulations, ordinances, and statutes that apply to work performed under the contract, including air pollution control rules, regulations, ordinances, and statutes provided in Government Code § 11017 (Pub Cont Code 10231).
- Do not burn material to be disposed of.

14-9.02 Dust Control:

- Prevent and alleviate dust by applying water, dust palliative, or both under Section 14-9.01.
- Apply water under Section 17, "Watering."
- Apply dust palliative under Section 18, "Dust Palliative."
- If ordered, apply water, dust palliative, or both to control dust caused by public traffic. This work would be paid for as extra work as specified in Section 4-1.03D, "Extra Work."

2.2.6 Climate Change

Refer to Section 2.4, *Climate Change*, at the end of this chapter.

2.2.7 Noise and Vibration

Regulatory Setting

The California Environmental Quality Act requires a strictly baseline versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under the California Environmental Quality Act, then the act dictates that mitigation measures must be incorporated into the project unless such measures are not feasible.

Affected Environment

The existing noise environment in the study area is dominated by noise from traffic traveling on Routes 1 and 9, occasional trains on the nearby railroad tracks, and activities from the adjacent industrial and commercial land uses.

Figure 1-3 shows land uses in the project area. Land uses south of Route 1 in the project area are commercial. A single-family residence (at 744 River Street) sits in the northeast quadrant of the intersection, but this residence would be removed as part of

the project. The northwest quadrant contains the Homeless Services Center complex, including the Rebele Family Shelter at the corner of Route 9/Coral Street that contains emergency housing for the homeless.

Environmental Consequences

Operational Impacts

The project would construct a right-turn lane on southbound Route 9. The roadway curb would move from 22 feet from the building to 11 feet from the building. Due to the standardization of the lane widths, the upstream lane that contributes to this right-turn lane would actually be 7 feet farther away from the Rebele Family Shelter. Near the southeast corner of the shelter building, the new turn lane would place a traffic lane closer to the shelter. The nearest lane is currently about 28 feet from the shelter, and the new lane would be about 19 feet from the shelter.

Based on the projected 2030 traffic volumes shown in Table 2-6 and the 9-foot shift in the lane geometry, noise at the shelter could increase by as much as about 3 dB. However, the increase would likely be less because of existing ambient noise created by the other five adjacent traffic lanes.

The potential change in operational noise is so small that it would not be perceivable, and it is well below the Caltrans definition of a substantial change in noise (12 dB).

Construction Impacts

Noise and vibration from construction activities (mainly operation of heavy equipment) may intermittently dominate the noise environment in the immediate area of construction. Table 2-12 shows the noise levels produced by construction equipment commonly used on roadway construction projects.

A reasonable worst-case assumption is that the three loudest pieces of equipment anticipated for use on the project (paver, loader, and a truck) would operate simultaneously and continuously for at least a 1-hour period. At 50 feet from the source, the combined sound level would be 92 dBA.

Table 2-12 Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, derrick	88
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jackhammer	88
Loader	85
Paver	89
Pile driver (impact)	101
Pile driver (sonic)	96
Pneumatic tool	85
Pump	76
Rock drill	98
Roller/sheep's foot	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Truck	88

Source: Federal Transit Administration 2006.

Table 2-13 shows the estimated noise levels at various distances from an active construction site, assuming this combined source level, distance attenuation (6 dB per doubling of distance), and attenuation from ground absorption (1 to 2 dB per doubling of distance).

Table 2-13 Estimated Construction Noise in the Vicinity of an Active Construction Site

Entered Data:			
Construction Condition: Site leveling			
Source 1: Scraper - Sound level (dBA) at 50 feet =			89
Source 2: Dozer - Sound level (dBA) at 50 feet =			85
Source 3: Truck - Sound level (dBA) at 50 feet =			88
Average Height of Sources - Hs (ft) =			10
Average Height of Receiver - Hr (ft.) =			5
Ground Type (soft or hard) =			soft
Calculated Data:			
All Sources Combined - Sound level (dBA) at 50 feet =			92
Effective Height (Hs+Hr)/2 =			7.5
Ground factor (G) =			0.0
Distance Between Source and Receiver (ft.)	**Geometric Attenuation (dB)**	**Ground Effect Attenuation (dB)**	**Calculated Sound Level (dBA)**
50	0	0	92
100	-6	-2	85
200	-12	-4	77
300	-16	-5	72
400	-18	-6	69
500	-20	-6	66
600	-22	-7	64
700	-23	-7	62
800	-24	-7	61
900	-25	-8	60
1000	-26	-8	58
1200	-28	-9	56
1400	-29	-9	55
1600	-30	-9	53
1800	-31	-10	52
2000	-32	-10	50
2500	-34	-10	48
3000	-36	-11	46

Nighttime construction activities may be needed to minimize traffic disruptions. No adverse noise impacts from construction are expected because construction noise would be short term, intermittent, and overshadowed by local traffic noise and because construction would be done in accordance with Caltrans Standard Specifications Section 14-8.02, which states:

> Do not exceed 86 dBA L_{max} at 50 feet from the job site activities from 9 p.m. to 6 a.m.

Equip internal combustion engines with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.

With this restriction in place, high vibration work would not be allowed at night near the shelter.

No-Project Alternative

This alternative would not result in any noise impacts. Therefore, no avoidance or minimization measures are required.

Avoidance, Minimization, and/or Noise Abatement

No avoidance or minimization measures are required.

2.3 Biological Environment

This section is based on the Natural Environment Study (July 2011), NES Addendum (February 2015), and Biological Opinion (October 2012) prepared for this project.

2.3.1 Natural Communities

This section of the document discusses natural communities of concern. The focus of this section is on biological communities, not individual plant or animal species. Habitat areas that have been designated as critical habitat under the Federal Endangered Species Act are discussed in Threatened and Endangered Species, Section 2.3.5. Wetlands and other waters are discussed in Section 2.3.2.

Affected Environment

Three natural communities—creek channel, riparian, and ruderal grassland—are present in the study area (Table 2-14). Figure 2-10 shows the locations of natural communities and other biological resources in the study area. Approximately 8 trees that meet the City's definition of a "heritage tree" are within the project limits.

Table 2-14 Total Area of Natural Communities in the Study Area

Natural Communities	Extent within Study Area (acres)
Creek Channel	0.1
Coast Live Oak-Arroyo Willow Riparian Forest	0.3
Ruderal and Landscaped	1.9
Total[a]	**2.3**

[a] Total area does not include 8 acres of development, including roads, sidewalks, road shoulders, and buildings.

Creek Channel

The ordinary high water mark of the Arroyo de San Pedro Regaldo ranges from 6 feet to 12 feet wide, and the water was 2 feet to 3 feet deep at the time of the summer season site visits, indicating that it is likely to be perennial. Coast live oak-arroyo willow riparian forest grows in a narrow band on the creek banks. The arroyo in the project area provides lower quality habitat for wildlife due to its proximity to urban development.

Coast Live Oak-Arroyo Willow Riparian Forest

Riparian trees, including coast live oak and arroyo willow, grow on the south bank of the creek, but most of the dominant trees are eucalyptus (several of which may meet the heritage criterion). The understory of the riparian forest is dominated by non-native species. Riparian habitat in the study area is heavily disturbed from foot traffic along the creek associated with an abandoned homeless encampment near the intersection. The riparian habitat includes more native species downstream of the project area.

Ruderal and Landscaped Areas

Ruderal areas are dominated by non-native plant species. Because ruderal and landscaped areas typically are disturbed on a regular basis by human activity, they provide low-quality habitat for wildlife.

Heritage Trees

Heritage trees include all species of trees with a circumference of 44 inches or more (equivalent to a diameter of about 14 inches or more) measured at 54 inches above the existing grade. Of the estimated 25 trees in the study area, approximately 8 trees meet the heritage tree size criterion, including a coast redwood tree with a diameter at breast height greater than 14 inches that stands in the southeast quadrant of the Route 1/9 intersection near the driveway to the medical offices.

Environmental Consequences

Creek Channel

Construction of the project would extend the existing toe of the embankment by about 40 feet beyond the existing roadway to support the intersection widening. The project would also extend the existing culvert by about 25 feet. These extensions would result in the permanent loss of 0.01 acre of creek channel within the project area and a temporary loss of 0.01 acre (see Figure 2-10). The existing concrete apron and cutoff wall that extend about 25 feet from the existing culvert would remain in place or be reconstructed "in-kind."

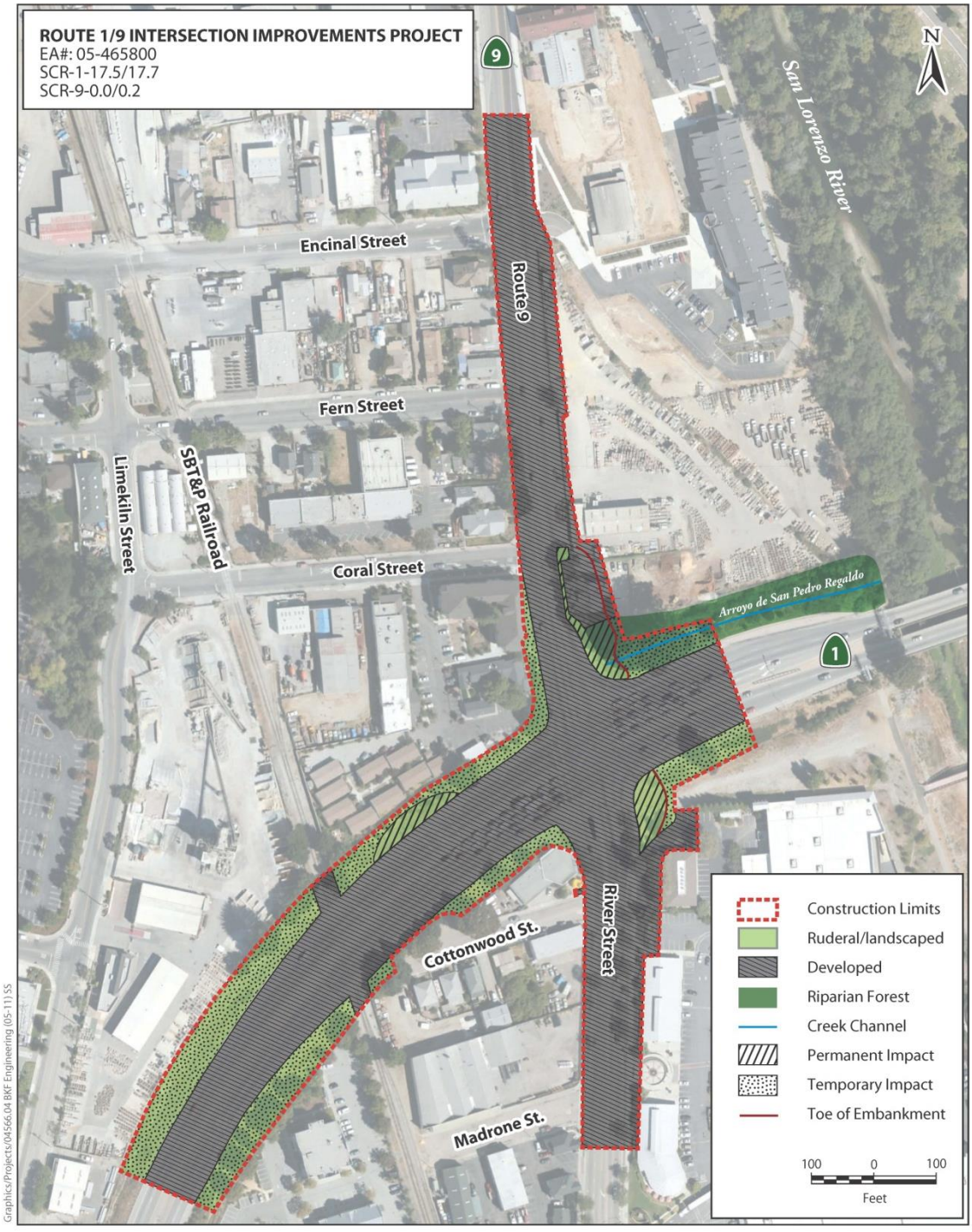

Figure 2-10 Temporary and Permanent Impacts to Natural Communities

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All in-water construction activities would be done during the dry season, but the creek is a perennial waterway and would require some dewatering for construction. Dewatering would be accomplished by using small check dams and bypass pipes, which would be considered temporary impacts.

Coast Live Oak-Arroyo Willow Riparian Forest

Construction would result in a permanent loss of 0.03 acre of riparian forest in the study area. The permanent impact area would include riparian trees and woody understory plants such as young trees and Himalayan blackberry. Approximately 0.04 acre of riparian forest vegetation would be temporarily disturbed during construction. This impact would include the probable removal of additional trees and understory vegetation to provide equipment access to the creek.

Heritage Trees

Although the exact number of heritage trees to be removed or trimmed will be determined during final project design, it is estimated that up to 8 heritage trees could be removed, including the redwood tree in the southeast quadrant and eucalyptus trees in the northeast quadrant of the intersection. Removal of heritage trees would be subject to the permit and mitigation requirements of the City.

No-Project Alternative

Under this alternative, natural communities in the project area would not be affected. Therefore, no avoidance or minimization measures are required.

Avoidance, Minimization, and/or Mitigation Measures

1. Caltrans/City or its contractor would install orange construction barrier fencing to identify environmentally sensitive areas including the creek channel and riparian areas. A qualified biologist would identify sensitive biological resources adjacent to the construction area before the final design plans are prepared so that the areas to be fenced can be included in the plans. Before construction begins, stakes would be placed around the sensitive resource sites to indicate these locations. The fencing would be maintained throughout the construction period and removed after completion of construction.
2. Caltrans/City would retain a U.S. Fish and Wildlife Service-approved biologist to develop and conduct environmental awareness training for construction employees on the importance of onsite biological resources, including sensitive natural communities; trees to be retained; special-status wildlife habitats; and nests of special-status birds. In addition, construction employees would be

educated about invasive plant identification and the importance of controlling and preventing the spread of invasive plant infestations.

3. Caltrans/City would retain a qualified biologist to conduct construction monitoring in and adjacent to all sensitive habitats in the construction area. The frequency of monitoring would range from daily to weekly depending on the biological resource. The monitor, as part of the overall monitoring duties, would inspect the fencing once a week along the creek and riparian vegetation in the construction area, surrounding trees, and special-status wildlife habitats. The biological monitor would assist the construction crew as needed to comply with all project implementation restrictions and guidelines.
4. Caltrans/City would avoid and minimize potential disturbance of riparian communities by implementing the following measures:
   - The potential for long-term loss of riparian vegetation would be minimized by trimming vegetation, where possible, rather than removing entire shrubs or trees. Shrubs that need to be trimmed would be cut at least 1 foot above ground level to leave the root systems intact and allow for more rapid regeneration. Cutting would be limited to the minimum area necessary within the construction zone. To protect nesting birds, Caltrans/City would not allow pruning or removal of woody riparian vegetation between February 1 and September 30 without preconstruction surveys.
   - A certified arborist would be retained to perform any necessary pruning or root cutting of retained riparian trees.
   - The areas that undergo vegetative pruning and tree removal would be inspected immediately before construction, immediately after construction, and 1 year after construction to determine the amount of existing vegetative cover, cover that has been removed, and cover that resprouts. If, after 1 year, these areas have not resprouted sufficiently to return the cover to the pre-project level, Caltrans/City would replant the areas with the same species (or native species if existing vegetation removed was non-native) to reestablish the cover to the pre-project condition.
5. Caltrans/City would implement Best Management Practices to maintain water quality. The practices are described in the Avoidance, Minimization, and/or Mitigation Measures subsection of Section 2.2.2, *Water Quality and Storm Water Runoff*.

6. Caltrans/City would compensate for temporary construction-related loss of riparian vegetation by replanting disturbed areas with the native species including coast live oak and arroyo willow. A mitigation planting plan that includes a species list and number of each species, planting locations, timing for planting, maintenance requirements, and success criteria would be prepared and implemented for the replanting. Caltrans/City would also compensate for the permanent loss of riparian vegetation by restoring the riparian forest adjacent to the permanent impact area along the Arroyo de San Pedro Regaldo at a minimum ratio of 1:1 (1 acre restored for every 1 acre permanently affected); this ratio would be confirmed through coordination with state and federal agencies as part of the permitting process for the proposed project.

7. Caltrans/City would identify heritage trees to be removed once project design is finalized and comply with the City's ordinance for the preservation of heritage trees and heritage shrubs (City of Santa Cruz Municipal Code Section 9.56). Under this ordinance, a tree permit from the City Parks and Recreation Department is required for trimming or removing any heritage tree or shrub, including the redwood tree in the southeast quadrant of the intersection. Mitigation is required for heritage tree removal, with the option of either paying a $250.00 bond for each tree to be removed and then replanting onsite or making a $150.00 donation to the City's Tree Trust fund for each tree to be removed. The replanting option requires the applicant to plant three 15-gallon trees (representing a 3:1 ratio) or one 24-inch-box-size specimen tree (representing a 1:1 ratio) for each approved tree removal.

Also, Caltrans/City would implement best management practices to control discharge of construction-related pollutants to surface waters (Measure 6 from the NES). Refer to Section 2.2.2, *Water Quality and Stormwater Runoff*, Measure #1.

2.3.2 Wetlands and Other Waters

Regulatory Setting

Wetlands and other waters are protected under a number of laws and regulations. At the federal level, the Federal Water Pollution Control Act, more commonly referred to as the Clean Water Act [Clean Water Act (33 U.S. Code 1344)] is the main law regulating wetlands and surface waters. The Clean Water Act regulates the discharge of dredged or fill material into waters of the U.S. including wetlands. Waters of the

U.S. include navigable waters, interstate waters, territorial seas and other waters that may be used in interstate or foreign commerce.

Section 404 of the Clean Water Act establishes a regulatory program that provides that discharge of dredged or fill material must be permitted by the U.S. Army Corps of Engineers. The U.S. Army Corps of Engineers issues two types of 404 permits: Standard and General permits. The proposed project would fall under a nationwide permit, a type of General permit issued to authorize a variety of minor project activities with no more than minimal effects.

At the state level, wetlands and waters are regulated mainly by the California Department of Fish and Wildlife, the State Water Resources Control Board, and the Regional Water Quality Control Boards. If the Department of Fish and Wildlife determines that the project may substantially and adversely affect fish or wildlife resources, a Lake or Streambed Alteration Agreement will be required. Department of Fish and Wildlife's jurisdictional limits are usually defined by the tops of the stream or lake banks, or the outer edge of riparian vegetation, whichever is wider.

The Regional Water Quality Control Boards issue water quality certifications for impacts to wetlands and waters in compliance with Section 401 of the Clean Water Act.

Affected Environment

The Arroyo de San Pedro Regaldo is considered a water of the U.S. as defined by the U.S. Army Corps of Engineers. See Section 2.3.1, *Natural Communities*, for additional information on the arroyo. Based on surveys done in the project area, the study area does not contain wetlands.

Environmental Consequences

As described in Section 2.3.1, *Natural Communities*, construction of the project would result in the permanent loss of 0.01 acre of creek channel within the project area and a temporary loss of 0.01 acre (see Figure 2-10).

No-Project Alternative

Under this alternative, the Arroyo de San Pedro Regaldo would not be affected. Therefore, no avoidance or minimization measures are required.

Avoidance, Minimization, and/or Mitigation Measures

1. Caltrans/City would restore portions of the creek channel temporarily disturbed by construction to original grade and preconstruction conditions following construction.
2. Caltrans/City would compensate for the permanent fill of other waters of the U.S. in creek channel habitat based on the requirements specified by the U.S. Army Corps of Engineers in the Nationwide Permit that is issued for this project by implementing one or a combination of the following options:
   - Purchase credits for created riparian stream channel at a locally approved mitigation bank.
   - Replant temporarily disturbed areas with native species and restore the riparian forest adjacent to the permanent impact area along the Arroyo de San Pedro Regaldo as described above in Section 2.3.1, *Natural Communities*.

2.3.3 Plant Species

Regulatory Setting

"Special-status" is a general term for species that are afforded varying levels of regulatory protection. The highest level of protection is given to threatened and endangered species; these are species that are formally listed or proposed for listing as endangered or threatened under the Federal Endangered Species Act and/or the California Endangered Species Act. See Threatened and Endangered Species, Section 2.3.5, in this document for information on these species.

This section of the document discusses all other special-status plant species, including California Department of Fish and Wildlife fully protected species and species of special concern, U.S. Fish and Wildlife Service candidate species, and non-listed California Native Plant Society rare and endangered plants.

Affected Environment

Potential habitat for two sensitive plant species (California bottlebrush grass and Loma Prieta hoita) is present in the study area, but the habitat is marginal due to the level of disturbance within the riparian community. Surveys of the study area done in August 2005 and May 2011 determined that these species were not present. Therefore, the study area does not support sensitive plant species, and the proposed project would not result in impacts on sensitive plant species.

Environmental Consequences

Based on surveys done in the project area, the study area does not support sensitive plant species. The project would not result in impacts to any sensitive plant species.

No-Project Alternative

This alternative would not result in any impacts on plant species. Therefore, no avoidance or minimization measures are required.

Avoidance, Minimization, and/or Mitigation Measures

No mitigation is required.

2.3.4 Animal Species

Regulatory Setting

This section discusses potential impacts and permit requirements for wildlife not listed or proposed for listing under the state or federal Endangered Species Act. Species listed or proposed for listing as threatened or endangered are discussed in Section 2.3.5. All other special-status animal species are discussed here, including California Department of Fish and Wildlife fully protected species and species of special concern, and the U.S. Fish and Wildlife Service or National Oceanic and Atmospheric Fisheries Service candidate species.

Affected Environment

Surveys of the study area done in August 2005 and November 2010 indicated that suitable habitat is present for the following special-status species:

- The foothill yellow-legged frog is designated as a state species of special concern. The species can occur from sea level to 6,000 feet in rocky streams in valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types of habitat. The streambeds where they are found are usually gravelly or sandy, and the stream gradient is generally not steep.
- The western pond turtle is a state species of special concern. It occurs throughout much of California except for east of the Sierra-Cascade crest and desert regions. Aquatic habitats used by western pond turtles include ponds, lakes, marshes, rivers, streams, and irrigation ditches with a muddy or rocky bottom in grassland, woodland, and open forest areas. Western pond turtles move to upland areas next to watercourses to deposit eggs and overwinter.

- The white-tailed kite (*Elanus leucurus*) is fully protected under the California Fish and Game Code. The white-tailed kite occurs in coastal and valley lowlands in California. White-tailed kites generally inhabit low-elevation grassland, savannah, oak woodland, wetland, agricultural, and riparian habitats.

Environmental Consequences

Movement of construction equipment on the creek banks and placement of fill in the Arroyo de San Pedro Regaldo could result in the injury or death of foothill yellow-legged frogs and western pond turtles. In-water construction activities would occur during the dry season (July 1 through October 15); because the creek appears to be perennial, water may still be present. Construction activities along the creek banks that do not involve in-water work would be restricted to May 1 through October 15. Construction of the earthen embankment and extension of the existing culvert within the creek channel would result in the permanent loss of 0.01 acre of creek channel and 0.03 acre of riparian forest that provides suitable habitat for the foothill yellow-legged frog and western pond turtle. There would also be a temporary loss of 0.01 acre of creek channel and 0.04 acre of riparian forest habitats. Removal and temporary loss of these small amounts of habitat would not substantially affect the foothill yellow-legged frog or western pond turtle.

Construction activities may occur during the nesting season (February 1 through September 30) of the white-tailed kite and other migratory birds and could result in the disturbance of nesting birds. Removal of nests or construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment.

No-Project Alternative

This alternative would not result in any impacts on animal species. Therefore, no avoidance or minimization measures are required.

Avoidance, Minimization, and/or Mitigation Measures

1. Within 48 hours of the start of work within or along the Arroyo de San Pedro Regaldo, a qualified biologist would conduct a preconstruction survey for foothill yellow-legged frogs and western pond turtles in the construction area and 500 feet upstream and downstream of the construction area. If the biologist discovers any frogs, tadpoles, or egg masses or western pond turtles in or near the construction area, a biological monitor would monitor construction activities within the Arroyo de San Pedro Regaldo. If any foothill yellow-legged frogs or western pond turtles

are found during monitoring, a biologist with authorization from the California Department of Fish and Wildlife would relocate frogs and/or turtles outside of the construction area.

2. Vegetation removal would occur during the non-breeding season for most migratory birds (generally between October 1 and January 31) to the extent feasible. If possible, construction activities would begin before the nesting season for most birds (generally February 1 through September 30) to discourage noise-sensitive raptors and other birds from attempting to nest within or near the study area.

   If beginning construction activities (including vegetation removal) before the breeding season is not possible, Caltrans/City would retain a qualified wildlife biologist to conduct nesting surveys before the start of construction. If an active nest is found in the survey area, a no-disturbance buffer would be established around the site to avoid disturbance or destruction of the nest site until the end of the breeding season (September 30) or until after a qualified wildlife biologist determines that the young have fledged and moved out of the project area.

2.3.5 Threatened and Endangered Species

Regulatory Setting

The main federal law protecting threatened and endangered species is the Federal Endangered Species Act: 16 U.S. Code Section 1531, et seq. This act and subsequent amendments provide for the conservation of endangered and threatened species and the ecosystems upon which they depend. Under Section 7 of this act, federal agencies are required to consult with the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service to ensure that they are not undertaking, funding, permitting or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is defined as geographic locations critical to the existence of a threatened or endangered species. The outcome of consultation under Section 7 is a Biological Opinion and/or an Incidental Take statement. Section 3 of the Federal Endangered Species Act defines take as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or any attempt at such conduct."

California has enacted a similar law at the state level, the California Endangered Species Act, California Fish and Game Code, Section 2050, et seq. The California Endangered Species Act emphasizes early consultation to avoid potential impacts to

rare, endangered, and threatened species and to develop appropriate planning to offset project-caused losses of listed species populations and their essential habitats. The California Department of Fish and Wildlife is the agency responsible for implementing the California Endangered Species Act. Section 2081 of the Fish and Game Code prohibits "take" of any species determined to be an endangered species or a threatened species. Take is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." The California Endangered Species Act allows for take incidental to otherwise lawful development projects; for these actions, an incidental take permit is issued by the Department of Fish and Wildlife.

Another federal law, the Magnuson-Stevens Fishery Conservation and Management Act of 1976, was established to conserve and manage fishery resources found off the coast, as well as anadromous species and Continental Shelf fishery resources of the United States, by exercising (A) sovereign rights for the purposes of exploring, exploiting, conserving, and managing all fish within the exclusive economic zone established by Presidential Proclamation 5030, dated March 10, 1983, and (B) exclusive fishery management authority beyond the exclusive economic zone over such anadromous species, Continental Shelf fishery resources, and fishery resources in special areas.

Affected Environment

Surveys of the study area in August 2005 and November 2010 indicated that suitable habitat is present for the following species. See Appendix H for 2015 Species List.

- The California red-legged frog is federally listed as threatened and is a California species of special concern. The species occurs in isolated locations in the Sierra Nevada, North Coast, and northern Transverse Ranges. California red-legged frogs use a variety of habitat types, including various aquatic systems as well as riparian and upland habitats.

  On February 3, 2012, Caltrans, as the federal lead agency under the National Environmental Policy Act for the project, requested that formal consultation be initiated with the U.S. Fish and Wildlife Service for the California red-legged frog under the May 4, 2011 Programmatic Biological Opinion for Projects Funded or Approved under the Federal Aid Program (File number 8-8-10-F-58). On October 29, 2012, the U.S. Fish and Wildlife Service issued a Biological Opinion for the project. The Biological Opinion concludes that the project is not likely to

jeopardize the conditnued existence of the California red-legged frog. See Appendix E for related correspondence.

- The Central California Coast steelhead trout is listed as threatened by the National Marine Fisheries Service. Steelhead trout populations inhabit coastal California streams from the Russian River to Aptos Creek and several tributaries of the San Francisco, San Pablo, and Suisun bays. The National Marine Fisheries Service has also designated critical habitat for steelhead trout in the San Lorenzo River within the study area.

  The steelhead trout is an anadromous fish species that spends one to two years in the ocean before returning to its natal streams. Unlike other salmonids, the steelhead trout is capable of spawning more than once before dying. Steelhead trout spawning in the San Lorenzo River system typically begins in December and continues into April with a peak between late December and March.

  On February 22, 2012, Caltrans received a letter of concurrence from the National Marine Fisheries Service that the project would not likely adversely affect the Central California Coast steelhead trout or its designated critical habitat. See Appendix F for related correspondence.

- The Central California Coast coho salmon is federally and state listed as endangered. Populations occur from Punta Gorda in Humboldt County to and including the San Lorenzo River in Santa Cruz County, along with populations in tributaries to San Francisco Bay (excluding the Sacramento-San Joaquin River system). Critical habitat for the coho salmon, designated by the National Marine Fisheries Service, includes the San Lorenzo River within the study area.

  The coho salmon is an anadromous fish species that spends the first 12–18 months of life in freshwater and up to two years in the ocean, returning to spawn in its natal stream in the third year. Because this 3-year cycle is fairly rigid, spawning runs with relatively poor reproductive success can result in poor spawning runs three years later. The upstream migration of adult coho in the San Lorenzo River system usually occurs in November and December, with peak times of entry in December. The coho salmon usually spawns at the heads of riffles, just below a pool, with gravel substrate. Following spawning, the adult coho dies.

  On February 22, 2012, Caltrans received a letter of concurrence from the National Marine Fisheries Service that the project would not likely adversely affect the

Central California Coast coho salmon or its designated critical habitat. See Appendix F for relevant correspondence.

- The tidewater goby is federally listed as endangered throughout its range. The San Lorenzo River is not designated as critical habitat for the tidewater goby, but is part of the U.S. Fish and Wildlife Service's Recovery Plan for the Tidewater Goby. The tidewater goby, a species endemic to California, occurs in coastal lagoons, estuaries, and marshes at the mouths of major stream drainages. Important habitats include stable lagoons formed by sandbars at the stream mouths during the later spring, summer, and fall. Available tidewater goby habitat in the San Lorenzo River encompasses 66 acres of the lower river. Evidence of gobies has not been found above the Water Street Bridge about half a mile downstream of the mouth of the Arroyo de San Pedro Regaldo.

  On October 29, 2012, the U.S. Fish and Wildlife Service issued a Biological Opinion for the tidewater goby for the project. The Biological Opinion concludes that the project is not likely to jeopardize the conditnued existence of the tidewater goby. See Appendix E for related correspondence.

Environmental Consequences

Movement of construction equipment on the banks of the channel and placement of fill in the channel could result in the injury or death of California red-legged frogs. In-water construction activities would occur during the dry season (July 1 through October 15); because the creek appears to be perennial, water may still be present. Construction activities along the creek banks that do not involve in-water work would be restricted to May 1 through October 15.

Project specifications would minimize impacts to the California red-legged frog. Although accidental spills could still occur, contamination of aquatic habitat from vehicle refueling and operation of vehicles and equipment next to the Arroyo de San Pedro Regaldo and subsequent injury or death of California red-legged frogs would be minimized through implementation of mitigation measure specified below. Construction of the earthen embankment and extension of the existing culvert within the creek channel would result in the permanent loss of 0.01 acre of creek channel and 0.03 acre of riparian forest that provides suitable habitat for the California red-legged frog (see Figure 2-10).

There would also be a temporary loss of 0.01 acre of creek channel and 0.04 acre of riparian forest habitats (see Figure 2-10). Removal and temporary loss of these small

amounts of aquatic and riparian habitat would not substantially affect the California red-legged frog.

Project impacts to the steelhead trout and coho salmon and their designated critical habitats include temporary increases in turbidity and sedimentation and potential discharges of contaminants into the San Lorenzo River. Construction activities would result in small temporary and permanent losses of riparian vegetation and aquatic habitat in the Arroyo de San Pedro Regaldo. Riparian vegetation bordering the channel of the Arroyo de San Pedro Regaldo contributes to aquatic habitat values in the San Lorenzo River by providing shade (reducing the amount of solar heating of the stream), stabilizing the channel and bank (reducing erosion and sediment inputs), and providing inputs of woody material, nutrients, and food (aquatic insects) for fish.

Because the tidewater goby is likely restricted to the San Lorenzo River and lagoon downstream of the Water Street Bridge, project effects on this species would be limited to potential water quality effects resulting from temporary increases in turbidity and sedimentation and potential discharges of contaminants into the San Lorenzo River during construction.

No-Project Alternative

This alternative would not result in any impacts on threatened or endangered species. Therefore, no avoidance or minimization measures are required.

Avoidance, Minimization, and/or Mitigation Measures

California Red-Legged Frog and Tidewater Goby

To ensure that the project is conducted in accordance with the Biological Opinion for the Route 1/Route 9 Intersection Improvement Project (Appendix E), Caltrans/City will implement the avoidance and minimization measures prior to and during construction at the Arroyo de San Pedro Regaldo. The measures are summarized below.

1. Only U.S. Fish and Wildlife Service-approved biologists will participate in activities associated with the capture, handling, and monitoring of California red-legged frogs and tidewater gobies.
2. Ground disturbance will not begin until written approval is received from the U.S. Fish and Wildlife Service that the biologist is qualified to conduct the work.
3. Before any activities begin on the project, a Service-approved biologist will conduct a training session for all construction personnel. At a minimum, the

training will include a description of the California red-legged frog and tidewater goby and their habitats, the specific measures that are being implemented to conserve the California red-legged frog and tidewater goby, and the boundaries within which the project may be accomplished.

4. A Service-approved biologist will be present at the work site until all California red-legged frogs and tidewater gobies have been removed and disturbance of habitat has been completed. After this time, the project proponent will designate a person to monitor on-site compliance with all minimization measures. The Service-approved biologist will ensure that the monitor receives the training outlined in measure 3 above. If the monitor or Service-approved biologist recommends that work be stopped because California red-legged frogs and/or tidewater gobies would be affected to a degree that exceeds the levels anticipated by the Service during review of the proposed action, they will notify the construction foreman immediately. The construction foreman will either resolve the situation by eliminating the effect immediately or require that all actions which are causing these effects be halted. If work is stopped, the Service will be notified as soon as possible.
5. During project activities, all trash that may attract predators will be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris will be removed from work areas.
6. All refueling, maintenance, and staging of equipment and vehicles will occur at least 60 feet from riparian habitat or water bodies and not in a location from where a spill would not drain directly towards aquatic habitat. The Service-approved biologist or designated monitor will ensure contamination of habitat does not occur during such operations. Prior to the onset of work, Caltrans will ensure a plan is in place for prompt and effective response to accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.
7. Project sites will be revegetated with an assemblage of native riparian, wetland, and upland vegetation suitable for the area. Locally collected plant materials will be used to the extent practicable. Invasive, exotic plants will be controlled to the maximum extent practicable. This measure will be implemented in all areas disturbed by activities associated with the project, unless the Service and Caltrans determine that it is not feasible or practical.

8. Project activities taking place in aquatic habitat will be restricted to July 1 through October 15. Construction activities taking place in riparian habitat (i.e., above the water line) will be restricted to May 1 through October 15.
9. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 0.2 inch to prevent California red-legged frogs and tidewater gobies from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any diversions or barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.
10. A Service-approved biologist will permanently remove any individuals of exotic species, such as bullfrogs (*Rana catesbeiana*) and centrarchid fishes from the project area, to the maximum extent possible.
11. Best management practices outlined in any authorizations or permits would be implemented to control sedimentation during and after project implementation.

California red-legged frog specific protective measures:

1. A Service-approved biologist will survey the project site no later than 48 hours before the onset of work activities. If any life stage of the California red-legged frog is found and these individuals are likely to be killed or injured by work activities, the approved biologist will be allowed sufficient time to move them from the site before work activities begin. The Service-approved biologist will relocate the California red-legged frogs the shortest distance possible to a location that contains suitable habitat and will not be effected by activities associated with the proposed project. The Service-approved biologist will maintain detailed records of any individuals that are moved to assist him or her in determining whether translocated animals are returning to the original point of capture.
2. The number of access routes, size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Caltrans will install orange construction barrier fencing along the creek channel and riparian forest to delineate the boundary of the work area and identify environmentally sensitive areas to be protected during construction. The Service-approved biologist or designated biological monitor will inspect the barrier fencing daily for California red-legged frogs.
3. Unless approved by the Service, water will not be impounded in a manner that may attract California red-legged frogs.

Tidewater goby specific protective measure:

1. Prior to and during incremental draining of the site, a Service-approved biologist will survey the area for tidewater gobies through the use of dip nets or seine nets. Any captured tidewater gobies will be released in appropriate habitat adjacent to the dewatered area.

Central California Coast Steelhead Trout, and Coho Salmon

1. Caltrans/City would conduct in-water construction activities during the dry season (July 1–October 15) to avoid the main migration seasons of adult and juvenile salmonids and minimize the potential for adverse effects on water quality and aquatic habitat in the San Lorenzo River resulting from temporary increases in suspended sediment and turbidity.
2. Caltrans/City would require the contractor to bypass the flow of the creek around the construction area and isolate the construction area from the live stream to minimize downstream water quality effects during construction. A pump and/or gravity would be used to bypass the flow through a pipe (large enough to accommodate the entire flow of the creek) to a point downstream of the construction area. Temporary cofferdams would be constructed as needed to isolate the construction area from the live stream and would be constructed of clean imported gravel, impermeable liners (e.g., plastic), water bladders, and/or sandbags.
3. During dewatering operations, water would be pumped out of the isolated construction area to water storage containers or a temporary detention or filtration basin away from the stream channel to prevent direct discharge of this water to the creek. All gravel, sandbags, liners, pipes, concrete debris, and other materials would be removed from the channel before stream flow is restored to the dewatered area.

The measures described above for creek channel, coast live oak-arroyo willow riparian forest, and wetlands and other waters also contribute to minimization and avoidance of impacts to the Central California Coast steelhead trout and coho salmon.

2.4 Climate Change

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to greenhouse gas emissions, particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the United Nations and World Meteorological Organization in 1988 has led to increased efforts devoted to greenhouse gas emissions reduction and climate change research and policy. These efforts are mainly concerned with the emissions of greenhouse gases generated by human activity, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), HFC-23 (fluoroform), HFC-134a (s, s, s, 2-tetrafluoroethane), and HFC-152a (difluoroethane).

In the U.S., the main source of greenhouse gas emissions is electricity generation, followed by transportation. In California, however, transportation sources (including passenger cars, light-duty trucks, other trucks, buses, and motorcycles make up the largest source of greenhouse gas-emitting sources. The dominant greenhouse gas emitted is CO_2, mostly from fossil fuel combustion.

There are typically two terms used when discussing the impacts of climate change: "greenhouse gas mitigation" and "adaptation." Greenhouse gas mitigation is a term for reducing greenhouse gas emissions to reduce or mitigate the impacts of climate change. Adaptation refers to the effort of planning for and adapting to impacts resulting from climate change (such as adjusting transportation design standards to withstand more intense storms and higher sea levels).[1]

There are four main strategies for reducing greenhouse gas emissions from transportation sources: 1) improving the transportation system and operational efficiencies, 2) reducing travel activity, 3) transitioning to lower greenhouse gas-emitting fuels, and 4) improving vehicle technologies/efficiency. To be most effective, all four strategies should be pursued cooperatively.[2]

Regulatory Setting

State

With the passage of several pieces of legislation, including State Senate and Assembly bills and Executive Orders, California launched an innovative and proactive approach to dealing with greenhouse gas emissions and climate change.

Assembly Bill 1493 (AB 1493), Pavley, Vehicular Emissions: Greenhouse Gases, 2002: This bill requires the Air Resources Board to develop and implement

[1] http://climatechange.transportation.org/ghg_mitigation/

[2] http://www.fhwa.dot.gov/environment/climate_change/mitigation/

regulations to reduce automobile and light truck greenhouse gas emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year.

Executive Order S-3-05 (June 1, 2005): The goal of this order is to reduce California's greenhouse gas emissions to: 1) year 2000 levels by 2010, 2) year 1990 levels by the 2020, and 3) 80% below the year 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32.

Assembly Bill 32 (AB 32), Núñez and Pavley, The Global Warming Solutions Act of 2006: AB 32 sets the same overall greenhouse gas emissions reduction goals as outlined in Executive Order S-3-05, while further mandating that the Air Resources Board create a scoping plan and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases."

Executive Order S-20-06 (October 18, 2006): This order establishes the responsibilities and roles of the Secretary of the California Environmental Protection Agency (Cal/EPA) and state agencies with regard to climate change.

Executive Order S-01-07 (January 18, 2007): This order set forth the low carbon fuel standard for California. Under this order, the carbon intensity of California's transportation fuels is to be reduced by at least 10% by the year 2020.

Senate Bill 97 (SB 97) Chapter 185, 2007, Greenhouse Gas Emissions: This bill required the Governor's Office of Planning and Research to develop recommended amendments to the CEQA Guidelines for addressing greenhouse gas emissions. The amendments became effective on March 18, 2010.

Senate Bill 375 (SB 375), Chapter 728, 2008, Sustainable Communities and Climate Protection: This bill requires the California Air Resources Board (CARB) to set regional emissions reduction targets from passenger vehicles. The Metropolitan Planning Organization (MPO) for each region must then develop a "Sustainable Communities Strategy" (SCS) that integrates transportation, land-use, and housing policies to plan for the achievement of the emissions target for their region.

Senate Bill 391 (SB 391) Chapter 585, 2009 California Transportation Plan: This bill requires the State's long-range transportation plan to meet California's climate change goals under AB 32.

Federal

Although climate change and greenhouse gas reduction are a concern at the federal level, currently no regulations or legislation have been enacted specifically addressing greenhouse gas emissions reductions and climate change at the project level. Neither the U.S. Environmental Protection Agency (U.S. EPA) nor the Federal Highway Administration (FHWA) has issued explicit guidance or methods to conduct project-level greenhouse gas analysis.[3] The Federal Highway Administration supports the approach that climate change considerations should be integrated throughout the transportation decision-making process—from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process will assist in decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project-level decision-making. Climate change considerations can easily be integrated into many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

The four strategies outlined by the Federal Highway Administration to lessen climate change impacts correlate with efforts that the state is undertaking to deal with transportation and climate change; these strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and a reduction in travel activity.

Climate change and its associated effects are also being addressed through various efforts at the federal level to improve fuel economy and energy efficiency, such as the "National Clean Car Program" and Executive Order 13514 - Federal Leadership in Environmental, Energy and Economic Performance.

Executive Order 13514 (October 5, 2009): This order is focused on reducing greenhouse gases internally in federal agency missions, programs and operations, but also direct federal agencies to participate in the Interagency Climate Change Adaptation Task Force, which is engaged in developing a national strategy for adaptation to climate change.

U.S. EPA's authority to regulate greenhouse gas emissions stems from the U.S. Supreme Court decision in Massachusetts v. EPA (2007). The Supreme Court ruled

[3] To date, no national standards have been established regarding mobile source greenhouse gases, nor has U.S. EPA established any ambient standards, criteria or thresholds for greenhouse gases resulting from mobile sources.

that greenhouse gases meet the definition of air pollutants under the existing Clean Air Act and must be regulated if these gases could be reasonably anticipated to endanger public health or welfare. Responding to the Court's ruling, U.S. EPA finalized an endangerment finding in December 2009. Based on scientific evidence, it found that six greenhouse gases constitute a threat to public health and welfare. Thus, it is the Supreme Court's interpretation of the existing act and EPA's assessment of the scientific evidence that form the basis for EPA's regulatory actions. The U.S. EPA in conjunction with the National Highway Traffic Safety Administration issued the first of a series of greenhouse gas emission standards for new cars and light-duty vehicles in April 2010.[4]

The U.S. EPA and National Highway Traffic Safety Administration are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced greenhouse gas emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever greenhouse gas regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle greenhouse gas regulations.

The final combined standards that made up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards implemented by this program are expected to reduce greenhouse gas emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012–2016).

On August 28, 2012, the U.S. EPA and National Highway Traffic Safety Administration issued a joint Final Rulemaking to extend the National Program for fuel economy standards to model years 2017 through 2025 passenger vehicles. Over the lifetime of the model year 2017-2025 standards, this program is projected to save approximately four billion barrels of oil and two billion metric tons of greenhouse gas emissions.

[4] http://www.c2es.org/federal/executive/epa/greenhouse-gas-regulation-faq

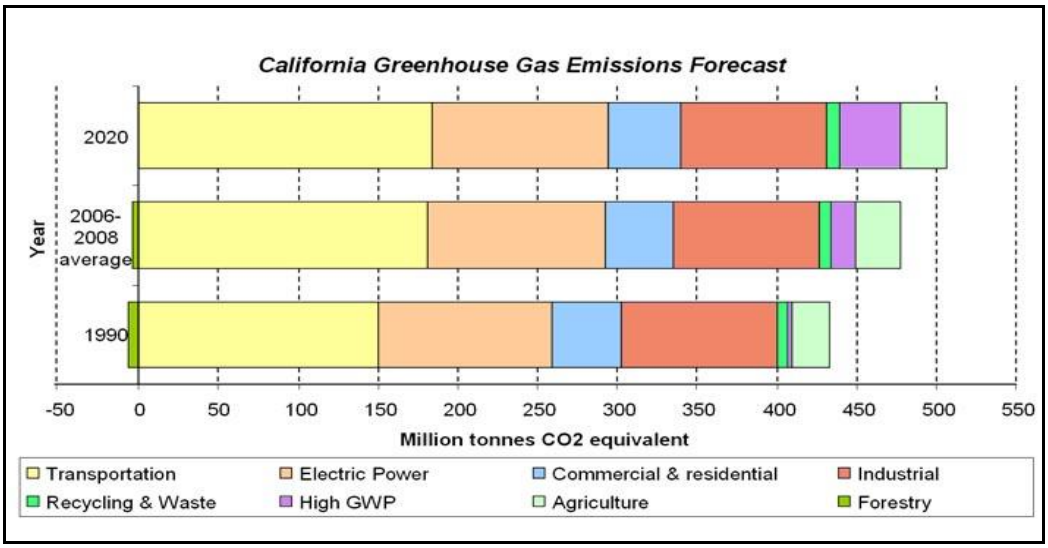
The complementary U.S. EPA and National Highway Traffic Safety Administration standards that make up the Heavy-Duty National Program apply to combination tractors (semi-trucks), heavy-duty pickup trucks and vans, and vocational vehicles (including buses and refuse or utility trucks). Together, these standards will cut greenhouse gas emissions and domestic oil use significantly. This program responds to President Barack Obama's 2010 request to jointly establish greenhouse gas emissions and fuel efficiency standards for the medium- and heavy-duty highway vehicle sector. The agencies estimate that the combined standards will reduce CO_2 emissions by about 270 million metric tons and save about 530 million barrels of oil over the life of model year 2014 to 2018 heavy duty vehicles.

Project Analysis

An individual project does not generate enough greenhouse gas emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may contribute to a potential impact through its *incremental* change in emissions when combined with the contributions of all other sources of greenhouse gas.[5] In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable" (CEQA Guidelines Sections 15064(h)(1) and 15130). To make this determination, the incremental impacts of the project must be compared with the effects of past, current, and probable future projects. To gather sufficient information on a global scale of all past, current, and future projects to make this determination is a difficult, if not impossible, task.

The AB 32 Scoping Plan mandated by AB 32 includes the main strategies California will use to reduce greenhouse gas emissions. As part of its supporting documentation for the Draft Scoping Plan, the Air Resources Board released the greenhouse gas inventory for California (forecast last updated: October 28, 2010). The forecast is an estimate of the emissions expected to occur in 2020 if none of the foreseeable measures included in the Scoping Plan were implemented. The base year used for forecasting emissions is the average of statewide emissions in the greenhouse gas inventory for 2006, 2007, and 2008. See Figure 2-11.

[5] This approach is supported by the AEP: *Recommendations by the Association of Environmental Professionals on How to Analyze GHG Emissions and Global Climate Change in CEQA Documents* (March 5, 2007), as well as the South Coast Air Quality Management



Source: http://www.arb.ca.gov/cc/inventory/data/forecast.htm

Figure 2-11 California Greenhouse Gas Forecast

Caltrans and its parent agency, the Transportation Agency, have taken an active role in addressing greenhouse gas emission reduction and climate change. Recognizing that 98% of California's greenhouse gas emissions are from the burning of fossil fuels and 40% of all human-made greenhouse gas emissions are from transportation, Caltrans has created and is implementing the Climate Action Program at Caltrans that was published in December 2006.[6]

One of the main strategies in Caltrans' Climate Action Program to reduce greenhouse gas emissions is to make California's transportation system more efficient. The highest levels of CO_2 from mobile sources, such as automobiles, occur at stop-and-go speeds (0–25 miles per hour) and speeds over 55 miles per hour; the most severe emissions occur from 0–25 miles per hour (see Figure 2-12). To the extent that a project relieves congestion by enhancing operations and improving travel times in high congestion travel corridors, greenhouse gas emissions, particularly CO_2, may be reduced.

[6] Caltrans Climate Action Program is located at the following web address: http://www.dot.ca.gov/hq/tpp/offices/ogm/key_reports_files/State_Wide_Strategy/Caltrans_Climate_Action_Program.pdf

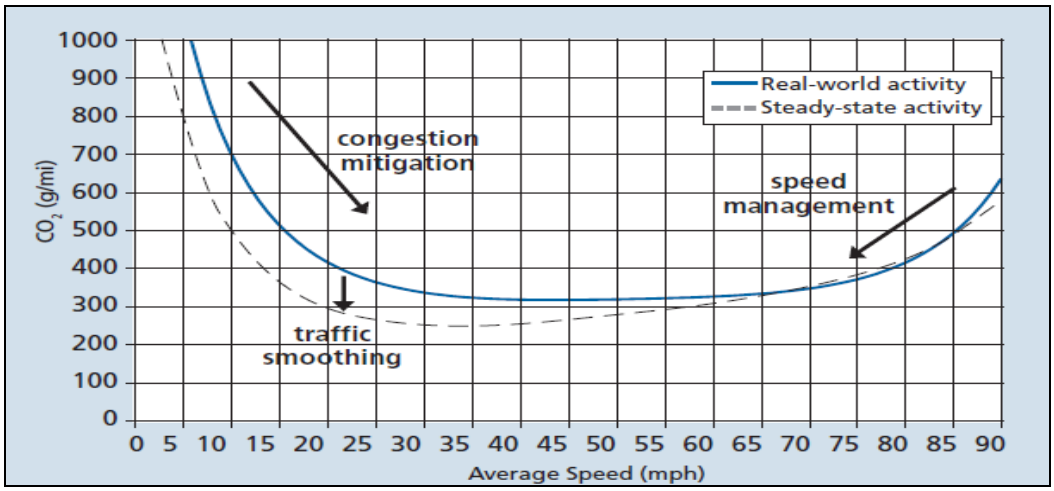


Figure 2-12 Possible Effect of Traffic Operation Strategies in Reducing On-Road CO_2 Emission[7]

In addition to affecting carbon monoxide, methane, and nitrogen oxide vehicle exhaust emissions of automobiles traveling through the study intersections, the project would also affect greenhouse gas emissions. As shown in Table 2-15, criteria pollutants were quantified for baseline (2005) and design-year (2030) with- and without-project conditions using the project traffic data (see Table 2-6 in Section 2.1.4, *Traffic and Transportation/Pedestrian and Bicycle Facilities*) and EMFAC. A similar analysis was done for annual CO_2, CH_4, and N_2O emissions here.

As described in Section 2.2.5, *Air Quality*, peak hour fuel consumption was generated by the SIMTRAFFIC model default vehicle profiles, and emission factors for Santa Cruz County were assumed in the emissions modeling. Based on this analysis, annual 2030 carbon dioxide emissions equivalents are expected to increase with implementation of the project relative to the 2030 no-project condition.

Table 2-15 shows the modeled yearly emissions.

[7] Traffic Congestion and Greenhouse Gases: Matthew Barth and Kanok Boriboonsomsin (TR News 268 May-June 2010) http://onlinepubs.trb.org/onlinepubs/trnews/trnews268.pdf |

Table 2-15 Operational Greenhouse Gas Emission Estimates Based on Peak Hour Traffic Estimates (metric tons per year)

Condition	Carbon Dioxide	Methane	Nitrous Oxide	Carbon Dioxide Equivalent[a]		
				Without Pavley[b]	With Pavley[b]	Difference
Baseline (2005)	84,942	4	4	86,311	86,311	0
No-Project (2030)	84,707	5	6	86,758	61,129	-25,629
Project (2030)	93,255	5	7	95,518	67,257	-28,260
Project Minus No-Project	*8,548*	*1*	*1*	*8,760*		

[a] A measure for quantifying the potential impact a greenhouse gas may have on global warming using the equivalent amount or concentration of carbon dioxide as a reference.

Vehicular emission rates, in general, are anticipated to decrease in future years due to continuing improvements in engine technology and the retirement of older, higher-emitting vehicles.

Daily vehicle miles traveled was calculated by multiplying peak hour volumes specified in Table 2-6 by 4.5 and then by the total length of each intersection (sum of north-south and east-west segments). The conversion factor is based on the ratio of peak to off-peak traffic.

Emissions are based on morning peak hour speeds. Because vehicle emissions decrease as a function of speed and peak hours are typically the most congested periods, this assumption likely overestimates annual emissions.

[b] The EMFAC2011 model was run with and without the effects of the Pavley (fuel efficiency standards) standards to document how project-related emissions with this standard in effect would compare to existing emissions.

Table 2-15 shows a project-related increase of 8,760 metric tons of carbon dioxide equivalents relative to the 2030 no-project condition. This estimate represents a worst-case analysis as it is based on peak hour traffic volumes for study area intersections rather than daily vehicle miles traveled. Table 2-15 also indicates that with the Pavley fuel efficiency standards that are, in effect, projected CO_2 emissions are expected to be less than existing conditions when comparing to future build and future no-build conditions. These emission results do not reflect the improvements in traffic operations and reduced delay expected with construction of the proposed improvements (see the Traffic and Transportation/Pedestrian and Bicycle Facilities section and Table 2-5 for a discussion of the expected reduction in delays projected to occur at study intersections with construction of the project). Because the project would decrease delay, it is expected to result in lower greenhouse gas emissions than shown in Table 2-15.

It should be noted the proposed project is included in the AMBAG 2035 Metropolitan Transportation Plan/Sustainable Communities Strategy (Moving Forward 2035 Monterey Bay), which presents a financially constrained list of transportation projects over the following 25 years that will enhance regional mobility as well as reduce greenhouse gas emissions. The AMBAG 2035 Metropolitan Transportation Plan/ Sustainable Communities Strategy will contain AMBAG's strategy for meeting the three-county region's greenhouse gas reduction target established by the Air

Resources Board (0% increase by 2020 and a 5% reduction per capita by 2035). While the project would generate a minor increase in emissions relative to future no-project conditions, the project would not preclude or limit the MTP/SCS from meeting the region's SB 375 reduction goals.

Greenhouse gas emissions are normally estimated based on the distribution of traffic at various speeds, rather than average speeds at specific intersections because vehicular emissions tend to follow a bell curve. This means that as traffic speeds increase from the lowest speeds (0–45 miles per hour), greenhouse gas emissions tend to decrease with the lowest emissions occurring around 45 miles per hour. The highest pollutant emission rates occur at stop-and-go speeds (0–25 miles per hour) and speeds greater than 65 miles per hour.

The project would add bicycle lanes to Route 9. Improving the pedestrian and bicycle network provides alternatives to single-occupancy vehicles; this may reduce vehicle miles traveled. Because vehicle miles traveled and greenhouse gas emissions are directly related, reducing vehicle miles traveled would reduce greenhouse gas emissions.

Limitations and Uncertainties with Modeling

EMFAC

Although EMFAC can calculate CO_2 emissions from mobile sources, the model does have limitations when it comes to accurately reflecting CO_2 emissions due to impacts on traffic. According to the National Cooperative Highway Research Program report, *Development of a Comprehensive Modal Emission Model* (April 2008) and a 2009 University of California study[8], brief but rapid accelerations, such as those occurring during congestion, can contribute significantly to a vehicle's CO_2 emissions during a typical urban trip. Current emission-factor models are insensitive to the distribution of such modal events (i.e., cruise, acceleration, deceleration, and idling) in the operation of a vehicle and instead estimate emissions by average trip speed. This limitation creates an uncertainty in the model's results when compared to the estimated emissions of the various alternatives with baseline in an attempt to determine impacts. Although work by EPA and the California Air Resources Board is underway on modal-emission models, neither agency has yet approved a modal emissions model that can be used to do this more accurate modeling.

[8] Barth, M., and Boriboonsomsin, K. 2009. Energy and emissions impacts of a freeway-based dynamic eco-driving system. Transportation Research Part D, 14, 6, 400-410.

The California Air Resources Board currently is not using EMFAC to create its inventory of greenhouse gas emissions. It is unclear why the California Air Resources Board has made this decision. Its website states only this:

> REVISION: Both the EMFAC and OFFROAD Models develop CO_2 and CH_4 [methane] emission estimates; however, they are not currently used as the basis for [CARB's] official [greenhouse gas] inventory which is based on fuel usage information. . . However, ARB is working towards reconciling the emission estimates from the fuel usage approach and the models. (California Air Resources Board 2010)

Other Variables

With the current science, project-level analysis of greenhouse gas emissions has limitations. Although a greenhouse gas analysis is included for this project, there are numerous key greenhouse gas variables that are likely to change dramatically during the design life of the proposed project and would thus dramatically change the projected CO_2 emissions.

First, vehicle fuel economy is increasing. The EPA's annual report, "Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012," which provides data on the fuel economy and technology characteristics of new light-duty vehicles including cars, minivans, sport utility vehicles, and pickup trucks, confirms that average fuel economy has improved each year beginning in 2005, and is now at a record high.[9] Corporate Average Fuel Economy (CAFE) standards remained the same between model years 1995 and 2003 and subsequently began setting increasingly higher fuel economy standards for future vehicle model years. The EPA estimates that light-duty fuel economy rose by 16% from 2007 to 2012. Table 2-16 shows the increases in required fuel economy standards for cars and trucks between Model Years 2012 and 2025 as available from the National Highway Traffic Safety Administration for the 2012-2016 and 2017-2025 CAFE standards.

[9] U.S. EPA 2013c. Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2012. Available:< http://www.epa.gov/fueleconomy/fetrends/1975-2012/420r13001.pdf>. Accessed: February 12, 2014.

Table 2-16 Average Required Fuel Economy (Miles Per Gallon)

	2012	2013	2014	2015	2016	2018	2020	2025
Passenger Cars	33.3	34.2	34.9	36.2	37.8	41.1 to 41.6	44.2 to 44.8	55.3 to 56.2
Light Trucks	25.4	26	26.6	27.5	28.8	29.6 to 30.0	30.6 to 31.2	39.3 to 40.3
Combined	29.7	30.5	31.3	32.6	34.1	36.1 to 36.5	38.3 to 38.9	48.7 to 49.7

Source: U.S. Environmental Protection Agency 2013c[9]

Second, near-zero carbon vehicles will come into the market during the design life of this project. According to the 2013 Annual Energy Outlook:

> "LDVs that use diesel, other alternative fuels, hybrid-electric, or all-electric systems play a significant role in meeting more stringent GHG emissions and CAFE standards over the projection period. Sales of such vehicles increase from 20% of all new LDV sales in 2011 to 49 % in 2040 in the AEO2013 Reference case." (U.S. Energy Information Administration 2013)[10]

The greater percentage of alternative fuel vehicles on the road in the future will reduce overall greenhouse gas emissions as compared to scenarios in which vehicle technologies and fuel efficiencies do not change.

Third, California adopted a low-carbon transportation fuel standard in 2009 to reduce the carbon intensity of transportation fuels by 10% by 2020. The regulation became effective on January 12, 2010 (codified in title 17, California Code of Regulations, Sections 95480-95490). Beginning January 1, 2011, transportation fuel producers and importers must meet specified average carbon intensity requirements for fuel in each calendar year.

Lastly, driver behavior has been changing as the U.S. economy and oil prices have changed. In its January 2008 report, "Effects of Gasoline Prices on Driving Behavior and Vehicle Market, the Congressional Budget Office found the following results based on data collected from California (U.S. Congressional Budget Office 2008):[11]

[10] U.S. Energy Information Administration. 2013. Annual Energy Outlook 2013. Available:< http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf>. Accessed: February 12, 2014.

[11] U.S. Congressional Budget Office. 2008. Effects of Gasoline Prices on Driving Behavior and Vehicle Market. January 2008. Available: < http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/88xx/doc8893/01-14-gasolineprices.pdf>. Accessed: February 12, 2014.

1. Freeway motorists have adjusted to higher gas prices by making fewer trips and driving more slowly;

2. The market share of sports utility vehicles is declining; and

3. The average prices for larger, less-fuel-efficient models declined from 2003 to 2008 as average prices for the most-fuel-efficient automobiles have risen, showing an increase in demand for the more fuel-efficient vehicles.

More recent reports from the Energy Information Agency and Bureau of Economic Analysis also show a slowing re-growth of vehicle sales in the years since its dramatic drop in 2009 due to the Great Recession, and the Federal Highway Administration revised its forecast downward by 22-40% based on actual data from the last 15 years (U.S. Energy Information Administration 2013: Table 53, U.S. Bureau of Economic Analysis 2014).[12,13]

Limitations and Uncertainties with Impact Assessment

Taken from p. 5-22 of the National Highway Traffic Safety Administration Final EIS for MY2017-2025 CAFE Standards (July 2012), Figure 2-13 shows how the range of uncertainties in assessing greenhouse gas impacts grows with each step of the analysis:

> "Moss and Schneider (2000) characterize the "cascade of uncertainty" in climate change simulations (Schneider 1983) [shown as Figure 2-13 below]. As indicated in (Henderson-Sellers 1993) , the emission estimates used in this EIS have narrower bands of uncertainty than the global climate effects, which are less uncertain than regional climate change effects. The effects on climate are, in turn, less uncertain than the impacts of climate change on affected resources (such as terrestrial and coastal ecosystems, human health, and other resources […] Although the uncertainty bands broaden with each successive step in the analytic chain, all values within the bands are not equally likely; the mid-range values have the highest likelihood."(National Highway Traffic Safety Administration 2012:5-21).[14]

[12] U.S. Energy Information Administration. 2013. Annual Energy Outlook 2013. Available:< http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf>. Accessed: February 12, 2014.

[13] U.S. Bureau of Economic Analysis. 2014. National Economic Accounts: Supplemental Estimates. Excel Spreadsheet. Available:< http://bea.gov/national/>. Accessed: February 12, 2014.

[14] National Highway Traffic Safety Administration. 2012. Corporate Average Fuel Economy Standards: Passenger Cars and Light Trucks Model Years 2017-2025. Final Environmental Impact Statement. July 2012. Docket No. NHTSA-2011-0056. Available:<

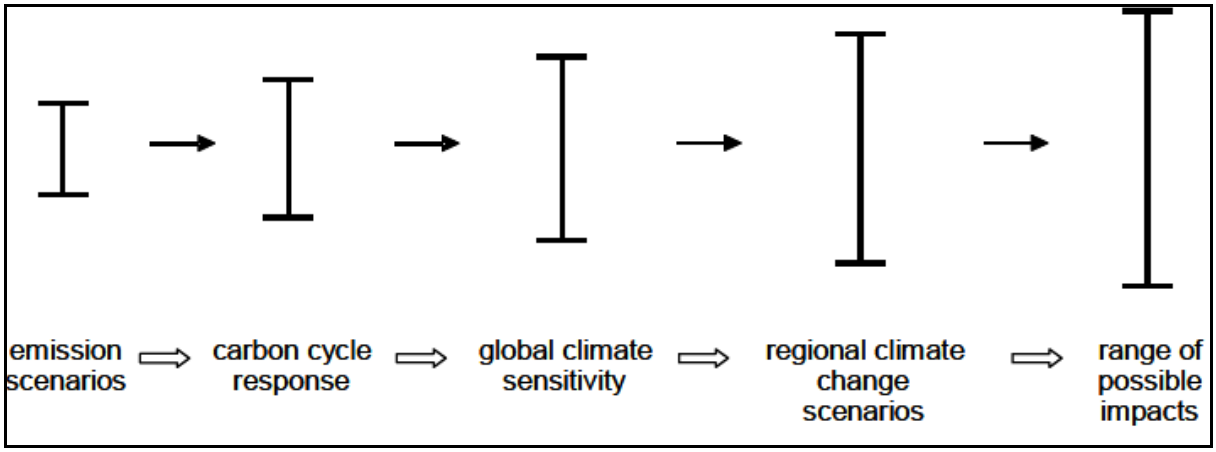


Figure 2-13 Cascade of Uncertainties

Much of the uncertainty in assessing an individual project's impact on climate change surrounds the global nature of the climate change. Even assuming that the target of meeting the 1990 levels of emissions is met, there is no regulatory or other framework in place that would allow for a ready assessment of what any modeled increase in CO_2 emissions would mean for climate change given the overall California greenhouse gas emissions inventory of approximately 430 million tons of $C0_2$ equivalent. This uncertainty only increases when viewed globally. The IPCC has created multiple scenarios to project potential future global greenhouse gas emissions as well as to evaluate potential changes in global temperature, other climate changes, and their effect on human and natural systems. These scenarios vary in terms of the type of economic development, the amount of overall growth, and the steps taken to reduce greenhouse gas emissions. Non-mitigation IPCC scenarios project an increase in global greenhouse gas emissions by 9.7 up to 36.7 billion metric tons CO_2 from 2000 to 2030, which represents an increase of between 25 and 90 percent. (Intergovernmental Panel on Climate Change 2007b)[15].

The assessment is further complicated by the fact that changes in greenhouse gas emissions can be difficult to attribute to a particular project because projects often

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http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FINAL_EIS.pdf>. Accessed: February 12, 2014.

[15] IPCC 2007b. Mitigation of Climate Change In: Climate Change 2007: Working Group III: The Physical Science Basis: Fourth Assessment Report. Available: http://www.dot.ca.gov/hq/tpp/offices/orip/climate_change/projects_and_studies.shtml

cause shifts in the locale for some type of greenhouse gas emissions, rather than causing "new" greenhouse gas emissions. It is difficult to assess the extent to which any project level increase in CO_2 emissions represents a net global increase, reduction, or no change; there are no models approved by regulatory agencies that operate at the global or even statewide scale.

CEQA Conclusion

As discussed above, both the future with-project and future no-project scenarios show increases in CO_2 emissions over the baseline levels; the future project CO_2 emissions are higher than the future no-project emissions. In addition, as discussed above, there are also limitations with EMFAC and with assessing what a given CO_2 emissions increase means for climate change. Therefore, it is Caltrans' determination that in the absence of further regulatory or scientific information related to greenhouse gas emissions and CEQA significance, it is too speculative to make a determination regarding significance of the project's direct impact and its contribution on the cumulative scale to climate change. However, Caltrans is firmly committed to implementing measures to help reduce the potential effects of the project. These measures are outlined in the following section.

Greenhouse Gas Reduction Strategies

AB 32 Compliance

Caltrans continues to be involved on the Governor's Climate Action Team as the Air Resources Board works to implement Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. Many of the strategies Caltrans is using to help meet the targets in AB 32 come from then-Governor Arnold Schwarzenegger's Strategic Growth Plan for California. The Strategic Growth Plan targeted a significant decrease in traffic congestion below 2008 levels and a corresponding reduction in greenhouse gas emissions, while accommodating growth in population and the economy. The Strategic Growth Plan relies on a complete systems approach to attain CO_2 reduction goals: system monitoring and evaluation, maintenance and preservation, smart land use and demand management, and operational improvements as shown in Figure 2-14: Mobility Pyramid.

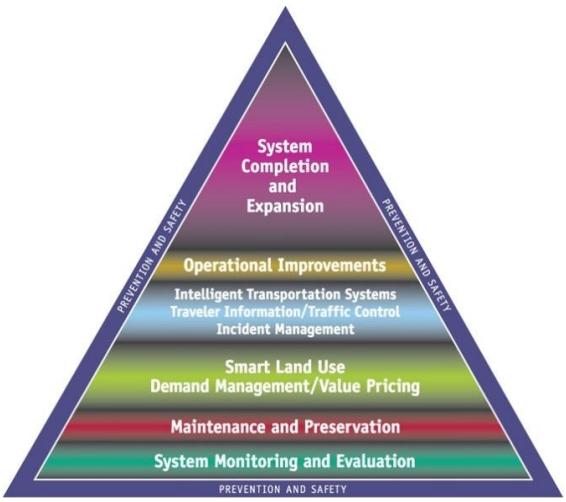

Figure 2-14 Mobility Pyramid

Caltrans is supporting efforts to reduce vehicle miles traveled by planning and implementing smart land use strategies: job/housing proximity, developing transit-oriented communities, and high-density housing along transit corridors. Caltrans works closely with local jurisdictions on planning activities, but does not have local land use planning authority. Caltrans assists efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars, light trucks and heavy-duty trucks; Caltrans is doing this by supporting ongoing research efforts at universities, by supporting legislative efforts to increase fuel economy, and by participating on the Climate Action Team. It is important to note, however, that control of fuel economy standards is held by the U.S. EPA and Air Resources Board.

Caltrans is also working toward enhancing the State's transportation planning process to respond to future challenges. Similar to requirements for regional transportation plans under Senate Bill 375 (Steinberg 2008), Senate Bill 391(Liu 2009) requires the State's long-range transportation plan to meet California's climate change goals under Assembly Bill 32.

The California Transportation Plan (CTP) is a statewide, long-range transportation plan to meet our future mobility needs and reduce greenhouse gas emissions. The California Transportation Plan defines performance-based goals, policies, and strategies to achieve our collective vision for California's future, statewide, integrated, multimodal transportation system.

The purpose of the California Transportation Plan is to provide a common policy framework that will guide transportation investments and decisions by all levels of

government, the private sector, and other transportation stakeholders. Through this policy framework, the California Transportation Plan 2040 will identify the statewide transportation system needed to achieve maximum feasible greenhouse gas emission reductions while meeting the State's transportation needs.

Table 2-17 summarizes the departmental and statewide efforts that Caltrans is implementing to reduce greenhouse gas emissions. More detailed information about each strategy is included in the Climate Action Program at Caltrans (December 2006).

Caltrans Director's Policy 30 (DP-30) Climate Change (June 22, 2012) is intended to establish a Department policy that will ensure coordinated efforts to incorporate climate change into departmental decisions and activities.

Caltrans Activities to Address Climate Change (April 2013)[16] provides a comprehensive overview of activities undertaken by Caltrans statewide to reduce greenhouse gas emissions resulting from agency operations.

The following measures will also be included in the project to reduce the greenhouse gas emissions and potential climate change impacts from the project:

Caltrans and the California Highway Patrol are working with regional agencies to implement Intelligent Transportation Systems (ITS) to help manage the efficiency of the existing highway system. Intelligent Transportation Systems commonly consist of electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.

In addition, the Santa Cruz County Regional Transportation Commission provides ridesharing services and park-and-ride facilities to help manage the growth in demand for highway capacity.

[16] http://www.dot.ca.gov/hq/tpp/offices/orip/climate_change/projects_and_studies.shtml

Table 2-17 Climate Change/CO_2 Reduction Strategies

Strategy	Program	Partnership		Method/Process	Estimated CO_2 Savings (MMT)	
		Lead	Agency		2010	2020
Smart Land Use	Intergovernmental Review (IGR)	Caltrans	Local Governments	Review and seek to mitigate development proposals	Not Estimated	Not Estimated
	Planning Grants	Caltrans	Local and regional agencies & other stakeholders	Competitive selection process	Not Estimated	Not Estimated
	Regional Plans and Blueprint Planning	Regional Agencies	Caltrans	Regional plans and application process	0.975	7.8
Operational Improvements & Intelligent Trans. System (ITS) Deployment	Strategic Growth Plan	Caltrans	Regions	State ITS; Congestion Management Plan	0.07	2.17
Mainstream Energy & GHG into Plans and Projects	Office of Policy Analysis & Research; Division of Environmental Analysis	Interdepartmental effort		Policy establishment, guidelines, technical assistance	Not Estimated	Not Estimated
Educational & Information Program	Office of Policy Analysis & Research	Interdepartmental, CalEPA, CARB, CEC		Analytical report, data collection, publication, workshops, outreach	Not Estimated	Not Estimated
Fleet Greening & Fuel Diversification	Division of Equipment	Department of General Services		Fleet Replacement B20 B100	0.0045	0.0065 0.045 0.0225
Non-vehicular Conservation Measures	Energy Conservation Program	Green Action Team		Energy Conservation Opportunities	0.117	0.34
Portland Cement	Office of Rigid Pavement	Cement and Construction Industries		2.5 % limestone cement mix 25% fly ash cement mix > 50% fly ash/slag mix	1.2 0.36	4.2 3.6
Goods Movement	Office of Goods Movement	Cal EPA, CARB, BT&H, MPOs		Goods Movement Action Plan	Not Estimated	Not Estimated
Total					**2.72**	**18.18**

The project would incorporate the use of energy-efficient lighting, such as LED traffic signals. LED bulbs cost $60 to $70 each, but last five to six years, compared to the one-year average lifespan of the incandescent bulbs previously used. The LED bulbs themselves consume 10% of the electricity of traditional lights, which will also help reduce the project's CO_2 emissions.[17]

According to Caltrans' Standard Specifications, the contractor must comply with all local Air Pollution Control District rules, ordinances, and regulations for air quality restrictions.

Adaptation Strategies

"Adaptation strategies" refer to how Caltrans and others can plan for the effects of climate change on the state's transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, variability in storm surges and intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damaging roadbeds by longer periods of intense heat; increasing storm damage from flooding and erosion; and inundation from rising sea levels. These effects will vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. There may also be economic and strategic ramifications as a result of these types of impacts to the transportation infrastructure.

At the federal level, the Climate Change Adaptation Task Force, co-chaired by the White House Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA), released its interagency task force progress report on October 28, 2011[18] outlining the federal government's progress in expanding and strengthening the nation's capacity to better understand, prepare for, and respond to extreme events and other climate change impacts. The report provides an update on actions in key areas of federal adaptation, including: building resilience in local communities, safeguarding critical natural resources such as freshwater, and providing accessible climate information and tools to help decision-makers manage climate risks.

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[17] Knoxville Business Journal, "LED Lights Pay for Themselves," May 19, 2008 at **http://www.knoxnews.com/news/2008/may/19/led-traffic-lights-pay-themselves/**.

[18] http://www.whitehouse.gov/administration/eop/ceq/initiatives/adaptation

Climate change adaptation must also involve the natural environment as well. Efforts are underway on a statewide level to develop strategies to cope with impacts to habitat and biodiversity through planning and conservation. The results of these efforts will help California agencies plan and implement mitigation strategies for programs and projects.

On November 14, 2008, then-Governor Schwarzenegger signed Executive Order S-13-08, which directed a number of state agencies to address California's vulnerability to sea level rise caused by climate change. This order set in motion several agencies and actions to address the concerns of sea level rise.

In addition to addressing projected sea level rise, the California Natural Resources Agency (Resources Agency) was directed to coordinate with local, regional, state and federal public and private entities to develop the California Climate Adaptation Strategy (Dec 2009)[19], which summarizes the best-known science on climate change impacts to California, assesses California's vulnerability to the identified impacts, and then outlines solutions that can be implemented within and across state agencies to promote resiliency.

The strategy outline is in direct response to Executive Order S-13-08 that specifically asked the Resources Agency to identify how state agencies can respond to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. Numerous other state agencies were involved in the creation of the Adaptation Strategy document, including the California EPA; Business, Transportation and Housing; Health and Human Services; and the Department of Agriculture. The document is broken down into strategies for different sectors that include: Public Health; Biodiversity and Habitat; Ocean and Coastal Resources; Water Management; Agriculture; Forestry; and Transportation and Energy Infrastructure. As data continues to be developed and collected, the state's adaptation strategy will be updated to reflect current findings.

The National Academy of Science was directed to prepare a Sea Level Rise Assessment Report[20] to recommend how California should plan for future sea level rise. The report was released in June 2012 and included:

[19] http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF

[20] *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (2012) is available at http://www.nap.edu/catalog.php?record_id=13389.