2.2 PHYSICAL ENVIRONMENT

2.2.1 HYDROLOGY AND FLOODPLAIN

REGULATORY SETTING

Executive Order (EO) 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. The Federal Highway Administration (FHWA) requirements for compliance are outlined in 23 Code of Federal Regulations (CFR) 650 Subpart A.

To comply, the following must be analyzed:

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

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

AFFECTED ENVIRONMENT

Information in this section is based on the Location Hydraulic Study Report (Caltrans, 2014a) approved in October 2014. The Location Hydraulic Study incorporates information from the Federal Emergency Management Agency (FEMA), Flood Insurance Rate Maps (FIRM) for Contra Costa County. The Location Hydraulic Study also incorporates information from United States Geological Survey (USGS) topographic maps, aerial photographs, and a site visit. The Location Hydraulic Study was prepared to assess the floodplain impacts associated with this project, relative to the directives in EO 11988.

The hydrologic study area includes floodplains and watersheds within which the Build Alternatives would be located, as well as the receiving waterways, marshes, and wetlands within the project limits.

Pine Creek is the only waterway within the hydrologic study area, which flows in a northwest direction beneath State Route (SR) 242, Market Street, and Willow Pass Road in a U-shaped concrete channel. Approximately 0.1 mile downstream, outside of the project limits, the creek is in

a natural, unlined channel. The project is located within the Pine Creek watershed. Walnut Creek crosses SR 242 approximately 150 feet south of the project limits, but is not near the proposed improvements.

Floodplains

Floodplains were defined using a FEMA FIRM, which categorize these floodplains into different Special Flood Hazard Areas:

- Zone AE. Floodplains identified as Zone AE represent areas with a one percent annual chance of flooding, where Base Flood Elevations (BFEs) have been determined.[1]
- Zone A. Floodplains identified as Zone A represent areas with a one percent annual chance of flood inundation, where no BFEs have been determined.
- Zone AO. Floodplains identified as Zone AO represent areas within the one percent annual chance of flood inundation, with an average depth ranging from 1 foot to 3 feet.
- Zone AH. Floodplains identified as Zone AH represent areas within the one percent annual chance of flood inundation, with flood depths of 1 to 3 feet and BFEs determined.
- Zone X. Unshaded Zone X indicates minimal risk area outside the 1% and 0.2% annual chance rainfall. No BFEs are shown in these zones.

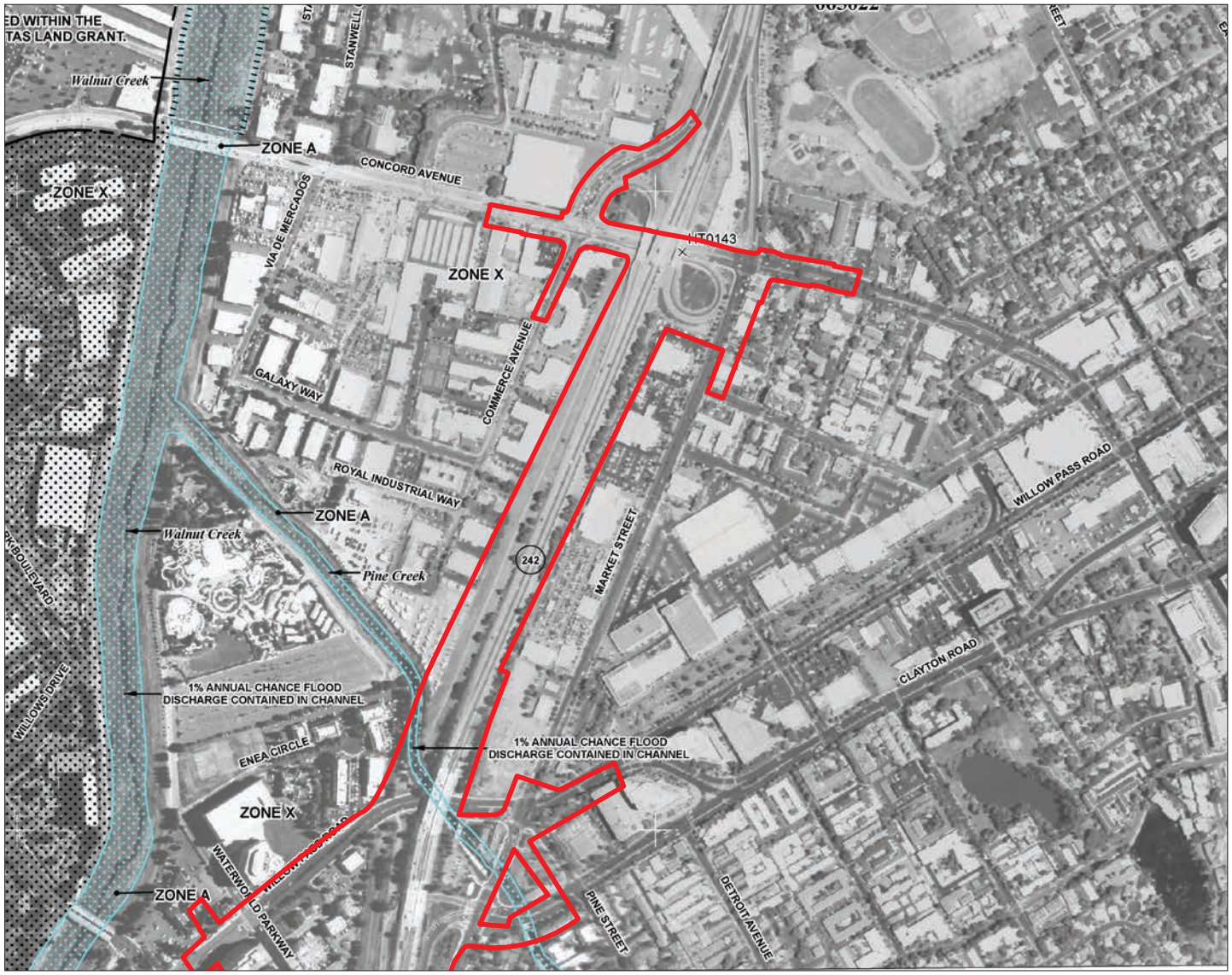
According to the FIRM, the project is located in Zone A and Unshaded Zone X. The Pine Creek channel is the only area within the project limits that is identified as floodplain (Zone A). The maps indicate that storm water flow is contained in the channel, and that SR 242 and surrounding local roadways would not be inundated during a 100-year flood event. No part of the Walnut Creek floodplain is within the project limits. **Figures 2.2-1** and **2.2-2** include the maps identifying the FEMA floodplains within the study area.

Natural and Beneficial Floodplain Values

Beneficial floodplain values include habitat for fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and ground water recharge. Pine Creek has natural and beneficial values that include:

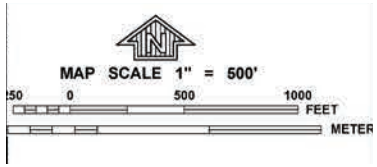
- Cold Freshwater Habitat
- Fish Migration
- Preservation of Rare and Endangered Species

[1] Base flood is the regulatory standard for a flood having a one percent chance of being equaled or exceeded in a given year. The BFE is the computed elevation to which floodwater is anticipated to rise during the base flood. The BFE is the regulatory requirement for the elevation or floodproofing of structures.



Legend

- Project Limits
- 100-Year Floodplain



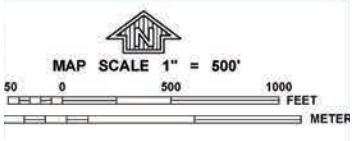
Floodplain Map - Northern Study Area

Figure **2.2-1**

Source: Caltrans, 2014a

Legend

- Project Limits
- 100-Year Floodplain



Floodplain Map - Southern Study Area

Figure **2.2-2**

Source: Caltrans, 2014a

- Water Contact Recreation
- Non-Contact Water Recreation
- Fish Spawning
- Warm Freshwater Habitat
- Wildlife Habitat

However, as noted in **Section 2.3, Biological Environment**, no sensitive natural communities, wetlands, or special status plant or animal species were found within the study area including the portion of Pine Creek within the project limits.

Tsunamis

A tsunami is a series of waves generated in a body of water by a rapid disturbance that vertically displaces the water. These changes can be caused by an underwater fault rupture (that generates an earthquake) or underwater landslides (typically triggered by earthquakes). Based upon the tsunami inundation map for Contra Costa County, the project limits are not located in a tsunami inundation area.[2]

ENVIRONMENTAL CONSEQUENCES

A "significant encroachment" as defined in 23 CFR 650.105 is a highway encroachment and any direct support of likely base floodplain development that would involve one or more of the following construction or flood-related impacts:

- A significant risk (to life or property)
- A significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or provides a community's only evacuation route
- A significant adverse impact on natural and beneficial floodplain values

The hydrologic study area encompasses permanent and temporary improvements associated with both Build Alternatives. Since Build Alternatives 1 and 2 are very similar in terms of flood risk and potential floodplain encroachment, effects discussed in this section apply to both of the Build Alternatives.

[2] California Department of Conservation, 2009. Tsunami Inundation Map for Emergency Planning – State of California – County of Contra Costa, Benicia Quadrangle. Available online at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/ContraCosta/Documents/Tsunami_Inundation_Benicia_Quad_ContraCosta.pdf; last Accessed: April 20, 2015.

Build Alternatives 1 and 2

Floodplain Encroachment and Risk of Action

Longitudinal Encroachment

As defined by the FHWA, a longitudinal encroachment is an action within the limits of the base floodplain that is parallel to the direction of the flow. No longitudinal encroachments have been identified as part of the Build Alternatives.

Risk of Action

Flood risks would involve: 1) change in land use, 2) fill inside the floodplain, or 3) change in the 100-year water surface elevation. The project is not proposing any change in land use. Both Build Alternatives 1 and 2 are proposing clear span bridge structures (i.e., SR 242 on- and off-ramps) over Pine Creek that would not place structures within the waterway. Therefore, the Build Alternatives would not result in any fill inside the floodplain or changes in the 100-year water surface elevation.

Both Build Alternatives 1 and 2 are proposing ramps and roadway improvements that would increase the total impervious surface within the watershed area, as shown in **Table 2.2-1**. Under either Build Alternative, the increase in impervious surface area represents approximately 0.02 percent of the total watershed area. Therefore, the potential flood risks as a result of the Build Alternatives are low.

Table 2.2-1 Added Impervious Surface Area to the Pine Creek Watershed

	Watershed Area (square mile)	Added Impervious Area (square mile)	Percent of Total Watershed (%)
Build Alternative 1	29.1	0.0071	0.024
Build Alternative 2	29.1	0.0063	0.022

Floodplain Development

As defined by the FHWA, the support of incompatible floodplain development would encourage, allow, serve, or otherwise facilitate incompatible base floodplain development, such as commercial development or urban growth. The proposed improvements would not occur within any floodplain and do not propose any incompatible floodplain development.

The Build Alternatives represent planned and programmed transportation improvements intended to accommodate the development identified and planned for in the local jurisdiction's General Plan. The project would not directly induce growth as it does not propose commercial or residential development, nor does it propose any changes to designated land use categories or zoning. The

Build Alternatives would support identified growth anticipated by Concord, but would not encourage floodplain development. The 100-year flood event water surface elevation for Pine Creek is below SR 242 and the surrounding local roadways within the project limits. All of the project improvements (Build Alternatives 1 and 2) would also be above the 100-year flood event. As such, a future 100-year flood event, with or without the project, would not result in the interruption or termination of a transportation facility that is needed for emergency vehicles or provides a community's only flood evacuation route.

Natural and Beneficial Floodplain Values

As previously discussed, natural and beneficial floodplain values for Pine Creek include wildlife and plant habitat, natural moderation of floods, water quality maintenance, and groundwater discharge. However, as noted in **Section 2.3, Biological Environment**, no sensitive natural communities, wetlands, or special status plant or animal species were found within the biological study area. All bridges for the Build Alternatives would clear span Pine Creek, thus avoiding direct effects to the creek and associated floodplain. No adverse effects on the natural and beneficial floodplain values of Pine Creek are anticipated as a result of the Build Alternatives.

Summary

As the proposed improvements would generally maintain the existing roadway profile of SR 242, the Build Alternatives' effects to floodplains would be negligible with regard to storm water runoff and changes in the 100-year water surface elevations. The Build Alternatives would not encourage floodplain development in the surrounding areas. Therefore, no significant floodplain encroachment would occur under the Build Alternatives.

No-Build Alternative

The No-Build Alternative assumes that SR 242 would remain in its existing condition and no further action of improvements would occur. Under this alternative, the existing roadways would remain unchanged. The No-Build Alternative would therefore not affect the hydrology or result in incompatible floodplain development.

AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The potential flood risk as a result of the Build Alternatives is anticipated to be low. As such, no avoidance, minimization, or mitigation measures are proposed related to flooding hazards.

CUMULATIVE IMPACTS

The cumulative setting for hydrology and floodplains includes water resources and floodplains that intersect the project limits. Based on a review of the foreseeable projects, with implementation of State and local regulations, such projects would not result in an adverse effect to hydrology. Thus, anticipated development in combination with the Build Alternatives would not result in a cumulative effect to hydrology and floodplains.

2.2.2 WATER QUALITY AND STORM WATER RUNOFF

REGULATORY SETTING

Federal Requirements: Clean Water Act

In 1972, Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (U.S.) from any point source[3] unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. This act and its amendments are known today as the Clean Water Act (CWA). Congress has amended the act several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/construction point sources to comply with the NPDES permit scheme. The following are important CWA sections:

- Sections 303 and 304 require states to issue water quality standards, criteria, and guidelines.
- Section 401 requires an applicant for a federal license or permit to conduct any activity that may result in a discharge to waters of the U.S. to obtain certification from the State that the discharge will comply with other provisions of the act. This is most frequently required in tandem with a Section 404 permit request (see below).
- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. Regional Water Quality Control Boards (RWQCB) administer this permitting program in California. Section 402(p) requires permits for discharges of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).
- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the United States. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

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

The USACE issues two types of 404 permits: General and Standard permits. There are two types of General permits: Regional permits and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to allow a variety of minor project activities with no more than minimal effects.

Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of the USACE's Standard permits. There are two types of Standard permits: Individual permits and Letters of Permission. For Standard permits, the USACE decision to approve is based on

[3] A point source is any discrete conveyance such as a pipe or a man-made ditch.

compliance with U.S. Environmental Protection Agency's Section 404 (b)(1) Guidelines (U.S. EPA CFR 40 Part 230), and whether the permit approval is in the public interest. The Section 404(b)(1) Guidelines (Guidelines) were developed by the U.S. EPA in conjunction with the USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The Guidelines state that the USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA) to the proposed discharge that would have lesser effects on waters of the U.S. and not have any other significant adverse environmental consequences. According to the Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent[4] standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition, every permit from the USACE, even if not subject to the Section 404(b)(1) Guidelines, must meet general requirements. See 33 CFR 320.4. A discussion of the LEDPA determination, if any, for the document is included in the Wetlands and Other Waters section.

State Requirements: 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 CWA 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. Additionally, it prohibits discharges of "waste" as defined, and this definition is broader than the CWA definition of "pollutant." Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA and regulating discharges to ensure compliance with the water quality standards. Details about water quality standards in a project area are included in the applicable RWQCB 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. As a result, the water quality standards developed for particular water segments are based on the designated use and vary depending on that use. In addition, the SWRCB identifies waters failing to meet standards for specific pollutants. These waters are then State-listed in accordance with CWA 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 (NPDES permits or WDRs), the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

[4] The U.S. EPA defines "effluent" as "wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall."

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB administers water rights, sets water pollution control policy, and issues water board orders on matters of statewide application, and oversees water quality functions throughout the State by approving Basin Plans, TMDLs, and NPDES permits. RWCQBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

National Pollutant Discharge Elimination System Program

Municipal Separate Storm Sewer Systems (MS4)

The Department's MS4 Permit, Order No. 2012-0011-DWQ (adopted on September 19, 2012 and effective on July 1, 2013), as amended by Order No. 2014-0077-DWQ (effective July 1, 2014) and Order No. 2015-0036-EXEC (effective April 7, 2015) has three basic requirements:

1. The Department must comply with the requirements of the Construction General Permit (see below);
2. The Department must implement a year-round program in all parts of the State to effectively control storm water and non-storm water discharges; and
3. The Department storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) Best Management Practices (BMPs), to the maximum extent practicable, and other measures as the SWRCB determines to be necessary to meet the water quality standards.

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

Construction General Permit

Construction General Permit, Order No. 2009-2009-DWQ (adopted on September 2, 2009 and effective on July 1, 2010), as amended by Order No. 2010-0014-DWQ (effective February 14, 2011) and Order No. 2012-0006-DWQ (effective on July 17, 2012). The permit regulates storm water discharges from construction sites that result in a Disturbed Soil Area (DSA) of one acre or greater, and/or are smaller sites that are part of a larger common plan of development. By law, all storm water discharges associated with construction activity where clearing, grading, and excavation result in soil disturbance of at least one acre must comply with the provisions of the General Construction Permit. Construction activity that results in soil disturbances of less than one acre is subject to this Construction General Permit if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop Storm Water Pollution Prevention Plans (SWPPPs); to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the Construction General Permit.

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

Section 401 Permitting

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the United States must obtain a 401 Certification, which certifies that the project will be in compliance with state water quality standards. The most common federal permits triggering 401 Certification are CWA Section 404 permits issued by the USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before the USACE issues a 404 permit.

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

AFFECTED ENVIRONMENT

Information in this section is based on Water Quality Assessment Report (Caltrans, 2014d) approved in September 2014. The analysis focuses on potential adverse effects to the water quality within the hydrologic study area (i.e., Pine Creek watershed), as defined in **Section 2.2.1, Hydrology and Floodplain**.

Regional Hydrology

The project limits are within the San Francisco Bay RWQCB jurisdiction, and cross two hydrologic sub-areas, as summarized in **Table 2.2-2.**

Table 2.2-2 Hydrologic Units within the Project Limits

Post Mile	Watershed	Sub-watershed	Hydrologic Unit Code	Planning Watershed
R0.1/R1.33	Walnut Creek-Frontal Suisun Bay Estuaries	Pine Creek	180500010203	2207310104
R1.34/R1.9	Walnut Creek-Frontal Suisun Bay Estuaries	Walnut Creek	180500010204	2207310104

Groundwater Resources

The project limits overlie the Ygnacio Valley (Basin ID 2-6) groundwater basin. There are no beneficial uses identified for the Ygnacio Valley groundwater basin (i.e., drinking water supply, biological significance, etc.). Ambient groundwater levels near the project limits range from about 21 to 23 feet above mean sea level (msl) and the depth of groundwater ranges from about 12 to 21 feet below ground surface. Based on the regional topography, hydrography, and reported groundwater levels, groundwater likely flows west and northwest across the hydrology study area.

Surface Water Resources

Pine Creek is the only waterway within the hydrologic study area. Pine Creek flows northwesterly through the project limits within a concrete U-shaped channel that crosses under SR 242, Willow Pass Road, and Market Street. Walnut Creek crosses SR 242 near the I-680/SR 242 interchange, approximately 150 feet south of the project limits. The confluence of Walnut Creek and Pine Creek is about 0.55 mile downstream (northwest) of SR 242, outside of the study area.

As previously discussed in **Section 2.2.1, Hydrology and Floodplain,** Pine Creek has natural and beneficial values which include:

- Cold Freshwater Habitat
- Fish Migration
- Preservation of Rare and Endangered Species
- Water Contact Recreation

- Non-Contact Water Recreation
- Fish Spawning
- Warm Freshwater Habitat
- Wildlife Habitat

Pine Creek and Walnut Creek are receiving water bodies listed as impaired for diazinon, an insecticide, on the 2012 Integrated Report. Diazinon is commonly found in chemicals used for landscaping and is released into water bodies as runoff from the irrigation of lawns and landscape area in developed neighborhoods. Caltrans does not use diazinon within state right-of-way. The Integrated Report describes water bodies that are included on the CWA Section 303(d) list. CWA Section 303(d) requires states to identify waters that do not meet applicable water quality standards. The potential source for diazinon is identified as urban runoff and storm sewers. The TMDL for diazinon for waterways draining to the San Francisco Bay was approved in May 2007, which specifies allowable diazanon pollutant loads from point and non-point sources.

ENVIRONMENTAL CONSEQUENCES

Permanent impacts to water quality result from the addition of impervious area. This additional impervious area prevents runoff from naturally dispersing and infiltrating into the ground, resulting in increased concentrated flow. The additional flow has the potential to transport an increased amount of sediment and pollutants to waterways and water resources, plus create increased erosion resulting from increases in velocity and volume from storm water runoff.

The existing, added, and reworked impervious area values for each alternative are shown in **Table 2.2-3**. The amount of added and reworked impervious area is similar for each Build Alternative. As a result, the water quality effect of each Build Alternative is expected to be the same.

Table 2.2-3 Estimated Impervious Area Values

Alternative	Impervious Area	Total (acres)
Build Alternative 1	Existing	35.60
	Added	4.88
	Reworked	2.41
	Total Added Plus Reworked (Build Alternative 1)	***7.29***
Build Alternative 2	Existing	35.56
	Added	4.38
	Reworked	2.82
	Total Added Plus Reworked (Build Alternative 2)	***7.20***

Build Alternatives 1 and 2

Effects to Receiving Waters

The Build Alternatives would result in an increase of impervious area that could potentially increase the volume and velocity of storm water flow to downstream receiving water bodies. In addition, pollutant loading could also be increased.

While the Build Alternatives do not propose work within Pine Creek, the added impervious area created by the project may result in minimal impacts to the existing hydrograph (creek flow versus time), including minimal increases in low flow and peak flow velocity and volume to Pine Creek and Walnut Creek. Changes to the existing hydrograph are called hydromodification. Increased flow can cause increased creek bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding. However, because Pine Creek is concrete-lined within the hydrologic study area, the creek is at low risk for hydromodification. Approximately 0.1 mile downstream of the project limits, Pine Creek converts from a concrete-lined channel to riprap lined with moderate to dense vegetation. This area is also considered to be at low risk for hydromodification.

Concord's storm drain system eventually drains into Walnut Creek. The added impervious surface area as a result of the Build Alternatives would represent approximately 0.006 percent of the Walnut Creek watershed area. This minor increase relative to the overall watershed area results in a low risk for hydromodification as a result of the Build Alternatives for Walnut Creek.

Existing drainage systems at the edge of shoulders or on local streets may need to be relocated. New drainage systems may be required to capture drainage from the Build Alternatives. No changes to creek characteristics at the crossing and upstream and downstream of the crossing are expected.

The increased impervious area resulting from the Build Alternatives would also increase the amount of runoff that doesn't infiltrate into the ground or disperse over unpaved surfaces. This runoff would result in the direct discharge of sediment-laden flow from the roadway to receiving water bodies. However, the additional impervious area is insignificant relative to the 29.1 square miles of the Pine Creek watershed.

The additional impervious area (e.g. roadways) created by the Build Alternatives would allow for an increased area for deposition of sediment and other pollutants from vehicular traffic. Generally, highway storm water runoff has the following pollutants: total suspended solids, nitrate nitrogen, total nitrogen, phosphorus, ortho-phosphate, copper, lead, and zinc. The pollutants are dispersed from tree leaves, combustion products from fossil fuels, and the wearing of brake pads and tires.

Effects to Groundwater

The increased impervious area resulting from the Build Alternatives would reduce the available unpaved area that allows runoff to infiltrate into the soils. The reduction of runoff infiltrating through soils has the potential to result in loss in volume or amount of water that previously

recharged localized aquifers and reduce regional groundwater volumes. The reduction in local aquifer and groundwater recharge also has the potential to impact the beneficial uses of groundwater basins.

The Ygnacio Valley groundwater basin covers 15,900 acres. The additional impervious area created by the Build Alternatives would affect 0.03 percent (4.8 acres) of the groundwater basin which would have a negligible effect on groundwater recharge.

Temporary Construction Impacts

Effects to Receiving Waters

During construction, potential water quality impacts include sediment-laden discharge from DSAs and pollutant-laden discharge from storage or work areas. The Build Alternatives would have the potential for temporary water quality impacts due to grading and excavation activities, which could cause increased erosion. Additional sources of sediment that could result in increases in turbidity include uncovered or improperly covered active and non-active stockpiles, unstabilized slopes, construction staging areas, and construction equipment not properly maintained or cleaned.

Storm water runoff from within the project limits may transport pollutants to nearby receiving waters and storm drains if BMPs are not properly implemented. Generally, as the DSAs increase, the potential for temporary water quality impacts also increases. The estimated DSA for each alternative is shown in **Table 2.2-4**.

Table 2.2-4 Disturbed Soil

Build Alternative	Disturbed Soil Area (acres)
Alternative 1	16.95
Alternative 2	14.34

Fueling or maintenance of construction vehicles would occur within the project limits during construction, so there would be a risk of accidental spills or releases of fuels, oils, or other potentially toxic materials. An accidental release of these materials could pose a threat to water quality if contaminants enter storm drains, open channels, or surface water receiving bodies (i.e., Pine Creek and Walnut Creek). The magnitude of the impact from an accidental release depends on the amount and type of material spilled.

Effects to Groundwater

Groundwater conditions will be verified during the final design phase, but is expected to be encountered at approximately 12 to 21 feet below ground surface. Cast-in-drilled-hole concrete pile foundations are proposed for ramp structures immediately adjacent to Pine Creek to minimize impacts to the existing concrete channel walls during construction. Foundation excavation for these ramp structures would require work up to 25 feet below ground surface. As such, the foundations for the new ramp structures that cross Pine Creek are expected to encounter the

groundwater table, and will require localized dewatering in the excavation areas (the removal of water from the subsurface prior to construction work). No dewatering of Pine Creek would be needed. Construction activities that intrude into the groundwater table and/or require dewatering could introduce loose soils and pollutants, resulting in increased sedimentation and adverse effects to groundwater quality.

No-Build Alternative

The No-Build Alternative assumes that SR 242 would remain in its existing condition and no further action of improvements would occur. Under this alternative, the existing route would remain unchanged. The No-Build Alternative would therefore not affect the water quality or storm water runoff within the project limits.

AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Construction activities and operation of the roadway improvements would be regulated under the applicable Caltrans NPDES permits and SWMP. The features to address adverse effects to water quality are a condition of Caltrans NPDES permit, Construction General Permit, and other regulatory agency requirements. The Notice of Intent (NOI) and SWPPP will be submitted prior to construction. The project would not require a Section 401or a 404 permit.

Design features or BMPs would be developed and incorporated into the selected Build Alternative during the final design phase. Conceptual design of the storm water treatment areas for the Build Alternatives is complete, as described in **Chapter 1.0, Proposed Project**. The measures below outline the temporary and permanent BMPs to be implemented, at a minimum, but also incorporate project-specific requirements for the protection of the natural values of the waterways.

To eliminate run-off of sediment from the proposed work area during and after construction, the Caltrans Storm Water Quality Handbooks – Project Planning and Design Guidelines would be used to determine the BMPs that are appropriate to install. The potential for adverse effects to water quality will be avoided by implementing temporary and permanent BMPs outlined in Section 13-1.01 of the Caltrans Standard Specifications. The Caltrans erosion control BMPs will be used to minimize any wind or water-related erosion.

Measure WQ-1: Temporary Construction BMPs

Pursuant to the Construction General Permit, a SWPPP would be developed for the project and would comply with the Caltrans SWMP, which includes guidance for Design staff to incorporate special provisions into construction contracts to include measures to protect sensitive areas and to prevent and minimize storm water and non-storm water discharges.

The SWPPP would reference the Caltrans Construction Site BMPs Manual. This manual is comprehensive and includes many other protective measures and guidance to prevent and minimize pollutant discharges. **Table 2.2-5** outlines temporary BMPs to be implemented, at a minimum. Further evaluation of the BMPs necessary for the project to comply with the permits and other regulatory agency requirements would be detailed prior to construction.

Per standard practices, and to be identified in the project's contract specifications, dewatered water would be discharged into Pine Creek after utilizing a temporary active treatment system and testing to ensure compliance with the applicable water quality standards.

Table 2.2-5 Temporary BMPs

Temporary BMP	Purpose
Soil Stabilization	
Move-In/Move-Out	Mobilization locations where permanent erosion control or re-vegetation to sustain slopes is required within the projects limits.
Temporary Cover	Plastic covers for stockpiles
Temporary Fence (Type ESA)	High visibility fence to designate areas off-limits to the contractor
Sediment Control	
Temporary Fiber Rolls	Degradable fibers rolled tightly and placed on the toe and face of slopes to intercept runoff
Temporary Silt Fence	Linear, permeable fabric barriers to intercept sediment-laden sheet flow. Placed downslope of exposed soil areas, along channels and project perimeter.
Temporary Gravel Bag Berm	Single row of gravel bags installed end to end to form a barrier across a slope to intercept runoff. Can be used to divert or detain moderately concentrated flows.
Temporary Check Dams	Small constructed device of rock or other product placed across a channel or ditch to reduce flow velocity.
Temporary Drainage Inlet Protection	Runoff detainment devices used at storm drain inlets that is subject to runoff from construction activities
Hydraulic Mulch (Bonded Fiber Matrix)	Consists of applying a water-based mixture of wood or paper fiber and stabilizing emulsion with hydro-mulching equipment. This will protect disturbed soil from erosion by raindrop impact or wind.
Tracking Control	
Temporary construction entrances/exits	Points of entrance/exit to a construction site that are stabilized to reduce the tracking of mud and dirt onto public roads.
Street Sweeping	Removal of tracked sediment to prevent them entering a storm drain or watercourse.
Waste Management and Materials Pollution Control	
Temporary Concrete Washout Facilities	Specified vehicle washing areas to contain concrete waste materials.

Temporary BMP	Purpose
All other anticipated waste management and materials pollution control measures are covered under Job Site Management.	
General measures covered under job site management includes: • spill prevention and control • materials management • stockpile management • waste management • hazardous waste management • contaminated soil • concrete waste • sanitary and septic waste and liquid waste • Miscellaneous job site management includes: • training of employees and subcontractors • proper selection, deployment and repair of construction site BMPs	**Non-storm water management consists of:** • water control and conservation • illegal connection and discharge detection and reporting • vehicle and equipment cleaning - No discharge of pollutants are allowed into the storm drain or watercourses • vehicle and equipment fueling and maintenance – must be at least 50 feet away from water courses • material and equipment used over water • structure removal over or adjacent to water • paving, sealing, saw cutting and grinding operations • thermoplastic striping and pavement markers • concrete curing and concrete finishing - concrete wastes is collected and disposed of and not allowed into watercourses.

Permanent BMPs

The design features to address water quality impacts are a condition of Caltrans' NPDES permit and other regulatory agency requirements. Implementation of details for these design features or BMPs would be developed and incorporated into the selected Build Alternative design prior to project construction.

Measure WQ-2: Design Pollution Prevention BMPs

The drainage and landscape elements listed below can be utilized as design pollution prevention BMPs for the project, as specified by the Design Engineer. The following elements would be considered during the final design phase:

- Consideration of downstream effects related to potentially increased flow: Necessary erosion control would be applied to unlined ditches to minimize erosion downstream from potentially increased discharge.
- Preservation of existing vegetation: Preserving existing vegetation is beneficial. Avoid any disturbance beyond what will be necessary to widen the existing transportation facilities.
- Concentrated flow conveyance systems: If necessary, flow attenuating devices would be implemented (e.g., flared-end-section, outlet protection/velocity dissipation devices).

- Slope/Surface Protection Systems: Necessary erosion control features would be incorporated for work along steep grades. When practicable, slope stability and erosion concerns would be reduced by maintaining or matching existing slopes.

- Hydromodification: In order to manage hydromodification, volume-reduction elements may be proposed during the design phase to match, or closely match, the pre- and post-construction hydrographs. Measures to address hydromodification impacts can include structural measures, such as underground detention, and non-structural measures, through the modification of proposed treatment BMPs (see Measure WQ-3). The proposed measures must be designed to show that storm water runoff discharge rates and durations match the pre-project conditions within a certain percentage of the peak flow rates during storm events.

The Pine Creek crossing along the project limits was determined to have a "low risk" for hydromodification. Measures to address hydromodification should be considered at all the receiving waters. If hydromodification measures are difficult to implement, then an exemption may be granted, at the discretion of the RWQCB. A complete hydromodification susceptibility assessment and negotiation with the RWQCB will be conducted during the final design phase.

Measure WQ-3: Treatment BMPs

Typical permanent treatment BMPs may include infiltration devices, such as vegetated basins and/or swales along the roadways that collect storm water runoff. The basins allow pollutants to settle and filter out prior to the storm water entering the drainage systems. Caltrans has an approved list of treatment BMPs that have been studied and verified to remove targeted design constituents and provide general pollutant removal. In addition, the San Francisco Bay RWQCB suggests the use of both infiltration and retention devices for pollutant removal or reduction while promoting the effort to mimic predevelopment hydrology by reducing flow rates and velocity and allowing for groundwater recharge. Although retention devices are not currently approved Caltrans BMP devices, the feasibility and determination of preferred treatment BMP type would be coordinated during the final design phase to ensure both Caltrans and regional requirements are met.

CUMULATIVE IMPACTS

In the cumulative setting, water quality and storm water runoff includes surface water and groundwater resources within which the project is located. Anticipated land development and transportation improvements in the region, including the Build Alternatives, would contribute to an increase in impervious surface. However, the project is located in an urban area that has been predominantly built-out, meaning that areas for future development are limited primarily to in-fill or redevelopment of existing land uses. This urban condition would lead to minimal added impervious surface. Any additional impervious area has the potential to result in higher peak flows, which could increase the quantity and velocity of storm water runoff and reduce groundwater recharge. As previously discussed, the Build Alternatives would only increase the impervious surface of the watershed by 0.02 percent and the groundwater basin by 0.03 percent.

All future and planned projects in the region would be required to comply with the requirements of the SWRCB C.3 regulations and coordinate with City and County construction and flooding regulations. The SWRCB regulations require the incorporation of post-construction storm water controls, which include measures to reduce storm water pollutants, or otherwise minimize the change in rate and flow of storm water runoff. Each project would convey its storm water runoff via different drainage systems, which would be required to have adequate capacity for any increased runoff. The project would not violate any water quality standards, deplete groundwater supplies, alter drainage patterns, or create capacity exceeding runoff through the implementation of standard long-term pollution prevention and control measures to be incorporated into the final design (see **Measures WQ-1** through **WQ-3**). Based on a review of the foreseeable projects, with implementation of State and local regulations, such projects would not result in an adverse effect to water quality. Thus, anticipated development in combination with the Build Alternatives would not result in a cumulative effect to water quality.

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 (CEQA).

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 Department projects. Structures are designed using the Department's Seismic Design Criteria (SDC).[5] The SDC provides the minimum seismic requirements for highway bridges designed in California. A bridge's category and classification will determine its seismic performance level and which methods are used for estimating the seismic demands and structural capabilities. For more information, please see the Department's Division of Engineering Services, Office of Earthquake Engineering, SDC.

AFFECTED ENVIRONMENT

Information in this section is based on the Preliminary Geological Assessment (Caltrans, 2014c) approved in August 2014. The geologic study area encompasses all areas that fall within the physical footprint of the proposed improvements (i.e., the Build Alternatives) and areas that may either be directly or indirectly affected by project-related construction activities. Because of the similarities in the location of proposed improvements, the geologic study area boundaries

[5] Caltrans Seismic Design Criteria (June 3, 2013). Available online at: http://www.dot.ca.gov/hq/esc/techpubs/manual/othermanual/other-engin-manual/seismic-design-criteria/sdc.html. Last accessed: May 26, 2016.

encompass the largest footprint of both proposed Build Alternatives; the Build Alternatives do not have different geologic boundaries. The geologic study area includes various geologic features such as topography, hydrogeology, subsurface soils, geologic hazards, and seismic hazards.

Topography and Hydrogeology

The project region is within the Coast Ranges Geomorphic Province of northern California, characterized by northwest trending folds and intervening valley; and faults associated with the San Andreas Fault Zone. The geologic study area, located in the Diablo Valley, is relatively flat with elevations ranging from 35 to 45 feet above msl.

Pine Creek is the only waterway within the geologic study area, which flows in a northwestern direction from near the intersection of Market Street/Clayton Road and beneath SR 242 and Willow Pass Road at the Willow Pass Road undercrossing. Pine Creek discharges into Walnut Creek approximately 0.3-miles to the west of the geologic study area. Walnut Creek ultimately discharges into the Suisun Bay roughly 4.5 miles northwest of the geologic study area.

This region experiences a Mediterranean climate, characterized by wet winters and dry summers. The Concord receives an average annual rainfall of roughly 18 inches. Based on review of recent groundwater data located near the geologic study area, groundwater elevations near the study area range from 21 to 23 feet above msl, and the depth to groundwater ranges from 12 to 21 feet below ground surface. Regional topography, hydrogeology and observed groundwater levels indicate that groundwater likely flows west and northwest across the geologic study area. See to **Section 2.2.1, Hydrology and Floodplain**, and **Section 2.2.2, Water Quality and Storm Water Runoff**, for detailed information about the hydrology throughout the geologic study area.

Geology and Subsurface Conditions

The geologic study area is predominantly underlain by Holocene and Pleistocene alluvium, with localized Late Holocene mud deposits along the edge of Pine Creek. No natural landmarks or other examples of major geologic features (such as scenic rock outcroppings) occur within the geologic study area. The soils encountered within the geologic study area can be grouped into seven soil categories, summarized in **Table 2.2-6** and illustrated in **Figure 2.2-3**. Of the seven different soil categories, clay and loam are primarily the major soil components mapped within the geologic study area.

Geologic Hazards

Geologic hazards include soil erosion, subsidence, expansive soils, and corrosive soils.

Soil Erosion

Erosion is the detachment and movement of soil material by natural processes, such as wind and water. Erosion from rain and storm water runoff is the dominant natural erosion process in the geologic study area. During a rain event, the rate of soil erosion is dependent on the slope, vegetative cover, and soil properties. Texture, structure, organic matter content, and permeability are specific soil properties that influence the rate of soil erosion.

Table 2.2-6 Soils Encountered Within Geologic Study Area

Map Unit Symbol	Map Unit Description	Study Area (acres)	Project Area (%)	Erosion Susceptibility	Expansion Potential	Corrosion Potential	
						Uncoated Steel	Uncoated Concrete
BaA	Botella clay loam, 0 to 2 percent slopes	13.3	17%	Low to Moderate	Moderate	Moderate	Low
Cc	Clear Lake clay	37.0	46%	Low to Moderate	High	High	Moderate
CeA	Conejo clay loam, 0 to 2 percent slopes	2.0	2%	Low to Moderate	Moderate	Moderate	Low
DdD	Diablo clay, 9 to 15 percent slopes	0.7	1%	Low to Moderate	High	High	Low
La	Laugenour loam	4.5	6%	High	Moderate	High	Low
RbA	Rincon clay loam, 0 to 2 percent slopes	8.2	10%	High	High	Moderate	Low
ZaA	Zamora silty clay loam, 0 to 2 percent slopes	14.8	18%	Low to Moderate	Moderate	Moderate	Low

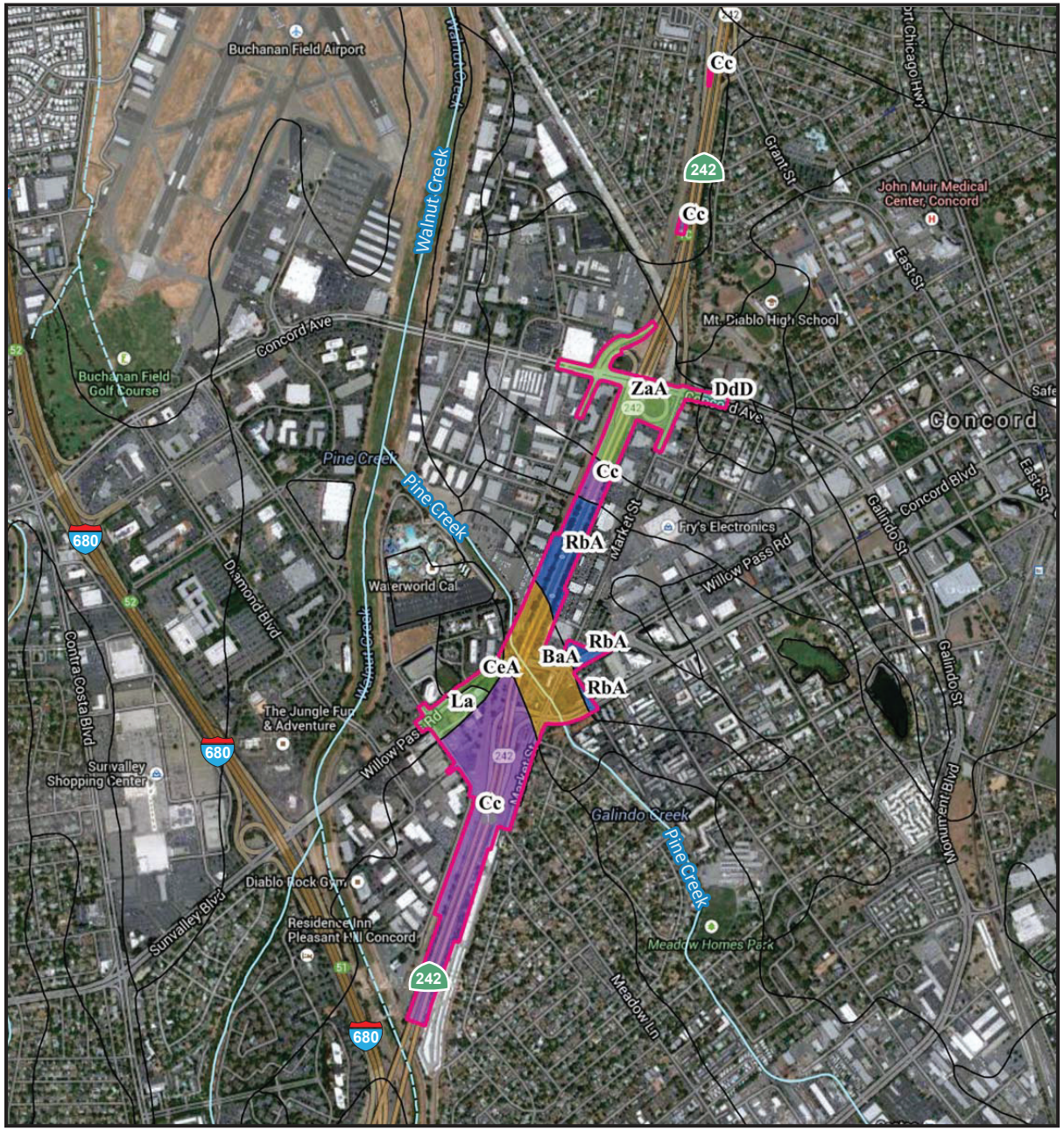
As shown in **Table 2.2-6,** roughly 16 percent of the soils within the geologic study area have properties that make them highly susceptible to water erosion. These soils are located along portions of Willow Pass Road, and about 700 to 1,700 feet north of the Willow Pass Road/SR 242 intersection. Overall susceptibility of soils to erosion can be increased by construction activities like excavation and grading, as vegetative cover is removed and/or local gradients and slope lengths are increased.

Subsidence

Subsidence is the settlement of organic soils and saturated mineral soils of low density following drainage. The soils found in the geologic study area are not expected to be susceptible to subsidence.

Expansive Soils

Expansive soils have the potential to shrink as moisture content of the soil decreases, and swell as moisture content of the soil increases. This potential for shrinking and swelling is dictated partially by the amount and type of clay minerals present and is measured by finding the percent change of the soil volume, known as "linear extensibility." **Table 2.2-6** shows that all of the soils found in the geologic study area have moderate to high expansion potential.



Legend

- Project Limits
- River/Stream
- Canal/Drainage Ditch
- Cc Clear Lake clay
- ZaA Zamora silty clay loam, 0 to 2 percent slopes
- DdD Diablo clay, 9 to 15 percent slopes
- RbA Rincon clay loam, 0 to 2 percent slopes
- BaA Botella clay loam, 0 to 2 percent slopes
- CeA Conejo clay loam, 0 to 2 percent slopes
- La Laugenour loam

N

0 1500
FEET

Soil Classification Map

Figure **2.2-3**

Source: Caltrans, 2014c

Corrosive Soils

Various properties of soil, such as moisture content, texture, acidity, electrical conductivity, and sulfate or sodium content, can cause the soil to corrode uncoated subsurface steel and concrete structures. As shown in **Table 2.2-6**, roughly 53 percent of the soils within the geologic study area have a high potential to corrode uncoated steel. Clear Lake clay comprises 46 percent of the potentially corrosive soil found within the geologic study area. None of the soils within the geologic study area have a high potential to corrode uncoated concrete.

Seismic Hazards

As identified by the California Geological Survey under the Alquist-Priolo Earthquake Fault Zoning Act, the Concord Fault, which is located within an Alquist-Priolo Earthquake Fault Zone area, crosses the northern terminus of the geologic study area just north of Concord Avenue at the Concord overhead structure, as seen in **Figure 2.2-4**. Additionally, the Los Medanos-Roe Island Fault and Clayton Fault are located 3.5 and 4.5 miles northeast of the geologic study area, respectively. Hazards associated with seismic events include surface fault rupture, seismic shaking, liquefaction, and landslides.

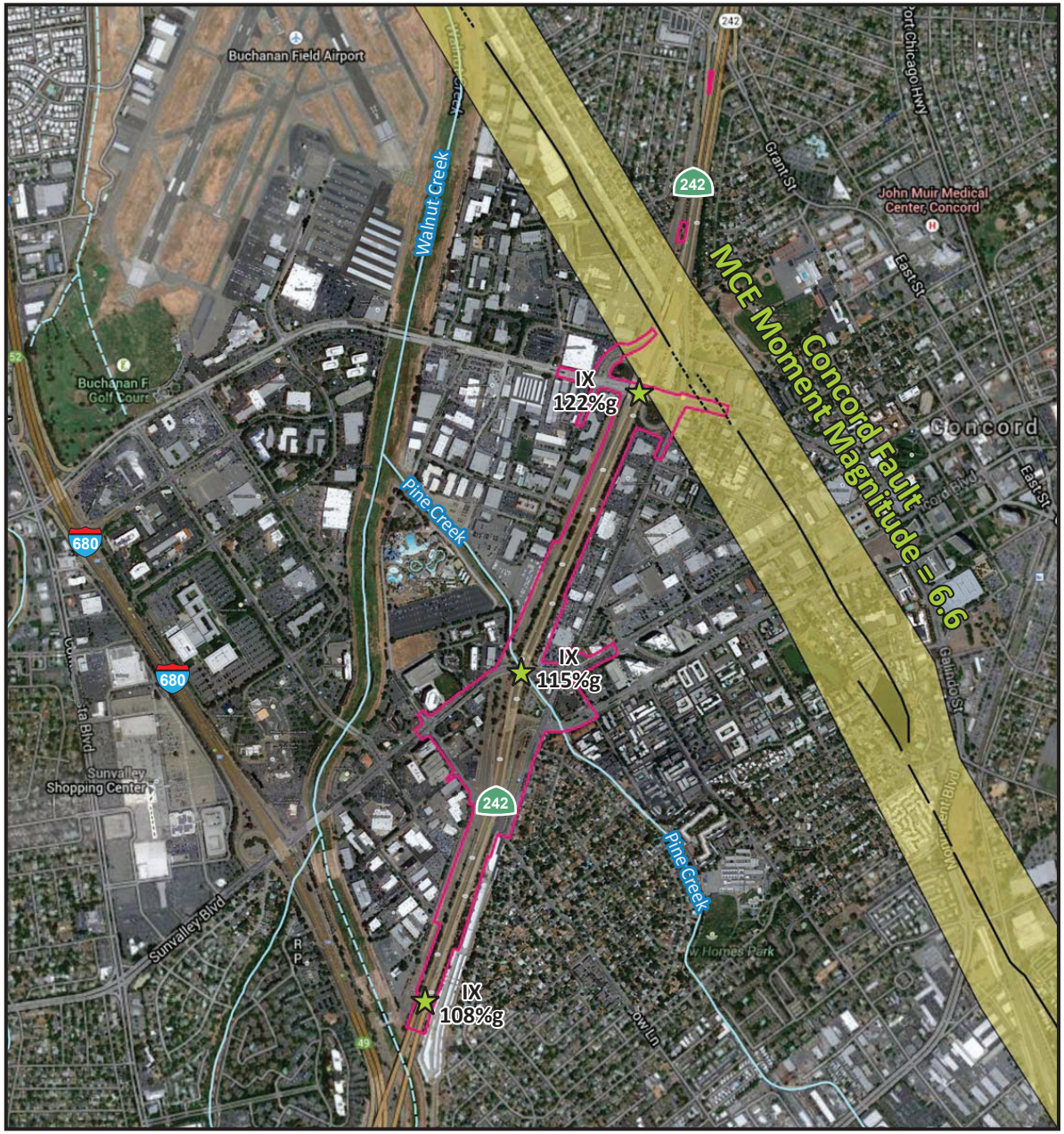
Surface Fault Rupture

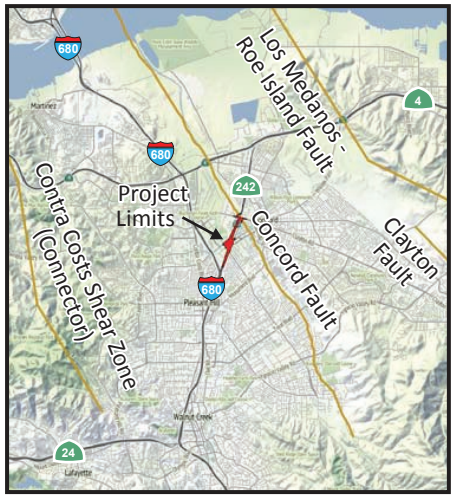
During an earthquake, surface rupture occurs when the ground surface is broken as a result of fault movement. Surface rupture is mostly found to occur along active fault traces. As noted above, the Concord Fault intersects the geologic study area near the Concord Avenue undercrossing. As a result of localized surface fault rupture, the wing wall on the south abutment of the Concord overhead has required seismic repairs multiple times within the past 15 years.

Seismic Ground Shaking

During a seismic event, all aspects of motion of the earth's surface caused by the earthquake are generally referred to as seismic ground shaking. Normally the predominant cause of damage during earthquakes, the extent of the seismic ground shaking is controlled by the magnitude and intensity of the earthquake, distance from the epicenter, and local geologic conditions. Magnitude is a measure of energy released during an earthquake and is found using seismographs that measure the amplitude of seismic waves. Intensity, a more subjective measure of an earthquake's perceptible effects, is most commonly assessed through the Modified Mercalli Intensity scale (MMI).

The MMI values range from I to XII as an earthquake increases in intensity. Another approach to quantifying intensity is the use of strong motion seismographs to record the peak ground acceleration (PGA) in terms of percent of acceleration force of gravity (%g). The measured PGA increases with the intensity of the seismic event. Descriptions of ground motion intensity at various MMI and PGA levels are listed below in **Table 2.2-7**.





Legend

- Project Limits
- Alquist-Priolo Earthquake Fault Zone
- Accurate Fault Trace
- Approximate Fault Trace
- River/Stream
- Canal/Drainage Ditch
- Ground Shaking Estimation Point
- IX — Modified Mercali Intensity Scale Value
- 108%g — Estimated Peak Ground Acceleration

N

0 1500 FEET

Surface Fault Rupture and Ground Shaking Hazards

Figure 2.2-4

Source: Caltrans, 2014c

The largest reasonable earthquake at the Concord Fault, or the maximum credible earthquake, has a moment magnitude[6] of 6.6. An earthquake of 6.6 magnitude from the Concord Fault would likely cause PGA values equivalent to IX on the MMI scale, classified as violent shaking.

Table 2.2-7 Modified Mercalli Intensity Scale

MMI Scale	PGA (%g)	Perceived Shaking	Description of Ground Motion Intensity
I	<0.17	None	Not felt except by a very few under especially favorable circumstances.
II	0.17-1.4	Weak	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	0.17-1.4	Weak	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of truck. Duration estimated.
IV	1.4-3.9	Light	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	3.9-9.2	Moderate	Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI	9.2-18	Strong	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII	18-34	Very Strong	Everybody runs outdoors. Damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.
VIII	34-65	Severe	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial col-lapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.
IX	65-124	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.

[6] Moment magnitude measures the total energy released from an earthquake and provides an estimate of earthquake size that is valid over the complete range of magnitudes.

MMI Scale	PGA (%g)	Perceived Shaking	Description of Ground Motion Intensity
X	>124	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.
XI	>124	Extreme	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII	>124	Extreme	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted.

Liquefaction

Liquefaction is the temporary transformation of loose, saturated, granular sediments to a fluid-like state as a result of seismic ground shaking. Liquefaction results in a loss of soil strength and often causes ground displacement. Although the California Geological Survey has created Seismic Hazard Zone Maps that show liquefaction susceptibility, the geologic study area is not yet mapped. Alternatively, the Association of Bay Area Governments (ABAG) developed maps delineating areas that are susceptible to liquefaction and likely to experience an earthquake large enough to trigger liquefaction. According to the ABAG map, soils within the geologic study area have a low to moderate susceptibility to liquefaction.[7]

Landslides

Landslides are classified as either rapid movement of large amounts of soil or imperceptibly slow movement of soils on slopes. Because the geologic study area is relatively flat, there is little to no potential for landslides.

ENVIRONMENTAL CONSEQUENCES

Because the Build Alternatives are located within the same geologic units, project effects discussed in this section apply to both of the Build Alternatives. There are no effects specific to one of the individual Build Alternatives.

No effects to natural landmarks or land forms would occur, as these resources are not located within the geologic study area.

Build Alternatives 1 and 2

Temporary Construction Impacts

Construction activities, such as grading and excavation, could potentially impact the stability of existing soils and increase the overall potential for soil erosion. Road cuts that increase natural

[7] ABAG, 2014. Liquefaction Susceptibility Map. Available online at: http://quake.abag.ca.gov/earthquakes/; Last accessed: May 6, 2014.

slopes can also increase the rate of soil erosion. During construction, erosion could cause sedimentation problems in storm drains, remove top soils, create deeply incised gullies on slopes, and undermine engineered fills beneath foundations or roadways.

Construction workers could be exposed to potential seismic hazards during construction of the proposed improvements, since the Build Alternatives are located in a seismically active region.

Permanent Operations Related Effects

The Build Alternatives are located in a geologically hazardous and seismically active region. Without proper engineering, the Build Alternatives could pose safety issues to people and structures as a result of soil erosion, expansive soils, corrosive soils, seismic shaking, and liquefaction. Seismic shaking damages could include collapse of bridges, rupturing of underground pipelines, and cracking and distortion of pavement, walls and foundations. Proposed bridge structures could increase the risk of structural damage if not properly designed.

Long-term impacts from building on soils with high erosion susceptibility could include undercutting of roadways by uncontrolled storm water runoff. As all of the soils in the geologic study area have a moderate to high potential for expansion, project structures (e.g., new pavement, retaining walls, and bridge foundations) and utilities proposed by the Build Alternatives could be impacted by seasonal shrink-swell effects.

No-Build Alternative

Under the No-Build Alternative, no changes would be made to SR 242 within the project limits. Implementation of other planned and approved projects in the project region would be subject to the same seismic and geological hazards as the Build Alternatives because they occur in the same seismically active region. The implementation of applicable regulations and design standards would ensure that the No-Build Alternative would not result in adverse effects related to seismic and geologic risks.

AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

All new or modified structures would be constructed in compliance with Caltrans seismic design standards and construction guidelines. No avoidance, minimization, or mitigation measures would be required beyond the implementation of the Caltrans standard specifications. All measures listed below are applicable to either of Build Alternatives.

As described in **Section 2.2.2, Water Quality and Storm Water Runoff**, **Measure WQ-1**, erosion control measures would be implemented during construction activities in accordance with the BMPs outlined in the SWPPP. Protective measures would reduce soil erosion and minimize impacts to water quality, including groundwater.

Measure GEO-1: As part of the final design phase, Caltrans requires preparation of the structure foundation reports and geotechnical design reports that incorporate the results of subsurface field work and laboratory testing. Site specific subsurface soil conditions, slope stabilities, and groundwater conditions within the project limits would be verified during the preparation of these

reports. The identification of the site specific soil conditions within the project limits would be used to determine the appropriate final design for the foundations that would support the project's structures. If corrosive soils are identified at locations where new subsurface facilities are proposed (e.g. bridge foundations, culverts, etc.) specially coated rebar, or alternative pipe culverts would be specified in the contract documents.

Caltrans' standard design and construction guidelines incorporate engineering standards that address seismic risks. Proposed structures, such as retaining walls and overhead ramp supports, constructed within the geologic study area, would consider seismically-induced liquefaction and settlement during the final design phase.

The final design phase would also include the evaluation of the Design Response Spectrum, which measures the ground motion or acceleration caused by the input of a vibration from an earthquake at a specific location and can help in understanding how structures would respond to earthquakes in a given place.

Measure GEO-2: With respect to worker safety during construction, OSHA requires employers to comply with hazard-specific safety and health standards. Pursuant to Section 5(a) (1) of OSHA, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. Potential seismic-related hazards to workers during construction are expected to be less than substantial with compliance with the OSHA and Caltrans standard design and construction guidelines.

CUMULATIVE ANALYSIS

Geological/seismic hazards related to future development in areas surrounding the project limits are site specific and relate to the type of building and building foundation proposed, as well as the soil composition and slope on the site. There is no additive effect of the geological/seismic hazards associated with other approved or foreseeable development and the project, and therefore no further cumulative analysis of this resource is warranted.

2.2.4 PALEONTOLOGY

REGULATORY SETTING

Paleontology is a natural science focused on the study of ancient animal and plant life as it is preserved in the geologic record as fossils. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized projects (e.g., Antiquities Act of 1906 [16 USC 431-433], Federal-Aid Highway Act of 1960 [23 USC 305]). The Antiquities Act prohibits appropriating, excavating, injuring, or destroying any object of antiquity situated on federal land without the permission of the Secretary of the Department of Government having jurisdiction over the land. Fossils are considered "objects of antiquity" by the Bureau of Land Management, the National Park Service, the Forest Service, and other federal agencies. Federal-Aid Highway Act of 1960 authorizes the appropriation and use of federal highway funds for paleontological salvage as necessary by the highway department of any

state, in compliance with the Antiquities Act above and state law. In addition, 23 United States Code (USC) 1.9(a) requires that the use of federal-aid funds must be in conformity with federal and state law.

Under California law, paleontological resources are protected by CEQA.

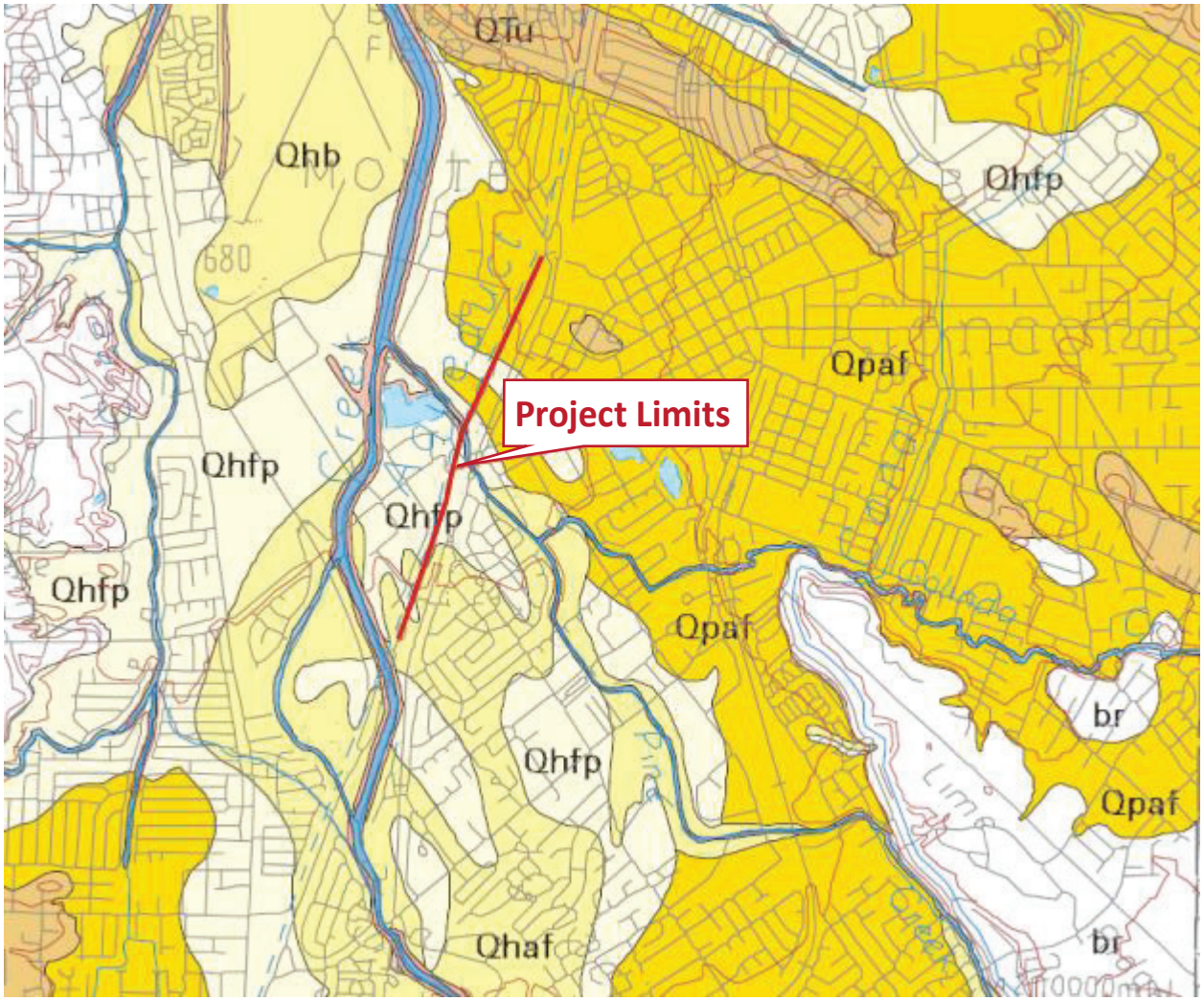
AFFECTED ENVIRONMENT

Information in this section is based on the Paleontological Evaluation Report (Caltrans, 2014b) approved in July 2014. The geologic study area, as defined in **Section 2.2.3, Geology/Soils/Seismic/Topography,** is also used as the study area for this evaluation of potential sensitivities for paleontological resources (i.e., vertebrate, invertebrate, and plant fossils). The aspects of geology relevant to this section are the types, distribution, and age of sediments immediately underlying the geologic study area and the probability of those sediments producing significant fossils during project construction.

The geologic study area is underlain by Holocene and Pleistocene alluvium with localized late Holocene mud deposits along the edge of Pine Creek. **Table 2.2-8** and **Figure 2.2-5** present a summary of the geological units within the study area, and their respective paleontological sensitivities.

Table 2.2-8 Paleontological Sensitivities of Geological Units within Project Limits

Map Symbol	Age	Formation	Lithology	Known Paleontological Resources
Qhaf Qhfp	Holocene	Holocene alluvial and flood plain deposits	Poorly consolidated, younger alluvial and flood plain deposits consisting of silt, sand, and gravel deposited in stream channels, basins, and alluvial fans.	No significant resources
Qpaf	Pleistocene	Pleistocene alluvial deposits	Poorly consolidated, older alluvial deposits consisting of silt, sand, and gravel deposited in basins and on alluvial fans. Mostly late Pleistocene in age.	Vertebrates, including mammoth, ground sloth, camel, and horse



Legend

- Project Limits
- Qhb Basin Deposits (Holocene)
- Qhfp Floodplain deposits (Holocene)
- Qhaf Alluvial Fan and Fluvial Deposits (Holocene)
- Qpaf Alluvial Fans and Fluvial Deposits (Pleistocene)
- QTu Undifferentiated Continental Gravels (Plio-Pleistocene)
- br Bedrock units

N

Not to scale

Geological Unit Map

Figure **2.2-5**

Source: Caltrans, 2014c

Artificial Fill

Artificial fill is manmade and as such, any fossils found in artificial fill are not considered significant because they have been removed from their original geologic context. As discussed in **Section 2.1.6, Cultural Resources,** approximately 75 percent of the State right-of-way is elevated roadway consisting of non-native/disturbed fill materials of up to 15 feet deep. In addition, a moderate level of disturbance exists within the geologic study area due to the construction of the following infrastructure:

- the installation of the original Mokelumne Aqueduct pipeline (1929)
- the installation of the second (1949) and third (1963) Mokelumne aqueduct pipelines
- the construction of the Pine Creek channelization (1950)
- the construction of SR 242 freeway and relocation of the Mokelumne Aqueducts (1965)
- the SR 242 Freeway Widening Project (2000), and associated sound wall construction

Due to the nature of non-native/disturbed fill, there is no potential this unit will produce any significant fossils.

Holocene Alluvial Deposits

Holocene deposits found within the geologic study area consist of alluvial fan and stream channel deposits as well as floodplain deposits. Consisting of brown, tan, and dark grey sands, silts, and clays; these sediments can be found at the surface, just south of Pine Creek. The Holocene alluvium is too thin and too young for the preservation of fossils and has been disturbed within much of the geologic study area. As such, within the project limits there is a low potential of discovering paleontological resources in this geologic unit.

Pleistocene Alluvial Deposits

Pleistocene alluvial deposits are the oldest sediments exposed in the geologic study area, composed of brown gravelly sands or sandy gravels that fine upwards into sandy clays. This unit is mapped near the surface within the geologic study area, between Pine Creek and Concord Avenue. These Pleistocene sediments also underlie younger alluvial deposits to the south at an unknown depth. As summarized in **Table 2.2-8,** sediments mapped as Pleistocene alluvial deposits in the project region have produced many fossils representing various extinct plants and animals from throughout the San Francisco Bay Area, which include mammoth, mastodon, camel, horse, ground sloth and mole. Due to the fact that vertebrate fossils have previously been reported in this geologic unit, there is a high potential that additional significant paleontological resources will be found in the Pleistocene sediments within the geologic study area.

ENVIRONMENTAL CONSEQUENCES

The paleontological study area encompasses the footprint of both Build Alternatives. Because the Build Alternatives are located within the same paleontological setting, project effects discussed in this section apply to both of the Build Alternatives.

Build Alternatives 1 and 2

For this project, activities that could adversely affect paleontological resources could include:

- Earth-moving and/or ground disturbance associated with grading and widening of road cuts below artificial fill or disturbed material
- Construction of retaining walls below the depth of artificial fill or disturbed material
- The installation of sign/light poles that reach depths below the artificial fill or disturbed material
- Bridge structures and abutments

Excavations for each of these project activities would be deep enough to impact high potential Pleistocene sediments to the north of Pine Creek, where these sediments occur at or near the surface. South of Pine Creek, only excavations related to overhead sign posts and retaining walls would be deep enough to impact Pleistocene material at depth below 10 feet. While the bridge foundations for this project could impact Pleistocene sediments, the foundations would be pile-driven or cast-in-drilled-hole. This activity would not produce sedimentary spoils that may be examined for the presence of fossil remains. Therefore, project-related bridge work would not need to be monitored.

No-Build Alternative

Under the No-Build Alternative, no changes would be made to SR 242 within the overall project limits. No construction activities would occur, and there would be no change in the operations of the existing highway facility.

AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Measure PAL-1: Monitoring and Mitigation Program. Prior to construction, a qualified professional paleontologist (as defined by Caltrans) should be retained to both design a monitoring and mitigation program, and implement the program during project-related excavation and earth disturbance activities. The paleontological resource monitoring and mitigation program would include:

- preconstruction coordination
- construction monitoring
- emergency discovery procedures

- sampling and data recovery, if needed
- preparation, identification, and analysis of the significance of fossil specimens salvaged, if any
- museum storage of any specimens and data recovered
- reporting

Prior to the start of construction, the paleontologist would conduct a field survey of exposures of sensitive stratigraphic units within the construction footprint that will be disturbed. The Monitoring and Mitigation Program will identify the excavations for project improvements that would be deep enough to impact high potential Pleistocene sediments. These areas would be monitored and inspected for the presence of potentially fossiliferous sediments. Monitoring would not need to be conducted in sediments that have been previously disturbed or in areas where exposed sediments would be buried, but not otherwise disturbed.

Prior to the start of construction, a worker training would be prepared and presented by a qualified professional paleontologist. Personnel involved with earth-moving activities would be trained to recognize the appearance of common fossils and would receive guidance on proper notification procedures if such protected resources were discovered.

CUMULATIVE IMPACTS

The cumulative setting for paleontological resources includes the areas within and surrounding the project limits which have documented paleontological resource sites, and/or high sensitivities to impact unrecorded fossils. Cumulative effects on paleontological resources would occur if planned and foreseeable development results in the removal of a substantial number of paleontological resources, when taken in combination with the project, and could degrade the physical historical record of the larger project region. Since all planned and foreseeable projects, including the Build Alternatives, would involve ground disturbing construction activities, all projects have the potential to adversely affect unknown resources. However, paleontological resources - both known and unknown - are protected by a number of federal, state, and local regulations. These regulations are reinforced by the City's planning review process. All grading plans for development projects are to include a contractor provision that in the event fossils are encountered, construction shall be temporarily halted. At that time, the Planning Division would be notified immediately. A qualified paleontologist shall evaluate the fossils and take steps necessary to photo-document or recover the fossils. This level of preventative measure is also included in Caltrans' standard specifications for transportation improvements within State right-of-way. Implementation of these applicable regulations and project approval processes would avoid cumulative effects to paleontological resources.

2.2.5 HAZARDOUS WASTE/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 primary federal laws regulating hazardous wastes/materials are the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA). The purpose of CERCLA, often referred to as "Superfund," is to identify and clean up abandoned contaminated sites so that public health and welfare are not compromised. The RCRA provides for "cradle to grave" regulation of hazardous waste generated by operating entities. Other federal laws include:

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

In addition to the acts listed above, EO 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 CA Health and Safety Code and is also authorized by the federal government to implement RCRA 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 clean-up of wastes that are below hazardous waste concentrations but could impact ground and surface water quality. California regulations that address waste management and prevention and clean up 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 found, disturbed, or generated during project construction.

AFFECTED ENVIRONMENT

Information in this section is based on the Initial Site Assessment (ISA) (Caltrans, 2015f) approved in June 2014, and amended in March 2015. The analysis focuses on determining the level of risk associated with hazardous materials, hazardous waste, and contamination along with each of the Build Alternatives that could potentially result from the proposed construction activities and operations.

The ISA included review and evaluation of historical aerial photographs, historical city directories, environmental records, and site reconnaissance. The ISA was prepared in accordance with American Society of Testing and Materials (ASTM) Method E1527-13, and the Caltrans Project Development Procedures Manual and Standard Environmental Reference.

Data sources related to historical land uses, current land uses, and environmental records from regulatory agencies were reviewed to identify known or potential sites associated with hazardous materials within 1 mile of the project limits. These sites were then evaluated to identify known or potential releases of hazardous materials that could impact soils and/or groundwater beneath the physical footprint of the proposed Build Alternatives.

Summary of Findings

The ISA identified several hazardous material release sites and former land uses that have contaminated soils and/or groundwater that may be encountered during project construction. Disturbance of contaminated materials during construction could adversely impact human health and the environment. These locations, along with other environmental concerns associated with the SR 242 corridor, are discussed in greater detail below, as they relate to the environmental consequences of the proposed project.

ENVIRONMENTAL CONSEQUENCES

Build Alternative 1

Hazardous Material Release Sites

The ISA identified 39 sites with known hazardous materials releases within up to one mile of the project limits. As summarized in **Table 2.2-9** and shown in **Figure 2.2-6**, known or potential groundwater contamination from 3 of the 39 release sites has migrated beneath the project limits. Contamination from the other 36 release sites (if any) would not be expected to migrate beneath the project limits.

Construction of Build Alternative 1 may encounter contaminated groundwater that could expose construction workers to the hazardous materials associated with these sites. The noted risk levels related to the known hazardous release sites in **Table 2.2-9** would apply to all of the proposed improvements under Build Alternative 1.

Agricultural Pesticides

Arsenic from inorganic pesticides and residues from organochlorine pesticides (OCPs) used in the past have the potential to persist for many decades in shallow soils and can affect human health and the environment. The land within the project limits and along the SR 242 corridor was used for agriculture as early as 1939; as such, arsenic and OCPs could potentially be present in shallow soils along the SR 242 corridor (**Table 2.2-9**).

Table 2.2-9 Areas with Potential Soil and Groundwater Contamination

Contaminant Source	Affected Media	Constituent of Concern	Summary of Potential Impacts	Build Alternatives	
				1	2
Release Sites					
Shell, 1500 Concord Avenue (Site 1)	Groundwater	Petroleum hydrocarbons, including gasoline (TPHg) and diesel (TPHd), methyl tert-butyl ether (MTBE), and tert-butyl alcohol (TBA).	A December 2013 monitoring event showed contaminated groundwater exceeded Environmental Screen Levels (ESLs) for all four COCs where groundwater is potential drinking water source. Contaminated groundwater appears to have migrated beneath the project limits at the intersection of Concord Avenue and Market Street, where minor ground disturbing construction activities are proposed.	X	X
All Star Services, Inc. 1791 Pine Street (Site 2)	Groundwater	TPHg, MTBE, and TBA	The March 2012 monitoring event showed contaminated groundwater exceeded ESLs for all four COCs where groundwater is a potential drinking water source. Contaminated groundwater appears to have migrated beneath the project limits at the intersection of Market Street and Willow Pass Road, where minor ground disturbing construction activities are proposed.	X	X

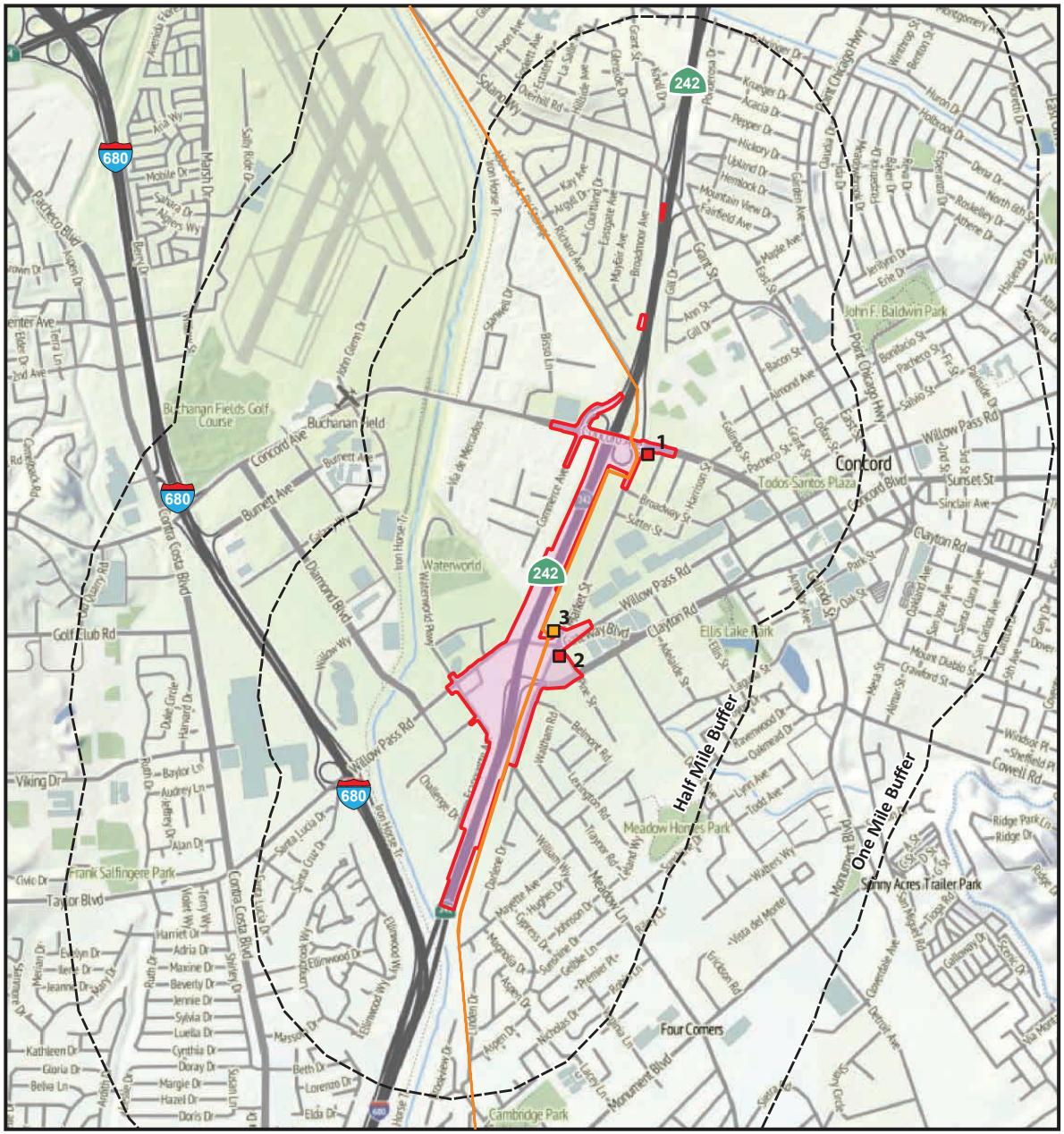
Contaminant Source	Affected Media	Constituent of Concern	Summary of Potential Impacts	Build Alternatives	
				1	2
Shell, 1905 Market Street (Site 3)	Groundwater	TPHg and total xylenes (BTEX)	This site is listed as "closed," however, prior to closure in 1997 groundwater samples were collected and analyzed for TPHg and total BTEX from eight monitoring wells. The residual concentration of these COCs exceeded current ESLs where groundwater is a potential drinking water source. Based on existing groundwater analytical data, residual groundwater contamination above ESLs could potentially be present beneath the project limits near the northwest corner of the intersection of Market Street and Willow Pass Road, where minor ground disturbing construction activities are proposed on fill slope areas adjacent to the freeway.	X	X
Other Environmental Concerns					
Agricultural Pesticides	Shallow soils	Arsenic and/or organochlorine pesticides (OCPs)	Inorganic and organochlorine pesticides were commonly used in California agriculture until the mid-1970s and have the potential to persist for many decades in shallow soils. While the soil concentration of these pesticides were likely reduced by the mixing of soils during excavation and grading activities for the SR 242 construction in the 1970s,shallow soils beneath the project site may be contaminated with arsenic and/or OCPs.	X	X
Aerially-Deposited Lead (ADL)	Exposed shallow soils	Lead	Lead alkyl compounds were commonly added to gasoline prior to the mid-1980s. Prior to the 1970s, the EPA estimated that vehicles emitted approximately 75 percent of the lead consumed in leaded gasoline as particulate matter in the exhaust. As a result, shallow soils within approximately 30 feet of the edge of the pavement along SR 242 could be contaminated with ADL.	X	X

Contaminant Source	Affected Media	Constituent of Concern	Summary of Potential Impacts	Build Alternatives	
				1	2
Unpaved Parking Lot (1490 Franquette Avenue)	Exposed shallow soils	Petroleum hydrocarbons	An unpaved parking lot for automotive repair and/or towing services was located at this address in the early 1970s, potentially exposing soils to multiple minor releases of petroleum hydrocarbons. The cumulative effect of many small releases over time could pose a risk to human health and the environment.	X	
Drainage Swales and Catch Basins	Exposed shallow soils	Title 22 metals	Sediments in catch basins and exposed soils in drainage swales on the project site could contain elevated concentrations of metals deposited from nonpoint runoff sources that, if disturbed, could pose a risk to human health and the environment.	X	X
Kinder Morgan Oil Pipeline (along the east side of SR 242)	Groundwater	Gasoline, diesel, jet fuel, BTEX, and polynuclear aromatic compounds (PAHs)	While pipeline safety and maintenance regulations have been in place since 1979, undocumented petroleum releases may have occurred in the past.	X	X

Other Environmental Concerns

Aerially-Deposited Lead (ADL)

Lead can be hazardous to humans as exposure can adversely affect the nervous, circulatory, and reproductive systems and can severely damage the brain and kidneys. Lead alkyl compounds were first added to gasoline in the 1920s. Beginning in 1973, the U.S. EPA ordered a gradual phase out of lead from gasoline that significantly reduced the prevalence of leaded gasoline by the mid-1980s. Prior to the 1970s, the U.S. EPA estimated that vehicles emitted approximately 75 percent of the lead consumed in leaded gasoline as particulate matter in the exhaust. As a result, shallow soils within 30 feet of the edge of pavement in highway corridors have the potential to be contaminated with ADL from historical car emissions. SR 242 was constructed in the early 1970s. Therefore, there is a potential for the presence of lead in shallow soils adjacent to the roadway (**Table 2.2-9**).



Legend

- Project Limits
- Approximate Location of Kinder Morgan oil pipeline
- Release Site with Known Project Impact
- Release Site with Potential Project Impact

N

Not to scale

Hazardous Materials Release Sites of Concern

Figure **2.2-6**

Source: Caltrans, 2015f

Unpaved Parking Lots

Since 1974, an unpaved parking lot for automotive repair and/or towing services has been located within the project limits at 1490 Franquette Avenue. About 40 years of maintaining and/or parking automobiles in the open and on top of exposed soils may have resulted in many minor releases of petroleum hydrocarbons (e.g., oil leaks) into the shallow soils. The cumulative effect of many small releases over time could be considered an environmental concern, as petroleum hydrocarbons and associated compounds can pose a risk to human health and the environment (**Table 2.2-9**).

Hazardous Building Materials

Building materials such as thermal system insulation, surfacing materials, and asphalt and vinyl flooring materials installed in buildings prior to 1981 may contain asbestos. Lead compounds may also be present in interior or exterior paints used for commercial buildings, regardless of construction date. Lead and asbestos are state-recognized carcinogens, and contaminants may be released upon demolition of buildings (**Table 2.2-9**).

Non-Point Source Metals

Nonpoint-source metals are metals from nonpoint runoff sources, such as urban development, agricultural fields, vehicle tires, and brake pads. These metals could accumulate in drainage swales and catch basins over time and pose a risk to human health and the environment (**Table 2.2-9**).

Petroleum Pipelines

An underground petroleum pipeline (Kinder Morgan oil pipeline) runs parallel immediately east of SR 242 within the project limits as depicted in **Figure 2.2-6.** The pipeline could be a source of potential soil and groundwater contamination from undocumented historical leaks (**Table 2.2-9**).

Yellow Traffic Stripes and Pavement Markers

Lead and hexavalent chromium have been used in yellow thermoplastic and yellow paint for traffic striping and pavement marking for many years and as recently as 2004. Residue from existing yellow thermoplastic and yellow paint striping and markings on roadways within project limits may contain elevated concentrations of lead and hexavalent chromium that may produce toxic fumes when heated.

Asphalt-Concrete and Portland-Cement grindings

Asphalt-concrete and Portland cement grindings have a relatively high pH and may contain metals and petroleum hydrocarbons that can impact surface waters from storm water runoff.

Build Alternative 2

All environmental concerns identified above for Build Alternative 1 are the same for Build Alternative 2. Work is proposed with the same area of known hazardous material release sites and other identified environmental concerns.

However, Build Alternative 2 would not require the demolition of any existing buildings; therefore, risks associated with the release of lead and asbestos during building demolition are not relevant. Additionally, Build Alternative 2 does not propose any construction in the vicinity of the unpaved parking lot at 1490 Franquette Avenue. Accordingly, the risks associated with petroleum hydrocarbons in shallow soils in this area are not relevant to Build Alternative 2.

No-Build Alternative

Under the No-Build Alternative, no changes would be made to SR 242 within the project limits. No construction activities would occur, and there would be no change in the operations of the existing highway facility. The No-Build Alternative would not result in increased risks associated with hazardous materials or hazardous waste.

AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Within the existing project limits, no other alternatives were deemed viable because of the physical constraints associated with the developed land uses surrounding the SR 242 corridor. Given these constraints, the current design of the Build Alternatives would not be feasible without constructing improvements in the areas near the identified hazardous material sites. As such, these hazardous material sites cannot be avoided. During the final design phase of the project, a qualified specialist would perform a preliminary site investigation to investigate potential hazardous materials concerns related to groundwater and soils within the project limits, as identified in the ISA (see **Measure HAZ-5**). An additional Detailed Site Investigation (DSI) may also be needed, depending on the results of the ISA. Based on the extent of ground disturbing activities proposed near these sites, delaying subsurface investigations until the design phase of the project is not expected to change the project design and cost.

Build Alternative 1

Measure HAZ-1: During the final design phase of the project, a Preliminary Site Investigation (PSI) shall be performed to investigate hazardous materials concerns related to soil, groundwater, and construction materials within the project limits, as identified in the ISA. A work plan for the PSI shall be submitted to Caltrans for review and approval. Additional investigation may be required to fully evaluate hazardous materials issues if concerns are identified during the PSI. All environmental investigations for the project would be provided to project contractors, so the findings may be incorporated into their Health and Safety and Hazard Communication Programs.

As part of the PSI, representative soil and groundwater sampling shall be conducted by a licensed professional to evaluate the potential presence of hazardous materials in soil and groundwater within the project limits prior to construction and earthwork activities. The sampling shall be performed in accordance with a work plan that has been reviewed and approved by Caltrans, and would address the areas of concern identified in **Table 2.2-9**. Soil samples collected to evaluate ADL shall be analyzed for total lead and soluble lead to evaluate whether the Department of Toxic Substances Control's variance issued to Caltrans could apply. If applicable, the variance would determine whether the lead-affected soils could be reused as fill within the project area. Soil and

groundwater analytical results shall also be screened against the San Francisco Bay Regional Water Quality Control Board's Environmental Screening Levels to determine appropriate actions that would ensure the protection of construction workers, future site users, and the environment, and also be screened against hazardous waste thresholds to determine soil management options.

Representative exposed shallow soils shall be collected from:

- All excavation/proposed grading areas, and analyzed for arsenic and OCPs.
- Within 30 feet of the edge of SR 242; analyzed for the total lead and soluble lead. Sampling of ADL should be performed in accordance with the requirements of the Caltrans/ DTSC ADL Variance, if necessary.
- Within the unpaved parking lot at 1490 Franquette Avenue; analyzed for petroleum hydrocarbons.
- Drainage swales and sediments in catch basins; analyzed for Title 22 metals[8].

Measure HAZ-2: As part of the PSI (see **Measure HAZ-1**), hazardous building materials surveys shall be conducted by a qualified professional for structures proposed for renovation and/or demolition as part of the project. Lead-based paint and asbestos-containing material shall be included in the hazardous materials building surveys. All loose and peeling lead-based paint and asbestos-containing material shall be removed by a certified contractor(s) in accordance with local, State, and federal requirements. All hazardous materials shall be removed from structures in accordance with California OSHA regulations.

Measure HAZ-3: Yellow thermoplastic and yellow paint striping and markings on existing roadways shall either be analyzed for lead chromate prior to disturbance/removal in accordance with Chapter 7 of the Caltrans Construction Manual or managed as an assumed hazardous waste by implementing a Lead Compliance Plan and testing the residues for hazardous waste classification prior to off-site disposal in accordance with Caltrans' Standard Special Provision 14-11.07.

Measure HAZ-4: Asphalt-concrete and Portland cement concrete grindings shall be reused in accordance with San Francisco Bay Regional Water Quality Control Board's guidelines for Caltrans' projects or transported offsite for recycling or disposal.

Measure HAZ-5: Construction along the Project corridor shall be conducted under a project-specific Construction Risk Management Plan (CRMP) to protect construction workers, the general public, and the environment from hazardous materials identified in the PSI (see **Measures HAZ-1** and **HAZ-2**). The CRMP shall incorporate the soil and groundwater analytical data from the PSI to ensure that soil and groundwater are stored, managed, and disposed of in a manner protective of human health and the environment, and in accordance with applicable laws and regulations.

[8] Title 22 metals or heavy metals are a metallic element which is toxic and has a high density, specific gravity and/or atomic weight.

To address potential residual groundwater contamination concerns along the entire project limits, the CRMP shall require all groundwater from dewatering of excavations, if any, to be stored in tank(s) during construction activities and characterized prior to disposal or recycling. This would be in addition to the pre-characterization of groundwater quality during the PSI.

The CRMP shall address the possibility of encountering undocumented sources of contamination in the subsurface by including the following measures for identifying, testing, and managing soil and groundwater suspected of containing hazardous materials that have not previously been identified at the site: (1) provide procedures for discovering, evaluating, handling, storing, testing, and disposing of soil and groundwater during project excavation and dewatering activities, respectively; (2) describe required worker health and safety provisions for all workers potentially exposed to hazardous materials in accordance with state and federal worker safety regulations; and (3) designate personnel responsible for implementation of the CRMP.

The CRMP shall incorporate procedures for sampling, analyzing, and managing traffic striping and pavement markings and asphalt-concrete and Portland cement concrete grindings (see **Measure HAZ-3**).

Build Alternative 2

All avoidance and minimization measures identified above for Build Alternative 1 would be applicable to Build Alternative 2, with the exception of **Measure HAZ-1.** The collection of shallow soils from the unpaved parking lot at 1490 Franquette Avenue, as identified in **Measure HAZ-1,** would not be needed, as Build Alternative 2 does not propose any construction activities in this area. Additionally, the hazardous building material survey required by **Measure HAZ-2** would not be necessary because Build Alternative 2 does not propose demolition of any buildings.

Implementation Cost Estimates

Implementation of the PSI for the project is anticipated to cost approximately $80,000. The soil and groundwater sampling would likely be a one-month endeavor, assuming property access and approval of the work plan are obtained in a timely fashion.

If soil and/or groundwater contaminants are found, the regulatory authorities (federal, State or local) may require that the soils be removed or specially managed through hazardous waste closure plans, implementation of contingency plans, remediation orders, permits, or other administrative actions. The responsible party (i.e., property owner of the contaminated area) would be expected to comply with the instructions in those plans, orders, permits, or actions. Based on the areas of concern identified in **Table 2.2-9**, implementation of special soil and/or groundwater remediation and handling efforts during construction is anticipated to cost approximately $60,000 and would take approximately three months to complete. The avoidance and minimization implementation costs would be the same under Build Alternatives 1 and 2.

CUMULATIVE IMPACTS

Effects from hazardous waste and materials related to future development in areas surrounding the project limits are site specific and relate to the type and location of construction proposed, as well as the environmental concerns associated with known hazardous material release sites within the project limits. There is no additive effect of the hazardous or waste materials associated with other approved or foreseeable development and the project, and therefore no cumulative effect.

2.2.6 AIR QUALITY

REGULATORY SETTING

The Federal Clean Air Act (FCAA), as amended, is the primary federal law that governs air quality while the California Clean Air Act is its companion state law. These laws, and related regulations by the United States Environmental Protection Agency (U.S. EPA) and California Air Resources Board (ARB), set standards for the concentration of pollutants in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS 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), particulate matter (PM), which is broken down for regulatory purposes into particles of 10 micrometers or smaller (PM_{10}) and particles of 2.5 micrometers and smaller ($PM_{2.5}$), and sulfur dioxide (SO_2). In addition, national and state standards exist for lead and state standards exist for visibility reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride. The NAAQS and state standards are set at levels that protect 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 in their general definition.

Federal air quality standards and regulations provide the basic scheme for project-level air quality analysis under the National Environmental Policy Act (NEPA). In addition to this environmental analysis, a parallel "Conformity" requirement under the FCAA also applies.

Conformity

The conformity requirement is based on FCAA Section 176(c), which prohibits the U.S. Department of Transportation (USDOT) and other federal agencies from funding, authorizing, or approving plans, programs or projects that do not conform to State Implementation Plan (SIP) for attaining the NAAQS. "Transportation Conformity" applies to highway and transit projects and 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 NAAQS, and only for the specific NAAQS that are or were violated. U.S. EPA regulations at 40 CFR 93 govern the conformity process. Conformity requirements do not apply in unclassifiable/attainment areas for NAAQS 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 NAAQS for CO, NO_2, O_3, particulate matter (PM_{10} and $PM_{2.5}$), and in some areas (although not in California) 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 however, lead is not currently required by the FCAA to be covered in transportation conformity analysis. Regional conformity is based on emission analysis of Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) that include all transportation projects planned for a region over a period of at least 20 years for the RTP and 4 years (for the TIP). RTP and FTIP conformity uses travel demand and emission models to determine whether or not the implementation of those projects would conform to emission budgets or other tests at various analysis years showing that requirements of the Clean Air Act and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), FHWA, and Federal Transit Administration (FTA), make determinations that the RTP and FTIP are in conformity with the SIP for achieving the goals of the FCAA. Otherwise, the projects in the RTP and/or FTIP 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 RTP and FTIP, then the proposed project meets regional conformity requirements for purposes of project-level analysis.

Conformity analysis at the project-level includes verification that the project is included in the regional conformity analysis and a "hot-spot" analysis if an area is "nonattainment" or "maintenance" for 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 a violation of the relevant standard and the U.S. EPA officially designates the area nonattainment. Areas that were previously designated as nonattainment areas but subsequently meet the standard may be officially re-designated to attainment by U.S. EPA and are then called "maintenance" areas. "Hot-spot" analysis is essentially the same, for technical purposes, as CO or particulate matter analysis performed for NEPA 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 CO or particulate matter violation is located in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

AFFECTED ENVIRONMENT

Information in this section is based on the Air Quality Report (Caltrans, 2015a) approved in July 2015. The project is located within the San Francisco Bay Area Air Basin (SF Air Basin) and within the jurisdictional boundaries of the Bay Area Air Quality Management District (BAAQMD). These boundaries effectively make up the air quality study area for the project.

The climate within the air quality study area is affected by proximity to both the Pacific Ocean and the San Francisco Bay, which has a moderating influence. The Bay cools the air with which it comes in contact during warm weather and warms the air during cold weather. Typical summer maximum temperatures for the region are in the upper 70's, while winter maximum temperatures are in the high 50's or low 60's. Minimum temperatures usually range from the high 50's in the summer to the upper 30's and low 40's in the winter. Rainfall in the area occurs mostly in the months of November through March. Winds flow typically from the southwest.

Air quality in the region is controlled by meteorological conditions and the rate of pollutant emissions. Meteorological conditions such as wind speed, atmospheric stability, and mixing height may all affect the atmosphere's ability to mix and disperse pollutants. Long-term variations in air quality typically result from changes in air pollutant emissions, while frequent, short-term variations result from changes in atmospheric conditions.

Air quality standards for O_3 are traditionally exceeded when relatively stagnant conditions occur for periods of several days during the warmer months of the year. Weak wind flow patterns combined with strong inversions substantially reduce normal atmospheric mixing. Key components of ground-level O_3 formation are sunlight and heat; therefore, significant O_3 formation only occurs during the months from late spring through early fall. Prevailing winds during the summer and fall can transport and trap O_3 precursors from the more urbanized portions of the Bay Area. Meteorological factors make air pollution potential in the project area relatively high during summer and fall months. When high pressure dominates the weather, low mixing depths and bay and ocean wind patterns can concentrate and carry pollutants from other cities to this area, adding to the locally emitted pollutants.

Regional Air Quality Conformity

The BAAQMD monitors pollutants of concern, known as criteria pollutants, and air quality conditions throughout the SF Air Basin. Areas that do not violate ambient air quality standards are considered to have attained the standard. Violations of ambient air quality standards are based on air pollutant monitoring data and are judged for each air pollutant. **Table 2.2-10** includes a summary of the applicable air quality standards, the typical sources of pollutants and their associated health effects, and the SF Air Basin's attainment status with respect to the air quality standards. As shown in **Table 2.2-10**, the SF Air Basin is not in attainment of state or federal standards with respect to O_3 or $PM_{2.5}$. In addition, the SF Air Basin is not in attainment of state standards for PM_{10}.

Within three years of the effective date of designations, nonattainment areas for $PM_{2.5}$ are required to submit SIP revisions that, among other elements, provide for implementation of reasonably available control measures, reasonable further progress, attainment of the standard as

expeditiously as practicable but no later than five years from the nonattainment designation (i.e., December 14, 2014), as well as contingency measures. ARB has requested that the U.S. EPA make a determination that the San Francisco Bay Area has subsequently attained the $PM_{2.5}$ NAAQS since its 2009 non-attainment designation. As such, ARB is asking the U.S. EPA to determine that attainment-related SIP submittal requirements are not applicable for as long as the area continues to attain the standard. On October 29, 2012 the U.S. EPA proposed to determine that the San Francisco Bay Area has attained the $PM_{2.5}$ NAAQS. This proposed determination is based on recent ambient air monitoring data showing that the SF Air Basin has monitored attainment of the $PM_{2.5}$ NAAQS for the 2009–2011 monitoring period. If the U.S. EPA finalizes this determination of attainment, the only SIP requirements would include an updated emission inventory for primary $PM_{2.5}$, as well as precursor pollutants that contribute to formation of secondary particulate matter and amendments to BAAQMD's New Source Review to address $PM_{2.5}$. The Bay Area's $PM_{2.5}$ emission inventory was submitted to the U.S. EPA on January 14, 2013.

Table 2.2-10 Highest Measured Air Pollutant Concentrations (Concord Monitoring Station)

Pollutant	Average Time	Measured Air Pollutant Levels				
		2009	2010	2011	2012	2013
Ozone (O_3)	1-Hour	**0.106 ppm**	**0.103 ppm**	**0.099 ppm**	**0.093 ppm**	0.074 ppm
	8-Hour	**0.088 ppm**	**0.087 ppm**	**0.078 ppm**	**0.085 ppm**	0.062 ppm
Carbon Monoxide (CO)	1-Hour	1.8 ppm	1.2 ppm	1.6 ppm	1.2 ppm	1.2 ppm
	8-Hour	1.1 ppm	1.0 ppm	1.2 ppm	0.8 ppm	1.0 ppm
Nitrogen Dioxide (NO_2)	1-Hour	0.04 ppm	0.042 ppm	0.042 ppm	0.04 ppm	.044 ppm
	Annual	0.009 ppm	0.008 ppm	0.009 ppm	0.008 ppm	.009 ppm
Respirable Particulate Matter (PM_{10})	24-Hour	33 ug/m^3	41 ug/m^3	**59 ug/m^3**	35 ug/m^3	**51 ug/m^3**
	Annual	14.7 ug/m^3	13.7 ug/m^3	15.7 ug/m^3	12.6 ug/m^3	16 ug/m^3
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	**39 ug/m^3**	**36.4 ug/m^3**	**47.5 ug/m^3**	32.2 ug/m^3	**36.2 ug/m^3**
	Annual	8.4 ug/m^3	7.1 ug/m^3	7.8 ug/m^3	6.5 ug/m^3	7.6 ug/m^3

Note: ppm = parts per million
Values reported in bold exceed ambient air quality standard
NA = data not available.

Existing Ambient Air Quality Standards

The Bay Area is considered to be one of the cleanest metropolitan areas in the country with respect to air quality. The BAAQMD monitors air quality conditions at locations throughout the Bay Area. The monitoring station closest to the project is in Concord, located at 2956-A Treat Boulevard. The highest air pollutant concentrations measured in any one year at the station closest to the project are shown in **Table 2.2-11**. **Table 2.2-12** reports the number of days that an ambient air quality standard was exceeded at the Concord monitoring station.

Table 2.2-11 State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State [8] Standard	Federal [8] Standard	Principal Health and Atmospheric Effects	Typical Sources	Project Area Attainment Status
Ozone (O_3)[2]	1 hour 8 hours	0.09 ppm 0.070 ppm	--- [4] 0.070 ppm (4th highest in 3 years)	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known toxic air contaminants. Biogenic VOC may also contribute	Low-altitude O_3 is almost entirely formed from reactive organic gases/volatile organic compounds (ROG or VOC) and nitrogen oxides (NOx) in the presence of sunlight and heat. Common precursor emitters include motor vehicles and other internal combustion engines, solvent evaporation, boilers, furnaces, and industrial processes.	Federal: No State: No
Carbon Monoxide (CO)	1 hour 8 hours 8 hours (Lake Tahoe)	20 ppm 9.0 ppm [1] 6 ppm	35 ppm 9 ppm ---	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical ozone. Colorless, odorless	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.	Federal: Yes State: Yes
Respirable Particulate Matter (PM_{10})[2]	24 hours Annual	50 µg/m^3 20 µg/m^3	150 µg/m^3 --- 2 (expected number of days above standard < or equal to 1)	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some toxic air contaminants. Many toxic & other aerosol and solid compounds are part of PM_{10}.	Dust- and fume-producing industrial and agricultural operations; combustion smoke & vehicle exhaust; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust; natural sources.	Federal: Yes State: No

Pollutant	Averaging Time	State [8] Standard	Federal [8] Standard	Principal Health and Atmospheric Effects	Typical Sources	Project Area Attainment Status
Fine Particulate Matter ($PM_{2.5}$)[2]	24 hours Annual 24 hours (conformity process[5]) Secondary Standard (annual; also for conformity process[5])	--- 12 µg/m^3 --- ---	35 µg/m^3 12.0 µg/m^3 65 µg/m^3 15 µg/m^3 (98th percentile over 3 years)	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter – a toxic air contaminant – is in the $PM_{2.5}$ size range. Many toxic & other aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical and photochemical reactions involving other pollutants including NOx, sulfur oxides (SOx), ammonia, and ROG	Federal: No State: No
Nitrogen Dioxide (NO_2)	1 hour Annual	0.18 ppm 0.030 ppm	0.100 ppm[6] (98th percentile over 3 years) 0.053 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain & nitrate contamination of storm water. Part of the "NOx" group of ozone precursors	Motor vehicles and other mobile or portable engines, especially diesel; refineries; industrial operations	Federal: Yes State: Yes
Sulfur Dioxide (SO_2)	1 hour 3 hours 24 hours	0.25 ppm --- 0.04 ppm	0.075 ppm[7] (99th percentile over 3 years) 0.5 ppm[9]	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, steel. Contributes to acid rain. Limits visibility	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.	Federal: Yes State: Yes

Pollutant	Averaging Time	State [8] Standard	Federal [8] Standard	Principal Health and Atmospheric Effects	Typical Sources	Project Area Attainment Status
Lead (Pb)[3]	Monthly Rolling 3-month average	1.5 µg/m^3 ---	--- 0.15 µg/m^3 11	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also a toxic air contaminant and water pollutant	Lead-based industrial processes like battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from older gasoline use may exist in soils along major roads	Federal: Yes State: Yes
Sulfate	24 hours	25 µg/m^3	---	Premature mortality and respiratory effects. Contributes to acid rain. Some toxic air contaminants attach to sulfate aerosol particles	Industrial processes, refineries and oil fields, mines, natural sources like volcanic areas, salt-covered dry lakes, and large sulfide rock areas	Federal: n/a State: Yes
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm	---	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea. Strong odor	Industrial processes such as: refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources like volcanic areas and hot springs	Federal: n/a State: Yes
Visibility Reducing Particles (VRP)	8 hours	Visibility of 10 miles or more (Tahoe: 30 miles) at relative humidity less than 70%	---	Reduces visibility. Produces haze. NOTE: not directly related to the Regional Haze program under the Federal Clean Air Act, which is oriented primarily toward visibility issues in National Parks and other "Class I" areas. However, some issues and measurement methods are similar	See particulate matter above May be related more to aerosols than to solid particles	Federal: n/a State: Yes

Pollutant	Averaging Time	State [8] Standard	Federal [8] Standard	Principal Health and Atmospheric Effects	Typical Sources	Project Area Attainment Status
Vinyl Chloride3	24 hours	0.01 ppm	---	Neurological effects, liver damage, cancer Also considered a toxic air contaminant	Industrial processes	Federal: n/a State: Yes

Notes: ppm = parts per million; µg/m3 = micrograms per cubic meter; ppb=parts per billion (thousand million)

1. Rounding to an integer value is not allowed for the state 8-hour CO standard. A violation occurs at or above 9.05 ppm.
2. Annual PM_{10} NAAQS revoked October 2006; was 50 µg/m^3. 24-hr. $PM_{2.5}$ NAAQS tightened October 2006; was 65 µg/m^3. Annual $PM_{2.5}$ NAAQS tightened from 15 µg/m^3 to 12 µg/m^3 December 2012 and secondary annual standard set at 15 µg/m^3.
3. The ARB has identified vinyl chloride and the particulate matter fraction of diesel exhaust as toxic air contaminants. Diesel exhaust particulate matter is part of PM_{10} and, in larger proportion, $PM_{2.5}$. Both the ARB and U.S. EPA have identified lead and various organic compounds that are precursors to ozone and $PM_{2.5}$ as toxic air contaminants. There are no exposure criteria for adverse health effect due to toxic air contaminants, and control requirements may apply at ambient concentrations below any criteria levels specified above for these pollutants or the general categories of pollutants to which they belong.
4. Prior to 6/2005, the 1-hour ozone NAAQS was 0.12 ppm. Emission budgets for 1-hour ozone are still in use in some areas where 8-hour ozone emission budgets have not been developed, such as the SF Bay Area.
5. The 65 µg/m^3 $PM_{2.5}$ (24-hr) NAAQS was not revoked when the 35 µg/m^3 NAAQS was promulgated in 2006. The 15 µg/m^3 annual $PM_{2.5}$ standard was not revoked when the 12 µg/m^3 standard was promulgated in 2012. The 0.08 ppm 1997 ozone standard is revoked FOR CONFORMITY PURPOSES ONLY when area designations for the 2008 0.75 ppm standard become effective for conformity use (7/20/2013). Conformity requirements apply for all NAAQS, including revoked NAAQS, until emission budgets for newer NAAQS are found adequate, SIP amendments for the newer NAAQS are approved with a emission budget, EPA specifically revokes conformity requirements for an older standard, or the area becomes attainment/unclassified. SIP-approved emission budgets remain in force indefinitely unless explicitly replaced or eliminated by a subsequent approved SIP amendment. During the "Interim" period prior to availability of emission budgets, conformity tests may include some combination of build vs. no build, build vs. baseline, or compliance with prior emission budgets for the same pollutant.
6. Final 1-hour NO_2 NAAQS published in the Federal Register on 2/9/2010, effective 3/9/2010. Initial area designation for California (2012) was attainment/unclassifiable throughout. Project-level hot spot analysis requirements do not currently exist. Near-road monitoring starting in 2013 may cause redesignation to nonattainment in some areas after 2016.
7. EPA finalized a 1-hour SO_2 standard of 75 ppb in June 2010. Nonattainment areas have not yet been designated as of 9/2012.
8. State standards are "not to exceed" or "not to be equaled or exceeded" unless stated otherwise. Federal standards are "not to exceed more than once a year" or as described above.
9. Secondary standard, set to protect public welfare rather than health. Conformity and environmental analysis address both primary and secondary NAAQS.
10. Standards no longer apply in CA starting in 2013 (1 year after designations to attainment/unclassified statewide) were completed. Do not use or quote any more. Will be removed in 2013 edition of this table.
11. Lead NAAQS are not considered in Transportation Conformity analysis.

Table 2.2-12 Number of Days Exceeding Ambient Air Quality Standards (Concord Monitoring Station)

Pollutant	Standard	Days Exceeding Standard				
		2009	2010	2011	2012	2013
Ozone (O_3)	NAAQS 8-hr	2	1	2	2	0
	CAAQS 1-hr	2	2	2	0	0
	CAAQS 8-hr	5	4	5	3	0
Respirable Particulate Matter (PM_{10})	NAAQS 24-hr	0	0	0	0	0
	CAAQS 24-hr	0	0	1	0	1
Fine Particulate Matter ($PM_{2.5}$)	NAAQS 24-hr	1	1	2	0	1
All Other (CO, NO_2, Lead, SO_2)	All Other	0	0	0	0	0

ENVIRONMENTAL CONSEQUENCES

There are no substantial differences in the operational characteristics or construction methods between Build Alternatives 1 and 2 (see **Tables 2.2-13** through **2.2-16**). As such, the environmental consequences of the Build Alternatives are presented together.

Build Alternatives 1 and 2

Regional Conformity

The proposed project is listed in the 2013 *Plan Bay Area* financially constrained RTP which was found to conform by MTC on July 18, 2013, and FHWA and FTA made a regional conformity determination finding on August 12, 2013. The 2015 TIP is the most current conforming TIP, which was adopted by MTC on September 24, 2014 and approved by the FTA and the FHWA on December 15, 2014. A general description of the Build Alternatives (Project Reference No. 22388) and TIP ID CC-070024 was included in the regional emissions analysis conducted by MTC for the 2040 Plan Bay Area and the 2015 TIP. The design concept and scope of the proposed project is consistent with the project description in the 2013 RTP and the open to traffic assumptions of the MTC's regional emissions analysis.

Project Level Conformity

Carbon Monoxide

The Build Alternatives' impacts from local traffic were evaluated by modeling roadside CO concentrations. The modeling was conducted for the busiest SR 242 mainline segment where there would be a combination of the highest traffic volumes, greatest project traffic contribution, and highest level of congestion. High volume freeways, such as SR 242, with a large volume of traffic, have the greatest potential to cause high-localized concentrations of CO. Of the two standards for

CO, the 8-hour standard is the more stringent. Modeling results are shown in **Table 2.2-13**. Modeling took into account the slowest speed and highest volume for each link to get the worst case predications.

This assessment was conducted for existing conditions (2013), and Build and No-Build Alternatives' conditions for opening year (2020) and horizon year (2040). The results indicate that current CO concentrations are below ambient air quality standards (state and federal); and that opening year (2020) and horizon year (2040), for the Build and No-Build Alternatives, would remain below the standards. CO concentrations for the Build and No Build Alternatives are mostly the same; slight variations are due to minor changes in traffic conditions between alternatives. The predicted decrease in CO concentrations is due to vehicle fleet turnover, with newer (less polluting) vehicles replacing older vehicles. As a result, the project would not cause or contribute to any localized CO violations.

Table 2.2-13 Year 2020 and 2040 Carbon Monoxide (CO) Concentrations Along Roadway Segments Within the Project Limits

Receptor ID	Carbon Monoxide (CO) Concentrations, Parts Per Million (PPM)													
	Existing		2020 No-Build		2020 Build Alt 1		2020 Build Alt 2		2040 No-Build		2040 Build Alt 1		2040 Build Alt 2	
	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr
1	2.3	1.6	2.0	1.4	2.0	1.4	2.0	1.4	1.8	1.3	1.8	1.3	1.8	1.3
2	2.3	1.6	2.0	1.4	2.0	1.4	2.0	1.4	1.6	1.1	1.6	1.1	1.6	1.1
3	2.2	1.6	1.9	1.3	2.1	1.5	2.0	1.4	1.7	1.2	1.9	1.3	1.8	1.3
4	2.5	1.8	1.8	1.3	1.9	1.3	2.0	1.4	1.7	1.2	1.9	1.3	1.9	1.3
5	2.1	1.5	1.8	1.3	1.8	1.3	1.8	1.3	1.7	1.2	1.6	1.1	1.6	1.1
6	2.5	1.8	1.9	1.3	1.9	1.3	1.9	1.3	1.8	1.3	1.8	1.3	1.8	1.3
7	2.0	1.4	1.8	1.3	1.8	1.3	1.8	1.3	1.7	1.2	1.6	1.1	1.6	1.1
NAAQS	*35*	*9*	*35*	*9*	*35*	*9*	*35*	*9*	*35*	*9*	*35*	*9*	*35*	*9*
CAAQS	*20*	*9.0*	*20*	*9.0*	*20*	*9.0*	*20*	*9.0*	*20*	*9.0*	*20*	*9.0*	*20*	*9.0*

Particulate Matter

On March 10, 2006, the Federal EPA published a final rule that establishes the transportation conformity criteria and procedures for determining which transportation projects must be analyzed for local air quality impacts in $PM_{2.5}$ and PM_{10} nonattainment and maintenance areas (71 FR 12468). The final rule requires a hot spot analysis to be performed for a project that would have localized air quality concerns with regard to particulate matter. Such projects are identified by the SIP and defined as a "Project of Air Quality Concern" (POAQC). The project is not subject to hot spot analysis for PM_{10} for purposes of transportation conformity because the Federal PM_{10} standards have been met in the Bay Area. The project would be subject to hot spot analysis for $PM_{2.5}$ for purposes of transportation conformity because the Federal $PM_{2.5}$ standards are exceeded in the Bay Area. Generally, a project is not a POAQC unless it changes capacity or alignment of a road with more than 125,000 annual average daily traffic (AADT) with more than 10,000 truck AADT, or otherwise may substantially increase or concentrate diesel exhaust emissions (such as bus terminals and transfer points, designated truck routes, and freight intermodal terminals). Interagency consultation is required to determine if a project meets such requirements. Accordingly, MTC's Air Quality Conformity Task Force met on August 28, 2014 as part of interagency consultation for the project and took action to conclude that the project was not a POAQC. As a result of that action, a project-level $PM_{2.5}$ Hot Spot Analysis is not required. Based on US EPA and FHWA guidance, the project will not create new violations or worsen existing violations, or prevent adherence to relevant $PM_{2.5}$ NAAQS as described in [40 CFR 93.101].

A quantitative analysis of project air pollutant emissions was performed to identify and compare the potential differences among particulate matter emissions (both PM_{10} and $PM_{2.5}$) and other pollutants with the implementation of the Build Alternatives. Project-level operational emissions are shown in **Table 2.2-14**. Emissions associated with implementation of the proposed project were obtained by comparing future with-project emissions to future without-project emissions for both the opening year (2020) and horizon year (2040) scenarios.

As shown in **Table 2.2-14**, when compared to existing conditions (2013), air pollutant emissions are anticipated to remain the same or decrease with or without the project in the future conditions. This decrease can be attributed to lower emission rates in the future due to a cleaner vehicle fleet. Project-related emissions would be the same between both Build Alternatives. When compared with opening year (2020) and horizon year (2040) No-Build conditions, emissions would remain about the same under either Build Alternative.

Table 2.2-14 Project-related Emissions (pounds per day)

Scenario	PM_{10}	$PM_{2.5}$
Existing Conditions	16	8
2020 No Build Alternative	15	7
2020 Build Alternative 1	15	7

Scenario	PM_{10}	$PM_{2.5}$
Existing Conditions	16	8
2020 No Build Alternative	15	7
2020 Build Alternative 1	15	7
2020 Build Alternative 2	15	7
2040 No Build Alternative	17	8
2040 Build Alternative 1	17	8
2040 Build Alternative 2	17	8
2020 Build Alternative Compared to Existing	**-1**	**-1**
2040 Build Alternative Compared to Existing	**1**	**0**
2020 Build Alternative Compared to 2020 No-Build Alternative	**0**	**0**
2040 Build Alternative Compared to 2040 No-Build Alternative	**0**	**0**
BAAQMD Significance Thresholds (for comparison only)	*82*	*54*

Note: ppm = Emissions calculations based on CT_EMFAC.

Mobile Source Air Toxics (MSAT)

FHWA has issued Interim Guidance on Air Toxic Analysis in NEPA Documents, which identifies three levels of analysis:

- Category 1 Projects are projects with No Meaningful Potential MSAT Effects or Exempt Projects. The types of projects included in this category are projects qualifying as a categorical exclusion under 23 CFR 771.117(c); Projects exempt under the Clean Air Act conformity rule under 40 CFR 93.126; or other projects with no meaningful impacts on traffic volumes or vehicle mix.
- Category 2 Projects are projects with Low Potential MSAT Effects. The types of projects included in this category are those that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions.
- Category 3 Projects are projects with Higher Potential MSAT Effects. This category includes projects that have the potential for meaningful differences in MSAT emissions among project alternatives.

Build Alternatives 1 and 2 would meet Category 2 project criteria because the project would improve traffic operations without adding substantial new capacity and, thus, would have low potential for MSAT effects. Nevertheless, an analysis of quantified MSAT emissions was conducted.

This analysis forecasts local-specific emission trends of the priority MSAT for each alternative, to use as a basis of comparison. **Table 2.2-15** represents the total project MSAT emissions for five scenarios: existing (2013); opening year (2020) under No-Build and Build conditions; and design year (2040) under the No-Build and Build conditions. The emissions are presented in grams per day of each pollutant for each scenario.

Table 2.2-15 Project Mobile Source Air Toxics Emissions (Grams per Day)

Pollutant	Existing	2020 No-Build	2020 Build Alt 1	2020 Build Alt 2	2040 No-Build	2040 Build Alt 1	2040 Build Alt 2
Benzene	547	293	298	298	254	256	256
Acrolein	21	10	10	10	9	9	9
Formaldehyde	596	302	314	314	297	309	309
Butadiene	96	46	47	47	40	40	40
Naphthalene	32	24	25	25	28	29	29
Polycyclic Organic Matter	9	5	5	5	6	6	6
Diesel PM [A]	1,295	488	489	489	556	552	552
Diesel Exhaust Organic Gases	2,003	1,114	1,176	1,176	1,209	1,283	1,282
Reactive Organic Gases	24,494	14,968	14,968	14,968	12,701	12,701	12,701
Nitrous Oxide	74,277	41,277	41,730	41,730	25,401	25,855	25,855

Note: Emissions calculations based on CT_EMFAC.

A. Diesel PM is a subset of PM2.5 that is emitted by diesel engines. Although diesel PM accounts for a small portion (less than 10%) of the overall PM2.5 emission inventory, it has been called out for special attention by CARB because of its toxicity.

Emissions for all MSATs are projected to decrease considerably over existing conditions. For example, diesel particulate matter (DPM) is projected to experience a decrease of approximately 60 percent by 2040 for the No-Build and Build Alternatives. However, due to increase in traffic during the peak period and increased travel speeds, DPM would be about 1 percent higher with the project than the No-Build scenario in 2020. Emission factors for DPM are lowest at 40 mph; therefore, increasing travel speeds can result in a slight increase in DPM emissions. MSAT emissions under the project would be slightly higher than the No-Build Alternative. Build Alternatives 1 and 2 have a slight variation (1 gram) related to diesel exhaust from minor differences in traffic conditions between the alternatives.

Additional Environmental Analysis

The Bay Area is considered a nonattainment area for ground-level O_3 and $PM_{2.5}$ under both the FCAA and the California Clean Air Act. The area is also considered non-attainment for PM_{10} under the California Clean Air Act, but not the federal Act. The area has attained both state and federal ambient air quality standards for CO. Transportation plans that have been found to conform to the SIP are not considered to cause or contribute to violations of ambient air quality standards.

Furthermore, a project included in a conforming plan would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard. Conforming transportation plans are subject to a threshold of no net increase in emissions. Because the project is included in Plan Bay Area 2040 and the 2015 TIP, which conform to the SIP, the project would not result in a cumulatively considerable net increase of any criteria pollutant.

Temporary Construction Impacts

Dust would be generated during grading and construction operations. The amount of dust generated would be highly variable and is dependent on the size of the area disturbed, amount of activity, soil conditions, and meteorological conditions.

Although grading and construction activities would be temporary, they would have the potential to cause both nuisance and health air quality impacts. Particulate emissions (PM_{10}) is the pollutant of greatest concern associated with dust. If uncontrolled, elevated PM_{10} levels could occur downwind

of actively disturbed areas. In addition, dust fall on adjacent properties could be a nuisance. If uncontrolled, dust generated by grading and construction activities would represent a significant impact.

Average daily construction exhaust emissions were modeled using the construction year (2020), total expected duration (24 months), and length of the project limits. Other model inputs such as area of disturbance and soil imported on a daily basis were estimated based on conservative and reasonable assumptions for similar construction projects.[9] **Table 2.2-16** presents these emissions for the project. The differences in construction emissions for each Build Alternative were so minor that the average daily construction emissions presented in **Table 2.2-16** apply to both Build Alternatives.

Table 2.2-16 Daily Maximum Construction Emissions

Project Phase	Maximum Daily Emission Estimates (lbs/day)					
	ROG	NOx	Exhaust PM_{10}	Fugitive Dust PM_{10}	Exhaust $PM_{2.5}$	Fugitive Dust $PM_{2.5}$
Grubbing/Land Clearing	2.5	20.3	1.0	2.5	0.9	0.5
Grading/Excavation	9.2	89.2	4.5	2.5	4.1	0.5
Drainage/Utilities/Sub-Grade	5.3	44.4	2.5	2.5	2.2	0.5
Paving	2.9	21.6	1.3	0.0	1.2	0.0
Average Daily Emissions	**5.0**	**43.9**	**2.3**	**1.9**	**2.1**	**0.4**

[9] Sacramento County Road Construction Emissions Model version 7.1.5.1 model defaults.

Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known Toxic Air Contaminant. Diesel exhaust poses both a health and nuisance impact to nearby receptors.

Construction activities will not last for more than five years at one general location, so construction-related emissions do not need to be included in regional and project-level conformity analysis (40 CFR 93.123(c)(5)).

No-Build Alternative

The No-Build Alternative assumes that the existing SR 242 corridor would remain in place and no further action of improvements would occur. The No-Build Alternative would not result in adverse effects to air quality.

AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

The following avoidance and minimization measures apply to both Build Alternatives because there are no unique effects specific to one Build Alternative.

Construction Related Minimization Measures

Measure AIR-1: The project will follow Caltrans' Standard Specification Sections 14-9.01 and 14-9.03, which addresses the requirements of the local air pollution control district (BAAQMD) and dust control and dust palliative application, respectively.

Measure AIR-2: The project will implement all feasible PM_{10} control measures required by the BAAQMD. The BAAQMD CEQA Guidelines provide feasible control measures for construction emissions, which will be finalized with the special provisions developed during final design phase. Measures to reduce PM_{10}, $PM_{2.5}$, and DPM from construction are recommended to ensure that short-term health impacts to nearby sensitive receptors are avoided.

Operational Related Measures

No avoidance, minimization, and/or mitigation measures are required for the operation of either selected Build Alternative, as the proposed improvements would not produce substantial operational air quality effects.

CLIMATE CHANGE

Climate change is analyzed in **Section 2.4, Climate Change**. Neither the U.S. EPA nor FHWA has issued explicit guidance or methods to conduct project-level greenhouse gas analysis. As stated on FHWA's climate change website (http://www.fhwa.dot.gov/hep/climate/index.htm), 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 aid 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.

Because there have been more requirements set forth in California legislation and Executive Orders on climate change, the issue is addressed in the **Section 2.4, Climate Change**, of this environmental document and may be used to inform the NEPA decision. The four strategies set forth by FHWA to lessen climate change impacts do correlate with efforts that the State has undertaken and is undertaking to deal with transportation and climate change; the strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and reduction in the growth of vehicle hours travelled.

CUMULATIVE IMPACTS

The cumulative setting for air quality includes the SF Air Basin and the jurisdictional boundaries of BAAQMD. Improved freeway operations and projected future development in the region would result in an increase in vehicle miles traveled within the SF Air Basin and related increases in vehicle emissions. Therefore, air quality impacts associated with transportation and other development projects in the SF Air Basin would result in cumulative effects to air quality for permanent operational pollutant emissions.

As previously discussed, transportation plans that have been found to conform with the SIP are not considered to cause or contribute to violations of ambient air quality standards. Furthermore, a project included in a conforming plan would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard. Conforming transportation plans are subject to a threshold of no net increase in emissions. Because the project is included in Plan Bay Area and 2015 TIP, which conform to the SIP, the project would not result in a cumulatively considerable net increase of any criteria pollutant.

2.2.7 NOISE

REGULATORY SETTING

NEPA and CEQA provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

California Environmental Quality Act

CEQA 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 CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless those measures are not feasible. The CEQA noise analysis is included at the end of this section.

National Environmental Policy Act and 23 CFR 772

For highway transportation projects with FHWA (and Caltrans, as assigned) involvement, the Federal-Aid Highway Act of 1970 and the associated implementing regulations (23 CFR 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations include noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 dBA) is lower than the NAC for commercial areas (72 dBA).[10] **Table 2.2-17** lists the noise abatement criteria for use in the NEPA 23 CFR 772 analysis.

Table 2.2-17 Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level, Leq(h)	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[1]	67 (Exterior)	Residential
C[1]	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A–D or F.
F	No NAC--- reporting only	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical, etc.), and warehousing.
G	No NAC--- reporting only	Undeveloped lands that are not permitted

Note: 1-Includes undeveloped lands permitted for this activity category.
Source: Caltrans, 2011. Traffic Noise Analysis Protocol

[10] dBA = A-weighted decibel

Figure 2.2-7 lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise levels discussed in this section with common activities.

According to Caltrans *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects, May 2011*, a noise impact occurs when the predicted future noise level with the project substantially exceeds the existing noise level (defined as a 12 dBA or more increase) or when the future noise level with the project approaches or exceeds the NAC. Approaching the NAC is defined as coming within 1 dBA of the NAC.

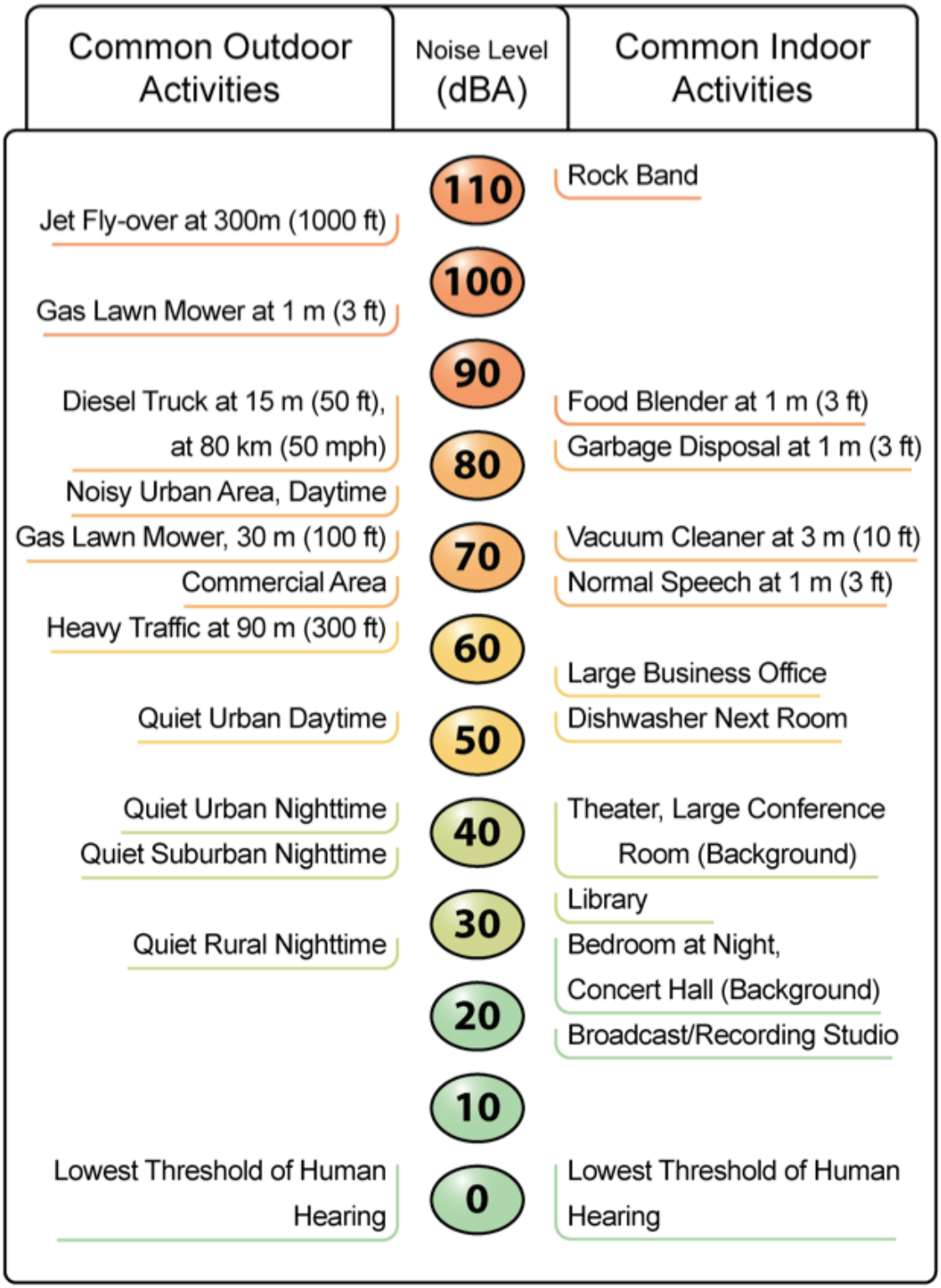
If it is determined that the project will have noise impacts, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This document discusses noise abatement measures that would likely be incorporated into the project.

Caltrans Traffic Noise Analysis Protocol sets forth the criteria for determining when an abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. A minimum 5 dBA reduction in the future noise level must be achieved for an abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety considerations.

Once all feasible noise abatement is identified, Caltrans conducts an assessment of the reasonableness of the noise abatement options. The determination of the reasonableness of noise abatement is more subjective than the determination of its feasibility. Reasonableness is the combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure. The overall reasonableness of noise abatement is determined by the following three factors:

- The noise reduction design goal (a barrier must be predicted to provide at least 7 dB of noise reduction at one or more benefited receptors)
- The cost of noise abatement (reasonable allowance of $80,000 per benefited receptor)
- The viewpoints of benefited receptors (including property owners and residents of the benefited receptors)

Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This document discusses noise abatement measures that would likely be incorporated into the project.



Noise Levels of Common Activities Figure **2.2-7**

Source: Caltrans, 2015i

AFFECTED ENVIRONMENT

Information in this section is based on a Noise Study Report (Caltrans, 2015i) and a Noise Abatement Decision Report (Caltrans, 2015h), approved in November 2014 and May 2015, respectively.

Noise Modeling

The project team worked closely with Caltrans to identify noise-sensitive land uses and select noise measurement and modeling receptor locations along the SR 242 corridor that represent the noise study area for this project. Short- and long-term field measurements were taken to document the current noise environment within the noise study area. Traffic counts were made for time periods corresponding to the short-term measurements. **Appendix H** includes detailed illustrations of the noise measurement locations evaluated for the project.

The FHWA Traffic Noise Model (TNM) was used to calculate existing and horizon year (2040) noise levels with or without the project. Short and long-term noise measurement results and concurrent traffic counts were used to calibrate the model. Noise measurement locations were used as noise modeling receivers for the prediction of existing and future worst-hour traffic noise levels. Additional modeled receptors points were added to the model calibrated based on the calibration factors determined at the measured locations. **Table 2.2-18** summarizes the long and short-term existing and future noise levels. Because the noisiest hours are related to free-flowing traffic conditions, there are no significant differences between the earlier construction opening year (2020) and design year (2040) scenarios. Design year 2040 results are therefore presented in this analysis to represent the worst-case noise scenario for the project.

Long-term (LT) reference noise measurements were made at three (3) locations along the SR 242 corridor to quantify the daily trend in noise levels and to establish the peak traffic noise hour. The noise measurements were made in July 2014, over a 24-hour period. Long-term noise measurement locations were selected to generally represent or act as model calibration points for human activity areas such as residential rear yard areas adjoining SR 242 or in areas considered to be acoustically equivalent to noise-sensitive exterior use areas. Care was taken to select sites that were primarily affected by highway traffic noise and to avoid those sites where extraneous noise sources such as barking dogs, pool pumps, or air conditioning units could contaminate the noise data. After the data was downloaded from the sound level meter, the data was reviewed to identify any time periods possibly contaminated by local noise sources.

Ten (10) short-term (ST) noise measurements were made concurrent with the data being collected at the long-term measurement sites. This facilitates a direct comparison between both the short-term and long-term reference noise measurements and allows for the identification of the worst-hour noise levels at Category B, C, D, and E land uses in the vicinity of the project limits where long-term noise measurements were not made. Two consecutive 10-minute measurements were made

at each noise measurement site. At all locations, noise levels were measured five feet above the ground surface and at least 10 feet from structures or barriers. Traffic counts and speed observation were also made during the short-term noise measurements for model calibration purposes.

Existing Conditions

The existing noise environment throughout the project limits varies by location, depending on site characteristics such as proximity to major roadways or other major sources of noise, the relative elevation of roadways and receptors, and any intervening structures or barriers. A summary of the existing and planned sensitive land uses within the noise study area and the current noise levels at these locations is provided below. Future development considered in the noise analysis include those that have received final development approval and are within approximately 500 feet of the centerline of SR 242, where traffic noise levels from the highway could dominate the noise environment. Future developments located beyond this distance are excluded from further analysis. Most of the land uses within the noise study area are built-out, and the review of Concord's Planning Division's list of current development projects found no noise-sensitive projects proposed near the project limits.

Currently, noise-sensitive activity Category B (residences), C (baseball fields), D (Contra Costa Mental Health Facility), and E land uses (the Premier Inn) are located within the noise study area. Three long-term noise measurements (LT-1 through LT-3) were made; one along Franquette Avenue, one at the Contra Costa County Mental Health Facility on Danzig Place, and the other at the Premier Inn on Concord Avenue. Ten (10) short-term noise measurements were made (ST-1 through ST-10) at nearby Activity Category B and E land uses. In addition, there are thirteen modeled receptor locations (R-1 through R-12a). As indicated in **Table 2.2-18**, existing worst-hour noise levels at short-term measurement locations range from 63 to 74 dBA Leq[h]. There are no existing noise barriers adjacent to SR 242 within the limits of the proposed improvements; however, there are existing sound walls located along the northbound and southbound SR 242 right-of-way, just north of Concord Avenue.

Table 2.2-18 Modeled Noise Levels

Receptor ID	Worst-Hour Noise Levels, Leq[h] dBA				Noise Increase Over Existing			Activity Category (NAC)	Impact[1]	
	Existing	2040 No-Build	2040 Build Alt 1	2040 Build Alt 2	2040 No-Build	2040 Build Alt 1	2040 Build Alt 2		2040 Build Alt 1	2040 Build Alt 2
R-1	67	67	67	67	0	0	0	B (67)	A/E	A/E
R-2	68	68	68	68	0	0	0	B (67)	A/E	A/E
R-3	65	65	65	65	0	0	0	B (67)	None	None
R-4	65	65	65	65	0	0	0	B (67)	None	None
ST-1	68	68	68	68	0	0	0	B (67)	A/E	A/E

Receptor ID	Worst-Hour Noise Levels, Leq[h] dBA				Noise Increase Over Existing			Activity Category (NAC)	Impact[1]	
	Existing	2040 No-Build	2040 Build Alt 1	2040 Build Alt 2	2040 No-Build	2040 Build Alt 1	2040 Build Alt 2		2040 Build Alt 1	2040 Build Alt 2
ST-2	65	65	65	65	0	0	0	B (67)	None	None
ST-3	70	70	70	70	0	0	0	Calibration	--	--
LT-1	75	75	75	75	0	0	0	Calibration	--	--
ST-4	73	73	73	74	0	0	1	E (72)	None[2]	None[2]
ST-5	73	73	73	73	0	0	0	B (67)	A/E	A/E
R-5	66	66	66	66	0	0	0	B (67)	A/E	A/E
ST-6	74	74	74	74	0	0	0	B (67)	A/E	A/E
R-6	65	65	65	65	0	0	0	B (67)	None	None
ST-7	72	72	72	72	0	0	0	B (67)	A/E	A/E
R-7	68	68	68	68	0	0	0	B (67)	A/E	A/E
LT-2	72	72	73	73	0	1	1	D (52)	None	None
ST-8	74	74	75	75	0	1	1	E (72)	None[2]	None[2]
R-8	65	65	65	65	0	0	0	E (72)	None	None
LT-3	66	66	66	66	0	0	0	Calibration	--	--
R-9	66	66	66	66	0	0	0	C (67)	A/E	A/E
R-10	66	66	66	66	0	0	0	C (67)	A/E	A/E
ST-9	63	63	63	63	0	0	0	B (67)	None	None
ST-10	64	64	64	64	0	0	0	B (67)	None	None
R-11	69	69	69	69	0	0	0	C (67)	A/E	A/E
R-12	69	69	69	69	0	0	0	B (67)	A/E	A/E
R-12a	70	70	70	70	0	0	0	B (67)	A/E	A/E

Notes:
1. Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC.
2. Although exterior noise levels approach or exceed the NAC at these receptors, there are no outdoor use areas located adjacent to these uses.

ENVIRONMENTAL CONSEQUENCES

The CFR (23 CFR 772) "Procedures for Abatement of Highway Traffic Noise" provides procedures for preparing operational and construction noise studies and evaluating noise abatement options. Under 23 CFR 772, projects are categorized as Type I or Type II projects. Type I projects are defined as proposed federal or federal-aid highway improvements for the construction of a highway on new location; or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment, or increases the number of through-traffic lanes. The FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location, the physical alteration of an existing highway where there is either a substantial horizontal or substantial vertical alteration, or other specifically listed activities in 23 CFR 772.7. Type I projects include the addition of an interchange, ramp, auxiliary lane, or truck-climbing lane to an existing highway, or the widening of an existing ramp by a full lane for its entire length. As the project would modify the existing partial interchanges at Clayton Road and Concord Avenue, including the construction of new on- and off-ramps, it is considered a Type I project. The FHWA noise regulations require noise analyses for all Type I projects.

Design year 2040 traffic noise conditions under the Build and No-Build Alternatives were modeled for the identified noise sensitive land uses, illustrated in **Appendix H. Table 2.2-18** presents the existing and future modeled noise levels for these land uses (receptors). The noise-sensitive receptors in the study area are mainly defined as Activity Category B land uses, which have an NAC threshold of 67 dBA. There are some Activity Category C and E land uses, and one category D land use; their respective NACs are also shown in **Table 2.2-18**. Noise levels predicted to approach or exceed the NAC must be evaluated for potential noise mitigation/abatement measures.

Build Alternative 1

As shown in **Table 2.2-18**, the overall existing worst-hour noise levels at measured and modeled receptors range from 64 to 75 dBA Leq[h] throughout the noise study area. Noise level increases over existing conditions range from 0 to 1 dBA under Build Alternative 1 which is not considered a substantial noise increase (greater than 12 dBA).

Build Alternative 1 noise levels are predicted to approach or exceed the NAC at the recently constructed Monument Corridor Trail (R-11), first row residences and some second row residences along the east side of SR 242 and Market Street and south of Clayton Road (ST-1, ST-5, ST-6, ST-7, R-1, R-2, R-5, and R-7); multi-family residential patios along Clayton Avenue and east of Market Street (R-12 and R-12a); and at the baseball fields located east of SR 242, north of Concord Avenue (R-9 and R-10). None of these receptors are currently shielded by noise barriers. Noise abatement in the form of new sound walls was considered for these receptors, as discussed in the *Avoidance, Minimization, and Mitigation Measures* section below.

The Contra Costa County Mental Health Facility (LT-2) was identified as a Category D land use. A visual inspection of this Category D facility revealed that the facility is mechanically ventilated, of light frame brick and stucco construction, with dual thermal pane insulating windows. This type of

construction provides a minimum noise reduction of 25 dBA indoors. Traffic noise modeling results show that exterior noise levels at the façade of the facility would reach 73 dBA Leq[h] in design year 2040. Interior noise levels would be expected to be 48 dBA Leq[h] or less which is below the NAC of 52 dBA Leq[h] for Category D land uses.

Although exterior noise levels are predicted to exceed the NAC at some Category E office uses to the west of SR 242, none of these areas have exterior uses that would be sensitive to noise. Interior noise levels in these offices would be reduced through building construction methods and are not considered Category D land uses. Therefore, further noise abatement is not assessed for these interior uses.

Build Alternative 2

Similar to Build Alternatives 1, noise level increases over existing conditions range from 0 to 1 dBA under Build Alternative 2, which is not considered a substantial noise increase.

As shown in **Table 2.2-18**, by design year 2040, noise levels are predicted to approach or exceed the NAC at the same locations as under Build Alternative 1 described above. Noise abatement in the form of new sound walls is considered for these receptors, as discussed in the *Avoidance, Minimization, and Mitigation Measures* section below.

No-Build Alternative

As shown in **Table 2.2-18**, under the 2040 No-Build conditions, noise levels are not anticipated to increase over existing conditions in any locations. Many locations are exposed to noise levels approaching or exceeding the NAC under existing conditions and would continue to experience noise levels approaching or exceeding the NAC under both the 2040 Build and No-Build conditions.

The No-Build Alternative would make no physical or operational improvements to SR 242, nearby roadways, or interchanges; therefore, noise abatement for those areas already approaching or exceeding the NAC thresholds would not be considered for this alternative.

Temporary Construction Impacts

Noise generated by project-related construction activities would be a function of the noise levels generated by individual pieces of construction equipment, the type and amount of equipment operating at any given time, the timing and duration of construction activities, the proximity of nearby sensitive land uses, and the presence or lack of shielding at these sensitive land uses. Construction noise levels would vary on a day-to-day basis during each phase of construction depending on the specific task being completed.

Construction phases anticipated with the project would include demolition; earthwork; excavation; grading; concrete work; pile driving; construction of new ramp structures; relocation of utilities; paving; and the installation of overhead signs, ramp metering lights, and lighting. The scope of work involved for the project entails roadway work beyond the immediate SR 242 corridor, primarily related to the new ramp locations and local roadway improvements. There are no construction noise effects specific to one of the individual Build Alternatives since the main

elements of each alternative are similar, and would require the same types of construction methods at similar distances from the noise-sensitive land uses in the study area. The temporary construction noise effects discussed in this section apply both Build Alternatives 1 and 2.

Table 2.2-19 presents the noise levels calculated at 100 feet for each major construction activity Noise generated by construction equipment drops off at a rate of 6 dBA per doubling of distance.

Table 2.2-19 Construction Equipment Noise Levels at 100 Feet

Construction Phase	Maximum Noise Level (Lmax, dBA)	Hourly Average Noise Level (Leq[h], dBA)
Demolition	84	78
Earthwork	76	78
Paving	79	79
Structures (with Pile Driving)	95	89
Structures (without Pile Driving)	77	78

Construction of the project is anticipated to occur during both daytime and nighttime hours. As indicated in **Table 2.2-19**, most construction phases would generate average noise levels that would exceed ambient daytime noise levels by 5 to 10 dBA Leq[h] in unshielded locations. Such receptors include the Category B residences located along Market Street and Clayton Road. As described, construction activities would be similar for Build Alternatives 1 and 2 in this area; therefore, noise levels in this area are not viewed to differ between the Build Alternatives. Maximum instantaneous noise levels generated by typical construction activities would generally be at or below existing maximum noise levels generated by traffic. Receptors shielded by structures would be exposed lightly lower construction noise levels because the shielding provided by the intervening structures would attenuate some of the construction noise. Demolition or construction of structures involving impact tools or pile driving would generate average noise levels approximately 15 to 20 dBA Leq[h] higher than ambient noise[11] conditions.

AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Receptors that would experience a substantial noise increase (greater than 12 dBA) or approach/exceed NAC thresholds must be evaluated for potential abatement measures. Noise abatement is considered only where frequent human use occurs and where a lowered noise level

[11] Ambient noise is all noise present in a given environment, including noises generated by transportation, mechanical, human, and natural noise sources.. Such noise includes nearby and distant sources.

would be of benefit. Noise abatement must be predicted to provide at least a 5 dBA minimum reduction at an impacted receiver to be considered feasible by Caltrans (i.e., the barrier would provide a noticeable noise reduction). Additionally, Caltrans' acoustical design goal for noise abatement is that noise abatement must be predicted to provide at least 7 dBA of noise reduction at one or more benefited receptors. Noise abatement measures that provide noise reduction of more than 5 dB are encouraged as long as they meet the reasonableness guidelines. Furthermore, under Caltrans' policies, noise barriers should interrupt the line of sight between a truck stack (assumed to be 11.5 feet high) and a receiver (assumed to be 5 feet above ground).

Potential noise abatement measures identified in Caltrans' protocol include:

- avoiding the project impact by using design alternatives, such as altering the horizontal and vertical alignment of the project
- constructing noise barriers
- using traffic management measures to regulate types of vehicles and speeds
- acquiring property to serve as a buffer zone
- acoustically insulating Activity Category D land uses

The chosen abatement type for the Build Alternatives would be the construction of noise barriers. A preliminary noise abatement analysis was conducted that identified the feasibility of constructing, replacing, or increasing the height of existing noise barriers to reduce traffic noise levels. If during final design conditions have substantially changed, noise abatement may, or may not, be necessary. The final decision on noise abatement will be made upon completion of the project design and the public involvement processes.

The views and opinions of the residents living immediately adjacent to the proposed improvements and affected by the traffic noise would be considered in reaching a decision on noise abatement measures. Caltrans' policy is to not provide noise barriers if 50 percent or more of those affected residents do not want them. The opinions of these residents would be obtained through public and community meetings or other means, as appropriate.

Noise Abatement Decision Report

A Noise Abatement Decision Report was prepared using the *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects, May 2011* guidance. This protocol incorporates the CFR (23 CFR 772) "Procedures for Abatement of Highway Traffic Noise", which requires that noise abatement be considered for projects that are predicted to result in potential traffic noise impacts.

Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This document discusses noise abatement measures that would likely be incorporated into the project.

Noise Barriers (Build Alternatives 1 and 2)

Based on the studies completed to date, Caltrans considered incorporating noise abatement in the form of noise barriers at three locations. **Appendix H** includes detailed representations of the noise measurement locations and proposed noise barrier locations for the Build Alternatives. Receptors that would experience noise levels at or above the NAC are the same between the Build Alternatives conditions. As such, the locations of these noise barriers are the same for Build Alternatives 1 and 2.

The final decision to include noise barriers in the proposed project design must consider reasonableness factors, such as cost-effectiveness, as well as other feasibility considerations including topography, access requirements, other noise sources, safety, and information developed during the design and public review process. All three barriers were found to be acoustically feasible and to also achieve the Caltrans noise reduction design goal (minimum 7 dB reduction for at least one receptor).

Table 2.2-20 summarizes the feasibility of noise barriers and provides the results of the reasonableness allowance calculations. All three barriers would cost more to construct than the total reasonable allowance, and are therefore not recommended for incorporation into the project design.

Table 2.2-20 Noise Abatement Summary (Build Alternatives 1 and 2)

Noise Barrier ID (length)	Barrier Height (feet)	Acoustically Feasible	Number of Benefited Receptors	Total Reasonable Allowance	Estimated Construction Cost	Preliminarily Recommended
1 (3,840 ft)	16	yes	36	$2,880,000	$4,981,000	no
2 (580 ft)	8	yes	4	$320,000	$1,011,000	no
	10	yes	4	$320,000	$1,049,000	no
	12	yes	4	$320,000	$1,106,000	no
	14	yes	4	$320,000	$1,159,000	no
	16	yes	4	$320,000	$1,228,000	no
3 (450 ft)	12	yes	8	$640,000	$890,000	no
	14	yes	8	$640,000	$943,000	no
	16	yes	8	$640,000	$1,010,000	no

Noise Barrier 1

Proposed Barrier 1 would be located along northbound SR 242 between Walnut Creek and Clayton Road, and would be approximately 3,840 feet long and 16 feet tall. Noise Barrier 1 would reduce noise levels by 6 to 7 dBA for the newly constructed Monument Corridor Trail and the residences along Market Street, at a cost of $4,981,000. The total reasonable allowance for Noise Barrier 1 is $2,880,000. Therefore, Noise Barrier 1 is not recommended as the cost of the barrier is almost double the reasonableness allowance.

Noise Barrier 2

Proposed Noise Barrier 2 would be located along the SR 242 northbound on-ramp from Concord Avenue, and would be approximately 580 feet long and between 8 to 16 feet tall. Noise Barrier 2 would reduce noise levels by 6 to 8 dBA for the Mt. Diablo High School baseball fields, located east of SR 242 and north of Concord Avenue, for a cost of $1,011,000 to $1,228,000 depending on the chosen height of the barrier. The total reasonableness allowance for Noise Barrier 2 is $320,000. Therefore, Noise Barrier 2 is not recommended as the cost of the barrier is more than three times the reasonableness allowance.

Noise Barrier 3

Noise Barrier 3 would be located along the edge of shoulder of eastbound Clayton Road from Market Street to Pine Street, over an approximate distance of 450 feet and with average heights between 12 and 16 feet. Calculations based on preliminary design data show that Noise Barrier 3 would reduce noise levels by 5 to 7 dBA for an existing multi-story residential apartment building at 1580 Clayton Road at a cost of $890,000 to $1,010,000, depending on the chosen height of the barrier. The total reasonable allowance for Noise Barrier 3 is $640,000. Noise Barrier 3 is not recommended as the cost of the barrier reaches almost double the reasonableness allowance. It is also important to note that when a proposed barrier exceeds 14 feet in height, it must be located 15 feet from the edge of the traveled way. The existing ground-level patios and apartment structure are approximately 20 feet from the edge of the Clayton Road travel way; however, there are a number of large trees, apartment access walkways, transformer boxes, street lights, and other utility boxes that would make the construction of Noise Barrier 3 potentially infeasible.

Construction Noise

Measure NOI-1: To reduce the potential for noise impacts resulting from construction activities, the following measures would be implemented during construction:

- Noise-generating construction activities should be restricted to between 7:30 AM and 6:00 PM, weekdays (except on holidays), where feasible.
- All construction equipment should conform to Section 14-8.02, Noise Control, of the latest Standard Specifications.
- Pile driving activities should be limited to during the off-peak commute hours of the daytime (from 9am to 3pm).

- Equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Locate stationary noise generating equipment at least 100 feet from sensitive receptors when sensitive receptors adjoin or are near a construction project area, or shield receptors from stationary noise generating sources with noise barriers or acoustical enclosures.
- Unnecessary idling (i.e., greater than 5 minutes in duration) of internal combustion engines within 100 feet of residences should be prohibited, where feasible.
- Utilize "quiet" air compressors and other "quiet" equipment where such technology exists.
- Avoid staging of construction equipment or vehicles within 200 feet of residences.
- The contractor should prepare a detailed construction plan identifying the schedule for major noise-generating construction activities and distribute this plan to adjacent noise-sensitive receptors. The construction plan should also list the construction noise reduction measures identified in this study.

CEQA NOISE ANALYSIS

The CEQA noise analysis is independent of the NEPA 23 CFR 772 analysis discussed previously in this section, which is centered on federal NAC thresholds. Under CEQA, the assessment entails looking at the setting of the noise impact and then how large or perceptible any noise increase would be in the given area. Key considerations include: the uniqueness of the setting, the sensitive nature of the noise receptors, the magnitude of the noise increase, the number of residences affected, and the ambient and project generated noise levels.

As shown in **Table 2.2-18**, the existing worst-hour noise levels at measured and modeled receptors are calculated to range from 64 to 75 dBA Leq[h]. A 0 to 1 dB increase over existing conditions is anticipated under either Build Alternative 1 or 2. This 1 dB increase would not be perceptible to the human ear. Therefore, under CEQA, no significant noise impact would occur as a result of the project and no mitigation is required.

CUMULATIVE IMPACTS

The cumulative setting for noise is equivalent to the noise study area evaluated above, and encompasses all developed land uses surrounding the proposed Build Alternatives, with a focus on noise-sensitive receivers. Noise-sensitive land uses in the vicinity of the project limits include single- and multi-family residences, active recreational areas, hospitals, and hotels. Most of the areas adjacent to SR 242 are built-out, and there are no projects planned and programed in the immediate vicinity of the project limits.

The noise study conducted for the project utilized traffic volumes based on the CCTA Travel Demand Model (as modified to ensure that the model accurately reflected planned and funded land-use development and transportation projects expected to be in place by 2020 and 2040). As such, the noise study conducted for the project analyzed cumulative conditions within the study area.

As shown in **Table 2.2-18**, a 0 to 1 dBA increase over existing conditions is anticipated under Build Alternatives 1 and 2. This 1 dBA increase would not be perceptible to the human ear. Therefore, no significant noise impact would occur as a result of the Build Alternatives, thus there would be no contribution to a cumulatively considerable impact.