2.2 Physical Environment

2.2.1 Hydrology and Floodplain

The information in this section is from the *Location Hydraulics Study/Floodplain Study*, completed by the Department in September 2004.

2.2.1.1 REGULATORY SETTING

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

The 100-year 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 100-year floodplain."

2.2.1.2 AFFECTED ENVIRONMENT

The Caldecott Tunnel is part of the State Route 24 corridor, which runs in an east-west alignment between Alameda and Contra Costa Counties. The Tunnel passes through the Berkeley Hills, which are part of the westernmost ridge of the East Bay Hills. The mean annual rainfall for the project site is about 66 centimeters (26 inches) per the Alameda County Flood Control and Water Conservation District's Mean Annual Precipitation Chart. Precipitation occurs mostly between November and April with relatively dry conditions the remaining months of the year.

The project site is not located within a Federal Emergency Management Agency (FEMA) designated 100-year floodplain.

2.2.1.3 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

The Alameda County portion of the project lies within the Tunnel Branch sub-shed of the Temescal Creek Watershed. The Tunnel Branch of Temescal Creek has also been referred to as Caldecott Creek. Construction of the highway approach to the Caldecott Tunnel required the lower reach of the Temescal Creek Tunnel Branch to be culverted to its outlet into Lake Temescal. Prior to 1986, storm runoff from the highway (from east of the lake to the Tunnel) discharged into Lake Temescal. After roadway modification was completed, highway pavement runoff (from east of the Lake to the Tunnel) was diverted from the lake to a discharge point just downstream of the lake. Tunnel wash water is also diverted, via a drainage-gated connection, to a sanitary sewer line near the eastbound Broadway off-ramp just before the Tunnel entrance. This concept would be perpetuated in the storm drain design for both Alternatives 2N or 3N.

The portion of State Route 24 in Contra Costa County is within the upper reaches of the San Pablo Creek Watershed. Storm runoff from this portion of the watershed, which includes the highway, is collected within a median drainage trunk line and conveyed to San Pablo Creek near the State Route 24 Interchange at Orinda. This would not change with the construction of a fourth bore under either alternative 2N or 3N..

2.2.2 Water Quality and Storm Water Runoff

The information in this section is from the *Revised Water Quality Report for the Caldecott Improvement Project*, September 2005, Caltrans, District 4, Office of Water Quality.

2.2.2.1 REGULATORY SETTING

The primary federal law regulating Water Quality is the Clean Water Act (CWA), issued by the U.S. Environmental Protection Agency (EPA). The EPA delegated its authority in California to the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCB). The RWQCB prepares and adopts the Water Quality Control Plan, (Basin Plan), a master policy document for managing surface and groundwater quality in the region. The State Water Resources Control Board and the Regional Water Quality Control Board issue permits, which implement the standards included in the Basin Plan as well as other requirements of the State Water Code and the federal Clean Water Act.

Section 401 of the CWA requires a water quality certification from the SWRCB or RWQCB when a project: 1) requires a federal license or permit (a Section 404 permit is the most common federal permit for Department projects), and 2) will result in a discharge to waters of the United States.

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permit system, which directs that storm water discharges are point source discharges and establishes a framework for regulating municipal and industrial storm water discharges. To ensure compliance with the CWA Section 402 the SWRCB has issued Caltrans an NPDES Statewide Storm Water Permit to regulate storm water discharges from Caltrans facilities (Order No. 99-06-DWQ, CAS000003).

In addition, the SWRCB has issued a statewide Construction General Permit for construction activities (Order No. 98-08-DWQ, CAS000002) that applies to all storm water discharges from land where clearing, grading, and excavation result in disturbances of at least 0.4 hectare (1 acre) or more. Construction activity that results in soil disturbances of less than 0.4 hectare (1 acre) is subject to the General Permit if the construction activity is part of a larger Common Plan of Development totaling 0.4 hectare (1 acre) or more of soil disturbing activities, or if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. All projects that are subject to the construction general permit require a Storm Water Pollution Prevention Plan (SWPPP). Caltrans' construction projects that are less than 0.4 hectare (1 acre) need to incorporate Water Pollution Prevention Plans (WPCP).

Additional laws regulating water quality include the Porter-Cologne Water Quality Act. Safe Drinking Water Act, and Pollution Prevention Act. State water quality laws are codified in the California Water Code, Health and Safety Code, and Fish and Game Code Section 5650-5656.

2.2.2.2 AFFECTED ENVIRONMENT

The project is located within the San Francisco Bay Regional Water Control Board (RWQCB) jurisdiction (Region 2), which is responsible for implementation of State and Federal water quality protection laws and regulations in the vicinity of the project site.

Storm Water

The Caldecott Tunnel is part of the State Route 24 corridor, which runs in an east-west alignment between Alameda and Contra Costa Counties. The project segment in Alameda County is within the San Francisco Bay Central Watershed, and more specifically, the Tunnel Branch sub-shed of the

Temescal Creek Watershed. In Contra Costa County, the project is within the San Pablo Creek Watershed, which is part of the San Pablo Basin Watershed.

A vertical crest in the highway profile exists about 150 meters (492 feet) beyond the East Portals of the three bores. Within this distance, pavement runoff generated by the roadway approach to the first two bores flows into the tunnels and is collected by their internal drainage systems. A drainage system located outside the entrance to the third bore collects runoff generated from the highway approach and the surrounding contoured area below Fish Ranch Road and the road leading to the Fish Ranch Road westbound State Route 24 on-ramp. The drainage system connects to the third bore's tunnel drainage system at a manhole located in the roadway, just inside the tunnel. The proposed roadway approach to the fourth bore lies within the contoured area that drains to the third bore's drainage system. The drainage system within the existing three bores flow westerly and connects to the State Route 24 drainage system at the westerly approach to the tunnels.

Construction of the State Route 24 westerly approach to the Caldecott Tunnel required the lower reach of the Temescal Creek Tunnel Branch to be culverted to its outlet into Lake Temescal. The existing highway drainage system between the Lake Temescal and the Caldecott Tunnel collects pavement runoff and conveys it to a discharge point just downstream of Lake Temescal. No storm runoff generated by State Route 24 between the lake and the Caldecott Tunnel is discharged into Lake Temescal. Runoff from shed areas outside of the State right-of-way, including local frontage roads tributary to the Tunnel Branch of Temescal Creek, is discharged into Lake Temescal. State Route 24 storm water runoff drains into a City of Oakland system, which generally follows the alignment of Temescal Creek. Oakland's system crosses State Route 24 at various locations and eventually passes under Interstate 80, south of Powell Street, where it outfalls to the Bay, approximately 4 kilometers (2.5 miles) away from project site. Temescal Creek has been culverted for most of its alignment, with some open channel sections along its lower reaches.

On the Contra Costa side, storm water runoff from the freeway and large offsite tributary sheds, is conveyed in a drainage system located within the median of State Route 24. At the Orinda/Moraga Avenue off-ramp, the drainage system angles to the west and outlets to an open channel adjacent to the off-ramp. At the base of the ramp the channel connects to San Pablo Creek, which is culverted under State Route 24. San Pablo Creek eventually outfalls to San Pablo Reservoir, located more than 4.8 kilometers (3 miles) away from the point where the project discharges into San Pablo Creek. Thus, the project would not have water quality impacts to the reservoir.

The Region 2 RWQCB Basin Plan establishes beneficial uses for waterways and water bodies within the region. There are no listed beneficial uses for Temescal Creek. San Pablo Creek's existing beneficial uses include fish migration, non-contact water recreation, fish spawning, warm freshwater habitat, and wildlife habitat.

Per Section 303(d) of the 1972 Clean Water Act, California has developed a list of water quality limited segments. Although San Pablo Creek is listed on EPA's 303(d) List of Water Quality Limited Segments for Diazinon, this pollutant is not found at levels of concern as a product of roadway runoff.

The proposed tunnel alternatives and highway approaches will have the same profile as the existing facilities. As such, new drainage facilities will convey roadway storm water in the same manner that currently exists.

Non-Storm Water Discharges

The existing tunnels are periodically washed as a standard routine maintenance procedure. The cleaning frequency is approximately once every couple months and it takes a minimum of three-night

time shifts to clean one bore. The existing tunnels are washed with a biodegradable soap. The existing highway storm drain system at the west portal has manually operated gates that allow the maintenance crew to divert flow emanating from within, and immediately downstream of, the Caldecott Tunnel to a nearby sanitary sewer system. The nearby sanitary sewer system is under the jurisdiction of the East Bay Municipal Utility District (EBMUD). Caltrans has an agreement with EBMUD to allow the periodic discharge of tunnel wash water into the sanitary sewer system.

The tunnel wash water from the new bore is proposed to be addressed in a similar fashion.

Groundwater

This project is located in the East Bay Plain Groundwater Basin. The existing beneficial uses of this groundwater resource according to the Basin Plan include municipal and domestic water supply, industrial process water supply, industrial services water supply, and agricultural water supply. The two most significant geologic units in the vicinity of this project are the chert-rich Claremont Formation and the basalt of the Moraga Formation. The Claremont Formation has the organic shale condition which allows groundwater migration into the adjacent, stratigraphically higher Orinda Formation within which, groundwater moves relatively freely through the more permeable sandstone beds, but is impeded by claystone beds and by occasional bentonite seams. Restriction of groundwater flow results in an accumulation of water at and above the contact zone of these layers. Flow occurs along these contact zones between formations when gradients are sufficient and often exits the hillside in the form of springs or seepage.

Currently, the existing Caldecott Tunnel and the two lower-elevation BART tunnels are fitted with lining subdrain systems that continuously produce water and therefore serve to drain the formations and reduce static head in the vicinity of the proposed new bore. For the new tunnel, an undertrain has been recommended at each side of the pavement inside the tunnel to protect the roadway from any groundwater infiltration. The underdrain system will drain in the same manner that currently exists.

2.2.2.3 WATER QUALITY IMPACTS

Storm Water

The Department has performed many studies to monitor and characterize highway storm water runoff throughout the State. Commonly found pollutants are Total Suspended Solids (TSS), nitrate nitrogen, Total Kjeldahl Nitrogen (TKN), phosphorous, Ortho-phosphate, Copper, Lead and Zinc. Some sources of these pollutants are natural erosion, phosphorus from tree leaves, combustion products from fossil fuels, and the wearing of break pads.

No Build: The no build would have water quality impacts due to continuing congestion, leading to a greater deposition of particulates from exhaust and heavy metals from braking.

Alternative 2N: The two-lane alternative would have less water quality impacts than the three-lane alternative due to less disturbed soil area and less amount of impervious area added to the approaches just outside of the tunnel portals. Preliminary calculations estimate 1.1 hectares (2.8 acres) of added impervious for the two-lane alternative. This equates to 0.06 cubic meter per second (2.2 cubic feet per second) of added surface water run-off using a 25 year storm event, 10 minute storm duration.

Alternative 3N: The three-lane alternative would have the most water quality impacts of the three alternatives. Preliminary calculations estimate 1.7 hectares (4.1 acres) of added impervious for the two-lane alternative. This equates to 0.09 cubic meter per second (3.2 cubic feet per second) of added surface runoff using a 25-year storm even, 10-minute storm duration.

The amount of additional runoff, however, is negligible for either the two-lane or three-lane new tunnel. The net impact of these changes on water quality and pollutant loading would be minimized with the proposed facility improvements, use of temporary construction site best management practices (BMPs), permanent Design Pollution BMPs, and permanent treatment BMPs if required.

Groundwater

Groundwater will be encountered during tunnel excavation. Early discussion shall be initiated regarding the handling and disposal of this water during the design phase. Also, the groundwater will be tested for potential contamination as a part of the Hazardous Waste Site Investigation. Proper handling and disposal of the groundwater will be based on the levels of contaminants reported in the Site Investigation Report. The main pollutant will be sediment. Temporary containment systems are proposed in combination with other sediment removal measures to reduce sediment loads down to acceptable thresholds that allow for discharge into the existing storm drain system.

During the construction of the first and second bores, groundwater flows of 4 to 570 liters (1.06 to 150.6 gallons) per minute were encountered in the Orinda Formation. During the 1964 BART tunnel construction, flows of groundwater ranged from negligible to 20 liters (5.3 gallons) per minute. Localized groundwater inflows may be encountered during tunnel excavation. On-site containment and treatment devices will be used to temporarily hold and treat the groundwater. Treated groundwater will be under permit agreement from the East Bay Municipal Utility District (EBMUD), into the existing sanitary sewer line near the eastbound Broadway Off-ramp just prior to the Caldecott Tunnel entrance. This existing sanitary inlet currently receives the Caldecott Tunnel wash water.

2.2.2.4 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

1) Section 401 of the Clean Water Act

Since there will be impacts to existing wetlands and Waters of the US within the project limits, an Army Corps 404 permit will be required along with a 401 Water Quality Certification from Region 2, RWQCB.

Any impacts to the Waters of the US will be minimized. Mitigation measures will be considered for any unavoidable impacts.

2) Section 402 of the Clean Water Act

According to the Department's NPDES permit and the Construction General Permit, Best Management Practices (BMPs) will be incorporated into this project to reduce the discharge of pollutants during construction as well as permanently to the Maximum Extent Practicable (MEP). These BMPs fall into three categories, Temporary Construction Site BMPs, Design Pollution Prevention BMPs, and Permanent Treatment BMPs.

(a) Construction Site BMP

Construction Site BMPs are implemented during construction activities to reduce pollutants in storm water discharges throughout construction. One critical construction activity, dewatering, will be necessary for this project because of the likelihood of encountering groundwater during tunnel excavation. Early discussion will be initiated regarding the handling and disposal of this water during the design phase. Groundwater will be treated and discharged into the sanitary sewer inlet of EBMUD under permit agreements. Dewatering BMPs and temporary holding devices such as Baker Tanks will be included in the special contract provisions to meet the dewatering requirements.

Grading of existing slopes will be required. However, the use of retaining structures, especially in excavation areas, will minimize the amount of grading required. Temporary fences, construction entrance/exit and temporary soil stabilizers are some of the temporary erosion and water pollution control measures that will be utilized in combination to prevent and minimize soil erosion and sediment discharges during construction. Given a projected disturbance of greater than 0.4hectares (1 acre),, Storm Water Pollution Prevention Plan (SWPPP) will be developed during construction. This dynamic document addresses the deployment of various erosion and water pollution control measures that are required commensurate to changing construction activities.

(b) Permanent Design Pollution Prevention BMPs

Design Pollution Prevention BMPs are permanent measures to improve storm water quality by reducing erosion, stabilize disturbed soil areas, and maximize vegetated surfaces. Erosion control measures will be provided on all disturbed areas.

As earlier noted, the use of retaining wall structures will minimize the amount of open disturbed soil. Erosion control measures will utilize a combination of source and sediment control measures to prevent and minimize erosion from soil disturbed areas. Source controls will utilize erosion control netting in combination with hydroseeding. The biodegradable netting is effective in providing good initial mechanical protection while seed applied during the hydroseeding operation germinates and establishes itself. Other forms of source control such as tacked straw will also be used when applicable. Sediment controls such as biodegradable fiber rolls are used to retain sediments and to help control runoff from disturbed slope areas.

Outlet protection and velocity dissipation devices placed at the downstream end of culverts and channels are also Design Pollution Prevention BMPs that reduce runoff velocity and control erosion and scour. The need of these devices for this project will be further investigated during the design phase.

(c) Permanent Treatment BMPs

Since this project is considered a major reconstruction project, with an estimated disturbed soil area over 1.2 hectares (3 acres) for all alternatives except the No-Build, it is not exempt from the consideration process for evaluating whether incorporating Treatment BMPs are feasible. Treatment BMPs are permanent devices and facilities treating storm water runoff. Caltrans approved Treatment BMPs are Biofiltration Swales, Infiltration Basins, Detention Basins, Traction Sand Traps, Dry Weather Flow Diversions, Media Filters, Gross Solids Removal Devices (GSRDs), Multi-chamber Treatment Trains, and Wet Basins. Those most feasible in the Bay Area are Biofiltration Swales, Infiltration Basins, Detention Basins, Dry Weather Flow Diversions, Media Filters, Multi-chamber Treatment Trains, and Wet Basins.

For either alternative, it is proposed to include a Dry Weather Flow Diversion device to accommodate tunnel washing and for emergency spills. Dry Weather Flow Diversion Devices direct flow through a pipe or channel to a local municipal sanitary sewer system for conveyance and treatment at a local wastewater treatment plant during dry weather. As previously mentioned, the existing tunnels currently have these devices to route tunnel washings to EBMUD, and similarly, the new bore will propose this device as well.

For the Alameda County side of the project, preliminary investigations show that media filters may be feasible to treat roadway runoff. On the Contra Costa side of the tunnel, biofiltration swales,

infiltration basins, and detention basins were evaluated as possible types of Treatment BMPs. During the design phase, the feasibility of these alternatives will be further investigated.

2.2.3 Climate/ Topography/Geology / Soils/ Seismic

The information in this section is summarized primarily from a memorandum/report entitled *Geologic Information for Caldecott Tunnel Fourth Bore EIR* from the Department's Office of Geotechnical Design, dated June 15, 2004.

This section discusses climate, topography, geology, soils, and seismic concerns as they relate to public safety and project design.

2.2.3.1 REGULATORY SETTING

The Historic Sites Act of 1935 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.

2.2.3.2 AFFECTED ENVIRONMENT

A preliminary geotechnical report was prepared to present existing geologic, and geotechnical information. Earth Mechanics, Inc. completed the technical report for Parsons Brinckerhoff and the Department in February 2003.

Climate

The climate of the project area is Mediterranean, characterized by mild, wet winters, and warm, dry summers. Only five percent of the total precipitation falls during the summer and early fall. Proximity to the Pacific Ocean results in cool, overcast mornings with clearing by midday and strong westerly sea breezes. Winter rains generally originate in the Gulf of Alaska and descend south and east. The clearest days of the year are during spring and autumn, transitioning between the rain clouds of winter and the overcast of summer. The hottest days are typically during early autumn, when dry, offshore winds from the northeast replace cool sea breezes, eliminating the natural cooling effect of the Pacific Ocean.

Topography

The project site is located within the Coast Range physiographic province, an area comprising northwest-southeast trending hills and valleys bounded by the Pacific Ocean on the west and the Great Valley physiographic province on the east. The project site is within the East Bay Hills, a group of low-elevation hills and narrow valleys bounded by the San Francisco Bay to the west and the San Ramon and Ygnacio Valleys to the east. The westernmost ridge of these hills comprises the Berkeley Hills, through which the Caldecott Tunnel has been excavated. Slopes of the Berkeley Hills are typically up to 25 percent.

Ridges of the Berkeley Hills rise from the San Francisco Bay plain to over 450 meters (1576 feet) in several locations; the average elevation is between 300 and 400 meters (984 to 1312 feet). The change in elevation between the coastal plain and the East Bay Hills is abrupt and coincident with the northwest-southeast trending Hayward Fault. The eastern flank of the East Bay Hills is more gradual, descending to lower elevations in the eastern valleys.

Numerous ephemeral streams that drain primarily southwesterly along the western ridge and irregularly along the eastern flank cut the vicinity of the project area. Principal drainages include Claremont Creek to the northwest and Temescal Creek to the south. State Route 24 is located in an unnamed southwest-flowing drainage.

Regional Geology

The project is in the Coast Range Geomorphic Province of California. The Caldecott Tunnel is located on the western margin of the East Bay Hills, more specifically the Berkeley Hills, a transition between the northern and southern Coast Ranges. The terrain of the project area is controlled by the interaction of splays of the San Andreas Fault system.

The East Bay Hills consist of faulted and folded strata ranging from Cretaceous to Pliocene in age. This packet or block of strata is bounded on the east by the Calaveras Fault and on the west by the Hayward Fault. Both faults are primary members of the San Andreas Fault system and are primarily right-lateral strike-slip faults. Right-lateral strike-slip faults are near-vertical faults in which the sense of movement across the fault is horizontal and to the right. The East Bay Hills are primarily the result of the interaction between the Hayward and the Calaveras Faults.

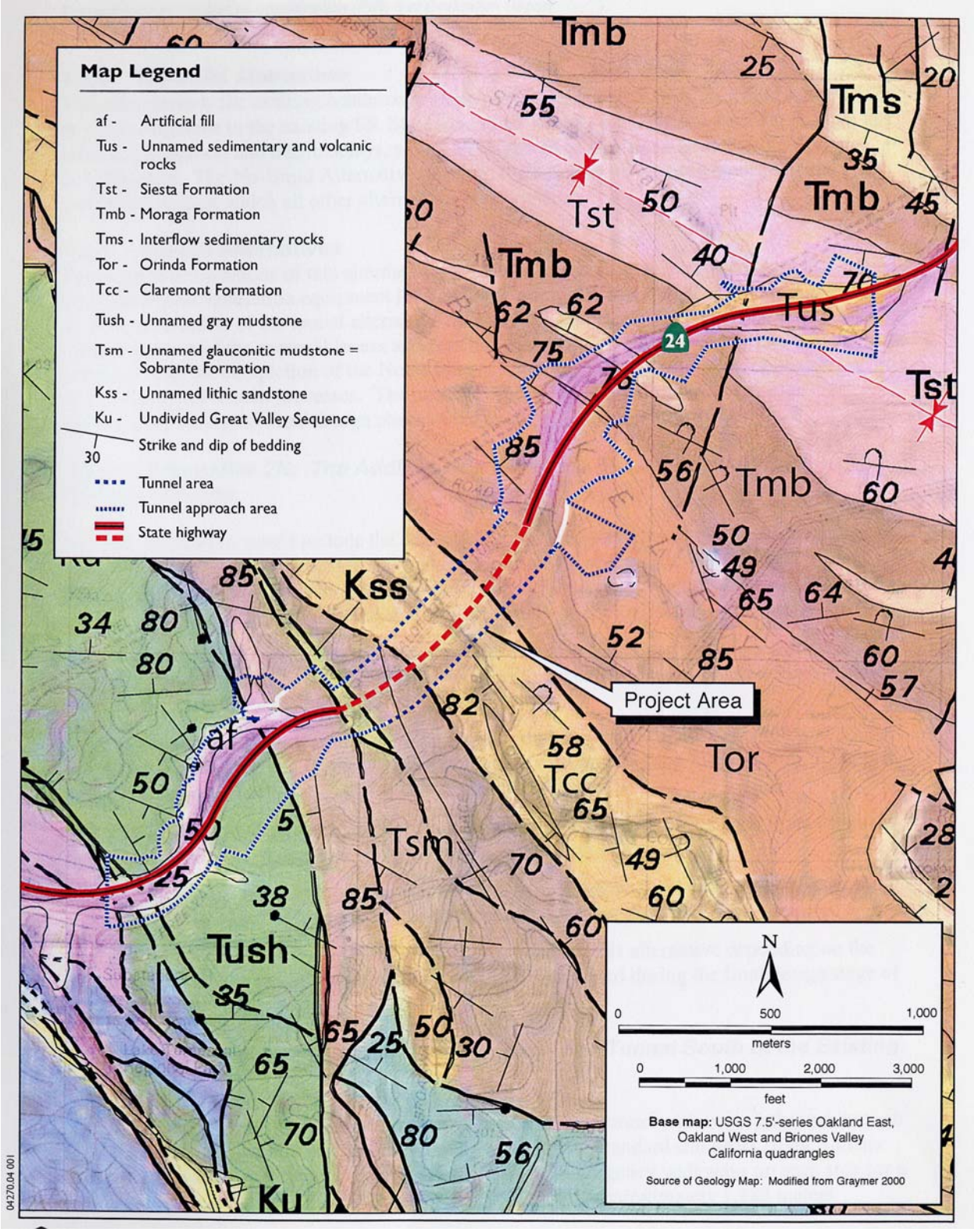
Site Geology

The geology of the Berkeley Hills near the Caldecott Tunnel consists of Upper Cretaceous to Late Miocene age sedimentary and volcanic rocks. From oldest to youngest the principal units are Undivided Great Valley Sequence (Ku) and a fault-bounded sliver of unnamed lithic sandstone (Kss); unnamed glauconitic mudstone (Tsm) [Sobrante formation]; Claremont chert (Tcc); Orinda Formation (Tor); Moraga Formation (Tmb); and Siesta Formation (Tst). Within the proposed tunnel limits, three of the above units, the Sobrante Formation, the Claremont chert, and the Orinda Formation, are present. (See Figure 2.2.3-1 Geologic map)

The layers of rocks, known as bedding, near the tunnel dip steeply to the southwest. At some locations, the layers of rocks are overturned. Numerous faults aligned NNW-SSE separate packets of rock into parallel slices or wedges. A smaller number of NNE-SSW cross-faults die out in either the Orinda-Moraga contact or partway into the Orinda Formation. Faults that intersect the Caldecott Tunnel, including the Wildcat Canyon fault, are not considered active and do not appear on the State of California's Alquist-Priolo maps. (The Alquist Priolo Act seeks to limit new or renewed construction for human occupancy near areas of an active fault trace. The California State Geologist has established fault rupture zones around active faults, and communities are limited in planning within these zones. The act only applies to surface rupture and does not involve other earthquake hazards such as strong shaking or liquefaction. The act was passed by the California legislature in 1972 in response to the San Fernando Earthquake of 1971).

The first two tunnel bores were mapped during construction in the 1930's by Ben Page. Page wrote a paper on the subject (Geology of the Broadway Tunnel, Berkeley Hill, California) that was not published until 1949 because of legal issues associated with the construction of the first two bores. The bores were again mapped during construction in 1964, at which time greater detailed mapping occurred. It is important to note that two intrusive rock units, sandstone dikes and diabases (volcanic) dikes, are important features at the scale of the tunnel bores, but do not show up on smaller scale geologic maps. These units played an important role in the difficulty of constructing the first two tunnel bores.

Figure 2.2.3-1Geologic Map



Soils

Soils within the project limits consist of loams of the Millsholm series and clay loams of the Los Osos series as well as rock outcrop. Artificial fill and soils of the Xerothents-Millsholm series (Xerothents referring to that part underlain by manmade features or reworked ground) underlie the western part of the project limits. These are loams and clay loams with moderate permeabilities and high erosion potential. Clay loams of the Los Osos series and rock outcrop underlie the eastern half of the project area. These soils have low permeabilities and moderate erosion potential. Mitigation measures to prevent soil erosion should be implemented and are discussed further in later sections of this document.

Seismicity

Earthquakes are prime considerations in the design and retrofit of structures. The Department's Office of Earthquake Engineering is responsible for assessing the seismic hazard for Department projects. The project area lies within the seismically active San Francisco Bay region and is crossed by mapped traces of the Hayward Fault on the westernmost edge. The Hayward Fault does not cross within the proposed tunnel limits. The three major active faults in the region, the San Andreas, the Calaveras, and the Hayward, all have the potential for magnitude 7.5 or greater earthquakes.

Several strong damaging earthquakes have occurred on the Hayward Fault in historical times. Two of these, in 1836 and 1868, left large surface ruptures south of the project area in Hayward. Because of the long absence of large earthquakes along the Hayward Fault, the 30-year probability of a greater than or equal to magnitude 6.7 earthquake is high. The northern segment (near the project) has a probability of 16 percent while the southern segment has a probability of 17 percent (Working Group on California Earthquake Probabilities, 1999). However, mapable traces of the Hayward Fault that cross within the project limits at the State Route 13 Interchange are creeping strands and former rupture surfaces and may not form new rupture surfaces during a large event. New rupture surfaces may form that are separate from mapable traces.

The San Andreas Fault is an active, right lateral, strike-slip fault extending from the Gulf of California in the south to the Mendocino Triple Junction near Eureka in northern California. The largest earthquakes during historical times in California including the 1906 San Francisco earthquake and the 1989 Loma Prieta earthquake have occurred along this fault. During the 1906 quake, an estimated 434.5 kilometers (270 miles) of ground ruptured in northern California, and the quake had an estimated magnitude of 8.2. While the Loma Prieta quake caused no fault surface rupture, substantial damage occurred to structures throughout the bay region, including the San Francisco Bay Bridge and the Cypress structure section of I-880. An accelerometer located at the Lawrence Laboratory in Berkeley, which is approximately 3 kilometers (1.9 miles) north of the project site and has similar ground conditions, recorded a peak ground acceleration of 0.12g during the Loma Prieta event. Peak ground acceleration is a measure of earthquake intensity where it is measured by the acceleration due to gravity.

The Calaveras Fault, a branch of the San Andreas Fault system that originates near Hollister in central California, is also an active, right-lateral, strike-slip fault. Located approximately 16 km east of the project area, the Calaveras Fault runs north-by-northwest until it terminates near Walnut Creek. Two recent earthquakes along the Calaveras Fault, one in 1979 and the other in 1984, had magnitudes of 5.9 and 6.2, respectively. Surface rupture after the 1979 event extended from Anderson Lake near Morgan Hill south to Hollister.

There are two methods of estimating the greatest rock motion that a particular structure will experience. In the past, Caltrans considered the motions from the Maximum Credible Event (MCE).

The MCE is the largest reasonable earthquake at a fault without regard or consideration of how often the earthquake might occur (the return period). It also does not provide a consistent or rational assessment of the probability that a structure will experience the design criteria. For the Caldecott Improvement Project, Caltrans estimated the greatest rock motions from the Safety Evaluation Event (SEE).

The current Caltrans policy is generally to use the anticipated Maximum Credible Earthquake (MCE) from young faults in and near California. However, because the Caldecott Tunnels are located along a lifeline route of the State highway system and to be consistent with other important facilities along the same route it was decided to design for a 1,500 year return period (SEE) earthquake for the tunnel design. The walls outside the tunnels and all permanent slopes will be designed for a 500-year return period earthquake. Other structures proposed for the project will be designed to withstand the anticipated Maximum Credible Earthquake for the area.

The Caldecott Tunnel is located along a lifeline route. Lifeline routes must be open to emergency vehicle traffic within 72 hours following the seismic event. Typically Caltrans designs to prevent the collapse of a structure not to maintain serviceability. To meet the lifeline criteria a much stricter standard is required. To achieve this, a probabilistic approach is a more complicated earthquake analysis that considers all possible earthquake scenarios, all possible ground motions, probability levels, and associated probabilities. The probability of these scenarios occurring is computed and those exceeding a specified value are used. The MCE approach is a more straightforward analysis that takes the perpendicular distance from a fault and a projected maximum fault magnitude to calculate ground motions.

To be consistent with other important facilities along the same route it was decided to design for a 1,500 year return period (SEE) earthquake for the tunnel design. The walls outside the tunnels and all permanent slopes will be designed to 500-year return period earthquake. For values of the design ground motion for a 1,500-year and 500-year return period event refer to studies done by Earth Mechanics, Inc. (Seismic Hazard Study, Final Report,, May 23, 2005 and Seismic Coefficient Study for Wall/Slope Designs, May 15, 2005). Further studies will reevaluate all seismic coefficients for the project. It is planned to study the 100, 300, 500, and 1,500-year return period events.

2.2.3.3 IMPACTS

Tunnel excavation could alter the groundwater regime and surface erosion. Increased drainage from the new tunnel could lower groundwater levels and possibly reduce the potential landslide hazard. The change in groundwater levels and thus the impacts will be relatively minor because there are already three existing bores that have already greatly reduced the surrounding groundwater levels. An additional bore will have a minimal effect on further reducing the groundwater level. Increased surface erosion could negatively affect slope stability and water quality.

2.2.3.4 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

The project proposes to construct a tunnel and widen portions of existing State Route 24 through hilly and rocky terrain. Widening State Route 24 includes constructing walls to accommodate additional lanes. A detailed geotechnical investigation will be conducted to assess subsurface conditions. This investigation will include drilling and sampling for the tunnel and proposed walls, in-situ testing, and laboratory testing of retrieved samples. From this investigation, designs will be developed to accommodate various rock strengths.

Some temporary cuts will need to be made during construction as well as perhaps small permanent cuts. Standard mitigation measures will be employed during construction to ensure slope stability.

These include limiting permanent slopes to 2:1 (Horizontal):(Vertical) unless engineering analysis shows that steeper slopes are stable, covering finished slopes with erosion control (coir netting, jute rolls), providing adequate drainage at the top of slopes to avoid sheet flow on slope faces, and revegetating the slopes. Temporary cuts will be designed by the Contractor and approved by Caltrans Construction on a case-by-case basis. Walls will be placed to avoid large cuts.

The project is in an active seismic area, therefore, walls and other structures will be designed to withstand strong ground motion. Liquefaction potential within the project limits is low; however, should the geotechnical investigation conclude otherwise, steps would be taken to mitigate against such conditions.

2.2.4 Paleontology

The information presented in this section is derived from the technical report, Paleontological Resources Identification and Evaluation Report (Jones & Stokes, July 2004) and an Addendum to the Paleontological Resources Identification and Evaluation Report (Caltrans, June 2005).

2.2.4.1 REGULATORY SETTING

Paleontology is the study of life in past geologic time based on fossil plants and animals. A paleontology report was prepared for the Caldecott Improvement Project to outline the steps necessary to ensure compliance with the National Environmental Policy Act of 1969 (NEPA) (42 USC 4321), the California Environmental Quality Act (CEQA) (Chapter 1, Section 21002), the Antiquities Act of 1906 (16 United States Code [USC] 431-433), and Archaeological and Paleontological Salvage (23 USC 305).

2.2.4.2 AFFECTED ENVIRONMENT

During the construction of the third bore in 1964, workers found the remains of an ancient rhinoceros and the jaw of a prehistoric three-toed dwarf horse. These finds indicate potential for finding additional fossils during the construction of a fourth bore.

The Caldecott Tunnel is located in the Berkeley Hills, which are part of the East Bay Hills. The geology of the Berkeley Hills is characterized by two highly deformed Mesozoic basement rock assemblages that are unconformably overlain by Tertiary sedimentary, volcanic rocks, and unconsolidated Quaternary deposits. The two basement rock assemblages are the Great Valley Complex and the Franciscan Complex. Only the Great Valley Complex extends into the project area, as the Franciscan Complex is not exposed (Figure 2.2.3-1, Geologic Map).

The Great Valley Complex of two distinct units, the Coast Range Ophiolite (CRO), which is composed of serpentinite, gabbro, diabase and basalt, and the Great Valley Sequence (GVS), composed of sandstone, conglomerate, and shale of Jurassic and Cretaceous age. The GVS unconformably overlies the CRO, and together they represent a slice of Jurassic and Cretaceous ocean crust. The Coast Range Ophiolite is not exposed in the project area (See Figure 2.2.3-1).

The Great Valley Complex is unconformably overlain by Miocene marine and nonmarine sedimentary rocks. The principal Miocene units (see Figure 2.2.3-1) exposed in the project area from oldest to youngest are the Sobrante Formation (Tsm); Claremont chert (Tcc); Orinda Formation (Tor); Moraga Formation (Tmb); and Siesta Formation (Tst). There is also a small exposure in the eastern part of the project area of unnamed sedimentary and volcanic rocks (Tus) of late Miocene age. There is a narrow exposure in the western tunnel approach of artificial fill (af), which is not of concern, because fossils would probably not be present in such material. Of the units named above, only the

Sobrante, Claremont, and Orinda Formations are present in the tunnel section. However, the Great Valley Complex sandstone and shale (Ku) and the artificial fill (af) are found beneath the bridges and part of the area required for the western approaches to the tunnel. The Moraga and Siesta Formations and unnamed sedimentary and volcanic rocks (Tus) are located in the area of the eastern approaches to the tunnel.

2.2.4.3 IMPACTS

The project would involve two distinct construction elements: (1) boring a tunnel and (2) modifying or widening bridge structures, portals, and approach cuts to the tunnel. If paleontological resources are present in any of the formations involved in the project area, these resources could be disturbed. Avoiding the paleontological resources would be impossible. Clearly, both elements have the potential to disturb or damage geologic formations and associated fossils in different ways. Potential paleontological resource impacts would be the same for both build alternatives because the alignments cross essentially the same geologic units.

Excavating the tunnel will involve grinding rock material to form a hole or tunnel. During this process, any paleontological resources in the rock will naturally be destroyed. Of the three geological formations (Sobrante, Claremont, and Orinda Formations) present in the tunnel section, both the Sobrante and Claremont Formations have a low paleontological sensitivity; that is, both of these units are considered unlikely to contain substantial paleontological resources. Consequently, no mitigation is required for construction activities in these formations.

However, the third formation in the tunnel, the Orinda Formation, has a high paleontological sensitivity, which means that a high potential for impacts on substantial paleontological resources in this formation exists. Vertebrate fossils in the Orinda Formation are scattered and fragmentary; thus, it is unlikely that entire skeletons will be destroyed during construction of the tunnel. There is no doubt, however, that any fragments of bone and teeth that may exist will be impacted by tunneling through the Orinda Formation. Consequently, mitigation is required for construction activities in this formation.

Approaches to the fourth bore tunnel from the west may involve excavation in rock formations which have a low paleontological sensitivity and are considered unlikely to contain substantial paleontological resources. Consequently, no mitigation is required for construction work in the vicinity of the western portal.

Approaches to the fourth bore tunnel from the east may involve excavation in the Moraga and Siesta Formations and in unnamed sedimentary and volcanic rocks. Because the Moraga Formation has low paleontological sensitivity, it is unlikely to contain substantial paleontological resources. Consequently, no mitigation is required for construction activities in this formation. However, the Siesta Formation is evaluated as having high paleontological sensitivity. Excavation in this unit could disturb or damage substantial paleontological resources. Consequently, mitigation is required for construction activities in the Siesta Formation.

The paleontological sensitivity of the unnamed sedimentary and volcanic rocks, which consist of conglomerate, sandstone, and siltstone, is unknown. However, other late Miocene sedimentary rocks in the area, specifically rocks of the Siesta Formation, contain substantial vertebrate remains, and it must be assumed that the unnamed sedimentary rocks also have the potential to contain vertebrate remains. Consequently, mitigation would be required for construction activities in the unnamed sedimentary and volcanic rocks.

Most of the potential project impacts would be on lands within the Department's right-of-way. Privately owned lands may be affected by the project on the western side of the existing tunnels. The East Bay Municipal Utility District and the East Bay Regional Park District own the land near the existing tunnels on the eastern side. While these lands are not likely to be affected by the project, any work done on public properties would require coordination with the appropriate agency. Any fossils found on private property during project construction would belong to the property owner who would be encouraged to allow the Department to properly curate them.

2.2.4.4 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

The following mitigation measures outline a plan to mitigate potential impacts on scientifically significant paleontological resources caused by project construction.

Mitigation Measure A: Retain a Vertebrate Paleontologist to Monitor Selected Construction Activities Associated with Tunnel Boring and during Excavation of Eastern Approach to the Tunnel.

A typical mitigation measure is to retain a qualified vertebrate paleontologist to monitor construction in a paleontologically sensitive geological unit. However, because of the very nature of the boring process, monitoring tunnel spoils would be of little value. Accordingly, the Department would retain a qualified vertebrate paleontologist to monitor construction activities under the following conditions:

A-1. Tunnel Mitigation. Once the tunnel has been excavated, the paleontologist would be retained to "walk" the tunnel to determine if any paleontological resources are exposed in the tunnel walls and worth collecting. This measure is contingent on the tunnel walls not being immediately lined with concrete or other cover as the boring proceeds, such that fossils would not be visible in the tunnel walls. As it is currently proposed, shotcrete will be applied immediately following excavation and thus this mitigation measure may not be possible.

A-2. Approach Mitigation. A qualified vertebrate paleontologist would be retained to monitor any excavation of the eastern approach and bridges that involves disturbing bedrock and the sedimentary rocks and any construction in the east portal area of the tunnel in the Orinda Formation.

Mitigation Measure B: Stop Work if Vertebrate Remains Are Encountered in the Rock Walls of the Tunnel or during Construction and Excavation.

B-1. Tunnel Mitigation. If vertebrate fossils are discovered in the rock walls of the tunnel (item A-1 above) or during the construction of the east portal (item A-2 above), the construction contractor will stop work immediately until the paleontological monitor can assess the nature and importance of the find and recommend appropriate treatment. If the fossils are determined to be sensitive, treatment will include preparing and recovering fossil materials so that they can be housed in an appropriate museum or university collection and may also include preparation of a report for publication describing the finds.

B-2. Approach Mitigation. If vertebrate fossils are discovered during excavation, the construction contractor should stop work immediately until the paleontological monitor can assess the nature and importance of the find and recommend appropriate treatment. If the fossils are determined to be sensitive, treatment will include preparing and recovering fossil materials so that they can be housed in an appropriate museum or university collection. Treatment may also include writing a report describing the finds.

2.2.5 Hazardous Waste/Materials

The information presented in this section is derived from the technical report, *Initial Site Assessment* (Caltrans, 2004).

2.2.5.1 REGULATORY SETTING

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

The primary federal laws regulating hazardous wastes/materials are the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The purpose of CERCLA, often referred to as Superfund, is to clean up contaminated sites so that public health and welfare are not compromised. RCRA regulates hazardous waste from "cradle to grave". Other federal laws include:

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

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

Hazardous waste in California is regulated primarily under the authority of the federal Resource Conservation and Recovery Act of 1976, and the California Health and Safety Code. Other California laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup and emergency planning.

Worker health and safety and public safety are key issues when dealing with hazardous materials that may affect human health and the environment. The proper disposal of hazardous material is vital if it is disturbed during project construction.

2.2.5.2 AFFECTED ENVIRONMENT

An *Initial Site Assessment* (ISA) was prepared in April 2004 to identify potential contaminant sources within the project area that may affect design and construction of the proposed project. The preliminary evaluation (regulatory review) of the project area indicated that no known sources of potential environmental concern are present. However, lead contamination in the unpaved areas may be present because of aerially deposited lead (ADL) from historic motor vehicle exhaust.

2.2.5.3 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

The ISA did not find any contaminant sources within the project area, thus no hazardous waste/material impacts to the project are expected. The Department will perform testing for ADL, asbestos and groundwater contamination at the Plans, Specifications and Estimates (PS&E) stage prior to construction of the project. If found, special handling would be required for ADL and

asbestos that would include implementing a Department health and safety plan. If construction involved excavation in one of the areas identified as having potential groundwater contamination, the Department would manage any extracted groundwater according to regulatory requirements. All activities involving contaminated soil will be planned to comply with the various regulatory agencies' requirements.

There was no evidence of naturally occurring asbestos (NOA) found during the investigation conducted for the Geologic and Geotechnical Data Report, prepared by Geomatrix, dated September 2005, for this project. Nine borings or approximately 4200 linear feet of core were drilled during the investigation for this report. In addition, there were no reported incidents involving NOA during the construction of the three previous bores. Based on the geology of the location, only the Orinda Formation has the potential for NOA. The Orinda Formation (Tor) is a Miocene age deposit composed of conglomerate, sandstone, and siltstone of nonmarine origin with abundant clasts of rocks from the Franciscan Complex. A small proportion of the Franciscan can contain serpentine asbestos or chrysotile. The physical weathering process which the Franciscan Formation goes through to form the Orinda Formation would disperse the serpentine asbestos to such an extent that it would be extremely unlikely that significant quantities would be found to cause a health risk.

If Serpentine asbestos were found in significant quantities during the project, best management practices would be implemented.

Geologic studies from the construction of the first and second tunnels indicate that infrequent, isolated pockets of naturally occurring hydrocarbons, e.g. tar, are present in the geologic formations of the Oakland-Berkeley hills. Because of this, the excavation spoils from the tunnel advancement will be systematically screened for hydrocarbons and managed accordingly during the construction phase of the project.

2.2.6 Air Quality

The information in this section is from the technical report, *Revised Air Quality Report* (Caltrans, March 2006).

2.2.6.1 REGULATORY SETTING

In August 2005, the Department prepared the air quality report, which addresses the impact of highway projects on air quality, in accordance with the following legislation: The Clean Air Act and its Amendments, the California Clean Air Act of 1988, the Environmental Protection Agency (EPA) Final Regulations (August 1997), NEPA and CEQA. The San Francisco Bay Area Air Basin has not exceeded the national or state standards for CO for several years and is now recognized as a maintenance area for CO. The Bay Area is currently classified as a nonattainment area under the 8-hour national ozone standard. For PM10, the Bay Area is designated as unclassified for the 24-hour standard and attainment for the annual arithmetic mean under the national standards and as non-attainment under the state standards. For PM2.5, the area is unclassified under federal standards; there are no state PM2.5 standards.

Methodology

This air quality analysis utilizes the Project-Level CO Analysis Protocol developed jointly by Caltrans and the Institute of Transportation Studies, University of California at Davis and approved by the EPA for use in the Bay Area. The protocol is based on the fact that the Bay Area meets air quality standards for carbon monoxide and permits a qualitative approach to determine air quality impacts. This protocol was accepted by EPA in early 1998 as an alternative to the quantitative

analysis procedure specified in the 1997 Conformity Rule. Acceptance and approval for use in the Bay Area as an alternative conformity analysis procedure was granted by the EPA in the Bay Area September 1, 1998.

The regional conformity assessment is based on quantitative modeling, which demonstrates that the cumulative impact of building all of the RTP and TIP projects is consistent with meeting all the regional provisions of the State Implementation Plan. The Caldecott project is included in this cumulative, quantitative modeling.

Conformity with State Implementation Plan (SIP)

On March 18, 2002 the U.S. Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) approved the Metropolitan Transportation Commission (MTC)'s finding that the 2001 Transportation Improvement Plan for the San Francisco Bay Area conforms to the State Implementation Plan (SIP). This puts the nine-county region in conformity with all transportation-related federal air quality requirements. Alternative 2N of this project is included in the 2005 TIP (adopted by MTC on July 28, 2004; approved by the FHWA on October 1, 2004) and the 2001 RTP. On February 23, 2005, MTC issued a final transportation conformity finding for the Transportation 2030 Plan and the 2005 TIP/Amendment #05-05; the FHWA and the FTA approved this conformity finding on March 17, 2005.

The design concept and scope of the project has not changed from the design scope and concept in the RTP and TIP listings. Therefore Alternative 2N conforms to the SIP; Alternative 3N does not have regional conformity. If this alternative is selected as the preferred alternative, a regional analysis will need to be performed by MTC to determine regional conformity.

Carbon Monoxide (CO)

Carbon monoxide (CO) is a colorless, odorless, poisonous gas. A product of incomplete burning of hydrocarbon-based fuels, carbon monoxide consists of a carbon atom and an oxygen atom linked together. Carbon monoxide enters the bloodstream through the lungs and forms carboxyhemoglobin, a compound that inhibits the blood's capacity to carry oxygen to organs and tissues. Persons with heart disease are especially sensitive to carbon monoxide poisoning and may experience chest pain if they breathe the gas while exercising. Infants, elderly persons, and individuals with respiratory diseases are also particularly sensitive. Carbon monoxide can affect healthy individuals, impairing exercise capacity, visual perception, manual dexterity, learning functions, and ability to perform complex tasks.

This air quality analysis utilized the *Transportation Project-Level Carbon Monoxide Protocol*, dated December 1997, prepared by the Institute of Transportation Studies, University of California at Davis. This protocol was approved by MTC in Resolution No. 3075 on June 24, 1998. Use of this protocol was recommended by the Bay Area Interagency Conformity Task Force, which is the interagency consultation group established pursuant to EPA's conformity regulation and the Bay Area's conformity SIP.

Since the Bay Area was designated an attainment area for CO on June 1, 1998, the protocol indicates that an analysis by comparison is appropriate for this project. This involves a comparison of the proposed facility with existing facilities within the air district. A list of the features to be compared is given on pages 4-6 to 4-7 of the protocol.

For comparison purposes, the State Route 101 from Tully Road to Story Road in San Jose was used, as shown in Table 2.2.6-1.

Table 2.2.6-1 Comparison of Air Quality Mainline Conditions

	Parameters	I-24 Build 2N Alternative	I-24 Build 3N Alternative	Route 101 – Existing Tully Rd to Story Rd
A	Receptor Distance	122m (400')	122m (400')	6.1m (20')
B	Roadway Geometry	8 lanes	8 lanes	8 lanes
C	Worse case Meteorology	Coastal Valley	Coastal Valley	Coastal Valley
D	AADT Volumes	167,000	167,000	245,000
E	Hot/Cold Starts	50/10 NB 50/10 SB	50/10 NB 50/10 SB	50/10 NB 50/10 SB
F	Percent HDG trucks	.72	.72	3.0%
G	8 Hr. Background CO (2005)	2.8 ppm	2.8 ppm	8.0 ppm

The AADT for Route 101 between Tully Road and Story Road represents current traffic volumes as expressed in the Caltrans publications "2004 Traffic Volumes on California State Highways" and "2003 Annual Average Daily Truck Traffic on the California State Highway System." Although nearby intersections will experience traffic volume increases as a function of this project and anticipated growth in the area, volumes will be well below similar intersections in the Bay Area, and therefore will not exceed state or federal CO standards.

To address the issue of air quality within the tunnel, a report was prepared entitled, Caldecott Improvement Project, 4th Bore, Ventilation Analysis Report, Jet Fan Feasibility Study, 2-Lane and 3-Lane Options, Revision 1 (EarthTech, April 2005). This report states that the ventilation system will be sufficient to meet all air quality standards (see Section 2.2.7).

Particulates (PM10 and PM2.5)

Particulate matter is the general term used for a mixture of solid particles and liquid droplets found in the air. Some particles are large enough to be seen as dust or dirt. Others are so small they can be detected only with an electron microscope. PM2.5 describes the "fine" particles that are less than or equal to 2.5 micrometers or less. PM10 is the term used to describe small particles, of any composition and origin, with a size of 10 micrometers or less.

At this time, because the Bay Area has either attainment or unclassified status for federal PM10 and is undesignated for federal PM2.5, a particulate analysis is not needed. However, the Bay Area is designated as a non-attainment area for the State PM10 standard. Although the EPA Transportation Conformity Regulations require a quantified microscale analysis for PM10, no approved methodologies are available yet to address the microscale impacts of PM10. The regulations state, "The EPA will be releasing technical guidance on how to use existing modeling tools to perform PM10 hotspot analysis. The requirements will not take effect until the Federal Register has announced availability of this guidance." (40 CFR Parts 51 and 93, Prologue Section V.K.: Federal Register, August 15, 1997).

Qualitatively, we expect that this project will not have adverse effects on microscale particulate levels since actual non-truck vehicle emissions of particulates are believed to be small, and the number of heavy-duty diesel trucks using the facility will not be increased by the project. While the Bay Area

does list yearly exceedences of the State PM10 standards, the closest monitoring stations show minimal problems; at the Fremont monitoring station there was only one exceedence of the State PM10 standard for 2002; at the Oakland station there were none. We would expect the levels in the project area to be substantially lower than at these monitoring stations. Especially since the project is not located in an agricultural area or an area of frequent snowfall, where particulate levels might be expected to be higher near the roadway.

This proposed project would result in a facility that will be smaller and less congested than comparable facilities within the same Air District. Since the comparable facilities are in an area that meets air quality standards (maintenance area), this project will also meet microscale air quality requirements and will therefore have no significant impact on air quality or cause exceedances of state or federal CO standards.

The No-Build alternative is likely to have negative air quality impacts. It will continue to show heavy congestion in the reverse commute. Therefore, it is likely to result in higher pollutant levels as compared to the build alternatives.

2.2.6.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Recent studies have raised significant concerns about the health risks associated with emissions from diesel construction equipment. For PM10, PM2.5 or air toxics, there currently are no microscale requirements, which are applicable at the project level for the temporary impacts of the construction phase.

However, the California Air Resources Board, through its Diesel Risk Program will contain a number of control measures, which will be implemented during the construction phase of this project as they apply to it. This program is anticipated to reduce risks to public health through the reduction of construction emissions.

All the Department's standard specifications for construction mitigation, including measures in the state implementation plan, will be implemented.

2.2.7 Ventilation

The information in this section is from the Caldecott Tunnel 4th Bore, Ventilation Analysis Report Jet Fan Feasibility Study 2-Lane and 3-Lane Options, EarthTech, April 14,2005.

Unlike those of the existing tunnels, the new portal structures will not need to house ventilation equipment because the ventilation system for the new bore will consist of jet fans located within the tunnel, with the control and monitoring systems connected to the existing or new control room.

Tunnel ventilation is required for emergency evacuation and to support firefighter access in the tunnel. Emergency operation generally results from a vehicle accident or a vehicle fire. The most serious is the vehicle fire requiring passenger evacuation. Ventilation will also be required for maintaining air quality during normal, peak or congested traffic conditions. During various tunnel operations there will be airflow due to the piston effect of the moving traffic as well as wind-induced airflow. These two passive ventilation mechanisms will usually generate sufficient ventilation airflow to keep the pollutant levels below the allowable thresholds. However, under certain conditions the passive ventilation will not be sufficient to maintain the required air quality standards and mechanical (forced) ventilation will be required.

2.2.7.1 REGULATORY SETTING

The Ventilation Analysis report addressed the requirements for controlling the emissions in the tunnel during various traffic conditions in order to maintain the concentration levels of CO below the EPA/State of California mandated limits. CO is the exhaust gas constituent of greatest concern from spark-ignition engines because of the asphyxiate nature of the gas. From diesel engines, the critical contaminants are nitrogen oxides (NOX). According to ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Handbook – HVAC Applications, 2003 Edition, tests and operating experience indicate that, when CO level is properly diluted, other exhaust by-products are also diluted to acceptable levels. Therefore, air quality ventilation analysis was conducted only for CO concentration levels. The air quality analysis was conducted using the U. S. Department of Transportation (USDOT) computer software TUNVEN dated 1991.

The ventilation system for fire emergency shall be according to National Fire Protection Association (NFPA) Standard 502-2004, *"Road Tunnels, Bridges, and Other Limited Access Highways."* Simulation of emergency ventilation is required for a tunnel fire to ensure sufficient airflow to prevent backlayering. Backlayering is the movement of smoke and hot gases contrary to the direction of the ventilation airflow in the tunnel. The predicted airflow past the fire is compared to the "critical velocity" value calculated for that particular fire location. Critical velocity is the ventilation airflow velocity at or above which backlayering of smoke and hot gases does not occur.

Ventilation analysis was conducted using USDOT Subway Environment Simulation (SES) computer program version 4.1. Typically SES analysis is conducted for a fire in the tunnel near the highest point and ventilating downhill, a worst-case scenario for ventilating against buoyancy and for sizing the jet fans. For single directional traffic flow, it is assumed that vehicles ahead of the fire will drive out of the tunnel and people from vehicles behind the fire will be evacuated towards the entry end of the tunnel. Therefore, longitudinal emergency ventilation is in the direction of traffic.

A mix of passenger cars, trucks and buses will use the tunnel. Fuel tankers will be allowed during certain hours. For emergency (fire) conditions, maximum heat release rate of 100MW (341 Mbtu/hr), corresponding to a tanker was used, based on the NFPA Standard 502-2004 recommendation. SES simulations were conducted for summer and winter conditions for both build alternatives.

Fire location was selected for the worst-case scenario. A vehicle fire was simulated near the east portal. The slope of the tunnel towards west portal is –4.77 percent. The vehicles were stopped near the highest point of the –4.77 percent grade. It is assumed that motorists downstream of the fire will drive out of the tunnel towards the west portal. Motorists upstream of the fire will be evacuated towards the east portal, in the uphill direction. Ventilation will be in the direction of the west portal, against buoyancy, providing outside air to evacuating motorists from the east portal.

The critical velocity and critical flow requirement is in the direction of the west portal. The critical velocity requirement is 3.4 m/s (670 fpm) and critical flow requirement is 342 m^3/s (724 kcfm) for Alternative 2N. The critical velocity requirement is 3.21 m/s (632 fpm) and critical flow requirement is 406 m^3/s (889 kcfm) for Alternative 3N.

To meet the requirements of the critical velocity and the critical flow for the worst-case fire scenario near the east portal, jet fans will be required. Predicted jet fan capacity is high due to effect of the high fire heat release rate and wind blowing into the west portal. In determining jet fan capacity and number of fans required, it is assumed that three fans will be installed in the first row near the east portal upstream of the fire location with one (critical) fan out of service. As required by NFPA 502-2004, redundancy is provided with one row of jet fans, near the fire, out of service due to the fire. It is also predicted that jet fans downstream of the fire will operate at higher than ambient temperature,

and therefore will deliver less than their rated thrust. The fire during the summer conditions is worst-case and requires the most number of fans. Jet fan requirements are shown in Table 2.2.7-1.

Table 2.2.7-1 SES Results and Jet Fan Requirements

Fire Scenario	Critical Velocity m/s (fpm)	Summer			Winter		
		Actual Velocity m/s (fpm)	Total Jet Fan Capacity m3/s (kcfm)	No. of Fans Note 1	Actual Velocity m/s (fpm)	Total Jet Fan Capacity m3/s (kcfm)	No. of Fans Note 1
Two-lane Option	3.4 (670)	4.93 (973)	425 (900)	20	3.88 (764)	425 (900)	19
Three-lane Option	3.21 (632)	3.89 (766)	437 (925)	21	3.86 (760)	472 (1000)	20

Note: 1. No of jet fans is based on 1.6 m diameter jet fan with silencer length of 0.5 times diameter delivering thrust of 3488 N. Overall diameter of jet fan is estimated at 1.84 m

2.2.7.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

The results of the SES analysis indicated that approximately 20 jet fans are required for Alternative 2N, and approximately 21 jet fans are required for Alternative 3N in order to generate sufficient airflow. Predicted numbers are based on a jet fan diameter of 1.6 meters (5.25 feet) and silencer length of 0.5 times diameter delivering thrust of 3488 N per fan. If a smaller than 1.6 meters (5.25 feet) diameter fan or a silencer longer than 0.5 times diameter fan is selected, more jet fans will be required to deliver required ventilation capacity.

Predicted jet fan capacity for the fire emergency conditions is higher than the predicted mechanical ventilation required for control of pollutants. Therefore, there will be sufficient mechanical ventilation capacity available during non-emergency conditions for the control of air quality within the tunnel.

2.2.8 Noise/Vibrations

The information presented in this section is taken from the technical report, *Revised Traffic Noise Impact Report* (Caltrans, August 2005).

Noise is defined as unwanted sound. A number of factors affect sound perceived by the human ear, including the level of sound, the frequencies involved, the period of exposure, and the changes or fluctuations in the noise levels during exposure. Levels of sound are measured in terms of decibels (dB). Since the human ear cannot perceive all frequencies equally well, measured sound levels are often adjusted, or weighted, to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA. All references to sound level in this report refer to A-weighted decibels.

Sound in our daily environment fluctuates over time. One way of describing fluctuating sound over a specific time period is to present the changing levels of sound as if it had been at a steady unchanging level for the time period. A descriptor called the equivalent sound level, Leq, is used to represent a constant level of sound that contains the same amount of acoustical energy as a fluctuating sound would generate in a given time period. Since highway traffic noise impacts are evaluated by using the average noise levels at sensitive receivers during the worst, or the noisiest, one hour period of the day,

the sound level equivalents of the acoustical energy received in one hour is the descriptor used for this purpose, which is represented as Leq(h).

Decibels are logarithmic units. A doubling of the number of noise sources, such as cars on a roadway, increases the noise levels by 3 dBA. A ten-fold increase in the number of noise sources adds 10 dBA to the noise levels. For every doubling of distance between the noise source and the receptor, traffic noise would decrease by 3 dBA over hard ground (paved surface) or 4.5 dBA over soft ground (vegetated or plowed soil). Furthermore, with normal human hearing, an increase of 10 dBA in sound levels is perceived as twice as loud, while a change of 3 dBA is barely perceivable (See Figure 2.2.8-1).

2.2.8.1 REGULATORY SETTING

The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for assessing noise impacts from a proposed project and considering mitigation if appropriate. The intent of these laws is to promote the general welfare and to foster a healthy environment.

Certain types of federally-funded projects (generally projects involving the addition of new lanes to an existing facility or construction of a new facility on a new alignment) must consider whether noise abatement should be considered as a project element. Under FHWA regulations (23 CFR 772), noise abatement must be considered for highway transportation projects with FHWA involvement when the project results in a substantial noise increase, or when existing or predicted future noise levels approach or exceed the Noise Abatement Criteria (See Table 2.2.8-1). Noise abatement measures which are reasonable and feasible must be identified and incorporated into the project's plans and specifications (23 CVF 772.11(e)(1) and (2)).

The distinction between CEQA/NEPA noise analysis and consideration of noise abatement under 23 CFR 772 is an important distinction. CEQA and NEPA require a no-build versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a noise impact as compared to a no-build alternative, then CEQA and NEPA require consideration of mitigation, and CEQA will require implementation of mitigation for significant impacts. However, even if a project is determined to have NO noise impact, 23 CFR 772 will require consideration of abatement if existing or future noise levels are above defined levels. The analysis under 23 CFR 772 is not dependent on a no-build versus build analysis. It simply looks to see what existing and future noise levels will be under the build alternative and if either are above the defined thresholds, abatement must be considered. This is true even if the existing or future noise levels are exactly the same for the no-build and build alternatives. The decision to implement abatement is discretionary while implementation of mitigation under CEQA is mandatory.

Table 2.2.8-1 Activity Categories and Noise Abatement Criteria (NAC)

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA L_{eq}(h)	Description of Activities
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	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above
D	--	Undeveloped lands.
E	52 Interior	Residence, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

In accordance with the *Department's Traffic Noise Analysis Protocol (TNAP) for New Highway Construction and Reconstruction Projects*, October 1998, noise abatement must be considered when the future noise levels after project construction will substantially increase (defined as an increase of 12 dBA or more) or when future noise levels will approach or exceed the NAC. Approaching the NAC is defined as within 1 dBA of the NAC.

Noise abatement measures that are determined to be reasonable and feasible will be reflected in the final environmental document and incorporated into the project plans and specifications. This document discusses noise abatement measures that may be incorporated into the project.

The protocol sets forth the criteria for determining when an abatement measure is reasonable and feasible. A noise abatement measure must reduce noise by a minimum of 5 dBA to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety. Factors used in determining whether a proposed noise abatement measure is reasonable include the opinions of residents, the absolute noise level, build noise level versus existing noise level, environmental effects of abatement, public and local agency input, the date of the development. (See Appendix I for the Preliminary Reasonableness Determination and Appendix J for the Reasonable Allowance Calculation).

2.2.8.2 AFFECTED ENVIRONMENT

Land uses in the project area are either in the open space or residential categories. Sensitive noise receptors considered for this study are the residences within the project limits, as well as outdoor areas intended for frequent human use. These include the baseball field in the North Oakland Sports Center, a picnic area inside the Temescal Regional Park, and the Bruns Amphitheater. Activity Category B of the NAC (67 NAC) applies to both the residences and these outdoor recreational areas.

The noise levels at selected receptors were calculated using the FHWA computer model TNM, Version 2.5, after field noise measurements were taken at representative locations. The noise effects were assessed for the outdoor areas of residences where the exposure to freeway noise is the greatest, usually in their front or back yards. A number of the residential receptors in the project area have no usable yards on the freeway side, as they are built on steep terrain. The exterior spaces in the balconies or decks on the freeway side of these residences were the areas of consideration.

The noise analysis indicated that 88 residences (receptors R1 through R15-Figures 2.2.8 [2-4]) presently have noise levels higher than 66 dBA Leq(h) (see Table 2.2.8-3 and Figures 2.2.8 [2-4]) in the yards or balconies on the sides facing the freeway. These residences are affected under the future conditions in the No-Build, and Alternative 2N. Up to 90 residences are affected under Alternative 3N. These affected residential receptors are all in the first row north of State Route 24 and, in general, having direct view of the freeway. The second row residences would not be affected by a substantial noise increase, where noise levels drop off by up to 10 dBA.

Also affected are 22 residential units in three currently planned but not yet constructed buildings (R23 through R28-See Figures 2.2.8 [2-4]) on Caldecott Lane, where the predicted future noise levels would range from 69 to 76 dBA.

The picnic area in the northeastern corner of Temescal Regional Park (R21-See Figures 2.2.8 [2-4]) is affected by traffic noise; as the predicted future noise would reach 68 dBA under either build alternatives.

None of the receptors within the project limits would have a 12 dBA or more increase in its future predicted noise levels as a result of the No-Build or the build alternatives. Therefore, the project causes no substantial noise increases, and no noise mitigation will be necessary.

2.2.8.3 IMPACTS

The project-generated noise increase would not cause a substantial adverse environmental effect, and the proposed noise abatements are not expected to have a substantial effect on a competing resource.

According to the model used in the noise study, with the proposed noise abatements, there would be no increases or barely perceptible noise increases for any of the receptors i.e. no increases greater than 2 dBA Leq(h) for Alternative 2N and no increases greater than 3 dBA Leq(h) for Alternative 3N. It is widely accepted that the average healthy human ear can barely percieve noise level changes of 3 dBA.

Figure 2.2.8-1 Relative Loudness

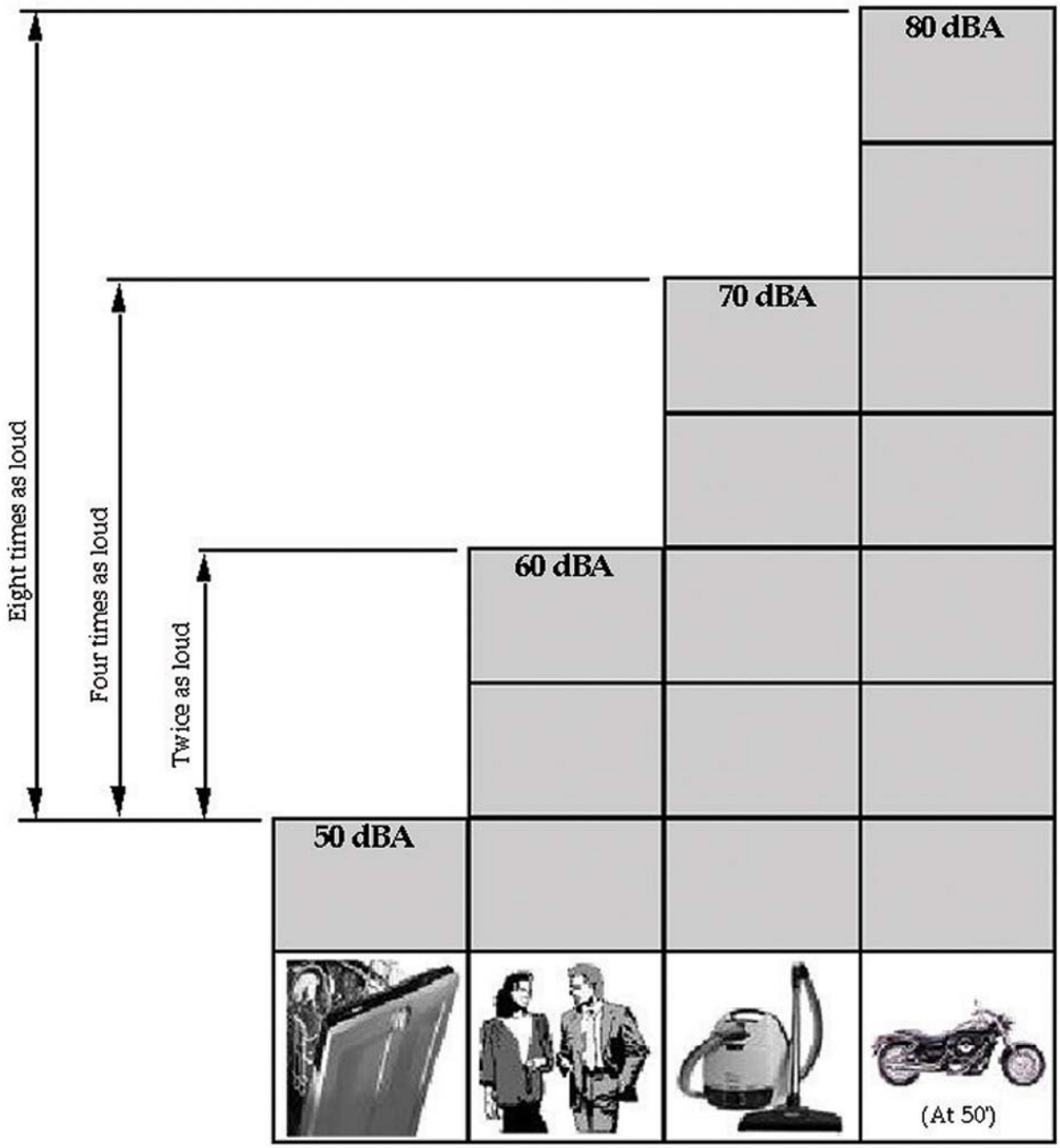


Figure 2.2.8-2 Noise Barrier and Receptors

Figure 2.2.8-3 Noise Barrier and Receptors

Figure 2.2.8-4 Noise Barrier and Receptors

2.2.8.4 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Noise Abatements Considered

Noise abatements, either in the form of soundwall or earth berm/soundwall combination, have been investigated for all affected receptors. Only those abatements that are determined *reasonable* will be considered further for construction.

Under Tunnel Alternative 2N

Noise Barrier No. 1

The picnic area in the northeastern corner of Temescal Regional Park (receptor R21-See Figures 2.2.8 [2-4]) would have traffic noise at 68 dBA Leq (h) during the noisiest hour under either build alternatives.

A 3.7-meter (12-foot) high, 115-meter (377-foot) long soundwall along the shoulder of eastbound State Route 24 (between mainline Stations 91+44 and 92+62), in combination with another 3.7-meter (12-foot) high, 134-meter (440-foot) long soundwall along the shoulder of the connector ramp to southbound State Route 13 (between mainline Stations 90+54 and 91+88) would reduce the noise level by up to 7 dBA for this area (see Figures 2.2.8 [5-8]). The soundwalls would be effective for an area that measures 35-meters (115-feet) along the frontage of the freeway. They would break the line of sight from a truck exhaust to the receptor. The soundwalls would have to be constructed on top of the existing retaining walls. Heights of soundwalls are measured from the elevations at the edge of shoulders. Based on guidelines from Caltrans TNAP, the reasonable allowance for this two-wall combination is determined to be $30,000 (see Appendix J). In computing the allowance for a non-residential area such as this one, each 30.5-meters (100-feet) of freeway frontage is considered equal to one benefited residence. Preliminary cost estimate for these two soundwalls is $1,005,000 (estimate based on current 2005 costs with no contingencies), which includes the replacement of the existing retaining walls. This cost estimate exceeds the reasonable allowance and thus is preliminarily determined not reasonable.

Noise Barrier No. 2 – Option A (Soundwall Only Option)

Under Alternative 2N, the predicted future noise levels for 31 residential units in the multi-story condominiums along Caldecott Lane (receptors R9 through R15-See Figures 2.2.8 [2-4]) would range from 68 to 73 dBA Leq (h). In addition, there will be seven currently planned but not yet constructed residential units (R27 and R28-See Figures 2.2.8 [2-4]) would have noise levels ranging from 70 to 73 dBA.

Based on preliminary design data, a 4.9-meter (16-foot) high, 277-meter (909-foot) long soundwall alongside the shoulder of the proposed westbound off-ramp to Caldecott Lane (see Figures 2.2.8-9 and 2.2.8-10) would reduce the future predicted noise levels by 6 to 10 dBA for 25 condominium units (R9 through R14-See Figures 2.2.8 [2-4]). The soundwall would be located between Stations 103+75 and 106+40 of the proposed westbound lanes with a distance varying between 4.5- and 23-meters (15- and 75-feet) from the edge of the traveled way of the off-ramp. Wall height is measured from the elevation of the existing ground at the location of the wall. The soundwall would break the line of sight to truck stacks for 13 units (R9 through R12-See Figures 2.2.8 [2-4]). The reasonable allowance for Option A is determined to be $850,000 (see Appendix J). Preliminary cost estimate for this option is $679,000 (estimate based on current 2005 costs with no contingencies), which is below the calculated reasonable allowance; thus is preliminarily determined reasonable and will be considered further for construction.

Six condominium units (R15-See Figures 2.2.8 [2-4]) and the seven planned residential units (R27 and R28-See Figures 2.2.8 [2-4]) on this section of Caldecott Lane would receive less than 5 dBA in noise reduction with this soundwall option.

An alternate design of the soundwall, a 4.9-meter (16-foot) high, 282-meter (925-foot) long wall on the State right-of-way line along Caldecott Lane, was determined less preferable than the one described above. It would reduce the future predicted noise levels by 5 to 8 dBA for 19 condominium units (R9 through R13-See Figures 2.2.8 [2-4]) and would break the line of sight for nine units (R9 and R11-See Figures 2.2.8 [2-4]). This alternate soundwall design is not recommended for further consideration.

Noise Barrier No. 2 – Option B (Earth Berm/Soundwall Option)

Instead of constructing a soundwall from the existing ground level as in Option A, Option B is to build an earth berm in combination with a 2.4-meter (8-foot) high, 161-meter (528-foot) long soundwall on top (see Figures 2.2.8 [12-14]), which would reduce the predicted noise levels by 6 to 10 dBA for a total of 25 condominium units (R9 through R14-See Figures 2.2.8 [2-4]). The soundwall would be located between Stations 104+63 and 106+21 of the proposed westbound lanes and have a distance between 15.5- and 17-meters (51- and 56-feet) from the edge of the traveled way of the off-ramp. The height of the berm would vary from 1 to 5.5 meters (3.3 to 18 feet) relative to the grade of the proposed off-ramp to Caldecott Lane. Wall height is measured from the proposed grade of the earth berm where the wall is situated. When combined with the earth berm, the top of wall elevation at its western end would reach 7.9 meters above the grade of the proposed off-ramp. The earth berm/soundwall combination would break the line of sight to truck stacks for 13 units (R9 through R12-See Figures 2.2.8 [2-4]). The reasonable allowance for Option B is calculated to be $850,000 (Appendix J) with its preliminary construction cost of $493,000 (estimate based on current 2005 costs with no contingencies). While the construction cost is far below the reasonable allowance for this option, the option is preliminarily determined feasible and reasonable and will be considered further for construction.

Six condominium units (R15-See Figures 2.2.8 [2-4]) and the seven planned residential units (R27 and R28-See Figures 2.2.8 [2-4]) on this section of Caldecott Lane would receive less than 5 dBA in noise reduction with this soundwall option.

Noise Barrier No. 3

For seven planned residential units (R23 and R24-See Figures 2.2.8 [2-4]) on Caldecott Lane, building a section of earth berm between Caldecott Lane and the westbound on-ramp would reduce the noise levels by 6 dBA. At its highest point, the earth berm would reach 6.0 meters (19.7 feet) above the proposed grade of the on-ramp. The reasonable allowance for this abatement is calculated to be $238,000 (Appendix J). The earth berm would achieve less than 5 dBA reduction for eight adjacent planned residential units (R25 and R26-See Figures 2.2.8 [2-4]). A soundwall design instead of earth berm, was determined not feasible at this location as it would achieve less than 5 dBA reduction. The estimated construction cost based on current 2005 costs with no contingencies is $92,000. This option is preliminarily determined reasonable and will be considered further for construction.

Under Tunnel Alternative 3N

Noise Barrier No. 1

This soundwall is identical to Soundwall No. 1 under Tunnel Alternative 2N described previously (see Figure 2.2.8 [5-8]).

Noise Barrier No. 2 – Option A (Soundwall Only Option)

Under Alternative 3N, the predicted future noise levels for 31 residential units in the multi-story condominiums along Caldecott Lane (R9 through R15-See Figures 2.2.8 [2-4]) would range from 69 to 75 dBA Leq(h). In addition, there will be seven currently planned but not yet constructed residential units (R27 and R28-See Figures 2.2.8 [2-4]) having noise levels at 72 to 73 dBA.

Based on preliminary design data, a 4.9-meter (16-foot) high, 277-meter (909-foot) long soundwall alongside the shoulder of the proposed westbound off-ramp to Caldecott Lane (see Figures 2.2.8-11 and 2.2.8-13) would reduce the future predicted noise levels by 5 to 11 dBA for 25 condominium units (R9 through R14-See Figures 2.2.8 [2-4]). The soundwall would be located between Stations 103+75 and 106+40 of proposed westbound lanes with a distance varying between 4.5 and 20 meters (15 and 66 feet) from the edge of the traveled way of the off-ramp. Wall height is measured from the elevation of the existing ground at the location of the wall. The soundwall would break the line of sight to truck stacks for 13 units (R9 through R12-See Figures 2.2.8 [2-4]). The reasonable allowance for Option A is determined to be $900,000 (see Appendix J). The preliminary cost estimate based on current 2005 cost with no contingencies is $679,000 and thus this option is considered to be preliminarily reasonable. This option will be considered for construction.

Six condominium units (R15-See Figures 2.2.8 [2-4]) and the seven planned residential units (R27 and R28-See Figures 2.2.8 [2-4]) on this section of Caldecott Lane would receive less than 5 dBA in noise reduction with this soundwall option.

An alternate design of the soundwall, a 4.9-meter (16-foot) high, 282-meter (925-foot) long wall on the State right-of-way line along Caldecott Lane, was determined less preferable than the one described above. It would reduce the future predicted noise levels by 5 to 9 dBA for 19 condominium units (R9 through R13-See Figures 2.2.8 [2-4]) and would break the line of sight for nine units (R9 and R11-See Figures 2.2.8 [2-4]). This alternate soundwall design is not recommended for further consideration.

Noise Barrier No. 2 – Option B (Earth Berm/Soundwall Option)

Instead of constructing a soundwall from the existing ground level as in Option A, Option B is to build an earth berm in combination with a 2.4-meter high (8-foot), 161-meter (528-foot) long soundwall on top, which would reduce the predicted noise levels by 6 to 12 dBA for 25 condominium units (R9 through R14-See Figures 2.2.8 [2-4]).

The soundwall would be located between Stations 104+63 and 106+21 of the proposed westbound lanes and with a distance varying between 15.5 and 17 meters (51 and 56 feet) from the edge of the traveled way of the off-ramp (see Figures 2.2.8-12, 2.2.8-15, and 2.2.8-16). The height of the berm would reach 5.5 meters (18 feet) from the grade of the proposed off-ramp to Caldecott Lane. Wall height is measured from the proposed grade of the earth berm where the wall is situated. When combined with the earth berm, the top of wall elevation at its western end would reach 7.9 meters (26 feet) above the grade of the proposed off-ramp. The earth berm/soundwall combination would break the line of sight to truck stacks for 13 units (R9 through R12-See Figures 2.2.8 [2-4]). The reasonable allowance for Option B is calculated to be $950,000 (Appendix J) and it is estimated to be $493,000 based on current construction costs with no contingencies. This option is preliminarily considered to be reasonable and will be considered for construction.

Six condominium units (R15-See Figures 2.2.8 [2-4]) and the seven planned residential units (R27 and R28-See Figures 2.2.8 [2-4]) on this section of Caldecott Lane would receive less than 5 dBA in noise reduction with this option.

Noise Barrier No. 3

For the seven currently planned but not yet constructed residential units (R23 and R24-See Figures 2.2.8 [2-4]) on Caldecott Lane, building a section of earth berm between Caldecott Lane and the westbound on-ramp would reduce the noise levels by 7 dBA. At its highest point, the earth berm would reach 6.0 meters (19.7 feet) above the grade of the proposed on-ramp. The reasonable allowance for this abatement is calculated to be $306,000 (Appendix J) and its preliminary construction costs is estimated at $92,000 (cost is based on current construction cost with no contingencies). Therefore, this barrier is determined to be preliminarily reasonable. The earth berm would achieve less than 5 dBA reduction for eight adjacent planned residential units (R25 and R26-See Figures 2.2.8 [2-4]). A soundwall design, instead of earth berm, was determined not feasible (achieving less than 5 dBA reduction) at this location.

Table 2.2.8-2 summarizes some of the characteristics and the reasonable allowance for all noise abatements under consideration before the reasonableness determination.

Table 2.2.8-2 Summary of Noise Abatements Considered

Noise Abatement	Type	Dimensions (m)	Reasonable Allowance	
			Alternative 2N	Alternative 3N
Barrier No. 1	Soundwalls	3.7 x 115 and 3.7 x 134	$30,000	$30,000
Barrier No. 2 - Option A	Soundwall	4.9 x 277	$850,000	$900,000
Barrier No. 2 - Option B	Earth Berm/Soundwall	5.5 (berm) / 2.4 x 161	$850,000	$950,000
Barrier No. 3	Earth Berm	6 (berm)	$238,000	$306,000

Table 2.2.8-3 Summary of Noise Levels

Receptors				Future Predicted Noise Levels, dBA Leq (h)										
					Tunnel Alternative 2N					Tunnel Alternative 3N				
No.	**Location**	**Measur-ed Levels dBA**	**Exist. Levels dBA**	**No Build**	**No Barrier**	**Barriers w/No.2 Opt. A**	**Reduc-ed**	**Barriers w/No.2 Opt. B**	**Reduc-ed**	**No Wall**	**Barriers w/No. 2 Opt. A**	**Reduc-ed**	**Barriers w/No. 2 Opt. B**	**Reduc-ed**
R1	690 Hiller Dr.	72	72	**72**	**72**	72	0	72	0	**72**	72	0	72	0
R2	680 Hiller Dr.	-	72	**72**	**72**	72	0	72	0	**72**	72	0	72	0
R3	19 Hawks Hill Ct.	68	68	**68**	**69**	69	0	69	0	**69**	69	0	69	0
R4	112 Starview Ct.	69	69	**69**	**70**	70	0	70	0	**70**	70	0	70	0
R5	86 Starview Dr.	-	68	**68**	**69**	69	0	69	0	**70**	70	0	70	0
R6	6678 Charing C. Rd.	69	69	**69**	**70**	70	0	70	0	**70**	70	0	70	0
R7	6750 Charing C. Rd.	-	72	**72**	**73**	73	0	73	0	**73**	73	0	73	0
R8	6854 Charing C. Rd.	-	67	**67**	**69**	69	0	69	0	**69**	69	0	69	0
R9	150 Caldecott Ln. F1	-	66	**66**	**68**	62	6	61	7	**69**	64	5	61	8
R10	150 Caldecott Ln. F2	-	71	**71**	**72**	64	8	62	10	**74**	65	9	62	12
R11	158 Caldecott Ln. F1	-	69	**69**	**70**	62	8	62	8	**71**	63	8	62	9
R12	158 Caldecott Ln. F2	-	73	**73**	**73**	63	10	62	11	**75**	64	11	63	12
R13	320 Caldecott Ln. F1	-	70	**70**	**71**	63	8	63	8	**72**	65	7	63	9
R14	320 Caldecott Ln. F2	-	71	**71**	**72**	66	6	66	6	**73**	68	5	67	6
R15	320 Caldecott Ln. F3	69	71	**71**	**72**	68	4	70	2	**73**	70	3	70	3
R16	2333 Tunnel Rd.	61	64	64	65	65	0	65	0	**66**	66	0	66	0
R17	31 Bay Forest Ct.	62	63	63	64	64	0	64	0	65	65	0	65	0
R18	5879 Skyline Bl.	57	59	59	60	60	0	60	0	60	60	0	60	0
R19	724 Grizzly Terrace	52	54	54	56	56	0	56	0	56	56	0	56	0
R20	N. Oakland Sports C.	61	63	63	64	64	0	64	0	64	64	0	64	0
R21	Temescal Park	65	67	**67**	**68**	61	7	61	7	**68**	61	7	61	7
R22	Bruns Amphitheater	57	58	58	59	59	0	59	0	59	59	0	59	0
R23	120 Caldecott Ln. F1	-	-	**72**	**73**	67	6	67	6	**73**	66	7	66	7
R24	120 Caldecott Ln. F2	-	-	**74**	**75**	69	6	69	6	**76**	69	7	69	7
R25	130 Caldecott Ln. F1	-	-	**67**	**69**	66	3	66	3	**70**	67	3	67	3
R26	130 Caldecott Ln. F2	-	-	**73**	**73**	69	4	69	4	**74**	69	5	69	5
R27	142 Caldecott Ln. F1	-	-	**67**	**70**	65	1	65	5	**72**	70	2	66	6
R28	142 Caldecott Ln. F2	-	-	**72**	**73**	70	3	67	6	**73**	71	2	68	5

Notes: 1. All noise levels are in dBA, Leq (h).
2. **Bold** type letters denote where future predicted noise levels exceed the NAC.
3. Not all measurements were taken at the exact locations where the receptors were modeled.

Figure 2.2.8-5 Existing Condition– (View from Temescal Regional Park)

Figure 2.2.8-6 Soundwall 1 Option– (View from Temescal Regional Park)

Figure 2.2.8-7 Existing Condition–On Broadway, North of Lake Temescal Looking West (Oakland Side)

Figure 2.2.8-8 Soundwall 1 Option– (Proposed 12 ft. High Soundwalls)

Figure 2.2.8-9 Existing Condition–Tunnel Road Looking East

Figure 2.2.8-10 Soundwall No. 2 – Option A (Two-Lane Alternative)

Figure 2.2.8-11 Soundwall No. 2 – Option A (Three-Lane Alternative)

Figure 2.2.8-12 Existing Condition–Route 24 Looking West from Proposed West Portal

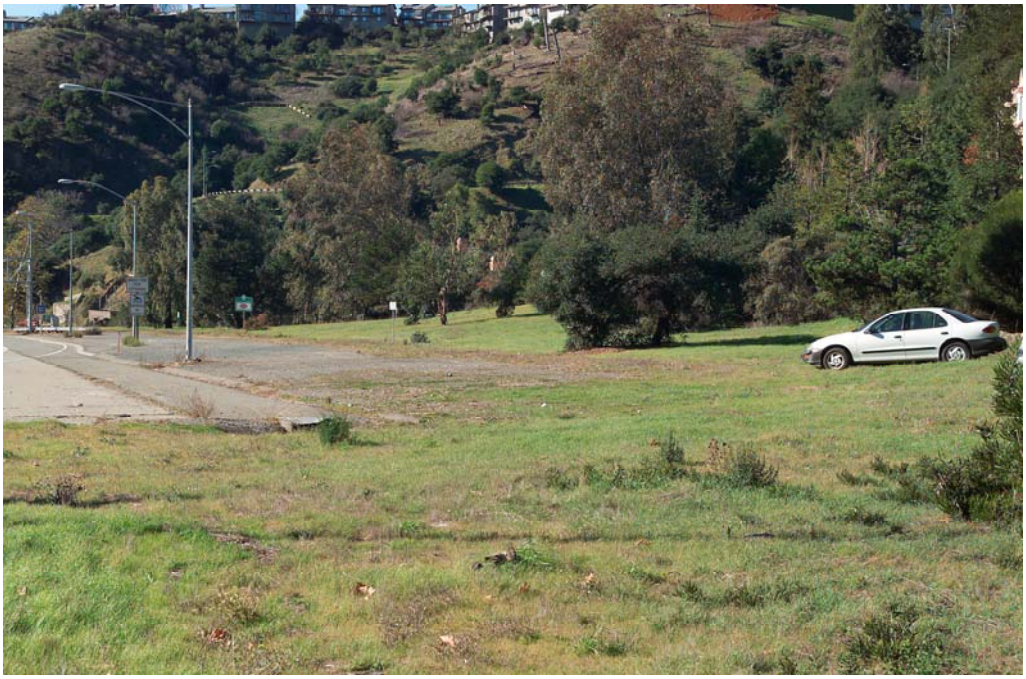


Figure 2.2.8-13 Soundwall No. 2 – Option A (Three Lane Alternative)

Figure 2.2.8-14 Soundwall No. 2 – Option B (Two Lane Alternative)

Figure 2.2.8-15 Soundwall No. 2 – Option B (Three Lane Alternative)

Figure 2.2.8-16 Soundwall No. 2 – Option B (Three Lane Alternative)

Reasonableness Determination

The preliminary reasonableness of each noise abatement measure (see Table 2.2.8-2) was determined individually by comparing its reasonable allowance with the estimated construction costs. The final reasonableness decision will be made upon completion of the public involvement process and the project design. This will be reflected in the final environmental document.

The exact dimensions and locations of above soundwalls are to be determined in final design. If project conditions are substantially changed during final design, these soundwalls will be subject to re-evaluation. A final decision of the construction of the noise abatements will be made upon completion of the project design. If the reported abatement design changes after approval of the final environmental document, a project re-analysis may be necessary.

Noise Abatements Not Feasible

TNM analyses show that, for residences situated on the top of slope (receptors R1 through R8, and R16), no soundwalls within the State right-of-way could possibly reduce the noise levels by at least 5 dBA, the minimum amount required to be considered *feasible*. Due to the steep terrain between these residences and freeway, constructing noise barriers within the private properties would not be feasible, either. Noise abatements would not be feasible for some of the units (R25 and R26) in the planned but not yet constructed buildings on Caldecott Lane.

Noise Mitigation

None of the receptors within the project limits would have a 12 dBA or more increase in its future predicted noise levels as a result of any of the proposed build alternatives. Therefore, the project causes no substantial noise increases, and no noise mitigation will be necessary. Under CEQA, the project-generated noise increase would not cause a substantial adverse environmental effect, and the proposed noise abatements are not expected to have a substantial effect on a competing resource.

2.2.8.5 CONSTRUCTION NOISE

Noise generated while constructing the tunnel improvement project could at times reach levels higher than the existing traffic noise. The increase in noise from construction activities would be temporary and can be reasonably minimized by implementing provisions in Section 7-1.01I, "Sound Control Requirements" of the Caltrans Standard Specifications, which may include the following measures:

- Consider constructing noise barriers as first items of work, where feasible;
- Erect temporary noise barriers, if necessary; and
- Keep the community informed of upcoming especially noisy construction activities, and establish a field office to handle noise complaints.

2.2.8.6 CONSTRUCTION VIBRATIONS

Blasting is the only activity that will result in peak particle vibrations (PPV) high enough to warrant special consideration. Other construction methods should not cause problems due to vibrations, and no special measures are recommended.

In addition, the residents of the houses on Tunnel Road, Bay Forest Road, Grizzly Terrace Drive, and Woodmont Way are directly over the alignment of the new bore and residents may be aware of blasting activities but structural damage is not expected. Before any blasting takes place, the

conditions of the structures would be documented; any existing defects or damage would be noted and photographed or videotaped. At this time the owners would be informed of the schedule for blasting. During blasting these areas would be monitored for vibration. If PPV exceed .5 inches/second, measures would be taken to abate vibrations. These measures can include using smaller charges and longer delay fuses (which would increase the time between successive blasts). Houses on Caldecott Lane located 122-meters (400-feet) from the west portal may be aware of blasting activities but again the structures, should not be affected by construction vibration. Measures would be taken if damage is noticed or if PPV rises above .5 inches/second. It is understood that dynamic testing is currently being done on the third bore. This recommendation may be adjusted later based on the results of that testing.

2.2.9 Energy

2.2.9.1 REGULATORY SETTING

The CEQA Guidelines state that EIRs are required to include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy.

NEPA (42 USC Part 4332) requires the identification of all potentially substantial impacts to the environment, including energy impacts.

When balancing energy used during construction and operation against energy saved by relieving congestion and other transportation efficiencies, the project would not have substantial energy impacts.

2.3 Biological Environment

A Natural Environment Study (NES) (Parsons 2005) and Preliminary Wetland Delineation Report (Jones and Stokes, 2004 and 2005) were prepared for the Caldecott Improvement Project. This section presents findings of these reports and studies for vegetation and wildlife communities, wetlands and other waters of the U.S., threatened and endangered species, and invasive vegetative species within the study area. An evaluation of the consistency of the proposed project with the Resource Management Plan for the Caldecott Wildlife Corridor is also included.

The biological study area encompasses the majority of the Caltrans right-of-way and additional easements along State Route 24 from the State Route 24/State Route 13 Interchange in Oakland to the State Route 24/Gateway Boulevard Interchange in Orinda (see Figure 2.3-1 and Figure 2.3-2).

Figure 2.3-1 Biological Study Area

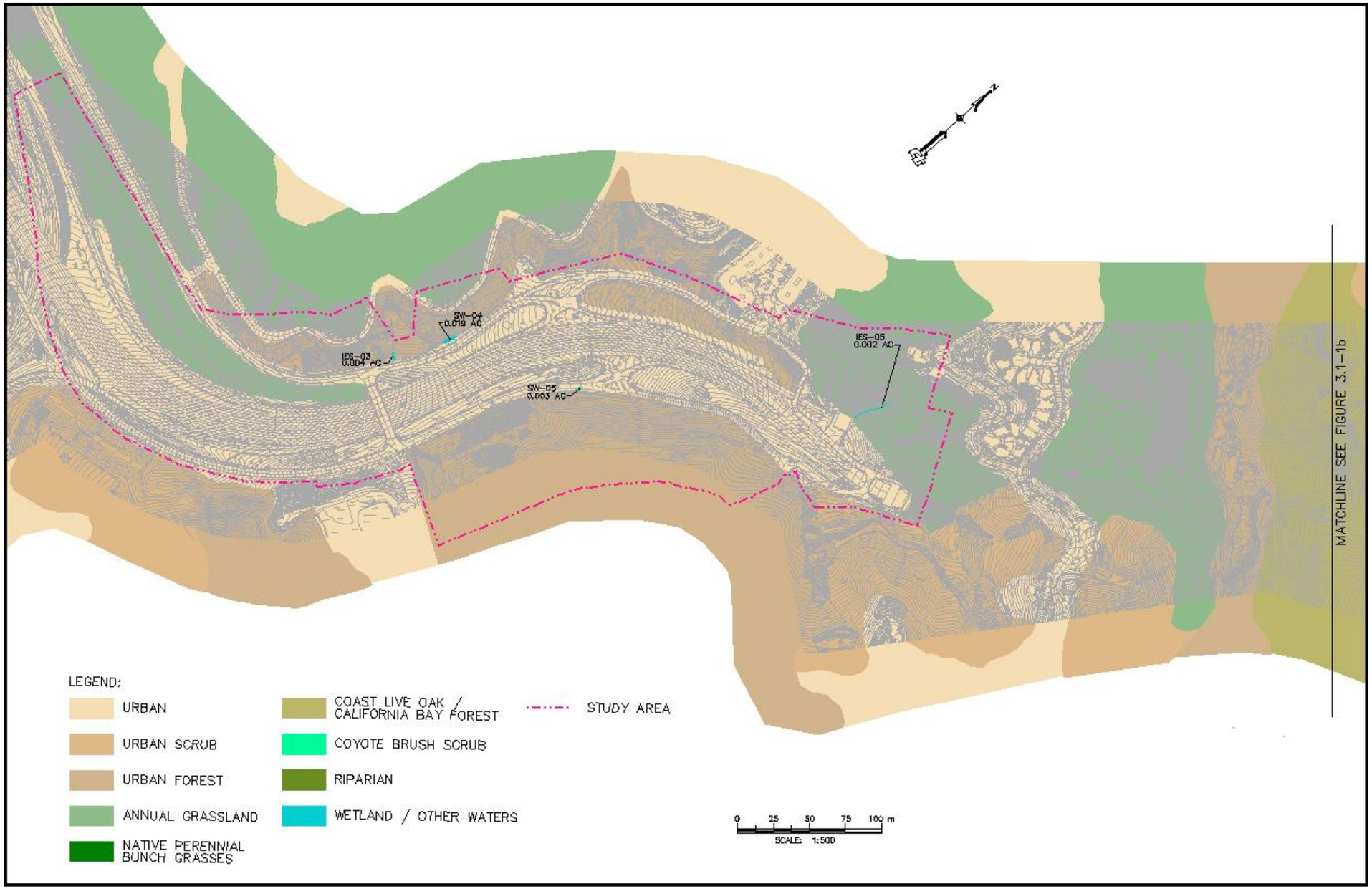
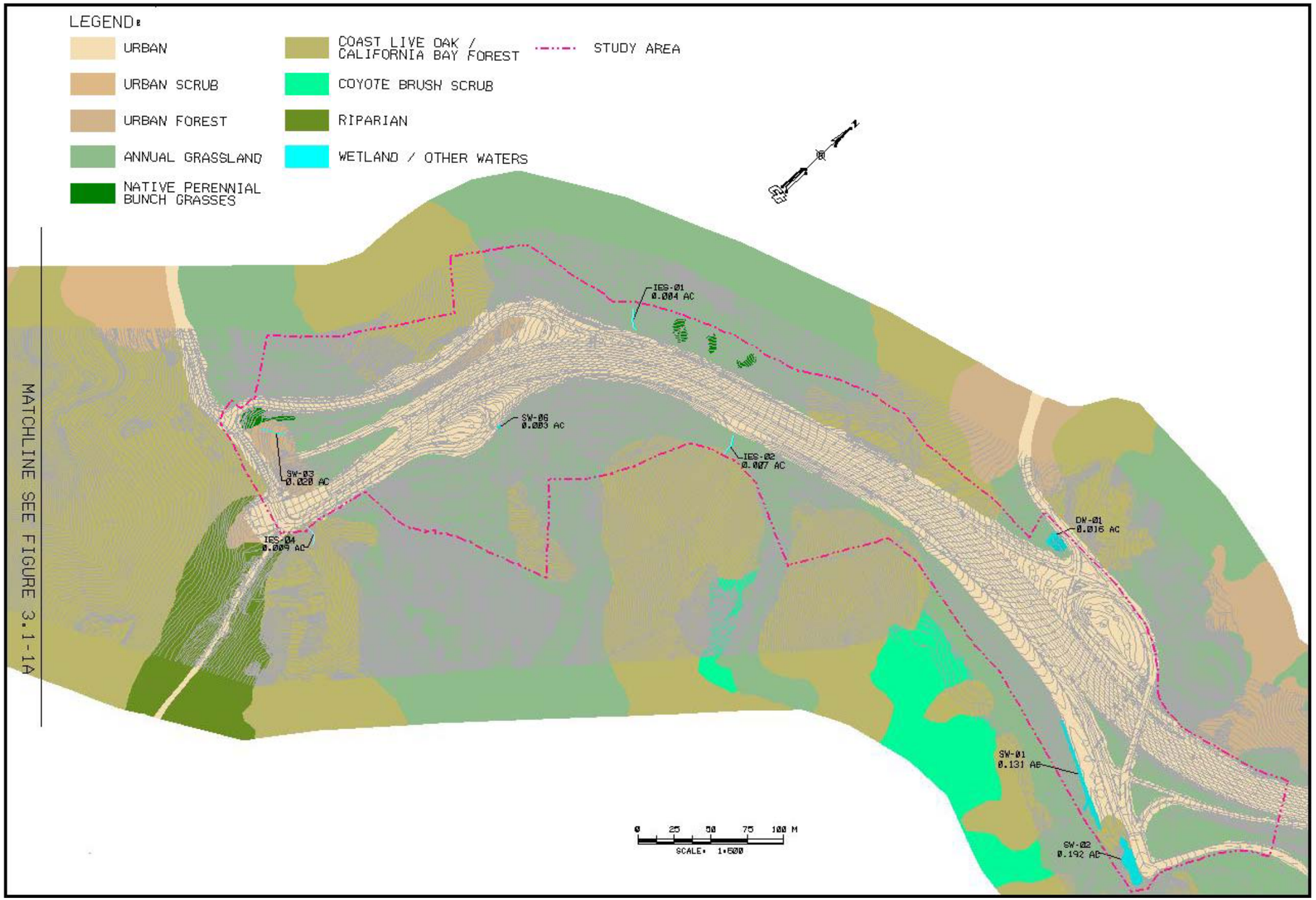


Figure 2.3-2 Biological Study Area



2.3.1 Natural Communities

2.3.1.1 AFFECTED ENVIRONMENT

Eight general natural community types exist within the study area: Coast live oak/California bay forest, annual grassland, native perennial bunch grasses, coyote brush scrub, urban scrub, urban forest, wetlands, and riparian. On the east side of the Caldecott Tunnel, the study area includes grassland, scrub, and forest composed primarily of native trees and shrubs. On the west side of the tunnel, the study area includes grassland, scrub, and forest composed primarily of trees and shrubs used in urban landscaping. A description of each community and its associated wildlife assemblage is provided below.

Coast Live Oak/California Bay Forest

Approximately 4 hectares (10 acres) of Coast live oak (*Quercus agrifolia*)/California bay (*Umbellularia californica*) forest are found within the study area. A dense forest of evergreen broadleaved trees is present at the east tunnel portal, and additional stands form a mosaic with grassland from the east portal to Gateway Boulevard. The dominant trees are Coast live oak and California bay. The overstory canopy ranges from closed with a primarily herbaceous understory to open with a dense shrub understory. Other woody species associated with this habitat in the vicinity include madrone (*Arbutus menziesii*), coyote brush (*Baccharis californicus*), California coffeeberry (*Rhamnus californica*), toyon (*Heteromeles arbutifolia*), bush monkeyflower (*Mimulus aurantiacus*), and poison oak (*Toxicodendron diversilobum*).

Coast live oak/California bay forest provides food and cover for many species of wildlife. Common reptiles include gopher snake (*Pituophis melanoleucus*) and Western fence lizard (*Sceloporus occidentalis*). Common mammals include deer mouse (*Peromyscus maniculatus*), Western gray squirrel (*Sciurus griseus*), mule deer (*Odocoileus hemionus*), and coyote (*Canis latrans*). Representative raptors in this cover type include red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), barn owl (*Tyto alba*), and great horned owl (*Bubo virginianus*). Trunk-dwelling birds include acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), Northern flicker (*Calaptes auratus*), and white-breasted nuthatch (*Sitta carolinensis*). Other common birds include California quail (*Callipepla californica*), spotted towhee (*Pipilo maculatus*), Bewick's wren (*Thryomanes bewickii*), and bushtit (*Psaltriparus minimus*).

Annual Grassland

Approximately 15.2 hectares (37.5 acres) of annual grassland are found within the study area. Non-native annual grasses dominate most of the grassland east of the Caldecott Tunnel. This grassland type is a diverse assemblage of many native and non-native annual species, often dominated by several wild oat (*Avena*), brome (*Bromus*), fescue (*Vulpia*), and filaree (*Erodium*) species. The associated plant species are often showy wildflowers, such as California poppy (*Eschscholzia californica*), California goldfields (*Lasthenia californica*), and many lupine (*Lupinus*), owl's-clover (*Castilleja*), and fiddleneck (*Amsinckia*) species. West of the Caldecott Tunnel, on the north side of the study area where not developed or landscaped, the vegetation is predominantly annual grassland. This area was burned in the 1991 Oakland Hills fire; small oak and California bay trees and coyote brush shrubs are scattered throughout the grassland.

Annual grassland supports insects, amphibians, reptiles, and small birds and mammals preyed upon by other wildlife such as red-tailed hawks, red-shouldered hawks (*Buteo lineatus*), Northern harriers (*Circus cyaneus*), American kestrels, great horned owls, California voles (*Microtus californicus*), deer mice (*Peromyscus maniculatus*), Western harvest mice (*Reithrodontymis megalotis*), California

ground squirrels (*Spermophilus beecheyi*), and coyotes. Grassland near open water and woodland habitats is used by more wildlife species than are other grasslands because it provides places for resting, breeding, and escape cover.

Native Perennial Bunch Grasses

Grasslands dominated by needlegrass (*Nasella*) species are considered rare and worthy of conservation consideration. Associated species are those found in California annual grassland, although cover of non-native grasses is generally much lower than in California annual grassland. Typical perennial grass species found in native perennial grassland in the project vicinity include purple needlegrass (*Nassella pulchra*), nodding needlegrass (*N. cernua*), foothill needlegrass (*N. lepida*), one-sided bluegrass (*Poa secunda*), and big squirreltail (*Elymus multisetus*). Native perennial grassland supports similar wildlife species as annual grassland, described above.

Approximately 0.22 hectare (0.55 acre) of native perennial bunch grasses is found within the study area. Small stands of native perennial bunch grasses are intermixed with annual grassland just north of the eastern tunnel portal near Fish Ranch Road. Some additional areas of native perennial bunch grasses intermixed with annual grassland are located further east on the north side of State Route 24.

Urban Scrub

Approximately .08 hectare (0.2 acre) of urban scrub is found within the study area. West of the Caldecott Tunnel, along the south side of the study area, there are stands of scrub dominated by non-native exotics, primarily French broom (*Genista monspessulana*) and cotoneaster (*Cotoneaster sp.*). Associated species include other exotics, such as firethorn (*Pyracantha sp*.) and pampas grass (*Cortaderia sp*.), as well as native shrubs that commonly occur in coastal scrub habitats, including poison oak, coyote brush, and California buckeye (*Aesculus californica*). The wildlife species described above as using coyote brush scrub may also be found in urban scrub.

Urban Forest

Approximately 8.5 hectares (21.1 acres) of urban forest are found within the study area. Before the 1991 Oakland Hills fire, the area above the west tunnel portal and west to Oakland was densely forested by urban landscaping trees, primarily eucalyptus and Monterey pine trees. Stands of this urban forest are present adjacent to the west portal and along the south side of the study area between Lake Temescal Regional Park and Broadway. Stands of eucalyptus trees are also present on the north side of the study area at the State Route 24/Gateway Boulevard interchange.

Wildlife species commonly found in urban forest include Western meadowlark (*Sturnella neglecta*), Brewer's blackbird (*Euphagus cyanocephalus*), American goldfinch (*Carduelis tristis*), white-crowned sparrow (*Zonotrichia leucophrys*), yellow-billed magpie (*Pica nuttallii*), mourning dove (*Zenaida macroura*), Virginia opossum (*Didelphis virginiana*), and black-tailed hare (*Lepus californicus*). American kestrels and red-tailed hawks may roost in this habitat.

Wetland/Other Waters

Five unvegetated drainages [approximately .01 hectare (0.026 acre)] are present in the study area, two on the south side of State Route 24 east of the Caldecott Tunnel, one on the north side of State Route 24 east of the Caldecott Tunnel, one on the north side of State Route 24 west of the Caldecott Tunnel, and one north of Caldecott Lane on the west side of the Caldecott Tunnel. Two of the drainages on the east side of the tunnel are located in Coast live oak/California bay forest, while the other three drainages are located in annual grassland.

Six slope wetlands and one depressional wetland [approximately .15 hectare (0.38 acre)] are present in the study area, two in willow scrub habitat and two in grassland habitat. Two of the slope wetlands are located in grassland and willow scrub habitat south of State Route 24 adjacent to the Gateway Boulevard Park-and-Ride area. These wetlands consist of freshwater marsh habitat, dominated by broad-leafed cattail (*Typha latifolia*) and willow scrub, dominated by shining willow (*Salix lucida ssp. lasiandra*).

The third slope wetland is located in willow scrub habitat dominated by shining willow north of State Route 24, adjacent to the eastern tunnel portal. Another slope wetland is located adjacent to and north of Caldecott Lane, dominated by shining willow, broad-leafed cattails, and common rush (*Juncus effusus*). The fifth slope wetland is located adjacent to and south of Broadway Road and is dominated by southern cattail (*Typha domingensis*) and shortspike canarygrass (*Phalaris brachystachys*). The sixth slope wetland is located south of the Fish Ranch Road eastbound on-ramp and is dominated by shining willow, narrow-leafed cattail (*Typha angustifolia*) and cotoneaster. The depressional wetland is located in grassland north of State Route 24 at the Gateway Boulevard exit and is dominated by Italian ryegrass (*Lolium multiflorum*) and bristly ox-tongue (*Picris echioides*).

Riparian

Riparian habitat is present along the stream that parallels Old Tunnel Road, south of the east tunnel portal. Arroyo willow (*Salix lasiolepis*) is dominant along the stream channel. Adjacent to the channel, the vegetation is a mixture of species characteristic of the adjacent coast live oak/California bay forest and species typically associated with riparian habitat. Species associated with riparian habitat in the project vicinity include white alder (*Alnus rhombifolia*), bigleaf maple (*Acer macrophyllum*), California hazelnut (*Corylus cornuta var. californica*), oso berry (*Oemleria cerasiformis*), and Pacific ninebark (*Physocarpus capitatus*).

2.3.1.2 IMPACTS

Each of the build alternatives would have permanent impacts on natural communities (see Table 2.3.1-1). Approximately 0.01 hectare (0.03 acre) of native perennial bunch grass would be affected by Alternative 3N. The other natural community that would be affected by the project alternatives is urban forest.

Construction of either of the proposed build alternatives would permanently affect .008 hectare (0.02 acre) of wetlands at slope wetland SW-03 and .0008 hectare (0.002 acre) of other waters of the U.S. at the intermittent/ephemeral stream IES-05.

Each of the build alternatives would affect individual Coast live oak trees. Alternative 2N would affect up to 39 Coast live oaks and Alternative 3N would affect up to 43 Coast live oaks (see Table 2.3.1-1). There will be no impact to Coast live oak/California Bay Forest trees.

Table 2.3.1-1 Permanent Natural Community Impacts in hectares (acres) of Build Alternatives for the Caldecott Improvement Project

Community Type	Alternative 2N	Alternative 3N
	Permanent Impact	Permanent Impact
Coast Live Oak/California Bay Forest	0	0
Annual Grassland	1.04 (2.57)	1.18 (2.92)
Native Perennial Bunch Grasses	0	0.01 (0.03)
Urban Forest	.72 (1.78)	.72 (1.78)
Urban scrub	0	0
Riparian	0	0
Wetlands	.008 (0.02)	.008 (0.02)
Intermittent and ephemeral streams	.0008 (0.002)	.0008 (0.002)
Source: Parsons, 2005; Jones and Stokes, 2004.		

2.3.1.3 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Implementation of avoidance and minimization efforts, as described in Section 2.4.11.2 (Construction Impacts), would ensure that the proposed project would have no impacts on California bay/Coast live oak forest. As the annual grassland is highly disturbed due to location and presence of non-native species, there is no proposed mitigation for permanent impacts to this habitat type. Annual grassland temporarily impacted will be seeded with a native seed mix upon completion the project. Impacts to trees within the urban forest will be mitigated. Section 2.3.3.3 describes this further.

Native grassland communities located adjacent to the construction zone that could be affected by construction activities will be temporarily fenced off and designated as ESA to prevent accidental intrusion of workers and equipment.

Revegetation of non-native grassland areas temporarily disturbed by project construction will utilize a seed mix containing at least 50 percent native grasses. If the resulting cover of native grasses is below 15 percent after two years, additional seeding with native grasses or planting of native bunch grass seedlings will be implemented in order to increase native species cover.

2.3.2 Wetlands and Other Waters

2.3.2.1 REGULATORY SETTING

Three primary regulations apply to undertakings that may affect wetlands or other waters of the United States, as follows:

Section 404, Clean Water Act

As established in Section 404 of the Clean Water Act (33 U.S.C. 1344), the U.S. Army Corps of Engineers (USACE) has final authority over the identification of wetlands and other waters of the U.S. in the project vicinity, including their jurisdiction, determination of area affected by the project, and type of permits and conditions required. Section 404 prohibits the discharge of dredged or fill material into waters of the U.S. without a permit from the USACE. In order for a project that affects wetlands to be approved and a permit to be obtained, it must be demonstrated that the proposed project is the least environmentally damaging. A “no net loss of wetland acreages or values” policy is established for mitigation of wetland impacts.

Section 401, Clean Water Act

Concurrent with the determination of a project's qualifications for an USACE permit is certification of the project's compliance with California State water quality standards as regulated by the Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act. The water quality certification may include waste discharge requirements.

Section 1600 et. Seq., California Fish and Game Code

Actions that have the potential to alter a streambed or discharge materials into a stream must obtain a Streambed Alteration Agreement ("1602 permit") with the California Department of Fish and Game (CDFG) in accordance with Section 1600 and following of the California Fish and Game Code. The Streambed Alteration Agreement effectively applies to any construction work between the banks of a stream or within the floodplain of a waterway. The agreement typically establishes seasonal limits or work windows for construction activities that may affect a streambank.

2.3.2.2 AFFECTED ENVIRONMENT

A delineation of potential jurisdictional wetland and other waters of the U.S. in the vicinity of the Caldecott Improvement Project was performed on May 6, July 12, and July 15, 2004, and May 31, 2005, in accordance with routine on-site determination procedures described in the U.S. Army Corps of Engineers Wetlands Delineation Manual. This delineation has been submitted to the USACE for its jurisdictional determination. The USACE has final authority over the identification of wetlands and other waters in the U.S., including their jurisdiction, determination of area affected by the proposed improvements, and type of permits and conditions required; therefore, the delineation of wetlands and other waters of the U.S is not final until the USACE returns its jurisdictional determination.

Table 2.3.2-1 identifies potentially jurisdictional features that were identified within the delineation area boundary. These areas are shown on the Wetland Delineation Maps in Appendix L. Jurisdictional wetlands are determined by the presence of three indicators: wetlands soils, wetlands vegetation, and hydrology, or period of inundation. Other waters of the U.S. must possess defined banks and an ordinary high water mark (OHWM).

Table 2.3.2-1 Jurisdictional Features Mapped within the Delineation Area

Wetlands	Area [hectares (acres)]
Slope Wetland SW-01	.053 (0.131)
Slope Wetland SW-02	.078 (0.192)
Slope Wetland SW-03	.008 (0.020)
Slope Wetland SW-04	.008 (0.019)
Slope Wetland SW-05	.001 (0.003)
Slope Wetland SW-06	.001 (0.003)
Depressional Wetland DW-01	.006 (0.016)
Wetland Subtotal	.155 (0.384)
Other Waters of the U.S.	
Intermittent/Ephemeral Stream IES-01	.002 (0.004)
Intermittent/Ephemeral Stream IES-02	.003 (0.007)
Intermittent/Ephemeral Stream IES-03	.002 (0.004)
Intermittent/Ephemeral Stream IES-04	.004 (0.009)
Intermittent/Ephemeral Stream IES-05	.001 (0.002)
Other Waters Subtotal	.011 (0.026)
Jurisdictional Features Total	**.166 (0.41)**
Source: Jones and Stokes, 2004 and 2005.	

2.3.2.3 IMPACTS

Either of the proposed build alternatives would permanently fill .008 hectare (0.02 acre) of wetlands at slope wetland SW-03 (see Figure 2.3-2). Surface water at slope wetland SW-03 originates from a groundwater seep at the upslope end of the wetland. Most of the seepage is routed through a shallow earthen swale towards a storm drain drop inlet structure at the downslope end of the wetland. Soils at this location consist of dark gray and greenish loams, silt loams, silty clay loams and clay loams that extend to depths of more than 16 inches. Dominant plant species at slope wetland SW-03 are shining willow (Salix lucida), iris-leaf rush (Juncus xiphioides), and broad-tooth monkey-flower (Mimulus guttatus).

Either of the proposed build alternatives would permanently fill .0008 hectare (0.002 acre) of other waters of the U.S. at the intermittent/ephemeral stream channel IES-05 (see Figure 2.3-1). This channel was not flowing during the time of the field surveys in early May and mid-July, so it was interpreted to be intermittent/ephemeral. IES-05 drains to a cement detention basin. Downstream of this detention basin it flows through a culvert which drains directly to a storm drain drop inlet structure. Vegetation surrounding IES-05 consists of a mixture of riparian vegetation, coastal scrub shrubs, and annual grasses and forbs. There would be no other temporary or permanent impacts to wetlands or other waters of the U.S. with either build alternative.

2.3.2.4 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Mitigation requirements for impacts to wetlands and other waters will be determined through consultation with the USACE, and will include restoration of wetlands at a ratio of 2:1 or purchase of wetland creation / enhancement credits at an USACE-approved mitigation bank. Mitigation measures will be identified for both permanent and temporary (construction phase) impacts of the project to ensure no net loss of wetlands and other waters. A final *Wetland Mitigation and Monitoring Plan* will be prepared for the project if a mitigation bank is not used.

2.3.3 Trees and Other Mature Vegetation

2.3.3.1 REGULATORY SETTING

California State Senate Concurrent Resolution No. 17 was filed with the Secretary of State on September 1, 1989. This resolution addresses the protection of native Valley/Coast live oak woodlands with respect to land use/transportation planning projects. The resolution specifically calls for State agencies to "preserve and protect native oak woodlands to the maximum extent feasible," or "provide for replacement plantings where designated oak species are removed from oak woodlands."

The Cities of Oakland and Orinda have ordinances for the protection of trees within their jurisdictions. Under the City of Oakland tree ordinance, a protected tree is a coast live oak 10.2 centimeters (four inches) or larger in diameter, measured 1.4 meters (4.5 feet) above the ground. Other protected trees under this ordinance include any other species nine inches or larger in diameter, except Eucalyptus and Monterey Pine.

The City of Orinda defines protected trees as any native riparian tree with a trunk diameter of 10.2 centimeters (four inches) at 1.4 meters (4.5 feet) above the ground. A native riparian tree is defined as a tree within 9.1 meters (30 feet) of the edge of a creek bank or a tree beyond 6.1 meters (20 feet), but in such proximity to a creek bank that it requires soil moisture levels in excess of that available in adjacent uplands. Other protected trees under this ordinance include trees with a trunk diameter equal to or greater than 15.2 centimeters (six inches) in diameter at 1.4 meters (4.5 feet) above the ground.

2.3.3.2 AFFECTED ENVIRONMENT

Biologists conducted a comprehensive tree survey in May, July, and October 2004, and May 2005 using GPS technology to estimate the location of individual trees. A total of 701 individual trees were recorded in the tree survey study area. Of these trees, 293 are oaks, comprising 292 coast live oaks (Quercus agrifolia) and one valley oak (Quercus lobata).

2.3.3.3 IMPACTS

Table 2.3.3-1 identifies the number and species of trees that would be permanently affected by Alternatives 2N and 3N. All tree impacts to both permanent and temporary impact areas were classified as permanent. The project's effect on ordinance trees (specifically oaks) would be substantially adverse unless mitigation is applied. Even with mitigation, tree removal will result in long-term impacts because it will take years for the new trees to mature and replace the wildlife habitat value of the present trees.

Table 2.3.3-1 Impacts to Urban Trees by Species for Either Build Alternative of the Caldecott Improvement Project

Species	Number of Trees Affected	
	Alternative 2N	Alternative 3N
Madrone Arbutus menziesii	1	1
American Creek Dogwood Cornus sericea ssp. sericea	2	2
Monterey Pine Pinus radiate	88	91
Western Sycamore Platanus racemosa	8	10
Coast Live Oak Quercus agrifolia	39	43
Valley Oak Quercus lobata	1	1
Pacific Willow *Salix lucida* ssp.	1	1
Blue Elderberry Sambucus mexicana	0	2
Peruvian Pepper Tree *Schinus molle*	1	1
Coast Redwood Sequoia sempervirens	3	3
California Bay Laurel Umbellularia californica	4	5
California Walnut Juglans californica	1	1
Total	149	161

2.3.3.4 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Tree replacement will occur on-site, insofar as practicable. Impacts not feasibly mitigated on-site will be replaced by off-site planting and by measures intended to enhance existing off-site forests. Consultation with the CDFG to discuss potential impacts and proposed mitigation will need to occur.

There is ample area within the Caltrans right-of-way at the site of the proposed noise barrier (earth berm) between State Route 24 and Caldecott Lane to mitigate for impacts to coast live oaks and valley oaks. None of the existing oaks that would be affected by the proposed project are within the Coast live oak forest. Plantable areas are also available along the east side of the proposed project. A Final Tree Replacement and Planting Plan will be prepared for the project. Preliminary recommendations for tree replacement include:

- All planting shall be as a separate planting contract and shall be implemented immediately following construction of the proposed project;
- Topsoil would be conserved during grading operations or areas otherwise excavated, as is practicable. This material would be stockpiled and specified as “select material” in the proposed project plans for reapplication on graded areas to aid in plant establishment;
- For oak tree impacts, the recommended replacement ratio for oak trees is 3:1 to 5:1 and 1:1 to 3:1 in relation to acreage. Consultation with the CDFG to discuss potential impacts and proposed mitigation will need to occur;

- Tree replacement would be coordinated with landscaping plans for the project. Permanent watering would be provided for on-site replacement locations. Temporary watering would be provided for off-site replacement areas to ensure plant establishment during a three-year monitoring period. The tree replacement plan would target a 80 percent survival rate to enable replacement ratios of 2:1 to 3:1;
- A qualified biologist shall be retained to monitor restoration success for three years to ensure a 80 percent survival rate at the end of the third year; and
- As a near-term mitigation measure to compensate for the delay in providing mature replacement habitat, California bay and Coast live oak forest and other adjacent areas of the project will be enhanced through removal of exotic species, including acacia (Acacia) and broom (Genista spp.). These enhancement measures will immediately improve existing forest quality. Combining existing forests enhancement with replacement of affected trees would reduce the impact of the proposed project on California bay/Coast live oak forest to a level less than significant.

2.3.4 Invasive Species

2.3.4.1 REGULATORY SETTING

Executive Order 13112

Executive Order (EO) 13112 requires federal agencies to prevent the introduction, control, and spread of invasive species. Species that are likely to harm the environment, human health, or the economy are of particular concern. The executive order builds on the National Environmental Policy Act (NEPA) of 1969, the Federal Noxious Weed Act of 1974, and the Endangered Species Act of 1973 to prevent the introduction of invasive species; provide for their control; and take measures to minimize economic, ecological, and human health effects.

2.3.4.2 AFFECTED ENVIRONMENT

Table 2.3.4-1 lists those species that were noted during the botanical surveys in the study area that are designated as exotic pest plants of ecological concern by the California Exotic Pest Plants Council. The table also includes information on where these pest species were noted. Eight species that are designated as "Widespread Most Invasive Wildland Pest Plants" were noted and two species designated as "Regional Most Invasive Wildland Pest Plants" were noted. In addition, four species that are designated as "Wildland Pest Plants of Lesser Invasiveness" were noted. The study area consists primarily of disturbed areas in close proximity to State Route 24; therefore, the large number of exotic pest plants is not surprising.

2.3.4.3 IMPACTS

Construction activities associated with the proposed project have the potential to introduce noxious weeds from the project area into uninfested areas. Uninfested areas that are potentially at risk include neighboring wildland areas and other areas where machinery used on the project may be used subsequently. Through the successful implementation of avoidance and minimization efforts, as described below, the project will have no adverse impact of noxious weeds on the sensitive communities.

2.3.4.4 AVOIDANCE, MINIMIZATION AND MITIGATION MEASURES

Measures such as worker training, avoidance of sensitive communities, and cleaning construction machinery before use on subsequent projects in sensitive communities would reduce the likelihood that noxious weeds would be spread by the proposed project. In addition, it is recommended that

disturbed areas be restored and revegetated after construction is complete to prevent noxious weeds from colonizing new areas.

Table 2.3.4-1 Noxious Weeds Noted in the Project Area During May 2004 Surveys

List A-1 Plants. Most Invasive Wildland Pest Plants; Widespread			
Scientific Name	**Common Name**	**Family**	**Location in Project Area**
Cortaderia jubata	Pampas Grass, Hairy	Poaceae	Grassland north of State Route 24 east and west of tunnel
Centaurea solstitialis	Thistle, Yellow Star	Asteraceae	Roadside grassland throughout the study area
Cynara cardunculus	Artichoke Thistle	Asteraceae	Grassland throughout the study area
Cystisus scoparius	Broom, Scotch	Fabaceae	In scrub adjacent to Caldecott Lane, west of State Route 24
Eucalyptus globules	Gum, Blue	Myrtaceae	Planted along the roadside in patches throughout the study area. Large population in urban forest south of State Route 24 and west of the tunnel
Eucalyptus camaldulensis	Gum, Red	Myrtaceae	Planted along the roadside in patches through the study area
Foeniculum vulgare	Fennel, Sweet	Apiaceae	In grasslands and scrub through the study area
Genista monspessulana	Broom, French	Fabaceae	In urban scrub. Most occurrences are west of the tunnel
List A-2 Plants. Most Invasive Wildland Pest Plants; Regional			
Scientific Name	**Common Name**	**Family**	**Location in Project Area**
Ailanthus altissima	Tree of Heaven	Simaroubaceae	In corporation yard north of State Route 24, about 0.25 mile west of Gateway Blvd. exit
Cotoneaster pannosa	Cotoneaster, Silverleaf	Rosaceae	Throughout the study area
List B: Wildland Pest Plants of Lesser Invasiveness			
Scientific Name	**Common Name**	**Family**	**Location in Project Area**
Bellardia trixago	Bellardia	Scrophulariaceae	Grassland throughout the study area
Brassica nigra	Mustard, Black	Brassicaceae	Grassland throughout the study area
Carduus pycnocephalus	Thistle, Italian	Asteraceae	Grassland throughout the study area
Centaurea melitensis	Tocalote	Asteraceae	Grassland throughout the study area
Cirsium vulgare	Thistle, Bull	Asteraceae	Grassland throughout the study area
Conium maculatum	Poison Hemlock	Apiaceae	Grassland throughout the study area
Ehrharta erecta	Stebbins Grass	Poaceae	West of tunnel, north of State Route 24, near tunnel portal
Note: The list is organized by California Exotic Pest Plants Council's ranking system (1999). Within these groups, species are ordered alphabetically by scientific name. Source: Jones and Stokes, 2004.			

2.3.5 Threatened and Endangered Species

Special-status plant and wildlife species are species that have been afforded special recognition and protection by federal, state, or local resource conservation agencies and organizations. These species are generally considered rare, threatened, or endangered due to declining or limited populations. For purposes of this environmental document, candidate threatened or endangered species were addressed in the same manner as listed species, since they could be listed during later stages of project development.

2.3.5.1 REGULATORY SETTING

A variety of laws seek to identify, avoid, minimize and mitigate for impacts to special-status plant and wildlife species, as summarized in the following paragraphs.

Federal Endangered Species Act

The Federal Endangered Species Act (ESA), enacted in 1973, protects fish and wildlife species (and their habitats) that have been identified by the U.S. Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) as endangered or threatened. Endangered refers to species, subspecies, or distinct population segments in danger of extinction through all or a significant portion of their range; threatened refers to those likely to become endangered in the near future. USFWS and NOAA Fisheries administer the federal ESA. In general, NOAA Fisheries is responsible for the protection of ESA-listed marine species and anadromous fish species, while other listed species are under USFWS jurisdiction.
Biological assessments are required under Section 7 of the Act if listed species or critical habitat may be present in the area affected by any major construction activity conducted by, or subject to issuance of a permit from, a federal agency as defined in Part 404.02. Under Section 7, the federal agency conducting, funding, or permitting an action (the lead agency) must consult with USFWS or NOAA Fisheries, as appropriate, to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat.

California Endangered Species Act

The California Endangered Species Act (CESA) enacted in 1984 protects wildlife and plants listed as endangered or threatened under the act by the California Fish and Game Commission (CFGC). The CESA prohibits all persons from taking species that are state-listed as endangered or threatened under the California Endangered Species Act (California Fish and Game Code Section 2080) or as fully protected (as defined in California Fish and Game Code Sections 3511, 4700, and 5050), except under certain circumstances. The CESA definition of "take" is any action or attempt to "hunt, pursue, catch, capture, or kill" a listed species.

Section 2081 of CESA provides a means by which agencies or individuals may obtain authorization for incidental "take" of state-listed species, except for certain species designated as "fully protected" under the California Fish and Game Code (see "California Fish and Game Code" below). Take must be incident to, not the purpose of, an otherwise lawful activity. Requirements for a Section 2081 permit are similar to those used in the Federal ESA Section 7 process, including identification of impacts on listed species, development of mitigation measures that minimize and fully mitigate impacts, development of a monitoring plan, and assurance of funding to implement mitigation and monitoring.

California Native Plant Protection Act

The California Native Plant Protection Act (CNPPA), enacted in 1977, prohibits the import of rare and endangered plants into California, the take of rare and endangered plants, and the sale of rare and endangered plants (the "threatened" category replaced "rare" when the CESA was enacted in 1984). The CESA defers to the CNPPA, which ensures that state-listed plant species are protected when state agencies are involved in projects subject to CEQA. The removal of plants for performance of a public service by a public agency or publicly- or privately-owned public utility is exempt from the CNPPA.

California Fish and Game Code Protections for Individual Species

The California Fish and Game Code provides protection from take for a variety of species; it defines "take" as the act or attempt to "hunt, pursue, catch, capture, or kill" species listed as endangered or threatened. Certain species are considered fully protected, meaning that the code explicitly prohibits all take of individuals of these species except for take required for scientific research, which may be authorized by DFG in some situations. Section 5050 lists fully protected amphibians and reptiles, Section 5515 lists fully protected fish, Section 3511 lists fully protected birds, and Section 4700 lists fully protected mammals.

The California Fish and Game Code provides less stringent protection for other species, prohibiting most take, but permitting CDFG to issue regulations authorizing take under some circumstances. Eggs and nests of all birds are protected under Section 3503; nesting birds, including raptors and passerines, under Sections 3513 and 3503.5; birds of prey under Section 3503.5; migratory nongame birds under Section 3800; and other specified birds under Section 3505. White shark (Carchadon carcharias) is protected under Sections 5517 and 8599. Mountain lion (Felis concolor) is protected under Section 4800 et seq.

Migratory Bird Treaty Act

Nesting activities of numerous birds are protected under the Migratory Bird Treaty Act. Tree removal activities that could alter nesting behavior, jeopardize eggs or young in nests, or reduce parental care would result in a violation.

2.3.5.2 AFFECTED ENVIRONMENT

The USFWS was contacted for a listing of threatened, endangered, and candidate species that may occur in the project vicinity. A copy of the letter and listing received from the USFWS is included in Appendix K. Studies and field surveys were performed as required for all special status species with potential to be present within the vicinity of the proposed Caldecott Improvement Project. All survey results for plants, wildlife and jurisdictional features are addressed in the NES. The discussion below focuses on the results of studies conducted for 15 special-status plant species, one invertebrate, three amphibian species, two reptiles, two birds and a variety of nesting raptors and other migratory birds for which there is potentially suitable habitat in the project vicinity.

Special-status Plant Species

Fifteen special-status plant species were identified to have potential to occur in the study area:

Table 2.3.5-1 Special-status Plant Species

Bent-flowered fiddleneck	*Amsinckia lunaris*
Pallid manzanita	*Arctostaphylos pallida*
Big-scale balsamroot	*Balsamorhiza macrolepis var. macrolepis*
Mt. Diablo fairy lantern	*Calochortus puchellus*
Western leatherwood	*Dirca occidentalis*
Round-leaved filaree	*Erodium macrophyllum*
Diablo helianthella	*Helianthella castanea*
Congdon's tarplant	*Hemizonia (Centromadia) parryi ssp. Congdonii*
Loma Prieta hoita	*Hoita strobilina*
Northern California black walnut	*Juglans Californica var. hindsii*
Hall's bush mallow	*Malacothamnus halii*
Mount Diablo cottonweed	*Micropus amphibolus*
Robust Monardella	*Monardella villosa ssp. globosa*
Adobe sanicle	*Sanicula maritima*
Oval-leaved viburnum	*Viburnum ellipticum*

Botanical surveys conducted in May and July 2004, and May 2005 during the bloom periods for the various flowering species resulted in negative findings for all 15 plants, and it is unlikely that these species exist within the study area.

Special-status Wildlife Species

San Francisco Lacewing. The San Francisco lacewing (Nothochrysa californica) is a small insect species currently identified by the USFWS as a federal species of concern. This species is associated with coastal sage scrub, riparian woodland, and oak woodland habitats. Adult and larval lacewings are predatory on aphids and other small insects. Although the historical range of this species includes coastal counties from Mendocino to Los Angeles, habitat degradation and land conversion has resulted in a reduced and disjunct current distribution.

Although San Francisco lacewings were not observed during the surveys conducted in May 2004, suitable habitat for the species was identified at two bore sites located on the north-east side of the existing tunnels. These bore sites were temporarily impacted during the geological investigation and will not be impacted due to the construction of the project. Suitable habitat was not identified within the area that will be affected by the proposed project.

California Red-legged Frog. The California red-legged frog (CRLF, Rana aurora draytonii) measures 5.1 to 12.7 centimeters (2 to 5 inches) in length and inhabits cold water ponds, pools in streams and marshes, and other semi-permanent bodies of water. This species occurs in the Coast Ranges and in portions of the Sierra Nevada. CRLF is recognized by its large size, pronounced

dorso-lateral folds, dark dorsal coloration, and red coloration on the underside of the lower abdomen and hind legs. The Rana aurora draytonii subspecies was federally listed as threatened in 1996 by the USFWS (2002). CDFG has designated the frog as a "species of special concern".

The study area does not lie within either designated or proposed critical habitat for CRLF. The closest proposed critical habitat unit for CRLF is located east of Interstate 680 and is primarily composed of lands immediately surrounding Mount Diablo.

Initial site visits for CRLF were conducted in early February 2004 (McGinnis 2004), followed by two daytime and two nighttime flashlight surveys in mid-May, and a final inspection of these areas in mid-August 2004. These visits failed to produce any sightings of CRLF egg clusters, larvae, juveniles, or adults. Habitat assessment conducted by project team biologists determined that neither of the wetland survey sites in the project vicinity can support successful reproduction of CRLF.

Given previous sightings of CRLF in the Gateway Valley area, a scenic valley located between the City of Orinda and the Caldecott Tunnel, and the saturated valley floor conditions that can occur during the rainy season, however, a possibility exists that in a given year one or more threatened frogs may wander to the Gateway east off-ramp wetland site and remain there during the summer-fall season. The California Natural Diversity Database (CNDDB) lists a 1997 CRLF sighting at a pool in Brookside Creek near the southeast end of the Gateway Valley, approximately one mile east of the Gateway off-ramp site and one and one-half miles from the east portals of the Caldecott Tunnel. In 1992, Dr. McGinnis observed a CRLF in a small pond adjacent to the ranch road that passes through the Gateway Valley area. This site is approximately one-half mile from the Gateway east off-ramp. These observations of CRLFs within wandering range of the Gateway east off-ramp wetland and seasonal habitat conditions on the Gateway Valley floor indicate that CRLFs may arrive at this wetland site. The depth of water at this location, however, would not provide successful breeding habitat.

There are no CNDDB records of CRLF occurrence within several miles west, north, and south of the east portals of the Caldecott Tunnel, and an attempt by a CRLF moving north from the Gateway Valley to cross State Route 24 on a rainy night would most likely fail. A slight possibility does exist, however, that a wandering CRLF could follow the south shoulder drainage ditch of State Route 24 from the north end of the Gateway Valley west to the area above the east portals of Caldecott Tunnel. If such an unlikely circumstance did occur during the rainy season, the small drainage culvert at the base of the hillside drainage pathway or the intermittent creek next to Old Tunnel Road would be the two wetland refuges temporarily available. These wetland areas would dry in late spring. In such a situation, the CRLF would be forced to retreat into either the small drainage culvert at the base of the hillside drainage pathway or into a deep, moist crevice area along the banks of the intermittent creek. It would be unlikely that the CRLF would return to the viable breeding population from whence it came.

California Tiger Salamander. The California tiger salamander (CTS, Ambystoma californiense) is federally listed as threatened and state listed as a "species of special concern". CTS use three distinct habitats during three different states of their life cycle: breeding habitat, upland aestivation habitat, and movement or dispersal habitat. Breeding habitat consists of bodies of water that fill in winter and dry by summer, such as vernal pools, seasonal ponds, stock ponds, and roadside ditches. Adult California tiger salamanders have been documented to have migrated as far as 2 km (1.2 mi) from their aestivation sites to reach a spawning pond or pool (Federal Register, 2003). Females lay 400-1300 eggs that hatch within two to three weeks of laying. The average CTS breeds at four to six years of age, and fewer than 50 percent breed more than once. The breeding season is December through April. Adults reach a length of three to five inches and their lifespan is approximately 10

years. The CTS follows the same migration route every year and prefers cool, wet winters and hot, dry summers.

The closest records of CTS occurrence are located approximately 10.5 kilometers (6.5 miles) east of both wetland sites identified within the Caldecott Improvement Project vicinity. Four site visits performed during the months of February, May, and August of 2004 (McGinnis 2004) failed to produce any sightings of adults or larvae of the CTS. The field surveys were performed at the end of the normal December-January spawning period for the CTS. At these times, the clear and shallow wetland conditions allowed for a thorough inspection of these small pool areas. If any CTS larvae were present, they would have been readily detected during the two mid-May visits. The fact that the small pool at the tunnel seasonal wetland site had completely dried well before the May-June metamorphosis period for the CTS negates this site as a functional breeding habitat for this species.

Western Spadefoot Toad. The USFWS and the CDFG have designated the western spadefoot toad (Sacphiopus hammondii) as a species of concern and a "species of special concern", respectively. The species is terrestrial, entering water only to breed. Western spadefoot toads become surface-active following relatively warm rains in late winter-spring and fall, emerging from burrows in loose soil to a depth of at least 1 meter (3.3 feet). The species distribution range is known from the vicinity of Redding, Shasta County, southward into northwestern Baja California, Mexico. Its known elevation range extends from near sea level to 1363 meter (4,498 feet).

Surveys were conducted in the project site in February 2004 (McGinnis 2004). Although the primary focus of the site visits was California red-legged frog, all site visits (two daytime and two nighttime flashlight surveys in mid-May, and a final inspection of these areas in mid-August) failed to produce any sightings of western spadefoot toad egg clusters, larvae, juveniles, or adults. A possibility does exist, nonetheless, that during a given rainy season, one or more western spadefoot toads may wander to and remain at the Gateway off-ramp wetland site for a period of time.

The field surveys failed to produce any evidence of western spadefoot toad presence at the Gateway Valley wetland site; in addition, the CNDDB lists no observations of the toad within the eight topographic quadrangles surrounding the project. Therefore, an occurrence of western spadefoot toad at the Gateway Valley wetland site is highly unlikely.

There are no CNDDB records of western spadefoot toad occurrences within several miles west, north, and south of the east portals of the Caldecott Tunnel. Similar to the CRLF, any attempt by a spadefoot moving north from the Gateway Valley to cross State Route 24 on a rainy night would probably fail; however, there is a slight possibility that a wandering toad might follow the south shoulder drainage ditch of State Route 24 from the north end of the Gateway Valley west to the area above the east portals of the Caldecott Tunnel. Even if this unlikely circumstance were to occur, the wetland refuges temporarily available to the wandering toad would be dry by late spring and that individual would be unlikely to breed.

Alameda Whipsnake. The Alameda whipsnake (AW, Masticophis lateralis euryxanthus) is federally and state listed as threatened. The Federal Register states that the AW is typically found in northern coastal scrub, coastal sage scrub, and chaparral plant communities, but may also occur in adjacent grasslands of oak and oak/bay woodlands. Optimal habitat for this snake is characterized by southern facing slopes with open-canopy stands, woody debris, and exposed rock outcrops. This fast-moving diurnal predator holds its head high off the ground to peer over rocks and vegetation while pursuing its prey. Its diet consists of lizards, small mammals, snakes, and nesting birds.

Critical habitat for AW was previously designated by the USFWS (October 3, 2000); however, based on a federal court ruling in May 2003, this critical habitat designation has been vacated and remanded to the USFWS for further action.

Additional studies are being completed for this species. Any avoidance and minimization, and/or mitigation measures needed will be developed during preparation of the Biological Evaluation and during consultation with the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act.

Dr. McGinnis applied a comparative habitat evaluation for the AW based on previous trapping studies and habitat evaluation conducted for the CDFG at 22 sites in Alameda and Contra Costa Counties at which there was potential for AW occurrence. This comparative habitat analysis revealed that the AW is nearly always associated with open canopy chaparral and coastal scrub communities, although it may utilize adjacent grassland and oak savannah associations if they are immediately adjacent to these shrub habitats. Rock outcrops and talus with deep crevices and rodent burrows are also important features at all sites, which support this snake. These features serve both as nightly retreats and winter hibernacula and in the case of the outcrops, are prime habitat for the preferred prey of the AW, the western fence lizard. The analysis also revealed that slope exposure to sunlight is very important. In summary, when south-facing hillsides within or adjacent to the known range of the AW support an open canopy coastal scrub or chaparral community, rock outcrops and/or abundant rodent burrows, and a substantial population of the western fence lizard and at least one other lizard species, the AW may be present.

California Horned Lizard. The California horned lizard (Phrynosoma coronatum frontale) is currently identified by the USFWS as a species of concern and as a "species of special concern" by the CDFG. The species is found in a variety of habitat types, ranging from areas with an exposed gravelly-sandy substrate containing scattered shrub, to clearings in riparian woodlands, to dry uniform chaparral to annual grassland with scattered perennial seepweed (Suaeda sp.) or saltbrush (Atriplex sp.) The CNDDB report that the species is found most commonly in lowlands along sandy washes where low shrubs provide cover. California horned lizards are distributed in California from Shasta County southward along the edges of the Sacramento Valley to Los Angeles County. The known elevation range of this species is from near sea level to 1980 m (6496 feet). Because this species is found in a variety of habitats, it has the potential to occur throughout the project vicinity.

Species-specific surveys for California horned lizard were not conducted; however, the project vicinity was intensively surveyed for other plant and wildlife species, and no California horned lizards were observed during the surveys. Due to its proximity to State Route 24, the study area provides low-quality habitat for California horned lizard and no other records of the species within the project vicinity have been identified; therefore, the probability that the species occurs within the project vicinity is extremely low.

Western Burrowing Owl. The western burrowing owl (Athene cunicularia hypugea) is federally and state listed as a species of concern. Although no western burrowing owls were observed in the study area during the initial reconnaissance survey, this species may occupy suitable habitat at the time the proposed project is implemented.

White-tailed Kite. The white-tailed kite (Elanus leucurus) is currently identified by the USFWS as a migratory non-game bird of management concern and as a fully protected species by the CDFG. White-tailed kites typically nest in isolated trees with dense foliage near suitable foraging habitat. This species will use a variety of habitats for foraging, including open grasslands, large meadows, and marshes. Several CNDDB records of white-tailed kite nesting sites have been reported from approximately eight kilometers (five miles) west of the study area.

White-tailed kite were not observed nesting or foraging in the study area during the initial reconnaissance survey. However, woodlands, forests, and individual trees within the project impact area may provide roosting and nesting sites for white-tailed kite. Open grasslands within the study area may provide foraging habitat for white-tailed kite. Nesting activities are protected under the federal Migratory Bird Treaty Act and various sections of the state Fish and Game Code, including sections 3503, 3503.5, 3511, and 3513. Tree removal activities could alter nesting behavior, jeopardize eggs or young in nests, or reduce parental care and would result in a violation.

Nesting Raptors and Other Migratory Birds. Raptor species and other migratory birds protected under the federal Migratory Bird Treaty Act, including white-tailed kite (Elanus leucurus), northern harrier, greater horned owl (Bubo virginianus), red-tailed hawk, American kestrel, red-winged blackbird (Agelaius phoeniceus), mourning dove, and American crow (Corvus brachyrhynchos), may use the project vicinity for nesting. These raptors and other bird species typically breed and nest from March until August.

The woodlands, forests, and individual trees within the project vicinity may provide roosting and nesting sites for raptors and other bird species. Nesting activities of numerous birds are protected under the federal Migratory Bird Treaty Act and various sections of the state Fish and Game Code, including sections 3503, 3503.5, 3511, and 3513. The Fish and Game Code sections apply to nesting birds or birds otherwise fully-protected. Tree removal activities that could alter nesting behavior, jeopardize eggs or young in nests, or reduce parental care would result in a violation.

2.3.5.3 IMPACTS

Special-status species impacts for the build alternatives are summarized in Table 2.3.5-2 and described below.

Table 2.3.5-2 Special-status Species Impacts for the Build Alternatives

Special-Status Plants Species	No affect.
Special-Status Wildlife Species	
San Francisco Lacewing	Suitable habitat was not identified within the project area and thus the project is not likely to affect the species.
California Red-legged Frog	No CRLFs observed during surveys; however, there is a possibility that CRLFs may enter the project vicinity during the rainy season. With the proposed protective measures, the project is not likely to adversely affect the species.
California Tiger Salamander	No affect.
Western Spadefoot Toad	No western spadefoot toads observed during surveys; however, there is a possibility that toads may enter the project vicinity during the rainy season. Proposed protective measures the project will not likely affect the species.
Alameda Whipsnake	No AWS observed during surveys. Additional studies are being completed to determine project impacts.
California Horned Lizard	The study area provides low-quality habitat for the species. Project will not likely affect the species.
Western Burrowing Owl	No western burrowing owls observed during surveys. Pre-construction surveys recommended. If species observed, avoidance and minimization measures would be established in coordination with CDFG.
White-tailed Kite	Project vicinity may provide roosting and nesting sites for white-tailed kite. Proposed protective measures would ensure that the project would not affect the species.
Nesting Raptors and Other Migratory Birds	Project vicinity may provide roosting and nesting sites for raptors and other migratory birds. Proposed protective measures would ensure that the project would not affect the species.

Special-status Plant Species

Botanical surveys conducted in May and July 2004, and May 2005 during the bloom periods for special-status plant species resulted in negative findings; therefore, the proposed project would have no effect on special-status plant species.

Special-status Wildlife Species

San Francisco Lacewing. Although San Francisco lacewings were not observed during the surveys, suitable habitat for this species was not identified within the project area and thus the project is not likely to affect the species.

California Red-legged Frog. No CRLF were observed during the surveys, however, there is a possibility that in the rainy season of a given year one or more CRLFs may wander to the Gateway east off-ramp wetland site and remain there during the summer-fall season. The depth of water at this location would not provide successful breeding habitat. There is also a slight possibility that a CRLF could follow the south shoulder drainage ditch of State Route 24 from the north end of the Gateway Valley west to the area above the east portals of the Caldecott Tunnel. If such an unlikely event did occur at this location, two wetland refuges, a small drainage culvert and an intermittent creek, would be temporarily available to a wandering CRLF. These wetland areas would dry in late spring, forcing the CRLF to retreat into the drainage culvert or moist crevice area along the banks of the intermittent

creek. It would be unlikely that the CRLF would return to the breeding population from whence it came. Through the successful implementation of avoidance and minimization efforts, as described in Section 2.4.11.2, the project is not likely to adversely affect the species.

California Tiger Salamander. There are no known occurrences of CTS within the proposed project area, thus, the project will have no effect to individuals or populations are not expected as a result of construction of this project.

Western Spadefoot Toad. Neither of the identified wetland sites can support successful reproduction of the western spadefoot toad. Given the saturated valley floor conditions that can occur during the rainy season, a possibility exists that in a given year one or more toads may wander to the Gateway east off-ramp permanent wetland site and remain there during the summer-fall season. Through the successful implementation of avoidance and minimization efforts, as described in Section 2.4.11.2, the project will not likely affect the species.

Alameda Whipsnake. Approximately two acres of habitat previously designated by the USFWS as critical habitat for the Alameda whipsnake (October 3, 2000) would be permanently affected by the proposed build alternatives. Based on a federal court ruling in May 2003, this critical habitat designation has been vacated and remanded to the USFWS for further action. Additional studies are being completed for this species. However, it is expected that the proposed project is not likely to adversely affect the species.

California Horned Lizard. Although the study area contains low-quality habitat for California horned lizard, the potential for direct impacts to the species is limited. The likelihood of the California horned lizard to actually occur within the study area is extremely low due to a lack of population abundance and distribution within the county. Indirect impacts to the species would occur due to potential habitat disturbance by the project.

Western Burrowing Owl. The proposed project is not likely to affect western burrowing owl. Pre-construction surveys are recommended, as described in Section 2.4.11.2.

White-tailed Kite. Through the successful implementation of avoidance and minimization efforts, as described in Section 2.4.11.2, the project would have no effect on white-tailed kite.

Nesting Raptors and Other Migratory Birds. Through the successful implementation of avoidance and minimization efforts, as described in Section 2.4.11.2, the project would have no effect on nesting raptors and other migratory birds.

2.3.5.4 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

The following avoidance, minimization, and mitigation measures are proposed to address the special-status species impacts identified in the foregoing section. Final measures will be subject to concurrence with the USFWS and CDFG.

Special-status Plant Species

No avoidance or minimization efforts are necessary, as no special-status plant species were found within the project limits.

Special-status Wildlife Species

San Francisco Lacewing, California Red-legged Frog, Western Spadefoot Toad, Western Burrowing Owl, White-tailed Kite and Nesting Raptors and Other Migratory Birds. Pre-construction surveys are recommended, as described in Section 2.4.11.2.

California Tiger Salamander. The CTS is not known to occur within the vicinity of the proposed project and field surveys have confirmed its absence. No avoidance or minimization efforts are needed.

Alameda Whipsnake. No AWS observed during surveys. Additional studies are being completed to determine project impacts. However, it is expected that the proposed project is not likely to adversely effect the species.

California Horned Lizard. No avoidance and/or minimization efforts are needed due to the extremely low probability that the species occurs within the project vicinity.

2.3.5.5 CONSULTATION TO DATE

A Biological Evaluation will be completed once a project alternative is chosen. This will occur after the Draft Environmental Assessment/Draft Environmental Impact Report is circulated. Informal Section 7 consultation with the U.S. Fish and Wildlife Service is expected for potential effects to the California red-legged frog and Alameda whipsnake. The project is expected to not likely adversely effect both species. Alameda whipsnake critical habitat was designated for the area in 2000, but was vacated by a federal court ruling in May.

2.3.6 Resource Management Plan for the Caldecott Wildlife Corridor

The Resource Management Plan for the Caldecott Wildlife Corridor (September 2001) was developed by the Caldecott Corridor Committee, formed in April 1995, to identify approaches to protect the long-term viability of an important biological resource and reduce the threat of wildfire to a fire-prone area while maintaining the interests and rights of public and private landowners. The Plan identifies 13 management goals and 22 supportive actions to develop a vegetation/habitat management strategy, protect and enhance the biological value of the resource, and control and reduce the threat of fire in the Caldecott Corridor, while providing benefits to all interested parties and to the general public. As shown in Figure 2.3.6-1, the Caldecott Improvement Project's proposed tunnel goes underneath the Resource Management Plan's Primary Study Area.

To identify any potential impacts of the Caldecott Improvement Project on natural and man-made resources and values that were the focus of the Resource Management Plan, an evaluation of the consistency of the proposed project with the Plan's goals was conducted. Results are presented in Table 2.3.6-1, below. Overall, the Caldecott Improvement project would be consistent with the Management Plan's goals or mitigation that would be applied for impacts of the project would render the project consistent with those goals.

Figure 2.3.6-1 Resource Management Plan's Primary Study Area

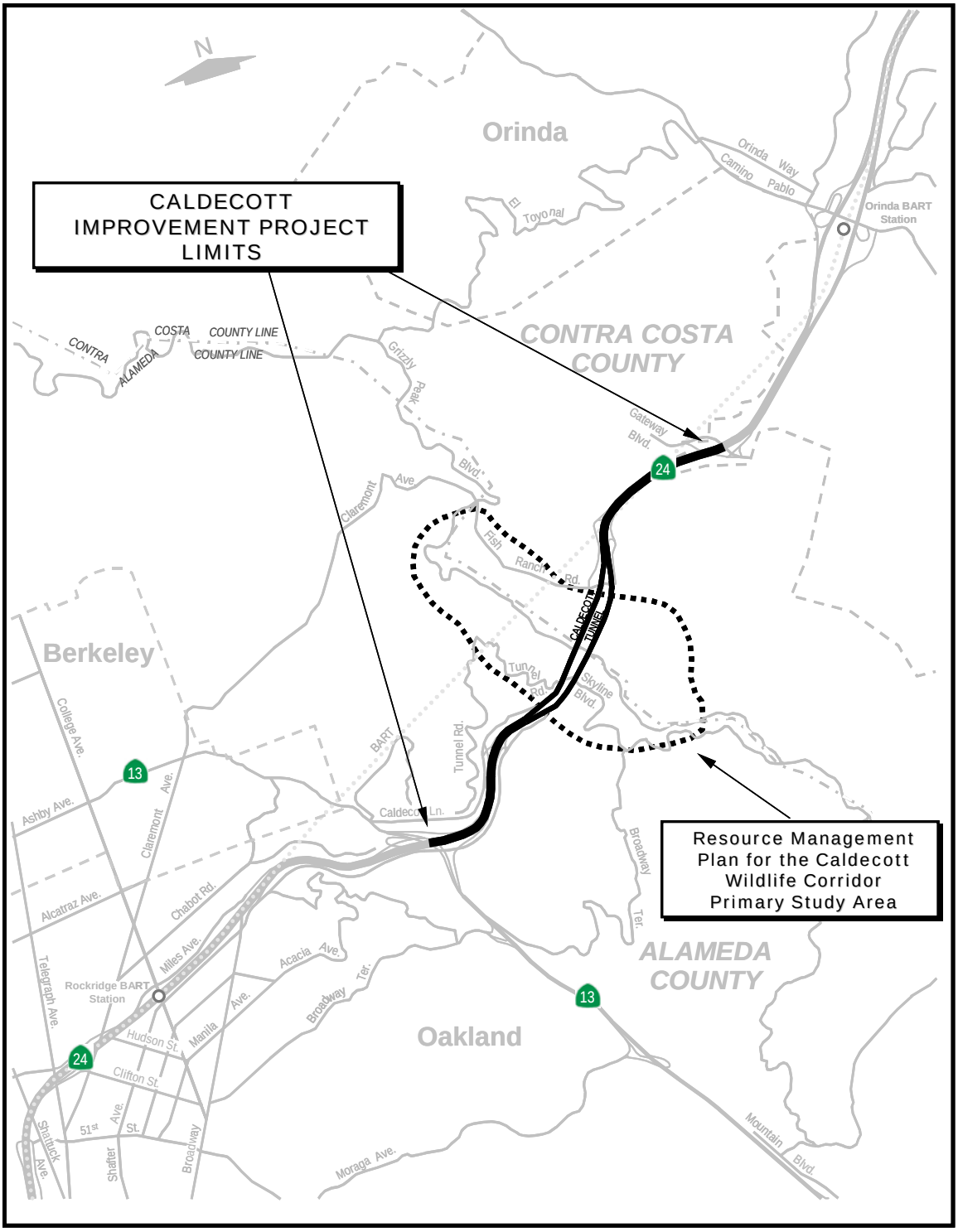


Table 2.3.6-1 Consistency with the Resource Management Plan for the Caldecott Corridor	
Management Goal	
A) Maintaining and/or enhancing the biological value of the Caldecott Corridor.	
1. Protect and improve the quality of habitat in the Corridor to facilitate wildlife/gene passage.	**Consistent.** Vegetation management steps that would be undertaken in concert with the Caldecott Improvement Project would include removal of non-native species and replanting with native species. These actions would protect and improve the quality of habitat in the proposed project's portions of the Management Plan's Primary Study area. In addition, avoidance and minimization measures will be implemented as detailed in Section 4.4, Special-Status Animal Species, to prevent or reduce project impacts within habitat that is suitable for special status species.
2. Minimize human impediments to wildlife/gene passage (such as fences, structures, and roads).	**Consistent.** The new bore would be located near the bottom of a hillside, next to an existing bore and roadway and would not create a new obstacle to wildlife passage.
3. Protect important or unique on-site biological resources, such as stands of rare plants.	**Consistent.** Habitat for special-status plant species in the project vicinity is present primarily at the tunnel portals and between the east portal and the State Route 24/Gateway Boulevard interchange. Plant surveys were conducted during the spring and summer when the majority of special-status plant species were in bloom. No special-status plant species were identified; therefore, the proposed project is very unlikely to affect these species. Although vegetation and trees would be removed near the fourth bore, replacement planting with native species would revegetate affected areas; therefore, the project is consistent with this principle.
4. Avoid significant changes to the area, recognizing that the Corridor is already a tenuous habitat link and that our understanding of wildlife movements and ecological response to disturbance is incomplete.	**Consistent.** The new bore would be located near the bottom of the hillside, next to an existing bore and would not result in a substantial ecological change to the area or interfere with wildlife movements.
5. Maintain and restore natural ecosystem processes. This expands on objectives 1 and 4. Avoiding significant changes applies to both suppression and exacerbation of natural disturbance regimes.	**Consistent.** See above.
B) Minimizing the threat of fire.	
6. Minimize values at risk.	**Consistent.** The proposed project would protect existing native and mature vegetation and areas providing suitable habitat for special-status species by designating Environmentally Sensitive Areas (ESA). Replacement planting would consist of fire resistant native vegetation and replacement areas will be selected to avoid increasing fire risk to private property as well as wildlife.
7. Improve ability to detect and to fight fire.	**Consistent.** Construction of a fourth bore would alleviate congestion, thereby improving the flow of traffic in the corridor and response times for emergency vehicles. During construction, a Transportation Management Plan (TMP) would be developed with the local jurisdictions and emergency

Table 2.3.6-1 Consistency with the Resource Management Plan for the Caldecott Corridor

Management Goal	
	service providers to develop detour routes and other traffic handling plans. Advance notice of all construction-related street closures and detours would be provided to local jurisdictions, emergency service providers and motorists.
8. Improve ability to escape fire.	**Consistent.** Construction of a fourth bore would alleviate congestion, thereby improving the flow of traffic in the corridor. During construction, a TMP would be developed with the local jurisdictions and emergency service providers to develop detour routes and other traffic handling plans. Advance notice of all construction-related street closures and detours would be provided to local jurisdictions, emergency service providers and motorists.
9. Reduce fire ignition risks.	**Consistent.** Replacement planting will consist of fire resistant native species and replacement areas will be in and along Caltrans right-of-way to minimize fire risk to private property and wildlife. In addition, areas disturbed during construction will be restored and revegetated to prevent unwanted vegetation from colonizing new areas.
10. Reduce fuel loads and flammability.	**Consistent.** Removing non-native vegetation and replacing removed plants with only native species will reduce fuel loads and flammability of the vegetated areas. In addition, measures will be incorporated into the project to avoid introducing exotic pest plants and noxious weeds into uninfested areas.
Protecting Property Owner Interests	
11. Protect property uses.	**Consistent.** The proposed fourth bore project will not result in any substantial land use changes in the project vicinity. All vegetation that is removed for the project will be replaced on site or in the immediate vicinity so that residential and other land uses will retain their privacy and park-like setting. The vegetated berm proposed for the western end of the fourth bore will enhance privacy by obscuring views of State Route 24 for residents in the vicinity of Caldecott Lane.
12. Protect Property values.	**Consistent.** The proposed project incorporates replacement planting and a landscaped berm to reduce the noise and visual effects of the project.
13. Distribute management costs equitably and appropriately.	**Not applicable.**

2.4 Construction Impacts

This section summarizes the construction impacts for the proposed project. The Department is committed to working with the various communities within the project vicinity to address issues that pertain to the construction activities for the Caldecott Improvement Project. The major components of construction are the portals, and the tunnel bore. Other elements of the Caldecott Improvement Project include electrical substations proposed to be located behind the portal facade walls, ventilation systems, noise barriers, which could include soundwalls, earth berms, or a combination of the two. Ramps, and retaining walls along the project area are also included as part of the proposed project.

Construction activities such as phased clearing, grubbing, grading, and the construction of the tunnel in general will typically result in increased levels of truck traffic, noise, dust, and visual impacts. Tunnel excavation from the Orinda and Oakland side would occur at the same time. The impact from construction activities would be temporary and can be reasonably minimized by implementing various mitigation measures.

2.4.1 Construction Methodology

The tunnel will be constructed using sequential excavation methods wherein the tunnel is advanced by systematic excavation and erection of initial ground support.

2.4.2 Construction Staging

Construction will be done in stages. The first stage will be constructed in two phases. Phase 1 involves constructing staging areas at the east and west portals, portal cuts and grading, constructing temporary walls at each portal, and installing additional slope support as required. Phase 2 involves excavating tunnel and cross passages, constructing final tunnel lining, constructing ventilation, installing lighting and control systems, constructing portals and electrical substations, and constructing the berm at Caldecott Lane (if the combination berm/soundwall is selected following public input on the noise barriers).

The second stage involves constructing final retaining walls, all ramp modifications, portal approaches and any potential soundwalls.

The final stage involves opening the fourth bore to traffic, constructing the median concrete barrier, paving and striping bore 2 approaches, and paving emergency crossovers at the portals.

2.4.2.1 TUNNELING

Both alternatives can be constructed using the New Austrian Tunneling Method (NATM) also known as the Sequential Excavation Method. It involves the excavation and support of several horizontal, underground openings (within the tunnel perimeter) known as drifts and benches in a specified order. As the excavation progresses, a layer of shotcrete is immediately sprayed on the interior surface of the tunnel, and rock bolts are installed in.

NATM allows excavation of a stable opening in small increments. The excavation is supported in sequential fashion, which limits exposure to rock instability or fallout. When performed with the requisite instrumentation and continuous interpretation of rock movements, NATM allows the support system to be tailored to actual field conditions and provides continuous feedback on the opening's stability.

Excavation is mainly expected to be done using a roadheader. A roadheader consists of a rotating, cylindrically or spherically shaped head with cutters that essentially claw at the soil or rock face. The cutting head would be moved over the tunnel face to create a profile of any desired shape or size. The walls and roof exposed by the roadheader excavation would be inspected at regular intervals to analyze its condition and determine any additional ground support required. The spoil would be loaded onto a conveyor within the machine, discharging to a truck for removal to the surface. However, limited reaches of the excavation may require drill and blast operations. This method would entail drilling holes for placement of explosive charges. The broken rock would then be carried out, and the process repeated. The blast operations will be the only construction activity that may result in peak particle vibrations (PPV) high enough to warrant special considerations. Before any blasting takes place, the conditions of the structures that may be affected will be surveyed. During blasting, areas of concern will be monitored for vibration.

The sequential excavation method requires that work be performed at a minimum on a 24-hour per day, 5-day per week basis to maintain stability of the excavation. Due to the variable geology, the initial ground support is expected to comprise varying amounts of pneumatically applied concrete (shotcrete), steel arches (lattice girders), rock anchors, and rock pre-support members (spilling and canopy tubes).

Since the decisions on which types of ground support are required are made in the field as excavation proceeds, it is necessary to maintain an adequate supply of initial ground support elements on hand for safety reasons and to eliminate schedule delays to tunnel construction. Because of the large amount of shotcrete to be used for initial support, it is expected that shotcrete will be batched on site to assure that shotcrete is batched and transported into the tunnel on demand and in a timely manner 24 hours per day.

2.4.2.2 CUT AND COVER

Cut and cover tunnel sections will be required adjacent to both the East and West Portals due to the shallow cover at each end of the tunnel alignment. The cut and cover structure will be approximately 15 to 30 meters (50 to 98 feet) long at both the West and East Portals.

The first step in constructing the cut and cover structure will be the installation of temporary excavation support measures, which will be done in conjunction with the staging area development and construction of the adjacent retaining walls at the beginning of the project. The temporary support walls will be pile[1] supported with tiebacks[2] or soil nail walls[3]. During the majority of the

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[1] Piles are usually steel, concrete, or timber members that are installed in the ground vertically (either by driving or installing in a drilled hole) to provide support for foundations and structures above. "Soldier Piles" are steel I-beams (Usually W or H steel shapes) that are dropped into drilled holes in the ground to provide the primary support for excavation. Timber "lagging" is placed horizontally between the soldier piles as the excavation proceeds to provide continuous retention of the ground behind the face of the excavation.

[2] Tiebacks are steel cable strands (or one larger steel rebar) that are drilled into the ground as an excavation proceeds. The steel tiebacks are set in cement grout that forms a bond with the existing ground to provide a support point for vertical steel members placed at the face of the excavation support walls. Tiebacks usually remain in the ground permanently and can be designed to be used as part of the permanent retaining wall support.

[3] A soil nail wall consists of steel tiebacks or large rebar drilled into an excavated cut slope as the excavation proceeds. The "soil nail" rebars are placed at each level as the excavation proceeds downward to stabilize the slope. Cement grout is placed in the drilled hole to surround the rebar and provide a bond between the "soil nail" and the surrounding ground. Soil nails walls are designed by the engineer based on the properties of the soil, steel bar, and groundwater conditions. The excavated face (the part of the wall that you see) is usually covered with steel wire mesh and then sprayed with shotcrete (spray-on concrete).

fourth bore construction duration, the cut and cover zones will be used for portal access and staging into the mined tunnel reach of the new fourth bore. After the final lining is installed in the entire mined tunnel, it is anticipated that the permanent cut and cover structures will be built.

The cut and cover structures will consist of cast in-place concrete walls and re-cast concrete t-beams will be placed on top of the support walls to provide primary roof support for the cut and cover structure. A final concrete roof pad will be cast-in-place to tie-in the t-beams and provide additional support for the electrical substation and service areas on the roof. The cut and cover structure will also be integrated into the final portal structures and facades.

After completion of the final portal walls above the cut and cover structure, the area around the portal will be restored by minor grading and revegetated. The roof area above each cut and cover structure will house small buildings that will contain substation and electrical switchgear[4]. A small access ramp will be built from the current access ways in front of the third bore on both the East and West sides of the tunnel. These electrical buildings will be completely surrounded by retaining wall structures above the cut and cover tunnel and will not be visible from the roadways.

2.4.2.3 DISPOSALS

Alternative 2N will produce approximately 227,000 cubic meters (296,905 cubic yards) of excavated material. Alternative 3N will produce approximately 285,708 cubic meters (375,000 cubic yards) of material. It is the responsibility of the contractor to obtain clearance for disposal sites outside of the highway right-of-way at locations where the Department has not made previous arrangements.

Numerous commercial landfills are available within a 40-kilometer (25-mile) radius of the tunnel site that could be considered as possible disposal sites. A small portion of the excavated material could be disposed of on-site and used for construction of the noise abatement berm. A parcel alongside the eastern side of Fish Ranch Road was utilized for disposal of spoils from construction of one of the existing tunnels and has been used for more recent spoil disposal. With the agreement of the landowner, this site may be available for a portion of the excavated material. However, adverse impacts from placement of fill will be avoided at the adjacent East Bay Regional Park District (EBRPD) land holdings and be consistent with the value of EBRPD lands as a wildlife corridor. Another potential site for use of fill is within a former quarry located within the EBRPD lands above Old Tunnel Road. The site is not open to the public due to existing hazards from the former quarry operations. EBRPD has been approached by others regarding the potential for beneficial uses for fill at this site. Discussions for disposal at the Port of Oakland have been held. The Port may have a need for fill for their expansion projects and may be able to accept the spoil material from the tunnel project.

Spoils will be disposed of in accordance with all applicable regulations and all disposal locations must be evaluated for sensitive resources and needs for permits prior to the location use. If sensitive resources may be impacted at the proposed disposal sites, mitigation would be required.

2.4.2.4 STAGING LOCATIONS

Potential staging locations have been identified at each portal (See Figures 2.4.2-1 to 2.4.2-3). The west portal staging area is proposed to be adjacent to the west portal in the relatively flat area

[4] Equipment that controls electrical supply in the new tunnel to allow it to be used (changes voltage or amperage) for various equipment in the fourth bore, such as the ventilation fans, lights, etc.

bounded by State Route 24 and Caldecott Lane. The east portal staging area is located adjacent to the east portal in two relatively narrow parcels. The parcels are separated by an on-ramp to State Route 24 from Fish Ranch Road. The relatively narrow work area available will make it difficult to develop an efficient layout of the contractor's staging area, and for that reason it is proposed to make an additional parcel available. This proposed parcel is bounded by on either side by State Route 24 immediately north of the second and third bore portals. It may also be beneficial to identify an additional staging area to the north of the east portal immediately adjacent to Fish Ranch Road. This area has been used in the past as a staging area for construction equipment and materials.

The staging areas will be used for temporary storage of heavy construction equipment, and other various construction needs. The staging areas will house facilities such as shotcrete batch plants, groundwater retention facilities, warehouse, equipment maintenance shops, muck handling and stockpile areas, and field offices. In addition, the staging areas must accommodate other ancillary facilities such as a ventilation plant sized to assure an adequate supply of fresh air in the tunnel. The plant is typically located within a few feet of the portal that it services. A bank of stationary compressors, sized to provide compressed air will be required during tunneling operations. The staging areas are must also house miscellaneous facilities such as a Quality Assurance/Quality Control laboratory for material testing. All staging locations must be evaluated for sensitive resources and needs for permits prior to the location use. If sensitive resources may be impacted at the proposed sites, mitigation would be required. During the final design stage, a specific construction plan will be developed to establish limits for the various construction phases and construction contracts.

Impacts

Noise and Vibration:

Vibration and noise will be generated from drilling support piers, truck transport and cranes used to lower pre-cast beams into place. During portal excavation, the chief source of noise and vibrations will be from drilling operations, excavation equipment and installation of other excavation support systems. During tunnel excavation, construction equipment engine noise outside of the tunnel, the ventilation system at the tunnel portal, batch plant activities, and equipment maintenance operations will be the chief sources of noise and vibrations. Limited amounts of blasting may be required if local reaches of hard rock are encountered.

Dust, Dirt and Construction Traffic:

During tunnel excavation, muck handling and rehandling outside of the portal and dust from shotcrete batching operations[5] are likely to be significant potential contributors to the generation of dust. Construction traffic exiting the site will track dirt on pavement. Delivery of equipment and materials will also be potential contributors to dust, dirt, and construction traffic.

[5] A large amount of spray-on concrete (Shotcrete) will be used for the initial lining of the tunnel walls. The materials to make the shotcrete must be mixed on-site in a "batching" plant adjacent to the tunnel. A "batch" is one mix of shotcrete made up of proportions of water, sand and/or small aggregate, cement, and various admixtures to adjust for viscosity and set time.

Figure 2.4.2-1 Potential Construction Staging Locations

Figure 2.4.2-2 Potential Construction Staging Locations

Figure 2.4.2-3 Potential Construction Staging Locations

Visual:

Construction at both portals will be visible to traffic traveling through the third bore, and to some residences at the West Portal.

Avoidance, Minimization and/or Mitigation Measures

The cut and cover structures will generate little additional noise and vibration compared to other tunnel operations. During portal development, work may be limited to single shift. During around the clock tunnel construction operations, the use of standard industry practice for equipment noise (strobe lights or spotters in lieu of backup alarms during nighttime operations, mufflers on ventilation and other equipment) may be used to minimize impacts. Other measures may include the construction of enclosures for compressors, and constructing a soundwall between the west portal staging area and nearby residences to the north. Due to the topography, residences along Tunnel Road immediately above the West Portal will not benefit from construction of a soundwall. Ambient noise levels are likely to be high due to existing traffic on State Route 24. No sound mitigation measures other than blasting restrictions, visual barriers, and possibly ventilation fan enclosures and batch plant enclosures is envisioned to be necessary during construction at the east portal.

Standard industry practice of wetting down muckpiles[6], providing wheel washes and street-sweeping services, and sealing aggregate and cement silos is expected to mitigate the generation of dust and dirt. It does not appear that residential routes will be used by construction traffic.

Temporary soundwalls along the northern perimeter of the west portal staging area may be provided to minimize visual impacts related to all construction and support activities outside of the portals. No mitigation is envisioned for the east portal activities.

2.4.3 Utilities/Emergency Services

2.4.3.1 IMPACTS

The Department anticipates that any utility relocation work would be performed in advance of the State Route 24 roadway and tunnel work. However, some utilities may require protection during construction of the roadway and tunnel improvements. The Department would coordinate with all utility providers during the preliminary engineering and design phases of the project so that effective design treatments and construction procedures are incorporated to avoid adverse impacts to existing utilities and traffic during construction. Nonetheless, unexpected utilities may be encountered during construction within the area of roadway improvements. In addition, utility relocations may require short-term, limited interruptions of service. No interference to existing utility services is anticipated during the realignment of the overhead power transmission lines because PG&E would put customer loads on alternate lines until the connections are re-established.

If unexpected underground utilities are encountered, the construction contractor would coordinate with the utility provider to develop plans to address the utility conflict, protect the utility if needed,

[6] These are temporary stock piles of material removed from the tunnel located outside the tunnels that are awaiting transport by truck to muck placement or disposal areas off site.

and limit service interruptions. Any short-term, limited service interruptions of known utilities would be scheduled well in advance and appropriate notification provided to users.

2.4.3.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

The Department will work with all utility providers to ensure that effective design treatments and construction procedures are incorporated to avoid adverse impacts to existing utilities during construction. Any short-term, limited interruption of service of known utilities would be scheduled well in advance and notification to appropriate users will be provided.

2.4.4 Traffic

2.4.4.1 IMPACTS

Impacts can be expected to occur during construction of the proposed project. These traffic impacts would occur during the construction of the tie-ins from the new tunnel to the existing freeway lanes and the interchange. The eastbound State Route 24 modifications, cross passage connections to the third bore and on/off-ramp modifications could also contribute to traffic impacts during construction.

2.4.4.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

A Traffic Management Plan (TMP) will be prepared to address traffic delays during construction. Preparation of the TMP will be coordinated with local partners to develop the necessary strategies to raise awareness and reduce traffic impacts. The Department will work with local agencies to minimize traffic impacts during construction for special events such as the California Shakespeare Festival in the City of Orinda.

2.4.5 Water Quality

2.4.5.1 IMPACTS

Groundwater will be encountered during tunnel excavation. Procedures for handling and disposing of this water will be addressed during the design phase of the project. On-site containment devices such as Baker Tanks would be used to temporarily hold the groundwater, which would be treated and discharged, under permit agreement from the East Bay Municipal Utility District, into the existing sanitary sewer line near the eastbound Broadway off-ramp just before the tunnel entrance. This existing sanitary inlet currently receives the tunnel wash water.

2.4.5.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

According to the Department's National Pollutant Discharge Elimination System (NPDES) permit and the Construction General Permit, Best Management Practices (BMPs) would be incorporated into this project to reduce the discharge of pollutants during construction as well as permanently to the Maximum Extent Practicable (MEP). These BMPs fall into three categories, Temporary Construction Site BMPs, Design Pollution Prevention BMPs, and Permanent Treatment BMPs and discussed further in Section 2.2.2.4.

2.4.6 Hazardous Waste/Materials

2.4.6.1 IMPACTS

Potential for lead contamination issues in the unpaved areas may be present because of aerially deposited lead (ADL) from historic motor vehicle exhaust.

There was no evidence of naturally occurring asbestos (NOA) found during the investigation conducted for the Geologic and Geotechnical Data Report, prepared by Geomatrix, dated September 2005, for this project. Nine borings or approximately 4200 linear feet of core were drilled during the investigation for this report. In addition, there were no reported incidents involving NOA during the construction of the three previous bores. Based on the geology of the location, only the Orinda Formation has the potential for NOA. The Orinda Formation (Tor) is a Miocene age deposit composed of conglomerate, sandstone, and siltstone of nonmarine origin with abundant clasts of rocks from the Franciscan Complex. A small proportion of the Franciscan can contain serpentine asbestos or chrysotile. The physical weathering process which the Franciscan Formation goes through to form the Orinda Formation would disperse the serpentine asbestos to such an extent that it would be extremely unlikely that significant quantities would be found to cause a health risk.

If Serpentine asbestos were found in significant quantities during the project, best management practices would be implemented.

Geologic studies from the construction of the first and second tunnels indicate that infrequent, isolated pockets of naturally occurring hydrocarbons, e.g. tar, are present in the geologic formations of the Oakland-Berkeley hills. Because of this, the excavation spoils from the tunnel advancement will be systematically screened for hydrocarbons and managed accordingly during the construction phase of the project.

2.4.6.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Unpaved areas within the project limit will be sampled and tested during the design phase of the project to determine if ADL is present. If ADL is present, appropriate measures will be included in the plans and specifications for the project. Materials found to contain lead at concentrations above those considered potentially hazardous to either human health or the environment will be handled in accordance with all local, State and Federal regulations.

2.4.7 Air Quality

2.4.7.1 IMPACTS

The proposed project would generate air pollutants during construction. Trucks and construction equipment emit hydrocarbons, oxides of nitrogen, carbon monoxide, and particulates. Most pollution will consist of wind-blown dust generated by excavation, grading, hauling and various activities. The impacts from the above activities would vary from day to day as construction progresses.

2.4.7.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Recent studies have raised significant concerns about the health risks associated with emissions from diesel construction equipment. For PM10, PM2.5 or air toxics, there currently are no requirements that are applicable at the project level for the temporary impacts of the construction phase.

However, the California Air Resources Board, through its Diesel Risk Program, contains a number of control measures, which will be implemented during the construction phase of this project. This program is anticipated to reduce the risks to public health by reducing construction emissions.

The Department's standard specifications for construction mitigation, including measures in the state implementation plan, will be implemented. The project's Special Provisions and Standard Specifications will also include requirements to minimize or eliminate dust by applying water or dust palliatives.

2.4.8 Noise

Noise generated while constructing the tunnel improvement project could at times reach levels higher than the existing traffic noise. The impact from construction activities would be temporary and would be minimized by implementing provisions in Section 7-1.01I, "Sound Control Requirements" of the Caltrans Standard Specifications and may include the following measures:

- Consider constructing noise barriers as first items of work, where feasible;
- Erect temporary noise barriers, if necessary; and
- Keep the community informed of upcoming especially noisy construction activities and establish a field office to handle noise complaints.

2.4.9 Vibrations

2.4.9.1 IMPACTS

Blasting is the only activity that will result in peak particle vibrations (PPV) high enough to warrant special consideration. Residents in homes that are located close to the West Portal or over the alignment of the new bore on Tunnel Road, Bay Forrest Road, Grizzly Terrace Drive, and Woodmont Way may be affected by this activity. Other construction methods should not cause problems due to vibrations and no special measures are recommended.

2.4.9.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Before any blasting takes place, the conditions of the structures would be documented. Any existing defects or damage would be noted and photographed or videotaped. At this time the owners of the homes on Tunnel Road, Bay Forest Road, Grizzly Terrace Drive, and Woodmont Way that are directly over the alignment of the new bore would be informed of the schedule for the blasting. During blasting, these areas will be monitored for vibrations.

2.4.10 Visual/Aesthetics

2.4.10.1 IMPACTS

Tunnel construction is expected to be intensive and continuous at the portal locations and would result in short term adverse visual impacts primarily to residents at the Parkwoods Apartment complex along Caldecott Lane and westbound motorists approaching the eastern portal. Affected viewers would be impacted by the visual encroachment of construction equipment, materials and crews. The loss of vegetation along Caldecott Lane due to clearing and grubbing would expose adjacent residences to direct views of construction activities. Initial construction activities would include the mobilization of heavy equipment and the stockpiling of construction materials. Subsequent construction activities would involve the loading and transport of tunnel spoils, excavation, grading and the placement of false work. Work inside the tunnel as well as ancillary

construction activities along the tunnel approaches is expected to occur during both daylight and night time hours. At times residents may experience increased light and glare due to nighttime construction. Although construction equipment may require ingress and egress from Caldecott Lane, Contractors equipment, while not in use, would not be parked or stored on the public streets. The Contractor would be required to maintain the appearance of the work site in a clean and orderly manner.

2.4.10.2 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Avoidance and minimization measures to protect mature trees and other vegetation are listed below:

- In areas where maximum protection of vegetation is desirable, clearing and grubbing shall occur only within excavation and embankment slope lines;
- Vegetation outside of clearing and grubbing limits shall be protected from the contractor's operations, equipment and materials storage;
- Tree trimming by the contractor shall be limited to that required in order to provide a clear work area;
- High visibility protective fencing shall be placed around trees prior to the commencement of tunnel construction;
- Trees to be removed shall be field marked by the Engineer and approved by the Engineer prior to removal; and
- Wherever feasible, slope lines will be adjusted to avoid tree removal.

2.4.11 Biological Resources

2.4.11.1 IMPACTS

Natural Communities

Each of build alternatives would have temporary impacts on natural communities (see Table 2.4.11-1). Both alternatives would have temporary impacts to annual grassland. Alternative 3N would impact approximately 0.01 hectare (0.03 acre) of native perennial bunch grass. The other natural community that would be affected by project alternatives is urban forest.

Table 2.4.11-1 Temporary Natural Community Impacts in hectares (acres) of Build Alternatives for the Caldecott Improvement Project

Community Type	**Alternative 2N**	**Alternative 3N**
	Temporary Impact	Temporary Impact
Coast Live Oak/California Bay Forest	**0**	**0**
Annual Grassland	**.84 (2.08)**	**.84 (2.08)**
Native Perennial Bunch Grasses	**0**	**0**
Urban Forest	**.59 (1.47)**	**.70 (1.72)**
Urban scrub	**0**	**0**
Riparian	0	0
Wetlands	0	0
Intermittent and ephemeral streams	0	0

Wetlands and Other Waters of the United States

Avoidance and minimization measures, including best management practices (BMPs) would be implemented to protect jurisdictional waters during construction, as described in Section 2.4.11.2, below.

Threatened and Endangered Species

As described in Section 2.3, Biological Environment, suitable habitat for San Francisco lacewing, California red-legged frog, western spadefoot toad, western burrowing owl and white-tailed kite occurs within the project vicinity. Avoidance and minimization measures, including pre-construction surveys, are proposed (See Section 2.4.11.2, below).

Avoidance and minimization measures are proposed to ensure that there would be no construction related impacts to nesting raptors or other migratory birds.

2.4.11.2 AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

Natural Communities

To protect and preserve the California bay/Coast live oak forest from effects during construction activities for the proposed project, Environmentally Sensitive Areas will be designated for bay and oak habitat adjacent to, and in the vicinity of the project. Environmentally Sensitive Areas will fully enclose the dripline of the oaks and any limbs that need to be removed will be pruned by an arborist in accordance with arboricultural industry standards or will be performed following the direction of a knowledgeable individual.

Where existing trees are to be preserved, equipment access may need to be constrained. The preservation areas will be identified on the construction plans. Environmentally Sensitive Area fencing will restrict vehicle and foot traffic near trees, and prohibit fueling, equipment/material storage, and placement of fill or other materials over the root zone.

Native grassland communities located adjacent to the construction zone that could be affected by construction activities will be temporarily fenced off and designated as Environmentally Sensitive Area to prevent accidental intrusion of workers and equipment.

Revegetation of non-native grassland areas temporarily disturbed by project construction will utilize a seed mix containing at least 50 percent native grasses. If the resulting cover of native grasses is below 15 percent after two years, additional seeding with native grasses or planting of native bunch grass seedlings will be implemented in order to increase native species cover.

Wetlands and Other Waters of the U.S.

Avoidance and minimization measures have been incorporated into the proposed project to minimize impacts to jurisdictional features. Other avoidance efforts that will be implemented to protect jurisdictional waters during construction include the following:

- Materials and fluids generated by construction activities will be placed no closer than specified distances from wetland areas or drainages until they can be disposed of at a permitted site; and
- All natural communities and wetland areas located adjacent to the construction zone that could be affected by construction activities will be temporarily fenced off and designated as environmentally sensitive areas to prevent accidental intrusion by workers and equipment.

Special-Status Wildlife Species

California Red-legged Frog. To avoid effects to CRLF that may enter the project vicinity, it is recommended that the following protective measures be incorporated into any project plans for the wetland area near the Gateway Boulevard east off-ramp:

- For project construction activities conducted between April 15 and October 15: Prior to construction activities, a pre-construction search for the CRLF at the Gateway east off-ramp willow riparian wetland should be made by a qualified biologist; and
- For project construction activities conducted between October 15 and April 15: Prior to construction activities, a pre-construction search for the CRLF at the Gateway east off-ramp willow riparian wetland, drainage culvert, and intermittent creek at the east portals should be made by a qualified biologist. In addition, weekly searches for the CRLF should be made by a permitted and qualified biologist throughout the construction period.

Western Spadefoot Toad. Neither of the wetland sites in the project area can support successful reproduction of the western spadefoot toad. Given the saturated valley floor conditions that can occur during the rainy season, a possibility exists that in a given year one or more toads may wander to the Gateway east off-ramp permanent wetland site and remain there during the summer-fall season. Therefore, it is suggested that the following protective measures be incorporated into any project plans for this site.

- Project construction between February 15 and May 15: a pre-construction search for the toad at the Gateway east off-ramp willow riparian wetland should be made by a qualified biologist; and
- Project construction between October 15 and April 15: a pre-construction search for the toad at the Gateway east off-ramp willow riparian wetland, drainage culvert, and intermittent creek at the east portals should be made by a qualified biologist. In addition, weekly searches for the spadefoot toad should be made by a qualified biologist through the construction period.

Western Burrowing Owl. Pre-construction surveys are recommended for western burrowing owl. If this species is found in the project area at the time the project is implemented, avoidance and minimization measures would be established in coordination with CDFG. The measures may include permanently protecting burrowing owl habitat on-site or off-site through land acquisition or through participation in a land bank or land tract purchase.

White-tailed Kite. Avoidance and minimization efforts would be the same as for nesting raptors and other migratory birds, as described below.

Alameda Whipsnake. Additional studies are being completed for this species. Any avoidance and minimization, and/or mitigation measures needed will be developed during preparation of the Biological Evaluation and during consultation with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act.

Nesting Raptors and Other Migratory Birds. To avoid violations of the Migratory Bird Treaty Act and Fish and Game Code and reduce the potential for impacts related to removal of trees in the project impact area, it is recommended that active nesting stands be identified prior to project construction. Activities such as removal of nests during the non-breeding season (September through February) and avoidance of nest disturbance during construction activities will reduce potential effects. Efforts will include flagging nests discovered during pre-construction surveys and avoiding trees with nests until they are abandoned or the young have fledged.

If construction were proposed between March 1 and August 15, surveys would be conducted before construction activities begin. If raptor or other migratory bird nests are found or if raptors or other

migratory birds are suspected to be nesting at the time the project is implemented, the establishment of a buffer area [76 meters (251 feet)] between the nest and the areas of construction activity is recommended. Construction activities would be prohibited within the nesting area and the buffer area until the young have fledged or the species is no longer attempting to nest.

Trees and Other Mature Vegetation

To protect and preserve California bay trees, coast live oaks, and valley oaks from effects during construction activities, Environmentally Sensitive Areas will be designated for bay and oak habitat adjacent to, and in the vicinity of the project site. Environmentally Sensitive Areas will fully enclose the dripline of the oaks and any limbs that need to be removed will be pruned by an arborist in accordance with arboricultural industry standards or will be performed following the direction of a knowledgeable individual. Where existing trees are to be preserved, equipment access may need to be constrained. The preservation areas will be identified on the construction plans. Environmentally Sensitive Area fencing will restrict vehicle and foot traffic near trees and prohibit fueling and equipment/material storage and placement of fill or other materials over the root zone.

2.5 Cumulative Impacts

2.5.1 Regulatory Setting

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of this project. A cumulative effect assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can result from individually minor, but collectively substantial impacts taking place over a period of time.

Cumulative impacts to resources in the project area may result from residential, commercial, industrial, and highway development, as well as from agricultural development and the conversion to more intensive types of agricultural cultivation. These land use activities can degrade habitat and species diversity through consequences such as displacement and fragmentation of habitats and populations, alteration of hydrology, contamination, erosion, sedimentation, disruption of migration corridors, changes in water quality, and introduction or promotion of predators. They can also contribute to potential community impacts identified for the project, such as changes in community character, traffic patterns, housing availability, and employment.

CEQA Guidelines, Section 15130 describes when a cumulative impact analysis is warranted and what elements are necessary for an adequate discussion of cumulative impacts. The definition of cumulative impacts, under CEQA, can be found in Section 15355 of the CEQA Guidelines. A definition of cumulative impacts, under NEPA, can be found in 40 CFR, Section 1508.7 of the CEQ Regulations.

2.5.2 Projects Considered in the Cumulative Impacts Evaluation

Actions and projects in the vicinity of the project may have collectively significant consequences, the cumulative impacts of the Caldecott Improvement Project have been evaluated with other nearby, past, present, and proposed transportation and non-transportation projects in Alameda and Contra Costa counties.

Various sources were consulted to try and be inclusive of all projects in the study area, but there may be projects that have been overlooked because they were completed, new, small, or only a concept. The sources consulted include:

- Governor's Office of Planning and Research Office database of environmental documents (database can be accessed on the world wide web at www.ceqanet.ca.gov);
- The Department's District 04 Intergovernmental Review/CEQA unit;
- The Metropolitan Transportation Commission's Transportation 2030 Plan, February 2005 (http://www.mtc.ca.gov/planning/2030_plan/index.htm);
- Alameda Congestion Management Agency's website; (http://www.accma.ca.gov/pages/projects.shtml); and
- Contra Costa County Transportation Authority website (http://www.ccta.net/index.html)

2.5.3 Related Projects

The Caldecott Improvement Project is within Alameda and Contra Costa Counties. Although both counties have a Countywide Transportation Plan (CTP), only Contra Costa County's CTP includes related projects that may help relieve the traffic congestion within the State Route 24 corridor. These projects include the following:

- Widening of State Route 24 Off-Ramp at Brookwood Road

  This project proposes to widen the eastbound State Route 24 Orinda off-ramp at Brookwood Road, construct a 400-meter auxiliary lane on eastbound State Route 24, and construct a Class I Bikeway (bike path) between Gateway Boulevard and the Orinda off-ramp (Brookwood Road). The project will add a second lane to the off-ramp to provide storage for the commute traffic that currently backs up on the State Route 24 during the evening commute. It will also improve traffic signals to provide better traffic flow at the intersection of Camino Pablo and Brookwood Road;

- Roadway Widening and Rehabilitation on State Route 24 from Caldecott Tunnel to El Curtola Overcrossing

  This project proposes to rehabilitate State Route 24 in Contra Costa County from the Caldecott Tunnel in the City of Orinda to El Curtola Overcrossing in the City of Lafayette. The project will include overlaying the existing road surface, replacing the failed pavement areas, and replacing the distressed bridge approach concrete slabs. The existing drainage systems in the area will also be upgraded. Thirty- seven maintenance vehicle pullouts will also be constructed at various on-and off-ramps. This project is expected to be completed in May 2008;

- Pavement Rehabilitation on State Route 24 in Alameda County from Interstate 580/State Route 24 Separation to the Alameda/Contra Costa County Line

  This project consists of repairing the existing pavement on State Route 24 as well as various on-and off-ramps in Oakland from Interstate 580/State Route 24 separation to the Alameda/Contra Costa County line just east of the State Routes 24/13 Interchange. This project is currently in construction;

- Lafayette Carpool Lots

  This project proposes to construct two carpool lots. One lot is to be located in the southerly portion of St. Mary's Road near the Lafayette Community Park, and the second located on Mt. Diablo Boulevard at Risa Road. The St. Mary's Road carpool lot has been completed. The construction of the second lot is anticipated to start in 2007;

- Moraga Park and Ride Lot

  This project proposes to construct a park and ride facility off Moraga Way near School Street. The project will provide a place for carpoolers to park their vehicle and will provide shelter for those waiting for rides in inclement weather. This location is near an established casual carpool pickup point, with BART and CCTA access for the return trip. Currently the number of carpoolers is limited by the amount of available parking. This project will allow additional commuters the opportunity to carpool. Additional funds are needed to initiate this project; and

- Santa Maria Intersection Improvements

  This project includes the review of traffic volumes and movements along Camino Pablo, extending northerly from State Route 24 to the Santa Maria Way intersection. The study will develop recommendations to improve the operations of the off -ramp and the two intersections, and will prepare financial plans on how they will be funded. The recommendations may include the addition of a second lane on northbound Camino Pablo to westbound State Route 24, signal coordination along Camino Pablo between Santa Maria Way and Camino Encinas, in addition to other improvements.

Other projects near the Caldecott Improvement Project include:

- Claremont Corridor Seismic Improvements Project

  The project involves a two-year effort to construct a permanent bypass tunnel (referred to as the Short Bypass Tunnel) where the Claremont Tunnel, which carries treated water for EBMUD crosses the Hayward Fault. The project also involves liner grouting and repairs to structurally reinforce the liner throughout the existing tunnel. Construction work for the tunnel's seismic improvements began in the summer of 2004;

- East Bay Regional Park District Vegetation Management Project

  This project proposes to conduct vegetation management on various sites within seven regional parks, which include Tilden Regional Park, Claremont Canyon Regional Preserve, Sibley Volcanic Regional Preserve, Huckleberry Botanic Regional Preserve, Redwood Regional Park, Anthony Chabot Regional Park, and Leona Heights Regional Open Space. Types of vegetation management proposed for these sites include hand labor, tree removal, mechanical treatments, prescribed burning, and chemical treatments. The project will be implemented over a 3-year period beginning in April 2003; and

- Montanera Project in the Gateway Valley

  The project site is in western Contra Costa County south of the State Route 24/Gateway Boulevard Interchange, in an area locally known as "Gateway Valley." The project proposes to develop up to 245 single-family homes, a swim club, five community playfields, a community art and garden center, a city maintenance facility/corporate yard, and associated roads and infrastructure. The site location includes approximately 409.5 hectares (1012 acres) of which approximately 310.8 hectares (768 acres), which is 76 percent of the total area, lies within Orinda's boundaries and the remaining 24 percent, which is approximately 98.7 hectares (244 acres), lies within, unincorporated Contra Costa County. The proposed project plans on developing 93.2 hectares (230.4 acres), approximately 22.8 percent of the 1012.0-acre project site, assuming city acquisition and use of the 10.9 hectares (27-acres) EBMUD property. The remaining 316.3 hectares (781.6 acres) of the project site would be retained for permanent open space and public transit use. The City of Orinda's Planning

Commission and City Council have certified the Supplemental Environmental Impact Report in March 2005. A pre-zoning Ordinance and Resolution of the Application to Local Agency Formation Commission was adopted in September 2005. The tentative map and Final Development Plan for the project was submitted to the City of Orinda in August 2005. The City of Orinda is waiting to receive the Infrastructure Improvement Plans that will include a greater detail for roads, infrastructure, detention ponds and other public improvements throughout the site from the project applicant. There will be opportunity during the Final Development Plan and Tentative Map stage of the review process for the City to review and approve specific details regarding grading, lot layout, and design of public improvements. The design review stage will allow more detailed review of individual home size, architectural design, height setbacks and landscaping. This stage has yet to be completed and schedule has yet to be set.

- Robert Sibley Volcanic Regional Preserve Land Use Amendment

  The East Bay Regional Park District proposes to integrate an additional 285 acres of land into Robert Sibley Volcanic Regional Preserve, and to make the land safe and accessible for public use. The project includes a group camp, a quarry staging area, Old Tunnel Road staging area, as well as vegetation management.

- Residential Units on Caldecott Lane

  There are seven condominiums currently planned for (or under construction) on Caldecott Lane. These units have been analyzed in the noise report for consideration of noise abatement (see Section 2.2.8.5).

In addition to these projects, as described above under *Mass Transit*, Regional Measure 2, approved by voters in 2004 mandated that, "The County Connection shall study all feasible alternatives to increase transit apacity in the westbound corridor of State Highway Route 24 between State Highway Route 680 and the Caldecott Tunnel, including the study of an express lane, high-occupancy vehicle lane, and an auxiliary lane…" The Contra Costa Transportation Authority has retained *DKS Associates*, to conduct this study. The study is currently underway and is examining three "Strategy Packages": Strategy Package A - New BART Service from Eastern Contra Costa County to the Coliseum Station; Strategy Package B- Corridor-wide HOV/ Express Bus lane using the left shoulder on State Route 24 in the a.m. peak; and Strategy Package C - HOV/ Express Bus Queue Jump Lanes.

2.5.4 Potential Cumulative Impacts

In order to analyze the role of the proposed project on cumulative effects in the project area, the topics of potential concern were first identified and environmental factors for which the proposed project might reasonably have the potential to contribute to a cumulative impact were identified. The transportation projects within the vicinity of the proposed project were evaluated for cumulative impacts. Due to the nature of these projects, they do not contribute to cumulative impacts. The discussion that follows is summarized in Table 2.5.4-1.

2.5.4.1 AIR QUALITY

Transportation projects such as the proposed project are considered to have met transportation air quality conformity requirements if they have been included in the regional air quality analysis conducted by MTC and the Bay Area Air Quality Management District for the Regional Transportation Program (RTP) and Transportation Improvement Plan (TIP), which conform to the State Implementation Plan. The analysis considers all planned and programmed transportation

projects within the San Francisco Bay Area Air Basin, and thus is a cumulative analysis. The design concept and scope of the project has not changed from the design scope and concept in the RTIP and TIP listings. Therefore Alternative 2N conforms to the SIP; Alternative 3N does not have regional conformity. If this alternative is selected as the preferred alternative, a regional analysis will need to be performed by MTC to determine regional conformity. Transportation projects within the project area have been analyzed and found not to contribute to a cumulative impact to air quality.

The non-transportation projects within the project area are also subject to air quality standards. The East Bay Regional Park District Vegetation Management Projects and the Claremont Tunnel Seismic Upgrade Project would produce some air pollutants during construction. The Robert Sibley Volcanic Regional Preserve Land Amendment Project, which includes the construction of a group camp, two staging areas, and conducting vegetation management, would produce air pollutants during construction, grading, filling and other earthwork. Automobile traffic and occasional prescribed burns would also cause air pollutants. The addition of the group camp possesses the potential for campfire smoke and odor. While these projects will generate air pollutants during construction, they will not be expected to have a negative cumulative impact.

2.5.4.2 GEOLOGY/SOILS

The proposed project lies within the seismically active San Francisco Bay region and is crossed by mapped traces of the Hayward Fault on the western most edge. The project area has the potential to be subject to strong ground shaking in the event of a major earthquake. The Claremont Tunnel Seismic Upgrade Project would also have similar impacts related to seismic shaking. Engineering and design features are available to avoid these seismic hazards. Both projects would be designed to meet current seismic safety standards and thus would withstand the maximum credible earthquake. Therefore, there would be no cumulative impacts related to seismic shaking.

2.5.4.3 NATURAL ENVIRONMENT

The proposed project would result in the loss of vegetation such as eucalyptus trees, and shrubs. The East Bay Regional Park District Vegetation Management Projects would have impacts to vegetation, wildlife, and special-status species. These impacts would be mitigated by pre-construction surveys, timing, and or avoidance measures. Best Management Practices and post treatment monitoring, maintenance and revegetation will be implemented.

There is a potential for wildlife disturbance and road kills with the addition of the group camp under the Robert Sibley Land Use Plan Amendment. Mitigation measures such as group camp attendees being required to arrive at camp prior to sunset as well as being restricting night hikes will be implemented. Roadway caution signs will be posted on the quarry access road and Old Tunnel Road to include the in-park speed limit and wildlife crossing information. The project also calls for the restoration and maintenance of three small ponds to maintain their functions as silt catch basins and to benefit native amphibian populations. This work would have a positive impact of restoring wetland habitat.

The Claremont Tunnel Seismic Upgrade Project has impacts to the biological resources within its project area. These impacts include but are not limited to the removal of trees. A staging area could potentially produce significant biological impacts to Temescal Creek due to increased siltation and discharge of deleterious materials contained in the groundwater drained from the tunnel construction. Mitigation measures will be implemented to minimize any potential impacts.

The Department habitat replacement policies, as well as requirements of regulatory agencies such as the California Department of Fish and Game, are expected to fully replace the natural resource values of lost vegetation.

Similarly, legal requirements as well as state policies to protect wildlife and threatened or endangered species are expected to prevent adverse effects to those species.

2.5.4.4 NOISE

Noise from temporary construction activities for the Caldecott Improvement Project, Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment, Claremont Tunnel Seismic Upgrade Project, and the Montanera Project in the Gateway Valley could have the potential to affect nearby residences. The Caldecott Improvement Project would not have a significant increase in its future predicted noise levels as a result of any of the projects alternatives to necessitate noise mitigation. Noise abatement measures are proposed but are not expected to have a significant effect on a competing resource. Noise that will be generated during construction of the proposed project may reach levels higher than the existing traffic noise. These impacts will be temporary and can be minimized by implementing mitigation measures as mentioned in Section 2.4.8.

The Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment does propose a group camp, which may generate some noise from voices, singing, and other group activities. The proposed group camp has been sited as far as possible from the nearest homes on Grizzly Peak Boulevard, a distance of at least 8 kilometers (.5 mile). One estimate of noise level for a similar land use is school children at lunchtime, which was 47 dB at a distance of 304.8 meters (1000 feet). The noise from this addition is expected to not exceed the school children example because it would attenuate over the greater distance. Therefore, the Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment will not have any noise impacts.

The Claremont Tunnel Seismic Upgrade Project will not generate noise levels that would exceed existing noise levels after construction. Construction activities will generate some impacts, which may include the removal of the sound barriers to allow back filling and landscaping of the Claremont Center site. This will only affect the continuation school, Rock La Fleche Community Day Center, to the south of the Claremont Center. To mitigate for these potential impacts, the project will include mitigation measures such as temporary noise barriers around the primary construction area, requiring the contractor to use construction equipment muffled to the 65 dB CNEL limit at the school or restricting the construction hours to those hours when school is not in session, and construction noise monitoring and control specifications to be included in the project specifications. Implementation of these mitigation measures will mitigate the project's impacts to a less than significant level.

The Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment, Claremont Tunnel Seismic Upgrade Project, and the Montanera Project in the Gateway Valley will not impact the area affected by the proposed project. While these projects have the potential for noise impacts during construction, their impact areas are not within the areas impacted by the Caldecott Improvement Project. Therefore, there would be no cumulative impact related to noise.

2.5.4.5 TRANSPORTATION/TRAFFIC

The Caldecott Improvement Project would result in a lowering of the level of service (LOS) during either the morning or afternoon peak period at various intersections as described in section 2.1.5.2, Impacts, under Intersection Analysis. At all other intersections, the LOS would either be maintained or improve as a result of the proposed project.

The Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment will add approximately 0.1 percent of the traffic volume on State Route 24 via the off-ramps at Fish Ranch Road. This amounts to approximately 200 vehicles per day. The use of the group camp may be a source of an increase of approximately .6 percent of the traffic volume during Friday commutes on State Route 24. These volumes are minimal and would not be significant impacts. The project may potentially add additional traffic volume to Fish Ranch Road and local intersections. There is an excess capacity available on Fish Ranch Road and local intersections to accommodate the project traffic.

The Claremont Tunnel Seismic Upgrade Project will not have any permanent traffic or transportation impacts. The project will have a temporary increase of 3 to 6 percent on local roadways around the Claremont Center due to construction workers and construction vehicles. Requiring the contractor to establish an off-site parking area for construction workers and to ferry the workers to the site using carpools or vanpools will mitigate these temporary impacts.

The Montanera Project in the Gateway Valley will have transportation and traffic impacts. These impacts include operational impacts on the westbound State Route 24/Gateway Boulevard interchange, dead end street lengths exceeding the maximum allowable for the City of Orinda, roadway gradients at intersections may exceed maximum city code criteria and may impact vehicle access. Other impacts include construction period peak hour traffic impacts on State Route 24, as well as heavy load impacts on Gateway Boulevard and the State Route 24/Gateway Boulevard Interchange. These impacts can only be addressed by increasing capacity on State Route 24.

While the Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment, The Claremont Tunnel Seismic Tunnel Upgrade Project, and the Montanera Project in the Gateway Project will have some transportation impacts, these impacts are not significant and combined with the relief of congestion provided by the proposed project would not create any significant traffic related cumulative impacts.

2.5.4.6 VISUAL/AESTHETICS

The proposed project may require construction of various noise barriers including but not limited to earth berms, and soundwalls. Visual change in the vicinity of the project area will change for motorists and residents. Impacts due to the construction of noise barriers will be minimized by the addition of aesthetic features such as revegetation, and soundwall aesthetics.

The East Bay Regional Park District Vegetation Management Projects, Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment, and the Claremont Tunnel Seismic Upgrade Project will have some minimal effects on scenic vistas. There also will be a change in the existing visual character and quality. These impacts are in different viewsheds and thus are not considered to have any cumulative impacts.

The Montanera Project in the Gateway Valley may reduce visual quality of views from the project's Gateway Valley entrance road, and the lighting at the proposed community playfield may produce glare towards State Route 24 and other areas surrounding the playfield. The proposed re-routed transmission line may affect scenic views, including views from State Route 24 and the Sibley Volcanic Preserve.

The projects that were considered for the cumulative impact analysis are in a different viewshed as that of the proposed Caldecott Improvement Project. Therefore, there would be no cumulative impact related to visual or aesthetics.

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	ALTERNATIVE		ALTERNATIVE	ALTERNATIVE	ALTERNATIVE	ALTERNATIVE	ALTERNATIVE
	2N	*3N*	*2: Proposed Action*	*3: Mitigation Methods*		*Ensure that sufficient water is available to customers served by the Claremont Tunnel following an earthquake*	
Description of Alternatives	*Construct a 2-lane tunnel north of the existing facility*	*Construct a 3-lane tunnel north of the existing facility*	*Selective removal of Monterey pines, red gum Eucalyptus trees, Tasmania blue gum Eucalyptus trees, and exotic understory; minor road improvements to fire trails; and creation of staging areas*	*At select sites, horse logging, sucker bashing, and goat grazing would be used as alternatives to treatments described for the Proposed Action Alternative*	*Construct a group camp and two trail staging areas, and conducting vegetation management on the new 285-acre parkland*	*Construction of a permanent bypass tunnel (Short Bypass Tunnel) where the Claremont Tunnel crosses the Hayward Fault and liner grouting and repairs to structually reinfoce the liner throughout the existing tunnel*	*Proposed project alternatives include: 245 single family residential units, five playfields, a community park , a recreation and maintenance yard, associated parking, community art and garden center, private swim club, trails, re-routing the existing 115kV Moraga-Claremont power line from an east-west alignment across the valley to a north-south alignment around the valley, and preservation of approximately 775 acres of open space*

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		**East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)**		**Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment**	**Claremont Tunnel Seismic Upgrade Project**	**Montanera Project In the Gateway Valley**
Affected Resource	***Potential Impacts***		***Potential Impacts***		***Potential Impacts***	***Potential Impacts***	***Potential Impacts***
AGRICULTURAL RESOURCES	N/A	N/A	N/A	N/A	Addition of recreational uses that would not be agriculturally related	N/A	N/A
AIR QUALITY	Possible less pollutant levels due to reduction in congestion in reverse commute.				Air pollutants during construction, grading, filling, and other earthwork	Increase in air pollutant emissions caused by construction activities	N/A
	N/A	N/A	N/A	N/A	Air pollutants caused by automobile traffic and occasional prescribed burns	Excavation of the proposed Short Bypass Tunnel could generate odors into the vicinity of the proposed tunnel portal at the Claremont Center	
	N/A	N/A	N/A	N/A	Potential for campfire smoke and odor	N/A	N/A
CULTURAL RESOURCES	Low potential to impact buried or discover new archaeological resources		Low potential to impact buried or discover new archaeological resources		N/A	Two historic properties may be affected by construction vibrations	N/A
	Includes one property eligible for listing in the NRHP (Caldecott Tunnel bores 1 and 2)				N/A	Potential to reveal unknown buried or otherwise obscured prehistoric or historic cultural resources	N/A

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project	East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
GEOLOGY/ SEISMOLOGY/ SOILS	Groundwater levels could be lowered due to increased drainage from the new tunnel, possibly reducing potential landslide hazard	Soil loss, erosion, compaction and potential landslides		Livestock grazing, if not properly managed, may result in topsoil erosion	Use of controlled detonations to fracture and loosen rocks during tunnel excavation may produce vibratory ground motion capable of triggering slope displacement or failure	N/A
	Project area lies within the seismically active San Francisco Bay region and is crossed by mapped traces of the Hayward Fault	N/A	N/A	N/A	Major earthquake on the Hayward fault or other regional active faults, facilities associated with the Short Bypass Tunnel could be damaged resulting in temporary service disruptions	N/A
	Increased surface erosion could negatively affect slope stability and water quality	N/A	N/A	N/A	Potential for slope failure during the tunnel portal construction at the Claremont Center could interfere with project construction or could damage facilities or surrounding properties.	N/A

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	N/A	N/A	N/A	N/A	N/A	Effects of squeezing ground could occur during tunnel construction, damaging interior supports and resulting in potential health and safety hazards	N/A
	N/A	N/A	N/A	N/A	N/A	Ground surface overlying the proposed Short Bypass Tunnel could settle or subside due to the tunnel excavation	N/A
	N/A	N/A	N/A	N/A	N/A	Increased surface erosion could negatively affect slope stability and water quality	N/A
	N/A	N/A	N/A	N/A	N/A	Reduce the potential seismically induced damage	N/A
GROWTH INDUCEMENT/ COMMUNITY IMPACT	Supports local planning goals and policies to improve traffic circulation along State Route 24		N/A	N/A	Construction of group camp would allow organized groups of up to 300 people access to picnic tables, shade structures, and campground facilities	Construction activities could cause disrupt land uses near the project area	N/A

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	Enhance access to parks and recreation areas within the project area		N/A	N/A	N/A	N/A	N/A
	Increase mobility and reduce delay along State Route 24		N/A	N/A	N/A	N/A	N/A
HAZARDOUS WASTE/MATERIALS	Potential for lead contamination issues in the unpaved areas due to aerially deposited lead (ADL) from historic motor vehicle exhaust		N/A	N/A	N/A	Construction activities could result in the release of airborne asbestos fibers from the rock into the air, which in turn could pose a potential public health hazard, depending on the concentration, duration of exposure, and physical characteristics of the asbestos fibers	N/A
	N/A	N/A	N/A	N/A	N/A	Use of construction equipment and temporary storage of diesel fuel at the Claremont Center could increase the risk of wildland fires during construction	N/A

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	N/A	N/A	N/A	N/A	N/A	Risk of an explosion, endangering tunnel construction workers and the public due to potential gassy conditions in the tunnel	N/A
	N/A	N/A	N/A	N/A	N/A	Hazardous materials could be encountered in the soil and/or groundwater during construction of the Short Bypass Tunnel	N/A
HYDROLOGY/ FLOODPLAIN	Not located within a Federal Emergency Management Agency (FEMA) designated 100-year floodplain		Not located within a Federal Emergency Management Agency (FEMA) designated 100-year floodplain	N/A	N/A	May result in increase erosion and sedimentation, and use of construction equipment could potentially result in a release of fuels, oils, or grease to stormwater	N/A

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	No major drainage alteration		N/A	N/A	N/A	Groundwater produced during dewatering of the Short Bypass Tunnel and excavation in the portal area could contain sediment, petroleum, dissolved methane, and chloramines, which could in turn degrade water quality if discharged directly to surface water	N/A
	Potential groundwater infiltration		N/A	N/A	N/A	Wash water from the concrete/grout batching plant at the Orinda WTP would likely require discharge to a sewer system in the vicinity of the Orinda WTP and will be required to comply with application regulations	N/A
NATURAL ENVIRONMENT	No impacts	Permanent impacts to perennial bunch grasses	Vegetation mortality, reproductive failure, enhanced reproduction, spread and establishment of native plants or nonnative plants, spread of diseases, vegetation type-conversion, improved biodiversity and diversification of vegetation types		Potential wildlife disturbance and road kills	Construction and tree cutting could disturb nesting raptors and other nonlisted special-status nesting birds	Construction of proposed powerline relocations may alter the stream bed, channel or bank of one or more of the east-west running natural stream channels

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	Permanent impacts to annual grassland		Individual mortality, morbidity, and reproductive failure to mollusks (snails, and slugs), annelids (worms), arthropods (insects), and miscellaneous small vertebrates		Potential for overgrazing and affect vegetation by interfering with flowering and seed production	Potential wildlife disturbance	Construction equipment and activities has the potential to disturb sensitive creek habitats
	39 individual coast live oaks affected	43 individual coast live oaks affected	Impacts to shrubs and trees	Potentially greater impacts to shrubs and trees than Proposed Action Alternative	Removal of Eucalyptus trees could result inadvertent disturbance to bird nests	Removal of coast live oak trees in Berkeley, which are considered protected by the City of Berkeley's ordinance	Runoff carrying sediment from exposed soils could discharge into one or more of the streams located within the project area
	149 urban trees permanently impacted	161 urban trees permanently impacted	N/A	N/A	Removal of Eucalyptus trees can help prevent the spread of wildfire to trees	N/A	N/A
	Potential to introduce noxious weeds from the project area into uninfested areas		N/A	N/A	N/A	N/A	N/A
	Alameda whipsnake may enter project vicinity		N/A	N/A	N/A	N/A	N/A
	California Red-Legged Frog may enter project vicinity during rainy season		N/A	N/A	N/A	N/A	N/A

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	Western spadefoot toad may enter project vicinity during rainy season		N/A	N/A	N/A	N/A	N/A
	Project vicinity may provide roosting and nesting sites for white-tailed kite		N/A	N/A	N/A	N/A	N/A
	Project vicinity may provide roosting and nesting sites for nesting Raptors and other migratory birds		N/A	N/A	N/A	N/A	N/A
NOISE	88 residences with noise levels higher than 66dBA Leq(h) impacted. Noise increases would be less than 3dBA	90 residences with noise levels higher than 66dBA Leq(h) impacted. Noise increases would be less than 3dBA	N/A	N/A	The Group Camp would generate some noise from voices, singing and other group activities not exceeding the 60dB standard	Temporary construction noise from trucks and various construction activities within the project vicinity	N/A

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	No receptors within the project limits would have a 12dBA or more increase in future predicted noise levels		N/A	N/A	Construction of park facilities would generate equipment noise	Construction truck traffic would generate noise levels above existing ambient levels along haul route	N/A
	Temporary construction noise impact		N/A	N/A	N/A	N/A	N/A
PALEONTOLOGY	Potential fossil finds		N/A	N/A	N/A	N/A	N/A
RIGHT-OF-WAY	R/W easements will be required	R/W easements will be required	N/A	N/A	N/A	N/A	N/A
SECTION 4-F	No impacts	No impacts	Park visitors would be temporarily excluded from using some areas of the parks	Sites would be closed to the public more often than under the Proposed Action Alternative	Addition of campground and trails	N/A	Addition of parks
TRAFFIC	Result in a lowering of the level of service (LOS) during either the morning or afternoon peak period at various intersections		N/A	N/A	An addition of approximately 0.1% (less than 200 vehicles per day) of the traffic volume on State Route 24 via the off-ramps at Fish Ranch Road	Temporary increase of 3%-6% on local roadways around the Claremont Center by construction workers and construction vehicles	Dead end street lengths exceed City of Orinda's maximum length of 1,000 feet and may impact emergency vehicle access

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	High growth in demand (2N higher than No-Build and 3N higher than 2N). Both alternatives eliminate directional capacity gap in off-peak direction. Both increase demand growth at nearby intersections. (2N incrementally higher than No-Build and 3N incrementally higher than 3N).		N/A	N/A	Occasionally an increase of traffic of approximately 0.6% during Friday commute time on State Route 24	Generate a demand for parking spaces to accommodate construction worker vehicles	Roadway gradients at intersections may exceed maximum City code criteria and may impact vehicular access
	N/A	N/A	N/A	N/A	Additional capacity on Fish Ranch Road	Increase wear-and-tear on the designated haul routes used by construction vehicles to access the project work sites	Proposed layout of internal intersections could result in operational and/or safety concerns
	N/A	N/A	N/A	N/A	Additional capacity on local roadways and intersections	N/A	Pedestrian circulation deficiencies
	N/A	N/A	N/A	N/A	N/A	N/A	Art and Garden Center special events and trailhead parking impacts

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
UTILITIES/SERVICE SYSTEMS	N/A	N/A	N/A	N/A	Additional water demand and solid waste disposal	N/A	N/A
VIBRATIONS	Blasting will result in peak particle vibrations (PPV) high enough to warrant special consideration		N/A	N/A	N/A	Various construction activities such as the use of controlled detonation, roadheader tunnel excavation, and tunnel train operations have the potential to generate vibration affecting overlying and/or nearby residences and buildings	N/A
VISUAL/AESTHETICS	New soundwall along SR 24 may block views of Lake Temescal		Temporary loss of vegetation	N/A	Minimal effect on scenic vistas	Minimal effect on scenic vistas	Proposed re-routed transmission line would adversely affect scenic views, including views from State Route 24 and the Sibley Volcanic Reserve, and would be inconsistent with the City of Orinda General Plan policies

Table 2.5.3-1 Cumulative Impacts Project List

	Caldecott Improvement Project		East Bay Regional Park District Vegetation Management Projects (ALAMEDA and CONTRA COSTA COUNTIES)		Robert Sibley Volcanic Regional Preserve Land Use Plan Amendment	Claremont Tunnel Seismic Upgrade Project	Montanera Project In the Gateway Valley
	Addition of soundwalls and retaining walls changes views from a view of grass and mature trees to concrete soundwalls and retaining walls		Temporary open viewer exposure to roadways and to more distant vistas	N/A	Change in the existing visual character and quality	Change in the existing visual character and quality	Lighting poles would reduce visual quality of views from the project's Gateway Valley entrance road
	Removal of vegetation and addition of retaining walls introduces substantial new man-made features		Temporary visual impact from the parks and residential properties	N/A	N/A	Construction of the project components would introduce new sources of light onto the project sites and increase ambient light in the project area	Lighting at proposed community playfield may produce glare towards State Route 24 and other areas surrounding the playfield
	N/A	N/A	N/A	Temporary grazing by use of goats will impact visual character longer than hand labor	N/A	N/A	Lighting fixtures at proposed community playfield may affect nighttime viewing of the sky by local residents
	N/A	N/A	N/A	N/A	N/A	N/A	Possible nighttime glare impacts of proposed community playfield lighting due to air moisture

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WATER QUALITY	Preliminary calculations estimate 1.1 hectares (2.8 acres) of added impervious area	Preliminary calculations estimate 1.7 hectares (4.1 acres) of added impervious area	Increased soil erosion and/or sedimentation downstream of cleared, burned, or grazed area		Soil erosion and sedimentation	Soil erosion and sedimentation	Proposed field turf material may become a pollutant in stormwater runoff
	Not located within a 100-yr. floodplain				Minimization of erosion and downstream siltation	N/A	Turf washing activities, if it involves use of detergent, could drain into the project storm drain system resulting in associated discharges of pollution into the downstream drainage system
	N/A	N/A	Runoff of fire residue/ash from prescribed fire sites		Potential to introduce automobile-related oils and grease into rainwater runoff	N/A	N/A
	N/A	N/A	Incidental introduction of herbicide (Garlon 4) into local drainages and/or water basins	May provide long-term beneficial impacts to local water resources	Potential for increase water runoff	N/A	N/A

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	N/A	N/A	Introduction of bacteria, organic matter and/or nitrogen-containing by-products from animal waste		N/A	N/A	N/A
WETLANDS	.008 hectare (.02 acre) of wetland to be permanently filled at slope wetland SW-03		N/A	N/A	Restoring wetland habitat	Potential to contribute to short-term disturbance of Waters of the United States, including wetlands	N/A
	Permanently fill .0008 hectare (.002 acre) of other waters of the U.S. at the intermittent/ephemeral stream channel IES-05		N/A	N/A	Pond restoration may have the potential for destruction of wetland vegetation and bullfrogs, and unintentional destruction of native wildlife	N/A	N/A