3.2.5 Hazardous Waste/Materials

Regulatory Setting

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

The 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 provides for "cradle to grave" regulation of hazardous wastes. Other federal laws include:

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

In addition to the acts listed above, 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. Proper disposal of hazardous material is vital if it is disturbed during project construction.

The California Health and Safety Code, Hazardous Waste Control

The Hazardous Waste Control Act (HWCA) regulates the generation, treatment, storage, and disposal of hazardous waste. Hazardous waste is any material or substance that is discarded, relinquished, disposed of, or burned, or for which there is no intended use or reuse, and the material or substance causes or significantly contributes to an increase in mortality or illness; or the material or substance poses a substantial present or potential hazard to human health or the environment. These materials or substances include spent solvents and paints (oil and latex), used oil, used oil filters, used acids and corrosives, and unwanted or expired products (pesticides, aerosol cans, cleaners, etc.). If the original material or substance is labeled Danger, Warning, Toxic, Caution, Poison, Flammable, Corrosive or Reactive, the waste is very likely to be hazardous.

The California Health and Safety Code, Underground Storage Tank Regulations

Chapter 6.7 of the Health and Safety Code outlines the requirements for USTs, identifies requirements for corrective actions, cleanup funds, liability, and the responsibilities of owners and operators of USTs.

Solano County, Environmental Health Services Division, Certified Unified Program Agency

The Solano County Department of Resource Management, Environmental Health Services Division is the Certified Unified Program Agency (CUPA) for all cities and unincorporated areas within Solano County. The CUPA is a single local agency designated by the California Environmental Protection Agency as having regulatory authority for eight environmental programs. These programs are Hazardous Materials Business Plan, Hazardous Waste, California Accidental Release Prevention (Risk Management Plan), Aboveground Storage Tanks, Underground Storage Tanks, Emergency Response, Waste Tire Program, and Illegal Disposal/Complaints. The Solano County CUPA enforces those programs throughout the County. In addition to the CUPA Program, staff responds whenever there is an accidental release of hazardous materials.

In addition, the State Water Resources Control Board has contracted with the County of Solano to provide regulatory oversight for the cleanup of leaking underground storage tanks (LUSTs) under Local Oversight Program (LOP) contract. The programs service all the cities and unincorporated areas of Solano County.

The site cleanup program oversees the voluntary cleanup of contaminated property. Sections 101480 through 101490 of the California Health and Safety Code provide that a Responsible Party (RP) for a release site may request oversight of a site investigation and any remediation necessary to mitigate the site. Oversight activities include any review required of site assessment and remediation workplans, review of required sampling operations, analysis of sampling data, and establishment of site cleanup criteria. The RP can initiate oversight by submitting a written request for oversight. Once the signed agreement is received, the Environmental Health Services Division is required to notify the California Department of Toxic Substances Control (DTSC) and the applicable Regional Water Quality Control Board (RWQCB) to determine if these agencies have regulatory involvement with the site. If no concerns are raised by the State agencies, then a staff person of the Environmental Health Services Division Hazardous Materials

Section will oversee the investigation and remediation of the site. After determining that the RP has completed the site investigation and remediation necessary to protect human health and the environment then, Environmental Health Services Division Hazardous Materials Section will prepare a no-further-action "closure" letter stating that the investigation and remediation is complete.

Asbestos Regulations

Title 8 California Code of Regulations Section 1529 regulates asbestos exposure in all construction work and defines permissible exposure limits and work practices. Typically, removal or disturbance of more than 100 square feet of material containing more than 0.1% asbestos must be performed by a registered asbestos abatement contractor, but associated waste labeling is not required if the material contains 1% or less asbestos. When the asbestos content of materials exceeds 1%, virtually all requirements of the standard become effective. With respect to potential worker exposure, notification, and registration requirements, the California Division of Occupational Safety and Health (Cal/OSHA) defines asbestos-containing construction material (ACCM) as construction material that contains more than 0.1% asbestos (8 CCR 341.6).

Affected Environment

The project consists of the project footprint and surrounding land in the vicinity of Fairfield and Suisun City, Solano County, California. The approximate site location is depicted on Figure 2-1. Environmental professionals have conducted studies, including an Initial Site Assessment. This section summarizes those studies.

Initial Site Assessment Reports

The information below is summarized from *Initial Site Assessment, I-80, I-680, SR-12 Improvement Project, Solano County* (ISA) prepared in 2008 and updated in 2009. The ISA reports were prepared in accordance with the Department's *Initial Site Assessment Guidance* in order to determine the presence of hazards and hazardous materials within the project right-of-way and temporary construction easements.

The ISA reports included the following:

- Reviews of previously prepared environmental reports, Draft Private Property Investigation and Aerially-Deposited Lead Report. These reports document potential environmental concerns within the Department's right-of-way and properties adjacent to the proposed project.
- Review of physical setting references and observations made to obtain information concerning the topographic, geologic, and hydrogeologic characteristics of the site and vicinity.
- Summary of a site reconnaissance conducted from public thoroughfares to observe conditions and activities for indications of evidence of recognized environmental conditions.
- Review of historical sources (including prior environmental reports, aerial photographs, and topographic maps) to develop a site history detailing previous uses of the site and the surrounding area to identify potential past uses that might have led to recognized environmental conditions.

- Review of publicly available federal, state, and local regulatory agency records to help identify recognized environmental conditions at or potentially affecting the site.

The information obtained for the ISA reports is relevant only for the dates of the records reviewed or as of the date of the latest site visit. Therefore, the information is valid only as of the date of the reports. Due to the lack of sufficient right-of-entry permits, site reconnaissance of private parcels and property owner interviews were not performed.

The ISA reports are not a comprehensive site characterization and should not be construed as such. The findings and conclusions presented are predicated on the site reconnaissance, a review of the historical usage of the site, and a review of the specified regulatory records as presented in the ISA. It should be noted that wetlands delineation and surveys of asbestos, lead-containing paint (non-bridge) structure, lead in drinking water, radon, methane gas, and mold were not included in the scope of services for these reports. Therefore, the ISA reports should be deemed conclusive only with respect to the information obtained.

Maps depicting the ISA study area and potential hazardous waste facilities are presented in Figures 3.2.5-1 through 3.2.5-9. Table 3.2.5-1, located at the end of this section, identifies potential hazardous waste facilities along with their respective Map ID numbers and potential impact (low and moderate risk) on right-of-way acquisition and build alternatives selection.

According to information presented in the Department of Conservation Division of Mines and Geology map, naturally occurring asbestos is not indicated in the project footprint or in the vicinity of the project (California Department of Conservation 2000).

Site Reconnaissance

Site reconnaissance of the project area was performed in April 2008 and April 2009. The purpose of the reconnaissance was to survey the existing I-80/I-680/SR 12 corridors, adjacent roadway connector and private property conditions within and adjacent to the area from public thoroughfares to attempt to identify visual indicators of potential hazardous waste facilities/impacts. The site reconnaissance excludes the segment of eastbound I-80 from SOL PM 14.0 to 15.7 and eastbound SR 12E from SOL PM L1.8 to L2.0, the eastbound I-80 Truck Inspection Facility, and portions of adjacent property south of I-80, which was addressed in the ISA for a previous study (I-80 Eastbound Truck Scales Relocation Project). Because no further construction is proposed in this area, it was not addressed in the site reconnaissance.

Aerially Deposited Lead

Aerially deposited lead (ADL) in soils adjacent to highways is attributed to the historic use of leaded gasoline. Areas of primary concern are soils along routes that have had high vehicle emissions from large traffic volumes or congestion during the time period when leaded gasoline was in use (generally prior to 1986). Typically, ADL is found in the top two feet of material in areas within the highway right-of-way. Soils within the Department's right-of-way that contain hazardous waste concentrations of ADL can be reused under the authority of variances issued by the DTSC. The variances allow stockpiling, transporting, and reusing soils with concentrations of lead below maximum allowable levels on the Department's right-of-way when specific conditions are met.

The ADL report for the I-80 Eastbound Cordelia Truck Scale Relocation Project (a nearby project) is summarized in the 2009 ISA update. ADL investigation of the Department's right-of-way consisting of the eastbound shoulder of I-80, from PM 10.0 to 15.7, and eastbound SR 12E from PM L1.8 to L2.0 were performed. A total of 105 soil samples were collected for lead analysis. Additionally, 20 step-out borings were advanced and 24 soil samples were collected. Soil samples were collected from the step-out borings at selected depths between the surface and 2.5 feet, and were based upon the depth intervals where reported soluble lead concentrations (using the waste extraction test [WET]) exceeded the soluble threshold limit concentration (STLC) of 5.0 milligrams per liter (mg/l) in the corresponding initial samples. Soil analytical results and the lead statistical evaluation of the initial borings indicated the following.

- Shallow soil at the western and eastern portions of the project area would not be classified as a California hazardous waste because the 90% upper confidence limit (UCL) predicted soluble WET lead concentration is less than the lead STLC of 5.0 mg/l.
- The top one foot of soil excavated from the central portion of the area investigated should be either (1) managed and disposed of as a California (but not an RCRA—i.e., Federal) hazardous waste or (2) stockpiled and re-sampled to confirm waste classification in accordance with specific disposal facility acceptance criteria, if applicable. Underlying soil would not be classified as hazardous waste based on lead content. Based on the results of the step-out borings, the ADL impacts at hazardous-waste levels do not appear to extend further than 12 feet from the edge of pavement (EOP).
- Analytical results of the step-out boring soil samples did not report soluble WET lead at concentrations above the STLC of 5.0 mg/l. Therefore, soil excavated from areas greater than approximately 12 feet from the EOP (approximately ten feet from the initial borings) and generated for offsite disposal should not be classified as a California hazardous waste based on lead content.

Environmental Data Resources Database Search

Environmental Data Resources (EDR) performed a search of federal, state, and local databases for the project footprint and the surrounding area (Appendix E in the 2008 ISA). The following sections provide additional information regarding properties with potential hazardous materials located within approximately 0.25 mile of the project footprint.

Emergency Response Notification System

The Emergency Response Notification System (ERNS) records and stores information on reported releases of oil and hazardous substances. Two ERNS sites are within the search area for the proposed project.

- Emergency Response Notification System (ERNS) listing for Eastbound I-80 and I-680 overpass—In December 1988, approximately 100 gallons of gasoline spilled from an overturned tanker truck into Green Valley Creek.
- ERNS listing for I-680 and 80 interchange—In January 1991, an overturned fuel tanker caught fire and spilled approximately 7,200 gallons of diesel, affecting soil and surface water in Green Valley and Dan Wilson Creeks.

LUST and Spills, Leaks, Investigation, and Cleanup Listings

Review of the EDR search report in the ISA indicates that 5 facilities of concern in the vicinity of the project area are referenced on the LUST and/or Spills, Leaks, Investigation, and Cleanup (SLIC) listings. Two sites appear to be associated with property to be potentially acquired by the Department as part of the proposed improvement project, and include the following:

- **The Valine property at 4000 Russell Road in Fairfield (Map ID No. 23).** Based on subsequent soil and groundwater sample results, the Solano County Department of Resource Management granted case closure on June 11, 2008.
- **The 76 station (formerly Unocal) at 119 Red Top Road in Fairfield (Map ID No. 2).** The County Department of Resource Management granted UST case closure on August 25, 1997.

Table 3.2.5-2 provides a summary of LUST and SLIC cases within the project vicinity that are currently open.

Table 3.2.5-2. LUST and SLIC Properties

Map ID No.	Name	Address	Substance	Affected Media	Status
6	PrimeSource Inc./ Sequoia Supply	250 Dittmer Road	Gasoline, MTBE	Soil and Groundwater (Drinking water aquifer)	Verification Monitoring
33	Canova Moving and Storage	1336 Woolner Avenue	Gasoline, MTBE, BTEX	Soil and Groundwater, possible utility migration	Remediation
36	Sheldon Oil Co.	526 School Street	Not Reported	Soil and Groundwater	Open LUST and SLIC case; Remediation

Source: ISA Update, Solano County, 2009.

UST/AST Listings

The EDR search report indicates that 12 facilities at and in the vicinity of the project study area contain registered USTs or ASTs. Many of these facilities are also included in the LUST listings. A review of the listings indicates that two of the registered UST facilities are located at properties proposed for full or partial Department acquisition as part of the proposed improvement project: the 76 Station at 119 Red Top Road in Fairfield (UST case closed), and Super Store #70567 Industries at 199 Red Top Road in Fairfield (no pending actions or violations).

RCRA SQG, FINDS and HAZNET Listings

There are 18 facilities at or in the vicinity of the project study area that are referenced on the RCRA Small and Large Quantity Generator (SQG and LQG) listings as generating between 100 and 1,000 kilograms and greater than 1,000 kilograms, respectively, of hazardous waste per month. There are 18 facilities listed in the Facility Index System (FINDS) from cross reference to other regulatory listings relating to chemical use, storage, and disposal, and 23 facilities at or in the vicinity of the project study area are referenced in the HAZNET listing for filing hazardous waste manifests.

The EDR Orphan Summary identifies properties that have incomplete address information and could not be specifically plotted. A total of 49 properties were listed in the Orphan Summary. Approximately four of the properties listed on the Orphan Summary are located within the project study area and have been incorporated in the prior regulatory listing summaries. None of

these properties, however, are properties proposed for acquisition (copies of the EDR Orphan Summary and individual EDR Site Reports for the listed facilities are presented in Appendix B in the ISA Update).

ISA Conclusions

Table 3.2.5-1 lists sites that were identified during the initial site assessment. The ISA identified a total of eight "moderate impact" areas of concern in addition to areas identified during site reconnaissance within the ROW such as the UPRR Bridge and crossing (listed at the end of Table 3.2.5-1). It should be noted that some sites are listed in multiple databases. Therefore, the total number of hazardous listings is greater than the total number of sites.

Site Investigation Report

A physical site investigation for this project has not been completed, however, the *Private Property Investigation Report, I-80 Eastbound Cordelia Truck Scale Relocation Project, Fairfield, California* reported finding chemicals of concern in the surface soil.

Dieldrin, an insecticide, was reported in composite soil samples collected at the eastbound I-80 truck-scale project site at concentrations that exceeding the residential and commercial/industrial land use environmental screening levels established by the San Francisco Bay Regional Water Quality Control Board.

The pesticide 4,4' DDE was reported in composite soil samples at concentrations that equaled or exceeded California's hazardous-waste threshold limit.

Arsenic concentrations in site soil samples collected at the eastbound I-80 truck-scale project site were between <1.0 mg/kg and 40 mg/kg, exceeding the residential land use environmental screening level of 0.39 mg/kg and the commercial/industrial land use environmental screening level of 1.6 mg/kg for shallow soil.

The chemicals of concern found on agricultural land required to build the eastbound I-80 truck-scale project might also be present on agricultural land required to construct this project.

Environmental Consequences

The ISA and site investigation reports identified the following potential hazardous materials/waste conditions.

- Contamination associated with nearby agricultural uses:
  - Soil impacts associated with pesticides, herbicides, petroleum hydrocarbons, and metals from agricultural use. Pesticides are present in surface soil in the central and eastern portions of the proposed project area and the Suisun Creek Bridge area.
- Other soil contamination:
  - Contaminated soil associated with leaking storage tanks and sanitary sewer pipelines.
  - Groundwater in the eastern portion of the proposed project area and the Suisun Creek Bridge area appears to be affected by pesticides. Potential impacts may be associated with construction of bridge pilings greater than ten feet deep.

- Contamination associated with traffic or roadway maintenance:
  - ADL at levels exceeding hazardous waste criteria have been identified within the unpaved shoulders and median within existing I-80 right-of-way in the central and eastern portions of the project area.
  - Lead-containing paint (LCP) associated with removal of existing yellow pavement striping.
- Potential contamination associated with the removal or modification of facilities or structures:
  - Sulfur from bridge rail posts may be encountered during demolition;
  - LCP associated with steel structures may be encountered during demolition;
  - Treated-wood waste may be encountered during demolition;
  - Asbestos-containing pipe may be encountered during demolition.
- Contamination associated with identified potential hazardous waste facilities:
  - Past residual petroleum hydrocarbon releases may require additional UST removal and soil and groundwater remediation.

The following environmental consequences may result from construction and operation of the project.

Exposure of Humans and the Environment to Groundwater Contamination as a Result of Construction Activities

As previously discussed, Table 3.2.5-1 identifies potential hazardous waste facilities along with their respective Map ID numbers and potential impact to right-of-way acquisition and build alternatives selection. Eight facilities located within the project area are considered moderate-risk. Five of these have documented groundwater contamination and as such, are considered high-risk facilities. All eight of the medium/high risk sites are located within or adjacent to the footprints of both alternatives and therefore would not influence the selection of one alternative over another. Although some of these cases are considered closed, testing for contaminants should be conducted in order to determine the extent and nature of possible contamination. During construction of the project, the potential for human exposure (i.e., construction workers) to existing contaminated groundwater would occur mainly during dewatering activities such as the installation of bridge piers.

Under the No-Build Alternative, there would be no construction and therefore, no potential to expose workers or nearby land uses to hazardous materials as a result of construction activities.

Potential for Exposure of Construction Workers or Nearby Sensitive Land Uses to Previously Unknown Hazardous Materials as a Result of Construction Activities

The project area generally has a moderate risk of previously unreported hazardous materials that could be discovered during construction of any of the build alternatives.

Under the No-Build Alternative, there would be no construction and therefore, no potential to expose workers or nearby land uses to hazardous materials as a result of construction activities.

Potential for Exposure of Known Hazardous Materials to Humans or the Environment as a Result of Construction Activities

The project area generally has the potential for hazardous materials in the form of heavy metals, such as chromium and lead in yellow pavement striping; soils contaminated with pesticides, herbicides, and metals; treated-wood waste; bridge rail post sulfur; asbestos-containing materials in various bridge components; and petroleum hydrocarbons that could be released during construction of any of the build alternatives unless measures are taken to avoid that release. In addition, a nearby ADL investigation confirmed the presence of lead-contaminated soil next to the freeway. Construction workers could be exposed to hazardous materials during ground-disturbing activities such as grading, demolition/replacement of structures, and/or roadbed resurfacing at any of the areas known to contain hazardous substances.

The ISA identified 8 areas of moderate concern that would be affected by the project (See Table 3.2.5.-1); the Private Property Investigation Report identified an additional potential area of concern. During the development of alternatives, feasible alternative geometrics were not identified that would avoid the listed properties. These properties are:

- The 76 Station (Map ID No 2) – affected by the extension of Red Top Road under Alternatives B and C and C, Phase 1.
- The Former Terminal Stations, Inc. (Map ID No. 15) site – affected by the construction of the Suisun Valley Road interchange under Alternatives B and C.
- The 76 Station (Map ID No. 19) – affected by the Suisun Valley Road Interchange under Alternatives B and C.
- The Former Old Fruit Bowl Mobile Station site (Map ID No. 23) – affected by the westbound truck scales under Alternatives B and C.
- Moore Tractor Company (map ID No. 25) – affected by I-80/SR 12E Interchange improvements under Alternatives B and C.
- Concrete Pipe Distributors (Map ID No. 26) – affected by I-80/SR 12E Interchange improvements under Alternatives B and C.
- Former Sheldon Oil Company site (Map ID No. 35) – affected by SR 12E overpass into Suisun City under Alternatives B and C.
- Former Sheldon Oil Company site (Map ID No. 36) – affected by SR 12E overpass into Suisun City under Alternatives B and C.

Excavation and construction in these areas may disturb contaminated soil or groundwater. Other potential sources of contamination include aerially applied chemicals during agricultural use of adjacent parcels that could present a respiratory irritant to construction workers. Construction may require the movement or disposal of soils or materials containing some or all of these hazardous materials.

Under the No-Build Alternative, no construction would occur and therefore, there would be no potential to expose any known hazardous materials during construction.

Potential for Exposure of Humans and the Environment to Hazardous Conditions from the Accidental Release of Hazardous Materials as a Result of Construction Activities

Construction would involve the use of heavy equipment, small quantities of hazardous materials (e.g., petroleum and other chemicals used to operate and maintain construction equipment) that may result in hazardous conditions in the project area. In addition, sanitary sewer pipelines may cross or exist within the planned roadway construction alignment. If pre-existing leaks are encountered, or if pipelines are ruptured during construction, construction workers or nearby land uses could be exposed to biological contamination. These hazards are applicable to any of the build alternatives.

Under the No-Build Alternative, no construction would occur and therefore, there would be no potential for an accidental release of hazardous materials as a result of construction activities.

Avoidance, Minimization, and/or Mitigation Measures

Perform Groundwater Contamination Testing

Five sites identified in Table 3.2.5-1 have documented groundwater contamination issues and as such, are considered high-risk facilities. Although some of these cases are considered closed, testing for contaminants should be conducted in order to determine the extent and nature of possible contamination. Testing at these five sites will verify whether groundwater contamination is present at environmentally significant concentrations. If contaminated groundwater will be encountered during construction then mitigation measures such as filtering the water will be used to ensure contaminated water is not discharged into storm drains.

Therefore, prior to the beginning of construction activities, testing will be performed on the five sites that are affected by Alternative C, Phase 1 (Map ID Nos. 15, 19, 23, 25, and 26).

Develop and Implement Plans to Address Worker Health and Safety

As necessary, plans such as a health and safety plan, best management practices, and/or an injury and illness prevention plan will be prepared and implemented to address worker safety when working with potentially hazardous materials, including biological contaminants, potential LCPs, soils potentially containing ADL, and other construction-related materials within the right-of-way for any soil disturbance.

Conduct Sampling, Testing, Removal, Storage, Transportation, and Disposal of Yellow Striping along Existing Roadways

As required by the Department's Standard Special Provision Section 14-11.07, the contractor will sample and test yellow pavement striping scheduled for removal to determine whether lead is present. All aspects of the proposed project associated with removal, storage, transportation, and disposal will be in strict accordance with appropriate regulations of the California Health and

Safety Code. Disposal of the stripes will be at a Class 1 disposal facility. The responsibility of implementing this measure will be outlined in the contract between the Department and the contractor. This measure will minimize effects from known hazardous materials.

Dispose of Soils Contaminated with ADL, Arsenic, Pesticides, and Herbicides in Accordance with Appropriate Regulations

Based on the results of the 2008 ADL investigation report summarized in the 2009 ISA, soils in the central and eastern portions of the project area would likely be classified as hazardous waste upon excavation. Additionally, 8 sites of moderate concern are located within the project footprint, and testing at these sites may reveal contaminated soils. This soil will be handled or disposed of in accordance with the California Health and Safety Code DTSC requirements. Lead-contaminated soil that is eligible for reuse on site under the provisions of the DTSC-approved variance will be used to construct new embankments. The Solano County Department of Resource Management, Environmental Health Services Division is the Certified Unified Program Agency (CUPA) for Solano County. The Solano County CUPA provides regulatory oversight for hazardous materials. Consultation and a permit from the Solano County CUPA will be obtained before reusing any contaminated soil, as necessary. The CUPA will consult with the DTSC regarding any further requirements.

Based on the elevated arsenic, lead, and pesticides concentrations reported in soil samples from the upper 2.5 feet of soil at the private property parcels adjacent to the project area (reported in site specific reports for the I-80 Eastbound Truck Scales project), the top 2.5 feet of excavated soil may be reused within the project limits by placing the soil beneath a minimum of one foot of clean fill or beneath a pavement structure. If reuse conditions are not met, material will be categorized for disposal and any hazardous waste will be transported to the Class 1 disposal site at Kettleman City. This measure would minimize effects from known hazardous materials.

Time Construction to Avoid Exposure of Construction Workers to Respiratory Irritants from Aerially Applied Chemicals

The Department will ensure that the contractor coordinates the timing of construction activities with individual growers on parcels within or adjacent to the project area to avoid any aerially applied chemical impacts on workers during construction.

Sampling, Testing, and Treatment of Groundwater

Groundwater sampling within the Suisun Creek Bridge vicinity of the project area should be performed to further evaluate potential contamination. Sampling and testing for contamination will be conducted during construction activities that require excavation deeper than four feet. Groundwater containing contaminants will be treated to reduce sediment load and metal content prior to discharge to surface water bodies or publicly owned treatment facilities, as required to meet the discharge requirements specified by the RWQCB. This process will avoid or minimize impacts to groundwater.

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Table 3.2.5-1. Summary of Identified Potential Hazardous Waste Facilities and Recommendations

TABLE 1
SUMMARY OF IDENTIFIED POTENTIAL HAZARDOUS WASTE FACILITIES AND RECOMMENDATIONS
I-80/I-680/SR-12 IMPROVEMENT PROJECT

Map ID No.	Facility	Address	APN	Impact to ROW and Acquisitions	Information Source(s)	Environmental Impacts/ Chemical of Concern	Regulatory Status	Potential Impact to I-80/I-680/SR-12 Improvement Project and Recommendations
1	Tower Mart	4720 Gold Hill Road		Low Impact Alt B and C ESA	EDR Report LUST	Active service station located west of the project ESA. Based on information presented in the EDR report, this facility was listed in the LUST database for petroleum hydrocarbon impacts to soil only.	The facility is listed with a case closed status from the SCDRM.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
2	**76 Station**	**119 Red Top Road**	**0180-01-0070**	**Moderate Impact Alt B and C ESA**	**Recon LUST SCDRM Files**	**Active service station located within the project ESA. USTs were removed in 1995. A leak in a waste oil UST was discovered and petroleum-impacted soil excavated. Confirmation soil samples did not contain detectable levels of contaminants. Low levels of BTEX reportedly remain in soil at a depth of 4.5 feet along the former product piping trenches. Groundwater not encountered in the excavation and the SCDRM indicates impacts to soil only. Replacement USTs reportedly subsequently installed at the facility.**	**This facility was granted UST case closed status from the SCDRM in August 1997.**	**This facility presents a moderate risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries. A partial or full parcel take may require UST removals, and additional soil and groundwater characterization and remediation from past petroleum hydrocarbon releases. Exploratory borings should be performed for any planned construction excavations on and adjacent to this facility to evaluate worker health & safety and soil disposal options.**
3	Sunnyside Farms	199 Red Top Road	0180-01-0050	Low Impact Alt B and C ESA	Recon LUST SCDRM Files	The facility is currently a food distribution facility within the project ESA. Three USTs abandoned in place in 1989. Confirmation sample results were not included in SCDRM files. Three diesel ASTs reported at the facility. A fourth diesel UST and fuel dispensers removed in 2004 under SCDRM supervision. Contaminants not detected in confirmation soil samples. Groundwater was not encountered during closure activities.	No pending regulatory action or active violations were noted in SCDRM files for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries. Exploratory borings should be performed if partial or full parcel take is contemplated to evaluate potential impacts related to petroleum hydrocarbon releases from past UST and current AST operations.
4	Jack-in-the-Box (Former Red Top Mini Market)	107 Red Top Road (formerly 151 Red Top Road)	0180-01-0080	Low Impact Alt B and C ESA	LUST SCDRM Files 1970 Aerial	Currently a fast-food restaurant (formerly a service station) within the project ESA. One UST failed a leak test in 1986, and three USTs removed in 1987. Petroleum impacts to soil and a limited amount of soil was excavated during the UST removal. A 1996 site characterization found TPHg and low levels of BTEX in 2 of the 30 soil samples collected at 10 feet. Soil samples at the 20 foot depth from the same borings did not contain detectable levels. Water samples collected from borings within the former UST excavation contained low levels of TPHg and BTEX. Additional impacted soil and groundwater were removed from the property for offsite disposal. Contaminants were reportedly not detected in confirmation soil samples.	This facility was granted a case closed status from the SCDRM in November 1996.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
5	United Parcel Service	5000 West Cordelia Road		Low Impact Alt C ESA	Recon UST	Active UPS parcel distribution facility within the project ESA. The UPS facility was listed in the EDR report in the UST database for operation of one UST at the facility. No case files at the SCDRM for this property and no releases indicated in the EDR report.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternative C based on proposed construction area boundaries.
6	Prime Source	250 Dittmer Road		Low Impact Alt C ESA	LUST GeoTracker	The facility is an active automobile re-seller. One UST removed in 1988. Petroleum-impacted soil was encountered in the tank pit. A replacement diesel UST was installed at the same location later that year. In 1997, a motor oil UST was abandoned in place under the supervision of SCDRM. In 2005, both USTs removed. Impacted soil and groundwater were identified and the area over-excavated. Contaminants were not detected in confirmatory soil samples, though were in groundwater. Additional borings and monitoring wells installed and soil excavated. Low levels of TPHd remain in onsite groundwater.	SCDRM is evaluating consultants request for No Further Action status for the facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternative C based on proposed construction area boundaries.
7	Arco Station	105 Lopes Road		Low Impact Alt B and C ESA	Recon UST	Active gas station with no reported releases or violations. The facility was observed in the field during the site reconnaissance and was not included in the EDR Report.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.

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TABLE 1
SUMMARY OF IDENTIFIED POTENTIAL HAZARDOUS WASTE FACILITIES AND RECOMMENDATIONS
I-80/I-680/SR-12 IMPROVEMENT PROJECT

Map ID No.	Facility	Address	APN	Impact to ROW and Acquisitions	Information Source(s)	Environmental Impacts/ Chemical of Concern	Regulatory Status	Potential Impact to I-80/I-680/SR-12 Improvement Project and Recommendations
8	Napa Valley Beverage Company	497 Edison Court		Low Impact Alt C ESA	Recon SCDRM Files LUST	Two USTs removed in 1989. Low levels of contaminants encountered in soil from the tank pit. SCDRM required installation of monitoring wells. Onsite soil remediation conducted in 1990. In August 1994, a groundwater sample from near the former UST excavation contained low levels of TPHd.	This facility was granted a case closed status from the SCDRM in August 1995.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternative C based on proposed construction area boundaries.
9	Hudson Beverage Company	237 Lopes Road		Low Impact Alt B and C ESA	Recon SCDRM Files LUST	The facility is a commercial business. Two USTs removed 1997. Impacts to soil and groundwater were encountered and over-excavation and removal of soil and groundwater conducted. Confirmation soil and groundwater samples showed residual petroleum impacts. In 2000, two USTs closed in place. In October 2000, sampling defined the extent of impact to a localized area near the former UST pit.	This facility was granted a case closed status from the SCDRM in March 2001.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
10	Sierra Truck and Van (Formerly Trail Wagons)	225 Lopes Road		Low Impact Alt B and C ESA	SCDRM Files LUST	The facility is a commercial business. Two USTs removed in August 1993. Confirmation soil samples contained low levels of contaminants. The tank pit was over-excavated and final confirmation soil samples contained no contamination.	This facility was granted a case closed status from the SCDRM in October 1995	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
11	Saturn of Fairfield	4850 Auto Plaza Court		Low Impact Alt B and C ESA	Recon	The property is an auto dealership located north of the project ESA. The facility was not listed in the EDR report, on the GeoTracker website, or in SCDRM case files.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
12	Costco Gas Station	5101 Business Center Drive		Low Impact Alt B and C ESA	Recon EDR	The property is an active gas station located north of the project ESA. The facility had no reported releases and was listed in the EDR Report in the UST, RCRA SQG, and FINDS databases. The EDR Report identified three gasoline USTs in use at the facility. The facility was not listed in the GeoTracker database or in SCDRM case files.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
13	Green Valley Cleaners	5055 Business Center Drive		Low Impact Alt B and C ESA	Recon EDR	The property is an active dry cleaner located north of the project ESA. The facility was listed in the EDR Report in the Drycleaners and HAZNET databases. Regulatory information for the facility was not listed on the GeoTracker website or available in SCDRM case files.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
14	Former Campbells Carpets	4731 Central Way		Low Impact Alt B and C ESA	SCDRM Files LUST	The property is a vacant portion of a commercial building. One UST was removed in 1989 without SCDRM permit. In August 1997, SCDRM requested soil and groundwater sampling to evaluate impacts. Soil and groundwater samples contained petroleum hydrocarbons and BTEX. Groundwater flow direction at that time was estimated to be to be toward the southeast. A 1998 soil gas survey indicated low risk to building occupants.	This facility was granted a case closed status from the SCDRM in September 1998.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.

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TABLE 1
SUMMARY OF IDENTIFIED POTENTIAL HAZARDOUS WASTE FACILITIES AND RECOMMENDATIONS
I-80/I-680/SR-12 IMPROVEMENT PROJECT

Map ID No.	Facility	Address	APN	Impact to ROW and Acquisitions	Information Source(s)	Environmental Impacts/ Chemical of Concern	Regulatory Status	Potential Impact to I-80/I-680/SR-12 Improvement Project and Recommendations
15	**Former Terminal Stations, Inc.**	**100 Suisun Valley Road**		**Moderate Impact Alt B and C ESA**	**SCDRM Files LUST**	**Currently vacant land, formerly occupied by a truck refueling facility located immediately west of I-80 and north of the I-80/I-680 interchange. In 1984 a waste oil/diesel fuel discharge from the facility to an unnamed flood control channel was discovered adjacent and parallel to I-80. Impacted soil was excavated and surface water removed for offsite disposal. In 1987, USTs were operated at the property without a SCDRM permit A 1987 soil and groundwater investigation conducted along the perimeter of the facility included two soil boring locations within the Caltrans ROW adjacent to westbound I-80. Petroleum-impacted groundwater encountered in Caltrans ROW. In 1987, widespread onsite petroleum impacts to soil were identified. In 1988 USTs were removed under SCDRM permit. In 1993, the groundwater flow direction was toward the south (toward the I-80/I-680 interchange). Subsequent groundwater extraction was conducted and monitoring indicated decreasing contaminant levels in groundwater.**	**Based on the decreasing contaminant concentration trends in groundwater, use of the property and lack of sensitive receptors within 1,000 feet, the SCDRM concluded that the facility met the requirements for low-risk case closure. The SCDRM granted UST case closure on May 3, 2001.**	**This facility presents a moderate risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries. Exploratory borings should be performed within the Caltrans ROW adjacent to the property to evaluate potential impacts to soil and groundwater, worker health & safety, and soil disposal options related to former petroleum hydrocarbon releases from UST operations and past surface water discharges at the adjacent property.**
16	Vacant land (former Arco Station)	4510 Central Way		Low Impact Alt B and C ESA	SCDRM Files LUST	Currently vacant land (formerly occupied by an Arco service station prior to 1987) located east of the project ESA. In 1993, soil and groundwater samples contained petroleum hydrocarbons. Groundwater flow direction in 1993 was toward the southeast.	The SCDRM granted UST case closure in July 2001.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
17	Chevron Station	4490 Central Way		Low Impact Alt B and C ESA	Recon SCDRM Files LUST	An active service station located east of the ESA. USTs removed in 1987. Onsite soil and groundwater impacts identified. Groundwater monitoring wells installed and sampled through 1997 showed decreasing contaminant levels. Groundwater flow direction in 1997 was toward the southeast. Subsequent onsite investigations during property transaction identified additional contamination that was remediated in 2001. Site conditions were also remediated following the UST removal and clean-up through 2003.	SCDRM granted low risk UST case closure for the prior USTs in 1997 and additional case closures in March 2001 and April 2004.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
18	Shell Station	4450 Central Way		Low Impact Alt B and C ESA	Recon SCDRM Files LUST	Active service station located east of the project ESA. USTs removed 1986. Onsite impacts to soil and groundwater identified. Groundwater monitoring wells were installed and monitored. Soil excavation and groundwater over-pumping conducted. Groundwater flow direction in 1996 was toward the southwest. Final groundwater sampling reported no further impacts.	SCDRM granted UST case closure in April 1996.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries

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I-80/I-680/SR-12 IMPROVEMENT PROJECT

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19	**76 Station**	**134 Pittman Road**		**Moderate Impact Alt B and C ESA**	**Recon SCDRM Files LUST**	**Active service station located at the northeast corner of the Pittman Road/Suisun Valley Road entrance ramp to eastbound I-80. USTs removed in 1993 and impacted onsite soil and groundwater over-excavated and over-pumped for offsite disposal. Groundwater wells installed and monitored through 2001. Groundwater impacts indicated decreasing trends. Groundwater flow direction in 2001 was toward the west-southwest. Impacted groundwater has approached the property boundary at Pittman Road, south of the eastbound I-80 entrance ramp.**	**SCDRM granted low risk UST case closure on July 27, 2001.**	**This facility presents a moderate risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries. Exploratory borings should be performed in the Caltrans ROW at the Pittman Road/I-80 area prior to construction to evaluate soil and groundwater conditions, worker health & safety, and soil disposal and groundwater treatment options due to potential impacts from petroleum hydrocarbon releases at the adjacent property.**
20	Valero Station	4444 Central Place		Low Impact Alt B and C ESA	Recon UST SCDRM Files	An active service station located east of the project ESA. Gasoline and diesel UST were installed at the facility in 2001 when the station was built. No violations or unauthorized releases were noted in the SCDRM files.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
21	Arco Station	4449 Central Place		Low Impact Alt B and C ESA	Recon SCDRM Files LUST	An active service station located east of the project ESA. USTs upgraded at the facility in 1998. Petroleum impacted soil identified at that time was excavated and removed. SCDRM requested additional soil and groundwater sampling to further define impacted areas. In 1999, additional soil and groundwater samples indicated low petroleum impacts.	SCDRM granted UST case closure on June 11, 1999.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
22	Scandia Family Center	4300 Central Place		Low Impact Alt B and C ESA	Recon EDR	The facility is a miniature golf and arcade entertainment park located south of the project ESA. The EDR report listed a UST closed at the property on January 25, 2005. The facility was listed on the GeoTracker website as a registered UST facility, though not as a release site.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
23	**Former Old Fruit Bowl Mobil Station (Valine Ranch Property)**	**4000 Russell Road**		**Moderate Impact Alt B and C ESA**	**SCDRM Files LUST**	**The property is a former service station (operated from 1946 to 1972) located west of and adjacent to I-80 within the project ESA on land proposed for Caltrans acquisition. Five USTs removed in 2000 under observation by SCDRM. Onsite petroleum impacts to soil and groundwater identified. Impacted soil over-excavated for onsite remediation and groundwater over-pumped for offsite disposal. Residual petroleum impacted soil and groundwater remain onsite.**	**SCDRM granted case closure on June 11, 2008.**	**This facility presents a moderate risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries. Exploratory borings should be performed if partial or full parcel take is contemplated to evaluate soil and groundwater conditions, worker health & safety, and soil disposal and groundwater treatment options due to impacts from residual petroleum hydrocarbon releases at the property.**
24	Pacific Gas & Electric substation	South of the I-80/SR-12 East interchange		Low Impact Alt B and C and Options 1 and 2 ESA	Recon	Active PG&E electrical substation with fluid-cooled pad-mounted transformers. Possible polychlorinated biphenyl (PCB) compound impacts to soil at the facility.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
25	**Moore Tractor Company**	**4088 Russell Road**	**0027-510-040**	**Moderate Impact Alt B and C ESA**	**Recon Prior Phase I SCDRM Files**	**Currently a tractor sales and service facility located southwest of the I-80/SR-12 East interchange and within the project ESA on land proposed for Caltrans acquisition. SCDRM inspections indicated bulk automotive fluids stored at the property including diesel fuel (500-gallon AST), engine oil, and waste oil. A cement sump associated with a wash rack was also noted. Past SCDRM violations have included an overflowing sump, onsite automotive fluid spills, and improper drum storage.**	**No pending regulatory action or active violations are noted for this facility.**	**This facility presents a moderate risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries. Exploratory borings should be performed if partial or full parcel take is contemplated to evaluate potential impacts to soil and groundwater, worker health & safety, and soil disposal and groundwater treatment options related to past use of petroleum hydrocarbons and past operations at the property.**

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SUMMARY OF IDENTIFIED POTENTIAL HAZARDOUS WASTE FACILITIES AND RECOMMENDATIONS
I-80/I-680/SR-12 IMPROVEMENT PROJECT

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26	**Concrete Pipe Distributors**	**4974 Abernathy Road**	**0027-510-070**	**Moderate Impact Alt B and C ESA**	**Recon Prior Phase I**	**Currently a concrete pipe distributor located southwest of the I-80/SR-12 East interchange. A UST was reportedly removed in approximately 1985. No SCDRM information regarding the removal. 55-gallon drums from the adjacent Moore Tractor Co. were observed stored at the facility in 1994.**	**No pending regulatory action or active violations are noted for this facility.**	**This facility presents a moderate risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries. Exploratory borings should be performed if partial or full parcel take is contemplated to evaluate potential impacts to soil and groundwater, worker health & safety, and soil disposal and groundwater treatment options related to former UST operation and past conditions noted at the property.**
27	Ford of Fairfield	3050 Auto Mall Court		Low Impact Alt B and C and Options 1 and 2 ESA	Recon	Active automobile dealership with no reported releases.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
28	Chrysler dealer	2955 Auto Mall Parkway		Low Impact Alt B and C and Options 1 and 2 ESA	Recon	Active automobile dealership with no reported releases.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
29	Dodge dealer	2901 Auto Mall Parkway		Low Impact Alt B and C and Options 1 and 2 ESA	Recon	Active automobile dealership with no reported releases.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
30	Volvo dealer	2855 Auto Mall Parkway		Low Impact Alt B and C and Options 1 and 2 ESA	Recon	Active automobile dealership with no reported releases.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
31	Hyundai dealer	2775 Auto Mall Parkway		Low Impact Alt B and C and Options 1 and 2 ESA	Recon	Active automobile dealership with no reported releases.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
32	Toyota dealer	2595 Auto Mall Parkway		Low Impact Alt B and C and Options 1 and 2 ESA	Recon	Active automobile dealership with no reported releases.	No pending regulatory action or active violations are noted for this facility.	This facility presents a low risk of impacting the I-80/I-680/SR-12 West Alternatives B and C based on proposed construction area boundaries.
33	Canova Moving and Storage	1336 Woolner Avenue		Low Impact Options 1 and 2 ESA	LUST Geotracker	Currently an active moving and storage company located northwest of the project ESA. One UST removed in 1989 and petroleum-impacted soil and groundwater identified. Groundwater wells installed and impacted groundwater monitored. Groundwater concentrations decreased during the 1990s. Additional investigations have defined onsite areas on soil and groundwater impacts. Groundwater flows to the southeast, though impacted groundwater does not extend south beyond Woolner Avenue.	On-going groundwater monitoring required by SCDRM.	This facility presents a low risk of impacting the SR-12 East Options 1 and 2 based on proposed construction area boundaries.
34	Suisun Fire District	445 Jackson Street		Low Impact Options 1 and 2 ESA	LUST SCDRM Files	An active district fire station located north of the project ESA. One UST removed in 1992. The tank pit was over-excavated and soil samples contained low petroleum impacts. Onsite groundwater wells were installed and monitored. Final sampling showed no petroleum impacts to groundwater.	SCDRM granted UST case closure on July 18, 1997.	This facility presents a low risk of impacting the SR-12 East Options 1 and 2 based on proposed construction area boundaries.

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I-80/I-680/SR-12 IMPROVEMENT PROJECT

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35	**Former Sheldon Oil Co.**	**426 Main Street**		**Moderate Impact Option 1 ESA**	**LUST Sanborn Maps SCDRM Files**	**A former bulk petroleum storage facility located at the north end of the Suisun Channel, northeast of a portion of the project ESA (Option 1 SR-12 East Concept). The property has been redeveloped to support a commercial office building (One Harbor Plaza), associated parking lot, and harbor waterfront walkways. The former Sheldon Oil Company was depicted in 1945 and 1954 Sanborn Maps. The facility stored bulk quantities of diesel fuel No. 2, asphalt emulsion, heating fuel Nos. 4, 5, 6, and used motor oil. Onsite soil impacted by petroleum hydrocarbons to a minimum depth of 9 ft. Onsite groundwater also impacted. Impacted areas extend to the Suisun Channel. Additional information regarding investigations and clean-up at the property were not available in SCDRM files.**	**SCDRM granted case closure to the facility on October 18, 1995.**	**This facility presents a moderate risk of impacting the SR-12 East Option 1 based on proposed construction area boundaries. Exploratory borings should be performed prior to roadway construction in areas near Main Street in Suisun City to evaluate potential impacts to soil and groundwater, worker health & safety, and soil disposal and groundwater treatment options related to residual impacts related to former UST operations and other onsite chemical handling operations at the adjacent property.**
36	**Former Sheldon Oil Co.**	**526 School Street**		**Moderate Impact Option 1 ESA**	**LUST SCDRM Files**	**Currently a vacant lot (formerly used by the Sheldon Oil Co. as a truck washing/cleaning facility from the mid-1940s to 1993) located west of the Suisun Channel, at or adjacent to a portion of the project ESA (Option 1 SR-12 East Concept). Operations as the facility included the use of trichloroethylene (TCE) to clean truck tanks. Onsite TCE discharges reported and onsite soil and onsite/offsite groundwater impacted by petroleum hydrocarbons and VOCs identified. VOC-impacted groundwater has migrated offsite to the northeast. Impacted soil excavated and groundwater over-pumped for offsite disposal in 2006. Groundwater monitoring on-going.**	**On-going groundwater monitoring required by SCDRM.**	**This facility presents a moderate risk of impacting the SR-12 East Option 1 based on proposed construction area boundaries. Exploratory borings should be performed if partial or full parcel take is contemplated or if road construction is planned near the property to evaluate potential impacts to soil and groundwater, worker health & safety, and soil disposal and groundwater treatment options related to former onsite chemical handling operations.**
37	Former Texaco Station	522 Main Street		Low Impact Option 1 ESA	LUST SCDRM Files	Currently a municipal parking lot (formerly occupied by a service station) located east of the project ESA (Option 1 SR-12 East Concept). USTs removed prior to 1991. Petroleum-impacted soil and groundwater identified and impacted soil excavated for offsite disposal. Following excavation, soil and groundwater impacts had decreased.	SCDRM granted closure UST case closure on April 14, 1997.	This facility presents a low risk of impacting the SR-12 East Option 1 based on proposed construction area boundaries.
38	Union Pacific Railroad/705 West Street	705 West Street		Low Impact Option 1 ESA	LUST SCDRM Files	Currently a commercial facility located southeast of the project ESA (Option 1 SR-12 East Concept). Two USTs removed in 1998. Soil and groundwater petroleum impacts identified. Shallow groundwater at the property was designated as brackish and tidally influenced and not of domestic beneficial use. Due to these conditions, additional groundwater monitoring was not required.	SCDRM granted UST case closure on July 15, 1999.	This facility presents a low risk of impacting the SR-12 East Option 1 based on proposed construction area boundaries.
NA	**Kinder Morgan Petroleum Pipelines**	**Adjacent to I-680 (Fairfield) and Union Pacific Railroad tracks (Suisun City)**	**NA**	**Existing I-80/I-680/ SR-12 West and East ROW**	**Recon**	**Planned excavation and grading in the vicinity of existing petroleum pipelines. Potential petroleum hydrocarbons resulting from pipeline operations.**	**NA**	**Perform soil and groundwater sampling for petroleum hydrocarbons based on proposed construction practices along the I-680 corridor in Fairfield and UPRR track crossing in Suisun City to evaluate potential impacts to soil and groundwater, worker health & safety, and soil disposal and groundwater treatment options related to petroleum pipeline operations.**
NA	**I-80/I-680/SR-12 West and East Bridge Structures**	**Various Locations**	**NA**	**Existing I-80/I-680/ SR-12 West and East ROW**	**Recon**	**Existing bridge structures to be renovated, or removed.**	**NA**	**Asbestos and lead-containing paint surveys should be conducted at the bridge structures prior to any planned renovation or demolition to evaluate worker health & safety, abatement and waste disposal options and comply with applicable regulations, including Bay Area Air Quality Management District requirements.**
NA	**I-80/I-680/SR-12 West and East**	**ROW Acquisition**	**NA**	**New ROW**	**Recon**	**Properties with current or historical agricultural land use may contain residual agricultural chemicals in shallow soil.**	**NA**	**Conduct soil investigations for pesticides, herbicides, and metals as applicable on land proposed for full or partial acquisition based on past agricultural land usage to evaluate soil reuse or disposal options.**

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NA	**I-80/I-680/SR-12 West and East**	**ROW Acquisition**	**NA**	**New ROW**	**Recon**	**Existing structures within the project ESA and on parcel takes requiring demolition.**	**NA**	**Asbestos and lead-containing paint surveys should be conducted prior to any planned renovation or demolition of buildings either within the Caltrans ROW or on properties proposed for full or partial takes to evaluate worker health & safety, abatement and waste disposal options and comply with applicable regulations, including Bay Area Air Quality Management District requirements.**
NA	**I-80/I-680/SR-12 West and East**	**Union Pacific Railroad Bridge and Crossing**	**NA**	**Existing I-80/I-680/ SR-12 West and East ROW**	**Recon**	**Planned excavation and grading within existing ROW and potential railroad crossing in SR-12 East Option 1. Potential metals, herbicides, petroleum hydrocarbons, and PAHs resulting from past railroad operations.**	**NA**	**Perform soil and groundwater sampling for metals, herbicides, petroleum hydrocarbons, and PAHs as applicable based on proposed construction practices at UPRR Bridge near I-80/SR-12 West interchange and UPRR track crossing in Suisun City to evaluate potential impacts to soil and groundwater, worker health & safety, and soil disposal and groundwater treatment options related to past railroad operations.**
NA	**I-80/I-680/SR-12 West and East**	**Existing Corridors**	**NA**	**Existing I-80/I-680/ SR-12 West and East ROW**	**Recon Prior Nearby ADL Study**	**Planned excavation and grading within existing ROW**	**NA**	**Perform shallow soil sampling to evaluate potential ADL in soil for worker health & safety and soil disposal options related to historical automobile exhaust emissions.**
NA	**I-80/I-680/SR-12 West and East**	**Existing Corridors**	**NA**	**Existing I-80/I-680/ SR-12 West and East ROW**	**Recon**	**Planned excavation and pavement work within existing ROW**	**NA**	**Further evaluate potential hazardous waste issues or provide construction special provisions for thermoplastic traffic paint, asbestos pipe, bridge rail post sulfur and proper abandonment of wells, septic systems, and encountered unidentified USTs.**

Properties and locations listed in **BOLD** print have a moderate risk of impacting the project ESA and are recommended for further evaluation.

Notes: ESA – Environmental Study Area
UST – Underground Storage Tank
AST – Aboveground Storage Tank
UPRR– Union Pacific Rail Road
BTEX – Benzene, Toluene, Ethylbenzene, and Total Xylenes
NA – Not Applicable
EDR – Environmental Data Resources database
SFBRWQCB – San Francisco Bay Regional Water Quality Control Board
LUST – Leaking UST
PAHs – Polynuclear Aromatic Hydrocarbons
TPHg – Total Petroleum Hydrocarbons as Gasoline
TPHd – Total Petroleum Hydrocarbons as Diesel
SCDRM – Solano County Department of Resource Management
ROW – Right-of-way
ADL – Aerially Deposited Lead

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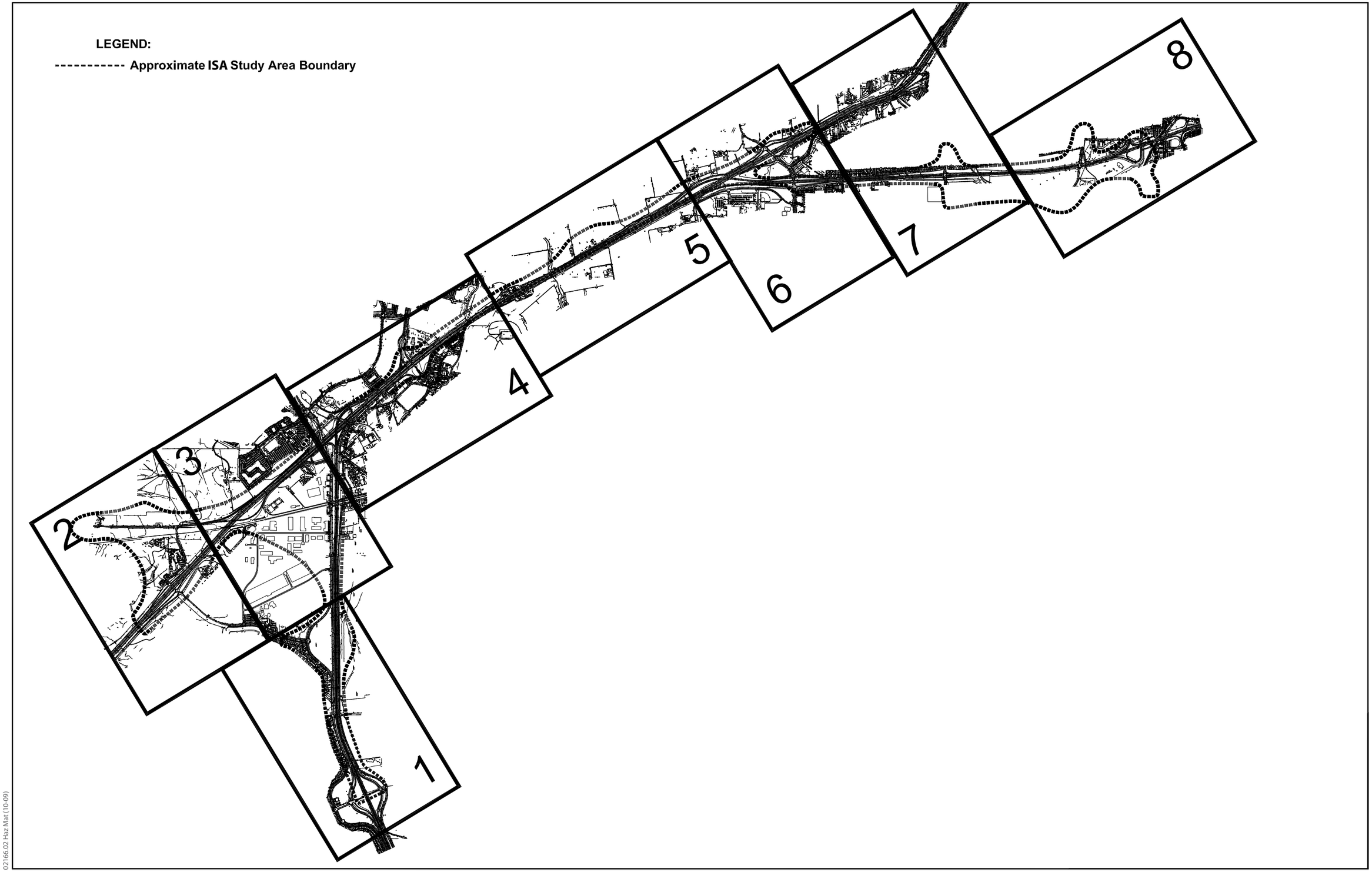

Figure 3.2.5-1
Potential Hazardous Facility Locations

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02166.02 Haz Mat (10-09)

Figure 3.2.5-2
Potential Hazardous Facility Locations

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02166.02 Haz Mat (10-09)

Figure 3.2.5-3
Potential Hazardous Facility Locations

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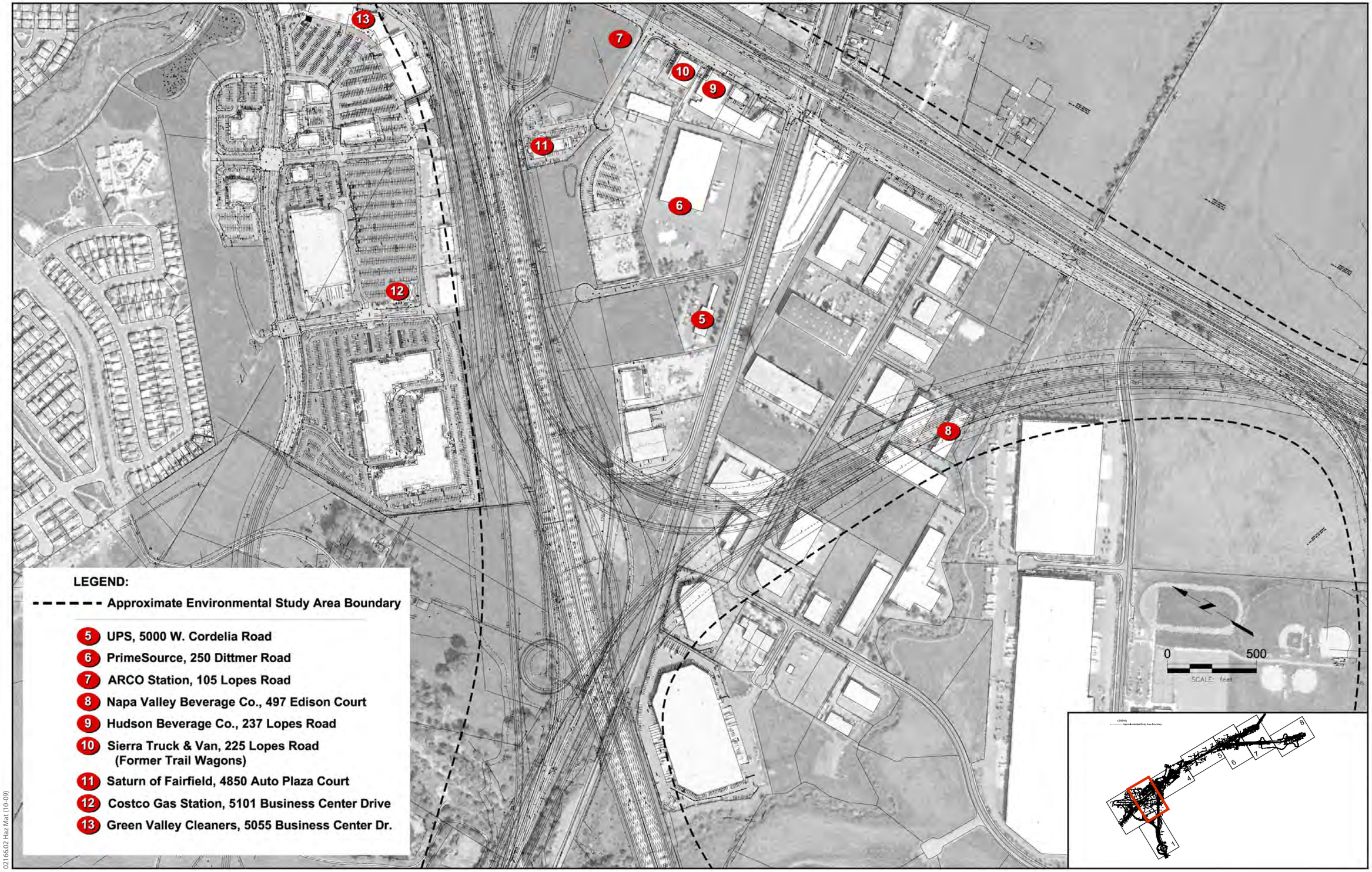

02166.02 Haz Mat (10-09)

Figure 3.2.5-4
Potential Hazardous Facility Locations

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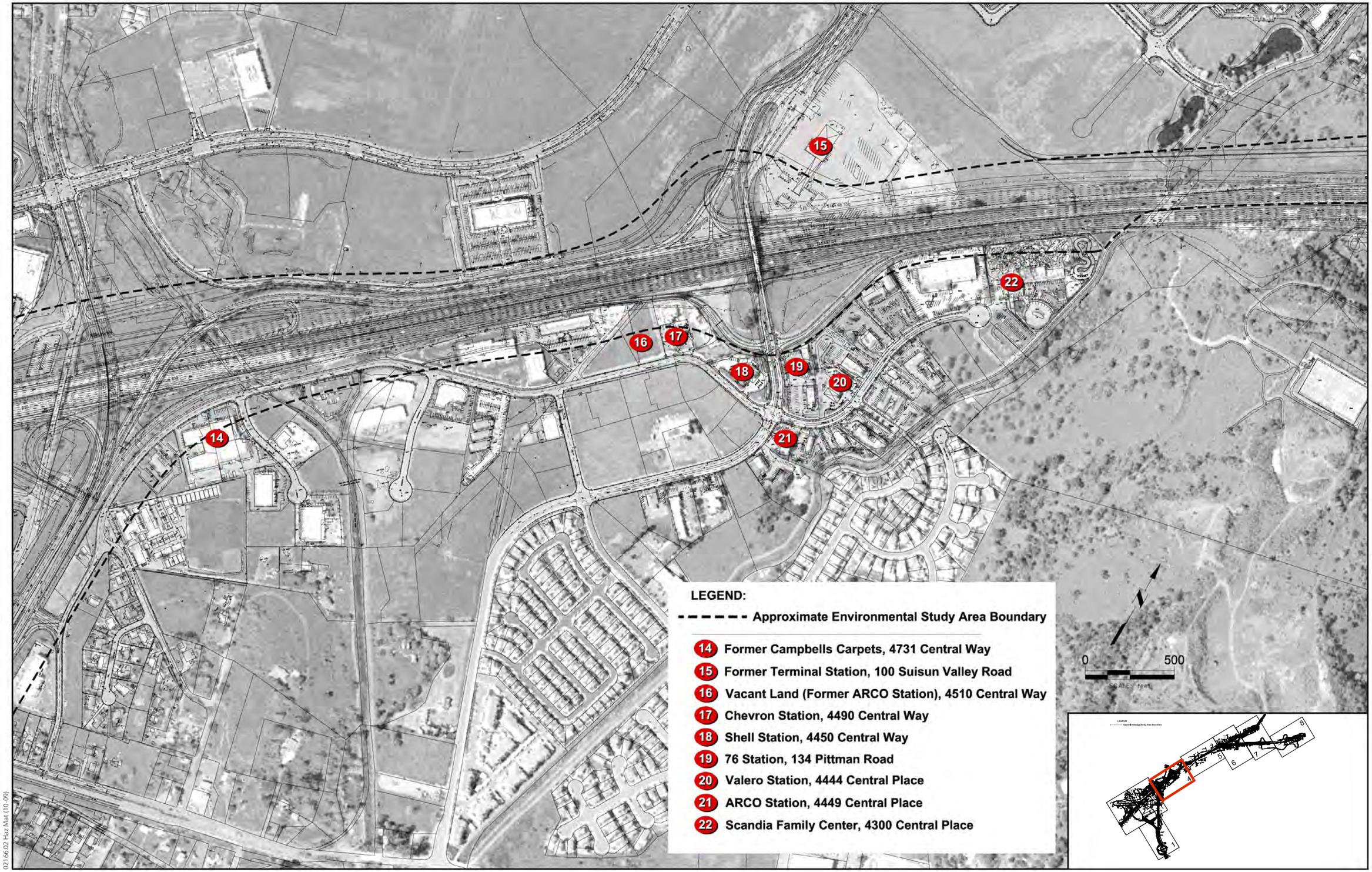

02166.02 Haz Mat (10-09)

Figure 3.2.5-5
Potential Hazardous Facility Locations

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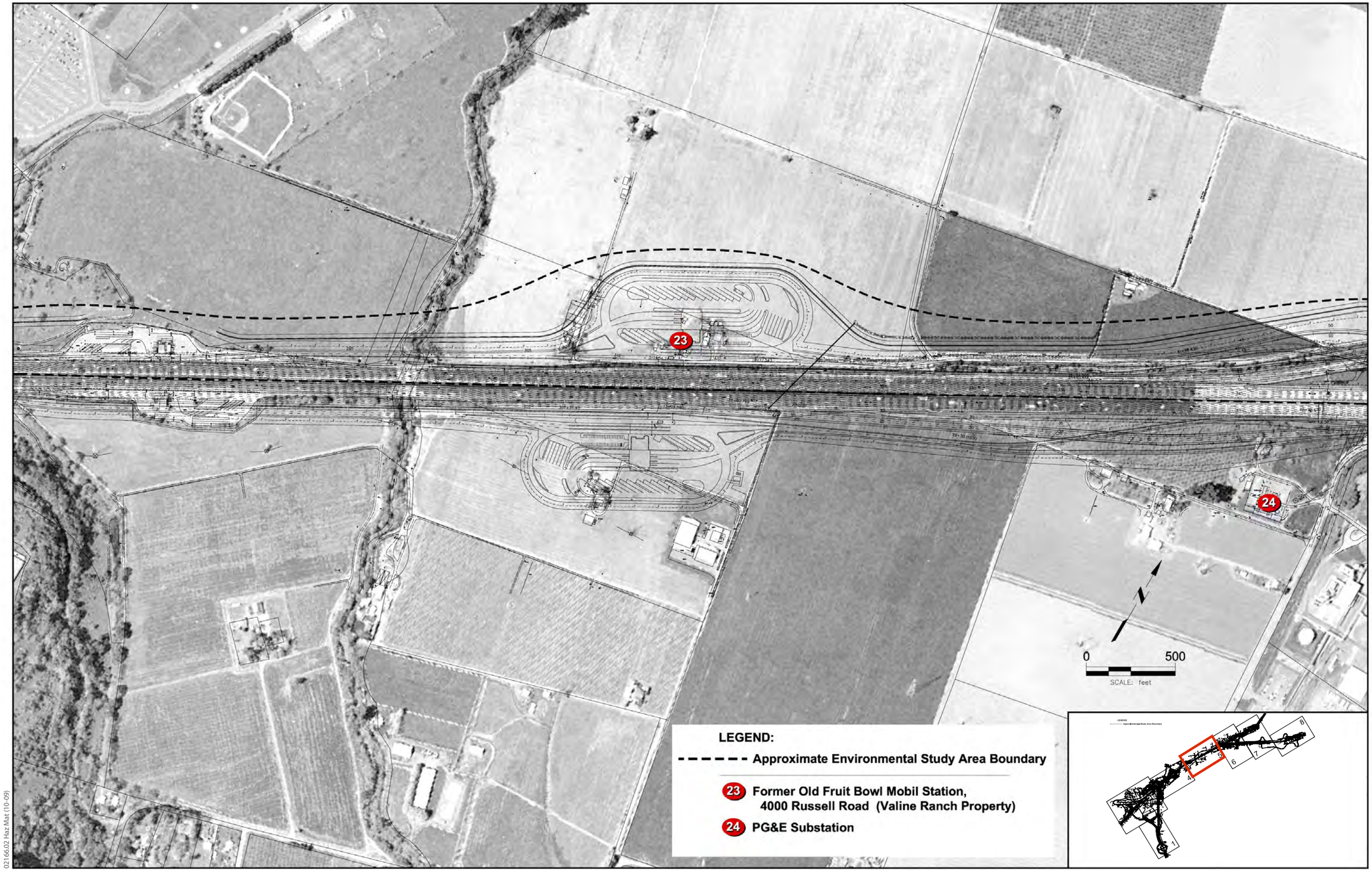

02166.02 Haz Mat (10-09)

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Potential Hazardous Facility Locations

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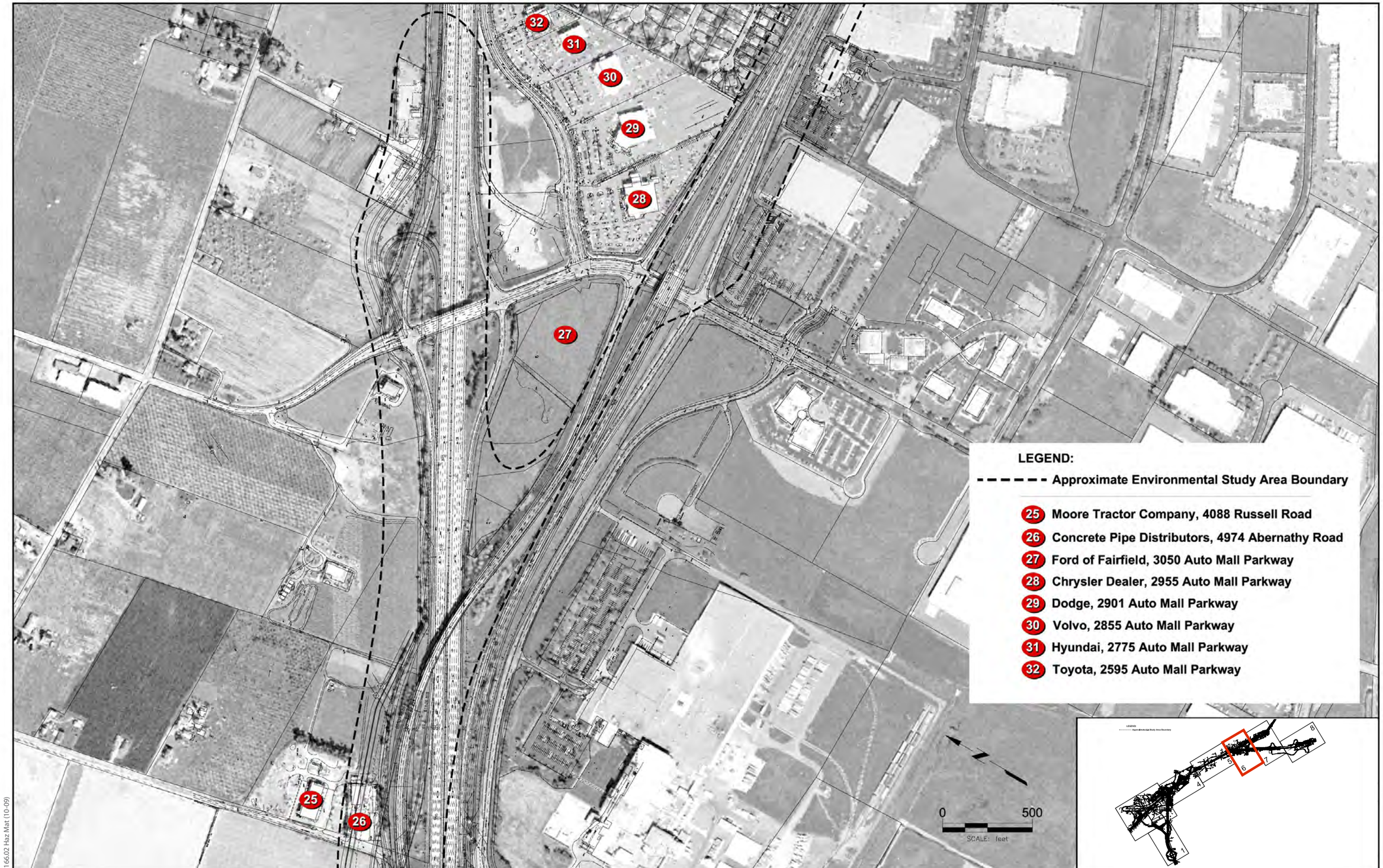

Figure 3.2.5-7
Potential Hazardous Facility Locations

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02166.02 Haz Mat (10-09)

Figure 3.2.5-8
Potential Hazardous Facility Locations

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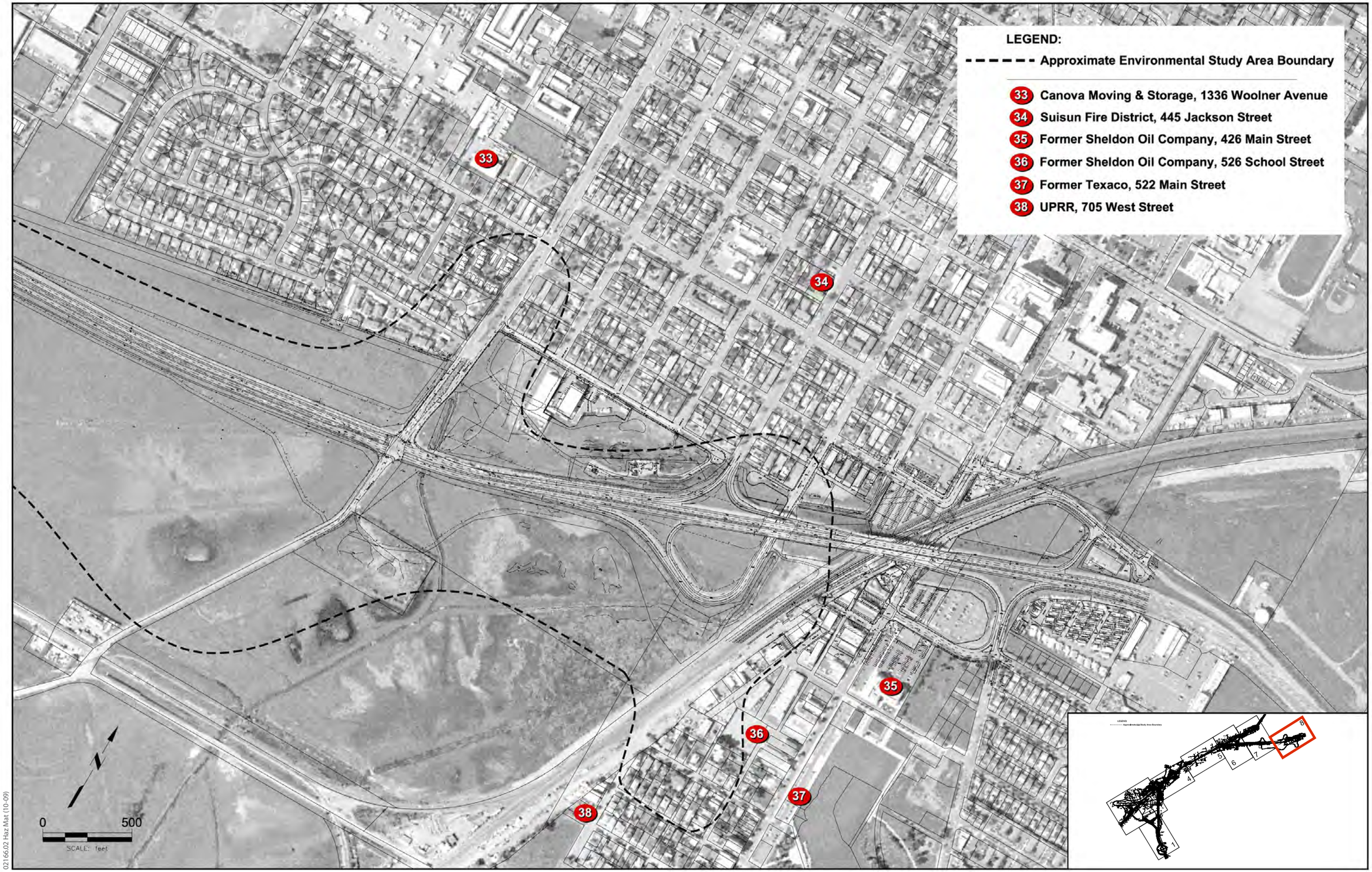

Figure 3.2.5-9
Potential Hazardous Facility Locations

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3.2.6 Air Quality

Regulatory Setting

The Federal Clean Air Act (FCAA) as amended in 1990 is the federal law that governs air quality. The California Clean Air Act of 1988 is its companion state law. These laws, and related regulations by the U.S. Environmental Protection Agency (U.S. EPA) and California Air Resources Board (ARB), set standards for the quantity of pollutants that can be in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS and State ambient air quality standards have been established for six transportation-related criteria pollutants that have been linked to potential health concerns. The criteria pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM, broken down for regulatory purposes into particles of 10 micrometers or smaller – PM10 and particles of 2.5 micrometers and smaller – PM2.5), lead (Pb), and sulfur dioxide (SO_2). In addition, State standards exist for visibility reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride. The NAAQS and State standards are set at a level that protects public health with a margin of safety, and are subject to periodic review and revision. Both State and Federal regulatory schemes also cover toxic air contaminants (air toxics). Some criteria pollutants are also air toxics or may include certain air toxics within their general definition.

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

FCAA Section 176(c) prohibits the U.S. Department of Transportation and other federal agencies from funding, authorizing, or approving plans, programs, or projects that are not first found to conform to State Implementation Plan (SIP) for achieving the goals of Clean Air Act requirements related to the NAAQS. "Transportation Conformity" Act takes place on two levels: the regional, or planning and programming, level, and the project level. The proposed project must conform at both levels to be approved. Conformity requirements apply only in nonattainment and "maintenance" (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. U.S. EPA regulations at 40 CFR 93 govern the conformity process.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the standards set for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and particulate matter (PM10 and PM2.5), and in some areas sulfer dioxide (SO_2). California is nonattainment or maintenance areas for all of these transportation-related "criteria pollutants" except SO_2, and also has a nonattainment area for lead. However, lead is not currently required by the FCAA to be covered in transportation conformity analysis. Regional conformity is based on Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) that include all of the transportation projects planned for a region over a period of at least 20 years for the RTP and 4 years for the FTIP. RTP and FTIP conformity is based on use of travel demand and air quality models to determine whether or not implementation of those projects would conform to emission budgets or other tests showing that

requirements of the Clean Air Act and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO) and the Federal Highway Administration (FHWA), make determinations that the RTP and FTIP are in conformity with the SIP for achieving the goals of the Clean Air Act. Otherwise, the projects in the RTP and/or the FTIP must be modified until conformity is attained. If the design concept, scope, and open to traffic schedule of a proposed transportation project are the same as described in the RTP and the FTIP, then the proposed project is deemed to meet regional conformity requirements for purposes of project-level analysis.

Conformity at the project-level also requires "hot spot" analysis if an area is "nonattainment" or "maintenance" for carbon monoxide (CO) and/or particulate matter (PM10 and PM2.5). A region is "nonattainment" if one or more monitoring stations in the region measures violation of the relevant standard, and U.S. EPA officially designates the area nonattainment. Areas that were previously designated as nonattainment areas but subsequently meet the standard may be officially redesignated to attainment by the U.S. EPA, and are then called "maintenance" areas. "Hot spot" analysis is essentially the same, for technical purposes, as CO or particulate matter analysis performed for NEPA purposes. Conformity does include some specific procedural and documentation standards for projects that require a hot spot analysis. In general, projects must not cause the "hot-spot"-related standard to be violated, and must not cause any increase in the number and severity of violations in nonattainment areas. If a known CO or particulate matter violation is located in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

Affected Environment

This discussion is based primarily on the *Interstate 80/Interstate 680/State Route 12 Interchange Project Air Quality Study Report* (Air Quality Study Report) and the *Traffic Operations Report for the I-80/I-680/SR 12 Interchange Project* (FTOR) prepared in 2012.

Ambient air quality is affected by climatological conditions, topography, and the types and amounts of pollutants emitted. The following discussion describes the relevant characteristics of the air basin and offers an overview of conditions affecting pollutant ambient air concentrations in the basin.

The project alternatives lie within the Carquinez Strait region of the San Francisco Bay Area Air Basin (SFBAAB). The Carquinez Strait is the only sea-level gap between the San Francisco Bay and the Central Valley. Within the region, the prevailing winds are from the west. During the summer and fall months, high offshore pressure systems and low pressure in the Central Valley force marine air to flow eastward through the Carquinez Strait. Figure 3.2.6-1 indicates the predominant wind direction in the region based on meteorological data from Travis Air Force Base (California Air Resources Board 2009). However, atmospheric conditions occasionally cause the winds to shift direction and flow from the east. These easterly winds usually contain more pollutants from the Sacramento and San Joaquin Valleys in the east than the cleaner marine air from the west. During summer and fall months, this condition can result in elevated pollutant levels as pollutants move through the strait into the central Bay Area from surrounding areas.

The high-pressure periods during the summer and fall months often are accompanied by low wind speeds, shallow mixing depths, higher temperatures, and little or no rainfall. During the summer, mean maximum temperatures reach about 32.2° C (90° F), while mean minimum temperatures in the winter are typically 1.6°–4.4º C (35°–40° F). In distant areas like Fairfield, where the region is sheltered from the moderating effects of the strait, temperature extremes are especially pronounced.

Attainment Status

The EPA has classified the portion of Solano County within the San Francisco Bay Area Air Basin as being a marginal nonattainment area for 8-hour ozone NAAQS. For CO NAAQS, the EPA has classified urban areas of the county as a moderate maintenance area (≤ 12.7 ppm) and the rest of the county as an unclassified/attainment area (U.S. Environmental Protection Agency 2012a). For PM10 NAAQS the EPA has designated the county as an unclassified/attainment area. This information is presented in Table 3.2.6-1.

The 24-hour PM2.5 standard was lowered from 65 µg/m^3 to 35 µg/m^3 in 2006, and the EPA issued their final attainment status designations for the 35 µg/m^3 standard on October 8, 2009. The county is now designated as a non-attainment area for 24-hour PM2.5 NAAQS (U.S. Environmental Protection Agency 2012a).

For ozone CAAQS, CARB has classified the county as being a serious nonattainment area, and for CO CAAQS CARB has classified the county as an attainment area .For PM10 and PM2.5 CAAQS, CARB has classified the county as a nonattainment area (California Air Resources Board 2012a). Solano County's attainment status for each of these pollutants relative to the NAAQS and CAAQS is summarized in Table 3.2.6-1.

Table 3.2.6-1. Federal and State Ambient Air Quality Standards

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria		Attainment Status of Solano County	
			California	National	California	National	California	National	California	National
Ozone	O_3	1 hour	0.09	N/A	180	N/A	If exceeded	N/A	Serious non-attainment	N/A
		8 hours	0.070	0.075	137	147	If exceeded	If fourth highest 8-hour concentration in a year, averaged over 3 years, is exceeded at each monitor within an area	Non-attainment	Marginal non-attainment
Carbon monoxide	CO	8 hours	9.0	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year	Attainment	Moderate (≤ 12.7 ppm) maintenance
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year	Attainment	Unclassified/ attainment
(Lake Tahoe only)		8 hours	6	N/A	7,000	N/A	If equaled or exceeded	N/A	N/A	N/A
Nitrogen dioxide	NO_2	Annual arithmetic mean	0.030	0.053	57	100	If exceeded	If exceeded on more than 1 day per year	N/A	Attainment
		1 hour	0.18	0.100	339	N/A	If exceeded	N/A	Attainment	N/A
Sulfur dioxide	SO_2	Annual arithmetic mean	NA	0.030	NA	80	NA	If exceeded	N/A	Attainment
		24 hours	0.04	0.14	105	365	If exceeded	If exceeded on more than 1 day per year	Attainment	Attainment
		1 hour	0.25	0.075	655	196	If exceeded	N/A	Attainment	N/A
		Annual mean	N/A	0.030	N/A	N/A	If exceeded	If exceeded	N/A	Attainment
Hydrogen sulfide	H_2S	1 hour	0.03	N/A	42	N/A	If equaled or exceeded	N/A	Unclassified	N/A
Vinyl chloride	C_2H_3Cl	24 hours	0.01	N/A	26	N/A	If equaled or exceeded	N/A	No designation	N/A
Inhalable particulate matter	PM10	Annual arithmetic mean	N/A	N/A	20	N/A	If exceeded	If exceeded at each monitor within area	Non-attainment	N/A
		24 hours	N/A	N/A	50	150	If exceeded	If exceeded on more than 1 day per year	Non-attainment	Unclassified/ attainment
	PM2.5	Annual arithmetic mean	N/A	N/A	12	15	If exceeded	If 3-year average from single or multiple community-oriented monitors is exceeded	Non-attainment	Attainment
		24 hours	N/A	N/A	N/A	35	NA	If 3-year average of 98th percentile at each population-oriented monitor within an area is exceeded	N/A	Non-attainment
Sulfate particles	SO_4	24 hours	N/A	N/A	25	N/A	If equaled or exceeded	NA	Attainment	N/A
Lead particles	Pb	Calendar quarter	N/A	N/A	N/A	1.5	NA	If exceeded no more than 1 day per year	N/A	Attainment
		30-day average	N/A	N/A	1.5	N/A	If equaled or exceeded	N/A	Attainment	N/A
		Rolling 3-month average	N/A	N/A	N/A	0.15	If equaled or exceeded	Averaged over a rolling 3-month period	N/A	Attainment

Source: California Air Resources Board 2012a and 2012b; U.S. Environmental Protection Agency 2012a.
Notes: All standards are based on measurements at 25ºC and 1 atmosphere pressure; national standards shown are the primary (health effects) standards; N/A = not applicable.

Sensitive Receptors

The Bay Area Air Quality Management District (BAAQMD) generally defines a sensitive receptor as a facility or land use that houses or attracts members of the population, such as children, the elderly, and people with illnesses, who are particularly sensitive to the effects of air pollutants.

Sensitive receptors normally refer to land uses with heightened sensitivity to localized rather than regional pollutants. Examples include emissions of criteria or toxic air pollutants (PM10 and PM2.5) that have health effects and, to a lesser extent, odors or odorous compounds such as ammonia and sulfur dioxide. Sensitive receptors would not be directly affected by emissions of regional pollutants such as ozone precursors (ROG and NO_X). Various sensitive receptors are located in the vicinity of the project area (Figure 3.2.6-2) and may include: residences, schools, playgrounds, child care facilities, athletic facilities, health care facilities, convalescent centers, or rehabilitation centers. Land use compatibility issues relative to the siting of pollution-emitting sources or the siting of sensitive receptors must be considered. In the case of schools, state law requires that siting decisions consider the potential for toxic or harmful air emissions in the surrounding area.

Figure 3.2.6-2 summarizes the general locations of sensitive receptors in the project area. Figure 3.2.6-2 does not include the locations of scattered or individual sensitive receptors. Land use compatibility issues relative to the siting of pollution-emitting sources or the siting of sensitive receptors must be considered. In the case of schools, state law requires that siting decisions consider the potential for toxic or harmful air emissions in the surrounding area.

Existing Air Quality Conditions

Existing air quality conditions in the project area can be characterized in terms of the ambient air quality standards that the federal and state governments have established for various pollutants (Table 3.2.6-1) and by monitoring data collected in the region. Monitoring data concentrations are typically expressed in terms of ppm or $\mu g/m^3$. The nearest air quality monitoring station in the vicinity of the project area is located in Fairfield at Chadbourne Road; this station monitors for ozone. The closest monitoring station that monitors for carbon monoxide and particulate matter is located in the City of Vallejo at Tuolumne Street. Table 3.2.6-2 summarizes air quality monitoring data from the Fairfield and Vallejo monitoring stations during the last five years for which complete data are available (2007–2011).

Table 3.2.6-2 indicates that the Fairfield monitoring station has exceeded the state 1-hour ozone standard during three of the five reported years and the state and national 8-hour standards during all but one of the reported years. The Vallejo monitoring station has experienced similar conditions, exceeding the state 1-hour ozone standard during three of the five reported years and the state 8-hour standard during three years, while the national 8-hour ozone standard was only exceeded once in 2010. The Vallejo station has exceeded the state PM10 standard and federal PM2.5 standard during the 5-year monitoring period, while no violations of the state or federal CO standards has occurred at these monitoring stations during this 5-year monitoring period. In general, the number of NAAQS and CAAQS violations at both air quality monitoring stations has remained relatively constant or declined over the reporting period. This is consistent with long-term trends presented in the Environmental Impact Report for the 2035 RTP, which

demonstrate that the number of days the region experiences unhealthy air quality conditions is falling due to ARB and BAAQMD regulations.

Carbon Monoxide

The project alternatives are located in a moderate (≤ 12.7 ppm) maintenance area with regards to the federal CO standard. Consequently, the evaluation of transportation conformity for CO is required. The CO transportation conformity analysis is based on the CO Protocol developed for the Department by the Institute of Transportation Studies at the University of California, Davis (Garza et al. 1997). This CO protocol details a qualitative step-by-step procedure to determine whether project-related CO concentrations have a potential to generate new air quality violations, worsen existing violations, or delay attainment of NAAQS for CO.

Particulate Matter

As previously indicated, Solano County was designated by the EPA as an unclassified/attainment area for 24-hour PM2.5 NAAQS. However, the 24-hour PM2.5 standard was lowered from 65µg/m^3 to 35 µg/m^3 in 2006, and the EPA designated the Bay Area as a nonattainment area. While the county is currently designated as a nonattainment area for 24-hour PM2.5 NAAQS, the county is designated as an attainment area for annual PM2.5 NAAQS. While conformity does not yet apply for PM2.5 (the effective date is December 14, 2010), a preliminary PM2.5 hot spot analysis in accordance with the EPA's 2006 guidance has been conducted to show that the proposed project would conform when the conformity requirements apply.

On March 10, 2006, the EPA published a final rule that establishes the transportation conformity criteria and procedures for determining which transportation projects must be analyzed for local air quality impacts in PM2.5 and PM10 nonattainment and maintenance areas. The final rule requires PM hot spot analyses to be performed for Projects of Air Quality Concern (POAQC) or any other project identified by the PM10 and/or PM2.5 SIP(s) as a localized air quality concern. In March 2006, the FHWA and EPA issued a guidance document titled *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (Federal Highway Administration and U.S. Environmental Protection Agency 2006). The PM10 hot spot analysis is not required for project-level conformity because the area is in attainment or unclassified for the national PM10 standards. For the assessment of PM10 hot spots, the final rule is that a hot spot analysis is to be performed only for POAQCs. POAQCs are certain highway and transit projects that involve significant levels of diesel traffic or any other project identified in the PM2.5 or PM10 SIP as a localized air quality concern.

For projects identified as not being a POAQC, qualitative PM2.5 and PM10 (for regions without an approved conformity SIP) hot spot analyses are not required. For these types of projects, state and local project sponsors should briefly document in their project-level conformity determinations that CAA and 40 CFR 93.116 requirements were met without a hot spot analysis because such projects have been found to not be of air quality concern under 40 CFR 93.123(b)(1). Because this analysis assumes the area is classified as a nonattainment area for the federal PM2.5 standard, a determination must be made as to whether it would result in a PM2.5 hot spot.

Table 3.2.6-2. Ambient Air Quality Monitoring Data Measured at the Fairfield at Chadbourne Road and of Vallejo at Tuolumne Street Monitoring Stations

Pollutant Standards	Fairfield					Vallejo				
	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
1-Hour Ozone										
Maximum 1-hour concentration (ppm)	0.089	0.116	0.104	0.103	0.094	0.078	0.109	0.104	0.091	0.090
1-hour California designation value	0.10	0.10	0.10	0.10	0.10	0.08	0.08	0.09	0.09	0.09
1-hour expected peak day concentration	0.100	0.103	0.102	0.103	0.102	0.077	0.083	0.087	0.094	0.090
Number of days standard exceeded[a]										
CAAQS 1-hour (>0.09 ppm)	0	2	2	1	0	0	1	2	0	0
8-Hour Ozone										
National maximum 8-hour concentration (ppm)	0.067	0.090	0.085	0.081	0.076	0.066	0.075	0.073	0.080	0.069
National second-highest 8-hour concentration (ppm)	0.067	0.071	0.083	0.081	0.074	0.056	0.072	0.070	0.073	0.064
State maximum 8-hour concentration (ppm)	0.068	0.090	0.085	0.081	0.076	0.067	0.075	0.074	0.081	0.070
State second-highest 8-hour concentration (ppm)	0.067	0.071	0.084	0.081	0.074	0.056	0.073	0.070	0.073	0.065
8-hour national designation value	0.066	0.068	0.067	0.069	0.069	0.054	0.060	0.061	0.063	0.061
8-hour California designation value	0.077	0.077	0.085	0.085	0.085	0.061	0.067	0.070	0.073	0.067
8-hour expected peak day concentration	0.080	0.083	0.085	0.088	0.087	0.061	0.067	0.070	0.073	0.069
Number of days standard exceeded[a]										
NAAQS 8-hour (>0.075 ppm)	0	1	2	2	1	0	0	0	1	0
CAAQS 8-hour (>0.070 ppm)	0	2	5	3	3	0	3	1	2	0
Carbon Monoxide (CO)										
National[b] maximum 8-hour concentration (ppm)	–	–	–	–	–	2.70	1.91	2.23	1.94	2.41
National[b] second-highest 8-hour concentration (ppm)	–	–	–	–	–	2.60	1.96	2.23	1.85	2.41
California[c] maximum 8-hour concentration (ppm)	–	–	–	–	–	2.70	2.31	2.23	1.94	2.41
California[c] second-highest 8-hour concentration (ppm)	–	–	–	–	–	2.60	1.96	2.23	1.85	2.41
Maximum 1-hour concentration (ppm)	–	–	–	–	–	3.3	2.7	2.8	2.9	3.0
Second-highest 1-hour concentration (ppm)	–	–	–	–	–	3.3	2.5	2.8	2.6	2.9
Number of days standard exceeded[a]										
NAAQS 8-hour (≥9 ppm)	–	–	–	–	–	0	0	0	0	0
CAAQS 8-hour (≥9.0 ppm)	–	–	–	–	–	0	0	0	0	0
NAAQS 1-hour (≥35 ppm)	–	–	–	–	–	0	0	0	0	0
CAAQS 1-hour (≥20 ppm)	–	–	–	–	–	0	0	0	0	0

Pollutant Standards	Fairfield					Vallejo				
	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
Particulate Matter (PM10)[d]										
National[b] maximum 24-hour concentration (μg/m^3)	–	–	–	–	–	49.1	42.1	–	–	–
National[b] second-highest 24-hour concentration (μg/m^3)	–	–	–	–	–	47.3	31.4	–	–	–
State[c] maximum 24-hour concentration (μg/m^3)	–	–	–	–	–	52.4	43.6	–	–	–
State[c] second-highest 24-hour concentration (μg/m^3)	–	–	–	–	–	51.1	32.4	–	–	–
State annual average concentration (μg/m^3)[e]	–	–	–	–	–	19.0	–	–	–	–
National annual average concentration (μg/m^3)	–	–	–	–	–	18.2	16.0	–	–	–
Number of days standard exceeded[a]										
NAAQS 24-hour (>150 μg/m^3)[f]	–	–	–	–	–	0.0	–	–	–	–
CAAQS 24-hour (>50 μg/m^3)[f]	–	–	–	–	–	12.6	–	–	–	–
Particulate Matter (PM2.5)										
National[b] maximum 24-hour concentration (μg/m^3)	–	–	–	–	–	40.8	41.8	38.9	29.5	30.6
National[b] second-highest 24-hour concentration (μg/m^3)	–	–	–	–	–	40.0	31.0	38.6	27.7	24.2
State[c] maximum 24-hour concentration (μg/m^3)	–	–	–	–	–	41.5	51.2	38.9	29.5	30.6
State[c] second-highest 24-hour concentration (μg/m^3)	–	–	–	–	–	41.3	47.5	38.6	27.7	24.2
National annual designation value (μg/m^3)	–	–	–	–	–	9.8	–	9.8	9.1	–
National annual average concentration (μg/m^3)	–	–	–	–	–	9.8	–	9.7	7.7	–
State annual designation value (μg/m^3)	–	–	–	–	–	12	–	12	10	12
State annual average concentration (μg/m^3)[e]	–	–	–	–	–	12.0	–	9.7	–	–
Number of days standard exceeded[a]										
NAAQS 24-hour (>35 μg/m^3)	–	–	–	–	–	12.1	–	5	0	–

Sources: California Air Resources Board 2012c; U.S. Environmental Protection Agency 2012b.

Notes: CAAQS = California ambient air quality standards.
NAAQS = national ambient air quality standards.
– = insufficient data available to determine the value.

[a] An exceedance is not necessarily a violation.

[b] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.

[c] State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, State statistics are based on California approved samplers.

[d] Measurements usually are collected every 6 days.

[e] State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

[f] Mathematical estimate of how many days concentrations would have been measured as higher than the level of the standard had each day been monitored.

Mobile-Source Air Toxics

The CAAA made controlling air toxic emissions a national priority, by which Congress mandated that the EPA regulate 188 air toxics. These substances are also known as hazardous air pollutants (HAPs). In the EPA's latest rule, *Control of Emissions of Hazardous Air Pollutants from Mobile Sources* (*Federal Registry, Vol. 72, No. 37, page 8430, February 2007*) it identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS). The IRIS is a comprehensive database of specific substances known to cause human health effects. In addition, the EPA identified the following seven compounds as priority MSATs:

- Acrolein.
- Benzene.
- 1,3-Butadiene.
- Diesel particulate matter/diesel exhaust organic gases.
- Formaldehyde.
- Naphthalene.
- Polycyclic organic matter.

While the FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future rules.

To address emissions of MSATs, the EPA has issued a number of regulations, including the 2007 rule mentioned above, that will dramatically decrease MSATs through cleaner fuels and cleaner engines. According to an FHWA analysis, even if VMT increases by 145% as assumed, a combined reduction of 72% in the total annual emission rate for priority MSATs is projected from 1999 to 2050, as shown in the Figure 3.2.6-3.

In light of recent developments regarding MSAT's, the FHWA has issued interim guidance for the assessment of MSAT's in NEPA documents for highways projects. The *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* uses a tiered approach to addressing MSAT emissions from highway projects in NEPA documents (Federal Highway Administration 2009a). Depending on the specific project circumstances, the FHWA has identified the following three levels of analysis:

1. No analysis for exempt projects or projects with no potential for meaningful MSAT effects.
2. Qualitative analysis for projects with low potential MSAT effects.
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Projects with Higher Potential MSAT Effects

Projects included in this category have the potential for meaningful differences among project alternatives. The FHWA expects only a limited number of projects to meet this two-pronged test. To fall into this category, projects must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location.

or

- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000[1], or greater, by the design year. In addition, to fall into this category, projects must also be proposed to be located in proximity to populated areas.

Projects falling within this category should be more rigorously assessed for impacts, and the FHWA should be contacted for assistance in developing a specific approach for assessing impacts. This approach would include a quantitative analysis to forecast local-specific emission trends of the priority MSATs (benzene, acrolein, formaldehyde, 1,3-butadiene, acetaldehyde, and diesel exhaust) for each alternative, to use as a basis of comparison. This analysis also may address the potential for cumulative impacts, where appropriate, based on local conditions. How and when cumulative impacts should be considered would be addressed as part of the assistance outlined above. If the analysis for a project in this category indicates meaningful differences in levels of MSAT emissions, mitigation options should be identified and considered.

Applicable Project MSAT Category Assessment

The FTOR prepared by the project traffic engineers does not directly evaluate AADT on I-80/ I-680/SR 12. However, based on the peak-hour traffic volumes on these roadways, an approximate estimate of AADT may be made using a peak-hour–to–daily conversion multiplier of 4.5 (according to Joel Rabinovitz, a transportation engineer in Walnut Creek, California, in a January 29, 2009 telephone conversation). Based on this information, it is estimated that mainline AADT on I-80 would be in excess of the FHWA's MSAT AADT threshold of 140,000 and will be located in proximity to populated areas. Consequently, based on the FHWA's 2009 MSAT guidance, the proposed project is considered a project with higher potential MSAT effects, and a quantitative analysis of MSAT emissions is required (Federal Highway Administration 2009a). Therefore, an evaluation of MSAT emissions was performed using traffic data provided by Fehr & Peers, and the CT-EMFAC model.

Unavailable Information for Project-Specific MSAT Impact Analysis

This text is taken from the Federal Highway Administration's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents,* Appendix C (Federal Highway Administration 2009a).

> In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any

[1] Using EPA's MOBILE 6.2 emissions model, FHWA technical staff determined that this range of AADT would be roughly equivalent to the CAA definition of a major HAP source (i.e., 25 tons per year for all HAPs or 10 tons per year for any single HAP). Significant variations in conditions such as congestion or vehicle mix could warrant a different range for AADT.

genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The U.S. Environmental Protection Agency (EPA) is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance Update on Mobile source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. The results produced by the EPA's MOBILE6.2 model, the California EPA's Emfac2007 model, and the EPA's DraftMOVES2009 model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in an NCHRP study (http://www.epa.gov/scram001/dispersion_alt.htm#hyroad), which documents poor model performance at ten sites across the country – three where intensive monitoring was conducted plus an additional seven with less intensive monitoring. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with National Ambient Air Quality Standards for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

> There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.
>
> There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine a "safe" or "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than safe or acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Environmental Consequences

The project alternatives would generate construction-related and operational emissions. The method used to evaluate construction and operational effects is described below. See the Air Quality Study Report for more detailed methodology.

Discussions with the project traffic engineers indicated that traffic volumes would not change between the build alternatives. Therefore, existing year (2004), interim year (2015) with and without project, and design-year (2035) with and without project conditions were evaluated.

Conformity of the Regional Transportation Plan with the State Implementation Plan

The evaluation of transportation conformity with regards to criteria pollutants was done by evaluating the inclusion of the proposed project in the most recent RTP as discussed above and in the Air Quality Study Report.

The fundable first phase of either alternative of the proposed project is fully funded in the financially constrained 2009 Regional Transportation Plan *Transportation 2035 Plan for the San Francisco Bay Area: Change in Motion* (RTP) (Appendix 1, page 126). The Federal Highway Administration (FHWA) and Federal Transportation Administration (FTA) found the 2009 RTP to be in conformity with the SIP on May 29, 2009. The project is also included in the MTC's financially constrained 2011 Transportation Improvement Program as TIP ID SOL070020. The MTC adopted the 2011 TIP on October 27, 2010, and the FHWA and FTA adopted the 2011 TIP on December 14, 2010. The design concept and scope of either alternative is consistent with the project description in the 2009 RTP and the 2011 TIP, and the assumptions in the Metropolitan Transportation Commission's regional emissions analysis.

Alternative C has been selected as the preferred alternative. Alternative C, Phase 1 is listed in the 2035 RTP and 2011 TIP. The design concept and scope of Alternative C, Phase 1 is consistent with the project description in the most recent 2035 RTP and the 2011 TIP. The design concept and scope of the proposed project are consistent with the project listings in the 2035 RTP and 2011 TIP and would not interfere with timely implementation of TCMs.

Under the No-Build Alternative, there would be no changes to the current conditions and no effect.

Potential Violations of Carbon Monoxide NAAQS or CAAQS

The effects of localized CO hot spot emissions were evaluated through CO dispersion modeling using the *Transportation Project-Level Carbon Monoxide Protocol* developed for the Department by the Institute of Transportation Studies at the University of California, Davis (Garza et al. 1997).

Existing year (2004), construction interim year (2015) with and without project, and design-future year (2035) with and without project conditions were modeled to evaluate CO concentrations relative to the NAAQS and CAAQS. As previously discussed, emissions of CO concentrations are estimated for roadway intersections within the project area, as well as mainline I-80, I-680, and SR 12 segments. These roadway intersections and segments were modeled because they represent the roadway intersections and segments in the vicinity of the project area with the highest traffic volumes and worst levels of congestion/delay. Table 3.2.6-3 and Table 3.2.6-4 summarize the results of the intersection and segment CO modeling, respectively, and indicate that CO concentrations are not anticipated to exceed the 1- or 8- hour NAAQS and CAAQS under any of the build alternatives or the No-Build Alternative.

Potential Violations of PM2.5 or PM10 NAAQS or CAAQS

The effects of localized PM were evaluated using the EPA and FHWA's guidance manual, *Transportation Conformity Guidance for Qualitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (Federal Highway Administration, and U.S. Environmental Protection Agency 2006).

The EPA's transportation conformity rules stipulate that transportation projects considered POAQCs, or any other project that is identified by the PM10 and/or PM2.5 SIP(s) as a localized air quality concern, must be analyzed for local air quality impacts (i.e., hot spot) in PM2.5 and PM10 nonattainment and maintenance areas. As previously indicated, the County is designated by the EPA as a nonattainment area for the lower PM2.5 standard. A PM2.5 hot spot analysis in accordance with the EPA's 2006 guidance was therefore conducted to show that the proposed project would conform when the conformity requirements apply. Because the area is in attainment or unclassified for the national PM10 standards, a hot-spot analysis for PM10 is not required to satisfy federal transportation conformity.

As previously indicated, the FTOR prepared for the project does not directly evaluate AADT on I-80/I-680/SR 12. An approximate estimate of AADT may be made based on the peak-hour traffic volumes on these roadways (according to Joel Rabinovitz, in the conversation cited earlier), and it is estimated that mainline AADT on I-80 would be in excess of the FHWA and EPA's POAQC threshold of 125,000 AADT. In addition, based on traffic count data collected by the Department, it is anticipated that diesel trucks would represent 3.49% of the total traffic volumes in the area (California Department of Transportation 2008).

Although truck traffic will not exceed more than 8% of the traffic volumes, ADT on I-80 would be in excess of 125,000. The proposed project is therefore considered a POAQC per the EPA's 2006 Transportation Conformity Rule. A qualitative PM2.5-hot spot analysis was conducted to demonstrate the project would not result in new violations of the federal PM2.5 air quality standards. Confirmation of this determination was made by the appropriate state and local agencies, including MTC and Caltrans, during interagency consultation (IAC) on December 8, 2010.

Although an analysis of PM10 hotspots is not required by the EPA's transportation conformity rule, it is important to note that the project is likewise not expected to result in new violations of the federal or state PM10 standards. Project-related PM10 and PM2.5 emissions follow similar trends and are relatively proportional in transportation analyses (with PM2.5 representing a fraction of PM10). This statement is substantiated by project-specific modeling (see Table 3.2.6-8 below), which demonstrates almost identical mass emissions rates for PM10 and PM2.5 under all project conditions. Based on the relationship between PM10 and PM2.5, the findings and results from the qualitative analysis performed for PM2.5, and trends in PM10 emissions, the project is not expected to result PM10 hot-spots or new violations the PM10 NAAQS or CAAQS.

There would be no effect under the No-Build Alternative.

Table 3.2.6-3. Modeled Carbon Monoxide Levels Measured at Receptors in the Vicinity of the Project Area (Intersections)

Intersection	North-South Roadway	East-West Roadway	2004			2015									2035														
			Existing			2015 No Project			2015 Alt B Phase 1			2015 Alt C Phase 1			2035 No Project			2035 Alt B Phase 1			2035 Alt C Phase 1			2035 Full Build Alt B			2035 Full Build Alt C		
			Caline Conc	1-hr	8-hr	Caline Conc	1-hr	8-hr	Caline Conc	1-hr	8-hr	Caline Conc	1-hr	8-hr	Caline Conc	1-hr	8-hr	Caline Conc	1-hr	8-hr	Caline Conc	1-hr	8-hr	Caline Conc	1-hr	8-hr	Caline Conc	1-hr	8-hr
4	Lopes Rd	Gold Hill Rd	1.6	5.3	4.06	0.6	4.3	3.36	0.6	4.3	3.36	0.6	4.3	3.36	0.4	4.1	3.22	0.4	4.1	3.22	0.4	4.1	3.22	0.2	3.9	3.08	0.4	4.1	3.22
7	I-80 EB Ramps	Red Top Rd	1.4	5.1	3.92	0.9	4.6	3.57	0.9	4.6	3.57	0.9	4.6	3.57	0.6	4.3	3.36	0.7	4.4	3.43	0.5	4.2	3.29	0.4	4.1	3.22	0.5	4.2	3.29
8	I-80 WB Ramps	Red Top Rd	0.9	4.6	3.57	0.7	4.4	3.43	0.8	4.5	3.5	0.7	4.4	3.43	0.6	4.3	3.36	0.5	4.2	3.29	0.5	4.2	3.29	0.3	4	3.15	0.5	4.2	3.29
9	Jameson Canyon Rd (SR12 West)	Red Top Rd	5	8.7	6.44	1	4.7	3.64	1	4.7	3.64	0.3	4	3.15	0.6	4.3	3.36	0.7	4.4	3.43	0.2	3.9	3.08	0.1	3.8	3.01	0.2	3.9	3.08
12	Lopes Rd	Cordelia Rd	4.2	7.9	5.88	1.2	4.9	3.78	1.2	4.9	3.78	0.5	4.2	3.29	0.6	4.3	3.36	0.8	4.5	3.5	0.4	4.1	3.22	0.5	4.2	3.29	0.4	4.1	3.22
13	Lopes Rd	Bridgeport Ave	3.5	7.2	5.39	1	4.7	3.64	1.1	4.8	3.71	0.5	4.2	3.29	0.6	4.3	3.36	0.7	4.4	3.43	0.3	4	3.15	0.5	4.2	3.29	0.3	4	3.15
14	Central Wy	Cordelia Rd	2.3	6	4.55	0.6	4.3	3.36	0.6	4.3	3.36	0.7	4.4	3.43	0.4	4.1	3.22	0.4	4.1	3.22	0.3	4	3.15	0.3	4	3.15	0.3	4	3.15
18	Green Valley Rd	Business Center Dr	2.4	6.1	4.62	1.2	4.9	3.78	1.2	4.9	3.78	1.2	4.9	3.78	0.6	4.3	3.36	0.8	4.5	3.5	0.5	4.2	3.29	0.5	4.2	3.29	0.5	4.2	3.29
21	I-80 EB Ramps	Pittman Rd	5.2	8.9	6.58	1.1	4.8	3.71	1.3	5	3.85	0.9	4.6	3.57	0.6	4.3	3.36	0.6	4.3	3.36	0.5	4.2	3.29	0.5	4.2	3.29	0.5	4.2	3.29
27	I-80 EB Ramps	Abernathy Rd	3.3	7	5.25	1	4.7	3.64	1	4.7	3.64	1	4.7	3.64	0.5	4.2	3.29	0.6	4.3	3.36	0.6	4.3	3.36	0.4	4.1	3.22	0.6	4.3	3.36
30	I-80 EB Off-Ramp	West Texas St	2.5	6.2	4.69	1.2	4.9	3.78	1.4	5.1	3.92	1.1	4.8	3.71	0.6	4.3	3.36	0.8	4.5	3.5	0.6	4.3	3.36	0.5	4.2	3.29	0.6	4.3	3.36
31	I-80 EB On-Ramp - Beck Ave	West Texas St	4.3	8	5.95	1.3	5	3.85	1.3	5	3.85	1.3	5	3.85	0.6	4.3	3.36	0.8	4.5	3.5	0.2	3.9	3.08	0.6	4.3	3.36	0.2	3.9	3.08
38	SR 12 East	Beck Ave	3.8	7.5	5.6	1.9	5.6	4.27	0.3	4	3.15	0.3	4	3.15	1	4.7	3.64	0.2	3.9	3.08	0.2	3.9	3.08	0.3	4	3.15	0.2	3.9	3.08
39	SR 12 East	Pennsylvania Ave	4	7.7	5.74	1.9	5.6	4.27	1.8	5.5	4.2	1.8	5.5	4.2	1	4.7	3.64	1.1	4.8	3.71	1	4.7	3.64	0.3	4	3.15	1	4.7	3.64
40	Pennsylvania Ave	Cordelia Rd	0.8	4.5	3.5	0.6	4.3	3.36	0.6	4.3	3.36	0.6	4.3	3.36	0.8	4.5	3.5	0.4	4.1	3.22	0.3	4	3.15	0.8	4.5	3.5	0.3	4	3.15
44	I-80 EB Ramps	Travis Blvd	5.6	9.3	6.86	1.8	5.5	4.2	1.7	5.4	4.13	1.8	5.5	4.2	0.8	4.5	3.5	1	4.7	3.64	0.8	4.5	3.5	0.8	4.5	3.5	0.8	4.5	3.5
45	Gateway Shopping Center - 2nd St	Travis Blvd	4.3	8	5.95	1.3	5	3.85	1.3	5	3.85	1.3	5	3.85	0.6	4.3	3.36	0.7	4.4	3.43	0.6	4.3	3.36	0.6	4.3	3.36	0.6	4.3	3.36
46	Pennsylvania Ave	Travis Blvd	2.8	6.5	4.9	1.1	4.8	3.71	1.1	4.8	3.71	1.1	4.8	3.71	0.6	4.3	3.36	0.7	4.4	3.43	0.6	4.3	3.36	0.6	4.3	3.36	0.6	4.3	3.36
51	I-80 WB On-Ramp - Hilborne Rd	Waterman Blvd	5.2	8.9	6.58	1.6	5.3	4.06	1.6	5.3	4.06	1.6	5.3	4.06	0.6	4.3	3.36	0.8	4.5	3.5	0.6	4.3	3.36	0.6	4.3	3.36	0.6	4.3	3.36
53	I-80 EB Ramps	Air Base Pkwy	4.8	8.5	6.3	1.8	5.5	4.2	1.8	5.5	4.2	1.8	5.5	4.2	0.8	4.5	3.5	1	4.7	3.64	0.8	4.5	3.5	0.8	4.5	3.5	0.8	4.5	3.5
54	Health Dr	Air Base Pkwy	4.5	8.2	6.09	1.3	5	3.85	1.3	5	3.85	1.3	5	3.85	0.6	4.3	3.36	0.7	4.4	3.43	0.6	4.3	3.36	0.6	4.3	3.36	0.6	4.3	3.36

Source: ICF Jones & Stokes 2009.

[a] Receptors are located 100 feet from the center of each intersection diagonal, 71 feet from the roadway centerline, and at the boundary of the mixing zone.

[b] Background concentrations of 3.7 ppm and 2.94 ppm were added to the modeling 1-hour and 8-hour results, respectively.

[c] The federal and state 1-hour standards are 35 and 20 ppm, respectively.

[d] The federal and state 8-hour standards are 9 and 9.0 ppm, respectively.

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Table 3.2.6-4. Modeled Carbon Monoxide Levels Measured at Receptors in the Vicinity of the Project Area (Segments)

Segment		Existing			No Project			Alternative B Phase 1			Alternative C Phase 1			No Project			Alternative B Phase 1			Alternative C Phase 1			Full Build Alternative B			Full Build Alternative C		
		Max Receptor	1-hr	8-hr	Max Receptor	1-hr	8-hr	Max Receptor	1-hr	8-hr	Max Receptor	1-hr	8-hr	Max Receptor	1-hr	8-hr	Max Receptor	1-hr	8-hr	Max Receptor	1-hr	8-hr	Max Receptor	1-hr	8-hr	Max Receptor	1-hr	8-hr
I-680	between Gold Hill and Red Top	2.9	6.6	4.97	1.8	5.5	4.2	1.4	5.1	3.92	1.5	5.2	3.99	0.9	4.6	3.57	0.6	4.3	3.36	0.9	4.6	3.57	1.1	4.8	3.71	1	4.7	3.64
I-80	between I-680 and Green Valley Rd	5.2	8.9	6.58	2.1	5.8	4.41	1.4	5.1	3.92	2	5.7	4.34	1.3	5	3.85	0.7	4.4	3.43	1.7	5.4	4.13	0.8	4.5	3.5	1.2	4.9	3.78
SR 12 West	between Red Top Rd and I-680 SB/Green Valley Rd	4.9	8.6	6.37	2.5	6.2	4.69	2.5	6.2	4.69	2.2	5.9	4.48	1.5	5.2	3.99	1.2	4.9	3.78	1.3	5	3.85	1.2	4.9	3.78	1.2	4.9	3.78
I-80	between Pittman/Suisin Valley and Truck Scales	4.8	8.5	6.3	2	5.7	4.34	2.4	6.1	4.62	2	5.7	4.34	1.1	4.8	3.71	1.1	4.8	3.71	1.1	4.8	3.71	2	5.7	4.34	2	5.7	4.34
I-80	between Truck Scales and Abernathy/SR12 East	6	9.7	7.14	3.4	7.1	5.32	2.7	6.4	4.83	3.3	7	5.25	1.6	5.3	4.06	1.5	5.2	3.99	1.4	5.1	3.92	1.8	5.5	4.2	1.4	5.1	3.92
I-80	between Green Valley Rd and Pittman Rd	6.1	9.8	7.21	3.3	7	5.25	2.8	6.5	4.9	2.1	5.8	4.41	1.3	5	3.85	1	4.7	3.64	1	4.7	3.64	1.3	5	3.85	1.4	5.1	3.92
I-80	between Abernathy Rd and W Texas St	7.3	11	8.05	3	6.7	5.04	2.9	6.6	4.97	2.7	6.4	4.83	1.8	5.5	4.2	1.4	5.1	3.92	1.7	5.4	4.13	1.5	5.2	3.99	1.5	5.2	3.99
I-80	between Beck Ave and Travis Blvd	6.2	9.9	7.28	2.6	6.3	4.76	2.6	6.3	4.76	2.4	6.1	4.62	1.5	5.2	3.99	1.2	4.9	3.78	1.5	5.2	3.99	1.3	5	3.85	1.4	5.1	3.92
I-80	between Travis Blvd and Air Base Pkwy/Waterman Blvd	6.3	10	7.35	2.7	6.4	4.83	2.7	6.4	4.83	2.4	6.1	4.62	1.6	5.3	4.06	1.3	5	3.85	1.5	5.2	3.99	1.3	5	3.85	1.3	5	3.85
SR 12 East	between Main St and Jackson St	1.9	5.6	4.27	0.9	4.6	3.57	0.9	4.6	3.57	1	4.7	3.64	0.7	4.4	3.43	0.5	4.2	3.29	0.5	4.2	3.29	0.7	4.4	3.43	0.5	4.2	3.29
SR 12 East	between Chadbourne Rd and Beck Ave	2.1	5.8	4.41	1.4	5.1	3.92	1.2	4.9	3.78	1.7	5.4	4.13	0.8	4.5	3.5	0.6	4.3	3.36	0.7	4.4	3.43	0.9	4.6	3.57	0.8	4.5	3.5
I-680	between Red Top and Central Ave/680 interchange	2.4	6.1	4.62	1.7	5.4	4.13	1.6	5.3	4.06	1.3	5	3.85	0.7	4.4	3.43	0.8	4.5	3.5	0.6	4.3	3.36	0.8	4.5	3.5	0.7	4.4	3.43

Source: ICF Jones & Stokes 2009.

[a] Receptors are located 10, 25, 50, and 100 feet from the edge of the freeway segment on either side of the roadway segment.

[b] Background concentrations of 3.7 ppm and 2.94 ppm were added to the modeling 1-hour and 8-hour results, respectively.

[c] The federal and state 1-hour standards are 35 and 20 ppm, respectively.

[d] The federal and state 8-hour standards are 9 and 9.0 ppm, respectively.

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Table 3.2.6-5. Criteria Pollutant, MSAT, and CO_2 Modeling Peak Period Traffic Data Inputs

EMFAC Speed Bin Name	VMT Speed Bins Actual	Existing		2015 No Project		2015 Alt B Phase 1		2015 Alt C Phase 1		2035 No Project		2035 Alt B Phase 1		2035 Alt C Phase1		2035 Alt B Full Build		2035 Alt C Full Build	
		VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%
5	0.0–4.99	3,590	0.6	6,215	0.7	2,047	0.2	3,545	0.4	21,989	2.3	12,646	1.1	3,976	0.4	3,216	0.3	2,559	0.2
10	5.0–9.99	17,038	2.6	16,242	1.7	3,562	0.4	7,539	0.8	41,087	4.3	16,067	1.4	17,791	1.7	8,904	0.7	11,641	0.9
15	10.0–14.99	11,810	1.8	14,557	1.6	3,401	0.3	9,132	0.9	48,812	5.1	15,480	1.4	16,896	1.6	8,904	0.7	15,604	1.3
20	15.0–19.99	7,904	1.2	23,837	2.6	9,252	0.9	7,337	0.8	21,129	2.2	12,036	1.1	5,964	0.6	11,460	0.9	26,090	2.1
25	20.0–24.99	23,955	3.7	30,830	3.3	14,910	1.5	16,290	1.7	21,760	2.3	18,856	1.7	18,222	1.8	29,268	2.4	39,874	3.2
30	25.0–29.99	33,274	5.1	12,635	1.4	10,365	1.1	13,777	1.4	15,723	1.7	26,951	2.4	14,660	1.4	24,901	2.0	26,252	2.1
35	30.0–34.99	50,273	7.7	28,900	3.1	28,966	2.9	36,619	3.8	40,434	4.2	65,329	5.7	36,444	3.6	37,728	3.1	41,104	3.3
40	35.0–39.99	35,486	5.5	34,740	3.7	29,240	3.0	44,901	4.7	38,276	4.0	56,737	5.0	24,450	2.4	26,778	2.2	33,182	2.7
45	40.0–44.99	28,251	4.3	40,116	4.3	41,813	4.3	50,507	5.2	35,568	3.7	45,606	4.0	53,390	5.2	28,098	2.3	56,301	4.5
50	45.0–49.99	14,061	2.2	66,066	7.1	58,947	6.0	33,837	3.5	58,120	6.1	96,091	8.4	47,359	4.6	14,827	1.2	42,022	3.4
55	50.0–54.99	35,562	5.5	58,966	6.3	99,068	10.1	104,719	10.9	72,410	7.6	88,650	7.8	142,873	13.9	210,737	17.1	240,163	19.4
60	55.0–59.99	30,615	4.7	83,806	9.0	91,023	9.3	98,014	10.2	176,533	18.5	189,314	16.6	123,109	12.0	193,360	15.6	227,071	18.3
65	60.0–64.99	103,135	15.8	192,765	20.7	194,363	19.8	209,644	21.7	111,859	11.7	171,672	15.1	193,862	18.9	188,653	15.3	153,073	12.4
70	65.0–69.99	256,001	39.3	316,914	34.1	393,885	40.1	316,180	32.8	243,730	25.6	323,270	28.3	316,593	30.8	445,133	36.0	321,283	26.0
75	70.0–74.99	0	0.0	3,691	0.4	1,886	0.2	12,296	1.3	5,176	0.5	1,716	0.2	10,966	1.1	3,622	0.3	1,816	0.1
Total		**650,956**	**100.0**	**930,280**	**100.0**	**982,728**	**100.0**	**964,339**	**100.0**	**952,605**	**100.0**	**1,140,420**	**100.0**	**1,026,555**	**100.0**	**1,235,590**	**100.0**	**1,238,035**	**100.0**

Note: Calculated from Fehr and Peers peak period traffic data (Fehr & Peers 2009).

Table 3.2.6-6. Criteria Pollutant, MSAT, and CO_2 Modeling Non-Peak Period Traffic Data Inputs

EMFAC Speed Bin Name	VMT Speed Bins Actual	Existing		2015 No Project		2015 Alt B Phase 1		2015 Alt C Phase 1		2035 No Project		2035 Alt B Phase 1		2035 Alt C Phase 1		2035 Alt B Full Build		2035 Alt C Full Build	
		VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%	VMT	%
5	0.0–4.99	12,564	0.6	21,752	0.7	7,165	0.2	12,408	0.4	76,963	2.3	44,259	1.1	13,915	0.4	11,258	0.3	8,957	0.2
10	5.0–9.99	59,632	2.6	56,848	1.7	12,468	0.4	26,387	0.8	143,804	4.3	56,234	1.4	62,267	1.7	31,164	0.7	40,743	0.9
15	10.0–14.99	41,336	1.8	50,949	1.6	11,904	0.3	31,964	0.9	170,842	5.1	54,179	1.4	59,136	1.6	31,164	0.7	54,614	1.3
20	15.0–19.99	27,665	1.2	83,430	2.6	32,383	0.9	25,681	0.8	73,951	2.2	42,126	1.1	20,872	0.6	40,111	0.9	91,315	2.1
25	20.0–24.99	83,843	3.7	107,904	3.3	52,185	1.5	57,015	1.7	76,161	2.3	65,997	1.7	63,776	1.8	102,440	2.4	139,561	3.2
30	25.0–29.99	116,459	5.1	44,223	1.4	36,276	1.1	48,219	1.4	55,032	1.7	94,329	2.4	51,311	1.4	87,155	2.0	91,882	2.1
35	30.0–34.99	175,957	7.7	101,149	3.1	101,381	2.9	128,167	3.8	141,517	4.2	228,652	5.7	127,552	3.6	132,048	3.1	143,865	3.3
40	35.0–39.99	124,202	5.5	121,589	3.7	102,340	3.0	157,152	4.7	133,965	4.0	198,578	5.0	85,576	2.4	93,722	2.2	116,136	2.7
45	40.0–44.99	98,880	4.3	140,406	4.3	146,345	4.3	176,776	5.2	124,486	3.7	159,620	4.0	186,866	5.2	98,344	2.3	197,054	4.5
50	45.0–49.99	49,213	2.2	231,232	7.1	206,314	6.0	118,430	3.5	203,419	6.1	336,318	8.4	165,757	4.6	51,895	1.2	147,078	3.4
55	50.0–54.99	124,465	5.5	206,381	6.3	346,738	10.1	366,517	10.9	253,436	7.6	310,275	7.8	500,057	13.9	737,578	17.1	840,569	19.4
60	55.0–59.99	107,154	4.7	293,322	9.0	318,581	9.3	343,050	10.2	617,865	18.5	662,598	16.6	430,881	12.0	676,760	15.6	794,748	18.3
65	60.0–64.99	360,974	15.8	674,678	20.7	680,271	19.8	733,753	21.7	391,505	11.7	600,854	15.1	678,516	18.9	660,286	15.3	535,754	12.4
70	65.0–69.99	896,004	39.3	1,109,200	34.1	1,378,596	40.1	1,106,630	32.8	853,054	25.6	1,131,444	28.3	1,108,076	30.8	1,557,965	36.0	1,124,492	26.0
75	70.0–74.99	0	0.0	12,917	0.4	6,601	0.2	43,036	1.3	18,117	0.5	6,007	0.2	38,382	1.1	12,676	0.3	6,354	0.1
Total		**2,278,348**	**100.0**	**3,255,980**	**100.0**	**3,439,548**	**100.0**	**3,375,186**	**100.0**	**3,334,118**	**100.0**	**3,991,470**	**100.0**	**3,592,941**	**100.0**	**4,324,565**	**100.0**	**4,333,123**	**100.0**

Note: Calculated from Fehr and Peers peak period traffic data (Fehr & Peers 2009).

Table 3.2.6-7. I-80/I-680/SR 12 MSAT Emissions (pounds per day)

Scenario	Acrolein	Acetalydehyde	Benzene	1, 3-Butadiene	Diesel Particulate Matter	Formaldehyde
Existing (2004)	3.25	24.68	71.49	14.39	110.91	71.34
2015 No Project	1.39	14.29	32.95	6.25	71.95	38.05
2015 Alt B, Phase 1	1.44	13.91	33.13	6.46	74.36	37.61
2015 Alt C, Phase 1	1.40	13.88	32.67	6.29	72.62	37.30
2035 No Project	0.79	7.17	18.62	3.52	25.86	19.62
2035 Alt B, Phase 1	0.91	7.40	20.61	4.05	29.74	20.89
2035 Alt C, Phase 1	0.85	6.60	18.93	3.79	27.19	18.90
2035 Alt B	1.04	7.76	22.79	4.62	32.81	22.45
2035 Alt C	0.96	7.57	21.52	4.27	31.85	21.55
Comparison of Alternatives to Existing						
2015 Alt B, Phase 1 to Existing	-1.80	-10.77	-38.35	-7.93	-36.55	-33.73
2015 Alt C, Phase 1 to Existing	-1.84	-10.80	-38.81	-8.10	-38.29	-34.04
2035 Alt B, Phase 1 to Existing	-2.34	-17.28	-50.88	-10.33	-81.17	-50.45
2035 Alt C, Phase 1 to Existing	-2.39	-18.08	-52.55	-10.59	-83.71	-52.44
2035 Alt B to Existing	-2.21	-16.92	-48.70	-9.76	-78.10	-48.89
2035 Alt C to Existing	-2.29	-17.11	-49.96	-10.11	-79.06	-49.80
Comparison of Alternatives to No Project						
2015 Alt B, Phase 1 to 2015 No Project	0.05	-0.37	0.19	0.21	2.41	-0.44
2015 Alt C, Phase 1 to 2015 No Project	0.01	-0.41	-0.28	0.04	0.67	-0.76
2035 Alt B, Phase 1 to 2035 No Project	0.12	0.24	1.99	0.53	3.88	1.27
2035 Alt C, Phase 1 to 2035 No Project	0.07	-0.56	0.31	0.27	1.33	-0.72
2035 Alt B to 2035 No Project	0.25	0.59	4.17	1.10	6.95	2.82
2035 Alt C to 2035 No Project	0.17	0.40	2.90	0.75	5.98	1.92

Source: Air Quality Study Report

Potential for Generation of MSAT Emissions

MSAT emissions were evaluated using the Federal Highway Administration's *Interim Guidance Update on Air Toxic Analysis in NEPA* (Federal Highway Administration 2009a).

The area of air toxics analysis is a new and emerging field and is a continuing area of research. Currently, limited tools and techniques are available for assessing project-specific health impacts from MSATs, as there are no established criteria for determining when MSAT emissions should be considered a significant issue in the NEPA context.

To comply with Council on Environmental Quality regulations (40 CFR 1502.22[b]) regarding incomplete or unavailable information, Appendix C of the Air Quality Study Report contains discussion regarding how air toxics analysis is an emerging field and current scientific

techniques, tools, and data are not sufficient to accurately estimate human health impacts that would result from a transportation project in a way that would be useful to decision-makers. Also in compliance with 40 CFR 150.22(b), Appendix C of the Air Quality Study Report contains a summary of current studies regarding the health impacts of MSATs.

The FTOR prepared for the project does not directly evaluate AADT on I-80/I-680/SR 12. However, based on the peak-hour traffic volumes on these roadways, an approximate estimate of AADT may be made (according to Joel Rabinovitz, in the conversation cited earlier). Based on this information, it is estimated that mainline AADT on I-80 would be in excess of the FHWA's MSAT AADT threshold of 140,000 and will be located in proximity to populated areas. Consequently, based on the FHWA's 2006 MSAT guidance, the proposed project is considered a project with higher potential MSAT effects, and a quantitative analysis of MSAT emissions was conducted using the CT-EMFAC program and traffic data presented in Table 3.2.6-5 and Table 3.2.6-6. Table 3.2.6-7 and Figure 3.2.6-4 through Figure 3.2.6-9 present modeled MSAT emissions. The differences in emissions between with- and without-project conditions represent emissions generated directly as a result of implementation of the build alternatives.

Emissions associated with implementation of the proposed project were obtained by comparing future with-project emissions to future no-project emissions for both the construction-interim year (2015) and design-future year (2035) scenarios. Table 3.2.6-7, which presents the project-level emissions for all alternatives, indicates that implementation of Alternative B; Alternative B, Phase 1; or Alternative C would result in minor increases in all MSAT emissions for 2035 conditions, while Alternative C, Phase 1 would result in minor increases in all MSATS except for acetaldehyde and formaldehyde, for 2035 conditions. Under 2015 condition, all alternatives would result in decreases in all MSAT emissions. The No-Build Alternative would result in lower MSAT emissions under 2015 conditions and 2035 conditions than all build alternatives except Alternative C, Phase 1. Emission would be reduced under all build alternatives compared to existing levels.

To the extent that it is applicable or feasible for the project alternatives and through coordination with the project development team, implementation of measures to reduce MSAT and criteria pollutant emissions, as described in *Avoidance, Minimization, and/or Mitigation Measures*, would be implemented to reduce this effect for all build alternatives.

Potential for Generation of Operation-Related Emissions of Ozone Precursors, Carbon Monoxide, and Particulate Matter

Long-term air quality impacts are those associated with motor vehicles operating on the roadway network, predominantly those operating in the project vicinity. Emission of ROG, NO_X, CO, PM10, PM2.5, and CO_2 for existing year (2004), construction interim year (2015) with and without project, and design-future year (2035) with and without project conditions were evaluated through modeling conducted using the Department's CT-EMFAC model and vehicle activity data provided in the FTOR.

Table 3.2.6-8 summarizes the modeled yearly emissions. The differences in emissions between with- and without-project conditions represent emissions generated directly as a result of implementation of the build alternatives. Vehicular emission rates are anticipated to lessen in

future years due to continuing improvements in engine technology and the retirement of older, higher-emitting vehicles. The one exception to this trend is PM, which compared to other pollutants, is not expected to experience as dramatic of reductions over time. This is because PM emission factors are comprised of PM emitted directly from vehicle tailpipes, as well as from normal break and tire wear. While more stringent emissions standards will reduce direct PM emissions, they will not affect emissions from break and tire wear, which are anticipated to remain relatively unchanged.

Table 3.2.6-8. I-80/I-680/SR 12 Project-Related Emissions (pounds per day)

Scenario	ROG	NO_X	CO	PM10	PM2.5	CO_2[a]
Existing (2004)	2,720	7,672	39,631	191	176	493,411
2015 No Project	1,424	4,386	19,025	206	187	694,836
2015 Alt B, Phase 1	1,388	4,660	19,783	204	185	711,894
2015 Alt C, Phase 1	1,388	4,522	19,355	202	184	701,297
2035 No Project	814	1,330	8,492	182	169	743,685
2035 Alt B, Phase 1	863	1,554	9,898	187	174	829,917
2035 Alt C, Phase 1	776	1,425	9,077	166	154	749,447
2035 Alt B	921	1,726	10,985	195	181	894,900
2035 Alt C	893	1,663	10,545	194	180	882,844
Comparison of Alternatives to Existing						
2015 Alt B, Phase 1 to Existing	-1,332	-3,011	-19,849	12	9	218,484
2015 Alt C, Phase 1 to Existing	-1,331	-3,150	-20,276	11	8	207,887
2035 Alt B, Phase 1 to Existing	-1,857	-6,117	-29,734	-5	-2	336,506
2035 Alt C, Phase 1 to Existing	-1,944	-6,246	-30,554	-25	-22	256,037
2035 Alt B to Existing	-1,799	-5,946	-28,647	3	5	401,490
2035 Alt C to Existing	-1,826	-6,009	-29,086	3	3	389,433
Comparison of Alternatives to No Project						
2015 Alt B, Phase 1 to 2015 No Project	-36	275	757	-2	-2	17,058
2015 Alt C, Phase 1 to 2015 No Project	-35	136	330	-3	-3	6,461
2035 Alt B, Phase 1 to 2035 No Project	49	224	1,405	5	5	86,232
2035 Alt C, Phase 1 to 2035 No Project	-38	95	585	-16	-15	5,763
2035 Alt B to 2035 No Project	107	396	2,492	13	12	151,216
2035 Alt C to 2035 No Project	79	333	2,053	13	11	139,159

Source: Air Quality Study Report
[a] CO_2 presented in metric tons per year.

Emissions associated with implementation of the proposed project were obtained by comparing future with-project emissions to future no-project emissions for both the construction-interim year (2015) and design-future year (2035) scenarios. Because the Department has statewide jurisdiction, and the setting for projects varies so extensively across the state, the Department has not and has no intention to develop thresholds of significance for CEQA. Further, because most air district thresholds have not been established by regulation or by delegation down from a federal or state agency with regulatory authority over the Department, the Department is not required to adopt those thresholds in their documents. Nevertheless, project-level operational emissions are presented in Table 3.2.6-8. In 2035, Alternatives B, Phase 1; Alternative B; and Alternative C would result in increases in all pollutants, while Alternative C, Phase 1 would

result in increases in NO_X and CO emissions and decreases in ROG, PM10, and PM2.5 emissions. In 2015, both Alternative B, Phase 1 and Alternative C, Phase 1 would result in increases in NO_X and CO emissions and decreases in ROG, PM10, and PM2.5 emissions.

Potential for Temporary Increase in Ozone Precursors (ROG and NO_X), CO, and PM10 Emissions during Grading and Construction Activities

Construction activity is a source of dust and exhaust emissions that can have substantial temporary impacts on local air quality (i.e., exceeding state air quality standards for ozone, CO, PM10, and PM2.5). Such emissions would result from earthmoving and use of heavy equipment, as well as land clearing, ground excavation, cut-and-fill operations, and roadway construction. Emissions can vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing weather. A major portion of dust emissions for the build alternatives would likely be caused by construction traffic on temporary areas.

During construction, short-term degradation of air quality may occur due to the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and various other activities. Emissions from construction equipment also are anticipated and would include CO, nitrogen oxides (NO_X), volatile organic compounds (VOCs), directly emitted particulate matter (PM10 and PM 2.5), and toxic air contaminants such as diesel exhaust particulate matter. Ozone is a regional pollutant that is derived from NO_X and VOCs in the presence of sunlight and heat.

Site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, removing or improving existing roadways, and paving roadway surfaces. Construction-related effects on air quality from most highway projects would be greatest during the site preparation phase because most engine emissions are associated with the excavation, handling, and transport of soils to and from the site. If not properly controlled, these activities would temporarily generate PM10, PM2.5, and small amounts of CO, SO_2, NO_X, and VOCs. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. PM10 emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM10 emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

The EPA estimates that construction activities for large development projects add 1.09 tonne (1.2 tons) of fugitive dust per acre of soil disturbed per month of activity. If water or other soil stabilizers are used to control dust, the emissions can be reduced by up to 50%. The Department's Standard Specifications (Section 14) pertaining to dust minimization requirements requires use of water or dust palliative compounds and will reduce potential fugitive dust emissions during construction.

In addition to dust-related PM10 emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_X, VOCs and some soot particulate (PM10 and PM2.5) in exhaust emissions. If construction activities were to increase traffic

congestion in the area, CO and other emissions from traffic would increase slightly while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction site.

SO_2 is generated by oxidation during combustion of organic sulfur compounds contained in diesel fuel. Off-road diesel fuel meeting Federal standards can contain up to 5,000 parts per million of sulfur, whereas on-road diesel is restricted to less than 15 parts per million of sulfur. However, under California law and Air Resources Board regulations, off-road diesel fuel used in California must meet the same sulfur and other standards as on-road diesel fuel, so SO_2-related issues due to diesel exhaust will be minimal. Some phases of construction, particularly asphalt paving, would result in short-term odors in the immediate area of each paving sites. Such odors would be quickly dispersed below detectable thresholds as distance from the sites increases.

Implementation of all build alternatives would result in the construction of widened roads, overcrossings, and embankments, as well as intersection improvements. Temporary construction emissions would result from grubbing/land clearing, grading/excavation, drainage/utilities/subgrade construction, and paving activities and construction worker commuting patterns. Pollutant emissions would vary daily, depending on the level of activity, specific operations, and prevailing weather.

The SMAQMD's Road Construction Emissions Model (Version 6.3.1) was used to estimate construction-related ozone precursors ROG and NO_X, CO, PM10, PM2.5, and CO_2 emissions from construction activities. The model estimates emissions for load hauling (on-road heavy-duty vehicle trips), worker commute trips, construction site fugitive dust (PM10 and PM2.5), and off-road construction vehicles. This analysis is based on anticipated construction equipment calculated by the Road Construction Emissions Model, which estimates construction equipment based on project size, duration of construction activities, and level of daily construction activities. While exhaust emissions are estimated for each activity, fugitive dust estimates are currently limited to major dust-generating activities, which include grubbing/land clearing and grading/excavation. In addition, dust estimates do not account for control measures required by BAAQMD.

Construction of the fundable first phase is expected to begin in 2012. It was assumed that construction activities would occur for eight hours per day. There are no projected dates for later phases of construction. The total project length was assumed to be 13 miles, and total area of disturbed ground is 192.5 acres for Alternative B and 220.2 acres for Alternative C. To represent a worst-case scenario, the total area of disturbed ground associated with Alternative C was evaluated, with an assumed maximum of 55.1 acres disturbed per day (based on a default assumption that the maximum amount of acreage disturbed in any given day would be 0.25 of the overall assumed project acreage). It was also assumed that no soil would be imported or exported. Construction activities were divided into separate phases and analyzed separately. Construction emission estimates represent the maximum emissions for each phase of construction. Total emissions per day represents the potential maximum daily emissions, while the total emissions provides an estimate of total maximum emissions associated with construction of the proposed project. The results of modeling for construction activities for the worst case alternative, Alternative C, are summarized in Table 3.2.6-9.

Table 3.2.6-9. Worst-Case Construction Emission Estimates (pounds per day)

Construction Phase	ROG	NO_X	CO	PM10	PM2.5	CO_2[a]
Grubbing/land clearing	64.7	547.3	287.9	574.7	135.9	7,019.0
Grading/excavation	56.5	440.6	271.4	573.5	134.8	6,659.8
Drainage/utilities/sub-grade	32.7	215.1	135.0	563.3	125.8	3,153.4
Paving	33.4	180.4	136.8	15.1	13.8	2,320.5
Total	**187.3**	**1,383.3**	**831.1**	**1,726.5**	**410.3**	**19,152.7**

Source: Air Quality Study Report
Note: Emissions calculations based on Road Construction Emissions Model (Version 6.3.1).
[a] CO_2 presented in metric tons per year.

Construction activities are subject to requirements found in the Standard Specifications for Construction of Local Streets and Roads (California Department of Transportation 2006). Standard Specification Section 14 stipulates that construction activities must comply with all rules, regulations, ordinances, and statutes of the local air pollution control district; addresses dust control requirements; and addresses dust palliatives.

Implementation of the Department's standard specification and measures to control dust and exhaust emissions during construction would help to minimize air quality impacts from construction activities.

There would be no effect under the No-Build Alternative because there would be no construction.

Naturally Occurring Asbestos

According to the California Department of Conservation's 2000 publication, *A General Location Guide for Ultramafic Rock in California*, there are no geologic features normally associated with NOA (i.e., serpentine rock or ultramafic rock near fault zones) in or near the project area (California Department of Conservation 2000). As such, there is no potential for impacts related to NOA emissions during construction activities. However, construction activities that involve the demolition of any building or structure containing asbestos would be subject to EPAs National Emissions Standards for Hazardous Air Pollutants (NESHAP) and CARB's Airborne Toxic Control Measures (ATCMs).

Climate Change

Climate change is analyzed in Chapter 4. Neither the United States Environmental Protection Agency (U.S. EPA) nor the Federal Highway Administration (FHWA) has promulgated explicit guidance or methodology to conduct project-level greenhouse gas analysis. As stated on the FHWA's climate change website (http://www.fhwa.dot.gov/hep/climate/index.htm), climate change considerations should be integrated throughout the transportation decision-making process—from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process will facilitate decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project-level decision making. Climate change considerations can easily be integrated into many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

Because there have been more requirements set forth in California legislation and executive orders regarding climate change, the issue is addressed in the California Environmental Quality Act chapter of this environmental document and may be used to inform the National Environmental Policy Act decision. The four strategies set forth by FHWA to lessen climate change impacts do correlate with efforts that the State has undertaken and is undertaking to deal with transportation and climate change; the strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and reduction in the growth of vehicle hours travelled.

Avoidance, Minimization, and/or Mitigation Measures

Amend the Transportation Improvement Program to Include Additional Alternatives

STA will submit a TIP amendment for the selected alternative if Alternative C, Phase 1 is not selected as the Preferred Alternative.

Implement Measures to Reduce MSAT and Criteria Pollutant Emissions

The project applicant shall implement measures to reduce MSAT emissions where feasible. The U.S. Department of Transportation Federal Highway Administration presents mitigation strategies to reduce emissions of MSATs (Federal Highway Administration 2006). Operational and long-term MSAT emissions are much more difficult to control than short-term construction MSAT emissions because variables such as daily traffic and vehicle fleet mix are elusive and beyond the Department's control. To the extent that it is applicable or feasible for the proposed project and through coordination with the project development team, the Department will consider the following MSAT emission reduction measures:

- Implement operational strategies that focus on speed limit enforcement and traffic management.
- Implement active Intelligent Transportation System programs, such as traffic management centers or incident management systems.
- Implement anti-idling strategies, such as truck-stop electrification.
- Establish buffer zones between new and expanded highway alignments and areas of vulnerable populations.
- Modify local zoning and develop guidelines that are more protective to separate emissions from sensitive receptors.

Most of the construction impacts on air quality are short term in duration and, therefore, will not result in adverse or long-term conditions. The Department's Standard Specifications pertaining to dust control and dust palliative requirement is a required part of all construction contracts and should effectively reduce and control emission impacts during construction. The provisions of the Department's Standard Specifications, Section 14 "Environmental Stewardship" "requires the contractor to comply with rules, ordinances, regulations, and statutes.

Implementation of the following measures would minimize air quality impacts from construction activities.

Implement California Department of Transportation Standard Specification Section 14

To control the generation of construction-related PM10 emissions, the project proponent will follow Standard Specification Section 14, "Environmental Stewardship," which addresses the contractor's responsibility on many items of concern, such as: air pollution; protection of lakes, streams, reservoirs, and other water bodies; use of pesticides; safety; sanitation; and convenience of the public; and damage or injury to any person or property as a result of any construction operation. Section 14-9.01 specifically requires compliance by the contractor with all applicable laws and regulations related to air quality, including air pollution control district and air quality management district regulations and local ordinances. Section 14-9.02 is directed at controlling dust. If dust palliative materials other than water are to be used, material specifications are contained in Section 14.9-01.

- Water or dust palliative will be applied to the site and equipment as frequently as necessary to control fugitive dust emissions.
- Soil binder will be spread on any unpaved roads used for construction purposes, and all project construction parking areas.
- Trucks will be washed off as they leave the right-of-way as necessary to control fugitive dust emissions.
- Construction equipment and vehicles will be properly tuned and maintained. Low-sulfur fuel shall be used in all construction equipment as provided in 17 CCR 93114.
- A dust control plan will be developed to address sprinkling, temporary paving, speed limits, and expedited revegetation of disturbed slopes as needed to minimize construction impacts on existing communities.
- Equipment and materials storage sites will be located as far away as practical from residential and park uses. Construction areas will be kept clean and orderly.
- To the extent feasible, ESAs will be established for sensitive air receptors within which construction activities involving extended idling of diesel equipment would be prohibited.
- Track-out reduction measures such as gravel pads at project access points, will be used to minimize dust and mud deposits on roads affected by construction traffic.
- Transported loads of soils and wet materials will be coved prior to transport, or adequate freeboard (space from the top of the material to the top of the truck) will be provided to reduce PM10 and deposition of particulate during transportation.
- Dust and mud deposited on paved, public roads due to construction activity and traffic will be removed to decrease particulate matter.
- To the extent feasible, construction traffic will be routed and scheduled to reduce congestion and related air quality impacts caused by idling vehicles along local roads during peak travel times.
- Vegetation will be planted or mulched as soon as practical after grading to reduce windblown particulate in the area.

Implement Additional Control Measures for Construction Emissions of Fugitive Dust

Additional measures to control dust shall be borrowed from the BAAQMD (see Table 3.2.6-10) and implemented to the extent practicable when the measures have not already been incorporated and do not conflict with requirements of the Department's Standard Specifications, Special Provisions, NPDES permit, and the Biological Opinions, Clean Water Act Section 404 permit, Clean Water Act Section 401 Certification, and other permits issued for the project.

Table 3.2.6-10. Feasible Control Measures for Construction Emissions of PM10

Basic Control Measures (The following controls should be implemented at all construction sites.)
• Water all active construction areas at least twice daily. • Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 0.6 meters (2 feet) of freeboard. • Pave; apply water three times daily; or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites. • Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites. • Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
Enhanced Control Measures (The following additional measures should be implemented at construction sites greater than four acres in area.)
• Hydroseed or apply (nontoxic) soil stabilizers to inactive construction areas (i.e., previously graded areas inactive for 10 days or more). • Enclose, cover, water twice daily, or apply (nontoxic) soil binders to exposed stockpiles (e.g., dirt and sand). • Limit traffic speeds on unpaved roads to 24.1 kilometers per hour (15 miles per hour). • Install sandbags or other erosion control measures to prevent silt runoff to public roadways. • Replant vegetation in disturbed areas as quickly as possible.
Optional Control Measures (The following control measures are strongly encouraged at construction sites that are large in area, located near sensitive receptors, or for any other reason may warrant additional emissions reductions, but the project applicant is not required to implement them.)
• Install wheel washers for all exiting trucks or wash off the tires or tracks of all trucks and equipment leaving the site. • Install windbreaks or plant trees or vegetative wind breaks at windward sides of construction areas. • Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 miles per hour. • Limit the area subject to excavation, grading, and other construction activity at any one time.

Source: Bay Area Air Quality Management District 1999.

Implement Measures to Reduce Exhaust Emissions from Off-Road Diesel-Powered Equipment

The construction contractor will be required to implement measures to reduce construction-related exhaust emissions. Such measures could include, but are not limited to maintaining properly tuned engines; minimizing the idling time of diesel powered construction equipment to two minutes; using alternative powered construction equipment (i.e., compressed natural gas, biodiesel, electric); using add-on mitigation devices such as diesel oxidation catalysts or particulate filters; using equipment that meets CARB's most recent certification standard for off-road heavy-duty diesel engines; phasing project construction; and limiting the operating hours of heavy-duty equipment.

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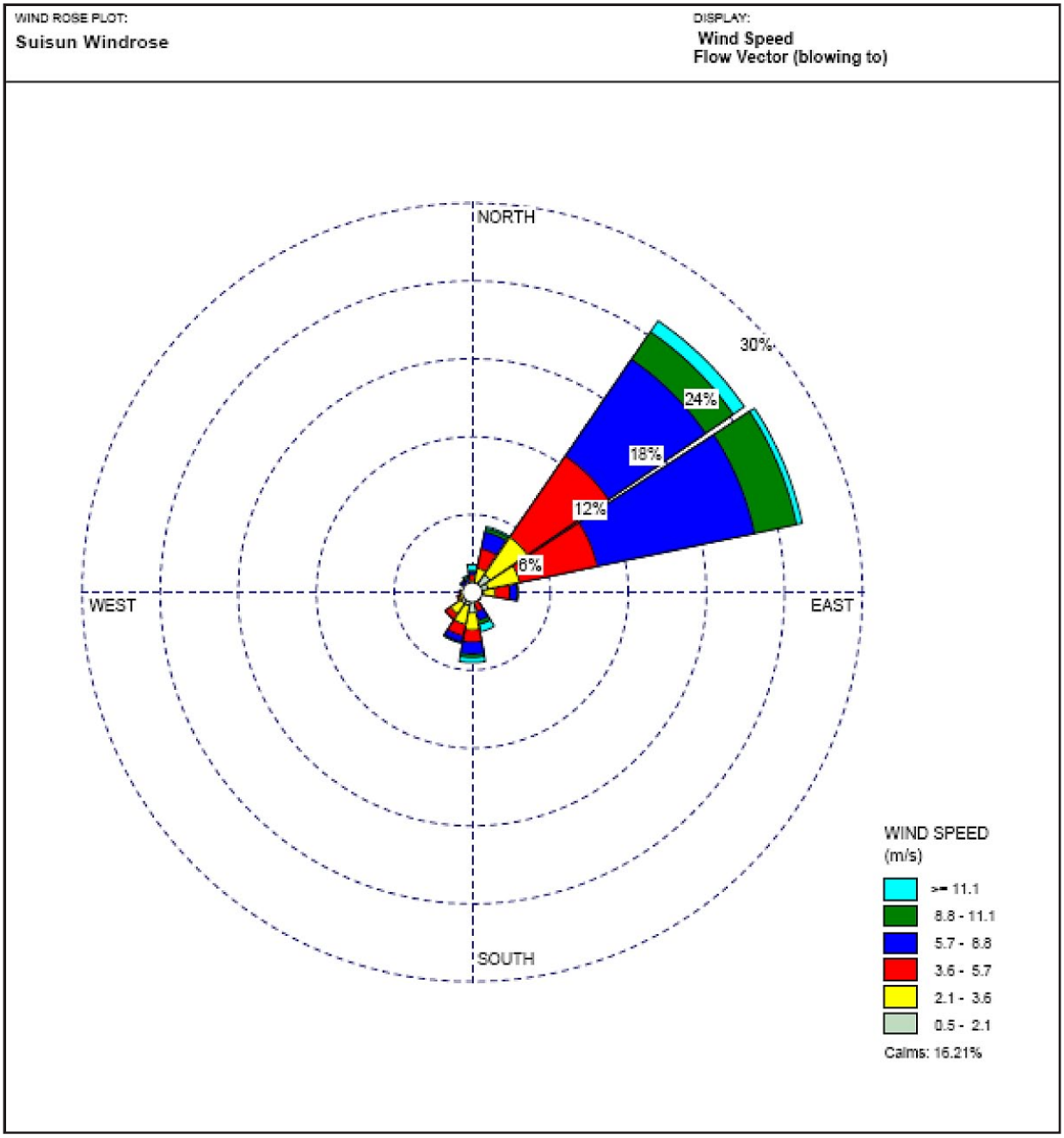

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Figure 3.2.6-1
Predominant Wind Direction at Travis Air Force Base

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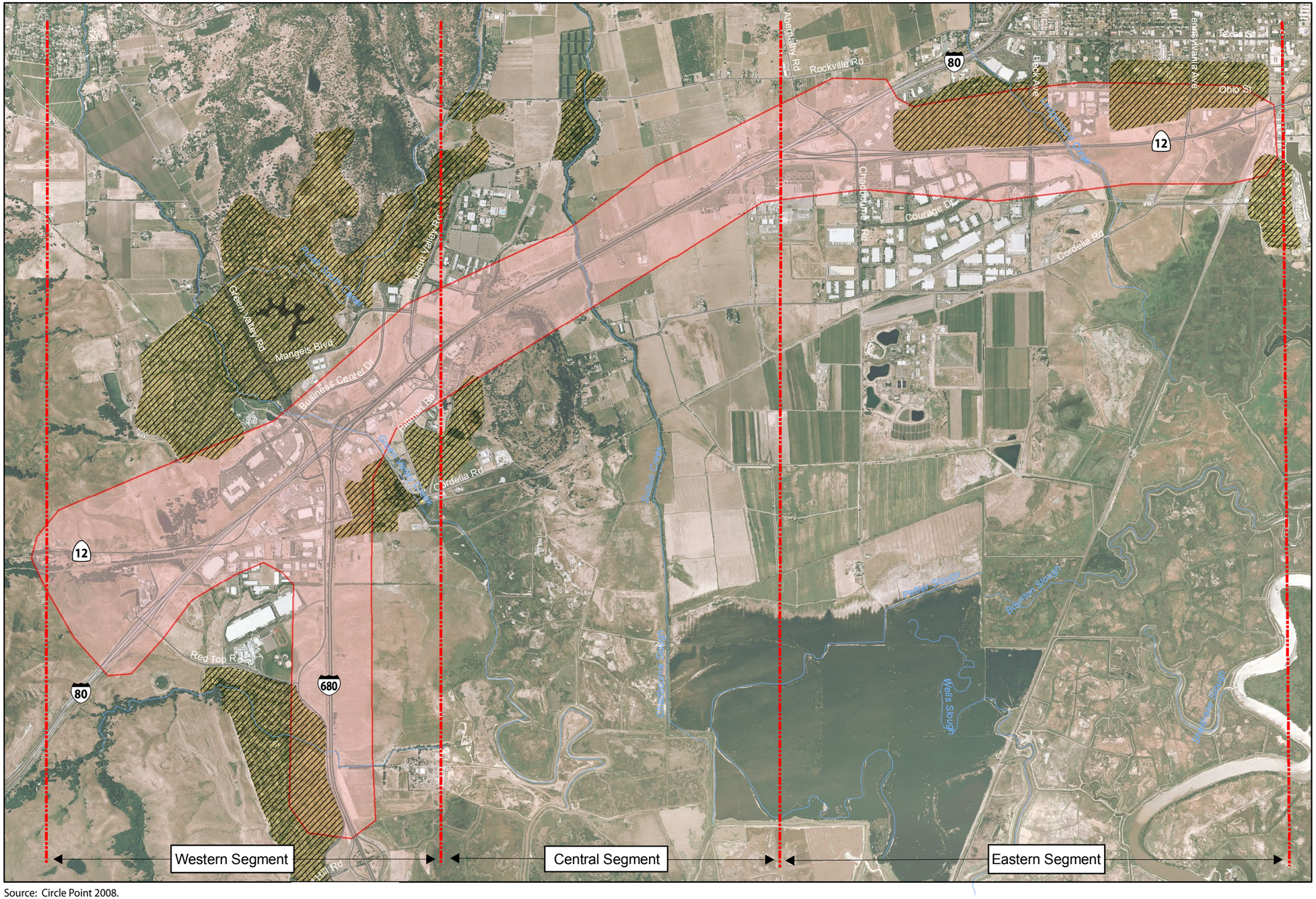

Source: Circle Point 2008.

Legend

I680/I80/SR12 Interchange

- Proposed Project Area
- Segment Lines
- General Location of Sensitive Receptors in Vicinity of Project Area *

* Does not include locations of scattered sensitive receptors in the project area.

1 inch equals 3,000 feet

Meters: 0 750 1,500

Feet: 0 3,100 6,200

Source: Nolte 2007, ESRI 2005, CirclePoint 2007, NAIP 2006.

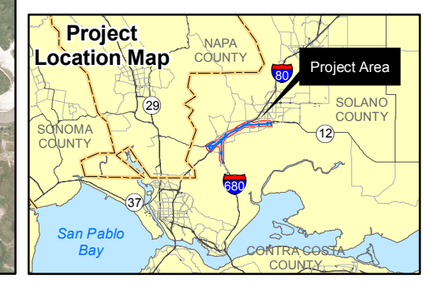

Figure 3.2.6-2
Project Area Map and General Locations of Sensitive Receptors

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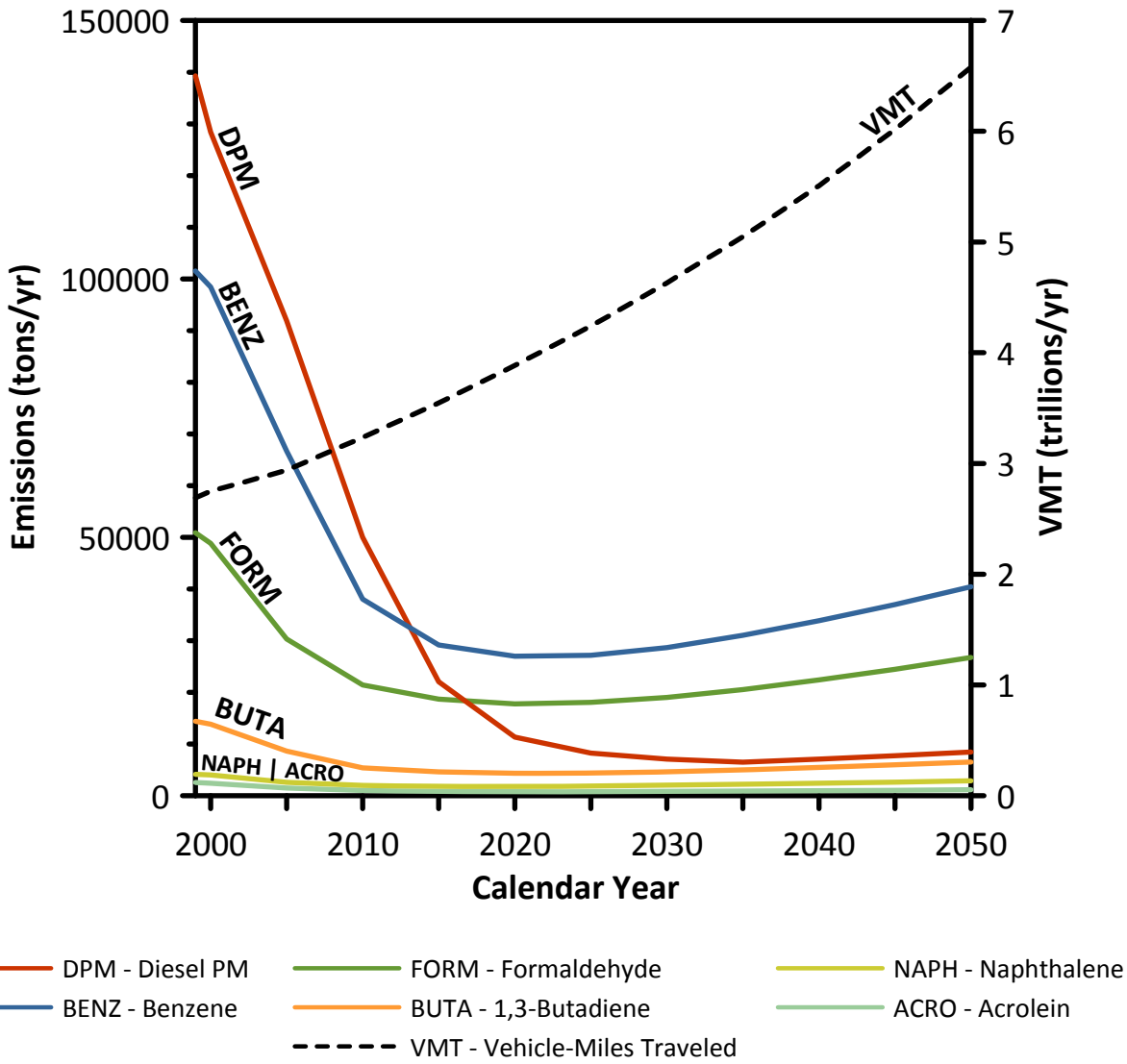

Note: (1) Annual emissions of polycyclic organic matter are projected to be 561 tons/yr for 1999, decreasing to 373 tons/yr for 2050.
(2) Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Source: FHWA 2009

Graphics/Projects/02166.02/EIS (rev. 1-11) SS

Figure 3.2.6-3
National MSAT Emission Trends 1999-2050
For Vehicle Operating on Roadways Using EPA's Mobile6.2 Model

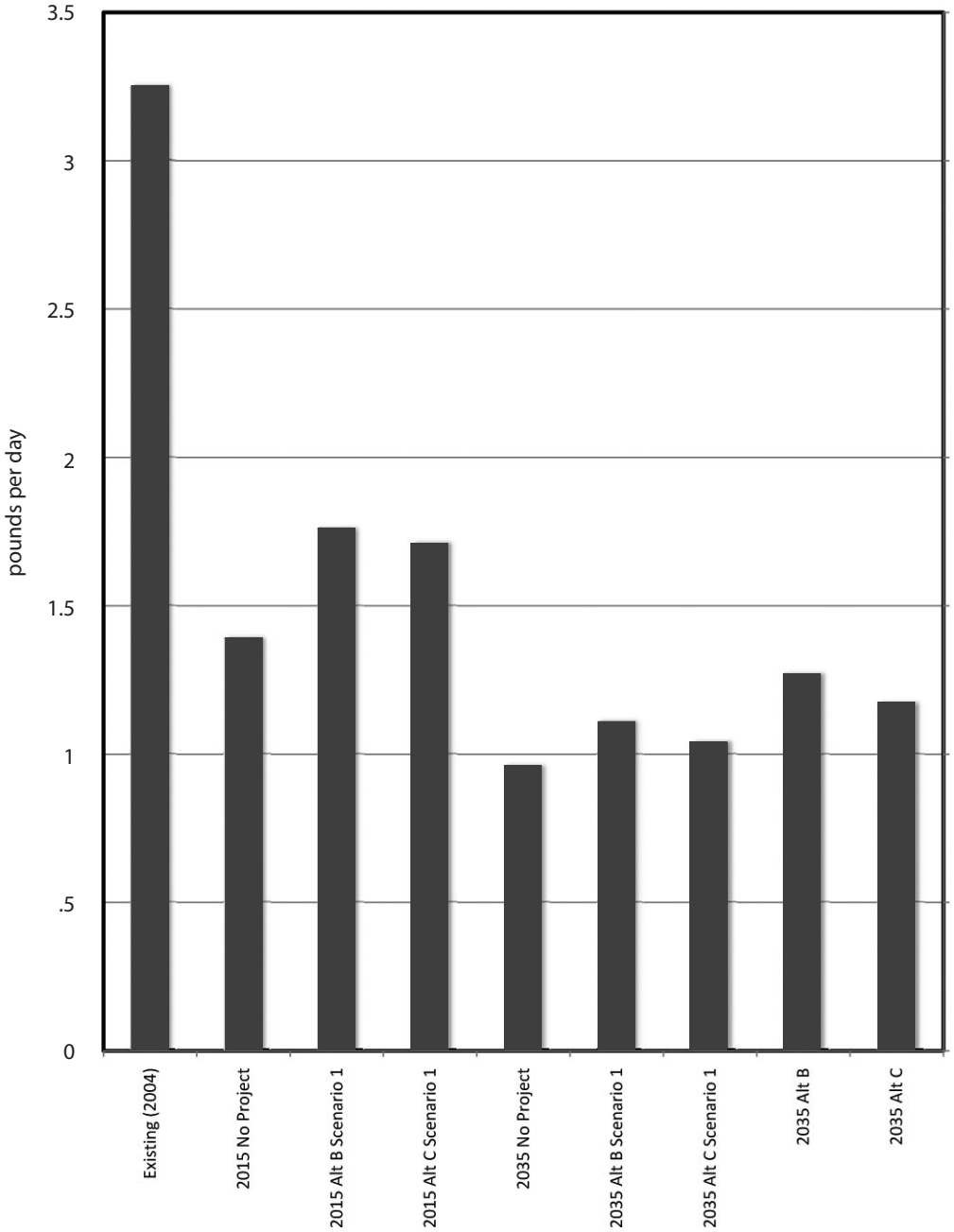

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Figure 3.2.6-4
Summary of Project Level Acrolein Emissions (pounds per day)

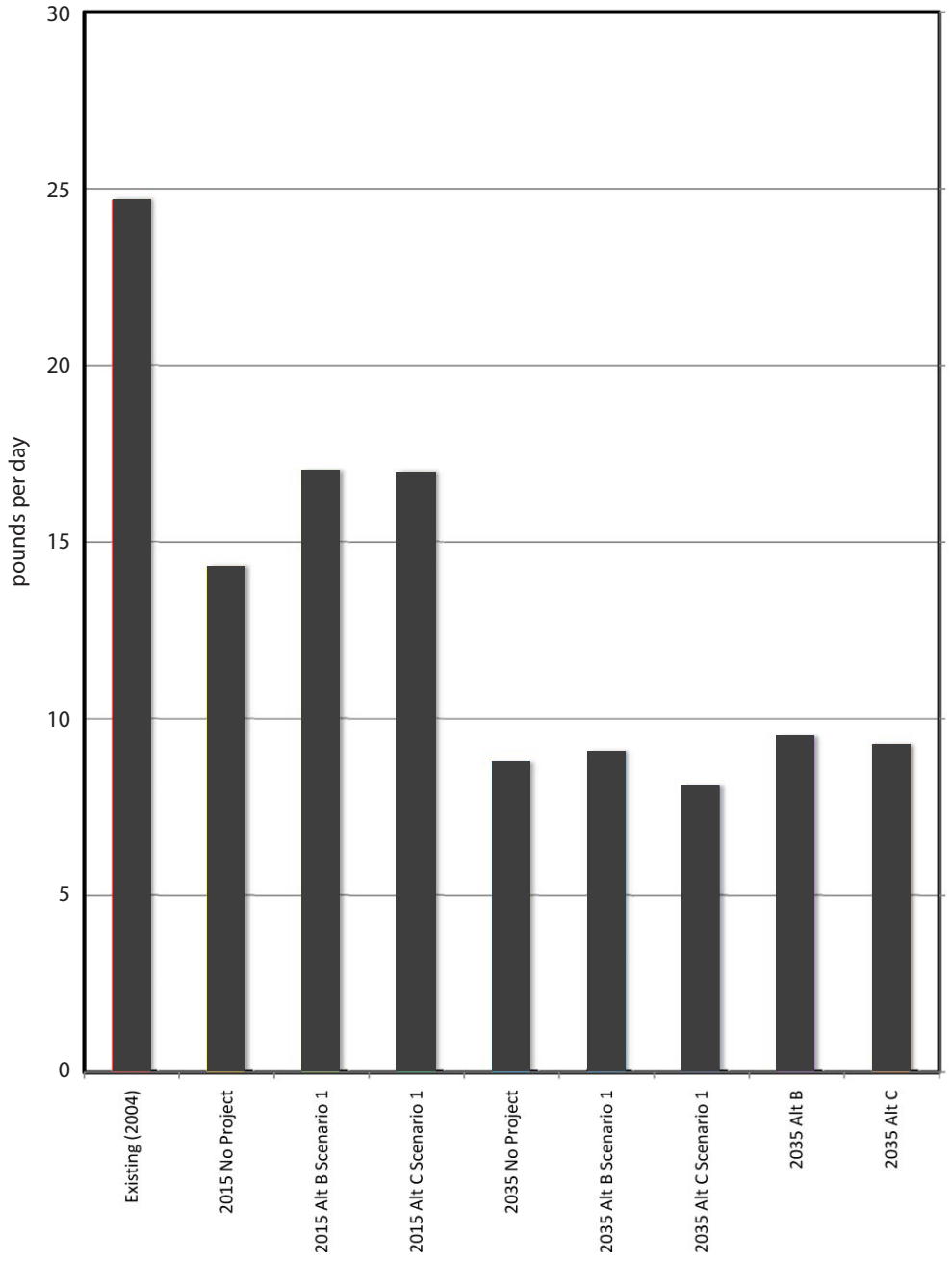

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Figure 3.2.6-5
Summary of Project Level Acetaldehyde Emissions (pounds per day)

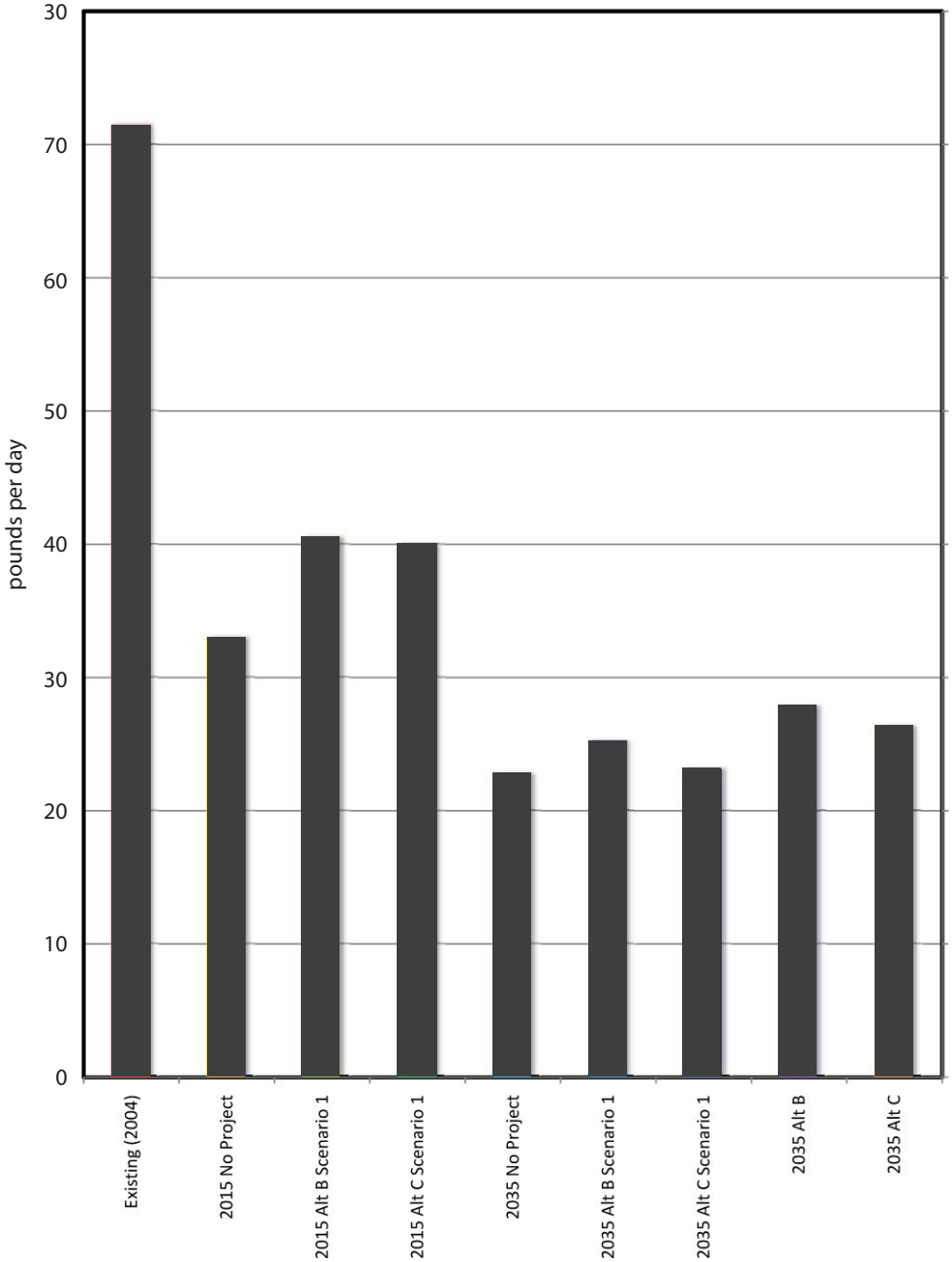

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Figure 3.2.6-6
Summary of Project Level Benzene Emissions (pounds per day)

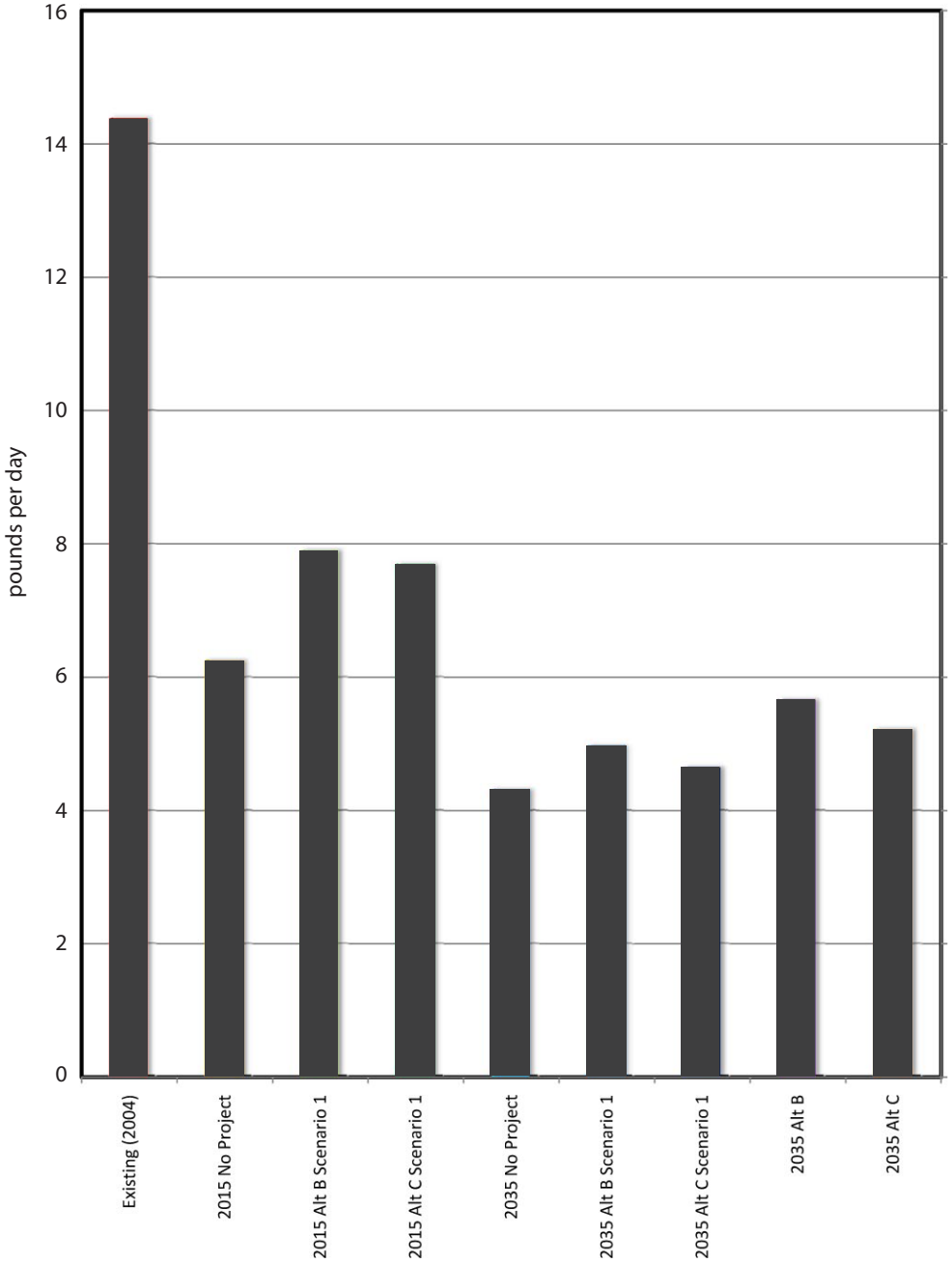

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Figure 3.2.6-7
Summary of Project Level 1,3-Butadiene Emissions (pounds per day)

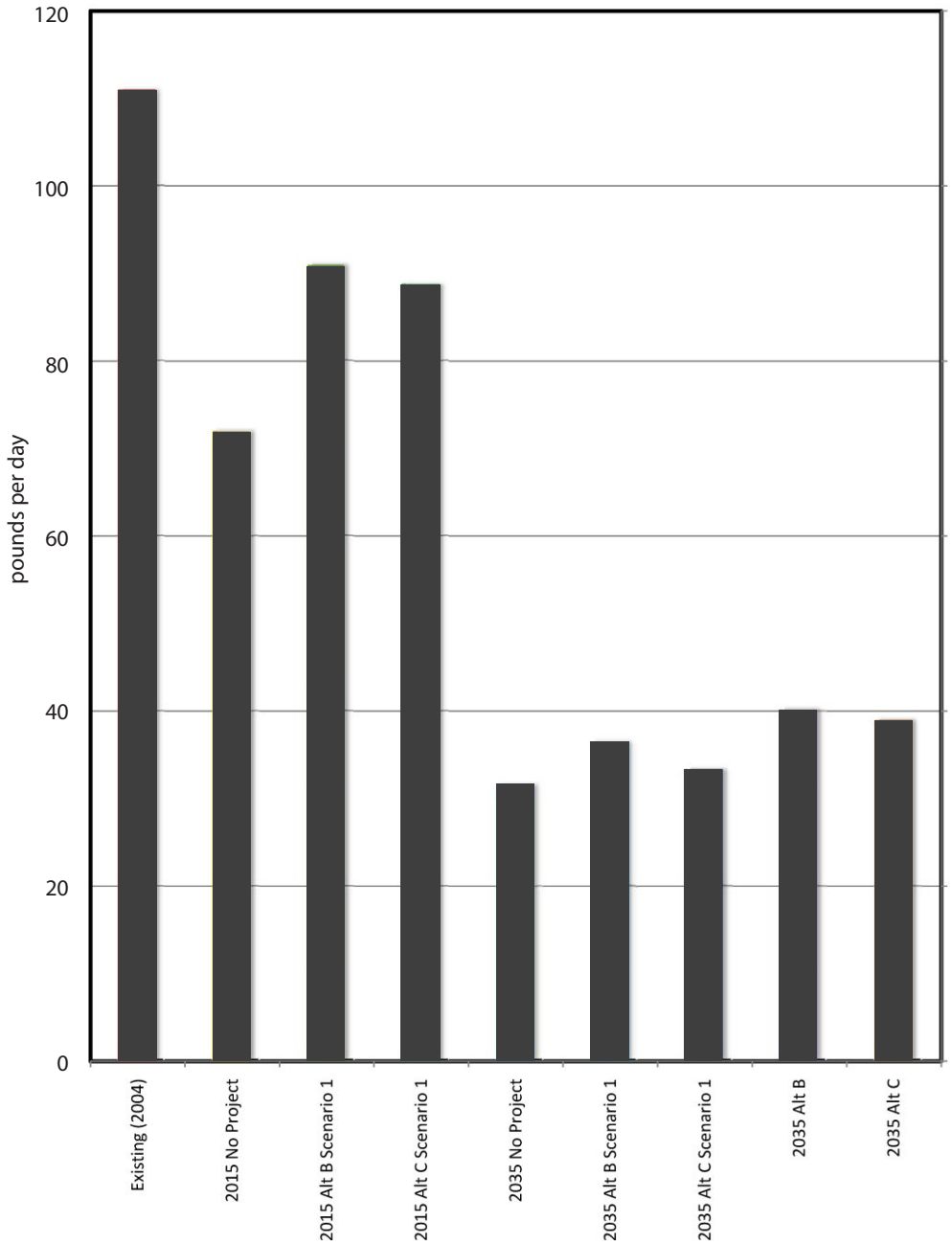

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Figure 3.2.6-8
Summary of Project Level Diesel Particulate Matter Emissions (pounds per day)

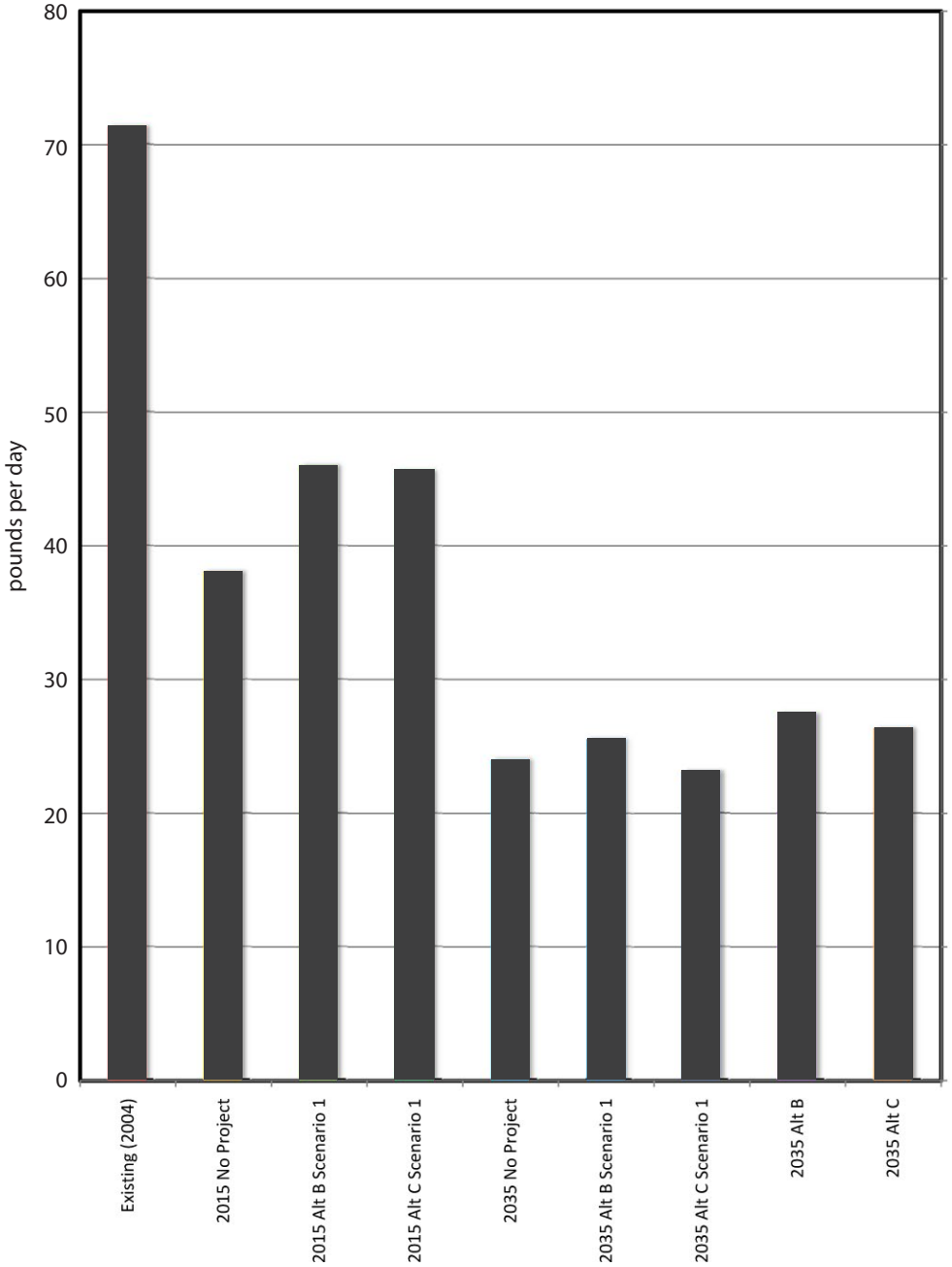

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Figure 3.2.6-9
Summary of Project Level Formaldehyde Emissions (pounds per day)

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3.2.7 Noise

Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

California Environmental Quality Act

CEQA requires a strictly baseline versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under CEQA, then CEQA dictates that measures must be incorporated into the project unless such measures are not feasible. The rest of this section will focus on the NEPA-23 CFR 772 noise analysis; please see Chapter 4 of this document for further information on noise analysis under CEQA.

National Environmental Policy Act and 23 CFR 772

For highway transportation projects with FHWA (and the Department, as assigned) involvement, the federal-Aid Highway Act of 1970 and the associated implementing regulations (23 CFR 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations contain noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 dBA) is lower than the NAC for commercial areas (72 dBA). Table 3.2.7-1 lists the noise abatement criteria for use in the 23 CFR 772 analysis.

Table 3.2.7-1. Activity Categories and Noise Abatement Criteria

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	Not applicable	Undeveloped lands.
E	52 interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Note: dBA $L_{eq}(h)$ = one-hour A-weighted equivalent sound level.

Table 3.2.7-2 lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise levels discussed in this section with common activities.

Table 3.2.7-2. Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Fly-over at 300m (1000 ft)		
	100	
Gas Lawn Mower at 1 m (3 ft)		
	90	
Diesel Truck at 15 m (50 ft), at 80 km (50 mph)		Food Blender at 1 m (3 ft)
	80	Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime		
Gas Lawn Mower, 30 m (100 ft)	70	Vacuum Cleaner at 3 m (10 ft)
Commercial Area		Normal Speech at 1 m (3 ft)
Heavy Traffic at 90 m (300 ft)	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime		
		Library
Quiet Rural Nighttime	30	Bedroom at Night,
		Concert Hall (Background)
	20	Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

In accordance with the Department's *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects* (California Department of Transportation 2006), a noise impact occurs when the future noise level with the project results in a substantial increase in the noise level (defined as an increase of 12 dB or more) or when the future noise level with the project approaches or exceeds the NAC. Approaching the NAC is defined as a noise level within 1 dB of the NAC.

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

The Department's *Traffic Noise Analysis Protocol* sets forth the criteria for determining when an abatement measure is reasonable and feasible. The feasibility of noise abatement is basically an engineering concern. A minimum 5 dB reduction in the future noise level must be achieved for an abatement measure to be considered feasible from an acoustical perspective. Other considerations affecting feasibility of noise abatement include topography, access requirements, other noise sources and safety considerations. The reasonableness determination is basically a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include: residents acceptance, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies input, newly constructed development versus development pre-dating 1978 and the cost per benefited residence.

Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3-dB increase in sound level. However, subjective perception of a doubling of loudness may be different than what is measured. In noisy environments, changes in noise of 1 to 2 dB are generally not detectable. However, it is widely accepted that the normal human ear begins to perceive a sound level increase of 3 dB in typical noisy environments. A 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. A 3-dB increase is considered a perceptible increase in noise level.

Affected Environment

The *Noise Study Technical Report for the Interstate 80/Interstate 680/State Route 12 Interchange Project* (Noise Study) was prepared in 2010. The technical report discusses potential noise impacts and related noise abatement measures associated with the construction and operation of mainline and interchange improvements on I-80, I-680, and SR 12 and the construction and operation of a truck scale facility on I-80 in Solano County. The report was prepared to comply with 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise," and the Department's noise analysis policies as described in the Traffic Noise Analysis Protocol.

The project area consists of a mix of residential, commercial, and industrial land uses (Activity Categories B and C). For the purposes of this analysis, land uses in the project area are grouped into a series of lettered regions as described below. Figures 3.2.7-1 through 3.2.7-16 in Volume 2 of this document identify the locations of these lettered regions. Figures 3.2.7-1 through 3.2.7-8 show the project area under Alternative B (and the fundable first phase). Figures 3.2.7-9 through 3.2.7-16 show the project area under Alternative C (and the fundable first phase).

Area A: Area A is located on the west side of I-680, north of Gold Hill Road, and is a dense single-family residential neighborhood (Activity Category B) adjacent to Lopes Road, extending north to Silver Creek Road. A sound barrier with a nominal height of six feet is located between I-680 and residences in Area A (refer to Volume 2, Figures 3.2.7-4 and 3.2.7-12).

Area A1: Area A1 is located on the west side of I-680, adjacent to Lopes Road and south of Gold Hill Road. This is a neighborhood densely populated with single-family residences (Activity Category B). A sound barrier with a nominal height of six feet is located between I-680 and residences in Area A1 (refer to Volume 2, Figures 3.2.7-4 and 3.2.7-12).

Area B: Area B is located on the west side of I-680, between Silver Creek Road and Rolling Hills Park. This area consists of residential townhouse units (Activity Category B) surrounded by a sound barrier with a nominal height of six feet (refer to Volume 2, Figures 3.2.7-4 and 3.2.7-12). This area also includes a walking trail that leads into Rolling Hills Park (Activity Category B).

Area C: Area C is located on the west side of I-680, north of Rolling Hills Park, extending along Lopes Road north to Red Top Road. This is a neighborhood densely populated with single-family residences (Activity Category B). Sound barriers with a nominal height of six feet are located between I-80 and residential receivers in this area (refer to Volume 2, Figures 3.2.7-4 and 3.2.7-12).

Area D: Area D is located on the west side of I-680, north of Cordelia Road. This area consists of two single-family residences on small lots adjacent to Lopes Road (Activity Category B), in the northwest quadrant of the Cordelia Road/Lopes Road intersection; and commercial land uses (Activity Category C) that do not include areas of frequent human use. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-3 and 3.2.7-11).

Area E: Area E is located on the east side of I-680 on both sides of Cordelia Road. This area consists of scattered single-family homes (Activity Category B), and commercial buildings (Activity Category C) that do not include areas of frequent human use. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-3 and 3.2.7-11).

Area F: Area F is located north of Business Center Drive, which will connect to the North Connector in the future under both Alternatives B and C. A single-family residential subdivision (Activity Category B) is located in this area. The area consists mostly of retail and commercial buildings (Activity Category C) that do not include areas of frequent human use. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-1 and 3.2.7-9).

Area G: Area G is located on the south side of SR 12E east of I-80. This area consists of the baseball diamond and park area adjacent to Busch Drive and west of Chadbourne Road (Activity Category B). The area consists mostly of retail and commercial buildings (Activity Category C) that do not include areas of frequent human use. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-7 and 3.2.7-15).

Area H: Area H is located on the north side of SR 12E east of I-80. This area is a single-family residential neighborhood (Activity Category B) that extends from east of Abernathy Road to

Beck Avenue. Two sound barriers in this area extend along SR 12; one extends along Marquette Way and has a nominal height of eight feet, and the other extends along Burgundy Way and has a nominal height of ten feet (refer to Volume 2, Figures 3.2.7-7 and 3.2.7-15).

Area I: Area I is located on the north side of SR 12E and consists of single-family residences (Activity Category B) along Diamond Way and Diamond Court. A sound barrier with a nominal height of eight feet is located between SR 12 and the residential area (refer to Volume 2, Figures 3.2.7-7 and 3.2.7-15).

Area J: Area J is located on the north side of SR 12E and consists of single-family residences (Activity Category B) along Ontario Street and Ontario Court. A sound barrier with a nominal height of eight feet is located between SR 12 and the residential area (refer to Volume 2, Figures 3.2.7-8 and 3.2.7-16).

Area K: Area K is located on the north side of SR 12E and consists of single-family residences (Activity Category B) and the Fairfield Vista apartment buildings along James Street and west of Pennsylvania Avenue. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-8 and 3.2.7-16).

Area L: Area L is located on the north side of SR 12E and consists of single-family residences and apartments (Activity Category B) along Illinois Street and Ohio Street. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-8 and 3.2.7-16).

Area M: Area M is located on the south side of SR 12E and consists of single-family residences and apartments (Activity Category B) and commercial buildings with no areas of outdoor frequent human use (Activity Category C) along Sacramento Street and Solano Street. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-8 and 3.2.7-16).

Area N: Area N is located along Chadbourne Road on the north side of I-80 and consists of scattered single-family residences (Activity Category B) and commercial buildings with no areas of outdoor frequent human use (Activity Category C). There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-7 and 3.2.7-15).

Area O: Area O is located on the south side of I-80 and consists of scattered single-family residences (Activity Category B) and commercial buildings with no areas of outdoor frequent human use (Activity Category C) near Hale Ranch Road. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-6 and 3.2.7-14).

Area P: Area P is located on the south side of I-80 and consists of scattered single-family residences (Activity Category B) and commercial buildings with no areas of outdoor frequent human use (Activity Category C) near Cordelia Road. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-6 and 3.2.7-14).

Area Q: Area Q is located in an area on the north side of I-80 bound by Dan Wilson Creek and Suisun Creek. This area is planned for mixed commercial and residential development (Activity Categories B and C) under the Fairfield Corporate Commons project (City of Fairfield 2005). Locations of residential use within the development are based on the configuration studied in the

Fairfield Corporate Commons Draft EIR. There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-5, 3.2.7-6, 3.2.7-13, and 3.2.7-14).

Area R: Area R is located in the southeastern quadrant of the I-80/Pittman Road interchange. This area consists of hotels with outdoor swimming pools (Activity Category B), a family outdoor recreation area, and commercial use (Activity Category C). There are no existing sound barriers in this area (refer to Volume 2, Figures 3.2.7-5 and 3.2.7-13).

Environmental Consequences

Noise Monitoring

The existing noise environment in the project area was characterized by short- and long-term noise monitoring. Short-term noise monitoring was conducted on Tuesday, October 9, and Wednesday, October 10, 2007. Short-term noise monitoring was conducted over 15-minute intervals at or near Activity Category B land uses within the project area. The short-term measurement positions are identified in Figures 3.2.7-1 through 3.2.7-16 in Volume 2. Table 3.2.7-3 summarizes the results of the short-term noise monitoring conducted in the project area.

Table 3.2.7-3. Summary of Short-Term Noise Monitoring

Measurement Location	Description	Area	Start Time	Duration (min.)	Existing Wall Height	Measured L_{eq}
ST-1	Ramsey Road, End of Smith Lane	E	4:20 p.m.	15	N/A	70.9
ST-2	First-row residence on Bridgeport Avenue	E	4:20 p.m.	15	N/A	62.8
ST-3	Second-row residence on Bridgeport Avenue	E	4:20 p.m.	15	N/A	63.1
ST-4	First-row residence on Silverado Drive	C	3:29 p.m.	15	6 feet	58.9
ST-5	Rolling Hills Park	B	3:29 p.m.	15	N/A	59.1
ST-6A	Trail, Rolling Hills Park	B	11:57 a.m.	15	N/A	63.9
ST-6B	Trail, Rolling Hills Park	B	3:29 p.m.	15	N/A	64.8
ST-7	First-row residence on Ridgecrest Court	A	11:57 a.m.	15	6 feet	56.2
ST-8	Second-row residence on Ridgecrest Court	A	11:57 a.m.	15	6 feet	47.2
ST-9	First-row residence on Northwood Drive	A	1:02 p.m.	15	6 feet	50.7
ST-10	Second-row residence on Northwood Drive	A	1:02 p.m.	15	6 feet	48.0
ST-11	Trail, Northwood Drive	A	1:02 p.m.	15	6 feet	68.3
ST-12	Fairfield Vista Apartments, Pennsylvania Avenue	K	12:32 p.m.	15	N/A	52.5
ST-13	First-row residence, James Street	K	12:32 p.m.	15	N/A	48.2
ST-14	First-row residence, James Street	K	12:32 p.m.	15	N/A	48.9
ST-15	First-row residence, Ontario Court	J	3:56 p.m.	15	8 feet	59.5
ST-16	First-row residence, Burgundy Way	H	2:52 p.m.	15	8 feet	54.2
ST-17	First-row residence, Burgundy Way	H	2:52 p.m.	15	8 feet	54.6
ST-18	First-row residence, Marquette Way	H	3:56 p.m.	15	8 feet	59.6
ST-19	First-row residence, Marquette Way	H	3:56 p.m.	15	8 feet	59.0
I-80-ST-1	Cordelia Road	I-80	1:00 p.m.	15	N/A	60.4
I-80-ST-6	Hamilton Avenue	I-80	3:00 p.m.	15	N/A	54.2
I-80-ST-13	Lozano Lane	I-80	11:00 a.m.	15	N/A	71.1

Note: N/A = not applicable.

Short-term monitoring was conducted at 23 positions within the project area. The maximum level measured was 71.1 dBA L_{eq}. The median level was 47.2 dBA L_{eq}.

Long-term monitoring position LT-1 was conducted at one position, next to Suisun Creek on the south side of I-80, approximately 200 feet from the edge of pavement (shown in Figures 3.2.7-5 and 3.2.7-13). The long-term sound level data was collected over five consecutive 24-hour periods, beginning on Thursday, January 19, 2006, and ending on Wednesday, January 25, 2006. The average loudest-hour sound level measured was 68.4 dBA L_{eq}1h, during the 7 a.m. hour.

Traffic Noise Modeling

A noise impact analysis was conducted for the proposed project. Three-dimensional modeling objects were developed using CAD drawings, aerials, and topographic contours provided by the STA. These objects were digitized into the FHWA Traffic Noise Model Version 2.5 (TNM 2.5). Loudest-hour traffic volumes, classification percentages, and speeds used to model traffic noise under existing and design-year (2035) conditions were provided in the FTOR for the proposed project. Table 3.2.7-4 summarizes the traffic noise modeling results under existing and design-year conditions.

Exposure of Noise Sensitive Land Uses to Increased Traffic Noise

Modeling results in Table 3.2.7-4 indicate that predicted traffic noise levels for the design-year with-project conditions would approach or exceed the NAC of 67 dBA, L_{eq}(h), for Activity Category B land uses within the project area.

Noise impacts resulting from a substantial increase over existing noise levels (12 dB) are not predicted to occur under the proposed project. As such, the increase in noise levels as a result of project operations would not be considered a significant adverse effect. However, because noise levels in the project area would approach or exceed the NAC thresholds, noise abatement must be considered.

Modeling results also indicate that predicted traffic noise levels for the design-year with-project conditions approach or exceed the NAC of 72 dBA, L_{eq}(h), for Activity Category C land uses within the project area. However, none of these Category C areas have exterior frequent human use that would benefit from lowered noise levels. Accordingly, no noise abatement is considered for any Category C uses in the project area.

Modeling results for Rodriguez High School (C15), an activity Category B land use, indicate that predicted noise levels do not approach or exceed the NAC of 67 dBA, L_{eq}(h), for school uses (Activity Category B).

Under Alternative B, Phase 1, noise impacts are predicted to occur in areas D, E (just south of the I-80/680 interchange), and R (just east of Suisun Valley Road). The affected units include 13 residences, an outdoor swimming pool (at the Days Inn) and an outdoor recreation area (Scandia Family Center). Under Alternative B, 28 residences along SR 12 and I-80 would be affected in addition to the noise impacts under Alternative B, Phase 1, resulting in a total of 49 affected units (Table 3.2.7-5).

Under Alternative C, Phase 1, one residence adjacent to I-680 would be exposed to high noise levels, resulting in a total of one unit affected (refer to Table 3.2.7-6). Under Alternative C, residences along I-80 and SR 12 are included in the project area, resulting in a total of 37 affected units, as shown in Table 3.2.7-6. The units affected include 29 residences, an outdoor swimming pool (at the Days Inn) and an outdoor recreation area (Scandia Family Center).

As indicated in Table 3.2.7-4, design year with-project traffic noise levels are predicted to be more than 3 dB greater than design year no-project traffic noise levels. This increase is more than the threshold of a perceptible change (3 dB).

Under Alternative B, noise levels would increase at Venus Drive (Area F), Busch Drive (Area G), Marquette Way (Area H) and Burgundy Way (Area H). Noise levels would exceed the NAC at the Marquette Way. Under Alternative B, Phase 1, noise levels would increase at Burgundy Way (Area H) only, and would not approach or exceed the NAC. Under Alternative C, noise levels would increase at James Street (Area K), Sacramento Street (Area M), and Marquette Way (Area H), but would only approach or exceed the NAC at Marquette Way. No exposure of sensitive land uses to traffic noise is expected to occur under Alternative C, Phase 1. Under the No-Build Alternative, noise levels associated with traffic would increase in the future as traffic congestion associated with growth increases (Table 2.3.7-4).

None of the receptors within the project boundaries would be exposed to a substantial increase over existing noise levels under any of the project alternatives. Therefore, no adverse effects related to increased traffic noise are expected.

Table 3.2.7-4. Traffic Noise Impact Evaluation, I-80, I-680, and SR 12

Position	Location	Area	Existing Traffic Noise Level, dBA, $L_{eq}(h)$	Design-Year No-Project Traffic Noise Level, dBA, $L_{eq}(h)$	Design-Year With Project, Alternative B Phase 1			Design-Year With Project, Alternative B Buildout			Design-Year With Project, Alternative C Phase 1			Design-Year With Project, Alternative C Buildout			Traffic Noise Impact[a]
					Noise Level, dBA, $L_{eq}(h)$	Increase re Existing, dB	Increase re No-Project, dB	Noise Level, dBA, $L_{eq}(h)$	Increase re Existing, dB	Increase re No-Project, dB	Noise Level, dBA, $L_{eq}(h)$	Increase re Existing, dB	Increase re No-Project, dB	Noise Level, dBA, $L_{eq}(h)$	Increase re Existing, dB	Increase re No-Project, dB	
A06	Birkdale Circle	A	61	63	64	+ 3	+ 1	64	+ 3	+ 1	64	+ 3	+ 1	64	+ 3	+ 1	–
A11	Stoneridge Circle	A	62	64	65	+ 3	+ 1	65	+ 3	+ 1	65	+ 3	+ 1	65	+ 3	+ 1	–
A13	Stoneridge Circle	A	62	64	65	+ 3	+ 1	65	+ 3	+ 1	65	+ 3	+ 1	65	+ 3	+ 1	–
B01	Smith Lane	B	61	63	64	+ 3	+ 1	64	+ 3	+ 1	64	+ 3	+ 1	64	+ 3	+ 1	–
B04	Rolling Hills Park	B	67	68	69	+ 2	+ 1	69	+ 2	+ 1	69	+ 2	+ 1	69	+ 2	+ 1	A/E All alts
C01	Silverado Drive	C	61	63	63	+ 2	0	64	+ 3	+ 1	63	+ 2	0	64	+ 3	+ 1	–
C04	Silverado Drive	C	60	62	63	+ 3	+ 1	63	+ 3	+ 1	63	+ 3	+ 1	63	+ 3	+ 1	–
C05	Silverado Drive	C	60	62	62	+ 2	0	63	+ 3	+ 1	62	+ 2	0	63	+ 3	+ 1	–
C15	Rodriguez High School	C	53	55	57	+4	+2	57	+4	+2	57	+4	+2	57	+4	+2	–
D01	Lopes Road	D	70	71	70	0	- 1	71	+ 1	0	n/a	n/a	n/a	n/a	n/a	n/a	A/E, Alt. B(ph1) B
E01	Bridgeport Avenue	E	68	70	70	+ 2	0	70	+ 2	0	n/a	n/a	n/a	n/a	n/a	n/a	A/E, Alt. B(ph1) B
E05	Cordelia Road	E	67	69	68	+ 1	- 1	69	+ 2	0	n/a	n/a	n/a	n/a	n/a	n/a	A/E, Alt. B(ph1) B
E10	Ritchie Road	E	63	63	63	0	0	63	0	0	n/a	n/a	n/a	n/a	n/a	n/a	–
E11	Ramsey Road	E	66	68	69	+ 3	+ 1	69	+ 3	+ 1	n/a	n/a	n/a	n/a	n/a	n/a	A/E, Alt. B(ph1) B
E12	Ramsey Road	E	73	75	74	+ 1	- 1	74	+ 1	- 1	74	+ 1	- 1	74	+ 1	- 1	A/E All alts
F01	Venus Drive	F	53	55	57	+ 4	+ 2	59	+ 6	+ 4	56	+ 3	+ 1	57	+ 4	+ 2	–
G01	Busch Drive Baseball Diamond	G	60	62	n/a	n/a	n/a	65	+ 5	+ 3	n/a	n/a	n/a	64	+ 4	+ 2	–
H01	Marquette Way	H	64	66	n/a	n/a	n/a	68	+ 4	+ 2	n/a	n/a	n/a	68	+ 4	+ 2	A/E, Alt. B C
H06	Marquette Way	H	64	66	n/a	n/a	n/a	69	+ 5	+ 3	n/a	n/a	n/a	69	+ 5	+ 3	A/E, Alt. B C
H09	Marquette Way	H	62	64	n/a	n/a	n/a	68	+ 6	+ 4	n/a	n/a	n/a	68	+ 6	+ 4	A/E, Alt. B C
H11	Marquette Way	H	61	63	n/a	n/a	n/a	66	+ 5	+ 3	n/a	n/a	n/a	66	+ 5	+ 3	A/E, Alt. B C
H12	Marquette Way	H	59	61	n/a	n/a	n/a	62	+ 3	+ 1	n/a	n/a	n/a	62	+ 3	+ 1	–
H21	Burgundy Way	H	59	61	64	+ 5	+ 3	64	+ 5	+ 3	n/a	n/a	n/a	63	+ 4	+ 2	–
I01	Diamond Way	I	59	61	59	0	- 2	59	0	- 2	n/a	n/a	n/a	60	+ 1	- 1	–
I11	Diamond Way	I	59	61	62	+ 3	+ 1	62	+ 3	+ 1	n/a	n/a	n/a	62	+ 3	+ 1	–
J01	Ontario Street	J	59	61	61	+ 2	0	61	+ 2	0	n/a	n/a	n/a	63	+ 4	+ 2	–
K01	James Street	K	58	61	n/a	n/a	n/a	58	0	- 3	n/a	n/a	n/a	62	+ 4	+ 1	–
K04	James Street	K	62	62	n/a	n/a	n/a	64	+ 2	+ 2	n/a	n/a	n/a	65	+ 3	+ 3	–
L04	Illinois Street	L	59	61	n/a	n/a	n/a	62	+ 3	+ 1	n/a	n/a	n/a	63	+ 4	+ 2	–
L06	Ohio Street	L	61	63	n/a	n/a	n/a	65	+ 4	+ 2	n/a	n/a	n/a	64	+ 3	+ 1	–
M01	Sacramento Street	M	51	53	n/a	n/a	n/a	54	+ 3	+ 1	n/a	n/a	n/a	59	+ 8	+ 6	–
N01	Chadbourne Road	N	63	64	n/a	n/a	n/a	65	+ 2	+ 1	n/a	n/a	n/a	65	+ 2	+ 1	–
O01	Hale Ranch Road	O	70	72	n/a	n/a	n/a	73	+ 3	+ 1	n/a	n/a	n/a	73	+ 3	+ 1	A/E All alts
P01	Cordelia Road	P	65	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	–[b]
Q01	Fairfield Commons (future)	Q	54	55	n/a	n/a	n/a	56	+ 2	+ 1	n/a	n/a	n/a	56	+ 2	+ 1	–
Q03	Fairfield Commons (future)	Q	55	56	n/a	n/a	n/a	57	+ 2	+ 1	n/a	n/a	n/a	57	+ 2	+ 1	–
Q04	end of Russell Road	Q	71	72	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	n/a[b]	–[b]
R01	Days Inn Pool (R1)	R	74	75	76	+ 2	+ 1	76	+ 2	+ 1	n/a	n/a	n/a	76	+ 2	+ 1	A/E All alts
R02	Scandia Rec Center (R2)	R	78	79	80	+ 2	+ 1	80	+ 2	+ 1	n/a	n/a	n/a	80	+ 2	+ 1	A/E All alts

[a] A/E indicates that traffic noise levels approach or exceed the NAC for the corresponding Activity Categories in the area.
[b] This property is taken under future project alternatives

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Table 3.2.7-5. Counts of Affected Residences, Alternative B, and Alternative B, Phase 1

Area	Primary Source of Traffic Noise	Alternative B, Phase 1		Alternative B	
		Approach or Exceed NAC	Substantial Increase over Existing Noise Levels	Approach or Exceed NAC	Substantial Increase over Existing Noise Levels
A	I-680	0	0	0	0
B	I-680	0	0	0	0
C	I-680	0	0	0	0
D	I-680	2	0	2	0
E	I-680	11	0	11	0
F	North Connector	0	0	0	0
G	SR 12	N/A	N/A	0	0
H	SR 12	0	0	25	0
I	SR 12	0	0	0	0
J	SR 12	0	0	0	0
K	SR 12	N/A	N/A	0	0
L	SR 12	N/A	N/A	0	0
M	SR 12	N/A	N/A	0	0
N	I-80	N/A	N/A	0	0
O	I-80	N/A	N/A	3	0
P	I-80	N/A	N/A	0	0
Q	I-80	0	0	0	0
R	I-80	8[a]	0	8[a]	0
Total Units Affected		**21**	**0**	**49**	**0**

Note: N/A = not applicable.

[a] Impact count for non-residential outdoor use is based on one unit per 100 linear feet of highway frontage.

Table 3.2.7-6. Counts of Affected Residences, Alternative C and Alternative C, Phase 1

Area	Primary Source of Traffic Noise	Alternative C, Phase 1		Alternative C	
		Approach or Exceed NAC	Substantial Increase over Existing Noise Levels	Approach or Exceed NAC	Substantial Increase over Existing Noise Levels
A	I-680	0	0	0	0
B	I-680	0	0	0	0
C	I-680	0	0	0	0
D	I-680	N/A	N/A	N/A	N/A
E	I-680	1	0	1	0
F	North Connector	0	0	0	0
G	SR 12	N/A	N/A	0	0
H	SR 12	N/A	N/A	25	0
I	SR 12	N/A	N/A	0	0
J	SR 12	N/A	N/A	0	0
K	SR 12	N/A	N/A	0	0
L	SR 12	N/A	N/A	0	0
M	SR 12	N/A	N/A	0	0
N	I-80	N/A	N/A	0	0
O	I-80	N/A	N/A	3	0
P	I-80	N/A	N/A	0	0
Q	I-80	N/A	N/A	0	0
R	I-80	N/A	N/A	8[a]	0
Total Units Affected		**1**	**0**	**37**	**0**

Note: N/A = not applicable.

[a] Impact count for nonresidential outdoor use is based on one unit per 100 linear foot of highway frontage.

Exposure of Noise-Sensitive Land Uses to Construction Noise

Construction noise is regulated by the Department's Standard Specifications Section 14-8, "Sound Control Requirements," which states that noise levels generated during construction will comply with applicable local, state, and federal regulations and that all equipment will be fitted with adequate mufflers according to the manufacturers' specifications.

Table 3.2.7-7 summarizes noise levels produced by construction equipment that is commonly used on roadway construction projects. Construction equipment is expected to generate noise levels ranging from 70 to 90 dB at a distance of 50 feet, and noise produced by construction equipment would be reduced over distance at a rate of about 6 dB per doubling of distance.

Table 3.2.7-7. Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)
Scrapers	89
Bulldozers	85
Heavy trucks	88
Backhoe	80
Pneumatic tools	85
Concrete pump	82

Source: Federal Transit Administration 2006.

No adverse noise effects from construction are anticipated, because construction would be conducted in accordance with the Department's Standard Specifications Section 14-8 and applicable local noise standards. Construction noise would be short-term, intermittent, and masked by local traffic noise. Under the No-Build Alternative, no new noise effects associated with project construction would occur.

Avoidance, Minimization, and/or Mitigation

Noise Abatement Evaluation under 23 CFR 772

None of the receptors within the project boundaries would be exposed to a substantial increase (greater than 12 dB) in future predicted noise levels under any of the project alternatives. Consequently, no adverse effects under NEPA were identified. However, several receptors within the project area would experience high noise levels that approach or exceed the NAC thresholds. Under the requirements of 23 CFR 772 noise abatement in the form of noise barriers was considered for the following areas that are predicted to experience high noise levels:

- Area E (All Project Alternatives).
- Area H (Project Alternatives B and C).
- Area O (Project Alternatives B and C).
- Area R (Project Alternatives B and C, Alternative B, Phase 1).

Potential noise abatement measures include the following:

- Avoiding the impact by using design alternatives, such as altering the horizontal and vertical alignment of the project.
- Constructing noise barriers.
- Acquiring property to serve as a buffer zone.
- Using traffic management measures to regulate types of vehicles and speeds.
- Acoustically insulating public-use or nonprofit institutional structures.

Because of the configuration and location of the proposed project, noise barriers are the only form of noise abatement evaluated in this report. Each noise barrier has been evaluated for feasibility based on achievable noise reduction. For each noise barrier found to be acoustically feasible, reasonable cost allowances were calculated. The Department's 2009 base cost-per-residence allowance is $31,000. Additional allowance dollars are added to the base allowance based on absolute noise levels, the increase in noise levels resulting from the proposed project, achievable noise reduction, and the date of building construction in the area. Worksheets in Appendix B of the Noise Study summarize the reasonable cost allowance calculations, based on the procedure outlined in the Protocol.

For any noise barrier to be considered reasonable from a cost perspective the estimated cost of the noise barrier should be equal to or less than the total cost allowance calculated for the barrier. The cost calculations of the noise barrier should include all items appropriate and necessary for construction of the barrier, such as traffic control, drainage modification, and retaining walls. The design of noise barriers presented in this report is preliminary only and has been conducted at a level appropriate for environmental review but not for final design of the proposed project.

Preliminary information on the physical location, length, and height of noise barriers is provided in this report. If pertinent parameters change substantially during the final project design, preliminary noise barrier designs may be modified or eliminated from the final project. A final decision on the construction of the noise abatement will be made upon completion of the project design.

Area D (Alternatives B and Alternative B, Phase 1)

The traffic noise modeling results in Table 3.2.7-4 indicate that traffic noise levels at residences in Area D will be in the range of 70–71 dBA-L_{eq}[h]. Traffic noise impacts are predicted to occur at two residences in this area under Alternative B. Receivers in Area D lie outside of the project area under Alternative C, so they are not considered for noise abatement under Alternative C.

Noise Barrier D was designed for the edge of southbound I-680, and was analyzed for feasibility to benefit receivers in Area D. Detailed modeling analysis of Barrier D indicates that a barrier with a height of up to 16 feet would provide a maximum noise reduction of less than 5 dB at noise-sensitive receiver locations. Barrier D is therefore not considered to be feasible.

A noise barrier along the western edge of Lopes Road would not be feasible because the affected residences require access to Lopes Road, and an acoustically effective barrier would block driveway access. Therefore, noise barriers are not considered a feasible noise abatement option for Area D.

Area E

Table 3.2.7-4 indicates that traffic noise levels at residences in Area E will be in the range of 63–74 dBA-L_{eq}[h]. Traffic noise impacts are predicted to occur at 11 residences in this area.

Noise Barrier E-1 was designed for the northbound edge of I-680, and was analyzed for feasibility to benefit receivers adjacent to Cordelia Road and Bridgeport Avenue. Traffic noise from local roadways such as Cordelia Road contributes significantly to sound levels, decreasing the potential for a noise barrier along I-680 to benefit receivers adjacent to Cordelia Road. Detailed modeling analysis of Barrier E-1 indicates that a barrier with a height of 16 feet would provide a maximum noise reduction of less than 5 dB at noise-sensitive first-row receiver locations. Barrier E-1 is therefore not considered to be feasible.

Construction of noise barriers along local roads such as Cordelia Road would not be feasible because the affected residences require access to the local roads, and an acoustically effective barrier would block those access points.

Noise Barrier E-2 was designed to benefit a single ranch property south of Bridgeport Avenue, and was evaluated for wall heights in the range of 6–16 feet. Barrier E-2 would extend approximately 1,160 linear feet within Caltrans right-of-way between I-680 northbound and Ramsey Road. Detailed modeling analysis of Barrier E-2 indicates that construction of this barrier at a height of ten to 16 feet would provide noise reduction of 5 dB or more at noise-sensitive receiver locations. Barrier E-2 is therefore considered feasible from an acoustical perspective. Barrier E-2 would meet the Department's line-of-sight requirement at a barrier height of 12 feet. Table 3.2.7-8 summarizes the calculated reasonable allowances for Noise Barrier E-2. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study. Barrier E-2 is shown in Figure 3.2.7-17.

Table 3.2.7-8. Summary of Reasonableness Determination Data—Barrier E-2, Ramsey Road

Barrier I.D.: E-2, Ramsey Road						
Predicted Sound Level without Barrier						
Design-year noise level, dBA-L_{eq}[h]	69					
Design-year noise level minus existing noise level, dB	3					
Design Year with Barrier	**Height: 6 feet**	**Height: 8 feet**	**Height: 10 feet**	**Height: 12 feet**	**Height: 14 feet**	**Height: 16 feet**
Barrier noise reduction, dB	3	4	5	6	6	7
Number of benefited residences	0	0	1	1	1	1
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	$45,000	$45,000	$45,000	$47,000	$47,000	$47,000
Total reasonable allowance	N/A	N/A	$45,000	$47,000	$47,000	$47,000

Note: N/A = not applicable.

Noise Barrier E-3 was analyzed for feasibility to benefit a single ranch property east of Red Top Road. Barrier E-3 would extend approximately 750 linear feet within Caltrans right-of-way between I-680 northbound and Ramsey Road. Barrier E-3 was evaluated for wall heights in the range of 6–16 feet, and would meet the Caltrans line-of-sight requirement at a barrier height of 12 feet. Detailed modeling analysis of Barrier E-3 indicates that a barrier with a height of up to 16 feet would provide noise reduction of 5 dB or more at noise-sensitive receiver locations. Barrier E-3 is therefore considered feasible from an acoustical perspective. Table 3.2.7-9 summarizes the calculated reasonable allowances for Barrier E-3. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study. Barrier E-3 is shown in Figure 3.2.7-17.

Table 3.2.7-9. Summary of Reasonableness Determination Data—Barrier E-3, Ramsey Road

Barrier I.D.: E-3, Ramsey Road						
Predicted Sound Level without Barrier						
Design-year noise level, dBA-L_{eq}[h]	74					
Design-year noise level minus existing noise level, dB	1					
Design Year with Barrier	**Height: 6 feet**	**Height: 8 feet**	**Height: 10 feet**	**Height: 12 feet**	**Height: 14 feet**	**Height: 16 feet**
Barrier noise reduction, dB	5	5	6	7	7	7
Number of benefited residences	1	1	1	1	1	1
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	$45,000	$45,000	$47,000	$47,000	$47,000	$47,000
Total reasonable allowance	$45,000	$45,000	$47,000	$47,000	$47,000	$47,000

Note: N/A = not applicable.

Area H (Project Alternatives B and C)

The traffic noise modeling results in Table 3.2.7-4 indicate traffic noise levels residences in Area H will be in the range of 62–69 dBA-L_{eq}[h]. Traffic noise impacts are predicted to occur at 25 residences in this area. There are two existing noise barriers within Area H. The first noise barrier (Barrier H-1) has a nominal height of eight feet and extends along the SR 12E right-of-way parallel to Columbus Drive to the Chadbourne Road exit ramp. All 25 affected receivers are first-row residences located behind Barrier H-1.The second barrier (Barrier H-2) has a nominal height of ten feet and extends along the SR 12E right-of-way from Beck Avenue to the end of Burgundy Way.

Barrier H-1 would extend approximately 2,250 linear feet within SR 12 right-of-way and perpendicular to SR 12 along the existing noise barrier footings on both sides of the neighborhood enclosing Marquette Way (see Figure 3.2.7-18). Detailed modeling analysis of Barrier H-1 indicates that increasing the height of the existing barrier to at least 14 feet would provide a noise reduction of 5 dB or more at first-row residences. Increasing the height of existing Barrier H-1 is therefore considered feasible from an acoustical perspective.

Increasing the height of Barrier H-1 to 14 feet would meet the Department’s line-of-sight requirement. Table 3.2.7-10 summarizes the calculated reasonable allowances for wall heights from ten to 16 feet. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study. Barrier H-1 is shown in Figure 3.2.7-18 in Volume 2.

Segments of Noise Barrier H-1 lie outside of Caltrans right-of-way, so would need to meet additional requirements before approval for construction. First, all affected property owners would need to approve construction of the segments of the Barrier H-1 which lie outside Caltrans right-of-way. Second, each affected property owner must enter into a contract agreement with Caltrans to specify responsibilities related to construction and maintenance of noise barriers.

Table 3.2.7-10. Summary of Reasonableness Determination Data—Barrier H-1, Marquette Way

Barrier I.D.: H-1, Marquette Way						
Predicted Sound Level without Barrier						
Design-year noise level, dBA-L_{eq}[h]	69					
Design-year noise level minus existing noise level, dB	6					
Design Year with Barrier	**Height: 6 feet**	**Height: 8 feet**	**Height: 10 feet**	**Height: 12 feet**	**Height: 14 feet**	**Height: 16 feet**
Barrier noise reduction, dB	0	0	2	4	6	7
Number of benefited residences	0	0	0	0	25	25
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	$45,000	$45,000	$45,000	$45,000	$47,000	$47,000
Total reasonable allowance	N/A	N/A	N/A	N/A	$1,175,000	$1,175,000

Note: N/A = not applicable.

Detailed modeling analysis of Noise Barrier H-2 indicates that increasing the height of the barrier to 16 feet would result in a maximum noise reduction of less than 5 dB at noise-sensitive first-row receiver locations. No receivers would benefit from increasing the height of Barrier H-2. Increasing the height of Barrier H-2 is therefore not considered to be feasible.

Area O (Project Alternatives B and C)

The traffic noise modeling results in Table 3.2.7-4 indicate that traffic noise levels at single-family residences will be up to 73 dBA-L_{eq}[h]. Traffic noise impacts are predicted to occur at three residences in this area. No noise barriers are currently located in this area. Barrier O (also Barrier SB4 in the I-80 Eastbound Cordelia Truck Scales Relocation Project) consists of two barriers that would provide shielding for traffic noise from both I-80 and the SR 12E flyover transition ramp. Barrier O would have a total length of approximately 4,800 linear feet within Caltrans right-of-way adjacent to I-80 eastbound to SR 12 transition ramps. Barrier O was evaluated for wall heights in the range of 6–16 feet, and would meet the Caltrans line-of-sight requirement at a barrier height of 12 feet. Detailed modeling analysis of Barrier O indicates that a barrier with a height of up to 16 feet would provide noise reduction of 5 dB or more at noise-sensitive receiver locations. Barrier O is therefore considered feasible from an acoustical perspective.

Table 3.2.7-11 summarizes the calculated reasonable allowances for the two barriers at equal heights. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study. Barrier O is shown in Figure 3.2.7-19 in Volume 2.

Table 3.2.7-11. Summary of Reasonableness Determination Data—Barrier O, Hale Ranch Road

Barrier I.D.: O (SB4), Hale Ranch Road						
Predicted Sound Level without Barrier						
Design-year noise level, dBA-L_{eq}[h]	73					
Design-year noise level minus existing noise level, dB	4					
Design Year with Barrier	**Height: 6 feet**	**Height: 8 feet**	**Height: 10 feet**	**Height: 12 feet**	**Height: 14 feet**	**Height: 16 feet**
Barrier noise reduction, dB	3	4	7	8	9	9
Number of benefited residences	0	0	1	3	3	3
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	$47,000	$47,000	$49,000	$49,000	$51,000	$51,000
Total reasonable allowance	N/A	N/A	$49,000	$147,000	$153,000	$153,000

Note: N/A = not applicable.

Area Q—Fairfield Corporate Commons

The Fairfield Corporate Commons project is currently under construction. The project is a mixed-use development that includes office buildings, single- and multi-family residential units, and a hotel. The Fairfield Corporate Commons Draft EIR included a noise study, which assessed noise impacts predicted to result from construction activities and operations from the long-term buildout of the project. The noise analysis was done to determine the project's conformity to local land use compatibility standards. The study determined that potentially significant impacts would occur at exterior areas of frequent human use associated with the planned residential use.

Based on the preliminary configuration of land use studied in the report, abatement in the form of noise barriers was required to reduce impacts at exterior locations. However, David Feinstein of the City of Fairfield Planning Department confirmed in a September 25, 2009, telephone conversation with ICF Jones & Stokes personnel that residential outdoor use areas would be located behind continuous building structures, which would function as shielding elements from traffic noise on the North Connector and I-80.

The traffic noise modeling results in Table 3.2.7-4 indicate traffic noise levels at planned residential use areas associated with the future Fairfield Corporate Commons project would be up to 57 dBA-L_{eq}[h]. No traffic noise impacts are predicted to occur within the Fairfield Corporate Commons project.

In addition, an existing residence in Area Q is expected to be removed due to construction of a truck scales facility on westbound I-80 as part of the project. Therefore, no noise abatement was considered for Area Q.

Area R (Project Alternatives B and C, Alternative B, Phase 1)

The traffic noise modeling results in Table 3.2.7-4 indicate that traffic noise levels at Scandia Family Center and the outdoor pool area of the Days Inn will be up to 80 dBA-L_{eq}[h]. Traffic noise impacts are therefore predicted to occur in this area. No noise barriers are currently located in this area. The two-barrier system identified as Barrier R in Figure 3.2.7-20 in Volume 2 (Barrier NR for the I-80 HOV Lanes Project) was evaluated for wall heights in the range of 6–16

feet, and would meet the Caltrans line-of-sight requirement at a barrier height of 12 feet. The Barrier R two-barrier system would have a total length of approximately 1,400 linear feet within eastbound I-80 right-of-way. Detailed modeling analysis of Barrier R indicates that a barrier with a height of up to 16 feet would provide noise reduction of 5 dB or more at noise-sensitive receiver locations. Barrier R is therefore considered feasible from an acoustical perspective.

Table 3.2.7-12 summarizes the calculated reasonable allowances for this wall. Reasonable allowance calculation sheets are provided in Appendix B of the Noise Study.

Table 3.2.7-12. Summary of Reasonableness Determination Data—Barrier R, Pittman Road

Barrier I.D.: R (NR), Pittman Road						
Predicted Sound Level without Barrier						
Design-year noise level, dBA-L_{eq}[h]	80					
Design-year noise level minus existing noise level, dB	2					
Design Year with Barrier	**Height: 6 feet**	**Height: 8 feet**	**Height: 10 feet**	**Height: 12 feet**	**Height: 14 feet**	**Height: 16 feet**
Barrier noise reduction, dB	5	6	7	9	10	10
Number of benefited residences	7	7	8	8	8	8
New highway or more than 50% of residences predate 1978	Yes	Yes	Yes	Yes	Yes	Yes
Reasonable allowance per benefited residence	$49,000	$51,000	$51,000	$53,000	$53,000	$53,000
Total reasonable allowance	$343,000	$357,000	$408,000	$424,000	$424,000	$424,000

Note: N/A = not applicable.

Under with-project design-year conditions, receiver R02 (Volume 2, Figure 3.2.7-20) is predicted to be exposed to a noise level of 80 dBA L_{eq}. This location is therefore predicted to be exposed to a severe traffic noise impact as defined in the Protocol. Noise abatement that is not reasonable and feasible as defined in the Protocol may be considered for severe traffic noise impacts on a case-by-case basis. This type of abatement is called extraordinary abatement. Barrier R would provide at least 5 dB of noise reduction and would reduce noise to less than 74 dBA L_{eq} at this location at a height of eight feet (as shown in Appendix C of the Noise Study). In the event that this barrier is not determined to be reasonable and feasible, it may be considered for extraordinary abatement.

Noise Abatement Decision Report

A Noise Abatement Decision Report (NADR) was prepared to include noise abatement construction cost estimates that have been prepared by the project engineer based on site-specific conditions. These cost estimates are then compared to the total reasonableness allowances as shown in Table 3.2.7-13.

Table 3.2.7-13. Summary of Reasonableness Allowances and Cost Estimates for Evaluated Noise Barrier Designs

Height (ft)	Receivers Benefited	Barrier Length (linear feet)	Barrier Area (square feet)	Department Cost Allowance per Residence ($)	Department Reasonableness Allowance ($)	Estimated Construction Cost ($)	Cost-Reasonable?
Barrier H-1							
14	25	2,250	31,500	$47,000	$1,175,000	$1,560,000	No
16	25	2,250	36,000	$47,000	$1,175,000	$1,700,000	No
Barrier E-2							
10	1	1,160	11,600	$45,000	$45,000	$440,000	No
12	1	1,160	13,920	$47,000	$47,000	$500,000	No
14	1	1,160	16,240	$47,000	$47,000	$560,000	No
16	1	1,160	18,560	$47,000	$47,000	$600,000	No
Barrier E-3							
6	1	750	4,500	$45,000	$45,000	$200,000	No
8	1	750	6,000	$45,000	$45,000	$260,000	No
10	1	750	7,500	$47,000	$47,000	$280,000	No
12	1	750	9,000	$47,000	$47,000	$330,000	No
14	1	750	10,500	$47,000	$47,000	$370,000	No
16	1	750	12,000	$47,000	$47,000	$390,000	No
Barrier O							
10	1	4,800	48,000	$49,000	$49,000	$2,530,000	No
12	3	4,800	57,600	$49,000	$147,000	$2,800,000	No
14	3	4,800	67,200	$51,000	$153,000	$3,030,000	No
16	3	4,800	76,800	$51,000	$153,000	$3,250,000	No
Barrier R							
6	7	1,400	8,400	$49,000	$343,000	$500,000	No
8	7	1,400	11,200	$51,000	$357,000	$570,000	No
10	8	1,400	14,000	$51,000	$408,000	$650,000	No
12	8	1,400	16,800	$53,000	$424,000	$730,000	No
14	8	1,400	19,600	$53,000	$424,000	$790,000	No
16	8	1,400	22,400	$53,00	$424,000	$850,000	No

As shown in Table 3.2.7-13, the estimated construction costs exceed the reasonableness allowance in all cases. Accordingly, the barrier designs studied in this analysis are not considered reasonable from a cost perspective. The public input process has been completed and the final determination is that none of the barriers evaluated are reasonable from a cost perspective.

Minimize Construction Noise

The Department's Standard Specification Section 14-8.02 will be implemented to minimize noise effects from construction. In addition, the following measures may be implemented to further minimize noise effects from construction:

- Use of equipment with sound-control devices that are no less effective than those provided on the original equipment.
- Prohibition of the use of any equipment with an unmuffled exhaust.
- Changing the location of stationary construction equipment to maximize the distance to noise sensitive uses.

- Turning off idling equipment.
- Rescheduling construction activity to non-sensitive hours of the day.
- Notifying adjacent residents in advance of construction work.
- Installing acoustic barriers around stationary construction noise sources.

3.2.8 Energy

Regulatory Setting

The California Environmental Quality Act (CEQA) Guidelines, Appendix F, Energy Conservation, 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.

The National Environmental Policy Act (NEPA) (42 USC Part 4332) requires the identification of all potentially significant impacts on the environment, including energy impacts.

California's Energy Action Plan (updated in 2008) describes a coordinated implementation plan for state energy policies, and identifies specific action areas to ensure that California's energy resources are adequate, affordable, technologically advanced, and environmentally sound. In accordance with this plan, the first-priority actions to address California's increasing energy demands are energy efficiency and demand response (i.e., reduction of customer energy usage during peak periods to address system reliability and support the best use of energy infrastructure). Additional priorities include the use of renewable sources of power and distributed generation (i.e., the use of relatively small power plants near or at centers of high demand). To the extent that these actions are unable to satisfy the increasing energy demand and transmission capacity needs, clean and efficient fossil-fuel–fired generation is supported.

Affected Environment

This discussion is based primarily on the *Interstate 80/Interstate 680/State Route 12 Energy Technical Report* (Energy Report) prepared in 2010. The affected environment includes the physical boundaries of the roadway construction site as well as the total vehicle flow passing through the completed roadway. Traffic flow passing through the project area at build-out is intrinsically connected to traffic patterns throughout the region, underpinned by socioeconomic and regulatory factors throughout the state and nation. Thus the affected environment can best be thought of as the regional energy budget. For reasons discussed in detail below, a comprehensive analysis of the regional energy budget is beyond the scope of this report. This analysis therefore is restricted to direct energy consumption and indirect energy consumption as defined below.

Direct Energy Use

Direct energy use is the energy used in the actual propulsion of a vehicle using the facility. It can be measured in terms of the thermal value of the fuel (usually measured in British thermal units [BTUs]), the cost of the fuel, or the quantity of electricity used in the engine or motor.

Indirect Energy Use

Indirect energy is defined as all the remaining energy used to run a transportation system, including construction energy, maintenance energy, and any substantial impacts on energy expenditures related to project-induced land use changes and mode shifts, and any substantial changes in energy associated with vehicle operation, manufacturing or maintenance due to increased automobile use.

Determination of Adverse Effects

There are no thresholds of significance for energy consumption. Instead, the Department and the Federal Highway Administration (FHWA) require a discussion of the potential energy effects of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy.

A qualitative comparison of the project alternatives was employed in this analysis. Direct energy consumption was relatively assessed across the project alternatives through a comparison of peak vehicle miles traveled (VMT) (a.m. and p.m.), total VMT, and delay hours. To assess indirect energy consumption, the construction parameters of the project alternatives were compared. The qualitative analysis was determined to be the simplest way of comparing the project alternatives. This approach limits the need for assumptions and avoids significant limitations in standard, but outdated methodologies.

Historically, transportation energy studies quantified direct and indirect energy expenditures. Quantitative analyses of direct energy consumption were a summation of the peak and non-peak energy for vehicle movement for the analysis period, which was typically the period from the completion of project construction to 20 years following the completion of project construction. In assessing the direct energy impact, assumptions are made when considering various factors, including vehicle fleet mix, annual VMT, fuel economy, and variation of fuel consumption rates over time and by vehicle type. Additional assumptions were made, including:

- New-model fleet fuel efficiency would always be improving.
- Vehicle fuel usage in rural settings would differ from vehicle fuel usage in urban settings.
- Multiple occupant vehicles could use high occupancy vehicle lanes.
- Pavement would be maintained in fair to reasonable condition.

Quantification analyses of indirect energy were the summation of energy required to construct, operate, and maintain the transportation network, as well as to manufacture and maintain on-road vehicles and transit vehicles. This approach relied on factors (construction equipment operation energy factors and maintenance energy factors) that have remained unchanged for 30 years. The methodology to estimate construction energy expenditures using project construction cost requires adjusting future construction costs to the 1977 highway construction price index, which is almost always overlooked.

Today we can no longer make these same assumptions. The on-the-road vehicle fleet mix can vary in type and age with the economy. The on-the-road vehicle fleet fuel usage rates will depend on the on-the-road vehicle fleet mix and can be propelled by gasoline or diesel fuels as well as by other means, including gasoline-electric hybrids, plug-in electricity, fuel cells, and compressed natural gas. New-model vehicle fleet fuel usage rates are known, but we do not know how the rates may change as vehicles age. There may be new or improved technologies during the analysis period that constitute significant leaps in vehicle fuel conservation rates and efficiency. With fuel injection technology, the commonly used assumptions about cold starts are outdated and are not deemed appropriate for this analysis. Vehicle fleet fuel efficiency doesn’t always increase over time; vehicle fleet fuel efficiency actually decreased in the 1990s with the proliferation of sport utility vehicles. There may be no differences in vehicle fuel usage between

rural and urban settings with urban expansion. Express (toll) lanes may replace high-occupancy vehicle lanes in the near future. Pavement condition may become worse over time if funding for maintenance improvements remains scarce. Construction equipment and techniques have improved in the last 30 years, so construction equipment operation energy factors require updating.

The project alternatives in and of themselves cannot influence the vehicle fleet, future fuel economy, or development patterns that steer regional driving patterns. All project alternatives would be equally affected by these uncertain future scenarios. However, at the writing of this document, both the regulatory environment and the market are responding to climate change concerns, and a transformation of American driving patterns and technologies seems likely within a generation. The practice of assuming present-day fuel economy and fleet conditions is commonly implemented as a worst-case scenario for energy analyses, but at this time the likelihood of large-scale changes in this sector would render that assumption grossly incorrect. This analysis has therefore relied on a comparison of the raw traffic numbers as well as converting them to BTUs.

In addition, numerous contributors to the energy balance within a project area require complicated and rigorous economic analysis. The decision of where people buy homes, how far they regularly commute, the choice of personal vehicle and the fuel price at which consumers begin to alter their transportation patterns are just a few examples of large-scale patterns that ultimately affect the number of vehicles in the project area. Traditional energy analyses for roadway projects have ignored these components, and consequently attributed increases in VMT uniquely to the implementation of the project—a gross oversimplification of the regional energy budget.

With so many unknowns and a multitude of future energy scenarios, a quantitative analysis has a high risk of being inaccurate and meaningless. Consequently, a qualitative analysis would provide more useful information upon which to judge a proposed project and its alternatives. The qualitative approach employed is described in detail in the “Methods” section.

Methods

The energy analysis addresses both direct and indirect energy. The direct energy analysis includes the potential for increased energy consumed by fossil-fuel–powered vehicles using the interchange. A discussion of motor vehicle traffic (VMT and average travel speeds) through the interchange is a component of the direct energy analysis because VMT and speeds can infer direct energy consumption. These VMT values were converted to BTUs based on anticipate future fuel economies (U.S. Department of Energy 2012; California Air Resources Board 2012

The indirect energy analysis addresses the energy associated with construction and maintenance of the interchange and other roadway infrastructures. This approach compares the amounts of various construction materials required for each alternative. Construction-related energy consumption and energy consumption embodied in materials production is assumed to be directly proportional to roadway elevation, length, area and volume needed. By comparing the raw materials employed, the need to use speculative or outdated factors relating energy consumption to cost are avoided. The cost of acquiring individual materials may vary

dramatically in response to global demand and availability. A lump cost estimate masks the effects of these fluctuations and is only very indirectly related to the true energy consumed.

Direct Energy Consumption

This analysis compares the estimated VMT, delay, fuel consumption (gallons and BTU), and average network speed on the I-80/I-680/SR 12 interchange system-wide measure of effectiveness network (i.e., the portion of the network included in the traffic study) that would result under implementation of the project alternatives. The analysis parallels the *Air Quality Study Report* of the EIR by presenting direct energy (fuel consumption through VMT) calculations associated with estimated vehicle speeds from the traffic study.

A comparison of traffic metrics in the project area in 2015 and 2035 are shown in Tables 3.2.8-1 and 3.2.8-2. It is assumed that societal, economic, or regulatory changes affecting fuel economy are equally reflected in the VMTs for each project alternative. Thus assumed fuel economy is not required to convert VMT to energy consumption in order to compare alternatives.

Table 3.2.8-1. Traffic Flow during Operations in Year 2015 and Ranking of Alternatives (score in parenthesis)

Vehicles		No-Build	Alternative B Phase 1	Alternative C Phase 1
Project distance (miles)		–	6.23	10.17
VMT/hour	a.m. p.m.	449,870 *(0)* 480,410 *(0)*	451,325 *(1)* 531,935 *(1)*	448,800 *(0)* 516,055 *(0)*
Vehicle hours of delay/hour	a.m. p.m.	1,075 *(0)* 5,100 *(1)*	840 *(0)* 2,150 *(0)*	1,105 *(1)* 3,110 *(0)*
Average network speed (miles per hour)	a.m. p.m.	51.2 *(1)* 36.2 *(1)*	52.6 *(1)* 47.6 *(0)*	51.0 *(1)* 43.3 *(0)*
Daily VMT		4,186,260 *(0)*	4,424,670 *(1)*	4,341,848 *(0)*
Off-peak VMT		3,255,980 *(0)*	3,441,410 *(1)*	3,376,993 *(0)*
Diesel Consumption (gal) [a]		33,079 *(0)*	34,963 *(1)*	34,309 *(0)*
Gasoline Consumption (gal) [b]		210,631 *(0)*	222,626 *(1)*	218,459 *(0)*
Total BTU [c]		1.92 *(0)*	2.03 *(1)*	2.00 *(0)*
Total score		***3***	***8***	***2***

Notes:

a. Fuel economy based on EMFAC2011 model run for diesel trucks in Solano County in 2015 (7.8 miles per gallon) (California Air Resources Board 2012). Values do not account for vehicle delay or speed.

b. Fuel economy based on future projections for passenger vehicles assuming implementation of future CAFÉ standards (34.1 miles per gallon) (U.S. Department of Energy 2012). Values do not account for vehicle delay or speed.

c. Assumes the BTU content of diesel fuel is 138,690 and the BTU content of gasoline fuel is 125,000

Source: Final Traffic Operations Report.

Table 3.2.8-2. Traffic Flow during Operations in Year 2035 and Ranking of Alternatives (score in parentheses)

Peak Hour Vehicles		No-Build	Alternative B	Alternative C	Alt B, Ph 1	Alt C, Ph 1
Project distance (miles)	–	–	21.17	22.95	6.23	10.17
VMT/hour	a.m. p.m.	539,445 *(0)* 413,160 *(0)*	575,300 *(0)* 660,290 *(0)*	577,480 *(1)* 660,555 *(1)*	564,605 *(1)* 575,815 *(1)*	546,625 *(0)* 480,410 *(0)*
Vehicle hours of delay/hour	a.m. p.m.	3,695 *(1)* 19,065 *(1)*	1,335 *(0)* 5,420 *(0)*	1,260 *(0)* 5,995 *(0)*	1,845 *(0)* 10,155 *(0)*	3,020 *(1)* 16,095 *(1)*
Average network speed (miles per hour)	a.m. p.m.	41.8 *(1)* 15.9 *(1)*	52.4 *(0)* 40.1 *(0)*	52.7 *(0)* 38.5 *(0)*	48.9 *(0)* 28.9 *(0)*	44.2 *(0)* 19.8 *(0)*
Daily VMT	–	4,286,723 *(0)*	5,560,155 *(0)*	5,571,158 *(1)*	5,131,890 *(1)*	4,621,658 *(0)*
Off-peak VMT	–	3,334,118 *(0)*	4,324,565 *(0)*	4,333,123 *(1)*	3,991,470 *(1)*	3,594,623 *(0)*
Diesel Consumption (gal) [a]		32,686 *(0)*	42,395 *(0)*	42,479 *(1)*	39,130 *(0)*	35,239 *(0)*
Gasoline Consumption (gal) [b]		148,284 *(0)*	192,334 *(0)*	192,714 *(1)*	177,519 *(0)*	159,870 *(0)*
Total BTU [c]		1.42 *(0)*	1.84 *(0)*	1.85 *(1)*	1.70 *(0)*	1.53 *(0)*
Total points	**–**	***4***	***0***	***7***	***4***	***2***

Source: Final Traffic Operations Report.

[a] Fuel economy based on EMFAC2011 model run for diesel trucks in Solano County in 2035 (8.1 miles per gallon) (California Air Resources Board 2012). Values do not account for vehicle delay or speed.

[b] Fuel economy based on future projections for passenger vehicles assuming implementation of future CAFÉ standards (49.6 miles per gallon) (U.S. Department of Energy 2012). Values do not account for vehicle delay or speed.

[c] Assumes the BTU content of diesel fuel is 138,690 and the BTU content of gasoline fuel is 125,000.

Tables 3.2.8-1 and 3.2.8-2 utilize a point system to compare No-Build Alternative with the various full-build alternatives (Alternative B and Alternative C) based on the various traffic flow metrics. One point was assigned to the alternative with the larger value for a particular traffic metric, presumably resulting in higher energy consumption relative to the other alternatives. The build and no-build alternatives are compared to estimate which would result in greater energy consumption, and a point is given if the alternative would potentially increase energy relative to the other alternatives. The higher the total points for each alternative, the greater the assumed direct energy consumption.

When comparing the fundable first phases of the alternatives to the no-build conditions, Alternative B, Phase 1 would result in increase in peak hourly, daily, and off-peak VMT, while decreasing hours of delay when compared to both Alternative C, Phase 1, and the No-Build Alternative. The fundable first phases of both alternatives would increase VMT, reduce hours of delay, increase average network speeds, and increase fuel consumption over 2035 no-build conditions. In general, energy consumption is minimized under traffic conditions that minimize delay hours, maintain speeds between 45 and 55 mph, and limit the need for vehicles to exit the freeway onto surface streets in order to avoid heavy traffic conditions. The relative scoring system shown in Table 3.2.8-1 indicates that at 2015, Alternative C, Phase 1 is the better performing build alternative for the specific metrics listed. However, neither fundable first phase would result in wasteful or excessive use of direct energy.

When comparing the two full build alternatives to no-build conditions, Alternative C would increase peak hourly VMT, daily VMT, and off-peak VMT compared to both Alternative B and the No-Build Alternative. Average network speed would improve for both build alternatives, but the resulting difference in fuel consumption between the two is considered negligible. Alternative C would result in a greater increase in VMT relative to the No-Build Alternative and

would decrease a.m. hours of delay and a.m. network speed. Alternative B would improve p.m. hours of delay and network speed. Total VMT is directly proportional to fuel consumed while average network speed is inversely proportional, through a certain range. The relative scoring system shown in Table 3.2.8-2 indicates that at 2035, Alternative B is the better performing full-build alternative for the specific metrics listed. However, neither full-build alternative would result wasteful or excessive use of direct energy.

This analysis does not take into account vehicles leaving the freeway in response to traffic conditions. The fuel consumption analysis is also based on assumptions about the future vehicle fleet and fuel economy. The analysis also does not account for changes in fuel consumption related to vehicle speeds and/or increased delay. Neglecting these activities likely introduces greatest error into the No-Build scenario because hours of delay are highest for this Alternative. A rigorous analysis accounting for these factors would allow more clear differentiation of Alternatives B and C, although it is expected that direct energy consumption is similar. Based on the data presented in Tables 3.2.8-1 and 3.2.8-2, Alternatives B and C should be considered comparable in 2035 for direct energy consumption, with Alternative B as a slightly better alternative.

Indirect Energy Consumption

This analysis compares the quantities of material for structures construction and numbers of structure types for the No-Build Alternative, Alternative B, and Alternative C. An additional metric used is lane-miles of roadway requiring maintenance after construction is complete. The total amount of energy required is inferred from these metrics and no assumptions regarding cost were made. Because many of the alternatives included in the proposed project are at conceptual planning stages and detailed construction information, such as the number of equipment, materials, and labor hours are not available, no detailed quantitative assessment of construction and maintenance impacts is possible. Were this information available, materials-specific energy factors and equipment-specific fuel economy could be employed to calculate construction-related energy consumption.

The qualitative comparison analysis presented here assumes that larger amounts of materials equates with more energy use due to increased labor hours, increased hauling of materials, and increased embodied energy consumption in materials manufacture. Construction- and maintenance-related metrics are presented for comparison in Table 3.2.8-3. An identical scoring system to that used for the direct energy evaluation was applied here.

Table 3.2.8-3. Materials Consumption for Construction and Maintenance and Ranking of Alternatives (score in parentheses)

Indirect Energy	No-Build	Alternative B	Alternative C	Alt B, Phase 1	Alt C, Phase 1
Roadway excavation (cubic yard [cy])	–	2,800,000 *(1)*	2,523,000 *(0)*	750,000 *(0)*	2,187,000 *(1)*
Imported borrow (cy)	–	1,120,000 *(0)*	2,129,000 *(1)*	75,000 *(0)*	607,400 *(1)*
Portland cement concrete (PCC) pavement roadway (cy)	–	220,000 *(1)*	126,852 *(0)*	64,000 *(0)*	137,611 *(1)*
Asphalt concrete (AC) Pavement (cy)	–	280,000 *(0)*	302,333 *(1)*	60,000 *(1)*	19,393 *(0)*
Bridge structures PCC (cy)	–	106,000 *(0)*	115,050 *(1)*	54,000 *(0)*	80,470 *(1)*
Bridge structures rebar (pounds)	–	22,000,000 *(0)*	23,895,000 *(1)*	11,000,000 *(0)*	16,713,000 *(1)*
Lighting (units)	–	305 *(1)*	206 *(0)*	130 *(1)*	108 *(0)*
Traffic signals (units)	–	22 *(1)*	16 *(0)*	8 *(1)*	7 *(0)*
Overhead sign structures (units)	–	20 *(0)*	20 *(0)*	10 *(0)*	10 *(0)*
Ramp meters (units)	–	19 *(1)*	17 *(0)*	5 *(0)*	6 *(1)*
Striping (feet)	–	1,788,000 *(1)*	1,566,000	710,000 *(1)*	693,800 *(0)*
Retaining walls (square feet)	–	475,000 *(1)*	407,700 *(0)*	388,300 *(1)*	325,100 *(0)*
Noise barriers (square feet)	–	25,000 *(0)*	25,000 *(0)*	33,000 *(1)*	0 *(0)*
Barriers and guardrails (feet)	–	108,000 *(0)*	110,400 *(1)*	32,300 *(0)*	34,800 *(1)*
Sidewalk, curb, and gutter(square feet)	–	243,500 *(1)*	117,800 *(0)*	120,700 *(0)*	143,880 *(1)*
Temporary MSE walls (square feet)	–	50,000 *(0)*	50,000 *(0)*	38,000 *(1)*	0 *(0)*
Total for all structures (square feet)		806,704 *(0)*	1,050,281 *(1)*	398,195 *(0)*	619,000 *(1)*
PCC lane-miles	75.83 *(0)*	86.34 *(0)*	89.75 *(1)*	29.34 *(0)*	48.13 *(1)*
AC lane-miles	17.76 *(0)*	20.57 *(0)*	25.36 *(1)*	0.98 *(0)*	9.03 *(1)*
Total Points	***0***	***8***	***8***	***6***	***11***

Source: John Thomson, personal communication, 2009.

Note: Construction cost estimate sheets are located in Appendix A of the *Interstate 80/Interstate 680/State Route 12 Energy Technical Report.*

Table 3.2.8-3 indicates that construction of Alternative B will require a larger volume of excavated roadway and a larger area of asphalt concrete (AC). Additionally, Alternative B requires more material associated with edge drains, median islands, sidewalk, curbs and gutters as compared to Alternative C. Conversely, construction of Alternative C will require a larger area be covered with Portland cement concrete (PCC) pavement and more barriers and guardrails. The total square footage of structures as defined by the client is larger in Alternative C. The total lane miles of roadway requiring maintenance would be higher for Alternative C. Without a more rigorous assessment of the energy associated with each of the unique construction activities listed in Table 3.2.8-3, it is impossible to quantify the total energy consumed for the aggregate of construction tasks. Some construction activities may be inherently more energy intensive than others, and thus apparent energy benefits in one metric could be negated in another. In general, Alternative B has larger values in more construction categories than Alternative C.

The estimated number of lane-miles for Alternative B, Alternative C, Alternative B Phase 1, and Alternative C, Phase 1 (Table 3.2.8-3) served as an estimate for maintenance energy usage. Based on the information from the *Draft Interchange Pavement and Interchange Configuration Data* (Nolte Associates 2009), the total estimated PCC and AC lane-miles for Alternative B and Alternative C are estimated to be approximately 86 to 90 lane-miles for PCC pavements and 20 to 25 lane-miles for AC pavements. According to Table C-14 in Appendix C of the Caltrans 1983 report, the estimated amount of energy factor required to maintain the roadway is approximately 16.3 and 17.8 billion BTUs per lane-mile for PCC and AC pavements, respectively.

According to the project description, Alternative C will have considerably more PCC and AC pavement to maintain than Alternative B and No-Build scenarios. For the fundable first phases of the project alternatives, Alternative C, Phase 1 will require more maintenance energy than Alternative B, Phase 1.

Based on the data presented in Table 3.2.8-3, Alternative B and C would result in comparable levels of indirect energy consumption. For the fundable first phases of the project alternatives, Alternative B, Phase 1 would result in slightly less indirect energy consumption. However, neither project alternative nor their fundable first phases are anticipated to result in wasteful or excessive indirect energy expenditures.

Environmental Consequences

Increased Consumption of Direct Energy

Direct energy consumption for each alternative would result from motor vehicle travel through the project area. This analysis compares traffic data summarized in the FTOR for the proposed project and inferred future energy consumption from the relationship between traffic conditions and fuel consumption.

Both build alternatives would result in increased VMT, reduced hours of delay, fuel consumption, and increased motor vehicle speed over no-project conditions. Increased VMT would result from increased motor vehicle trips traveling a greater distance over the project area. Increased vehicle speeds would increase travel flow and reduce congestion. While Tables 3.2.8-1 and 3.2.8-2 estimate fuel consumption, the analysis does not take into account vehicle speed or delay. The optimal fuel efficiency varies by vehicle, but generally the lowest fuel economy is in the 0–25 mph range, and the optimal range is 45–55 mph, with a steady decline in efficiency occurring as speeds exceed 55 mph. Under 2035 Alternative B and C full-build conditions, a.m. peak hour vehicle speeds increase to the optimal range for fuel efficiency (52.4 mph for Alternative B; 48.9 mph for Alternative B, Phase 1; 52.7 mph for Alternative C; 44.2 mph for Alternative C, Phase 1), a condition that would increase fuel efficiency when compared to no-project a.m. average speeds (41.8 mph). Improved traffic flow would reduce the vehicle hours of delay for all build scenarios (except 2015 Alternative C, Phase 1), a condition that might reduce fuel use as lower traffic speeds (0–25 mph) result in poor fuel economy. It is unknown to what extent drivers bypass the existing interchange and use alternate and potentially longer-distance traffic routes because of existing traffic conditions. The inability to capture these VMTs in the analysis likely has the greatest affect on the No-Build Alternative where delay hours are highest.

Implementation of either build alternative would relieve traffic congestion by reducing vehicle hours of delay and increasing network speeds, while increasing total VMT and fuel consumption through the project area. However, none of the build alternatives are expected to result in an inefficient, wasteful, or unnecessary consumption of energy.

Increase Consumption of Indirect Energy

Indirect energy consumption would result from project construction and maintenance. Construction of the proposed project would result in the consumption of energy to prepare the project site, manufacture and deliver construction materials to the project site, and construct the roadway interchange and associated structures. This increased fossil fuel consumption from project construction is not expected to have an appreciable impact on energy resources.

Based on the qualitative comparison, Alternative C would result in more AC pavement, more bridge structures (both PCC and rebar), slightly more barriers and guardrails, and would have a longer project distance. Based on the qualitative comparison, Alternative B would require more PCC pavement, more lighting, more traffic signals, more ramp meters, more striping, and more sidewalks, curbs, and gutters. For the fundable first phase scenarios, Alternative C, Phase 1 will require more PCC bridge structures, rebar structures, AC pavements, and roadway base aggregate materials than Alternative B, Phase 1. The construction of any of the proposed build alternatives would be a necessary component of the project and a one-time expenditure of energy. This one-time expenditure of energy would provide for energy benefits in the long run because reduced congestion and improved traffic flow through the interchange might result in reduced direct energy consumption. Based on the qualitative analysis, Alternative C was determined to be the most preferable alternative.

Implementation of the proposed project would result in an increase in indirect energy consumption relative to the No-Build Alternative due to project construction and maintenance. However, the associated construction and maintenance of the build alternatives are not expected to result in an inefficient, wasteful, or unnecessary consumption of energy.

Avoidance, Minimization, and/or Mitigation Measures

For the proposed project alternatives, an adverse impact on energy consumption would occur if a project alternative results in wasteful, inefficient, or unnecessary consumption of energy. The increase in energy consumption associated with any of the build alternatives is not expected to result in an inefficient, wasteful, or unnecessary consumption of energy. Moreover, to the extent that it is applicable or feasible for the project, standard energy efficiency measures such as LED bulbs, idling limits, and limits on haul distance will be included in the project. Because the build alternatives would not result in wasteful or excessive use of energy, avoidance, minimization, and mitigation measures would not be necessary.

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3.3 Biological Environment

The biological study area generally comprises the maximum project construction footprint for all alternatives and an area outside the project footprint to accommodate construction activities and staging where needed. The approximately 772-acre biological study area also includes areas outside of this general construction footprint in order to analyze indirect impacts on listed species. These additional areas include known occurrences of special-status plants within 250 feet of the construction footprint, seasonal wetlands that provide habitat for listed shrimp species (vernal pool fairy shrimp [*Branchinecta lynchi*] and vernal pool tadpole shrimp [*Lepidurus packardi*]) within 250 feet of the construction footprint, elderberry shrubs (host plant for valley elderberry longhorn beetle [*Desmocerus californicus dimorphus*]) within 100 feet of the construction footprint, California red-legged frog (*Rana draytonii*) (CRLF) aquatic and upland habitat and CRLF Critical Habitat within one mile, and California tiger salamander (*Ambystoma californiense*) (CTS) aquatic and upland habitat within 1.24 miles. Where seasonal wetlands extend beyond the 250-foot boundary, the entire wetland is included in the biological study area.

Temporary, permanent, and indirect project effects are described below for the proposed project. For purposes of this document, temporary effects are defined as effects that return to baseline or better conditions within a year following the disturbance and where there will be no ongoing disturbance such as mowing or herbicide spraying.

Potential biological resources associated with the proposed project were identified through agency coordination, a review of existing information, and field surveys. Field surveys included botanical surveys (May 2004, May 2005, August 2007, December 2008, April 2009, and May 2011 [only on one property west of Business Center Drive]); wetland delineations (April, May, and June 2004; June and August 2007; August 2008) and verification (January 2009); CTS habitat assessment (November 2010); reconnaissance-level surveys and CRLF site assessment (July and October 2007); fisheries habitat assessment (July 2007); valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (VELB) surveys (July 2007); vernal pool fairy and tadpole shrimp habitat assessments (July 2007 and February 2009); Callippe silverspot butterfly (*Speyeria callippe callippe*) habitat survey (Monk & Associates 2004c) and focused surveys for Johnny-Jump-Up plants (*Viola pedunculata*), the host plant for the callippe silverspot butterfly, in May 2011 and March 2012; a fish passage assessment (September 2006, August 2007); salt-marsh harvest mouse (*Reithrodontomys raviventris*) site assessment (August 2007); tree surveys (November and December 2007); and biological reconnaissance surveys of the PG&E valve lot, a gas transmission facility location (December 2011). The analysis presented in this chapter is based on the technical reports (listed below) that documented the above studies.

- *Interstate 80/Interstate 680/State Route 12 Interchange Natural Environmental Study* (2010).
- *Site Assessment for California Red-legged Frog for the Interstate 80/Interstate 680/State Route 12 Interchange Project*, submitted to the U.S. Fish and Wildlife Service (USFWS) on March 3, 2009, for review (2009).

- *Preliminary Delineation of Waters of the United States for the Interstate 80/Interstate 680/State Route 12 Interchange Project* (2008); field verified in January 2009, final verification on July 9, 2009.
- *Interstate 80 High-Occupancy Vehicle Lane Project Initial Study/Proposed Mitigated Negative Declaration* (2007).
- Interstate 80/Interstate 680/State Route 12 Interchange Project Biological Assessment (2010).
- Biological Opinion on the Effects of the Proposed Interstate 80/Interstate 680/State Route 12 Interchange Phase 1 Project, Solano County, California (EA 0A5300) (April 2012)
- I-80/I-680/SR 12 Interchange Project Fish Passage Assessment for Green Valley, Ledgewood, and Suisun Creeks, Solano County, California (2010).

3.3.1 Natural Communities

This section of the document discusses natural communities of concern. The focus of this section is on biological communities and their ecological function, not individual plant or animal species. This section also includes information on wildlife corridors and habitat fragmentation. Wildlife corridors are areas of habitat used by wildlife for seasonal or daily migration. Habitat fragmentation involves the potential for dividing sensitive habitat and thereby lessening its biological value.

Habitat areas that have been designated as critical habitat under the Federal Endangered Species Act are discussed in the Threatened and Endangered Species Section 3.3.5. Wetlands and other waters are discussed in Section 3.3.2.

The study area supports nine natural communities of special concern: riparian woodland, blue oak woodland, live oak woodland, valley oak woodland, perennial marsh, perennial drainage, seasonal drainage, alkali seasonal marsh, and seasonal wetland (Volume 2, Figure 3.3-1). In the discussions of riparian woodland and oak woodlands below, the sheet numbers shown in parentheses indicate the sheet numbers in Volume 2, Figures 3.3-2a, 3.3-2b, 3.3-2c, and/or 3.3-2d. All biological resource figures are bound separately in Volume 2 of this document. Affected acreage is tabulated for each natural community under each alternative in Table 3.3.1-1.

Only riparian woodland and oak woodlands (blue oak woodland, live oak woodland, and valley oak woodland) are discussed in this section. The wetland communities and drainages are discussed in Section 3.3.2, “Wetlands and Other Waters.” Other parts of the study area support upland scrub, other woodland, eucalyptus grove, orchard, vineyard, nonnative annual grassland, ruderal, row crops, landscaped, and a small area of open water in an artificial pond.

3.3.1.1 Riparian Woodland

Regulatory Setting

Riparian communities are considered sensitive locally, regionally, and statewide because of their habitat value and decline in extent. The Solano County Water Agency (SCWA) administrative draft habitat conservation plan (HCP) concludes that the riparian corridor along Suisun Valley Creek is important because it provides connectivity between the West Hills and Suisun Marsh (Solano County Water Agency 2009). The California Department of Fish and Game (CDFG) has adopted a no-net-loss policy for riparian habitat values, and the streambed alteration agreement (SAA) would include mitigation requirements for a loss of riparian vegetation. The USFWS mitigation policy identifies California's riparian habitats in Resource Category 2, for which no net loss of existing habitat value is recommended (46 FR 7644).

Affected Environment

Riparian woodland occurs along the drainages in the study area listed here and illustrated in Figures 3.3-2a through 3.3-2d in Volume 2.

- Jameson Canyon Creek (OW-8) (Sheets 7, 9, and 14) south of SR 12W and on the east side of I-680, and its tributary south of I-80 (OW-8c) (Sheet 7).
- Two roadside ditches south of I-80 along Cordelia Road west of I-680 (W-26 and W-41) (Sheets 7–8).
- Green Valley Creek (W-45) (Sheet 17).
- Suisun Creek at I-80 (OW-56) (Sheet 22).
- Ledgewood Creek at SR 12E (W-90) (Sheet 32).

Tree species that characterize riparian woodland in the study area include valley oak, coast live oak, willows, white alder, California buckeye, California bay, Fremont's cottonwood, and box elder. Riparian woodland also supports elderberry shrubs in three locations: along Green Valley Creek north of I-80, adjacent to the east side of Dan Wilson Creek, and along the north and south sides of SR 12W in the vicinity of Jameson Canyon Creek. Herbaceous groundcover consists of nonnative grasses, sedge species, mugwort, and Bermuda grass, and shrubs include Himalayan blackberry, California wild rose, poison-oak, and California wild grape.

Riparian woodland habitat provides wildlife movement corridors up- and downstream for fish, amphibians, reptiles, birds, and mammals on a seasonal basis. However, its biological value is reduced because of fragmentation by roads and nearby development.

Affected acreage in riparian woodland is tabulated for each alternative in Table 3.3.1-1.

Table 3.3.1-1. Summary of Impacts on Sensitive Communities by Project Alternative

Impact Type	Sensitive Natural Communities (acres)											
	Riparian Wood-land	Blue Oak Wood-land	Valley Oak Wood-land	Live Oak Wood-land	Perennial Drainage	Jurisdic-tional Seasonal Drainage[b]	Nonjuris-dictional Seasonal Drainage	Jurisdic-tional Perennial Marsh[a]	Nonjuris-dictional Perennial Marsh	Jurisdic-tional Alkali Seasonal Marsh	Jurisdic-tional Seasonal Wetland	Nonjuris-dictional Seasonal Wetland
Alternative B												
Temporary	0.41	0.52	0.03	4.12	1.00	0.78	0.17	4.68	0.01	0.28[c]	1.85[c]	0
Permanent	1.31	0	0.16	5.16	0.67	2.22	0.11	5.15	0.03	1.75	7.84	0.03
Total Alternative B Impacts	**1.72**	**0.52**	**0.19**	**9.28**	**1.67**	**3.00**	**0.28**	**9.83**	**0.04**	**2.03**	**9.69**	**0.03**
Alternative B, Phase 1												
Temporary	0.06	0.50	<0.01	0	0.88	0.23	0	1.26	0	0	0	0
Permanent	0.10	0	0.19	0	0.08	1.25	0	0.34	0.04	0	1.82	0.02
Total Alternative B, Phase 1 Impacts	**0.16**	**0.50**	**0.20**	**0**	**0.96**	**1.48**	**0**	**1.60**	**0.04**	**0**	**1.82**	**0.02**
Alternative C												
Temporary	0.25	0.52	0.02	1.68	0.92	0.52	0.17	3.68	0	0.13[c]	0.70[c]	0.01[c]
Permanent	2.24	0	0.17	12.17	0.66	2.28	0.11	5.03	0	1.03	8.62	0.36
Total Alternative C Impacts	**2.49**	**0.52**	**0.19**	**13.85**	**1.58**	**2.80**	**0.28**	**8.71**	**0**	**1.16**	**9.32**	**0.37**
Alternative C, Phase 1												
Temporary	0.08	0	0.02	2.03	0.51	0.40	0.05	1.66	0	0	0	0.01[c]
Permanent	1.11	0	0.14	11.77	0.10	1.52[d]	<0.01	0.07[d]	0	0	2.88[d]	0.34
Total Alternative C, Phase 1 Impacts	**1.19**	**0**	**0.16**	**13.80**	**0.61**	**1.92[d]**	**0.06**	**1.73[d]**	**0**	**0**	**2.88[d]**	**0.35**

[a] Perennial marsh acreages include areas mapped as perennial wetland drainage in the delineation.

[b] Non-jurisdictional seasonal drainage impacts are provided in Section 3.3.2.5. No compensatory mitigation is required for the impacts on non-jurisdictional seasonal drainages, as discussed in Section 3.3.2.5.

[c] Temporary impacts on alkali seasonal marsh and jurisdictional and non-jurisdictional seasonal wetland will be avoided and minimized through use of ESA-type and silt fencing fencing, worker training, and biological monitoring during construction.

[d] Numbers are based on a reduction in fill achieved through refinements to Alternative C, Phase 1 design during the 404b(1) process.

Environmental Consequences

Loss or Disturbance of Riparian Woodland Resulting from Construction

Construction of Alternative B would result in a permanent loss of approximately 1.31 acres of riparian woodland along the following drainages within the project footprint (Volume 2, Figure 3.3-2a).

- Jameson Canyon Creek (OW-8) and the tributary of Jameson Canyon Creek (OW-8c) south of I-80 for widening of I-80 for the I-80/I-680/SR 12W interchange.
- Two roadside ditches (W-26 and W-41) south of I-80 along Cordelia Road west of I-680 for the I-80/I-680/SR 12W interchange (Sheets 7–8).
- The north side of Suisun Creek (OW-56) for the widening of I-80 (Sheet 22).
- Ledgewood Creek (W-90) for widening of SR 12E (Sheet 32).

Construction of Alternative B, Phase 1 would result in a permanent loss of approximately 0.10 acre of riparian woodland. These impacts would occur along Ledgewood Creek south of SR 12E within the project footprint (Volume 2, Figure 3.3-2b, Sheet 32).

Under Alternative C, construction of the proposed project would result in a permanent loss of approximately 2.24 acres of riparian woodland along the following drainages within the project footprint (Volume 2, Figure 3.3-2c).

- Jameson Canyon Creek (OW-8) and the tributary to Jameson Canyon Creek south of I-80 (OW-8c) for widening of I-80 for the I-80/I-680/SR 12W interchange (Sheet 7).
- Jameson Canyon Creek west of I-680 for realignment of I-680 to SR 12W (Sheets 9 and 14).
- One roadside ditch south of I-80 along Cordelia Road west of I-680 (W-26) for the I-80/I-680/SR 12W interchange (Sheet 8).
- The north side of Suisun Creek (OW-56) for widening of I-80 (Sheet 22).
- Ledgewood Creek (OW-90) for widening of SR 12E (Sheet 32).

Construction of Alternative C, Phase 1 would result in a permanent loss of approximately 1.11 acre of riparian woodland along the following drainages within the project footprint (Volume 2, Figure 3.3-2d).

- Jameson Canyon Creek west of I-680 (OW-8) and one of its tributaries (OW-8c) for the realignment of I-680 to SR 12W (Sheets 9 and 14).
- Roadside ditches south of I-80 along Cordelia Road west of I-680 (W-26 and W-41) for the I-80/I-680/SR 12W interchange (Sheet 8).
- Ledgewood Creek (OW-90) for the widening on SR 12E (Sheet 32).

The permanent impact area would include riparian trees, as well as woody understory plants such as young trees, coyote brush, Himalayan blackberry, and possibly elderberry, adjacent to the south side of the study area at Suisun Creek and along the north and south sides of SR 12W in the vicinity of Jameson Canyon Creek.

Approximately 0.41 acre of riparian woodland vegetation would be temporarily disturbed during construction of Alternative B in the areas listed above for permanent impacts. Under Alternative B, Phase 1, approximately 0.06 acre of riparian woodland vegetation would be temporarily disturbed during construction at the areas listed above for permanent impacts. Under Alternative C, approximately 0.25 acre of riparian woodland vegetation would be temporarily disturbed during construction at the areas listed above for permanent impacts. Under Alternative C, Phase 1, approximately 0.08 acre of riparian woodland vegetation would be temporarily disturbed during construction at the areas listed above for permanent impacts. This impact would include the probable removal of additional trees and understory vegetation to provide equipment access to the drainages.

Indirect impacts on riparian woodland vegetation could occur from adjacent construction activity. Riparian vegetation is adjacent to the construction area and would not be removed for construction, but it could sustain damage from equipment.

Implementation of avoidance, minimization, and/or mitigation measures to install ESA-type fencing, to conduct environmental awareness training, and for biological monitoring will protect trees during construction and avoid indirect impacts. Implementation of compensation measures would mitigate loss of riparian habitat.

State and federal agencies require avoidance, minimization, and compensatory mitigation for the prhloss of riparian habitat. The loss or disturbance of riparian woodland vegetation is considered adverse because it provides a variety of important ecological functions and values.

Under the No-Build Alternative, there would be no temporary or permanent impacts on riparian woodland.

Avoidance, Minimization, and/or Mitigation Measures

To avoid and minimize impacts to biological resources, the Department includes the following measures as Standard Specifications (SS) or as Standard Special Provisions (SSP) in all construction contracts: prohibit construction work in environmentally sensitive areas (Standard Specification 14-1.02A); install ESA fencing (Standard Specification 14-1.03); monitor construction and other activities by a contractor-supplied biologist (Standard Special Provision 14-6.05); and conduct environmental awareness training (Standard Special Provision 14-6.08). Thus each of these measures is an element of the project and pertains to the minimization of impacts to riparian woodlands, as well as other biological resources discussed in this section. More specific measures to minimize impacts to riparian woodlands follow.

ESA fencing would be installed adjacent to areas of construction along Jameson Canyon Creek, Suisun Creek, Ledgewood Creek, and roadside ditches south of I-80 along Cordelia Road to protect trees and riparian vegetation from potential indirect impacts associated with project construction.

Avoid and Minimize Potential Disturbance of Riparian Communities

Potential disturbance of riparian communities will be avoided and minimized by implementing the following measures.

- Ground disturbing work in riparian areas will be restricted to the dry season, between June 15 and October 15.
- Vegetation clearing and construction operations shall be limited to the minimum necessary in areas of temporary access work areas and staging.
- The potential for long-term loss of riparian vegetation will be minimized by trimming vegetation rather than removing entire shrubs. Shrubs that need to be trimmed will be cut at least one foot above ground level to leave the root systems intact and allow for more rapid regeneration. Cutting will be limited to the minimum area necessary within the construction zone. All cleared vegetation will be removed from the project site to prevent attracting animals to the project site. To protect nesting birds, the project proponent will not allow pruning or removal of woody riparian vegetation between February 1 and August 31 without preconstruction surveys.
- All vegetation trimmings shall either be hauled off –site and disposed of properly or chipped and left on-site as determined by the Department Resident Engineer. When possible, stockpiles of trimmed vegetation shall be kept at least 50 feet from the bed and bank.
- The areas that undergo vegetative pruning will be inspected immediately before construction, immediately after construction, and one year after construction to determine the amount of existing species cover, cover that has been removed, and cover that resprouts. If, after one year, these areas have not reached the success criteria agreed upon between the Department and resources agency, the project proponent will replant the areas with the same species (native species) to reestablish the vegetation cover.

Compensate for Temporary and Permanent Loss of Riparian Vegetation

Temporary construction-related loss of riparian vegetation will be compensated for by replanting the temporarily disturbed areas with native species appropriate to the area. Replanting will occur immediately after completion of the construction activities and no later than October 15 to minimize erosion, creek sedimentation, and adverse effects on fish.

Permanent loss of riparian vegetation will be compensated for at a ratio to be determined in cooperation with the RWQCB and CDFG. Potential mitigation areas include, but are not limited to, Solano Community College; the Solano Land Trust's Lynch Canyon Open Space, which is northwest of I-80 in American Canyon; and the King Ranch Open Space, which is west of I-680 in the American Canyon area (according to Sue Wickham, project coordinator at the Solano Land Trust, in a phone conversation with Lisa Webber of ICF Jones & Stokes on March 12, 2008, and an e-mail to the same recipient on October 13, 2008). Compensation may be combined with project impacts on CRLF aquatic habitat. Mitigation areas will be placed within a conservation easement to ensure protection in perpetuity.

The temporary and permanent losses of riparian vegetation will be compensated for through the preparation of a mitigation planting plan, including a species list and number of each species, planting locations, and maintenance requirements. Plantings will consist of native species appropriate to the area, and from local sources.Plantings will be monitored annually for three years or as required in the project permits.

An adaptive management plan will be developed to address plant mortality and methods for

correction. If the survival criteria agreed upon by the Department and resource agency are not met at the end of the monitoring period, planting and monitoring will be repeated after mortality causes have been identified and corrected per the adaptive management plan.

3.3.1.2 Oak Woodlands

Regulatory Setting

Local and state agencies recognize oak woodlands as sensitive natural communities. The Resources Chapter of the draft Solano County General Plan (2008) includes policies to protect oak woodlands and heritage trees, encourage the planting of native tree species, and develop an ordinance to protect oak woodlands and heritage oak trees. The CDFG recognizes oak woodland types that include valley oak as rare natural communities of high priority for inventory in the California Natural Diversity Database (CNDDB) (California Department of Fish and Game 2003). The California State Board of Forestry and Fire Protection oak conservation policy supports a statewide program of research and education known as the Integrated Hardwood Range Management Program. The State Wildlife Conservation Board enacted the Oak Woodlands Conservation Act of 2001 to recognize the importance of oak woodlands and provide financial support for oak woodland conservation activities. State agencies protect blue oak and valley oak woodlands and live oak woodland under CEQA. The CDFG recommends avoidance, minimization, and compensatory mitigation for the loss of native oak trees and oak woodland habitat. The loss or disturbance of oak woodland vegetation is considered adverse because this vegetation is declining and provides important wildlife habitat and other ecological functions and values.

The City of Fairfield Tree Conservation ordinance (FCC 25.36) also protects native trees that may occur in oak woodlands, including native oaks (*Quercus* spp.), bay laurel (*Umbellularia californica*), madrone (*Arbutus menziesi*), and California buckeye (*Aesculus californica*). This ordinance protects native trees located inside the City Limit Line on public property or on private property developed or landscaped with City approval, but not those located within the Department right-of-way. Because all the oak woodlands in the study area are located either outside the City Limit Line or inside of the Department right-of-way, no native trees in these woodlands are protected under the City ordinance.

Individual native trees in the study area that do not occur in or adjacent to riparian and oak woodland communities are discussed in Section 3.3.7, “Native Trees.”

Affected Environment

The study area supports three types of oak woodland: blue oak woodland, valley oak woodland, and interior live oak woodland. Because oak woodlands are regulated as a general type rather

than as separate community types, and the woodland types are often intergraded, the same mitigation would be required for impacts on all three community types.

The locations of each oak woodland type in the study area are listed here illustrated in Figures 3.3-2a through 3.3-2d in Volume 2.

- Blue oak woodland occurs only in one location in the study area: on the hill south of I-80 and west of the I-80 westbound truck scale (Sheet 21). This community is dominated by blue oak with a nonnative grassland understory and scattered poison-oak shrubs.
- Several patches of valley oak woodland occur in the study area. One area occurs at the northeast quadrant of the Green Valley Road/Business Center Drive intersection (Sheet 17). A small area of valley oak woodland is located in the I-80 on-ramp loop at the I-80/I-680 interchange (Sheets 17–18). Valley oak woodland is also at the south side of I-80 near the eastbound truck scales (Sheet 21). This community is dominated by valley oak trees, although the overstory also contains coast live oak and blue oak. The understory is open and grassy with blue wildrye and poison-oak.
- Live oak woodland occurs in the study area along the north and south sides of SR 12W (Sheets 3–5 and 7–8) and west of the I-80 eastbound truck scales (Sheet 21). This community type is dominated by interior live oak with elderberry and poison-oak shrubs and an understory of nonnative annual grasses, creeping wildrye, and purple needlegrass.

Affected acreage in oak woodland is tabulated for each alternative in Table 3.3.1-1.

Environmental Consequences

Permanent Loss and Temporary Disturbance of Oak Woodlands

Construction of Alternative B would result in a permanent loss of approximately 0.16 acre of valley oak and 5.16 acres of live oak woodland types within the following parts of the project area (Volume 2, Figure 3.3-2a):

- Valley oak woodland in the area between Dan Wilson Creek and the former eastbound truck scale location proposed for widening of I-80.
- Live oak woodland in the area proposed for the realignment of Red Top Road, the Red Top Road on- and off-ramps to SR 12W, and the SR 12W westbound on-ramp from WB I-80.

Temporary impacts occurring in the areas adjacent to the construction area for Alternative B could affect up to 0.52 acre of blue oak woodland, 0.03 acre of valley oak woodland, and up to 4.12 acres of live oak woodland. Shading of live oak woodland vegetation could occur in the area of the SR 12W connector ramps, which would be elevated. The effects of shading could include loss of vegetation over time in the area adjacent to the project footprint. No permanent impacts on blue oak woodland would occur within the Alternative B footprint.

Construction of Alternative B, Phase 1 would result in no permanent loss of blue oak woodland, but a loss of approximately 0.19 acre of valley oak woodland in the area between Dan Wilson Creek and the former eastbound truck scale location proposed for widening of I-80 (Volume 2,

Figure 3.3-2b). Temporary impacts in the area adjacent to the construction area could affect up to 0.50 acre of blue oak woodland and less than 0.01 acre of valley oak woodland. No permanent or temporary impacts on live oak woodland would occur within the Alternative B, Phase 1 footprint.

Construction of Alternative C would result in a permanent loss of approximately 0.17 acre of valley oak woodland and 12.17 acres of live oak woodland types within the same general parts of the project area as described for Alternative B (Volume 2, Figure 3.3-2c). Temporary impacts in the area adjacent to the construction area could affect up to 0.52 acre of blue oak woodland, 0.02 acre of valley oak woodland, and 1.68 acres of live oak woodland. No permanent impacts on blue oak woodland would occur within the Alternative C footprint.

Construction of Alternative C, Phase 1 would result in a permanent loss of approximately 0.14 acre of valley oak woodland and 11.77 acres of live oak woodland along SR 12W and in the area between Dan Wilson Creek and the former eastbound truck scale location proposed for widening of I-80 (Volume 2, Figure 3.3-2d). Approximately 0.02 acre of valley oak woodland and 2.03 acres of live oak woodland could be temporarily affected. No permanent or temporary impacts on blue oak woodland would occur within the Alternative C, Phase 1 footprint.

Under all build alternatives, indirect impacts on oak woodland vegetation outside the temporary impact zone could result from adjacent construction activity and damage from equipment. Construction could cause indirect impacts on trees in the oak woodland due to long-term damage through excessive pruning before construction begins.

Avoidance, Minimization, and/or Mitigation Measures

The loss or disturbance of oak woodland vegetation is considered adverse because it provides important wildlife habitat and other ecological functions and values. Implementation of the measure below and the Standard Specifications and Special Provision measures mentioned in Section 3.3.1.1 would work together to minimize permanent loss and temporary disturbance of oak woodlands.

Compensate for Temporary and Permanent Loss of Oak Woodland Vegetation

Temporary construction-related loss of oak woodland habitat will be compensated for by replanting the temporarily disturbed area with the native species removed, including blue oak, valley oak, and interior live oak. Replanting will occur in fall so that less frequent irrigation and maintenance will initially be necessary.

The permanent loss of oak woodland vegetation will be compensated for at a minimum ratio of 1:1 (1 acre restored or created for every one acre permanently affected). This ratio will be confirmed through coordination with state agencies as part of the permitting process for the proposed project. Potential mitigation areas include, but are not limited to the Solano Land Trust's Lynch Canyon Open Space, which is northwest of I-80 in American Canyon, and the King Ranch Open Space, which is west of I-680 in the American Canyon area (Wickham pers. comm.). A mitigation planting plan will be developed for each construction phase or package that includes a species list and number of each, planting locations, and maintenance requirements. This plan will be reviewed and approved by USFWS no later than sixty (60)

calendar days prior to the date of initial groundbreaking. Plantings will consist of native species appropriate to the area and from local sources. Planted species will be based on those removed from the project area and may include valley and interior live oak, as well as suitable native understory species such as blue wildrye, creeping wildrye, and purple needlegrass. Plantings will be monitored annually for three years, or as required in the project permits. If the survival criteria agreed upon by the Department and resources agencies is not met at the end of the monitoring period, planting and monitoring will be repeated until the survival criterion is met.

3.3.2 Wetlands and Other Waters

The information presented here is taken from the *Preliminary Delineation of Waters of the United Stated for the Interstate 80/Interstate 680/State Route 12 Interchange Project* and the *Interstate 80/Interstate 680/State Route 12 Interchange Project Natural Environment Study*. The wetland delineation was submitted to the U.S. Army Corps of Engineers (USACE) in August 2008. A field verification of the preliminary delineation was conducted with Andrea Meier of the USACE San Francisco District on January 7, 2009, and final verification of the revised map occurred on July 9, 2009. This section addresses waters of the United States, which are under the jurisdiction of the USACE, as well as wetland and drainage features that are outside USACE jurisdiction (nonjurisdictional features) and are regulated only as waters of the state. Impacts on nonjurisdictional features are also discussed per CEQA requirements in Chapter 4. Jurisdictional wetlands and other waters (waters of the United States) in the study area include perennial drainages (American Canyon Creek, parts of Green Valley Creek, parts of Dan Wilson Creek, Suisun Creek, and parts of Ledgewood Creek); seasonal drainages (Jameson Canyon Creek and unnamed drainages); perennial wetland drainages (parts of Green Valley Creek, parts of Dan Wilson Creek, parts of Ledgewood Creek, and unnamed drainages); perennial marshes; alkali seasonal marshes; and seasonal wetlands. Non-jurisdictional features (waters of the state) in the study area include seasonal drainages (irrigation and roadside ditches) and seasonal wetlands. In the discussions below, the sheet numbers shown in parentheses indicate the sheet numbers in Figures 3.3-2a, 3.3-2b, 3.3-2c, and 3.3-2d in Volume 2.

Documentation of this, and other, consultation with the USACE is presented in Appendix H and discussed in Chapter 5.

Regulatory Setting

Wetlands and other waters are protected under a number of laws and regulations. At the federal level, the Federal Water Pollution Control Act, more commonly referred to as the Clean Water Act [CWA(33 U.S.C. 1344)], is the primary law regulating wetlands and waters. The Clean Water Act regulates the discharge of dredged or fill material into waters of the United States (U.S.), including wetlands. Waters of the U.S. include navigable waters, interstate waters, territorial seas and other waters that may be used in interstate or foreign commerce. To classify wetlands for the purposes of the CWA, a three-parameter approach is used that includes the presence of hydrophytic (water-loving) vegetation, wetland hydrology, and hydric soils (soils formed during saturation/inundation). All three parameters must be present, under normal circumstances, for an area to be designated as a jurisdictional wetland under the CWA.

Section 404 of the CWA establishes a regulatory program that provides that discharge of dredged or fill material cannot be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. The Section 404 permit program is run by the U.S. Army Corps of Engineers (USACE) with oversight by the U.S. Environmental Protection Agency (U.S. EPA).

USACE issues two types of 404 permits: Standard and General permits. Nationwide permits, a type of General permit, are issued to authorize a variety of minor project activities with no more than minimal effects. Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of USACE's Standard permits. For Standard permits, the USACE decision to approve is based on compliance with U.S. EPA's Section 404(b)(1) Guidelines (U.S. EPA 40 CFR Part 230), and whether permit approval is in the public interest. The Section 404 (b)(1) Guidelines were developed by the U.S. EPA in conjunction with USACE, and allow the discharge of dredge or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The Guidelines state that USACE may not issue a permit if there is a LEDPA to the proposed discharge that would have less effects on waters of the U.S., and not have any other significant adverse environmental consequences.

The Department, the Federal Highway Administration (FHWA), the Army Corps of Engineers (USACE), the United States Environmental Protection Agency (U.S. EPA), and U.S. Fish and Wildlife Service (USFWS) entered into a memorandum of understanding (MOU) to integrate the National Environmental Policy Act (NEPA) and the Clean Water Act (CWA) for Environmental Impact Statement (EIS) projects that have five or more acres of permanent impacts on Waters of the United States (U.S.). Under this Memorandum of Understanding (MOU), the signatory agencies agree to coordinate at three checkpoints: 1) purpose and need, 2) identification of range of alternatives, and 3) preliminary determination of the least environmentally damaging practicable alternative (LEDPA) and conceptual mitigation plan. The goal of the MOU process is to allow the USACE to more efficiently adopt the EIS for their Section 404 permit action.

The Executive Order for the Protection of Wetlands (E.O. 11990) also regulates the activities of federal agencies with regard to wetlands. Essentially, this executive order states that a federal agency, such as the Federal Highway Administration, cannot undertake or provide assistance for new construction located in wetlands unless the head of the agency finds: 1) that there is no practicable alternative to the construction and 2) the proposed project includes all practicable measures to minimize harm.

The least environmentally damaging practicable alternative (LEDPA) was determined in consultation with the USACE, U.S. EPA, USFWS and NOAA's NMFS. The USACE and the U.S. EPA concurred that Alternative C is the LEDPA (see correspondence in Appendix H). The Department considered all practicable measures to minimize harm in selecting this alternative. A wetland only practicable alternative finding has been developed to satisfy EO 11990 and is provided in Section 3.3.2.5 below.

At the state level, wetlands and waters are regulated primarily by the California Department of Fish and Game (CDFG), the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCB). In certain circumstances, the Coastal Commission (or

Bay Conservation and Development Commission) may also be involved. Sections 1600–1607 of the California Fish and Game Code (CFGC) require any agency that proposes a project that will substantially divert or obstruct the natural flow of or substantially change the bed or bank of a river, stream, or lake to notify the CDFG before beginning construction. If the CDFG determines that the project may substantially and adversely affect fish or wildlife resources, a Lake or Streambed Alteration Agreement will be required. CDFG jurisdictional limits are usually defined by the tops of the stream or lake banks, or the outer edge of riparian vegetation, whichever is wider. Wetlands under jurisdiction of the USACE may or may not be included in the area covered by a Streambed Alteration Agreement obtained from the CDFG.

The RWQCB were established under the Porter-Cologne Water Quality Control Act to oversee water quality. The RWQCB issues water quality certifications in compliance with Section 401 of the CWA. Please see the Water Quality section [3.2.2] for additional details.

Wetlands and drainages that are not under USACE jurisdiction but have beneficial uses are considered waters of the State and are regulated by the RWQCB. The RWQCB also issues waste discharge requirements (WDRs) for loss of waters of the State.

3.3.2.1 Perennial Drainage

Affected Environment

The drainage numbers used in this discussion correspond to the numbers used in the delineation of waters of the United States. However, there are drainage features that were not labeled on the delineation maps because they were in areas that had been delineated for other projects. These drainages are labeled in Figures 3.3-2a through 3.3-2d in Volume 2 for the purpose of discussion in this document. Perennial drainages that are densely vegetated are discussed separately from the unvegetated perennial drainages in this section. See the “Perennial Marsh” section below for descriptions of vegetated perennial drainages.

The following unvegetated drainages in the study area are perennial and carry flow year-round or nearly year-round.

- The downstream reach of American Canyon Creek (OW-23) (Sheet 12).
- Bridged parts of Green Valley Creek (Sheets 17 and 18).
- Dan Wilson Creek (OW-53) (Sheet 21).
- Suisun Creek (OW-56) (Sheet 22).
- Culverted parts of Ledgewood Creek (OW-90) (Sheet 32) and its tributary (OW-90a) (Sheets 30-31).

Functions and values of perennial drainages in the study area include flood conveyance and providing food and habitat for fish and wildlife species.

Drainages that connect to the Suisun Marsh sloughs and tributaries of these drainages are considered waters of the United States, subject to regulation under CWA Section 404. Both permanent and temporary placement of material in these areas, including cofferdams and bridge

supports, would be considered placement of fill within waters of the United States. This activity would require Section 404 authorization from the USACE and CWA Section 401 water quality certification from the RWQCB.

Affected acreage in perennial drainage is tabulated for each alternative in Table 3.3.1-1.

Environmental Consequences

Construction of the project alternatives would involve the installation of culverts and placement of fill for road widening and bridge construction, resulting in direct disturbance of jurisdictional drainages. Impact acreages are based on the final USACE-verified delineation.

Loss or Disturbance of Perennial Drainage Resulting from Construction

Construction of both of the build alternatives would result in permanent and temporary losses of perennial drainage within the project area as summarized in Tables 3.3.2-1 through 3.3.2-4 and Figures 3.3-2a through 3.3-2d in Volume 2. Impacts on perennial drainages that persist for less than one year are considered temporary, and those that continue for a longer period are considered permanent. Temporary impacts on perennial drainages would result from the use of cofferdams that would remain in place for less than one year. Construction at Green Valley Creek will continue for multiple years but coffer dams will not be left in place through the wet season; therefore, this impact will be considered temporary.

Under Alternative B, permanent impacts on perennial drainages would include construction associated with removal and replacement of the bridges over Green Valley Creek (OW-45) (Sheets 17 and 18), Dan Wilson Creek (OW-53) (Sheet 21), and Suisun Creek (OW 56) (Sheet 22) and replacement of culverts on American Canyon Creek (OW-23) (Sheet 12), a tributary of Ledgewood Creek (OW-90a) (Sheet 31), and Ledgewood Creek (OW-90) (Sheet 32) (Volume 2, Figure 3.3-2a). Construction would result in a total area of 1.67 acres and 286 linear feet of fill in perennial drainages, the highest of the build alternatives (Table 3.3.2-1).

Table 3.3.2-1. Direct Impacts on Drainages in the Study Area under Alternative B[a]

Drainage Type	Area of Permanent Fill (acres)	Area of Temporary Fill (acres)	Total Area of Fill (Permanent + Temporary) (acres)	Linear Feet of Permanent Fill
Waters of the State (Nonjurisdictional)				
Nonjurisdictional Seasonal (constructed)	0.11	0.17	0.28	896
Waters of the U.S. (Jurisdictional)				
Perennial	0.67	1.00	1.67	286
Jurisdictional Seasonal	2.22	0.78	3.00	14,619
Total direct impacts	**3.00**	**1.95**	**4.95**	**15,801**

[a] In this table, the acreages for waters of the State (nonjurisdictional) include only those drainages that are not also waters of the U.S. Because all drainages that are waters of the U.S. (jurisdictional) are also considered waters of the State, the total acreage for waters of the State would include both the nonjurisdictional and jurisdictional acreages.

Under Alternative B, Phase 1, permanent impacts on perennial drainages would include construction associated with removal and replacement of the bridges over Green Valley Creek (OW-45) (Sheets 17 and 18), Dan Wilson Creek (OW-53) (Sheet 21), and Ledgewood Creek (OW-90) (Sheet 32) and with replacement of culverts on American Canyon Creek (OW-23) (Sheet 12) and Ledgewood Creek (Sheet 32) (Volume 2, Figure 3.3-2b). Construction of Alternative B, Phase 1 would result in a total area of 0.96 acre and 78 linear feet of fill in perennial drainages.

Table 3.3.2-2. Direct Impacts on Drainages in the Study Area under Alternative B, Phase 1[a]

Drainage Type	Area of Permanent Fill (acres)	Area of Temporary Fill (acres)	Total Area of Fill (Permanent + Temporary) (acres)	Linear Feet of Permanent Fill
Waters of the State (Nonjurisdictional)				
Nonjurisdictional Seasonal (constructed)	N/A	N/A	N/A	N/A
Waters of the US (Jurisdictional)				
Perennial	0.08	0.88	0.96	78
Jurisdictional Seasonal	1.25	0.23	1.48	7,833
Total direct impacts	**1.33**	**1.11**	**2.44**	**7,911**

[a] Because all drainages that are waters of the U.S. (jurisdictional) are also considered waters of the State, the acreages for waters of the U.S. in this table also represent acreages of waters of the State.

Under Alternative C, permanent and temporary impacts on perennial drainages would be in the same areas as described for Alternative B, though the total area of fill for perennial drainages would be 1.58 acres and 286 linear feet of fill, which is slightly less than Alternative B (Table 3.3.2-3).

Table 3.3.2-3. Direct Impacts on Drainages in the Study Area under Alternative C[a]

Drainage Type	Area of Permanent Fill (acres)	Area of Temporary Fill (acres)	Total Area of Fill (permanent + temporary) (acres)	Linear Feet of Permanent Fill
Waters of the State (Nonjurisdictional)				
Nonjurisdictional Seasonal (constructed)	0.11	0.17	0.28	896
Waters of the US (Jurisdictional)				
Perennial	0.66	0.92	1.58	286
Jurisdictional Seasonal	2.28	0.52	2.8	16,738
Total direct impacts	**3.05**	**1.61**	**4.66**	**17,920**

[a] In this table, the acreages for waters of the State (nonjurisdictional) include only those drainages that are not also waters of the U.S. Because all drainages that are waters of the U.S. (jurisdictional) are also considered waters of the State, the total acreage for waters of the State would include both the nonjurisdictional and jurisdictional acreages.

Construction of Alternative C, Phase 1 would result in permanent loss of perennial drainage (summarized in Table 3.3.2-4) for removal and replacement of the bridges over Green Valley Creek (OW-45) (Sheets 17 and 18), replacement of culverts on American Canyon Creek (OW-23) (Sheet 12), and widening of SR 12E over the tributary of Ledgewood Creek (OW-90a) (Sheet 31). Construction of Alternative C, Phase 1 would result in a total area of 0.61 acre and 53

linear feet of fill in perennial drainages, the smallest effect of the first fundable phase of the alternatives.

Table 3.3.2-4. Direct Impacts on Drainages in the Study Area under Alternative C, Phase 1[a]

Drainage Type	Area of Permanent Fill (acres)	Area of Temporary Fill (acres)	Total Area of Fill (Permanent + Temporary) (acres)	Linear Feet of Permanent Fill
Waters of the State (Nonjurisdictional)				
Nonjurisdictional Seasonal (constructed)	<0.01	0.05	0.05	51
Waters of the US (Jurisdictional)				
Perennial	0.10	0.51	0.61	53
Jurisdictional Seasonal	1.52[b]	0.40	1.92[b]	13,084
Total direct impacts	**1.62[b]**	**0.96**	**2.58[b]**	**13,188**

[a] In this table, the acreages for waters of the State (nonjurisdictional) include only those drainages that are not also waters of the U.S. Because all drainages that are waters of the U.S. (jurisdictional) are also considered waters of the State, the total acreage for waters of the State would include both the nonjurisdictional and jurisdictional acreages. Under the No-Build Alternative, there would be no impacts on perennial drainage.

[b] Numbers are based on a reduction in fill achieved through design refinements during the 404 b(1) process.

Although the bridges over Green Valley Creek, Dan Wilson Creek, and Suisun Creek are clear spans, and no piers would be placed below the ordinary high water mark (OHWM), and existing piers and supports would be removed from the creekbed. The removal may result in the need for placing fill and recontouring the bed, which would be a direct permanent impact. This analysis assumes that the bridge abutments at these three creeks would be constructed above the OHWM and would not result in permanent fill. The SR 12E bridges carrying on- and off-ramps over Ledgewood Creek would each include a single pier wall within the OHWM of the creek, which would be permanent fill. Replacement of the culvert on I-680 at American Canyon Creek with a longer culvert and replacement of the culvert under SR 12E at Ledgewood Creek would be permanent fill. For bridge construction, cofferdams installed during construction would be considered a temporary impact.

Additional indirect impacts caused by sedimentation or modification of hydrology could occur in portions of perennial drainages that lie outside the project footprint.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of the Standard Specification and Standard Special Provision measures in Section 3.3.1.1 (prohibit construction work in environmentally sensitive areas (Standard Specification 14-1.02A); install ESA fencing (Standard Specification 14-1.03); monitor construction and other activities by a contractor-supplied biologist (Standard Special Provision 14-6.05); and conduct environmental awareness training (Standard Special Provision 14-6.08)), as well as Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10), and the measures listed below to restore and compensate for drainage habitat would address the impacts on perennial drainages for all build alternatives.

ESA fencing would be installed at construction areas at Green Valley, Dan Wilson, Suisun, American Canyon, and Ledgewood Creeks, as well as a tributary of Ledgewood Creek during construction to minimize temporary and indirect impacts during construction. A 100-foot buffer will be established where feasible.

Protect Water Quality and Prevent Erosion and Sedimentation into Drainages and Wetlands

Features to be protected include American Canyon, Green Valley, Suisun, Dan Wilson, and Ledgewood Creeks; unnamed drainages; wetlands, and the Suisun Marsh Secondary Management Area in and adjacent to the project area. The following BMPs will be implemented before and during construction.

- All earthwork or foundation activities involving creeks, culverts, and bridges will occur in the dry season (generally between June 1 and October 15).
- Equipment used in and around drainages and wetlands will be in good working order and free of dripping or leaking engine fluids. All vehicle maintenance, staging, and materials storage will be performed at least 250 feet from all drainages and wetlands. Any necessary equipment washing will be carried out where the water cannot flow into drainages or wetlands. A Spill Response Plan will be prepared.
- Any surplus concrete rubble, asphalt, or other rubble from construction and water from concrete curing operations will not be allowed to enter watercourses and will be taken to an appropriate landfill or disposal facility.
- Spill containment kits will be maintained onsite at all times during construction operations and/or staging or fueling of equipment.
- An erosion control plan will be prepared and implemented for the proposed project. It will include the following provisions and protocols:
  - Discharge from dewatering operations, if needed, and runoff from disturbed areas will be made to conform to the water quality requirements of the waste discharge permit issued by the RWQCB.
  - Material stockpiles will be located in non-traffic areas only. Side slopes will not be steeper than 2:1. All stockpile areas will be surrounded by a filter fabric fence and interceptor dike.
  - Temporary erosion control measures, such as sandbagged silt fences, will be applied throughout construction of the proposed project and will be removed after the working area is stabilized or as directed by the engineer. The plan will detail the applications and type of measures, and the allowable exposure of unprotected soils. ESA-type fencing and silt fencing or other erosion control measures will be in place throughout the construction period in order to avoid indirect effects on adjacent parts of drainages, wetlands, and the Suisun Marsh Secondary Management Area. The least environmentally damaging practicable alternative for protecting temporarily affected wetlands will be used during construction, such as a timber mat system, which minimizes compaction of the

underlying wetland soils. The SWPPP for the proposed project will detail the applications and type of measures and the allowable exposure of unprotected soils.

- Soil exposure will be minimized through use of temporary BMPs, groundcover, and stabilization measures. Exposed surfaces will be stabilized at least three days prior to a forecasted rain event. Exposed dust-producing surfaces will be sprinkled daily, if necessary, until wet; this measure will be controlled to avoid producing runoff. Paved streets will be swept daily following construction activities.
- The contractor will conduct periodic maintenance of erosion and sediment control measures.
- Disturbed areas will be restored to pre-project conditions to the maximum extent feasible and an appropriate seed mix of native species will be planted on disturbed areas upon completion of construction.

Restore Temporarily Disturbed Drainage Habitat and Compensate for Permanent Loss of Drainage Habitat

Portions of the drainages temporarily disturbed by cofferdam construction will be restored to original grade and preconstruction conditions following construction, and no permanent impacts will result. All temporary disturbance will continue for less than one year, except at Green Valley Creek, which will require the placement of cofferdams over multiple years.

The permanent fill of other waters of the United States in drainages will be compensated for at a minimum ratio of 1:1 (one linear foot of habitat restored or created for every one linear foot permanently affected). The actual compensation ratios will be determined through coordination with the RWQCB and the USACE as part of the permitting process. Permanent loss of perennial and seasonal drainage will be compensated for by implementing one or a combination of the following options. The final mitigation approach will be determined in cooperation with the RWQCB and USACE.

- Purchase credits for created riparian stream channel at a locally approved mitigation bank. Written evidence will be provided to the resource agencies that compensation has been established through the purchase of mitigation credits.
- Compensate out of kind for loss of drainages by implementing compensatory mitigation for riparian woodland impacts described in the measure to compensate for temporary and permanent loss of riparian vegetation in Section 3.3.1.1. Out-of-kind compensation is generally used for drainage impact mitigation due to the difficulty in creating new drainage habitat; therefore, restoration of riparian woodland in order to improve existing drainage habitat is recommended. The linear feet restored to compensate for loss of drainages will be in addition to the acreage restored for loss of riparian habitat. If this approach is used for mitigation of waters of the U.S., the restoration plan will comply with the USACE and EPA compensatory mitigation rule (40 CFR Part 230 Subpart J) and will include location and timing of restoration, species to be used, planting locations and maintenance, success criteria, and an adaptive management plan.

3.3.2.2 Seasonal Drainage

Affected Environment

Seasonal drainages in the study area primarily carry water after storm events and during the wet season. This category includes both natural seasonal drainages and constructed seasonal drainages, both of which provide habitat for wildlife. Some natural and constructed seasonal drainages in the study area are considered jurisdictional by the USACE and are subject to regulation under CWA Section 404. Drainages that are not under USACE jurisdiction but have beneficial uses or potential beneficial uses would be considered waters of the State that would be regulated by the RWQCB, which would issue WDRs for loss of drainage area.

Natural Seasonal Drainage

Natural seasonal drainages in the study area are listed here illustrated in Figures 3.3-2a through 3.3-2d in Volume 2.

- Jameson Canyon Creek and its tributaries (OW-8, OW-8a, OW-8b, OW-8c, OW-8d, and OW-8e) (Sheets 3, 4, 5, 7, 9, and 14).
- Drainages north of SR 12W (OW-149 and OW-161) (Sheet 5).
- Erosional drainages north of I-80 and Red Top Road (OW-1a and OW-2b) (Sheets 2 and 3).
- Erosional drainages west of I-680 (OW-150 and OW-151) (Sheet 13).

Functions of natural seasonal drainages in the study area include flood conveyance during and after storm events. Most natural seasonal drainages in the study area ultimately drain to Cordelia or Peytonia Sloughs, which in turn drain to Suisun Bay and are considered jurisdictional by the USACE. These features are subject to USACE regulation under CWA Section 404 and are considered sensitive natural communities. Some natural seasonal drainages in the study area are not subject to USACE jurisdiction, because they have no connection to the tidal sloughs that drain to Suisun Bay. However, these natural drainages are considered sensitive natural communities and would be considered waters of the state regulated by the RWQCB.

Constructed Seasonal Drainages

Constructed seasonal drainages occur throughout the study area and include ditches excavated in upland areas along roadsides, railroads, and agricultural fields or around developments. Some ditches are concrete lined. Roadside and irrigation ditches that were constructed in uplands and do not connect to a natural stream are not subject to USACE jurisdiction and are not considered sensitive natural communities. Based on the USACE-verified delineation of the waters of the U.S., the only non-jurisdictional seasonal drainages in the study area are OW-3 (Sheet 1) and OW-56a (Sheets 23 and 24).

Environmental Consequences

Construction of the project alternatives would involve the installation of culverts and placement of fill for road widening and bridge construction, resulting in direct disturbance of jurisdictional and nonjurisdictional seasonal drainages. Impact acreages are based on the final USACE-verified delineation.

Loss or Disturbance of Nonjurisdictional Seasonal Drainages

Construction of the full build alternatives would involve the installation of culverts and placement of fill for road widening, resulting in direct disturbance of nonjurisdictional constructed seasonal drainages. Under Alternatives B and C, approximately 0.11 acre of nonjurisdictional irrigation ditch would be placed in a culvert for construction. Alternative B, Phase 1 would not affect nonjurisdictional seasonal drainages, and Alternative C, Phase 1 would remove less than 0.01 acre of nonjurisdictional seasonal drainage.

Loss or Disturbance of Jurisdictional Seasonal Drainages Resulting from Construction

Impacts on seasonal drainages that persist for less than one year are considered temporary, and those that continue for a longer period are considered permanent. Temporary impacts on jurisdictional seasonal drainages under both build alternatives would occur during project construction activities for equipment access and placement of cofferdams and falsework that would remain in place for less than one year.

Alternative B

Construction of Alternative B would result in a permanent loss and a temporary loss of jurisdictional seasonal drainage within the project area (summarized in Table 3.3.2-1 and Volume 2, Figures 3.3-1 and 3.3-2a). These impact acreages are based on the final USACE-verified delineation.

Permanent impacts on jurisdictional seasonal drainages would occur in the areas listed below.

- Replacement and lengthening of culverts in Jameson Canyon Creek (OW-8) (Sheets 7, 9, and 14); its tributaries (OW-8b, OW-8d, OW-8e) (Sheets 3, 4, and 5); and unnamed drainages (OW-13, OW-15, OW-86, OW-149, OW-160) (Sheets 3, 4, and 5) for the realignment of Red Top Road and construction of on- and off-ramps for SR 12W.
- Grading and culverting of unnamed drainages for the extension of Red Top Road north of SR 12W (OW-145, OW-153, and OW-161) (Sheets 5 and 6).
- Replacement and lengthening of culverts in unnamed jurisdictional seasonal drainages throughout the project area for road widening on I-80 (OW-1a, OW-2, OW-2a, OW-2b, OW-8, OW-57, OW-87, OW-88, OW-93, OW-139, and OW-141) (Sheets 1, 2, 3, 7, 19, 20, 21, and 23); I-680 (OW-8, OW-43, OW-44, OW-103c, OW-104, OW-150, and OW-151) (Sheets 10, 11, 13, 15, and 16); and SR 12E (OW-90b, OW-110, and OW-119) (Sheets 25, 32, 33, and 34).
- Improvements to the I-80/I-680 interchange (OW-45a, OW-45d, OW-45e, OW-61a, and OW-61) (Sheets 8, 16, 17, and 18).

Alternative B, Phase 1

Construction of Alternative B, Phase 1 would result in a permanent loss and a temporary loss of jurisdictional seasonal drainage within the project area (summarized in Table 3.3.2-2 and Volume 2, Figure 3.3-2b). These impact acreages are based on the final USACE-verified delineation.

Permanent impacts on jurisdictional seasonal drainages would occur in the following areas.

- Replacement and lengthening of culverts in unnamed jurisdictional seasonal drainages throughout the project area for road widening on I-80 (OW-57, OW-87, OW-88, OW-93, OW-139, and OW-141) (Sheets 19, 20, and 21); I-680 (OW-8, OW-43, OW-44, OW-104, OW-150, and OW-151) (Sheets 13, 14, 15, and 16); and SR 12E (OW-90b) (Sheet 32);
- Improvements to the I-80/I-680 interchange (OW-45a, 45d, OW-45e, OW-61a, and OW-61) (Sheets 16, 17, and 18).

Alternative C

Construction of Alternative C would result in a permanent loss of and a temporary loss of jurisdictional seasonal drainage within the project area (summarized in Table 3.3.2-3 and Volume 2, Figure 3.3-2c). These impact acreages are based on the final USACE-verified delineation.

Permanent impacts on jurisdictional seasonal drainages would occur in the following areas.

- Replacement and lengthening of culverts in Jameson Canyon Creek tributaries (OW-8b, OW-8d, and OW-8e) (Sheets 3, 4, and 5); and unnamed drainages (OW-13, OW-15, OW-86, OW-149, and OW-160) (Sheets 3, 4, and 5) for realignment of Red Top Road and construction of on- and off-ramps for SR 12W.
- Grading and culverting of unnamed drainages within the extension of Red Top Road north of SR 12W (OW-145, OW-153, and OW-161) (Sheets 5 and 6).
- Replacement and lengthening of culverts in unnamed jurisdictional seasonal drainages throughout the project area for road widening on I-80 (OW-1a, OW-2, OW-2a, OW-2b, OW-8, OW-57, OW-87, OW-88, OW-93, and OW-139) (Sheets 1, 2, 3, 7, 19, 20, 21, and 23); I-680 (OW-8, OW-19, OW-103c, OW-150, and OW-151) (Sheets 11 and 13); and SR 12E (OW-110, OW-90b, and OW-119) (Sheets 25, 32, 33, and 34).
- Improvements to the I-80/I-680 interchange (OW-8, OW-45a, OW-61a, and OW-61) (Sheets 8, 9, 14, 16, and 17).

Alternative C, Phase 1

Construction of Alternative C, Phase 1 would result in a permanent loss and a temporary loss of jurisdictional seasonal drainage within the project area (Table 3.3.2-4 and Volume 2, Figure 3.3-2d). These impact acreages are based on the final USACE-verified delineation.

Permanent impacts on jurisdictional seasonal drainages would occur in the following areas.

- Replacement and lengthening of culverts in Jameson Canyon Creek (OW-8); its tributaries (OW-8a, OW-8b, OW-8d, and OW-8e) (Sheets 3, 4, and 5); and unnamed drainages (OW-13, OW-15, OW-86, OW-149, and OW-160) (Sheets 3, 4, and 5) for the realignment of Red Top Road and construction of on- and off-ramps for SR 12W.
- Grading and culverting of unnamed drainages within the extension of Red Top Road north of SR 12W (OW-145, OW-153, and OW-161) (Sheets 5 and 6).

- Replacement and lengthening of culverts in unnamed jurisdictional seasonal drainages throughout the project area for road widening on I-80 (OW-1, OW-1a, OW-2, OW-2a, and OW-8) (Sheets 1, 2, 3, and 7); I-680 (OW-19, OW-150, and OW-151) (Sheet 13); and SR 12E (OW-119) (Sheet 33).
- Improvements to the I-80/I-680 interchange (OW-8, OW-45a, OW-61a, and OW-61) (Sheets 8, 9, 14, 16, and 17).
- Widening of I-80 east of the interchange (OW-87) (Sheet 19).

No-Build Alternative

Under the No-Build Alternative, there would be no impacts on seasonal drainage.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08), as well as Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) would address temporary and indirect impacts on jurisdictional seasonal drainages for all build alternatives. The measure to restore and compensate for drainage habitat presented in Section 3.3.2.1 would address the permanent and temporary impacts on jurisdictional seasonal drainages for all build alternatives.

3.3.2.3 Perennial Marsh

Affected Environment

Perennial marsh includes areas mapped in the delineation of waters of the United States as perennial wetland drainages, as well as areas mapped as perennial marsh. Perennial marsh occurs within study area drainages in the following areas (Volume 2, Figures 3.3-2a through 3.3-2d).

- An unnamed drainage adjacent to the east side of Ramsey Road, the frontage road east of I-680 (W-103c-1) (Sheet 11).
- Green Valley Creek and an unnamed tributary (W-45 and W-45g) (Sheets 17 and 18).
- Dan Wilson Creek upstream of I-80 (W-53) (Sheet 21).
- The downstream reach of Ledgewood Creek that crosses SR 12E (W-90), and an unnamed constructed tributary to Ledgewood Creek (W-90a) (Sheets 30, 31, and 32).
- An unnamed drainage south of SR 12E (W-175) (Sheet 33).

Green Valley Creek has a cement-lined bed and bank under the I-80 bridges, which has been classified as perennial drainage, but also has areas north and south of the bridges that support dense emergent vegetation, including willow and cattail, which has been classified as perennial marsh. The unnamed drainage, Dan Wilson Creek, and Ledgewood Creek have natural beds and banks, although Ledgewood Creek and the unnamed constructed tributary are culverted under

SR 12E. In Ledgewood Creek and the tributary, the open water and emergent vegetation habitats are considered to function as a single ecological unit.

The five drainages listed above support freshwater marsh vegetation but are mentioned separately from either the perennial marsh or drainage types because they have characteristics and functions of both types. Dominant plant species observed in perennial wetland drainages include narrow-leaved cattail, bulrush, Himalayan blackberry, watercress, water-milfoil, and Goodding's willow. Water is present year-round, or nearly year-round, in these areas. Wetland functions of perennial wetland drainages in the study area include flood conveyance and wildlife habitat because of the presence of generally dense wetland vegetation.

Perennial marsh wetlands that are outside of drainages occur in the following parts of the study area (Volume 2, Figures 3.3-2a through 3.3-2d).

- A pond north of SR 12W (W-150) (Sheet 5).
- A drainage basin between Rodriquez High School and Lopes Road (W-205) (Sheet 13).
- A pond north of Cordelia Road (W-105) (Sheets 15 and 16).
- In a mitigation area east of Green Valley Creek (W-45e-1) (Sheet 18).
- Surrounding a water treatment plant at the east end of SR 12E (W-136 and W-137) (Sheet 35).
- In the Webster Street off-ramp loop on SR 12E (W-155) (Sheet 35).
- South of SR 12E at the eastern end of the study area (W-142) (Sheets 33, 34, and 35).

Dominant plant species observed in perennial marsh wetlands include those found in the perennial wetland drainages, as well as California blackberry, Harding grass, curly dock, and soft rush. This community type is inundated or saturated year-round. Perennial marsh at the east end of SR 12E is brackish.

Wetland functions of perennial marsh in the study area include flood storage, groundwater discharge due to high water tables, sediment control (in the case of marsh that directly abuts a drainage), and wildlife habitat associated with the presence of generally dense wetland vegetation.

Perennial wetland drainages that connect to the Suisun Marsh sloughs and tributaries of these drainages are considered waters of the United States, subject to regulation under CWA Section 404. Placement of material in these areas, including cofferdams, would be considered placement of fill within waters of the United States. This activity would require Section 404 authorization from the USACE and CWA Section 401 water quality certification from the RWQCB. An SAA from the CDFG would be required for construction activity within perennial wetland drainages and their floodplains. No creeks in the study area are regulated by the State Lands Commission, and construction would not require a land lease amendment (Jones pers. comm.). Perennial marshes that are not under USACE jurisdiction but have beneficial uses would be considered waters of the State that would be regulated by the RWQCB, which would issue WDRs for loss of wetlands.

Environmental Consequences

Construction of the project alternatives would involve the installation of culverts and placement of fill for road widening and bridge construction, resulting in direct disturbance of jurisdictional perennial marsh wetlands. Impact acreages are based on the final USACE-verified delineation. Affected acreage in this community is tabulated for each alternative in Table 3.3.1-1.

Loss or Disturbance of Non-jurisdictional Perennial Marsh

Under Alternative B and Alternative B, Phase 1, approximately 0.04 acre of non-jurisdictional perennial marsh in an isolated wetland (W-105 [Volume 2, Figures 3.3-2a and 3.3-2b, Sheets 15 and 16]) would be permanently affected and up to 0.01 acre of the same wetland would be temporarily affected by construction for the widening of I-680. Impacts on nonjurisdictional perennial marshes that occur during construction and last for less than one year are considered temporary, and impacts that continue for a longer period, such as placement of fill, are considered permanent.

No non-jurisdictional perennial marsh would be affected under Alternative C or Alternative C, Phase 1.

Loss or Disturbance of Jurisdictional Perennial Marsh Resulting from Construction

Construction of all of the build alternatives would involve installation of culverts and placement of fill for road widening, resulting in direct disturbance of jurisdictional perennial marsh, including perennial wetland drainages and marsh habitat that occurs outside of drainages. Additional indirect impacts caused by sedimentation or modification of hydrology could occur in portions of perennial wetland drainages that lie outside the project footprint. Impacts on jurisdictional perennial marshes that occur during construction and last for less than one year are considered temporary, and impacts that continue for a longer period, such as placement of fill or modification of hydrology, are considered permanent.

Alternative B

Construction of Alternative B would result in a permanent loss of approximately 5.15 acres of jurisdictional perennial marsh. Perennial marsh would be filled in the following features within the project footprint (Volume 2, Figure 3.3-2a).

- An unnamed drainage adjacent to the east side of Ramsey Road, the frontage road east of I-680 (W-103c-1), due to a lengthened culvert for the widening of I-680 (Sheet 11).
- One unnamed tributary of Green Valley Creek (W-45g) for the off-ramp from northbound I-680 to eastbound I-80 and Green Valley Road (Sheet 18).
- The perennial marsh mitigation area east of Green Valley Creek (W-45e-1) for a new off-ramp from westbound I-80 to Green Valley Road (Sheet 18).
- The downstream reach of Ledgewood Creek (W-90) that crosses SR 12E and an unnamed constructed tributary of Ledgewood Creek (W-90a) for widening of the culvert under SR 12E by ten feet on both sides (Sheets 30, 31, and 32).

- Two brackish perennial marshes south of SR 12E at the eastern end of the study area (W-142, W-175) for widening of SR 12E and construction of access to Main Street in Suisun City (Sheets 33, 34, and 35).

Under Alternative B, a total of 4.68 acres of temporary impacts would occur in jurisdictional perennial marsh, including areas adjacent to the permanent impacts listed above as well as in Green Valley Creek (W-45) (Sheet 17) and Dan Wilson Creek upstream of I-80 (W-53a) (Sheet 21) for installation of cofferdams during construction of clear-span bridges within the I-80/I-680 interchange.

Without implementation of Best Management Practices (BMPs), indirect effects on jurisdictional perennial marsh would occur in areas adjacent to the construction area due to sedimentation caused by the construction. In perennial marsh located in drainages (W-103c-1, W-45, W-45g, W-45e-1, W-90, W-90a, and W-175), these indirect effects would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. In perennial marsh habitat located outside of drainages, these measures would also prevent sedimentation into the part of the wetlands located outside of the permanent impact area. The extent of fill in the marsh south of SR 12E (W-142) would remove a portion of the watershed for this feature, but the majority of the feature (3.74 acres filled out of 48.36 acres of the existing wetland) would be left intact and continue to function hydrologically as a wetland. No adverse indirect effect on perennial marsh is expected to occur, and no additional mitigation for indirect effects is proposed.

Alternative B, Phase 1

Construction of Alternative B, Phase 1 would result in a permanent loss of approximately 0.34 acre of jurisdictional perennial marsh. Perennial marsh would be filled in the following features within the project footprint (Volume 2, Figure 3.3-2b).

- One unnamed tributary of Green Valley Creek (W-45g) for the off-ramp from northbound I-680 to eastbound I-80 and Green Valley Road (Sheet 18).
- The perennial marsh mitigation area east of Green Valley Creek (W-45e-1) for a new off-ramp from westbound I-80 to Green Valley Road (Sheet 18).
- The downstream reach of Ledgewood Creek (W-90) that crosses SR 12E and an unnamed constructed tributary of Ledgewood Creek (W-90a) for widening of the culvert under SR 12E (Sheets 30, 31, and 32).

Under Alternative B, Phase 1, a total of 1.26 acres of temporary impacts would occur in jurisdictional perennial marsh, including areas adjacent to the permanent impacts listed above, as well as in Green Valley Creek (W-45) (Sheet 17) and Dan Wilson Creek (W-53a) (Sheet 21) for installation of cofferdams during construction of clear-span bridges within the I-80/ I-680 interchange.

Without implementation of Best Management Practices (BMPs), indirect effects on jurisdictional perennial marsh would occur in areas adjacent to the construction area due to sedimentation caused by the construction. In perennial marsh located in drainages (W-45, W-45g, W-45e-1, W-90, and W-90a), these indirect effects be avoided by implementation of avoidance and

minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. No perennial marsh habitat located outside of drainages is present in the Alternative B, Phase 1 project area.

Alternative C

Construction of Alternative C would result in a permanent loss of approximately 5.03 acres of jurisdictional perennial marsh. Perennial marsh would be filled in the following features within the project footprint (Volume 2, Figure 3.3-2c).

- A drainage basin between Rodriquez High School and Lopes Road (W-205) for improvements to I-680 (Sheet 13).
- A small area of marsh in an unnamed drainage adjacent to the east side of Ramsey Road, the frontage road east of I-680 (W-103 and W-103c-1), for a lengthened culvert for widening of I-680 (Sheet 11).
- The downstream reach of Ledgewood Creek (W-90) that crosses SR 12E and an unnamed constructed tributary of Ledgewood Creek (W-90a) for widening of the culvert under SR 12E on both sides (Sheets 30, 31, and 32).

Under Alternative C, a total of 3.68 acres of temporary impacts would occur in jurisdictional perennial marsh, including areas adjacent to the permanent impact areas listed above, as well as in Green Valley Creek (W-45) (Sheets 17 and 18) and Dan Wilson Creek upstream of I-80 (W-53a) (Sheet 21) for installation of cofferdams during construction of clear-span bridges associated with the I-80/I-680 interchange.

Without implementation of Best Management Practices (BMPs), indirect effects on jurisdictional perennial marsh would occur in areas adjacent to the construction area due to sedimentation caused by the construction. In perennial marsh located in drainages (W-103, W-103c-1, W-45, W-45g, W-45e-1, W-90, W-90a, and W-175), these indirect effects would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. In perennial marsh habitat located outside of drainages, these measures would also prevent sedimentation into the parts of the wetlands located outside of the permanent impact area. The extent of fill in the marshes east of I-680 (W-205) and south of SR 12E (W-142) would remove a portion of the watershed for these features, but the remaining parts of the features (0.30 acre filled out of 1.20 acres existing for W-205 and 3.76 acres filled out of 48.36 acres existing for W-142) would be left intact and continue to function hydrologically as wetlands. W-155 is not connected to other wetlands and would be avoided entirely, therefore no indirect impacts on other wetlands would occur. No adverse indirect effect on perennial marsh is expected to occur, and no additional mitigation for indirect effects is proposed.

Alternative C, Phase 1

Construction of Alternative C, Phase 1 would result in a permanent loss of approximately 0.07 acres of jurisdictional perennial marsh with reduction of fill achieved through design design refinements during the 404 b(1) process. Perennial marsh would be filled in the following features within the project footprint (Volume 2, Figure 3.3-2d).

- A drainage basin between Rodriquez High School and Lopes Road (W-205) for improvements to I-680 (Sheet 13).
- The downstream reach of Ledgewood Creek (W-90) that crosses SR 12E and an unnamed constructed tributary of Ledgewood Creek (W-90a) for widening of the culvert under SR 12E on the south side (Sheets 31 and 32).

A total of 1.66 acres of temporary impacts would occur in jurisdictional perennial marsh, including areas adjacent to the permanent impact areas listed above, as well as in Green Valley Creek (W-45) (Sheets 17 and 18), for installation of cofferdams during construction of clear-span bridges associated with the I-80/I-680 interchange.

Without implementation of Best Management Practices (BMPs), indirect effects on jurisdictional perennial marsh would occur in areas adjacent to the construction area due to sedimentation caused by the construction. In perennial marsh located in drainages (W-90 and W-90a), these indirect effects would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. In perennial marsh habitat located outside of drainages, these measures would also prevent sedimentation into the part of the wetland located outside of the permanent impact area. The extent of fill in the marsh east of I-680 (W-205) would remove a portion of the watershed for this feature, but the remaining part of the feature would be left intact and continue to function hydrologically as a wetland. No adverse indirect effect on perennial marsh is expected to occur, and no additional mitigation for indirect effects is proposed.

No-Build Alternative

Under the No-Build Alternative, no construction activities would occur, and no impacts on perennial marshes would occur.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08), as well as Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) would address temporary and indirect impacts on perennial marsh for all build alternatives. The measure to restore and compensate for drainage habitat presented in Section 3.3.2.1 and the measures below to restore temporarily disturbed perennial marsh and compensate for permanent loss of wetlands would address the permanent and temporary impacts on perennial marsh for all build alternatives.

Restore Temporarily Disturbed Perennial Marsh

Portions of perennial marsh may be temporarily disturbed by cofferdam construction, if necessary. These areas will be restored to original grade and preconstruction conditions following construction. Cofferdams will remain in place for less than one year and will be

completely removed after construction activities in the area are completed. Any temporarily disturbed marsh vegetation in the channel is anticipated to regenerate.

Compensate for Permanent Loss of Wetlands

In compliance with the CWA Section 404 permit and WDRs, the permanent loss (fill) of wetlands, including perennial marsh, alkali seasonal marsh, and seasonal wetland, will be compensated for and measures will be taken to ensure no net loss of habitat functions. Loss of wetlands will be compensated for at a minimum ratio of 1:1 (one acre of mitigation for every one acre filled), except for any loss of wetlands in W-45e-1, which is a mitigation area and will require mitigation at a minimum ratio of 2:1. The actual compensation ratios will be determined through coordination with the RWQCB and the USACE as part of the permitting process. Compensation may be a combination of mitigation bank credits and restoration/creation of habitat. Permanent loss of wetland habitat will be compensated for by implementing one or a combination of the following options.

- Purchase credits for the affected wetland type (perennial marsh, alkali seasonal marsh, or seasonal wetland) at a locally approved mitigation bank. Written evidence will be provided to the resource agencies that compensation has been established through the purchase of mitigation credits.
- In coordination with the RWQCB and USACE, develop and ensure implementation of a wetland restoration plan that involves creating or enhancing the affected wetland type (perennial marsh, alkali seasonal marsh, or seasonal wetland). Potential restoration sites will be evaluated to determine whether this is a feasible option, and restoration sites will be approved by the RWQCB and USACE through coordination during the permitting process. If suitable restoration sites are approved by the RWQCB and USACE, a restoration plan will be developed that complies with the USACE and EPA compensatory mitigation rule (40 CFR Part 230 Subpart J). The plan will describe where and when restoration will occur and who will be responsible for developing, implementing, and monitoring the restoration plan. The plan will also include a species list and number of each species, planting locations, and maintenance requirements. Plantings will be native species appropriate to the area and from local sources. Plantings will be monitored annually for three years or as required in the project permits. If survival of wetland plant cover is at least 75%, or as required by the RWQCB and USACE, at the end of the monitoring period, the revegetation will be considered successful. An adaptive management plan will be developed to address plant mortality and methods for correction. If the survival criterion is not met at the end of the monitoring period, planting and monitoring will be repeated after mortality causes have been identified and corrected per the adaptive management plan. Mitigation sites will be protected in perpetuity in a conservation easement.

3.3.2.4 Alkali Seasonal Marsh

Affected Environment

Alkali seasonal marsh was mapped only in the area south of SR 12E at the eastern end of the study area (Figures 3.3-2a through 3.3-2d, Sheet 33 in Volume 2). This area is surrounded by seasonal wetland and nonnative annual grassland. Alkali seasonal marsh is seasonally inundated or saturated and is distinguished from seasonal wetland habitat by the presence of saline soils

and salt-tolerant species, including curved sicklegrass, alkali weed, alkali heath and, in low areas, pickleweed.

Local, state, and federal agencies recognize alkali seasonal marshes as sensitive natural communities. Alkali seasonal marsh wetlands in the study area are considered waters of the United States, subject to regulation under CWA Section 404. Placement of material in these areas, including cofferdams, would be considered placement of fill within waters of the United States. This activity would require Section 404 authorization from the USACE and CWA Section 401 water quality certification from the RWQCB.

Environmental Consequences

Construction of the project alternatives would involve the installation of culverts and placement of fill for road widening and bridge construction, resulting in direct disturbance of jurisdictional alkali seasonal marsh wetlands. Impact acreages are based on the final USACE-verified delineation. Affected acreage in this community is tabulated for each alternative in Table 3.3.1-1.

Loss or Disturbance of Alkali Seasonal Marsh Resulting from Construction

Construction of Alternative B and Alternative C would involve placement of fill, resulting in direct disturbance of jurisdictional alkali seasonal marsh. These impact acreages are based on the final USACE-verified delineation. Additional indirect impacts caused by sedimentation or modification of hydrology could occur in portions of alkali seasonal marsh that lie outside the project footprint.

Alternative B

Construction of Alternative B would result in a permanent loss of approximately 1.75 acres of alkali seasonal marsh. Alkali seasonal marsh would be filled for the new SR 12E off-ramp, extension of Meyer Lane between Beck and Pennsylvania Avenues, and widening of Pennsylvania Avenue south of SR 12E (W-163, W-164, W-166, and W-168) (Volume 2, Figure 3.3-2a, Sheet 33). Under Alternative B, 0.28 acre of alkali seasonal marsh lies within the temporary impact area, but implementation of avoidance and minimization measures listed below will avoid temporary impacts.

Indirect effects on alkali seasonal marsh could occur in areas adjacent to the construction area due to sedimentation caused by the construction. These indirect effects would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. The extent of fill in alkali seasonal marshes W-163, W-166, and W-168 would remove a portion of the watershed for these features, but the remaining parts of the features (0.22 acre filled out of 0.59 acres existing for W-163, 1.18 acres filled out of 4.90 acres existing for W-166, and 0.29 acre filled out of 1.95 acres existing for W-168) would be left intact and continue to function hydrologically as wetlands. W-164 would be filled entirely. No adverse indirect effect on alkali seasonal marsh is expected to occur, and no additional mitigation for indirect effects is proposed.

Alternative B, Phase 1

No alkali seasonal marsh occurs in the Alternative B, Phase 1 study area, and no impacts on this habitat would result from construction of Alternative B, Phase 1.

Alternative C

No permanent impact areas in alkali seasonal marsh habitat are identified for Alternative C, Phase 1 due to the design of a retaining wall to be constructed in the existing right-of-way south of SR 12E.

Indirect effects on alkali seasonal marsh could occur in areas adjacent to the construction area due to sedimentation caused by the construction. These indirect effects would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. No adverse indirect effect on alkali seasonal marsh is expected to occur, and no additional mitigation for indirect effects is proposed.

Alternative C, Phase 1

No permanent impact areas in alkali seasonal marsh habitat are identified for Alternative C, Phase 1 due to the design of a retaining wall to be constructed in the existing right-of-way south of SR 12E. Temporary impacts due to movement of construction equipment and indirect impacts due to sedimentation could potentially occur in portions of alkali seasonal marsh wetlands that lie outside the project footprint under Alternatives B and C. Indirect impacts could also potentially occur under Alternatives C and C, Phase 1. However, implementation of avoidance, minimization, and/or mitigation measures to install ESA-type fencing, to conduct environmental awareness training, and for biological monitoring in Section 3.3.1.1, measures to prevent erosion and sedimentation into drainages and wetlands in Section 3.3.2.1, and the measure below would avoid and minimize temporary and indirect impacts on alkali seasonal marsh.

Under the No-Build Alternative, no construction activities would occur, and no impacts on alkali seasonal marshes would occur.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08), as well as Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) would address temporary and indirect impacts on alkali seasonal marsh for both full-build alternatives and Alternative C, Phase 1. The measures to compensate for permanent loss of wetlands in Section 3.3.2.3 would address the permanent impacts on alkali seasonal marsh under all build alternatives.

In the area south of SR 12E, the ESA-type fencing will be placed on the inside of the existing right-of-way fencing and will also include silt fencing (described in the Department Standard BMPs) to prevent sedimentation into the wetlands outside of the right-of-way. This fencing will prevent direct impacts on wetlands south of SR 12E between Ledgewood Creek and the eastern end of the construction area.

In addition, implementation of the following measure would prevent indirect impacts on wetlands located on the south side of SR 12E.

Construct a Retaining Wall on the South Side of SR 12E

A low retaining wall will be constructed on the south side of SR 12E between Ledgewood Creek and Suisun City. This design feature will reduce the overall footprint and southern expansion of the highway into alkali seasonal marsh and seasonal wetlands, and sensitive species habitat. These project modifications and implementation of the avoidance and minimization measures would prevent indirect impacts on adjacent alkali seasonal marsh, seasonal wetlands, and rare plants.

3.3.2.5 Seasonal Wetland

Affected Environment

The numbers used to refer to seasonal wetlands in this discussion are the numbers used in the delineation of waters of the United States conducted in the study area. However, there are wetland features that were not labeled on the delineation maps, because they were in areas that had been delineated for other projects. These wetlands are labeled on Figures 3.3-2a through 3.3-2d in Volume 2 for the purpose of discussion in this document.

Numerous seasonal wetlands were mapped in the study area; they are mostly in or adjacent to areas disturbed by development and agriculture. Many seasonal wetlands in the study area are near roadways and receive runoff from the roads. The vegetation in these wetlands is correspondingly degraded, often dominated by nonnative annual grasses and nonnative forbs. Dominant species observed in this wetland type typically include Italian ryegrass, Mediterranean barley, Harding grass, rabbits-foot grass, creeping wildrye, creeping spikerush, curly dock, iris-leaved rush, toad rush, prickly ox-tongue, birds-foot trefoil, and alkali mallow.

This habitat type also includes features south of SR 12E and west of Pennsylvania Avenue that were more specifically identified as “seasonally saturated annual grassland” in the wetland delineation conducted for another project in that area (Huffman-Broadway Group 2007). These areas are dominated by Italian ryegrass, Mediterranean barley, alkali weed, and alkali heath. Some seasonal wetlands located south of SR 12E support special-status vernal pool species. These wetlands were not categorized separately from the other seasonal wetlands, but they do provide higher quality habitat and support more native species.

Wetland functions of seasonal wetlands in the study area include flood storage, groundwater recharge, wildlife habitat, and—in the case of wetlands that support more native species—rare and endangered species habitat.

Some of the seasonal wetlands in the study area are considered jurisdictional by the USACE and subject to regulation under CWA Section 404; some are isolated features. Placement of material in these areas would be considered placement of fill in waters of the United States. This activity would require Section 404 authorization from the USACE and CWA Section 401 water quality certification from the RWQCB. Wetlands that are not under USACE jurisdiction but have potential beneficial uses would be considered waters of the State that would be regulated by the

RWQCB, which would issue WDRs for loss of wetlands. Regardless of USACE or state jurisdiction, however, local, state, and federal agencies recognize seasonal wetlands as sensitive natural communities.

Environmental Consequences

Construction of the project alternatives would involve the installation of culverts and placement of fill for road widening and bridge construction, resulting in direct disturbance of jurisdictional and nonjurisdictional seasonal wetlands. Affected acreages in jurisdictional and nonjurisdictional seasonal wetlands are tabulated for each alternative in Table 3.3.1-1.

Loss or Disturbance of Nonjurisdictional Seasonal Wetland

Construction of Alternative B would result in a permanent loss of 0.03 acre of nonjurisdictional seasonal wetland as a result of project construction for the widening of I-680 (W-21) and I-80 east of Green Valley Road (W-85) (Volume 2, Figure 3-3-2a, Sheets 12 and 18).

Alternative B, Phase 1 would result in a permanent loss of 0.02 acre of nonjurisdictional seasonal wetland as a result of project construction for widening of I-80 east of Green Valley Road (W-85) (Volume 2, Figure 3-3-2b, Sheet 18).

Construction of Alternative C would result in a permanent loss of approximately 0.36 acre of nonjurisdictional seasonal wetland as a result of project construction for improvements to the I-80/I-680 interchange (W-3, W-21, and W-147) (Volume 2, Figure 3-3-2c, Sheets 2, 9, 12, and 14) and for widening of I-80 east of Green Valley Road (W-85) (Volume 2, Figure 3-3-2c, Sheet 18).

Alternative C, Phase 1 would result in a permanent loss of approximately 0.34 acre of nonjurisdictional seasonal wetland for improvements to the I-80/I-680 interchange (W-147) (Volume 2, Figure 3-3-2d, Sheets 9 and 14).

Additional temporary impacts due to movement of construction equipment during project construction and indirect impacts caused by sedimentation or modification of hydrology could occur in seasonal wetlands that lie outside the project footprint. However, implementation of Standard Specifications and Standard Special Provisionsin Section 3.3.1.1 and Section 3.3.2.1 would avoid and minimize temporary and indirect impacts on nonjurisdictional seasonal wetlands.

Loss or Disturbance of Jurisdictional Seasonal Wetland Resulting from Construction

Under both of the build alternatives, temporary impacts due to movement of construction equipment during project construction and indirect impacts caused by sedimentation or modification of hydrology could occur in portions of seasonal wetlands that lie outside the project footprint. However, implementation of Standard Specifications and Standard Special Provisions would avoid and minimize temporary and indirect impacts on seasonal wetland.

Alternative B

Construction of Alternative B would involve placement of fill, resulting in a permanent loss of approximately 7.84 acres of jurisdictional seasonal wetland (Table 3.3.1-1 and Volume 2, Figure 3.3-2a). These impact acreages are based on the final USACE-verified delineation. Direct permanent impacts on parts or all of seasonal wetlands would occur in the following areas because of project construction.

- The realignment area to be graded for Red Top Road north of SR 12W (W-187 and W-189) (Sheets 5 and 6).
- Widening of SR 12W and construction of westbound on- and off-ramps for SR 12W (W-13, W-14, W-15, W-148, W-149, W-149a, W-156, W-159, W-194, and W-195) (Sheets 4, 5, and 6).
- Widening of the SR 12W/I-80 interchange (W-60 and W-62) (Sheets 7 and 8).
- Improvements to the SR 12W/I-680 interchange (W-28, W-29, W-30, W-42, W-63, W-64, W-143, W-144, W-145, and W-146) (Sheet 8).
- Improvements to the I-80/I-680 interchange (W-45a-1, W-45a-2, W-45-1, W-45-2, W-61, W-80, W-81, W-86, W-109, and W-191) (Sheets 17 and 18).
- Widening of I-80 east of the interchange (W-192 and W-193) (Sheet 21).
- Construction of the Meyer Lane extension between Beck and Pennsylvania Avenues (W-131 and W-132) (Sheet 32).
- The overcrossing and local road improvements at Pennsylvania Avenue and SR 12E (W-121, W-122, W-123, W-127, W-128, W-130, W-162, W-165, W-167, W-169, W-170, W-173, and W-174) (Sheets 32, 33, and 34).

Under Alternative B, 1.85 acres of jurisdictional seasonal wetland lies within the temporary impact area, but implementation of avoidance and minimization measures listed below will avoid temporary impacts.

Without implementation of Best Management Practices (BMPs), indirect effects on seasonal wetlands would occur adjacent to the construction area due to sedimentation caused by the construction and by alteration of the wetland hydrology. Potential indirect effects due to sedimentation would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. Indirect effects due to alteration of wetland hydrology could occur where part of a wetland is filled and the rest of the wetland outside of the permanent impact area is left intact. Seasonal wetlands with small permanent impacts could continue to function hydrologically as wetlands. For small seasonal wetlands, however, a substantial part of the wetland and the surrounding upland area would be paved, potentially changing the amount of water that the remaining part of the wetland receives. Most of these wetlands have been historically altered due to the construction of roads and other development. For seasonal wetlands that are suitable habitat for federally listed fairy shrimp (discussed in Section 3.3.5.4), including W-143, W-189, W-15, and W-45a-2, the indirectly affected wetland area will be compensated for in addition to the directly affected area. In addition, all seasonal wetlands that are suitable habitat for federally

listed fairy shrimp and are within 250 feet of ground disturbance, with no intervening barrier, will be compensated as indirect impacts. With implementation of the avoidance and minimization measures and compensation for listed fairy shrimp habitat, the net indirect effect on seasonal wetland is not expected to be adverse, and no additional mitigation for indirect effects is proposed.

Alternative B, Phase 1

Construction of Alternative B, Phase 1 would involve placement of fill, resulting in a permanent loss of approximately 1.82 acres of jurisdictional seasonal wetland (Table 3.3.1-1 and Volume 2, Figure 3.3-2b). These impact acreages are based on the final USACE-verified delineation. Direct permanent impacts would occur in parts or all of seasonal wetlands W-45-1, W-45a-2, W-45-2, W-45-3, W-61, W-63, W-80, W-81, W-86, W-109, and W-191 (Sheets 8, 17, and 18) for improvements to the interchange.

Without implementation of Best Management Practices (BMPs), indirect effects on seasonal wetlands would occur adjacent to the construction area due to sedimentation caused by the construction and by alteration of the wetland hydrology. Potential indirect effects due to sedimentation would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. Indirect effects due to alteration of wetland hydrology could occur where part of a wetland is filled and the rest of the wetland outside of the permanent impact area is left intact. Seasonal wetlands with small permanent impacts could continue to function hydrologically as wetlands. For small seasonal wetlands, however, a substantial part of the wetland and the surrounding upland area would be paved, potentially changing the amount of water that the remaining part of the wetland receives. Most of these wetlands have been historically altered due to the construction of roads and other development. For seasonal wetlands that are suitable habitat for federally listed fairy shrimp (discussed in Section 3.3.5.4), including W-63, W-45a-2, and W-45-3, the indirectly affected wetland area will be compensated for in addition to the directly affected area. In addition, all seasonal wetlands that are suitable habitat for federally listed fairy shrimp and are within 250 feet of ground disturbance, with no intervening barrier, will be compensated as indirect impacts. With implementation of the avoidance and minimization measures and compensation for listed fairy shrimp habitat, the net indirect effect on seasonal wetland is not expected to be adverse, and no additional mitigation for indirect effects is proposed.

Alternative C

Construction of Alternative C would involve placement of fill, resulting in a permanent loss of approximately 8.62 acres of jurisdictional seasonal wetland (Table 3.3.1-1 and Volume 2, Figure 3.3-2c). These impact acreages are based on the final USACE-verified delineation. Direct permanent impacts on parts or all of seasonal wetlands would occur in the following areas as a result of project construction.

- The realignment area to be graded for Red Top Road north of SR 12W (W-183, W-187, and W-189) (Sheets 5 and 6).
- Widening of SR 12W and construction of westbound on- and off-ramps for SR 12W (W-13, W-14, W-15, W-148, W-149, W-149a, W-156, W-159, W-194, and W-195) (Sheets 4 and 5).

- Widening of the SR 12W/I-80 interchange (W-60 and W-62) (Sheets 7 and 8).
- Improvements to the SR 12W/I-680 interchange (W-28, W-29, W-30, W-42, W-63, W-64, W-143, W-145, and W-146) (Sheet 8).
- Improvements to the I-80/I-680 interchange (W-20, W-45a-1, W-45a-2, W-45-1, W-45-2, W-61, W-80, W-86, W-109, W-145, and W-191) (Sheets 9, 12, 13, 14, 17, and 18).

Under Alternative C, 0.70 acre of jurisdictional seasonal wetland lies within the temporary impact area, but implementation of avoidance and minimization measures below will avoid temporary impacts.

Without implementation of Best Management Practices (BMPs), indirect effects on seasonal wetlands would occur adjacent to the construction area due to sedimentation caused by the construction and by alteration of the wetland hydrology. Potential indirect effects due to sedimentation would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. Indirect effects due to alteration of wetland hydrology could occur where part of a wetland is filled and the rest of the wetland outside of the permanent impact area is left intact. Seasonal wetlands with small permanent impacts could continue to function hydrologically as wetlands. For small seasonal wetlands, however, a substantial part of the wetland and the surrounding upland area would be paved, potentially changing the amount of water that the remaining part of the wetland receives. Most of these wetlands have been historically altered due to the construction of roads and other development. For seasonal wetlands that are suitable habitat for federally listed fairy shrimp (discussed in Section 3.3.5.4), including W-143, W-189, W-15, W-63, and W-45a-2, the indirectly affected wetland area will be compensated for in addition to the directly affected area. In addition, all seasonal wetlands that are suitable habitat for federally listed fairy shrimp and are within 250 feet of ground disturbance, with no intervening barrier, will be compensated as indirect impacts. With implementation of the avoidance and minimization measures and compensation for listed fairy shrimp habitat, the net indirect effect on seasonal wetland is not expected to be adverse, and no additional mitigation for indirect effects is proposed.

Alternative C, Phase 1

Construction of Alternative C, Phase 1 would result in direct disturbance of jurisdictional and nonjurisdictional seasonal wetlands.

Construction of Alternative C, Phase 1 would involve placement of fill, resulting in a permanent loss of approximately 2.88 acres of jurisdictional seasonal wetland with reduction of fill achieved through design design refinements during the 404 b(1) process (Table 3.3.1-1 and Volume 2, Figure 3.3-2d). These impact acreages are based on the final USACE-verified delineation. Direct permanent impacts on parts or all of seasonal wetlands would occur in the following areas because of project construction.

- The realignment area to be graded for Red Top Road north of SR 12W (W-184, W-187, and W-189) (Sheets 5 and 6).

- Widening of SR 12W and construction of westbound on- and off-ramps for SR 12W (W-13, W-14, W-15, W-148, W-149, W-149a, W-159, W-194, and W-195) (Sheets 4 and 5).
- Improvements to the SR 12W/I-680 interchange (W-28, W-29, W-30, W-42, W-60, W-62, W-63, W-64, W-143, and W-146) (Sheets 7 and 8).
- Improvements to the I-80/I-680 interchange (W-20, W-45a-1, W-45a-2, W-45-1, W-45-2, W-60, W-61, W-62, W-109, W-144, W-145, and W-191) (Sheets 9, 12, 13, 14, 17, and 18).

Without implementation of Best Management Practices (BMPs), indirect effects on seasonal wetlands would occur adjacent to the construction area due to sedimentation caused by the construction and by alteration of the wetland hydrology. Potential indirect effects due to sedimentation would be avoided by implementation of avoidance and minimization measures described in Section 3.3.2.1 that would prevent erosion and sedimentation into drainages and wetlands. Indirect effects due to alteration of wetland hydrology could occur where part of a wetland is filled and the rest of the wetland outside of the permanent impact area is left intact. Seasonal wetlands with small permanent impacts could continue to function hydrologically as wetlands. For small seasonal wetlands, however, a substantial part of the wetland and the surrounding upland area would be paved, potentially changing the amount of water that the remaining part of the wetland receives. Most of these wetlands have been historically altered due to the construction of roads and other development. For seasonal wetlands that are suitable habitat for federally listed fairy shrimp (discussed in Section 3.3.5.4), including W-63 and W-45a-2, the indirectly affected wetland area will be compensated for in addition to the directly affected area. In addition, all seasonal wetlands that are suitable habitat for federally listed fairy shrimp and are within 250 feet of ground disturbance, with no intervening barrier, will be compensated as indirect impacts. With implementation of the avoidance and minimization measures and compensation for listed fairy shrimp habitat, the net indirect effect on seasonal wetland is not expected to be adverse, and no additional mitigation for indirect effects is proposed.

No-Build Alternative

Under the No-Build Alternative, no construction activities would occur, and no impacts on seasonal wetlands would occur.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08), as well as Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10), and the measure to construct a vegetated swale in Section 3.3.2.4 would address temporary and indirect impacts on nonjurisdictional and jurisdictional seasonal wetlands all alternatives. The measures to compensate for permanent loss of wetlands in Section 3.3.2.3 would address the permanent impacts on seasonal wetlands under all build alternatives.

Wetlands Only Practicable Finding

The following discussion of the alternatives and all practicable measures to minimize harm is intended to satisfy the requirements of Executive Order 11990, Protection of Wetlands.

The purpose and need for the project are presented in Chapter 1 of this document and the alternatives analyzed here and those withdrawn from consideration prior to the Draft EIR/EIS are presented in Chapter 2. The permits and regulations that pertain to the project are summarized in Table 2-3. As discussed in Section 2.5, Alternative C, which realigns I-680 to the west bringing it into the I-80/SR 12 interchange, is the Preferred Alternative.

Both Alternative B and Alternative C meet the purpose and need of the project discussed in Chapter 1, however, Alternative C would result in superior traffic operations and offers more favorable construction phasing and staging opportunities. While impacts to biological resources in general would be similar, Alternative C would impact approximately 0.5 acre less of jurisdictional wetlands (perennial marsh, alkali seasonal marsh, and seasonal wetlands) than Alternative B, as well as result in less impact to seasonal and perennial drainages. No jurisdictional waters would be affected under the No-Build Alternative, but the No-Build Alternative would not meet the purpose and need outlined in Chapter 1, because it would not increase capacity, address truck traffic or improve safety.

Several alternatives that were eliminated from consideration prior to the Draft EIR/EIS proposed new roads and were eliminated because they located a transportation facility within the Primary Suisun Marsh, in violation of the Suisun Marsh Preservation Act. The alternatives analyzed here represent the alternatives that address the purpose and need for the project with minimal disturbance to natural resources, by virtue of utilizing existing roadways.

All Practicable Measures to Minimize Harm

The Department has been incorporating all practicable measures to minimize environmental harm in project design. Wetland and marsh areas were avoided, and existing roadways are used or widened where possible.

Avoidance and minimization measures to be implemented to reduce additional indirect affects to wetlands are enumerated above and include installation of ESA-type fencing, environmental awareness training, biological monitoring, erosion and sedimentation minimization measures. Proposed mitigation measures are also provided above.

Finding

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.

3.3.3 Plant Species

Botanical surveys of the study area were conducted in April and May 2004, April and May 2005, August 2007, and April 2009. Surveys were conducted for Johnny jump-ups, host plant for the callippe silverspot butterfly, (on May 4, 2011 and March 15, 2012 only on portions of the

Dittmer property adjacent to the west end of Business Center Drive. Botanical surveys for the Gentry-Suisun project included a portion of the study area south of SR 12E and were conducted in spring 2000 and 2002; summer 2000; and April 6, 7, 8, 11, 12, 13, and 15, 2005. Five sensitive plant species (Table 3.3.3-1 located at the end of this section) were found in the study area during these surveys: alkali milk-vetch, pappose tarplant, Contra Costa goldfields, streamside daisy, and saline clover. Another species, showy Indian clover, was not found but has potential to occur in the part of the study area north of SR 12W that was part of the North Connector study area and has not been surveyed since 2003. Contra Costa goldfields and showy Indian clover are discussed in Section 3.3.5, Threatened and Endangered Species. The remaining species are discussed below.

Table 3.3.3-2 summarizes impacts on special-status plant species and native trees. Impacts on Contra Costa goldfields are discussed in Section 3.3.5.1, and impacts on native trees are discussed in Section 3.3.7.

Table 3.3.3-2. Summary of Sensitive Plant Species and Native Tree Impacts by Project Alternative

	(Number of plants, unless otherwise stated)						
	Alkali Milk-Vetch	**Pappose Tarplant**	**Contra Costa Gold-fields**	**Gold-fields Critical Habitat (acres)[a]**	**Stream-side Daisy**	**Saline Clover**	**Native Trees[b] (# of trees)**
Alternative B							
Temporary	0	0	0	14.02	0	0	0
Permanent	0	185	30	55.95	0	35	8
Total	**0**	**185**	**30**	**69.97**	**0**	**35**	**8**
Alternative B, Phase 1							
Temporary	0	0	0	1.17	0	0	0
Permanent	0	0	0	7.27	0	0	6
Total	**0**	**0**	**0**	**8.44**	**0**	**0**	**6**
Alternative C							
Temporary	0	0	0	8.55	0	0	0
Permanent	0	200	30	39.59	0	65	6
Total	**0**	**200**	**30**	**48.14**	**0**	**65**	**6**
Alternative C, Phase 1							
Temporary	0	0	0	2.52	0	0	0
Permanent	0	2	0	1.31	0	0	4
Total	**0**	**2**	**0**	**3.83**	**0**	**0**	**4**

[a] Includes all habitats in the designated critical habitat for Contra Costa goldfields. Only a part of the impact acreage is within suitable habitat for goldfields.

[b] Includes only native trees mapped outside of riparian woodland and oak woodland habitats.

Regulatory Setting

The U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) have regulatory responsibility for the protection of special-status plant species. "Special-status" species are selected for protection because they are rare and/or subject to population and habitat declines. Special status is a general term for species that are afforded varying levels of regulatory protection. The highest level of protection is given to threatened and endangered species; these are species that are formally listed or proposed for listing as endangered or threatened under the Federal Endangered Species Act (FESA) and/or the

California Endangered Species Act (CESA). Please see Section 3.3.4, "Threatened and Endangered Species" in this document for detailed information regarding these species.

This section of the document discusses all the other special-status plant species, including CDFG species of special concern, USFWS candidate species, and California Native Plant Society (CNPS) rare and endangered plants.

The regulatory requirements for FESA can be found at United States Code 16 (USC), Section 1531, et seq. See also 50 CFR Part 402. The regulatory requirements for CESA can be found at California Fish and Game Code, Section 2050, et seq. Department projects are also subject to the Native Plant Protection Act, found at Fish and Game Code, Section 1900–1913, and the California Environmental Quality Act (CEQA), Public Resources Code, Sections 2100–21177.

3.3.3.1 Alkali Milk-Vetch

Alkali milk-vetch (*Astragalus tener* var. *tener*) is an annual herb in the pea family (Fabaceae) that blooms between March and June. Alkali milk-vetch occurs in alkaline vernal pools and annual grasslands with adobe clay (heavy clay) soils at elevations below 200 feet. Alkali milk-vetch has no federal or state listing status, but it is on CNPS List 1B.2 (rare, threatened, or endangered in California and elsewhere; fairly endangered in California with 20%–80% of occurrences threatened). The primary threats to this species are development; competition from nonnative plants; habitat destruction, especially agricultural conversion; and possibly trampling. (California Native Plant Society 2010.)

Alkali milk-vetch is known from the southern Sacramento Valley, northern San Joaquin Valley, and east San Francisco Bay Area. It is currently recorded in the CNDDB at 67 locations in Alameda, Contra Costa, Merced, Monterey, Napa, San Benito, San Francisco, San Joaquin, Santa Clara, Solano, Sonoma, Stanislaus, and Yolo Counties. Of this total, 24 occurrences are in Solano County. One of these is recorded in the study area south of SR 12E, and another is approximately 0.5 mile south of this location. (California Natural Diversity Database 2010a.)

Affected Environment

Four populations of alkali milk-vetch occur in seasonal wetland habitat approximately 250 to 350 feet south of the study area, but outside the project construction areas, along SR 12E, between Ledgewood Creek and Pennsylvania Avenue (Volume 2, Figure 3.3-2a, Sheets 32–33). Based on surveys in 2000–2002 and 2005, these occurrences varied from one to 20 plants (Vollmar Consulting 2005). Although the occurrences were not found in 2009, the habitat remains suitable and the plants are assumed to be extant. Below average rainfall and varied temperature patterns in 2009 may have affected germination and growth of annual species such as alkali milk-vetch.

Environmental Consequences

Potential Direct and Indirect Effects on Alkali Milk-Vetch

Alkali milk-vetch plants are outside the temporary and permanent impact areas for all build alternatives. With implementation of measures designed to protect sensitive natural communities and to protect water quality and prevent erosion and sedimentation in drainages and wetlands described in Sections 3.3.2.1, none of the build alternatives would result in indirect effects on seasonal wetlands that support alkali milk-vetch. However, the project alternatives would not be constructed in the area of the alkali milk-vetch occurrences for many years, and updated surveys for the species will be needed to document the extent and number of plants at that time to ensure that the species has not established within the project footprint. If the species is found within the proposed construction area, compensation for loss of plants would be based on the preconstruction data obtained from the updated surveys.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of mitigation measures to conduct preconstruction surveys and to compensate for loss of special-status plants described below would address impacts to alkali milk-vetch.

Conduct Preconstruction Surveys for Special-Status Plants

As a prerequisite to developing compensatory mitigation, a qualified botanist will be retained to conduct botanical surveys of the portion of the study area to be affected within one year prior to construction of each construction phase of the project. A list of special-status species with potential to occur in the study area will be compiled based on contemporary CNDDB and CNPS Inventory data. Surveys will be conducted during the blooming period for these special-status plants. Surveys will be conducted consistent with CNPS guidelines for botanical surveys (California Native Plant Society 2001).

If any special-status plants are identified during the surveys, the botanist will photograph and map locations of the plants, document the location and extent of the special-status plant population on a CNDDB Survey Form, and submit the completed Survey Form to the CNDDB. The amount of compensatory mitigation required will be based on the results of these surveys.

Compensate for Loss of Special-Status Plants

Permanent loss (areas directly affected in the project area) of occupied special-status plant habitat for alkali milk-vetch, pappose tarplant, streamside daisy, or saline clover will be compensated for through preservation in an appropriate location in suitable habitat as agreed upon with CDFG. Detailed information will be provided to the agencies on the location and quality of the preservation area, the feasibility of protecting and managing the area in perpetuity, and the responsible parties involved. Other pertinent information will also be provided, to be determined through future coordination with the resource agencies.

3.3.3.2 Pappose Tarplant

Pappose tarplant (*Centromadia parryi* ssp. *parryi*) is an annual herb in the sunflower family (Asteraceae) that blooms between May and November. Pappose tarplant is found in meadows and seeps, salt marsh, and mesic annual grassland, often on alkaline soils at elevations below 1,400 feet. Pappose tarplant has no federal or state listing status, but it is on CNPS List 1B.2 (rare, threatened, or endangered in California and elsewhere; fairly endangered in California, with 20–80% of occurrences threatened). The primary threats to the species have been development and habitat disturbance. (California Native Plant Society 2010.)

Pappose tarplant is known historically from central California in the Sacramento Valley and San Joaquin Valley. It is currently recorded in the CNDDB at 23 occurrences in Butte, Glenn, Lake, Napa, San Mateo, Solano, and Sonoma Counties. Of this total, 13 occurrences are recorded in Solano County. One of these 13 occurrences is recorded in the study area south of SR 12E, and another is approximately 0.25 mile south of this location. One additional occurrence is generally mapped south of the I-80/I-680 interchange. (California Natural Diversity Database 2010a.)

Affected Environment

A total of 43 occurrences of pappose tarplant (approximately 7,000 plants) were found during the August 2007 and April 2009 botanical surveys of the study area (Volume 2, Figure 3.3-2a, Sheets 32–33). Points shown in Figure 3.3-2a represent stands of between one and 6,000 plants. This species was observed primarily in seasonal wetlands (W-118, W-134 W-135, W-162, W-163, W-165, W-166, and W-172), but three occurrences are in areas of nonnative annual grassland near these seasonal wetlands.

There are six occurrences (approximately 185 plants) of pappose tarplant in the proposed construction area for Alternative B, seven occurrences (approximately 200 plants) for Alternative C, and one stand (two plants) for Alternative C, Phase 1. None occur within 250 feet of the Alternative B, Phase 1 construction area.

All but one of these occurrences are south of SR 12E and east of Ledgewood Creek; one is north of SR 12E approximately 200 feet east of Ledgewood Creek. Additional occurrences were observed in the study area but outside the temporary and permanent impact areas. Five occurrences are within 250 feet of the temporary impact boundary for Alternative B, 33 occurrences are within the temporary impact boundary for Alternative C, and two occurrences are within the temporary impact boundary for Alternative C, Phase 1.

Environmental Consequences

Loss or Disturbance of Pappose Tarplant

Based on the 2007 and 2009 survey results, approximately 185 pappose tarplants would be removed within the Alternative B footprint south of SR 12E for construction of the Meyer Lane extension, widening of SR 12E, and construction of the frontage road south of SR 12E and west of Pennsylvania Avenue (Volume 2, Figure 3.3-2a, Sheets 32–33). Indirect effects on the 33 stands of pappose tarplant outside the Alternative B construction area but within 250 feet of the temporary impact area could result from adjacent construction activity. These plants would not

be removed for construction, but they could be indirectly affected by earthmoving activities and changes in hydrology.

Pappose tarplants are outside the temporary and permanent impact areas for Alternative B, Phase 1.

Within the Alternative C footprint, approximately 200 pappose tarplant plants would be removed south of SR 12E for widening of SR 12E and construction of the interchange at Pennsylvania Avenue (Volume 2, Figure 3.3-2c, Sheet 33). Indirect effects on the five stands of pappose tarplant outside the construction area but within 250 feet of the temporary impact area could occur from adjacent construction activity.

Within the Alternative C, Phase 1 footprint, two pappose tarplant plants would be removed south of SR 12E for construction of the Meyer Lane extension, widening of SR 12E, and the frontage road south of SR 12E and west of Pennsylvania Avenue (Volume 2, Figure 3.3-2d, Sheets 32–33). Indirect effects on the two stands of pappose tarplant (approximately 300 plants) outside the construction area but within 250 feet of the temporary impact area could result from adjacent construction activity.

Because pappose tarplant is not a state- or federally listed species, authorization under FESA or CESA would not be required for removal of the plants. However, CDFG would recommend avoidance, minimization, and compensatory mitigation for the loss of a CNPS List 1B.2 species. The loss or disturbance of pappose tarplant is considered adverse because this species is identified by CNPS as rare or endangered in California.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) mentioned in Section 3.3.2.1 would protect pappose tarplant and wetland habitat from indirect impacts. Implementation of mitigation measures to conduct preconstruction surveys and to compensate for loss of special-status plants described in Section 3.3.3.1 would address impacts to pappose tarplant.

3.3.3.3 Streamside Daisy

Streamside daisy (*Erigeron biolettii*) is a perennial herb in the sunflower family (Asteraceae). This species blooms between June and October and occurs in rocky, mesic areas, including woodlands below 2,300 feet. Streamside daisy has no state or federal listing status but is on CNPS List 3 (plants about which more information is needed to determine their status). The CNDDB does not currently include any records for streamside daisy, but the CNPS Inventory records the species in Humboldt, Mendocino, Marin, Napa, Solano, and Sonoma Counties (California Native Plant Society 2010; California Natural Diversity Database 2010a).

Affected Environment

Streamside daisy was observed in August 2007 at one location outside the study area within approximately 100 feet of the study area boundary, in the area north of the westbound I-80 truck scales (Volume 2, Figure 3.3-2a, Sheet 21). This site is a rocky hill vegetated by valley oak woodland, and fewer than 20 plants were observed. Since the time of the survey, the vegetation has been removed and the hill has been graded for another project. The population of streamside daisy on the hill is extirpated, because the hill has been removed.

Environmental Consequences

Potential Direct and Indirect Effects on Streamside Daisy

Streamside daisy plants near the study area have been removed. However, the project alternatives would not be constructed in this area for several years, and updated surveys for the species will be needed to document of the presence of any streamside daisy plants at that time to ensure that the species has not established within the project footprint. If the species is found within the proposed construction area, compensation for loss of plants would be based on the preconstruction data obtained from the updated surveys.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of mitigation measures to conduct preconstruction surveys and to compensate for loss of special-status plants described in Section 3.3.3.1 would address effects to streamside daisy.

3.3.3.4 Saline Clover

Saline clover (*Trifolium depauperatum* var. *hydrophilum*) is an annual herb in the pea family (Fabaceae). This species blooms between April and June and grows in mesic, alkaline areas, including annual grasslands and vernal pools at elevations below 1,000 feet. Saline clover has no federal or state listing status, but it is on CNPS List 1B.2 (rare, threatened, or endangered in California and elsewhere; fairly endangered in California with 20–80% of occurrences threatened). Saline clover is threatened by development. The CNDDB currently lists 20 records of saline clover occurrences in Alameda, Monterey, Napa, San Benito, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma Counties. Of this total, two occurrences are recorded in Solano County. (California Natural Diversity Database 2010a.)

Affected Environment

Based on surveys in 2000–2002 and 2005, a total of 12 occurrences of saline clover were found in seasonal wetland habitat south of SR 12E and east of Ledgewood Creek (Volume 2, Figure 3.3-2a, Sheets 32–33). These occurrences varied from one to 100 plants and were located outside the project construction area (Vollmar Consulting 2005). No occurrences were found within the proposed construction area, but eight occurrences were within 250 feet of the temporary impact boundary for the project. Based on surveys in 2000–2002 and 2005, these occurrences varied from one to 100 plants (Vollmar Consulting 2005). In April 2009, five additional occurrences of saline clover were observed north of the previously observed locations, and all five occur within the project construction area for Alternative B and Alternative C. The five occurrences varied from one to ten plants each.

Environmental Consequences

Direct and Indirect Effects on Saline Clover

Five occurrences of saline clover totaling 35 plants in an approximately 0.2-acre area are within the permanent impact area for Alternative B (Volume 2, Figure 3.3-2a, Sheet 33), based on the 2009 surveys. These plants would be removed within the project footprint south of SR 12E for widening of SR 12E and construction of the interchange at Pennsylvania Avenue. An additional two occurrences are within the temporary impact area. Indirect effects on the four stands of saline clover outside the construction area but within 250 feet of the temporary impact area could result from adjacent construction activity. These plants would not be removed for construction, but they could be indirectly affected by earthmoving activity and changes in hydrology.

Six occurrences of saline clover totaling 65 plants in two 0.1-acre locations are within the permanent impact area for Alternative C (Volume 2, Figure 3.3-2c, Sheet 33), based on the 2005 and 2009 surveys. These plants would be removed within the project footprint south of SR 12E for widening of SR 12E and construction of the interchange at Pennsylvania Avenue. Indirect effects on the four stands of saline clover could result from adjacent construction activity.

Saline clover plants are outside the temporary and permanent impact areas for Alternative B, Phase 1 and Alternative C, Phase 1.

Because saline clover is not a state- or federally listed species, authorization under FESA or CESA would not be required for removal of the plants. However, CDFG would recommend avoidance, minimization, and compensatory mitigation for the loss of a CNPS List 1B.2 species. The loss or disturbance of saline clover is considered adverse because the species is identified by CNPS as rare or endangered in California.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section

13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) mentioned in Section 3.3.2.1 will avoid indirect effects on saline clover. Implementation of mitigation measures to conduct preconstruction surveys and to compensate for loss of special-status plants described in Section 3.3.3.1 would address impacts to saline clover.

3.3.4 Animal Species

Based on the CNDDB search results and the USFWS list for the project region, 29 special–status wildlife species and ten special-status fish species were determined to have the potential to occur in the project region (Table 3.3.4-1 located at the end of this section). After completion of field surveys and review of species distribution and habitat requirements data, the biologists determined that 11 of the 29 wildlife species and six of the ten fish species would not occur in the study area because the area lacks suitable habitat for the species or is outside the species' known range. An explanation for the absence of each of these species from the study area is provided in Table 3.3.4-1.

Four of the 18 special-status wildlife species with potential to occur in the study area have been observed in the study area; (California red-legged frog, burrowing owl, northern harrier, and western pond turtle).In addition, elderberry shrubs (host plant) for a fifth special-status species, valley elderberry longhorn beetle, is present in the study area.

The threatened or endangered species known or with potential to occur in the study area are discussed in Section 3.3.5. The remaining special-status species known to occur or with potential to occur in the study area, including migratory birds, raptors, and swallows are discussed below. Impacts for all special-status species are summarized in Tables 3.3.4-2a.

Four special-status fish species—central California coast steelhead, river lamprey, Sacramento splittail, and fall-run/late-fall-run Chinook salmon—have potential to occur in the study area based on the presence of suitable habitat (Table 3.3.4-2b). Central California coast steelhead is a threatened species and is discussed in Section 3.3.5.

Table 3.3.4-2a. Summary of Special-Status Wildlife Species Potential Impacts by Project Alternative

Impact Type	Callippe Silverspot Butterfly Habitat Present	Vernal Pool Fairy and Tadpole Shrimp Habitat (acres)	VELB (number of shrubs)	CRLF Aquatic Habitat (acres)	CRLF Upland Habitat (acres)	CRLF Critical Habitat	CTS Upland Habitat	CTS Aquatic Habitat	Swainson's Hawk Foraging Habitat[a]	Nesting Birds[b]	Special-Status Bats
Alternative B											
Indirect		1.24	1								
Direct	Temp: 19.32 Perm: 38.82	1.36	11	Temp: 2.16 Perm: 2.11	Temp: 37.58 Perm: 109.23	Temp: 1.98 Perm: 18.24	Temp: 6.96 Perm: 23.06	Temp: 0.95 Perm: 6.21	Perm: 231.52	Yes	Yes
Alternative B, Phase 1											
Indirect		0.04	0								
Direct	None	0.20	1	Temp: 0.96 Perm: 0.58	Temp: 0.74 Perm: 21.09	None	Temp: 0 Perm: 0.49	None	Perm: 53.94	Yes	Yes
Alternative C											
Indirect		1.10	1								
Direct	Temp: 19.32 Perm: 38.82	2.43	10	Temp: 1.25 Perm: 1.68	Temp: 12.99 Perm: 142.63	Temp: 0.13 Perm: 22.89	Temp: 3.35 Perm: 12.58	Temp: 0.49 Perm: 4.47	Perm: 224.60	Yes	Yes
Alternative C, Phase 1											
Indirect		0.26	2								
Direct	Temp: 19.32 Perm: 38.82	1.45	10	Temp: 0 Perm: 2.86	Temp: 19.32 Perm: 78.48	Temp: 0.47 Perm: 22.38	Temp: 0 Perm: 0.76	None	Perm: 169.64	Yes	Yes

[a] Only permanent impacts are shown because there are no mitigation requirements for temporary losses of foraging habitat.
[b] Includes special-status birds such as burrowing owl and northern harrier as well as resident and migratory species.

Table 3.3.4-2b. Summary of Special-Status Fish Species with Potential for Impacts by Project Alternative

Impact Type	Central California Coast Steelhead	Central Valley Fall/ Late Fall–Run Chinook Salmon	Sacramento Splittail	River Lamprey
Alternative B				
Indirect				
Direct	Yes	Yes	Yes	Yes
Alternative B, Phase 1				
Indirect				
Direct	Yes	Yes	Yes	Yes
Alternative C				
Indirect				
Direct	Yes	Yes	Yes	Yes
Alternative C, Phase 1				
Indirect				
Direct	Yes	Yes	No	Yes

Regulatory Setting

Many state and federal laws regulate impacts on wildlife. Federal laws and regulations pertaining to wildlife include the following:

- National Environmental Policy Act.
- Migratory Bird Treaty Act.
- Fish and Wildlife Coordination Act.

State laws and regulations pertaining to wildlife include the following:

- California Environmental Quality Act.
- Sections 1600–1603 of the California Fish and Game Code.
- Sections 4150 and 4152 of the California Fish and Game Code.

The U.S. Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA's NMFS) and the California Department of Fish and Game (CDFG) are responsible for implementing these laws. This section discusses potential impacts and permit requirements associated with wildlife not listed or proposed for listing under the state or federal Endangered Species Act including CDFG fully protected species and species of special concern, and USFWS or NOAA's NMFS candidate species. Species listed or proposed for listing as threatened or endangered are discussed in Section 3.3.5, "Threatened and Endangered Species."

3.3.4.1 Western Pond Turtle

Western pond turtle is designated a state species of special concern. Western pond turtle occurs from Baja California to the lower Columbia River in Oregon and Washington (Jennings et al. 1992).

Western pond turtles are thoroughly aquatic, preferring the quiet waters of ponds, reservoirs, and sluggish streams (Stebbins 1985). The species occurs in a wide range of both permanent and intermittent aquatic environments (Jennings et al. 1992). Western pond turtles spend considerable time basking on rocks, logs, emergent vegetation, mud or sand banks, or human-generated debris. They move up to 1,300 feet or more to upland areas adjacent to watercourses to deposit eggs and to overwinter (Jennings and Hayes 1994). Western pond turtles spend time in upland habitats during the spring and summer, frequently moving between aquatic and upland habitats (Rathbun et al. 2002). Western pond turtles typically become active in March and return to overwintering sites by October or November (Jennings et al. 1992).

Affected Environment

The species is present within the Dan Wilson Creek/Green Valley Creek watershed (Solano County Water Agency 2009). Western pond turtles were also observed in the two ponds (Mangels pond and perennial marsh W-150) north of SR 12W (Solano Transportation Authority 2007) (Volume 2, Figure 3.3-2a, Sheet 5). One of those ponds (W-150 on the north side of SR 12W) is within the Alternative B, Alternative C, and Alternative C, Phase 1 study areas. In

addition, there is suitable upland habitat around the two ponds, some of which is within the study area. Western pond turtles share suitable habitat with California red-legged frogs, addressed in Section 3.3.5.6.

A western pond turtle was observed in Ledgewood Creek at I-80 (approximately one mile upstream of the study area for Alternatives B and C) in April and September 2008 during construction monitoring surveys for the I-80 HOV project (Caltrans 2007). In addition to Mangels pond and W-150, the following locations in the study area provide potential aquatic habitat for western pond turtles. The following locations can be found in Volume 2, Figure 3.3-2a

- Two locations on Ledgewood Creek at SR 12E (Sheet 32).
- Suisun Creek (Sheet 22).
- Dan Wilson Creek (Sheet 21).
- Green Valley Creek (Sheets 17 and 18).
- American Canyon Creek (Sheet 12).
- Four locations on Jameson Canyon Creek (Sheets 3, 7, and 9).

Except for W-150 north of SR 12W, upland habitat in the study area is in heavily disturbed areas along I-80, I-680, and SR 12E. If turtles nest or overwinter in these locations, they would do so in the narrow strip of riparian habitat between the aquatic habitat and urban development, agricultural crops, and roads.

Environmental Consequences

Because suitable aquatic habitat for western pond turtles is present within the study area, pond turtles could be affected by the project alternatives. Western pond turtles are very sensitive to disturbances and quickly retreat into the water when threatened. If pond turtles are present in the creek channel or along the creek bank during the construction period, they could be injured or killed during construction.

Potential Loss or Disturbance of Western Pond Turtles Resulting from Construction

Alternative B and Alternative C include Mangels pond, W-150, and upland habitat north of SR 12W, three locations on Jameson Canyon Creek—at Red Top Road, upstream from Red Top Road, and I-80 (Alternative B) and upstream from Red Top Road, I-80 and upstream from I-680 (Alternative C)—crossings in Green Valley Creek, Dan Wilson Creek, Suisun Creek, and Ledgewood Creek. Western pond turtles could be directly affected during construction activities in creeks and in upland habitat around ponds and adjacent to creeks.

Alternative B, Phase 1 includes construction associated with removal and replacement of the bridges over Green Valley Creek, Dan Wilson Creek and Ledgewood Creek and with replacement of culverts on American Canyon Creek and Ledgewood Creek. Western pond turtles could be directly affected during construction in creeks and in upland habitat around the creeks.

Alternative C, Phase 1 includes culverts or crossings over Green Valley Creek, and four locations on Jameson Canyon Creek—at Red Top Road, upstream from Red Top Road, I-80, and upstream from I-680. Although the areal extent of effects would be less than those described for Alternatives B and C, all project effects on western pond turtle would be the same as those described for Alternative B.

Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on western pond turtle.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Special Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) mentioned in Section 3.3.2.1, and the mitigation measure below would avoid effects on western pond turtle. Avoidance, minimization and/or mitigation measures for CRLF (see Section 3.3.5.6) will also protect habitat for western pond turtles.

Conduct Clearance Surveys for Western Pond Turtle

A qualified biologist will conduct clearance surveys for western pond turtle immediately preceding construction activities in the creeks and near ponds, and will move turtles to a safe location.

3.3.4.2 White-Tailed Kite

White-tailed kite (*Elanus leucurus*) is a fully protected species under CFGC 3511. The species has a restricted distribution in the United States, occurring only in California and western Oregon and along the Texas coast (American Ornithologists' Union 1983). The species is fairly common in California's Central Valley lowlands. White-tailed kites nest in riparian and oak woodlands and forage in nearby grasslands, pastures, agricultural fields, and wetlands. White-tailed kites use nearby treetops for perching and nesting sites. Voles and mice are common prey species.

Affected Environment

No white-tailed kite nest sites are known from the study area, but the CNDDB (2010a) lists one record along Suisun Creek approximately 0.5 mile south of I-80. Riparian habitat in and adjacent to the study area provides potential nesting habitat for white-tailed kites. Kites could also nest in riparian and oak woodlands north of SR 12W. However, it is unlikely that white-tailed kites would nest in the study area because of its proximity to I-80/I-680/SR 12. Annual grasslands in the study area are located along I-80/I-680/SR 12 and within developed portions of Fairfield. These areas are not typically used by white-tailed kites for foraging. Higher quality foraging habitat (open agricultural fields) occurs in portions of the study area that would not be affected by the proposed project.

Environmental Consequences

Although there is a low likelihood that white-tailed kites would nest adjacent to I-80/I-680/SR 12, tree removal or noise associated with construction activities could result in the disturbance of nesting white-tailed kites if active nests are present in or near the construction area. These disturbances could cause nest abandonment and death of young or loss of reproductive potential at active nests in or near the study area. Such disturbance would violate CFGC Sections 3503, 3503.5 and 3511 and the MBTA.

Potential Disturbance of Nesting White-Tailed Kites Resulting from Construction

Both build alternatives would result in a permanent loss and temporary disturbance of riparian woodland in the study area, which provides potential nesting habitat for white-tailed kites.

Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on white-tailed kites.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and the measure below will reduce the project's effect on white-tailed kites, their eggs, or young.

Conduct Preconstruction Nesting Bird and Raptor Surveys and Establish a No-Disturbance Buffer, if Necessary

To avoid and minimize effects on nesting migratory birds, one or more of the following surveys and restrictions will be implemented to ensure compliance with the MBTA.

- Tree and shrub removal will occur during the nonbreeding season for most migratory birds and raptors (generally between September 1 and February 15).
- If construction activities, including tree and shrub removal, are scheduled to occur during the breeding season for migratory birds and raptors (generally between February 15 and September 1), a qualified wildlife biologist (with knowledge of the species to be surveyed) will be retained to conduct nesting migratory bird and raptor surveys before the start of construction. A set of three nesting surveys should be conducted within a 2-week period just prior to initiation of construction activities (including tree removal) between February 15 and September 1. If no active nests are detected during these surveys, tree removal can proceed.
- If surveys indicate that migratory bird or raptor nests are present in the survey area, a no-disturbance buffer will be established in coordination with CDFG around the site to avoid disturbance or destruction of the nest site until after the breeding season or until after a qualified wildlife biologist determines that the young have fledged (usually late June to mid-July). The extent of these buffers will be determined by the biologist (in coordination with the CDFG) and will depend on the level of noise or construction disturbance, the line of sight between the nest and the disturbance, ambient levels of noise and other disturbances, and

other topographical or artificial barriers. These factors will be analyzed to make an appropriate decision on buffer distances. Suitable buffer distances may vary between species.

3.3.4.3 Western Burrowing Owl

Western burrowing owl (*Athene cunicularia*) is designated as a state species of special concern. Western burrowing owl is found throughout much of California in annual and perennial grassland, desert, and arid scrubland. It also can be found in vacant lots in residential areas, railroad ballast, dirt roads, and canal levees. The presence of burrows is the most critical requirement for western burrowing owl habitat; the species uses burrows excavated by ground squirrels and badgers, as well as artificial burrows, such as cement culverts, debris piles, or openings under roads. Its breeding season extends from March through August, peaking in April and May.

Affected Environment

Several (ten-plus) occurrences of burrowing owl have been reported within a ten-mile radius of the study area (California Natural Diversity Database 2010a). Burrowing owls were observed near Alternative B, Alternative C, and Alternative C, Phase 1 project limits north of SR 12W, in November 2003 and March 2004 (Solano Transportation Authority 2007). Annual grassland, edges of agricultural ditches and farm roads, and fallow fields in the project area provide suitable foraging and nesting habitat for burrowing owls. Minimal loss of foraging habitat for western burrowing owls would occur because most of the construction would occur in existing roadbeds and rights-of-way.

Environmental Consequences

If western burrowing owls are nesting in or within 250 feet of the construction right-of-way, grading and excavation activities could result in the removal of an occupied breeding or wintering burrow site and loss of adults, young, or eggs. These disturbances could cause nest abandonment and death of young or loss of reproductive potential at active nests in or near the study area. Such disturbance would violate CFGC Sections 3503.5 and 3511 and the MBTA.

Potential Disturbance of Burrowing Owls and Permanent Loss of Habitat Resulting from Construction

Both build alternatives and Alternative C, Phase 1 would result in a permanent loss and temporary disturbance of annual grassland that provides potential nesting habitat for western burrowing owl in and adjacent to the study area north of SR 12W. Both build alternatives could result in disturbances to burrowing owls that might be present in areas of annual grassland, edges of agricultural ditches and farm roads, and fallow fields in the study area.

Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on burrowing owls.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to

conduct environmental awareness training (SSP 14-6.08) and measures listed below will reduce the project's effects on burrowing owl burrows, eggs, or young.

Conduct Preconstruction Surveys for Active Burrowing Owl Burrows and Implement the California Department of Fish and Game Guidelines for Burrowing Owl Mitigation, if Necessary

CDFG (1994) recommends that preconstruction surveys be conducted in suitable habitat (except paved areas) in a project study area and in a 250-foot-wide buffer zone around the construction site to locate active burrowing owl burrows. This would apply to habitat north of SR 12W that provides the most suitable habitat for breeding burrowing owls. A qualified biologist will be retained to conduct preconstruction surveys for active burrows according to the CDFG guidelines. The surveys will include a nesting season survey and a wintering season survey (wintering season is the season immediately preceding construction).

If no burrowing owls are detected, no further mitigation is required. If active burrowing owl burrows are detected, the following measures will be implemented in coordination with DFG.

- Occupied burrows will not be disturbed during the nesting season (February 1–August 31).
- When destruction of occupied burrows is unavoidable outside the nesting season (September 1–January 31), unsuitable burrows will be enhanced (enlarged or cleared of debris) or new burrows created (installing artificial burrows) on protected lands as agreed upon with CDFG. Newly created burrows will conform to guidelines established by the CDFG.
- If owls must be moved away from the project construction area, passive relocation techniques (e.g., installing one-way doors at burrow entrances) will be used instead of trapping. At least one week will be necessary to accomplish passive relocation and allow owls to acclimate to alternate burrows.
- If avoidance is the preferred method of dealing with potential impacts, no disturbance will occur within 160 feet of occupied burrows during the nonbreeding season (September 1 to January 31) or within 250 feet during the breeding season. Avoidance also requires that foraging habitat (based on an approximately 300-foot foraging radius around an occupied burrow) be permanently preserved for each pair of breeding burrowing owls or single unpaired resident bird. The configuration of the protected site will be submitted to the CDFG for approval.

Compensate for Loss of Burrowing Owl Nesting Habitat

If active burrowing owl burrows are found and the owls must be relocated, the loss of foraging and burrow habitat in the project construction area will be offset by acquiring and permanently protecting foraging habitat at a ratio agreed upon with CDFG. The protected lands should be located adjacent to the occupied burrowing owl habitat in the project construction area or at another occupied site near the project construction area. The location of the protected lands will be determined in coordination with the CDFG. If on-site compensation is not feasible, the Department will purchase credits at an approved mitigation bank. It may be possible to compensate for burrowing owl habitat in conjunction with compensation for loss of Swainson's hawk habitat (Section 3.3.5.8).

3.3.4.4 Northern Harrier

Northern harrier (*Circus cyaneus*) is a state species of special concern. The breeding range includes most of the Central Valley, the Delta, Suisun Marsh, and portions of San Francisco Bay. Northern harriers use tall grasses and forbs in wetlands and field borders for cover (Zeiner et al. 1990). They roost on the ground in shrubby vegetation, often near a marsh edge. The species' breeding season is between April and late August, with peak activity in June and July. Northern harriers feed mainly on voles, other small mammals, birds, small reptiles, crustaceans, and insects.

Affected Environment

Northern harriers are not known to nest in the study area (California Natural Diversity Database 2010a) but are known to nest in Solano County. In 2004, a northern harrier was observed foraging over grassland habitat north of SR 12W (Solano Transportation Authority 2007). The tall annual grassland north of SR 12W in the project area provides suitable foraging and nesting habitat for northern harriers (Volume 2, Figure 3.3-2a, Sheets 5 and 6).

Environmental Consequences

There is potential for northern harriers to nest in the undisturbed annual grassland habitat north of SR 12W. In addition to direct mortality during the breeding season from construction activities, noise associated with construction activities could result in the disturbance of nesting northern harriers if active nests are present in or near the construction area. These disturbances could cause nest abandonment and death of young or loss of reproductive potential at active nests located in or near the study area. Such disturbance would violate CFGC Sections 3503.5 and 3511 and the MBTA.

Potential Disturbance of Nesting Northern Harriers Resulting from Construction

Under Alternative B, Alternative C, and Alternative C, Phase 1, nesting northern harriers could be disturbed during construction in annual grassland habitat north of SR 12W. There is no suitable nesting habitat for northern harrier within the project area for Alternative B, Phase 1 and therefore there would be no effects to nesting habitat under this alternative.

Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on northern harriers.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and the measure to conduct preconstruction surveys for nesting birds and raptors in Section 3.3.4.2 will reduce the project's effects on northern harrier nests, eggs, or young.

3.3.4.5 Loggerhead Shrike

Loggerhead shrike (*Lanius ludovicianus*) is a state species of special concern. It is a common year-round resident throughout the lowlands and foothills of California. Loggerhead shrikes prefer open habitats with shrubs, fences, utility line poles, or other perches. They tend to avoid urbanized areas but frequent open croplands. Nests are usually hidden in densely foliaged shrubs or trees. The breeding season is March through August.

Affected Environment

No loggerhead shrikes were observed in the study area during the field surveys; however, loggerhead shrikes are known to nest in Solano County, and trees and shrubs in the study area provide suitable nesting habitat for the species.

Environmental Consequences

If loggerhead shrikes are nesting in or adjacent to the construction right-of-way, grading and excavation activities could result in the removal of an occupied breeding site and loss of adults, young, or eggs. These disturbances could cause nest abandonment and death of young or loss of reproductive potential at active nests in or near the study area. Such disturbance would violate CFGC Sections 3503.5 and 3511 and the MBTA.

Potential Disturbance of Nesting Loggerhead Shrikes Resulting from Construction

Under both build alternatives, nesting loggerhead shrikes could be disturbed during construction throughout the study area.

Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on loggerhead shrikes.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and the measure to conduct preconstruction surveys for nesting birds and raptors in Section 3.3.4.2 will reduce the project's effects on loggerhead shrike nests, eggs, or young.

3.3.4.6 Tricolored Blackbird

Tricolored blackbird (*Agelaius tricolor*) is a state species of special concern. It is a resident in the Central Valley from Butte County south to Kern County. Nests are usually in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grain fields. Habitat must be large enough to support 50 pairs.

Affected Environment

No tricolored blackbirds were observed in the study area during the field surveys; however, tricolored blackbirds are known to nest in Solano County, and marshes and shrubs in the study area provide suitable nesting habitat for the species.

Environmental Consequences

Implementation of either build alternative could affect nesting tricolored blackbirds if construction activities remove or otherwise disturb occupied nests during the breeding season. Construction activities during the breeding season that result in death of young or loss of reproductive potential would violate CFGC Sections 3503, 3503.5 and 3511, and the MBTA.

Potential Disturbance of Nesting Tricolored Blackbirds Resulting from Construction

Implementation of either build alternative could affect nesting tricolored blackbirds, if construction activities remove or otherwise disturb occupied nests during the breeding season. Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on tricolored blackbirds.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and the measure to conduct preconstruction surveys for nesting birds and raptors in Section 3.3.4.2 will reduce the project's effects on tricolored blackbird nests, eggs, or young.

3.3.4.7 Migratory Birds and Raptors

Several migratory birds and raptors could nest in and adjacent to the study area. The breeding season for most birds is generally February 15 through August 31. The occupied nests and eggs of these birds are protected by federal and state laws, including the MBTA and CFGC Sections 3503 and 3503.5.

Affected Environment

A number of nesting birds have been observed in the study area during preconstruction surveys for the I-80 HOV construction project (Caltrans 2007). In 2008 and 2009, biological monitors observed a nesting mockingbird, Anna's hummingbird, cliff swallow, northern rough-winged swallow, wrentit, bushtit, California spotted towhee, white-throated swifts, and black phoebes. Potential nesting habitat for other migratory birds and raptors occurs in riparian habitat, trees, oak woodlands, and shrubs in the Alternative B study area.

Environmental Consequences

Implementation of both of the build alternatives could affect nesting birds, including raptors, if construction activities remove or otherwise disturb occupied nests during the breeding season. Construction activities during the breeding season that result in death of young or loss of reproductive potential would violate CFGC Sections 3503 and 3503.5 and the MBTA.

Potential Disturbance of Nesting Migratory Birds and Raptors Resulting from Construction

Implementation of the build alternatives could affect nesting migratory birds and raptors if construction activities remove or otherwise disturb occupied nests during the breeding season.

Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on migratory birds or raptors.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and the measure to conduct preconstruction surveys for nesting birds and raptors in Section 3.3.4.2 will avoid adverse effects on nesting migratory birds and raptors.

3.3.4.8 Swallows

Swallows are not considered sensitive wildlife species. However, their occupied nests and eggs are protected by both federal and state laws, including the MBTA. Cliff and barn swallows are two swallow species that frequently build mud nests on the undersides of artificial structures, such as bridges. The two species winter in South America and arrive back in California to breed in February. Nesting generally occurs from March to August, and migration south occurs in September and October (Zeiner et al. 1990).

Affected Environment

Empty and remnant swallow nests were observed on the undersides of the bridge decks and ledges within the study area. At Green Valley and Suisun Creeks, no nests or nest remnants were observed in 2008 or 2009 during monitoring surveys for the I-80 HOV project, but approximately three cliff swallow nests were removed from the eastbound lanes on Green Valley Creek in 2007. During the 2008 monitoring surveys, the on-ramp from I-680 to EB I-80 (just south of the EB I-80 lanes) that spans Green Valley Creek had approximately 30 remnant cliff swallow nests, and the Central Way bridge (the southernmost of the four bridges) had an active cliff swallow colony of approximately 50 nests.

Environmental Consequences

Construction activities associated with bridge construction for both build alternatives could result in the direct loss of active swallow nests. Loss of a nest could in turn result in the death of adults, young, or eggs. This would violate CFGC Section 3503 and the MBTA.

Potential Disturbance to Nesting Swallows Resulting from Construction

Construction activities associated with bridge construction under both build alternatives could result in the direct loss of active swallow nests.

Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on nesting swallows.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of the measure below to prevent swallows from nesting adjacent to new bridge construction will reduce the project's effect on swallow nests, eggs, or young.

Prevent Swallows from Nesting Adjacent to New Bridge Construction

To avoid adverse effects on nesting swallows and other bridge-nesting migratory birds that are protected under the MBTA and CFGC, the following measures will be implemented.

- If bridge construction will take place during the breeding season (generally between February 15 and August 31), a qualified wildlife biologist will be retained to inspect all bridges during the swallows' non-breeding season (August 16 through February 14). If nests are found and are abandoned, they may be removed. To avoid damaging active nests adjacent to new bridge construction, nests must be removed before the breeding season begins (February 15).
- After nests are removed, the undersides of the bridges will be covered with 0.5- to 0.75-inch mesh net or poultry wire. All net installation will occur before February 15. The netting will be anchored so that swallows cannot attach their nests to the bridge through gaps in the net. Netting will be monitored during construction.
- An option to netting is to daily remove any newly constructed nests until the start of construction and continue monitoring during construction.
- If netting of the bridges does not occur by February 15 and swallows colonize the bridge, modifications to this structure should not begin before August 31 of that year or until a qualified biologist has determined that the young have fledged and all nest use has been completed.

If appropriate steps are taken to prevent swallows from constructing new nests, work can proceed at any time of the year.

3.3.4.9 Roosting Bats

Two species of special concern and three Working Bat Group priority bat species have potential to occur in the study area: pallid bat (*Antrozous pallidus*), western red bat (*Lasiurus blossevillii*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), and Yuma myotis (*Myotis yumanensis*). Both pallid bats and Yuma myotis use bridges over perennial waterways or in or near open agricultural or grassland areas. Western red bats could occur in riparian woodland and orchards. All five bat species use trees for roosting. These areas provide abundant roosts as well as a source of insects, the primary food source for bats.

Affected Environment

At the time of the 2007, 2008, and 2009 field surveys, no evidence of bat presence (guano, urine staining, odor, or vocalizations) was observed on portions of the undersides of the existing bridges over creeks in the study area. However, the undersides of the bridge decks contained expansion joints that could provide roosting sites for bats. This habitat would not support a maternal roost but could support a small number of day- or night-roosting bats. In addition to bridges, trees throughout the study area provide suitable roost sites.

Environmental Consequences

Potential bat roosting areas occur in portions of the existing bridges and more mature trees in riparian woodland on Dan Wilson, American Canyon, Jameson Canyon, Green Valley, Suisun, and Ledgewood Creeks that could be directly disturbed during new bridge construction. No

bridge roosting habitat would be permanently removed. Noise disturbances associated with new bridge construction and pile driving could disturb day-roosting bats if they are present in the bridge during construction. However, these disturbances would be temporary and would not result in the death of a large number of bats. Both build alternatives could remove bat roosting habitat in trees, with the potential to adversely affect roosting bats.

Potential Disturbance to Roosting Bats Resulting from Construction

Both build alternatives have the potential to disturb roosting bats. Construction noise during bridge construction could disturb day-roosting bats under bridges. Tree-roosting bats could be adversely affected under all build alternatives by the removal of mature trees in the construction area. Under the No-Build Alternative, no construction activities would occur and there would be no adverse effects on roosting bats.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of the measure below to conduct preconstruction surveys for bats will reduce the project's effects on roosting bats.

Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures

The following measure will be incorporated in the project construction conditions to minimize direct impacts on roosting bats.

Bat species with potential to occur in the project area employ varied roost strategies, from solitary roosting in the foliage of trees to colonial roosting in trees. Daily and seasonal variations in habitat use are common. To obtain the highest likelihood of detection, preconstruction bat surveys will include these components.

- Identification of potential roosting habitat within project area prior to construction.
- Daytime search for bats and bat signs in and around identified habitat.
- Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or active full-spectrum acoustic monitoring where species identification is sought.
- Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from dusk to dawn over multiple nights.
- Additional on-site night surveys as needed following passive acoustic detection of special status bats to determine nature of bat use of the structure in question (e.g., use of structure as night roost between foraging bouts).
- Qualified biologists will have knowledge of the natural history of the species that could occur in the project area and experience using full-spectrum acoustic equipment. During surveys, biologists will avoid unnecessary disturbance of occupied roosts.

Bridges and Other Structures

Before work begins on the bridge/structure, qualified biologists will conduct a daytime search for bat sign and evening emergence surveys to determine if the bridge/structure is being used as a roost. Biologists conducting daytime surveys will listen for audible bat calls and will use naked

eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes, and other bridge features that could house bats. Bridge surfaces and the ground around the bridge/structure will be surveyed for bat sign, such as guano, staining, and prey remains.

Evening emergence surveys will consist of at least one biologist stationed on each side of the bridge/structure watching for emerging bats from a half hour before sunset to 1-2 hours after sunset for a minimum of two nights within the season that construction will be taking place. Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence surveys to assist in species identification. All emergence surveys will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted).

Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in determining species present. A minimum of four nights of acoustic monitoring surveys will be conducted within the season that the construction will be taking place. If site security allows, detectors should be set to record bat calls for the duration of each night. To the extent possible, all monitoring will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). The biologists will analyze the bat call data using appropriate software and prepare a report with the results of the surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost, biologists will conduct a night survey from 1-2 hours past sunset up to 6 hours past sunset to determine if the bridge is serving as a colonial night roost.

If suitable roost structures would be removed, additional surveys may be required to determine how the structure is used by bats. Whether it is as a night roost, maternity roosts, migration stopover, or for hibernation.

Trees

If tree removal or trimming is necessary, qualified biologists will examine trees to be removed or trimmed for suitable bat roosting habitat. High-quality habitat features (large tree cavities, basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be identified and the area around these features searched for bats and bat sign (guano, culled insect parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should be considered potential habitat for solitary foliage roosting bat species.

If bat sign is detected, biologists will conduct evening visual emergence survey of the source habitat feature, from a half hour before sunset to 1-2 hours after sunset for a minimum of two nights within the season that construction will be taking place. Methodology should follow that described above for the bridge emergence survey.

Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector will be used to assist in determining species present. These surveys will be conducted in coordination with the acoustic monitoring conducted for the bridge/structure.

Avoidance and minimization measures may be necessary if it is determined that bats are using trees as roost sites and/or sensitive bats species are detected during acoustic monitoring.

Appropriate measures will be determined in coordination with DFG and may include measures listed below.

- Tree removal will be avoided between April 15 and September 15 (the maternity period) to avoid impacts on pregnant females and active maternity roosts (whether colonial or solitary).
- All tree removal will be conducted between September 15 and October 30, which corresponds to a time period when bats have not yet entered torpor or would be caring for non-volant young.
- Trees will be removed in pieces, rather than felling the entire tree.
- If a maternity roost is located, whether solitary or colonial, that roost will remain undisturbed until September 15 or until a qualified biologist has determined the roost is no longer active.

If avoidance of non-maternity roost trees is not possible, and tree removal or trimming must occur between October 30 and September 15, qualified biologists will monitor tree trimming/removal. Prior to removal/trimming, each tree will be gently shaken and several minutes should pass before felling trees or trimming limbs to allow bats time to arouse and leave the tree. The biologists should search downed vegetation for dead and injured bats. The presence of dead or injured bats that are species of special concern will be reported to DFG.

Avoid Disturbance of Roosting Bats

Avoidance and minimization measures may be necessary if it is determined that bats are using the bridge/structure or trees as roost sites and/or sensitive bats species are detected during acoustic monitoring. Appropriate measures will be determined in coordination with DFG and may include measures listed below.

- Disturbance of the bridge will be avoided between April 15 and September 15 (the maternity period) to avoid impacts on reproductively active females and dependent young.
- Installation of exclusion devices from March 1 through April 14 or September 15 through October 30 to preclude bats from occupying the bridge during construction. Exclusionary devices will only be installed by or under the supervision of an experienced bat biologist.
- Tree removal will be avoided between April 15 and September 15 (the maternity period) to avoid impacts on pregnant females and active maternity roosts (whether colonial or solitary).
- All tree removal will be conducted between September 15 and October 30, which corresponds to a time period when bats have not yet entered torpor or would be caring for non-volant young.
- Trees will be removed in pieces, rather than felling the entire tree.
- If a maternity roost is located, whether solitary or colonial, that roost will remain undisturbed until September 15 or until a qualified biologist has determined the roost is no longer active.

  If avoidance of non-maternity roost trees is not possible, and tree removal or trimming must occur between October 30 and September 15, qualified biologists will monitor tree trimming/removal. Prior to removal/trimming, each tree will be gently shaken and several minutes should pass before felling trees or trimming limbs to allow bats time to arouse and

leave the tree. The biologists should search downed vegetation for dead and injured bats. The presence of dead or injured bats that are species of special concern will be reported to DFG.

3.3.4.10 River Lamprey

Affected Environment

River lamprey (*Lampetra ayresi*), a state species of special concern, could occur in the study area in any of the drainages, although the occurrence of river lamprey has not been explicitly documented. The study area falls within the species' distribution and environmental conditions generally support their habitat requirements. While it appears that the creeks in the study area do not support spawning or rearing habitat for river lamprey, these creek segments at a minimum support migration habitat for both adult and juvenile river lamprey. Juvenile lampreys (ammocoetes) rear in the silt and sand of backwater areas. None of the creeks in the study area have backwater habitat in the immediate vicinity of the impact areas: Green Valley and Ledgewood Creeks have concrete-lined channels and Suisun Creek has high-velocity water and gravel in the construction area. This is unsuitable rearing habitat for ammocoetes.

Environmental Consequences

Potential Effects on River Lamprey Resulting from Construction

Construction of either build alternative could affect water quality, substrate conditions, channel morphology, water temperature, and river lamprey movement in streams that provide habitat for river lamprey. In addition, all build alternatives could result in disturbance and direct injury to river lamprey. Alternatives B and C include construction of crossings over Green Valley, Suisun, and Ledgewood Creeks. Alternative B would additionally include construction of a second, new bridge over Ledgewood Creek. The fundable first phases of the alternatives would not include construction of crossings over Suisun Creek, and would have potential impacts only on Green Valley and Ledgewood Creeks. Under the No-Build Alternative, no construction activities would occur, and no impacts on river lamprey or its habitat would occur.

Water Quality

The assessment of water quality addresses the effects of both sediment and contaminants on river lamprey and their habitat. Activities associated with bridge removal and reconstruction, highway improvements, and revegetation could increase erosional processes, thereby increasing sedimentation and turbidity in downstream waterways. Excessive sediment deposited in or near stream channels can degrade aquatic habitats. Increased turbidity can increase fish mortality; reduce feeding opportunities for fish, including rearing lamprey; and cause fish to avoid important habitat. Contaminants include toxic substances such as metals, petroleum products, pesticides, fertilizers, sewage, and uncharacteristically high sediment loading. Construction materials such as concrete, sealants, oil, and paint could adversely affect water quality if accidental spills occurred during project construction. Increased pollutant concentrations could limit fish production, abundance, and distribution by direct mortality of fish or their prey.

Implementation of the measure to prepare and implement a SWPPP in Section 3.2.3 and avoidance, minimization, and/or mitigation measures listed below that would prevent

contaminants from entering streams and restrict the construction time frame for in-water work would address this impact.

Habitat and Channel Morphology

Construction activities associated with the project alternatives that would affect fish habitat include stream dewatering, removal of existing bridge structures, placement of new bridge abutments, and activities related to revegetation. Bridge replacement and bank stabilization activities would require removal of vegetation, resulting in temporary loss of vegetative cover and reducing fish habitat complexity. Construction activities, such as heavy equipment use, could also change the channel morphology by damaging or compacting the streambed substrate.

Riparian vegetation, including shaded riverine aquatic (SRA) cover, is an essential component of fish habitat. Undercut banks and overhead SRA cover, such as canopy cover and overhanging vegetation, provide fish with protection from predators, maintain shade necessary to reduce thermal input, and provide nutrients to the stream in the form of fallen leaves and insects. Riparian vegetation is also important in maintaining undercut banks and controlling streambank erosion, thereby contributing to instream structural diversity. Bridge construction would remove vegetation and SRA cover. However, the amount of vegetation removal is relatively minor, and revegetation would mitigate any long-term adverse effects related to its removal.

Construction activities in the streambeds could also change channel morphology and cause migration habitat to be degraded. However, the channels would be restored to preproject conditions based on fish passage assessments for Suisun, Green Valley, and Ledgewood Creeks, and no permanent changes to channel morphology are expected.

Implementation of measures listed below to minimize impacts on creek channels would avoid or minimize the potential for adverse effects.

Water Temperature

As a result of the lack of specific information regarding the habitat requirements of river lamprey, especially the ammocoete (juvenile lamprey) rearing stage, it is unknown whether existing water temperatures in the study area are suitable for ammocoete rearing. Water temperature is an important variable that determines the suitability of fish habitat for growth, reproduction, survival, and migration.

Water temperature is controlled primarily by flow, weather, stream width, stream depth, and shading of the stream surface. The proposed project would affect shade provided by riparian vegetation, however the amount of shade that would be affected by vegetation removal is relatively minor. Revegetation that is proposed in disturbed areas, combined with the shading provided by the bridge extension, is expected to maintain existing shade conditions in the study area.

Based on an evaluation conducted during the field visit, the proposed project would affect a relatively minimal amount of SRA cover and would not affect the low-flow channel geometry that could affect residence time, depth, or area of water exposed to solar radiation. From the perspective of water temperature, the temporary reduction in stream shading from removal of SRA cover vegetation would not result in any measurable increase in water temperature.

Furthermore, the loss of shade would be offset over time by the increased shading provided by the new bridges at Suisun and Ledgewood Creeks and the replacement and reestablishment of riparian vegetation in the affected areas. Implementation of the proposed project is not expected to affect creek shading and water temperature, therefore the project would not adversely affect river lamprey or its habitat.

Implementation of measures listed below to minimize impacts on creek channels would further reduce the project's effect on river lamprey or river lamprey habitat.

Interference with Movement

Construction activities associated with the project alternatives would require temporary redirection of the flow of water through the use of cofferdams and pipelines. These devices could block the migration of adult and juvenile river lamprey. However, construction activities would be avoided during the primary migration time of river lamprey (i.e., fall, winter, and spring). Furthermore, maintenance of fish passage conditions through the construction site during stream dewatering activities would further reduce the potential for impacts on fish movement. The pipeline would be checked every few hours (or more often, if necessary) to clear debris buildup that may occur during construction. Therefore, temporary stream diversions associated with construction are not likely to adversely affect migrating river lamprey.

Implementation of measures listed below to restrict the timing of in-water work and to maintain a migration corridor in the study area creek channels would minimize or avoid any adverse effects on fish movement.

Disturbance and Direct Injury

Noise, vibrations, artificial light, and other physical disturbances can harass fish, disrupt or delay normal activities, and cause injury or mortality. The potential magnitude of effects depends on a number of factors, including the type and intensity of the disturbance, proximity of the action to the water body, timing of actions relative to the occurrence of sensitive life stages, and frequency and duration of activities. For most activities, the effects on fish would be limited to avoidance behavior in response to movements, noises, and shadows caused by construction personnel and equipment operating in or adjacent to the water body. However, survival may be altered if disturbance causes fish to leave protective habitat (increasing exposure to predators) or is of sufficient duration and magnitude to affect growth and spawning success. Injury and mortality may result from direct and indirect contact with humans and machinery, sound pressure, and physiological stress.

Physical disturbance and injury are most likely to occur during in-water work. Project actions that involve in-water work include removing and disturbing aquatic vegetation, removing sediment and debris from the stream channel, and removing the current bridge structures. Project actions that cause no direct harm but may temporarily disturb fish include movement of construction equipment and personnel, lighting, removal and disturbance of riparian vegetation, and grading and construction of access roads and staging areas adjacent to the stream.

Short-term noise disturbance caused by pile driving would occur during construction. Pile driving and blasting can generate intense sound pressure that can injure or kill fish. The effects on fish can range from avoidance to direct mortality, depending on the species, life stage, and

intensity of the pressure waves. Factors that influence the intensity of pressure waves include the proximity to the source, the maximum force generated, the rate at which the maximum force is generated, and characteristics of the medium (i.e., water and substrate) through which the waves travel. It is unknown how lamprey react to pile driving, but it is expected ammocoetes would move out of the disturbed area.

During in-channel construction activities, some harassment or delay of migrating adults or juveniles may occur because of noise, artificial light, and other disturbances. However, these disturbances are not expected to be of sufficient extent, duration, or intensity to affect survival, growth, or spawning success.

Implementation of the measures listed below to restrict the timing of in-water work, to provide alternate migration corridors through creek channels, and to minimize noise impacts would reduce the project's effect on river lamprey.

Potential Effects on River Lamprey Associated with Operations

Water Quality

Both build alternatives will result in increased impervious surfaces. The fundable first phases of the alternatives have smaller footprints than the full build alternatives and, therefore, would result in lesser impacts. The Green Valley Creek crossing under Alternative C is slightly smaller than that of Alternative B and, therefore, Alternative C would result in a lesser effect. Under the No-Build Alternative, no additional impervious surfaces would be constructed and therefore there would be no potential effect on water quality from operations.

The increase in new impervious surfaces combined with runoff from petroleum products and other contaminants from automobiles potentially would result in an increase of contaminated runoff. The potential for impacts would likely be greatest during the initial winter storm event, or "first flush," when pollutant constituents would be concentrated.

Although the creeks in the study area are believed to have no spawning or rearing habitat for river lamprey, pollutants entering the creeks could adversely affect migration of river lamprey.

Most of the discharges from the proposed project would occur in winter and spring, when dilution would greatly limit the amount of nutrient and pollutant constituent loading in the creeks. However, this effect on river lamprey is considered potentially adverse because of the potential for direct effects associated with the "first flush."

Implementation of the measure to prepare and implement a SWPPP in Section 3.2.3 and measures listed below to prevent contaminants from entering the stream channel would minimize this effect.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of the measures below would avoid and minimize impacts to river lamprey related to water quality, habitat and channel morphology, interference with movement and disturbance.

Prevent Contaminants and Hazardous Materials from Entering the Stream Channel

A SWPPP will be implemented as part of the NPDES Construction General Permit and General Construction Activity Storm Water Permit to minimize the potential for sediment input to the aquatic system. A toxic materials control and spill response plan will be developed and implemented to regulate the use of hazardous materials, such as the petroleum-based products used as fuel and lubricants for equipment and other potentially toxic materials associated with project construction. In addition, the following measures will be implemented.

- Falsework will be installed to keep bridge debris and construction and maintenance materials from falling into streams during demolition, construction, and substantial maintenance activities.
- When concrete is poured to construct bridge footings or other infrastructure in areas of flowing water, work must be conducted to prevent contact of wet concrete with water (e.g., within a cofferdam).

Restrict In-Water Work to Avoid Special-Status Fish Spawning Seasons

In-channel construction, including riverbank and channel-bed construction below the OHWM, will be limited to the summer low-precipitation period (June 1–October 15) to reduce the likelihood of adverse effects on rearing juvenile salmonids and on adult fish spawning and migration, unless otherwise approved by appropriate resource agencies.

Minimize Impacts on Creek Channels

The following measures will be implemented to decrease impacts on the creek channel and habitat. Please also see the avoidance and minimization efforts in Section 3.3.2.1 “Perennial Drainage.”

- The duration and extent of in-water activities will be limited to the maximum extent practicable.
- The minimum amount of wood, sediment, gravel, and other natural debris will be removed to maintain and protect bridge function, ensure suitable fish passage conditions, and minimize disturbance of the streambed.
- Immediately upon completion of in-channel work, temporary fills (as needed), cofferdams, and other in-channel structures will be removed in a manner that minimizes disturbance to downstream flows and water quality.
- Streamflow through the widened portion of the bridges must meet the velocity, depth, and other passage criteria for salmonids as described by NOAA’s NMFS and the CDFG—or as developed in cooperation with NOAA’s NMFS and the CDFG—to accommodate site-specific conditions.
- All creek channels will be restored to preconstruction conditions or better, to the maximum extent feasible.

Provide Alternate Migration Corridor through Creek Channels

In-water construction activities will provide a migratory route through the creek channel by installing cofferdams in all creeks around the new footing excavations. Pipelines may be installed at Green Valley and Suisun Creeks to ensure fish passage through the project areas.

The pipeline in Green Valley and Suisun Creeks will be a corrugated steel pipe, approximately 24 to 36 inches in diameter, allowing passage of various sizes of fish. The pipe will span the width of the bridge plus ten feet on either side. It will be laid down in the channel so that all water passes through the pipeline, and it will be removed as soon as possible after construction. If flows exceed the capacity of the steel pipe, an additional or larger-diameter pipe will be installed to convey the increased flow. Subject to the sufficiency of ambient conditions in upstream and downstream stream reaches unaffected by project construction, adequate fish passage conditions will be sustained by maintaining contiguous flows, avoiding the creation of vertical drops in excess of six inches, and maintaining suitable water velocities (i.e., eight feet per second or less) and water depths (minimum of one foot).

Cofferdams will affect no more of the stream channel than is necessary to support completion of the construction activity. Flow will be diverted the minimum distance necessary to isolate the construction area. Water will be released downstream at an appropriate rate to maintain downstream flows at all times.

Retain a Fish Biologist During Instream Construction

Because special-status fish might be present and subject to potential injury or mortality from construction activities, a qualified biologist will conduct preconstruction surveys of the project area to determine whether such species are present or likely to be present near the project site. When special-status fish are present and could be affected by construction activities, the project biologist will identify appropriate methods to capture, handle, exclude, and relocate those individuals. All fish exclusion and salvage activities will adhere to accepted NMFS and CDFG protocols.

Minimize Noise Impacts on Special-Status Fish Species

Potential injury and mortality associated with pile driving will be avoided or minimized by implementing the following measures.

- Vibratory hammers will be used whenever feasible.
- The smallest pile driver and minimum force necessary will be used to complete the work.

3.3.4.11 Fall- /Late Fall–Run Chinook Salmon

Affected Environment

The Central Valley fall- /late fall–run evolutionarily significant unit (ESU) of Chinook salmon (*Oncorhynchus tshawytscha*) is a federal species of special concern and a commercial species. Only fall-run Chinook salmon are likely to occur in the study area streams (late fall–run Chinook salmon spawn and rear primarily in the Sacramento River drainage). Fall-run Chinook salmon

have been documented as occurring upstream of the study area (National Marine Fisheries Service 2006). For example, redds (nests) have been observed upstream of I-80 near Mangels Boulevard in Green Valley Creek; in Suisun Creek the upper limit of the Chinook salmon run extends to the Napa/Sonoma County line, more than six miles upstream of I-80. Chinook salmon have also been observed in Ledgewood Creek upstream of I-80. There is a potential spawning gravel patch in Suisun Creek about 20 feet downstream of the existing bridge. Spawning habitat is not supported in Green Valley and Ledgewood Creeks in the study area; however, both creeks support migration habitat for fall-run Chinook salmon. It is unlikely that Chinook salmon occur in Dan Wilson, American Canyon, or Jameson Canyon Creeks because these drainages are relatively small and dry and do not appear to support habitat conditions necessary for migration and spawning of fall-run Chinook salmon.

Fall-run Chinook salmon, a commercially valuable species, is managed under the Magnuson-Stevens Fishery Conservation and Management Act. This act requires that all federal agencies consult with NOAA's NMFS on all proposed projects that may adversely affect Essential Fish Habitat (EFH). EFH is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity (National Marine Fisheries Service 1998) that will allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem. Because Chinook salmon is managed by NMFS and the species occurs in the study area streams, these streams are considered EFH for Chinook salmon.

Existing conditions for fish passage were examined in a Fish Passage Report prepared for this project. Existing conditions at Suisun Creek do not pose any barriers to fish movement. Under existing conditions the creek crossing (culvert) at Ledgewood Creek presents an impediment to adult fish passage due to shallow water in the notched culvert when flows are low. Under existing conditions, shallow water depths and sedimentation create unfavorable passage conditions at Green Valley Creek. The existing channel is concrete-lined and includes a low flow channel. However, deposited sediment has reduced the efficacy of this feature.

Environmental Consequences

Potential Effects on Chinook Salmon Resulting from Construction

Construction of either build alternative could affect water quality, channel morphology, water temperature, and Chinook salmon movement in streams that provide habitat for Chinook salmon. In addition, both build alternatives could result in disturbance and direct injury to Chinook salmon. Alternatives B and C include construction of crossings over Green Valley, Suisun, and Ledgewood Creeks. Alternative B would additionally include construction of a second, new bridge over Ledgewood Creek. The fundable first phases of the alternatives would not include construction of crossings over Suisun Creek, and would have potential impacts only on Green Valley and Ledgewood Creeks. Under the No-Build Alternative, no construction activities would occur, and no impacts on Chinook salmon or its habitat would occur as a result of construction activities. However, because creek crossings would not be replaced beneficial impacts from the replacement of existing bridges with clear span structures and improvement of fish passage conditions would not occur.

Water Quality

As described above in Section 3.3.4.10, the temporary effects of construction on water quality include increased sedimentation and turbidity and possible release of contaminants into Green Valley, Suisun, and Ledgewood Creeks from construction activities and equipment. These water quality effects could increase Chinook salmon mortality; reduce feeding opportunities, including for rearing juveniles; and cause Chinook salmon to avoid important habitat. Increased pollutant concentrations could limit Chinook salmon production, abundance, and distribution by direct mortality of eggs, fry, and juveniles or by reducing availability of prey for juvenile Chinook salmon.

Implementation of the measure to prepare and implement a SWPPP in Section 3.2.3 and measures listed in Section 3.3.4.10 to prevent contaminants from entering streams and to restrict in-water work to avoid spawning seasons would address this effect.

Habitat and Channel Morphology

As described above in Section 3.3.4.10, project construction activities would affect fish habitat (e.g., through vegetation removal) and could also change channel morphology by disturbing the streambed substrate. However, revegetation would mitigate the minor loss of vegetation and SRA cover, and the channel beds would be restored to a natural substrate wherever possible.

At Green Valley Creek, all existing bridges would be replaced with clear span structures under Alternative B, Alternative B, Phase 1, and Alternative C. Under Alternative C, Phase 1, the westbound off-ramp bridge would be replaced with a clear span bridge and the channel restored to a natural substrate, but the eastbound bridges would not be replaced. At Suisun Creek, the existing overcrossings would be replaced with freespan structures and the substrate restored to natural conditions under both full build alternatives. No construction would occur at Suisun Creek under Phase 1 for either alternative.

At Ledgewood Creek, the culvert would be widened under Alternative B and Alternative C, and Alternative C, Phase 1. Under all three alternatives, existing habitat and channel conditions would persist with the widened culvert. However, though fish passage impediments on Ledgewood Creek would be addressed with the implementation of the culvert retrofit described in the *Avoidance, Minimization and/or Mitigation* section below. No construction would occur at Ledgewood Creek under Alternative B, Phase 1.

Implementation of the measure in Section 3.3.4.10 to minimize impacts on creek channels would address this impact.

Water Temperature

Under existing conditions, habitat for juvenile Chinook salmon rearing in the study area is marginal to unsuitable. Water temperature is an important variable that determines the suitability of fish habitat for growth, reproduction, survival, and migration. This is especially true for Chinook salmon, which have relatively narrow temperature requirements for carrying out their life history. Any increase in water temperatures could further reduce the suitability of habitat in the study area for Chinook salmon.

As described above in Section 3.3.4.10, the project alternatives would have a minor effect on SRA cover. Revegetation proposed in disturbed areas, combined with the shading provided by the bridge extension, would be expected to offset shade loss and result in maintaining existing water temperatures in the study area. Therefore, the project alternatives would not adversely affect growth, reproduction, survival, or migration of Chinook salmon with respect to water temperature.

Implementation of the measure in Section 3.3.4.10 to minimize impacts on creek channels would reduce water temperature effects as a result of the project.

Interference with Movement

As described above in Section 3.3.4.10, construction activities associated with the project alternatives would require the use of cofferdams and pipelines, which could interfere with the migration of adult and juvenile Chinook salmon. However, the timing of construction activities and maintenance of fish passage through the construction site during stream dewatering activities would reduce the potential for impacts on fish movement. Therefore, temporary stream diversions associated with construction are not likely to adversely affect juvenile Chinook salmon.

Implementation of the measures listed in Section 3.3.4.10 to restrict the timing of in-water work and to maintain a migration corridor in the study area creek channels would minimize or avoid any adverse effects on fish movement.

Disturbance to Potential Spawning Habitat

A potential spawning gravel bed was observed in Suisun Creek approximately 20 feet downstream of the existing bridge, which is proposed for removal and reconstruction. It is anticipated that the gravel bed would not be disturbed by the project alternatives. All construction equipment would access the construction site from the existing bridge and road. If the gravel cannot be avoided, it would be temporarily removed and replaced to preconstruction conditions using, to the extent practicable, gravel removed from the site. No spawning habitat was observed on Ledgewood Creek or Green Valley Creek in the project area (the channel bottom at these two locations is concrete lined).

Alternatives B and C both include construction on Suisun Creek and therefore could disturb potential spawning habitat for Chinook salmon. Because no construction is proposed on Suisun Creek under the fundable first phase of either alternative or under the No-Build Alternative, there would be no effect on spawning habitat under these alternatives.

Implementation of measures listed below to avoid potential spawning habitat and measures in 3.3.4.10 to minimize impacts on creek channels would address this impact.

Disturbance and Direct Injury

As described above in Section 3.3.4.10, noise, vibrations, artificial light, and other physical disturbances can harass fish, disrupt or delay normal activities, and cause injury or mortality. Under Alternative B, short-term noise disturbance caused by pile driving would occur within Ledgewood Creek.

Potential direct effects of pile-driving activities include increased noise and turbidity. Researchers have suggested that salmonids can hear pile-driving noise approximately 2,000 feet from the source (Feist et al. 1992). Feist et al. (1992) observed that pile driving altered the distribution and behavior of juvenile pink and chum salmon. The potential impact on salmonids from pile-driving activities depends on the distance separating the noise-generating activity from fish and the duration of these activities. Evidence suggests that, although pile-driving noise may affect the distribution and behavior of juvenile pink and chum salmon, no significant changes occurred in their overall abundance (Feist et al. 1992).

Implementation of measures in Section 3.3.4.10 to restrict in-water work to avoid spawning seasons and to minimize noise impacts on fish would address this impact.

Potential Water Quality Effects on Chinook Salmon Associated with Operations

Water Quality

As described above in Section 3.3.4.10, both build alternatives except the No-Build Alternative would result in increased impervious surfaces and potential for contaminated runoff. The potential increase in contaminated runoff entering the creeks could adversely affect Chinook salmon that use the creeks for migration, spawning, and rearing. Pollutants could also cause mortality to, and reduced growth of, the egg, larval, and juvenile life stages of Chinook salmon.

Implementation of the measure in Section 3.2.3 to prepare and implement a SWPPP and measures listed in Section 3.3.4.10 to prevent contaminants from entering the stream channel would address this impact.

Potential Interference with Movement

Current conditions in Ledgewood Creek under SR 12E are such that fish movement could be impeded by low water levels. Shallow water in the existing notched box culvert may create unfavorable passage conditions for adults. Results from modeling conducted for the fish passage assessment indicate that the proposed extension of the culvert under SR 12E would exacerbate existing shallow water conditions during the migration season and would worsen fish passage conditions relative to current conditions. Bridge widening would occur under both build alternatives. Implementation of measures discussed below to address shallow water depths by improving the channel downstream of the culvert would improve postproject fish passage conditions at Ledgewood Creek.

Under the No-Build Alternative, no construction would take place and the current conditions would remain. The impediment to fish movement would remain and no measures to improve conditions would be implemented.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of the Water Pollution Control Standard Specification measures pertaining to water pollution control programs (SS 13-2), stormwater pollution prevention plans (SS 13-2), and measures in Section 3.3.4. 10 to restrict in water work, minimize impacts on creek channels, provide alternate migration corridors, retain a biologist for instream construction, and minimize noise impacts and the measures below would avoid and minimize effects on Chinook salmon

related to water quality, habitat and channel morphology, interference with movement and disturbance.

Avoid Potential Fish Spawning Habitat

In-water construction activities will avoid disturbance of the spawning gravel bed immediately downstream of the existing bridge on Suisun Creek. If the gravel cannot be avoided, the gravel will be removed temporarily and replaced to preconstruction conditions, using—to the extent practicable—gravel removed from the site. If imported gravel is used, only washed river rock ranging in size from 0.25- to 4.0-inches will be used (i.e., angular rock or unwashed gravel will not be used).

Implement Culvert Retrofit at the SR 12E Crossing on Ledgewood Creek

Because the proposed culvert design would maintain the existing culvert dimensions (width and slope) to address existing shallow water depths at low flows, it is recommended that the culvert invert be modified to concentrate low flows to increase water depths when flows are low (i.e., less than 20 cfs). In accordance with Article 3.5 Chapter 1 of Division 1 of the Streets and Highways Code, Caltrans will implement the following alternatives to be discussed with CDFG to remediate fish passage barriers:

- **Low-Flow Walls.** Low-flow walls running parallel to the long axis of the culvert and straddling the low-point of the culvert mid-line could be installed to help confine the width of low flows and increase water depths.
- The walls could be configured at the inlet such that it directs and concentrates low flows to the mid-line of the culvert between the walls and be constructed of concrete. The height of the walls and the distance separating the left and right walls would be determined based on hydraulic analyses to achieve minimum water depths of one foot. It is further recommended that once the dimensions of the low-flow walls are determined, a hydraulic analysis be performed to confirm that the low-flow walls do not compromise the culvert's ability to safely pass flows with a 1% exceedance.
- **Offset (Washington) Baffles.** As an alternative to or in conjunction with low-flow walls, offset (Washington) baffles can be utilized to further increase minimum water depths while providing resting habitat for migrating fish. As described above for low-flow walls, offset baffles could be constructed out of concrete. Several different offset baffle configurations used in combination with or without low-flow walls are possible; the precise configuration would be determined based on hydraulic analyses and subject to evaluations to determine effects on safely passing flows with a 1% exceedance. While offset baffles have the added benefit of creating resting habitat for fish (especially during higher flows), they also have greater potential to trap debris which can render them impassable in extreme circumstances.

3.3.4.12 Sacramento Splittail

Affected Environment

Sacramento splittail (*Pogonichthys macrolepidotus*), a state species of special concern, is present in Suisun Marsh and its associated sloughs, including Peytonia Slough (Schroeter et al. 2006).

Due to the connection of Ledgewood Creek with Peytonia Slough downstream of the project area, water quality impacts could affect Sacramento splittail occurring in Peytonia Slough.

Environmental Consequences

Potential Water Quality Effects on Sacramento Splittail Resulting from Construction

Both build alternatives have the potential to affect water quality in Ledgewood Creek. Alternative B could have a greater effect than the other alternatives because it includes construction of a second, new bridge to the south. Under Alternative C and the fundable first phase of both alternatives, only the existing culvert would be widened. Under the No-Build Alternative, no construction activities would occur, and no impacts on Sacramento splittail or its habitat would occur.

As described above in Section 3.3.4.10, the temporary effects of construction on water quality include increased sedimentation and turbidity and possible release of contaminants into Ledgewood Creek from construction equipment. These water quality effects could increase Sacramento splittail mortality; reduce feeding opportunities, including those for rearing splittail; and cause splittail to avoid important habitat. Increased pollutant concentrations could limit Sacramento splittail reproduction, abundance, and distribution by direct mortality of splittail or their prey.

Implementation of the measure to prepare and implement a SWPPP in Section 3.2.3 and avoidance, minimization, and/or mitigation measures in Section 3.3.4.10 to prevent contaminants from entering streams would address this impact.

Potential Water Quality Effects on Sacramento Splittail Associated with Operations

As described above in Section 3.3.4.10, water quality effects could result from construction of new bridges and increased impervious surfaces at Ledgewood Creek. Pollutants entering Ledgewood Creek and carried downstream could cause mortality to and reduced growth of the egg, larval, and juvenile life stages of Sacramento splittail. As mentioned above, implementation of the measure to prepare and implement a SWPPP in Section 3.2.3 and measures listed in Section 3.3.4.10 to prevent contaminants from entering the stream channel would minimize this effect.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of the Water Pollution Control Standard Specification measures pertaining to water pollution control programs (SS 13-2), stormwater pollution prevention plans (SS 13-2), and measures in Section 3.3.4. 10 to prevent contaminants from enter streams would avoid and minimize effects on Sacramento splittail related to water quality.

3.3.5 Threatened and Endangered Species

This section addresses species listed or eligible for listing as threatened or endangered. Tables 3.3.3-1 and 3.3.4-1 list the threatened and endangered plant and animal species, respectively,

with potential to occur in the study area. CNDDB occurrences are shown in Figures 3.3-3a and 3.3-3b. The USFWS list of federally listed species for the study area is provided in Appendix F.

Based on early coordination with USFWS it was determined that there is potential for a "may affect" determination for the following federally listed species:

- Contra Costa goldfields (*Lasthenia conjugens*), and critical habitat,
- Showy Indian clover (*Trifolium amoenum*),
- Callippe silverspot butterfly (*Speyeria callippe callippe*),
- Vernal pool fairy shrimp (*Branchinecta lynchi*),
- Vernal pool tadpole shrimp (*Lepidurus packardi*),
- Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*),
- California tiger salamander (*Ambystoma tigrinum*), and
- California red-legged frog (*Rana draytonii*) and critical habitat.

The Department has made a "no effect" determination for the remaining federally species listed below based on the absence of suitable habitat or because the project is outside of the species range.

- Baker's stickyseed (*Blennosperma bakeri*)
- Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*)
- Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*)
- Soft bird's-beak (*Cordylanthus mollis* ssp. *mollis*)
- Colusa grass (*Neostapfia colusana*)
- Antioch Dunes evening–primrose (*Oenothera deltoides* ssp. *howellii*)
- San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*)
- Keck's checker-mallow (*Sidalcea keckii*)
- Solano grass (*Tuctoria mucronata*)
- Conservancy fairy shrimp (*Branchinecta conservatio*)
- Delta green ground beetle (*Elaphrus viridis*)
- Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*)
- California freshwater shrimp (*Syncaris pacifca*)
- Alameda whipsnake (*Masticophis lateralis euryxanthus*)
- Giant garter snake (*Thamnophis gigas*)
- Western snowy plover (*Charadrius alexanderinus nivosus*)

- California clapper rail (*Rallus longirostris obsoletus*)
- California least tern (*Sternula antillarum browni*)
- Northern spotted owl (*Strix occidentalis caurina*)
- Salt marsh harvest mouse (*Reithrodontomys raviventris*)
- Green sturgeon (*Acipenser medirostris*)
- Tidewater goby (*Eucyclogobius newberyi*)
- Delta smelt (*Hypomesus transpacificus*)
- Coho salmon (*Oncorhynchus kisutch*)
- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*)

Two state listed species have potential or are known to occur in the study area, Swainson's hawk (*Buteo swainsoni) and CTS, bot*h of which *are inc*luded in this section. The proposed project would not result in take of either Swainson's hawk or CTS.

One additional species with the potential to occur within the study area, salt-marsh harvest mouse (*Reithrodontomys raviventris*), was determined to be not present within the study area. Dr. Phil Leitner conducted a habitat assessment for salt-marsh harvest mouse (federally listed as endangered and a fully protected species) on August 31, 2007. The primary survey area was south of SR 12E between Ledgewood Creek and Suisun City. To assess the condition of adjoining habitat, he also inspected the area north of SR 12E that is within the project footprint, and areas to the south as far as Cordelia Road. Dr. Leitner concluded, in a letter sent to Stephanie Myers of ICF Jones & Stokes on September 2, 2007, that there is no suitable salt-marsh harvest mouse habitat within the project footprint. The area did support this species more than 20 years ago, but land use changes appear to have significantly reduced and degraded the pickleweed habitat. The small patches of pickleweed that remain do not have the structure and density required by salt-marsh harvest mouse. USFWS further stated in their April 10, 2012 BO that although there are records of the salt marsh harvest mouse from the pickleweed habitat in the Gentry Suisun wetlands which is adjacent to the portion of the project along SR 12E, that the species would not be adversely affected because the Department proposed retaining wall which will avoid any intrusion into the adjacent wetlands.

A Biological Assessment addressing central California coast steelhead (*Oncorhynchus mykiss*) was submitted to NOAA's NMFS in December 2010. A letter of concurrence was issued January 14, 2011 by NOAA's NMFS concurring with the finding that the project is not likely to adversely affect central California coast steelhead.

Impacts on habitat for each sensitive wildlife species and fish are tabulated for each project alternative in Table 3.3.4-2.

During preparation of this document, the Department and ICF coordinated with the following federal and state agencies.

March 20, 2008: Ms. Myers contacted USFWS biologist Peter Johnsen to initiate coordination concerning the potential for effects on federally listed species in the project vicinity. Mr. Johnsen requested a project description and stated that he would be our contact for Section 7 coordination and consultation. Ms. Myers emailed him a copy of the project description on March 25, 2008.

November 19, 2009: Ms. Webber, Ms. Myers, and Ms. Ashkar from ICF met with Department biologist, Mr. Hashemi and USFWS biologist John Cleckler to review the interchange project, discuss our approach to analysis for the BA, and discuss listed species issues including but not limited to CRLF, its critical habitat, and callippe silverspot butterfly.

March 26, 2010: ICF obtained a species list from the USFWS website of all federally proposed and listed endangered and threatened species and critical habitat that could occur in the vicinity of the proposed project (Appendix F).

June 28, 2010: Meeting between the Department, STA, ICF, and FWS to discuss BA species effects and conservation measures.

July 15, 2010: An email from USFWS (Cleckler pers. comm.) summarized their review of the CRLF site assessment. Mr. Cleckler stated that USFWS would consider the project area north of I-80 to be potential aquatic and upland CRLF habitat and would likely limit the consideration of potential CRLF habitat on the south side of I-80 to where the project intersects Jameson Canyon Creek. He further noted that much of this area is within or adjacent to designated critical habitat (units SOL-2 and SOL-3). USFWS advises STA and the Department to incorporate frog-friendly undercrossings (not just hydrologically connected) in the design of the new road through the Mangels property to minimize the effects of road mortality and population fragmentation.

July 19, 2010: Field visit with Ms. Webber, Ms. Myers, Mr. Cleckler, and Sue Wickham with the Solano Land Trust to view possible mitigation and compensation lands on Solano Land Trust properties including Lynch Canyon and the Swett and King Ranches.

September 13, 2010: Email from USFWS (Cleckler pers. comm.) provided information and photographs of tunnels and directional fencing constructed in a new roadway in Livermore, California to allow California tiger salamander safe crossing. Mr. Cleckler recommended considering this application for CRLF crossings on the new roadway that will connect Red Top Road and Business Center Drive.

November 2009 through April 2011: Numerous email exchanges between ICF, Department, and USFWS biologists.

November 4, 2010: Ms. Webber, Ms. Myers, from ICF; Dale Dennis and Janet Adams with STA; Scott Steinwert with CirclePoint met with USFWS biologists John Cleckler and Chris Nagano to review the interchange project, discuss our approach to analysis for the BA, and discuss listed species issues including but not limited to Contra Costa goldfields, CTS, CRLF, its critical habitat, and callippe silverspot butterfly.

November 18, 2010: Field visit with Ms. Myers and Ms. Webber from ICF, Ahmad Hashemi from the Department, and John Cleckler and Chris Nagano from USFWS to view CTS and

Contra Costa goldfields project impact area south of SR 12E and callippe silverspot and CRLF critical habitat area near Business Center Drive and SR 12W.

April 2011: The Department submitted a Biological Assessment to USFWS on April 19, 2011.

April 2012: The Department received a final Biological Opinion on April 16, 2012

Regulatory Setting

The primary federal law protecting threatened and endangered species is the Federal Endangered Species Act (FESA): 16 United States Code (USC), Section 1531, et seq. See also 50 CFR Part 402. This act and subsequent amendments provide for the conservation of endangered and threatened species and the ecosystems upon which they depend. Under Section 7 of this act, federal agencies, such as the Federal Highway Administration (FHWA), are required to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA's NMFS) to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is defined as geographic locations critical to the existence of a threatened or endangered species. The outcome of consultation under Section 7 is a Biological Opinion or an Incidental Take statement. Section 3 of FESA defines take as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or any attempt at such conduct."

California has enacted a similar law at the state level, the California Endangered Species Act (CESA), California Fish and Game Code, Section 2050, et seq. CESA emphasizes early consultation to avoid potential impacts on rare, endangered, and threatened species and to develop appropriate planning to offset project-caused losses of listed species populations and their essential habitats. The California Department of Fish and Game (CDFG) is the agency responsible for implementing CESA. Section 2081 of the Fish and Game Code prohibits "take" of any species determined to be an endangered species or a threatened species. Take is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." CESA allows for take incidental to otherwise lawful development projects; for these actions an incidental take permit is issued by the CDFG. For species listed under both FESA and CESA requiring a Biological Opinion under Section 7 of the FESA, CDFG may also authorize impacts to CESA species by issuing a Consistency Determination under Section 2080.1 of the Fish and Game Code.

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

3.3.5.1 Contra Costa Goldfields

Contra Costa goldfields (*Lasthenia conjugens*) is an annual herb in the sunflower family (Asteraceae). It can bloom from March to June but is usually at its peak bloom in the project region in late April and early May. Contra Costa goldfields inhabits neutral to alkaline or saline vernal pools and adjacent seasonally moist grassy areas at elevations below 1,500 feet. It is dependent on continuous, high soil-moisture content and appears to occupy deep pools that dry out later in the growing season, rather than very shallow, "flashy" pools (Ornduff 1966; Rajakaruna 2003). Saturated, low-salinity soils appear to provide optimum conditions for germination and growth of Contra Costa goldfields (Collinge et al. 2003). Contra Costa goldfields requires insect pollinators for reproduction. Ground-nesting solitary bees (*Andrenidae*) that nest in the uplands around vernal pools are important pollinators of the goldfields genus (Thorp and Leong 1998).

Contra Costa goldfields was federally listed as endangered on July 18, 1997 (62 FR 33029–33038).The USFWS designated final critical habitat for Contra Costa goldfields on February 10, 2006 (71 FR 7217–7266) (Figure 3.3-6). The designation of critical habitat requires federal agencies to consult with the USFWS regarding any action that could destroy or adversely modify critical habitat. This species is included in the 2005 recovery plan for vernal pool species (U.S. Fish and Wildlife Service 2005).

Contra Costa goldfields has no state listing status, but it is on CNPS List 1B.1 (rare, threatened, or endangered in California and elsewhere; seriously endangered in California—more than 80% of occurrences threatened/high degree and immediacy of threat). The primary threats to the species have been historical habitat loss, commercial and residential development, grazing, and competition from invasive nonnative plants (California Native Plant Society 2010).

Contra Costa goldfields is known historically from coastal valleys in central California (from Mendocino to Santa Barbara County) and from the western edge of the Sacramento Valley, north of Suisun Marsh. The CNDDB lists 32 occurrences in Alameda, Contra Costa, Marin, Mendocino, Monterey, Napa, and Solano Counties (California Natural Diversity Database 2010a). The largest known concentration of Contra Costa goldfields is in Solano County in the City of Fairfield. Of the 32 total recorded occurrences, 12 are recorded in Solano County.

Affected Environment

Based on the 2005 surveys (Vollmar Consulting 2005), two stands of Contra Costa goldfields (29 plants) occur within seasonal wetland W-165 in the Alternative B footprint south of SR 12E on the west side of Pennsylvania Avenue as illustrated in Volume 2, Figure 3.3-2a (Sheet 33). The total area occupied by the plants in these three stands was less than 0.01 acre. Thirteen additional stands (Sheets 33 and 35) with a total of 420 plants, based on the 2005 survey results (Vollmar Consulting 2005), were mapped within several hundred feet of the Alternative B project area. Nine of the stands are within 250 feet of the project area; these supported 190 plants in 2005 (Vollmar Consulting 2005).

Four stands of Contra Costa goldfields occur within seasonal wetlands (W-165, W-171, and W-174) in the project footprint for Alternative C south of SR 12E, on the west and east sides of Pennsylvania Avenue as illustrated in Volume 2, Figure 3.3-2c (Sheet 33). Based on the 2005

surveys (Vollmar Consulting 2005), the two stands in W-165 west of Pennsylvania Avenue comprised a total of 29 plants, and the stands in W-171 and W-174 east of Pennsylvania Avenue each comprised a single plant. The total area occupied by the plants in these four stands was less than 0.01 acre. Eleven additional stands (Sheets 33 and 35) with a total of approximately 420 plants, based on the 2005 survey results (Vollmar Consulting 2005), were mapped within several hundred feet of the Alternative C project area. One of the stands, less than 100 feet from the project area, contained one plant in 2005 (Vollmar Consulting 2005). Three of the stands (totaling 116 plants) were within 250 feet of the temporary impact area.

The area south of SR 12E is fairly flat, with a gradual slope to the south, and the wetland depressions are shallow and difficult to discern. W-165, W-171, and W-174 are annual grassland habitats that are not located in depressions, but remain saturated during the wet season, providing suitable habitat for Contra Costa goldfields. Due to the lack of landscape depressions to hold the water, the seasonal saturation is likely due to a high water table or perching of rainwater and sheet flow over a shallow hardpan soil. A shallow roadside swale is located south of SR 12E and west of Pennsylvania Avenue at the base of the road prism. The hydrologic connection between this swale and the wetlands located south of the ROW fence line was assessed utilizing topographic surveys and an onsite qualitative evaluation. It is likely this roadside swale contributes flow directly into wetlands W-162 and W-163. These seasonal wetlands occur at the base of a berm that extends southwest of the swale. The swale may also contribute sheet flow to the annual grassland south of SR 12E in the area where the CCG were found. The SR 12E roadway has been assessed and sections of the road that drain to the south and contribute runoff into this roadside swale have been identified. No Contra Costa goldfields have been found within the Alternative B, Phase 1 or Alternative C, Phase 1 study areas.

Because Contra Costa goldfields is an annual plant, the numbers of plants that grow in an area can vary widely from year to year, depending on rainfall, disturbance regime, and other factors that affect seed germination and plant survival (U.S. Fish and Wildlife Service 2005). Although the stands of Contra Costa goldfields were not found in April 2009, the habitat remains suitable and the plants are assumed to be extant. The area has not been visibly disturbed since 2005, and the seed bank for Contra Costa goldfields would still be present in the area where the plants were observed in 2005. Below average rainfall and varied temperature patterns in 2008/2009 may have affected germination and growth of this species for spring 2009, causing the lack of mature plants during the 2009 surveys. For the purposes of this analysis, the extent of occupied habitat and numbers of plants are based on the 2005 data.

The area immediately south of SR 12E between Beck Avenue and Pennsylvania Avenue includes the northern edge of Vernal Pool Critical Habitat Unit 5B, which is designated for Contra Costa goldfields (71 FR 7217–7266).

Environmental Consequences

Loss or Disturbance of Contra Costa Goldfields Resulting from Construction

Impacts on Contra Costa goldfields could occur under either full build alternative. No Contra Costa goldfields occur within the temporary or permanent impact areas for Alternative B, Phase 1 or Alternative C, Phase 1.

Based on the 2005 and 2009 survey results, approximately 30 Contra Costa goldfields plants in a total area of less than 0.01 acre would be removed within the Alternative B and Alternative C footprints. Under Alternative B, this would occur south of SR 12E for construction of the Meyer Lane extension, the frontage road south of SR 12E and west of Pennsylvania Avenue, and widening of Pennsylvania Avenue south of SR 12E (Volume 2, Figure 3.3-2a, Sheets 32–33). Under Alternative C, impacts would occur south of SR 12E on either side of Pennsylvania Avenue for construction of the Pennsylvania Avenue interchange (Volume 2, Figure 3.3-2c, Sheet 33). Implementation of the measures to compensate for the loss of Contra Costa goldfields would reduce the severity of this impact under either alternative.

A total of 55.95 acres of critical habitat for Contra Costa goldfields would be permanently removed and approximately 14.02 acres of critical habitat would be temporarily disturbed with implementation of Alternative B. Of these totals, 6.22 acres of the permanent impact and 0.96 acre of the temporary impact would be within seasonal wetlands and alkali seasonal marsh, which are the Primary Constituent Elements (PCEs) of Contra Costa goldfields critical habitat in this area. The remaining permanent and temporary impacts are within habitats that do not support Contra Costa goldfields, including landscaped, nonnative annual grassland (upland), other woodland, perennial drainage, perennial marsh, riparian woodland, ruderal, seasonal drainage, and developed areas.

Alternative B, Phase 1 would not directly affect Contra Costa goldfield plants, but 7.27 acre of its critical habitat would be permanently removed and 1.17 acre would be temporarily affected. These effects are all within habitats that do not support Contra Costa goldfields, including landscaped, nonnative annual grassland (upland), other woodland, perennial drainage, perennial marsh, riparian woodland, ruderal, and developed areas.

A total of 39.59 acres of Contra Costa goldfields critical habitat would be permanently removed in the Alternative C project area and approximately 8.55 acres of critical habitat would be temporarily affected by construction of Alternative C. Of these totals, 4.47 acres of the permanent impact and 0.49 acre of the temporary impact would be within seasonal wetlands and alkali seasonal marsh, which are PCEs of Contra Costa goldfields critical habitat. The remaining permanent and temporary impacts are within habitats that do not support Contra Costa goldfields, including landscaped, nonnative annual grassland (upland), other woodland, perennial drainage, perennial marsh, riparian woodland, ruderal, seasonal drainage, and developed areas.

Alternative C, Phase 1 would not directly affect Contra Costa goldfield plants, but 1.31 acres of its critical habitat would be permanently removed and 2.52 acres would be temporarily affected. However, these effects are all within habitats that do not support Contra Costa goldfields, including nonnative annual grassland (upland), other woodland, perennial drainage, perennial marsh, riparian woodland, ruderal, and seasonal drainage. There would be no direct temporary or permanent project effects on the seasonal wetlands. Project construction of a retaining wall, as discussed in Section 3.3.2.4, would minimize indirect effects on goldfields critical habitat.

Implementation of measures to install construction barriers, to conduct environmental awareness training and to conduct biological monitoring discussed in Section 3.3.1.1, the measure to protect water quality and prevent erosion and sedimentation discussed in Section 3.3.2.1, and the

measure to construct a retaining wall south of SR 12E discussed in Section 3.3.2.4 would protect Contra Costa goldfields and wetland habitat within the designated critical habitat for the species.

Because Contra Costa goldfields is a federally listed species, consultation under FESA was required for removal of the plants. Loss or disturbance of Contra Costa goldfields and its critical habitat would be considered an adverse effect. The USFWS concurred with a determination of "may affect, not likely to adversely affect" Contra Costa goldfields in the Biological Opinion (BO) dated April 16, 2012. The federal lead agency must ensure that its activities do not adversely modify critical habitat to the point that it will no longer aid in the species' recovery. The SR 12E portion of the project would not be constructed until funding is available, which is not expected until after 2035.

Under the No-Build Alternative, no construction activities would occur, and no effects on Contra Costa goldfields or its habitat would occur.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08); Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) mentioned in Section 3.3.2.1; the measure to construct a retaining wall south of SR 12E discussed in Section 3.3.2.4; and the measure below would address direct and indirect effects to Contra Costa goldfields under all alternatives.

Implementation of the following measure would avoid all direct impacts on Contra Costa goldfields under Alternative C, Phase 1; therefore, no compensatory mitigation is required under these alternatives.

Avoid and Minimize Potential Direct and Indirect Disturbance of Populations of Contra Costa Gold Fields

- The Department will construct a retaining wall along SR 12E between Ledgewood Creek and Suisun City. This design feature will limit the roadway expansion to the existing raised roadbed and avoid permanent intrusion into the immediately adjacent seasonal wetland (Gentry Suisun Wetland) that provides potential Contra Costa goldfields habitat.
- The boundaries of sensitive wetland habitat along SR 12E will be identified as inaccessible by an orange construction barrier fence (ESA-type fencing) and depicted on final design plans. The fence will be at least 4 feet high, it will include signage as the boundary of an Environmentally Sensitive Area, and the installation will be guided and monitored by a USFWS- approved biologist.
- A USFWS-approved biologist will identify potential Contra Costa goldfields habitat prior to ground-disturbing activities, and a protective silt fence, described in the Department's Standard BMPs, will be installed to protect down-gradient areas from being affected by

sediment loading. This fencing will prevent direct impacts on wetlands south of SR 12E between Ledgewood Creek and the eastern end of the construction area.

- A USFWS-approved biologist will conduct construction monitoring in and adjacent to all sensitive special-status plant populations. Construction monitoring frequency will range from daily to weekly depending on the biological resource and the construction activities.
- A USFWS-approved biologist will coordinate with the Resident Engineer to ensure that the contractor maintains the staked, fenced, and flagged perimeters of the construction area and staging areas adjacent to sensitive biological resources, including potential Contra Costa goldfields habitat.
- Vegetation removal within the retaining wall construction area south of SR 12E will be limited to the minimum necessary.
- Construction in the area between Ledgewood Creek and Suisun City will be confined to the driest season (May 15 to October 15) to protect down-gradient wetland habitat.

Compensate for the Loss of Contra Costa Goldfields

No compensatory mitigation would be necessary under the Phase 1 alternatives. Under both full-build alternatives, a plan to compensate for the permanent loss of Contra Costa goldfields will be developed and implemented. The Contra Costa goldfields compensation plan will include mitigation for impacts on seasonal wetlands, because the primary constituent elements of critical habitat for the goldfields are associated with seasonal wetlands/vernal pool habitat.

The Contra Costa goldfields compensation plan will be developed through extensive and well-documented coordination between the Department, resource agency specialists, and conservation groups. Compensation for permanent loss (areas directly affected in the project area) of Contra Costa goldfields will consist of restoration of Contra Costa goldfields habitat by transplantation of Contra Costa goldfields onto suitable habitat sites on private property. Compensation will occur as agreed upon with appropriate resource agencies

Should restoration be selected for compensation, a qualified restoration ecologist will work with resource agency specialists and knowledgeable individuals to identify a transplantation area and ensure that the area can be managed and protected in perpetuity. Transplanting the Contra Costa goldfields plants will entail the activities listed below.

- Identifying suitable transplant sites within Vernal Pool Critical Habitat Unit 5B that either do not support the goldfields or support a sparse cover of goldfields.
- Moving the plant material and seed bank to the transplant sites.
- Monitoring the transplant sites to document recruitment and survival rates.

The restoration ecologist will develop a detailed transplanting and monitoring plan. The following general steps will be involved in the transplanting and monitoring efforts, as appropriate.

- Conduct a site analysis to document the biotic and physical requirements of the Contra Costa goldfield plants that will be affected by the proposed action. This task will include an evaluation of the plant populations to gather the following information: soil type, soil salinity, plant species associations, aspect, level of disturbance, and surrounding upland vegetation cover and soil type.
- Identify and evaluate sites that may be suitable for transplanting the Contra Costa goldfields. Preferred sites will include pools with neutral soils; saturated conditions through at least mid-spring; and solitary bee nesting habitat, such as mounds and uplands with friable soils. The information identified in the previous bullet item will be gathered for the transplant sites.
- Prepare the transplant sites by excavating the topsoil, roughening the subsoil, presoaking the subsoil, and removing weeds from the surrounding area.
- Excavate the topsoil from the area containing the Contra Costa goldfields that would be directly affected by the proposed action. The topsoil will be excavated with the seed bank and any roots in place (depth of excavation will be determined after further research on the species and site conditions). This excavation will occur after the plants have flowered and set seed (generally by June or July). The excavation will be done by hand or with a truck-mounted tree spade. The type of equipment chosen will depend on the depth and diameter of excavation required. The topsoil will be placed on the transplant site immediately after excavation. This activity will be conducted or monitored by a botanist to ensure that the appropriate amount of topsoil is removed and placed in the appropriate location. Special project specifications will be developed for removing and relocating soils containing Contra Costa goldfields. A post-transplantation report will be prepared, documenting the measures used to relocate the populations and where they were relocated.
- Protect the transplanted Contra Costa goldfields by installing ESA-type fencing with signs around the transplant sites. The purpose of this temporary fencing will be to prevent animals and humans from entering and disturbing the transplant sites during the establishment phase. The fencing will remain in place during the monitoring period or longer, if it appears that the populations could be significantly disturbed by grazing or human encroachment. Grazing might be necessary in and around the transplant area over the long term to prevent overgrowth and encroachment by other species.
- Conduct periodic maintenance visits to ensure that the transplant sites are undisturbed and the ESA-type fencing is in place. Maintenance activities may consist of manual weeding, supplemental watering, and mending of fences.
- Monitor the transplanted populations to document survival and recruitment rates over a period established in consultation with the resource agencies and vernal pool community experts. The populations will be monitored annually during the flowering period to document success rates and identify remedial actions. The detailed transplanting and monitoring plan will provide specific monitoring protocols and documentation procedures. A copy of the annual monitoring reports and the final monitoring report, with maps of the transplant sites, will be provided to the USFWS and public agencies for their review.

3.3.5.2 Showy Indian Clover

Showy Indian clover is an annual herb in the clover family (*Fabaceae*) that blooms from April to June. This species was known to occur in several habitats, including low-lying, wet swales and grasslands, sometimes on hillsides, at elevations below 1,020 feet. It can occur on serpentine soils, but was typically found in moist, heavy soils. The sites found in 1993 and 1996 are on a roadside and an eroding cliff face, respectively (California Natural Diversity Data Base 2010b).

Showy Indian clover, also known as showy rancheria clover, was federally listed as endangered on October 22, 1997 (62 FR 55791–55808). No critical habitat has been designated, because the USFWS determined that it would not confer any additional benefit to the listing and would increase the degree of threat to the species.

Showy Indian clover has no state listing status, but is on the CNPS List 1B.1 (rare, threatened, or endangered in California and elsewhere; seriously endangered in California—more than 80% of occurrences threatened/high degree and immediacy of threat). The primary threats to showy Indian clover have been urban and agricultural development. Overgrazing may have also caused the elimination of the clover from some locations (62 FR 55800-55801), and competition with weedy invasive species may have also extirpated populations (62 FR 55803).

Showy Indian clover occurred historically from the western edge of the Sacramento Valley in Solano County to Marin and Sonoma counties, and also in Santa Clara County. Showy Indian clover was considered extinct until its rediscovery at a site in Sonoma County in 1993. It was later extirpated from this site, but in 1996 another location was found on private land in Marin County. This population comprises approximately 200 plants and is the only known extant natural population. A reintroduction project was conducted in 2006 that planted showy Indian clover seed on a site at Point Reyes National Seashore. Monitoring of the site in 2008 indicated that 77 plants survived, and 76 of those produced flowers and were in the process of setting seed at the last monitoring visit that year (U.S. Fish and Wildlife Service 2009a).

The CNDDB lists 26 occurrences of showy Indian (rancheria) clover, all but two of which are historic sightings from 1969 and earlier (California Natural Diversity Data Base 2010b). Three of these historic occurrences (last seen in 1952, 1909, and 1892) are in Solano County within the Elmira and Fairfield North 7.5-minute USGS quadrangles. The other 23 occurrences are in Sonoma, Marin, Napa, and Santa Clara counties. The only know extant population is in Marin County.

Affected Environment

No showy Indian clover was observed in the project study area for any of the alternatives during the 2009 surveys, however, the Mangels property north of SR 12W was not accessible for those surveys. The Mangels property was surveyed as part of the North Connector project in 2003, and no showy Indian clover or other federally listed plant species were observed in the study area. On May 4, 2011, Lisa Webber and Stephanie Myers from ICF, with Chris States and Frankie Malamud-Roam from the Department conducted a field survey on portions of the Dittmer property not previously surveyed by ICF. No showy Indian clover was observed during this survey.

Environmental Consequences

Loss or Disturbance of Showy Indian Clover Resulting from Construction

Impacts on showy Indian clover could occur under Alternative B, Alternative C, and Alternative C, Phase 1. No showy Indian clover occurs within the temporary or permanent impact areas for Alternative B, Phase 1.

No showy Indian clover plants were observed during the surveys conducted in 2004, 2005, 2007, and 2009. The area north of SR 12W was surveyed in 2003 for the North Connector project, and no showy Indian clover was found (Volume 2, Figure 3.3-2a, -2c, and -2d Sheets 4-6). However, the area north of SR 12W was not accessible for the surveys in 2004 and later, and the species absence cannot be concluded with certainty. Therefore, project construction for Alternative B, Alternative C, or Alternative C Phase 1 in the area north of SR 12W could potentially affect suitable habitat for showy Indian clover through excavation and road construction. Implementation of the avoidance and minimization measures below and mitigation measures to conduct preconstruction surveys and to compensate for the loss of showy Indian clover, if present, would reduce the severity of this effect.

Indirect effects on suitable habitat north of SR 12W could result from the alteration of hydrology and soil compaction from earthmoving activities during construction. Implementation of measures to install construction barriers, to conduct environmental awareness training and to conduct biological monitoring discussed in Section 3.3.1.1 and the measure to protect water quality and prevent erosion and sedimentation discussed in Section 3.3.2.1 would protect showy Indian clover habitat, avoiding this potential effect.

The USFWS concurred with a determination of "may affect, not likely to adversely affect" showy Indian clover in the Biological Opinion (BO) dated April 16, 2012.

Under the No-Build Alternative, no construction activities would occur, and no effects on showy Indian clover or its habitat would occur.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and the measures below to conduct protocol level surveys and avoid and minimize disturbance to populations would reduce direct effects to showy Indian clover and its habitat under Alternative B, Alternative C, and Alternative C, Phase 1. Implementation of Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) mentioned in Section 3.3.2.1 would address indirect effects under the same alternatives.

Conduct Protocol-Level Surveys for Showy Indian Clover

As a prerequisite to developing compensatory mitigation, a qualified botanist will be retained to conduct botanical surveys of the part of the Mangels property north of SR 12W that is in the project construction area within one year prior to construction in that area. Surveys will be conducted in accordance with the USFWS protocol (USFWS 1996; Cypher 2002), and survey results will be submitted to the USFWS and DFG. If any showy Indian clover plants are identified during the surveys, the botanist will photograph and map locations of the plants, document the location and extent of the showy Indian clover population on a CNDDB Survey Form, and submit the completed Survey Form to the CNDDB.

Avoid and Minimize Potential Direct and Indirect Disturbance of Populations of Showy Indian Clover

If populations of showy Indian clover are found within 250 feet of the construction work area, the following measures will be implemented.

- Orange ESA-type fencing at least 4 feet in height will be installed to protect ESAs. A USFWS-approved biologist will identify sensitive biological resources adjacent to the construction area; the ESAs to be fenced will be included in the contract plans and specifications.
- A USFWS-approved biologist will identify potential showy Indian clover habitat, and a protective silt fence, described in the Department Standard BMPs, will be installed to protect down-gradient habitat for showy Indian clover from being affected by sediment loading.
- Construction activities conducted within the area of potential showy Indian clover habitat will be confined to the dry season (June 1–October 15) to protect down-gradient, showy Indian clover habitat and minimize potential indirect dust effects on identified flowering showy Indian clover plants.
- A USFWS-approved biologist will be present during all ground-disturbing activities occurring within 250 feet of occupied showy Indian clover habitat to ensure that showy Indian clover habitat is avoided.
- Vegetation removal within 250 feet of occupied showy Indian clover habitat will be limited to the maximum extent practicable.
- A USFWS-approved biologist will develop and conduct environmental education training for construction employees working on ground-disturbing activities. The program will include the following: a description of showy Indian clover and its habitat needs, photographs of the plant species, an explanation of its legal status and protection under FESA, and a list of the measures that will be implemented to minimize and avoid potential effects on showy Indian clover.
- The biological monitor will coordinate with the Resident Engineer to ensure that the contractor maintains the staked, fenced, and flagged perimeters of the construction area and staging areas adjacent to sensitive biological resources, including occupied or potential showy Indian clover habitat.

- To the maximum extent practicable, the Department or STA will install bio-swales and bio-filtration in the area adjacent to the highway to avoid and minimize sediment loading and point source pollutants.
- Dust control will be managed through Department standard water quality control BMPs through the utilization of an organic tackifier and water trucks.

If plants cannot be completely avoided, consultation with the USFWS pursuant to Section 7 of the FESA will be reinitiated, and additional measures will be developed to ensure that the project would avoid direct and indirect effects on showy Indian clover.

3.3.5.3 Callippe Silverspot Butterfly

Callippe silverspot butterfly (CSB) was listed as endangered in 1997 (FR 62:64306) and has no state listing. In August 2009, USFWS published a 5-year review recommending that the species retain its endangered status (U.S. Fish and Wildlife Service 2009b). There is no designated critical habitat for the species.

Historically, CSB occupied much of the Bay Area, from Vallejo and southeastern Napa and Sonoma Counties to northwestern Contra Costa County, south to the Castro Valley area, east to the Livermore–Pleasanton–Sunol area, and from San Francisco south to the vicinity of La Honda in San Mateo County. Currently, USFWS recognizes only two existing populations: one in the San Bruno Mountain in San Mateo County and a second in the Cordelia Hills in Solano County. The population in the Cordelia Hills on the King–Swett Ranches Solano Land Trust property has been observed as recently as spring 2009 (Wickham pers. comm.). While the CSB is found within the fog-influenced zone surrounding San Francisco Bay at a regional level, it appears that the distribution of the butterfly at a local, site-specific level may be limited by the avoidance of fog during the flight season. For example, the distribution of adult CSB on San Bruno Mountain shows a clear boundary of adult presence on the sunny side of the summer persistent fog line.

Female CSB lay their eggs on or near the dried remains of their host plant, *Viola pendunculata*, and within a week the larvae hatch and eat their egg shells, wander a short distance, and spin a silk pad upon which they pass the summer and winter in diapause (an inactive period). Upon ending diapause the following spring, the larvae search for food plants, spend the next few months feeding, pupate after completing their larval development, and emerge as adults about 2 weeks after pupating. The adult flight season is about 6–8 weeks from mid-May through early to mid-July, but timing and length of the flight season varies depending on annual weather conditions. Warmer weather accelerates the blooming period of nectar plants and tends to shorten the adult flight season, while cooler weather tends to extend the blooming period and flight season. The average lifespan of the adult CSB was determined to be about 5 days for males and 7 days for females (Arnold 1981).

Adults of the *Speyeria* genus are known to be strong fliers and can disperse several miles during the adult life span. Adult CSBs have been documented to disperse up to 0.8 mile between breeding colonies at San Bruno Mountain (Thomas Reid Associates 1981; Arnold 2004). In the Cordelia Hills, near the BSA, nectar plants are not in close proximity to larval host plants, requiring the adults to fly more than 1 mile for food gathering (Arnold pers. comm.).

Habitat requirements (Arnold 1981) are listed below.

- Grasslands with proper topography in the San Francisco Bay area.
- Sufficient larval host plants.
- Adequate nectar sources.
- Hilltops for mate location.
- Shelter from coastal winds.

Grasslands: The topography of the grassland is an important factor influencing larval host plant growth and survival. Researchers have demonstrated that the best grassland habitat for CSB, based on the distribution of adults, includes cool north- and east-facing hill slopes with fairly dense occurrences of both the larval host plant and nectar source plants (U.S. Fish and Wildlife Service 2009b). Also important are large areas of continuous grassland that support a variety of nectar sources since the CSB is a large and vagile butterfly that can have a home range encompassing hundreds of acres of grassland habitat.

Larval host plant: Johnny jump-ups in the San Francisco Bay Area are associated with clay soils that have established grass cover. They may bloom anywhere from January through April, depending on weather conditions (Arnold pers. comm.). Although the plant is a perennial, all aboveground growth dies back annually, with only its roots and rhizomes surviving year-round. Annual precipitation seems to influence the annual bloom, with fewer blooming individuals and area of cover in dry years and larger numbers and area in wet years. Thus, plant density fluctuates annually. The distribution of viola patches, as well as density of any particular patch, contributes to the successful completion of the butterfly's life cycle. Low-density patches of viola near other, denser patches can also support CSB, but not as many.

Nectar plants: A variety of flowering plants provide nectar sources used by adult CSB. Nectar sources include California buckeye, native coyote mint (*Monardella villosa*), Alameda County thistle (*Cirsium quercetorum)*, blessed milk thistle (*Silybum marianum*), and nonnative thistles (*Carduus* spp.) (Arnold 2006).

Hilltops: Hilltops that have connectivity with grasslands containing nectar sources and larval host plants are vital to the hill-topping behavior of CSB. Hill-topping allows the congregation of males and females, which promotes mate selection. Sites that support larval and adult food plants do not always coincide with areas where mate location and other behaviors occur, and Arnold (2004) observed adults gathering nectar at locations more than 1 mile from the nearest patches of the larval host plant.

These habitat components need to be relatively close to each other to support the species. The larval host plants presumably need to be in relatively high-density patches interspersed within grasslands, typically along steep hill slopes, such as are found in places in Solano County.

Threats to CSB that were identified when the butterfly was listed and still persist today include the loss to urbanization and fragmentation of potential habitat in the San Francisco Bay area, poaching by insect collectors, indiscriminate use of herbicides, inappropriate grazing regimes,

elimination of larval host plants by competition from invasive plants, fire-suppression policies resulting in hotter wildfires, and the negative effects of small and geographically isolated populations. Threats that were defined after listing during the 5-year review (U.S. Fish and Wildlife Service 2009) include road mortalities, increased interactions with humans, deposition of nitrogen from local traffic that encourages invasive plants, nonnative predators, and global climate change. Apparently, there is no documented evidence that some of these additional threats have caused the demise of any populations (Arnold pers. comm.). While afforded some protection by preserved areas of potential habitat on Solano Land Trust properties, the butterfly population in the Cordelia Hills is threatened by grazing management practices that do not favor the butterfly and by habitat fragmentation, degradation, and loss caused by a series of local development projects.

The current number of individual butterflies in each of the known populations (Cordelia Hills and San Bruno Mountain) remains unknown (U.S. Fish and Wildlife Service 2009b).

Affected Environment

There are no known CNDDB (2011) occurrences of CSB within the BSA or project footprint. However, the draft Solano County HCP (BUGGY database, as cited in LSA 2009) lists eight records ranging from 1 to 5 miles from the western portion of the project BSA, all to the southwest near the Cordelia Hills (Figure 3.3-7). Richard Arnold observed an adult butterfly and several stands of larval host plants in 1993 at the nearest known occurrence approximately 1 mile from the BSA (LSA 2008). In support of the draft EIR for the Fieldcrest Development project, LSA (2008) conducted follow-up surveys at this location for larval host plants in 2007 and found two stands of host plants. In previous years, surveys had recorded seven distinct stands.

Areas of the BSA that have potential CSB habitat are generally located in the western portion of the BSA between the Business Center Drive extension on the Mangels property and I-80 (Figure 3.3-2a, sheets 4–6). No surveys for adult CSB or host plants were conducted within the BSA by ICF for this project due to access limitations on the Mangels property. However, in 2004, Monk & Associates surveyed a portion of the BSA on the Mangels property north of SR 12W for presence/absence of larval host plants for STA's North Connector project (Monk & Associates 2006). The 2004 survey identified two populations of the host plant, Johnny jump-ups, but did not record density of the populations. Both of these locations are within the area identified as part of the Callippe Silverspot Butterfly Conservation Area in the Solano Multi-species Habitat Conservation Plan (LSA 2009) and provide connectivity to butterfly habitat located to the south in the Cordelia Hills.

On May 4, 2011, Lisa Webber and Stephanie Myers from ICF, with Chris States and Frankie Malamud-Roam from the Department conducted a field survey on portions of the Dittmer property not previously surveyed by ICF. The survey area included one of the *Viola* populations previously identified by Monk & Associates in 2004. In addition, the survey area is adjacent to the Mangels property and the second population of *Viola* identified by Monk & Associates in 2004.

One *Viola* plant was observed on the Mangels property within the area south of the proposed alignment and previously mapped by Monk & Associates. No *Viola* plants were observed on the Dittmer property. However, it is likely we missed this year's optimal blooming period for *Viola*.

Sue Wickham, project coordinator with Solano Land Trust, stated in a May 16, 2011 email that *Viola* plants on their properties had peaked by mid-April and were hard to find by May so it is likely that our survey in early May was too late and missed *Viola* plants. Numerous Italian thistle (*Carduus pycnocephalus*), milk thistle (*Silybum marianum*), *and* bull thistle (*Cirsium vulgare*) plants, all adult butterfly nectar sources, were observed on both the Dittmer and Mangels property.

On March 4, 2012, H.T. Harvey & Associates conducted a field survey on portions of the Dittmer property. The survey area included the two *Viola* populations identified by Monk & Associates in 2004. In contrast to the May 2011 survey, H.T. Harvey & Associates found 7 populations, which included the two previously identified by Monk & Associates (2004) (Figure 3.3-2a sheets 6-8). H.T. Harvey & Associates observed a total of 1,350 individual plants.Based on the topography of the BSA and the presence of grasslands with nectar plants, there is potential CSB habitat within the BSA in the area between the Business Center Drive extension and I-80 (Figure 3.3-2a, Sheets 4–6). Some, and possibly all, of the essential habitat features identified by USFWS in its 5-year review (U.S. Fish and Wildlife Service 2009b) have historically been present or may currently be present within the BSA.

Environmental Consequences

Under Alternative B, Phase 1, no construction is proposed in the vicinity of Red Top Road and SR 12W; therefore this alternative would not have the potential for effects.

Alternative B, Alternative C, and Alternative C, Phase 1would result in the permanent loss of 38.82 acres of callippe silverspot butterfly habitat due to construction of the Business Center Drive Extension from approximately 500 feet west of the existing western terminus of Business Center Drive to the existing Red Top Road/1-80 Intersection. Establishment of this new road will require extensive grading and recontouring of rolling grasslands that provide topographical features important for callippe silverspot butterfly hill-topping breeding behavior, foraging, and possible larval development. Construction of the road will result in replacement of butterfly habitat with hardscape and maintained ROW that will likely be inhospitable for the listed butterfly. In addition to the harm and harassment associated with the destruction of callippe silverspot butterfly habitat, the project is also likely to result in effects associated with habitat fragmentation.

Construction of the Business Center Drive Extension will also result in the temporary loss of 19.32 acres of callippe silverspot butterfly habitat. This habitat will be temporarily lost due to construction access, staging, and recontouring for borrow material. Successful restoration of temporarily disturbed areas with a grassland seed mix that includes callippe silverspot butterfly nectar plants is likely to limit the habitat loss to less than one year following the initial ground disturbance.

The USFWS concurred with a determination of “not likely to adversely affect” California tiger salamander (central California distinct population segment) in the Biological Opinion (BO) dated April 16, 2012.This impact will be mitigated through compliance with avoidance and minimization measures described below.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08), as well as Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) mentioned in Section 3.3.2.1 and the measure below would address permanent and temporary effects to Callippe silverspot butterfly under Alternative B, Alternative C, and Alternative C, Phase 1.

Conduct Surveys for Larval Host Plants for Callippe Silverspot Butterfly

The Department will survey for the presence of adult nectar and larval host plants and adult nectar sources within areas that will be subject to temporary effects within callippe silverspot habitat. The surveys will be conducted during the blooming season (March to May) no more than one year prior to the excavation and grading of the Business Center Drive Extension proposed to occur during Construction Packages within callippe silverspot butterfly habitat. SLT will be contacted in order to synchronize the surveys with peak *Viola* blooming on the Swett Ranch. Observed adult nectar plants and *Viola* will be mapped and flagged. The Department will modify the boundaries of temporary work areas to avoid the nectar and host plants when feasible.

Minimize Potential Direct and Indirect Disturbance of Populations of Callippe Silverspot Butterflies

- To the maximum extent possible, the Department will avoid areas of Viola delineated prior to construction and during preconstruction surveys within temporary affected areas.
- The project footprint will be clearly delineated with ESA-type fencing and signage to limit construction activities to the described footprint and to maintain awareness. All Environmentally Sensitive Areas will be shown on the final construction drawings.
- Grading activities within callippe silverspot butterfly habitat will be conducted between August 1 and April 1, to the extent practicable as determined during constructability review. When grading activities must take place after April 1 and before August 1, daily biological monitoring will occur for the callippe silverspot butterfly.
- Insecticides or herbicides in the Business Center Drive Extension ROW will not be applied during road construction or long-term operational maintenance within 300 feet of the host plant occurrences mapped by Monk & Associates in 2004 or otherwise identified or adult nectar plants or from other locations where the chemical treatments can be carried in by wind or surface flow.
- Standard erosion and dust control measures will be implemented to minimize the deposition of dust, soil, and silt on callippe silverspot butterfly habitat.
- The Department and STA will ensure there is no drift of sprayable dust control formulations used for dust and erosion control towards callippe silverspot butterfly habitat during

construction. Appropriate spray devices and application methods, such as spray pressures, nozzle opening size, and additives such as spray retardants, will be used to prevent drift. Applications will be made on calm days or when the wind speed is low and blowing away from callippe silverspot butterfly habitat. Spray applications will not be made within 200 yards by air or 40 yards by ground upwind from callippe silverspot butterfly habitat. Applications will not occur during rain events.

- No equipment will be driven or parking or laydown areas established within 20 feet of larval host plants located outside the defined construction footprint and, to the extent feasible, within 20 feet of adult nectar plants located outside the defined construction footprint.
- If any other life history phases of the callippe silverspot butterfly are found such as adults, pupae, larvae, or eggs, the USFWS shall be immediately contacted for further guidance.
- Compensate for Direct and Indirect Effects on Callippe Silverspot Butterfly Habitat

The Department will minimize harm to the callippe silverspot butterfly resulting from the adverse effects on habitat. Compensation implemented within USFWS-approved areas that are both California red-legged frog habitat and callippe silverspot butterfly may be overlaid on common acreage as long as it is appropriate habitat for each species. The area will receive conservation credit from the USFWS for both species. The compensation will be phased to coincide with project construction packages as presented in Table 3.3.5-1 and implemented 60 calendar days prior to the date of initial ground disturbance.

Compensation will be based on the amount of permanent and temporary loss of callippe silverspot butterfly habitat. Temporary habitat loss will be compensated at rates based on the amount of time it takes to restore the habitat to baseline conditions following the date of initial habitat disturbance and whether the restored habitat will be subjected to ongoing roadway maintenance activities that would not be entirely beneficial to the species. Off-site conservation will offset routine maintenance activities that are short in duration, e.g., mowing. Habitat value in these ROW areas is diminished but not permanently destroyed. Should the determination of permanent versus temporary habitat loss change after the Department has provided this compensation, the Department will provide additional compensation, if necessary, or apply excess compensation towards future projects that adversely affect the callippe silverspot butterfly.

The maintained ROW is defined as the ROW between the edge of pavement or denuded road shoulder and the Department ROW fence. Permanent effects will occur within the bounds of the maintained ROW (road surface and area between edge of pavement and ROW fence).

Table 3.3.5-1. Callippe Silverspot Butterfly Habitat Compensation

Level of Effect	Duration[a]	Compensation Ratio
Permanent	Permanent	3:1
Temporary	Within 1 year	1:1on-site 0.5 off-site
	Within 2 years)	1:1 on-site 1.5:1 off-site
	Greater than 2 years	3:1 off-site OR 2:1 off-site AND 1:1 on-site

[a] Period of time from the date of initial ground disturbance until the success criteria described in the restoration/revegetation plan are met.

The Department will compensate for adverse effects to callippe silverspot butterfly habitat by implementing one of the following two options:

1. The Department will establish in-perpetuity callippe silverspot butterfly habitat preservation by purchasing habitat or purchasing callippe silverspot butterfly habitat credits from a USFWS-approved conservation bank. Compensation will be implemented with in-perpetuity preservation of callippe silverspot butterfly habitat with high conservation values and: a) include ridge line topographical features associated with callippe silverspot butterfly breeding behavior and adult and/or larval nectar plants, and b) preference given to areas located within the Callippe Silverspot Butterfly Conservation Area defined in the Draft Solano HCP (SCWA 2009). Location of the proposed conservation areas will be submitted to the USFWS for review and approval.

   The habitat will include a USFWS-approved conservation easement, held by a third party. An approved ecologically-based conservation easement will include managed public access, a management plan, and an in- perpetuity endowment or other permanent non-wasting management fund based on a PAR-like property analysis. The management plan will include a description of the site, management needs (e.g., grazing plan, non-native vegetation and animal control, etc.), when the management activities will be implemented, how often and to what level monitoring of the site will occur, and an action/contingency plan to address potential management issues.

or

2. The Department will implement or fund restoration and enhancement actions within occupied callippe silverspot butterfly habitat that will have beneficial effects on the species. Such measures shall be implemented on lands with in-perpetuity conservation beneficial to the callippe silverspot butterfly. Implementation includes identification of land to be restored or enhanced, associated agreements to fund restoration or enhancement activities, and a restoration plan and schedule approved by the USFWS.

   The Department will provide a Funding Assurance Letter stating that sufficient funds for habitat compensation have been budgeted in the Phase 1 Project Expenditure Authorization. The Funding Assurance Letter will be signed by the District Deputy Director of Project Management and the District Deputy Director of Environmental Planning and Engineering.

   The Department would ensure that land used for habitat compensation will include a USFWS-approved conservation easement. An approved ecologically-based conservation easement will include managed public access, a management plan, and an in-perpetuity endowment or other permanent non-wasting management fund based on a PAR-like property

analysis. The management plan will include a description of the site, management needs (e.g., grazing plan, non- native vegetation and animal control, etc), when the management activities will be implemented, how often and to what level monitoring of the site will occur, and a action/contingency plan to address potential management issues.

The Department would provide a restoration and revegetation plan for callippe silverspot butterfly and California red-legged frog for each construction package to be reviewed and approved by the USFWS no later than sixty (60) calendar days prior to date of its initial groundbreaking of each construction package. The plan will include, but will not be limited to: schedule, methodology, a list of the seed mixes and container plants, plant material source, irrigation, maintenance schedule, monitoring program, success criteria, control of invasive, noxious weeds, and remediation and adaptive management. In addition, annual monitoring reports on the success of the plantings shall be provided to the USFWS following the completion for each construction package. The reports will be submitted on or before December 31 of each year monitoring is conducted.

The revegetation plan will include a photo monitoring plan. The plan will include, but is not limited, to the following:

a. An adequate number of photo monitoring stations will be established to provide representative views of project restoration and construction activities. Stations will be located in areas that allow for unobstructed views and a field of vision of approximately 2,000 feet, to the extent allowed by surrounding vegetative cover and topography. Each station will provide a representative panoramic view of the restoration footprint. The Department will ensure that photo monitoring stations numbers and locations are sufficient to document restoration success.

b. Baseline photographs will be taken during the spring growing season prior to construction. Following the completion of ground disturbance, photo documentation will be conducted quarterly to document restoration relative to four seasons. Photo documentation will conclude when the USFWS has agreed that success criteria have been met.

c. Photo monitoring station locations will be provided to the USFWS in an acceptable geographic format with the coordinate system identified.

d. If the USFWS or the biological monitor(s) determines that additional monitoring stations are necessary, the locations will be added to the inventory of photo monitoring stations prior to the date of the next photo documentation.

e. During each photo monitoring cycle all stations will be visited within a two day period.

f. At the conclusion of restoration, the acreage of restored areas will be tabulated and provided to the USFWS. The extent of restoration will be delineated with a handheld GPS device and a trackfile provided to the USFWS Representative.

g. Routine maintenance activities will be identified in the Restoration/Revegetation Plan. Maintained R-O-Ws may include routine maintenance activities that are short in duration, such as spraying and mowing. Specific restrictions may apply for the valley elderberry longhorn beetle, callippe silverspot butterfly, California red-legged frog, and the showy Indian clover.

3.3.5.4 Vernal Pool Fairy Shrimp/Vernal Pool Tadpole Shrimp

Vernal pool fairy shrimp is listed as threatened under FESA (59 FR 48136). Vernal pool fairy shrimp occurs in the Central Valley from Tehama to Madera Counties and in the eastern margin of the central and southern Coast Ranges from San Benito to Ventura Counties. A disjunct population occurs in Riverside County (Eng et al. 1990). Most known locations are in the Sacramento and San Joaquin Valleys and along the eastern margin of the central Coast Ranges (Eng et al. 1990).

Vernal pool tadpole shrimp is listed as endangered under FESA (59 FR 48136). Vernal pool tadpole shrimp occurs in the Central Valley from Shasta County in the north to Merced County in the south, and a disjunct population occurs in western Alameda County (Rogers 2001).

Vernal pool fairy shrimp and vernal pool tadpole shrimp (listed branchiopods) are restricted to seasonal wetland habitats (e.g., vernal pools and wet swales) in California that provide the necessary environmental conditions. These species produce cysts (eggs) that lie dormant in the soil over summer and hatch when pools fill during the winter rainy season. To complete their life cycle, vernal pool fairy shrimp and vernal pool tadpole shrimp require an annual cycle of inundation during cold and wet winter months, when the water temperature is cool and oxygen concentration is high, contrasted by dry soil conditions during the summer months (Helm 1998; Eriksen and Belk 1999).

Vernal pool fairy shrimp and vernal pool tadpole shrimp are not known to occur in shallow seasonal wetlands that lack a defined basin and do not provide a water column of sufficient depth (>1 inch) and duration (three to four weeks), because such conditions are necessary for reproduction. Similarly, these species do not occur in wetlands that remain wet or damp throughout most of the year (such as seasonal marsh and perennial wetlands) or permanent bodies of water (such as riverine and marine habitats) because these conditions do not allow egg cysts to properly dry and cure (59 FR 48136–48153).

Affected Environment

There are no known occurrences of vernal pool fairy shrimp or vernal pool tadpole shrimp (both species are part of the listed branchiopods group, which includes a number of species) within the BSA or the project footprint. The nearest recorded occurrence of vernal pool fairy shrimp (CNDDB occurrence 331, dated 2001, 2002) is 2.6 miles away in Tolenas (Fairfield) in a seasonal wetland created by a railroad borrow pit and surrounded by development and the railroad. The nearest recorded occurrence of vernal pool tadpole shrimp (CNDDB occurrence 158, dated 2002) is approximately 3.75 miles away in an isolated vernal pool in a grazed grassland on the Parker Ranch, 2.5 miles west of Travis Field. Within Solano County, there are 23 records of vernal pool fairy shrimp and 30 records of vernal pool tadpole shrimp, most reported near Jepson Prairie Preserve, northeast of the BSA.

While habitat assessments for vernal pool fairy shrimp and vernal pool tadpole shrimp were conducted by ICF for the proposed project, ICF did not conduct protocol-level surveys because of access restrictions and the long timeline for this project. However, Brent Helms conducted protocol-level surveys of a 250-foot buffer along SR 12W as part of the Jameson Canyon project.

This analysis includes results of habitat assessments completed for the proposed project and, additionally, references the results of protocol-level surveys conducted within and adjacent to the BSA for other development projects. Helm Biological Consulting (HBC) conducted protocol-level wet- and dry-season surveys of W-13, W-14, W-15, and W-149 along the north and south sides of SR 12W west of I-80 as well as other adjacent basins in the vicinity as part of the Jameson Canyon Road Widening project BA and found no branchiopods or cysts (Helm 2009). Based on the negative results of the surveys in these features, they are not discussed further.

The study area does not occur within designated critical habitat for vernal pool fairy shrimp (71 FR 7117). Vernal Pool Critical Habitat Units 12A and 12B are located in Napa County, approximately six miles west of the study area.

Alternative B

There are 29 suitable habitat features for vernal pool fairy shrimp or vernal pool tadpole shrimp within 250 feet of the Alternative B construction area (i.e., within the study area for vernal pool crustaceans).

Suitable habitat was observed in the areas listed below and illustrated in Figure 3.3-2a in Volume 2.

- Along the north and south sides of SR 12W west of I-80 (Sheets 4–6).
- In disturbed areas on the north side of I-80 (Sheets 11 and 14).
- Along Ramsey Road west of I-680 (Sheets 11 and 14).
- Along the north side of SR 12E between Beck and Pennsylvania Avenues (Sheets 32–34).

Suitable habitat features observed during the habitat assessment were primarily seasonal wetlands. Many of the habitat features occur in disturbed areas that are subject to plowing, disking, stormwater runoff, and other human influences that greatly reduce the ecologic value these habitats provide for listed shrimp species.

Alternative B, Phase 1

Four suitable habitat features for vernal pool fairy shrimp or vernal pool tadpole shrimp are located within 250 feet of the Alternative B, Phase 1 construction area.

Suitable habitat was observed in two locations in the Alternative B, Phase 1 study area as illustrated in Figure 3.3-2b in Volume 2.

- In disturbed areas on the north side of I-80 (Sheets 8 and 17).
- Along the north side of SR 12E between Beck and Pennsylvania Avenues (Sheet 32).

Alternative C

There are 24 suitable habitat features for vernal pool fairy shrimp or vernal pool tadpole shrimp located within 250 feet of the Alternative C project construction area.

During the July 27, 2007, habitat assessment, suitable habitat was identified in the project areas listed below and illustrated in Figure 3.3-2c in Volume 2.

- Along both the north and south sides of SR 12W west of I-80 (Sheets 4–6).
- In disturbed areas on the north side of I-80 (Sheets 8 and 17).
- Along Ramsey Road west of I-680 (Sheet 11).
- Along the north side of SR 12E between Beck and Pennsylvania Avenues (Sheets 32–34).
- On the south side of SR 12E between Webster Street and the railroad tracks on the edge of Suisun City (Sheet 35).

Alternative C, Phase 1

Nineteen suitable habitat features for vernal pool fairy shrimp or vernal pool tadpole shrimp are located within 250 feet of the project construction area for Alternative C, Phase 1.

Suitable habitat was observed in the project areas listed below and illustrated in Figure 3.3-2d in Volume 2.

- Along the north and south sides of SR 12W west of I-80 (Sheets 4–6).
- In disturbed areas on the north side of I-80. (Sheets 8 and 17).

Environmental Consequences

Potential Loss or Disturbance of Vernal Pool Fairy Shrimp/Vernal Pool Tadpole Shrimp Resulting from Construction

Both build alternatives would result in temporary and permanent impacts on vernal pool fairy shrimp or vernal pool tadpole shrimp. This conclusion is consistent with a **"may affect, likely to adversely affect"** determination under the Section 7 FESA process.

See the discussions below for more specific information.

The USFWS generally considers all habitats for listed shrimp species that are located within 250 feet of ground disturbance to be indirectly affected unless suitable habitat is separated from construction activities by a road or other suitable barrier. The acreages below are based on this assumption. Project construction would directly affect suitable seasonal wetlands through excavation and road construction. Indirect impacts on suitable seasonal wetlands that could result from project activities include altered hydrology, soil compaction, introduction of urban stormwater runoff, and increased human activity.

Under the No-Build Alternative, no construction activities would occur, and no effects on vernal pool fairy shrimp or vernal pool tadpole shrimp or their habitat would occur.

Alternative B

Alternative B would directly affect 15 suitable habitat features (all pools within the construction footprint) totaling 1.36 acres of habitat for vernal pool fairy shrimp or vernal pool tadpole shrimp (Table 3.3.5-2 and Volume 2, Figure 3.3-2a). In addition, Alternative B could indirectly affect 14

suitable habitat features (all pools within 250 feet of the construction footprint) totaling 1.24 acres of habitat for these species.

Table 3.3.5-2. Direct and Indirect Impacts on Vernal Pool Fairy and Tadpole Shrimp in the Study Area under Alternative B

Pool Identification Number	Direct Impact	Indirect Impact
W-13 (Sheet 5)	0.28	
W-14 (Sheet 4)	0.08	
W-15 (Sheet 5)	0.19	
W-25 (Sheet 14)	0.21	
W-35 (Sheet 11)		0.01
W-36 (Sheet 11)		0.01
W-37 (Sheet 11)		0.21
W-38 (Sheet 11)		0.08
W-39 (Sheet 11)		0.14
W-45a-2 (Sheet 17)	0.16	
W-45-3 (Sheet 17)	0.02	
W-63 (Sheet 8)	0.02	
W-118 (Sheet 32)		0.04
W-121 (Sheet 34)	0.06	
W-128 (Sheet 33)	0.02	
W-151 (Sheet 6)	0.04	
W-154 (Sheet 35)		0.14
W-156 (Sheet 4)	0.09	
W-177 (Sheet 5)		0.07
W-182 (Sheet 6)		0.01
W-183 (Sheet 6)		0.37
W-184 (Sheet 6)		0.06
W-185 (Sheet 6)		0.05
W-186 (Sheet 6)		0.01
W-187 (Sheet 6)	0.01	
W-188 (Sheet 6)		0.04
W-189 (Sheet 6)	0.03	
Total impact (acres)	**1.36**	**1.24**
Total combined impact (acres)	**2.60**	

Alternative B, Phase 1

Alternative B, Phase 1 would directly affect three suitable habitat features encompassing 0.20 acre of habitat for vernal pool fairy shrimp or vernal pool tadpole shrimp. In addition, Alternative B, Phase 1 could indirectly affect one suitable habitat feature encompassing 0.04 acre of habitat for these species (Table 3.3.5-3 and Volume 2, Figure 3.3-2b).

Table 3.3.5-3. Direct and Indirect Impacts on Vernal Pool Fairy and Tadpole Shrimp under Alternative B, Phase 1

Pool Identification Number	Direct Impact	Indirect Impact
W-45a-2 (Sheet 17)	0.16	
W-45-3 (Sheet 17)	0.02	
W-63 (Sheet 8)	0.02	
W-118 (Sheet 32)		0.04
Total impact (acres)	**0.20**	**0.04**
Total combined impact (acres)	**0.24**	

Alternative C

Project construction would directly affect suitable seasonal wetlands through excavation and road construction. Alternative C would directly affect 14 suitable habitat features totaling 1.33 acres of habitat for vernal pool fairy shrimp or vernal pool tadpole shrimp. In addition, Alternative C could indirectly affect 15 suitable habitat features totaling 1.10 acres of habitat for these species (Table 3.3.5-4 and Volume 2, Figure 3.3-2c).

Table 3.3.5-4. Direct and Indirect Impacts on Vernal Pool Fairy and Tadpole Shrimp under Alternative C

Pool Identification Number	Direct Impact	Indirect Impact
W-13 (Sheet 5)	0.28	
W-14 (Sheet 4)	0.08	
W-15 (Sheet 5)	0.19	
W-25 (Sheet 14)		0.21
W-35 (Sheet 11)		0.01
W-36 (Sheet 11)		0.01
W-37 (Sheet 11)		0.21
W-38 (Sheet 11)		0.08
W-39 (Sheet 11)		0.14
W-45a-2 (Sheet 17)	0.16	
W-45-3 (Sheet 17)		0.02
W-63 (Sheet 8)	0.02	
W-118 (Sheet 32)		0.04
W-121 (Sheet 34)	0.06	
W-128 (Sheet 33)	0.02	
W-143 (Sheet 4)	0.09	
W-149 (Sheet 5)	0.16	
W-151 (Sheet 6)	0.04	
W-154 (Sheet 36)		0.14
W-156 (Sheet 4)	0.09	
W-177 (Sheet 5)		0.07
W-182 (Sheet 6)		0.01
W-183 (Sheet 6)	0.37	
W-184 (Sheet 6)		0.06
W-185 (Sheet 6)		0.05
W-186 (Sheet 6)		0.01
W-187 (Sheet 6)	0.01	
W-188 (Sheet 6)		0.04
W-189 (Sheet 6)	0.03	
Total impact (acres)	**1.33**	**1.10**
Total combined impact (acres)	**2.43**	

Alternative C, Phase 1

Alternative C, Phase 1 would directly affect 12 suitable habitat features totaling 1.45 acres of habitat for vernal pool fairy shrimp or vernal pool tadpole shrimp (Table 3.3.5-5 and Volume 2, Figure 3.3-2d). The direct impact acreage for Alternative C, Phase 1 includes construction of a bike trail north of SR 12W that is not part of the full build alternative, and the bike trail would cross one wetland not directly affected by the full build alternative (W-183) and indirectly affect another wetland (W-184). In addition, Alternative C, Phase 1 could indirectly affect seven suitable habitat features totaling 0.26 acre of habitat for these species.

Table 3.3.5-5. Direct and Indirect Impacts on Vernal Pool Fairy and Tadpole Shrimp under Alternative C, Phase 1

Pool Identification Number	Direct Impact	Indirect Impact
W-45a-2 (Sheet 17)	0.16	
W-45-3 (Sheet 17)		0.02
W-63 (Sheet 8)	0.02	
W-151 (Sheet 6)	0.04	
W-156 (Sheet 4)	0.09	
W-177 (Sheet 5)		0.07
W-182 (Sheet 6)		0.01
W-183 (Sheet 6)	0.37	
W-184 (Sheet 6)		0.06
W-185 (Sheet 6)		0.05
W-186 (Sheet 6)		0.01
W-187 (Sheet 6)	0.01	
W-188 (Sheet 6)		0.04
W-189 (Sheet 6)	0.03	
Total impact (acres)	**1.45**	**0.26**
Total combined impact	**1.71**	

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Water Pollution Control Standard Specification measures pertaining to water pollution control program (SS Section 13-2), stormwater pollution prevention plan (SS Section 13-3), temporary soil stabilization (SS Section 13-5), temporary sediment control (SS Section 13-6), temporary linear sediment barriers (SS Section 13-10) mentioned in Section 3.3.2.1, the measure to construct a retaining wall south of SR 12E discussed in Section 3.3.2.4; and the measure below would address direct and indirect effects to vernal pool fairy shrimp and vernal pool tadpole shrimp under all alternatives.

Avoid and Minimize Potential Indirect Disturbance of Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat

- To the extent practicable, the Department and its contractors will initiate all work in or within 250 feet of potential habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp
- between May 1 and November 1. When construction activities must take place after November 1 and before May 1, daily biological monitoring by a USFWS-approved biological monitor will occur within 250 feet of suitable habitat.
- To the extent practicable, incorporate design modifications to avoid direct permanent effects on potential habitat for federally listed branchiopods.
- The Department will avoid potential vernal pool fairy shrimp and vernal pool tadpole shrimp habitat, to the maximum extent practicable, during construction activities in temporary work areas. All potential vernal pool fairy shrimp and vernal pool tadpole shrimp habitat not directly affected will be designated as an ESA and protected with appropriate fencing and signage. All ESAs will be shown on the final construction drawings.
- The Department will perform all work in accordance with a SWPPP. BMPs will be implemented and may include the use of silt fences, sandbags, detention basins, and other means as appropriate to prevent erosion into any identified or potential, but not surveyed, habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp.

Compensate for Direct and Indirect Impacts on Vernal Pool Fairy Shrimp or Vernal Pool Tadpole Shrimp Habitat

The potential vernal pool fair shrimp and vernal pool tadpole shrimp habitat within the study area is within what is described in the draft Solano HCP as having a low conservation value. The Department will compensate for the effects to vernal pool habitat based on the conservation strategy in the draft Solano HCP as follows:

Table 3.3.5-6. Vernal Pool Fairy Shrimp and Vernal Pool Tadpoles Shrimp Compensation

Type of Effect	Compensation Ratio	Type of Compensation
Direct	1:1	Preservation of vernal pool and swale habitat
Direct	1:1	Restoration of vernal pool and swale habitat
Indirect	1:1	Preservation of vernal pool and swale habitat

The above compensation through preservation and restoration will be implemented no later than sixty (60) calendar days prior to the date of initial ground disturbance of the specific construction packages.

Preservation and restoration for adverse effects to Low Value Conservation Areas shall occur within Medium to High Value Conservation Areas identified in the draft Solano HCP. The location of the compensation will be submitted for USFWS approval. Preservation and restoration ratios reflected above are based on the premise that effects to low value conservation areas will be compensated in medium to high value areas.

The Department will provide a Funding Assurance Letter stating that sufficient funds for habitat compensation have been budgeted in the Phase 1 Project Expenditure Authorization. The Funding Assurance Letter will be signed by the District Deputy Director of Project Management and the District Deputy Director of Environmental Planning and Engineering.

3.3.5.5 Valley Elderberry Longhorn Beetle (VELB)

VELB is federally listed as a threatened species (45 FR 52803). This species was first described in 1921 from specimens collected in Sacramento (U.S. Fish and Wildlife Service 1984). On February 14, 2007, USFWS completed a 5-year review recommending the species be delisted. However, a delisting proposal has not yet been released. The species' range extends throughout the associated foothills of the Central Valley in California, from Kern County in the south to Shasta County in the north (Jones & Stokes Associates 1985, 1986, 1987).

VELB is closely associated with elderberry, the host plant for beetle larvae. Elderberry is considered a typical riparian shrub (Roberts et al. 1977; Katibah et al. 1984; Warner 1984) in California. Blue elderberry is a hardy shrub that successfully grows in a variety of riparian habitat types. In a study of Sacramento Valley riparian vegetation, Conard et al. (1977) found that elderberry grows mainly at an intermediate elevation in the floodplain, in association with box elder and buttonbush. Where a source of water exists, elderberry shrubs grow in nonriparian habitats. However, most VELB occurrences are known from elderberry shrubs in or adjacent to riparian communities.

Affected Environment

Information on all elderberry shrubs in the study area is provided below in Table 3.3.5-7. Effects on VELB by alternative are discussed in the Environmental Consequences section.

Table 3.3.5-7. Summary of Stem Counts for All Elderberry Shrubs In the Study Area

Shrub	Presence of Exit Holes?	Riparian Habitat?	Number of Stems (by Diameter)			Comments
			One to Three Inches	Three to Five Inches	More than Five Inches	
1	No	No	3	4	1	South side of SR 12, northwest of I-80; clump with very old stems
2	Yes	No	2	1	1	North side of SR 12, northwest of I-80
3	Yes, old hole	No	0	0	1	North side of SR 12W, northwest of I-80; very large tree
4	No	No	3	1	1	North side of SR 12W, northwest of I-80; one shrub with several stems
5	No	No	2	1	2	North side of SR 12W, northwest of I-80
6	No	No	0	1	1	North side of SR 12W, northwest of I-80; small tree
7	No	Yes	2	0	1	South side of SR 12W, near a homeless encampment; small tree
8	No	Yes	0	0	3	South side of SR 12W
9	No	Yes	0	4	2	South side of SR 12W; clump is three meters in diameter
10	No	Yes	0	2	1	South side of SR 12W
11	No	Yes	3	2	2	North side of I-80 along frontage road; short shrub on roadside
12	No	Yes	15	0	0	North side of I-80 along frontage road; ~100 stems that are less than one inch
13	No	Yes	2	1	4	On Green Valley Road; large shrub in urban area, evidence of pruning
14	No	Yes	2	1	2	On Green Valley Road
15	No	Yes	2	0	0	On Green Valley Road
16	No	Yes	4	0	0	Numerous smaller stems that are almost one inch
17	No	Yes	1	0	0	New growth, with stems almost one inch
18	No	Yes	0	0	0	Abundant new growth from this year, and many stems may be 1 inch by end of growing season
19	No	Yes	0	0	0	Abundant new growth from this year, and many stems may be 1 inch by end of growing season
20	No	Yes	2	0	0	One large clump of stems and another smaller clump very close; many stems are almost one inch
21	No	Yes	1	0	0	Large shrub with numerous smaller stems that are almost one inch
22	No	Yes	0	0	0	Small shrub farther upland from other shrubs; stems are very small and appear to be growing slowly
Overall total			**44**	**18**	**22**	

Twenty-two shrubs were identified in the study area. Locations of all the shrubs are shown in Figure 3.3-2a, 2b, 2c, 2d - Sheets 7, 17, 18, and 21 in Volume 2. Shrubs 1–15 were located during field surveys in 2007. Shrubs 16–22 were located on the east side of Dan Wilson Creek during field surveys in 2004 conducted for the City of Fairfield Corporate Commons EIR (RBF Consulting 2005). An exit hole was observed in Shrub 2 and an old exit hole was observed in Shrub 3 which would indicate the presence of VELB.

In 2004, the seven elderberry shrubs (shrubs 16-22) adjacent to Dan Wilson Creek appeared to have been cut back to the ground in the preceding couple of years, as evidenced by the large amount of new growth that appeared to be growing from existing parent material, as well as the presence of large remnants of cut elderberry stems. Although only a few of the living elderberry stems on the seven shrubs measured at least one inch in diameter at the time of the 2004 field surveys, these shrubs appeared to be growing rapidly, and a number of additional stems are likely to have attained a diameter of one inch or more by the end of the 2010 growing season and in subsequent growing seasons.

Alternative B

Under Alternative B, 12 elderberry shrubs were identified in the following three locations. The number and size of stems present on each shrub and riparian habitat associations for each shrub are listed in Table 3.3.5-7 and illustrated in Figure 3.3-2a in Volume 2.

- Along Green Valley Creek north of I-80 (Sheet17 and 18).
- Adjacent to the east side of Dan Wilson Creek (Sheet 21).
- Along the north and south sides of SR 12W in the vicinity of Jameson Canyon Creek in the project area (Sheet 7).

Alternative B, Phase 1

In the project area for Alternative B, Phase 1, one elderberry shrub was identified in one location along Green Valley Creek north of I-80 (Volume 2, Figure 3.3-2b, Sheet 18).

Alternative C

In the Alternative C study area, 11 elderberry shrubs were identified in three locations, as illustrated in Figure 3.3-2c in Volume 2.

- Along Green Valley Creek north of I-80 (Sheet 17).
- Adjacent to the east side of Dan Wilson Creek (Sheet 21).
- Along the north and south sides of SR 12W in the vicinity of Jameson Canyon (Sheet 7).

Alternative C, Phase 1

Twelve elderberry shrubs were identified including

- Ten shrubs along the north and south sides of SR 12W in the vicinity of Jameson Canyon Creek in the project area (Volume 2, Figure 3.3-2d, Sheet 7).
- Two shrubs along Neitzel Road near Green Valley Creek (Volume 2, Figure 3.3-2b, Sheet 18).

Environmental Consequences

Potential Loss of VELB Habitat Resulting from Construction

Both build alternatives would directly affect (by removal or transplanting) VELB habitat (elderberry shrubs) although Alternative B, Phase 1 would only indirectly affect elderberry

shrubs. These conclusions are consistent with a **"may affect, likely to adversely affect"** determination that would occur under the Section 7 FESA process.

Possible indirect effects on VELB potentially occurring within 100 feet of the construction work area include increases in dust accumulation on shrubs from ground-disturbing activities and removal of associated woodland species. Tree and shrub removal activities within the study area would be minimized and would involve only the removal of trees and shrubs necessary to construct the proposed project; however, ground-disturbing activities occurring within 100 feet of an elderberry shrub could cause an accumulation of dust on elderberry shrubs, altering VELB habitat. Although implementation of the build alternatives would not change the hydrology of the existing habitat, excavation and grading in the vicinity of an elderberry shrub could damage the root system, resulting in death of the shrub.

Construction activities associated with Alternative B would directly affect 11 elderberry shrubs, as listed in Table 3.3.5-8. Shrub 16 is more than 20 feet but less than 100 feet from proposed construction activities for Alternative B, and could be indirectly affected by construction.

Table 3.3.5-8. Summary of Elderberry Shrub Effects under Alternative B

Shrub	Presence of Exit Holes?	Riparian Habitat?	Number of Stems (by Diameter)			Effect on Shrub (None, Direct, or Indirect)
			One to Three Inches	Three to Five Inches	More than Five Inches	
1	No	No	3	4	1	Direct
2	Yes	No	2	1	1	Direct
3	Yes, old hole	No	0	0	1	Direct
4	No	No	3	1	1	Direct
5	No	No	2	1	2	Direct
6	No	No	0	1	1	Direct
7	No	Yes	2	0	1	Direct
8	No	Yes	0	0	3	Direct
9	No	Yes	0	4	2	Direct
10	No	Yes	0	2	1	Direct
11	No	Yes	3	2	2	Direct
16	No	Yes	4	0	0	Indirect
Indirect total			4	0	0	
Direct total			15	16	16	
Overall total			**19**	**16**	**16**	

Alternative B, Phase 1 would directly affect one shrub during construction, as listed in Table 3.3.5-9. Alternative B, Phase 1 would not indirectly affect any shrubs.

Table 3.3.5-9. Summary of Elderberry Shrub Effects under Alternative B, Phase 1

Shrub	Presence of Exit Holes?	Riparian Habitat?	Number of Stems (by Diameter)			Effect on Shrub (None, Direct, or Indirect)
			One to Three Inches	Three to Five Inches	More than Five Inches	
11	No	Yes	3	2	2	Direct
Indirect totals			0	0	0	
Direct totals			3	2	2	
Overall totals			**3**	**2**	**2**	

Alternative C would directly affect ten shrubs, as listed in Table 3.3.5-10. Shrub 16 is more than 20 feet and less than 100 feet from, proposed construction activities for Alternative C, and could be indirectly affected by construction.

Table 3.3.5-10. Summary of Elderberry Shrub Effects under Alternative C

Shrub	Presence of Exit Holes?	Riparian Habitat?	Number of Stems (by Diameter)			Effect on Shrub (None, Direct, or Indirect)
			One to Three Inches	Three to Five Inches	More than Five Inches	
1	No	No	3	4	1	Direct
2	Yes	No	2	1	1	Direct
3	Yes, old hole	No	0	0	1	Direct
4	No	No	3	1	1	Direct
5	No	No	2	1	2	Direct
6	No	No	0	1	1	Direct
7	No	Yes	2	0	1	Direct
8	No	Yes	0	0	3	Direct
9	No	Yes	0	4	2	Direct
10	No	Yes	0	2	1	Direct
16	No	Yes	4	0	0	Indirect
Indirect totals			4	0	0	
Direct totals			12	14	14	
Overall totals			**16**	**14**	**14**	

Alternative C, Phase 1 would directly affect shrubs 1–10 during construction, as listed in Table 3.3.5-11. Construction could indirectly affect shrubs 11 and 12 which are within 100 feet of construction along Neitzel Road.

Table 3.3.5-11. Summary of Elderberry Shrub Effects under Alternative C, Phase 1

Shrub	Presence of Exit Holes?	Riparian Habitat?	Number of Stems (by Diameter)			Effect on Shrub (None, Direct, or Indirect)
			One to Three Inches	Three to Five Inches	More than Five Inches	
1	No	No	3	4	1	Direct
2	Yes	No	2	1	1	Direct
3	Yes, old hole	No	0	0	1	Direct
4	No	No	3	1	1	Direct
5	No	No	2	1	2	Direct
6	No	No	0	1	1	Direct
7	No	Yes	2	0	1	Direct
8	No	Yes	0	0	3	Direct
9	No	Yes	0	4	2	Direct
10	No	Yes	0	2	1	Direct
11	No	Yes	3	2	2	Indirect
12	No	Yes	15	0	0	Indirect
Indirect total			18	2	2	
Direct total			12	14	14	
Overall total			**30**	**16**	**16**	

Under the No-Build Alternative, no construction activities would occur, and no impacts on VELB or its habitat would occur.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08) and the measure below would address direct and indirect effects to VELB under all alternatives.

Minimize Direct and Indirect Effects on VELB

For the compensation measure below, minimization ratio tables are provided specific to each build alternative.

- The direct and indirect effects on VELB will be minimized by transplanting directly affected shrubs, as well as providing supplemental plantings to ensure there is an abundance of host plants for VELB. The Department and STA will work with the Solano County Resource Conservation District or a USFWS-approved bank to facilitate the plant removal and transplanting effort. Transplantation of all elderberry shrubs that are within the construction footprint will be done prior to ground-disturbing activities within 100 feet of the shrubs and will be conducted according to the USFWS's 1999 Conservation Guidelines for the Valley Elderberry Longhorn Beetle. A USFWS-approved biologist will be on-site to monitor the transplanting of the elderberry plants.
- Install ESA-type fencing and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved by USFWS, the fencing will provide a minimum 20-foot setback from the drip line of each elderberry plant.

- Provide contractors with training educating them on the status of VELB and its host plant and emphasizing the need to avoid damaging elderberry plants.
- Dust control measures will be implemented for all ground-disturbing activities in the project area. These measures may include application of water to graded and disturbed areas that are unvegetated. To avoid attracting Argentine ants, at no time will water be sprayed within the driplines of elderberry shrubs.
- Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction.
- Restore, to the maximum extent practicable, any damage or disturbance to the buffer area (areas within 100 feet of elderberry plants) during construction. Provide erosion control and revegetate with appropriate native plants.
- Prohibit use of insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant in the buffer areas or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or more in diameter at ground level.

Compensate for Direct Effects on Valley Elderberry Longhorn Beetle Habitat

Project areas will be resurveyed for elderberry shrubs prior to construction.

The Department would implement one of the following:

1. Provide replacement plantings and associated native plantings as described in Table 3.3.5-12 at a USFWS-approved location.
2. Purchase valley elderberry longhorn beetle credits from a USFWS-approved conservation
2. bank.

Table 3.3.5-12. USFWS-Approved Compensation Ratios for VELB Habitat

Location	Stems (diameter in inches at ground level)	Exit Holes?	Elderberry Seedling Ratio	Associated Native Plant Ratio[a]
Nonriparian	1–3	No: Yes:	1:1 2:1	1:1 2:1
Nonriparian	3–5	No: Yes:	2:1 4:1	1:1 2:1
Nonriparian	≥5	No: Yes:	3:1 6:1	1:1 2:1
Riparian	1–3	No: Yes:	2:1 4:1	1:1 2:1
Riparian	3–5	No: Yes:	3:1 6:1	1:1 2:1
Riparian	>5	No: Yes:	4:1 8:1	1:1 2:1

[a] Ratio of native trees/plants to each elderberry seedling.

Alternative B

The minimum numbers of elderberry cuttings or seedlings and native plants required to compensate for effects under Alternative B are provided in Table 3.3.5-13.

Table 3.3.5-13. Affected Elderberry Plant Minimization Ratios Based on Location, Stem Diameter, and Presence of Exit Holes under Alternative B

Location	Stems	Holes	Number of Stems	Elderberry Ratios (multiply number of stems by)	Elderberry Planting	Associated Native Planting	Native Ratios
Non-riparian	≥ 1 inch and ≤ 3 inches	No	8	1	8	8	1
		Yes	2	2	4	8	2
Non-riparian	> 3 inches and < 5 inches	No	7	2	14	14	1
		Yes	1	4	4	8	2
Non-riparian	≥ 5 inches	No	5	3	15	15	1
		Yes	2	6	12	24	2
Riparian	≥ 1 inch and ≤ 3 inches	No	5	2	10	10	1
		Yes	0	4	0	0	2
Riparian	> 3 inches and < 5 inches	No	8	3	24	24	1
		Yes	0	6	0	0	2
Riparian	≥ 5 inches	No	9	4	36	36	1
		Yes	0	8	0	0	2
Totals			**47**		**127**	**147**	
Total acres needed for compensation				**1.13**			

Alternative B, Phase 1

The minimum numbers of elderberry cuttings or seedlings and native plants required to compensate for proposed project effects are provided in Table 3.3.5-14.

Table 3.3.5-14. Affected Elderberry Plant Minimization Ratios Based on Location, Stem Diameter, and Presence of Exit Holes under Alternative B, Phase 1

Location	Stems	Holes	Number of Stems	Elderberry Ratios (multiply number of stems by)	Elderberry Planting	Associated Native Planting	Native Ratios
Non-riparian	1–3	No	0	1	0	0	1
		Yes	0	2	0	0	2
Non-riparian	3–5	No	0	2	0	0	1
		Yes	0	4	0	0	2
Non-riparian	>5	No	0	3	0	0	1
		Yes	0	6	0	0	2
Riparian	1–3	No	3	2	6	6	1
		Yes	0	4	0	0	2
Riparian	3–5	No	2	3	6	6	1
		Yes	0	6	0	0	2
Riparian	>5	No	2	4	8	8	1
		Yes	0	8	0	0	2
Totals			**7**		**20**	**20**	
Total acres needed for compensation				**0.17**			

Alternative C

The minimum numbers of elderberry cuttings or seedlings and native plants required to compensate for proposed project effects under Alternative C are shown in Table 3.3.5-15.

Table 3.3.5-15. Affected Elderberry Plant Minimization Ratios Based on Location, Stem Diameter, and Presence of Exit Holes under Alternative C

Location	Stems (diameter in inches at ground level)	Holes	Number of Stems	Elderberry Ratios (multiply number of stems by)	Elderberry Planting	Associated Native Planting	Native Ratios
Non-riparian	1–3	No	8	1	8	8	1
		Yes	2	2	4	8	2
Non-riparian	3–5	No	7	2	14	14	1
		Yes	1	4	4	8	2
Non-riparian	>5	No	5	3	15	15	1
		Yes	2	6	12	24	2
Riparian	1–3	No	2	2	4	4	1
		Yes	0	4	0	0	2
Riparian	3–5	No	6	3	18	18	1
		Yes	0	6	0	0	2
Riparian	>5	No	7	4	28	28	1
		Yes	0	8	0	0	2
Totals			**40**		**107**	**127**	
Total acres needed for compensation				**0.97**			

Alternative C, Phase 1

The minimum numbers of elderberry cuttings or seedlings and native plants required to compensate for effects under Alternative C, Phase 1 are provided in Table 3.3.5-16.

Table 3.3.5-16. Affected Elderberry Plant Minimization Ratios Based on Location, Stem Diameter, and Presence of Exit Holes under Alternative C, Phase 1

Location	Stems	Holes	Number of Stems	Elderberry Ratios (multiply number of stems by)	Elderberry Planting	Associated Native Planting	Native Ratios
Non-riparian	1–3	No	8	1	8	8	1
		Yes	2	2	4	8	2
Non-riparian	3–5	No	7	2	14	14	1
		Yes	1	4	4	8	2
Non-riparian	>5	No	5	3	15	15	1
		Yes	2	6	12	24	2
Riparian	1–3	No	20	2	40	40	1
		Yes	0	4	0	0	2
Riparian	3–5	No	8	3	24	24	1
		Yes	0	6	0	0	2
Riparian	>5	No	9	4	36	36	1
		Yes	0	8	0	0	2
Totals			**62**		**157**	**177**	
Total acres needed for compensation				**0.97**			

3.3.5.6 California Red-Legged Frog

CRLF is federally listed as threatened and is a California species of special concern. USFWS published a recovery plan in 2002 (U.S. Fish and Wildlife Service, 2002) and published a final

rule to revise critical habitat for CRLF on March 17, 2010 (75 FR 12816). The BSA contains a portion of one recovery area, the Jameson Canyon-Lower Napa River Core Recovery Area, as well as portions two critical habitat Units (SOL-2 and SOL-3) (Figure 3.3-5).

Historically, CRLF was common from Redding to Baja California, including the Sierra Nevada and Coast Ranges. Its current range is much reduced, and most remaining populations are found in central California along the coast from Marin to Ventura Counties.

CRLFs breed in lowland and foothill streams and wetlands, including livestock ponds (Jennings and Hayes 1994). They may also be found in upland habitats near breeding areas and along intermittent drainages connecting aquatic sites. Adults may take refuge during dry periods in rodent holes or leaf litter in riparian habitats. Although CRLFs typically remain near streams or ponds, recent studies in Santa Cruz suggest that they are capable of moving 1 mile or more in upland habitat or through ephemeral drainages (Bulger 1999).

Although CRLFs are found in ephemeral streams and ponds, populations cannot be maintained where all surface water disappears (Jennings and Hayes 1994). CRLFs are infrequent or absent in habitats where introduced aquatic predators such as green sunfish (*Lepomis cyanellus*), Louisianan red-swamp crayfish (*Procambarus clarkii*), and bullfrogs (*Rana catesbeiana*) are present (Hayes and Jennings 1986, 1988), probably because larval stages are susceptible to predation (Jennings and Hayes 1994).

The CNDDB lists 16 records from 1993 to 2006 for CRLF within a 5-mile radius of the BSA (California Natural Diversity Database 2010) (Figure 3.3-3b). The 16 records were all associated with aquatic breeding and dispersal habitat and included adults, juveniles, and tadpoles. Two recent records in the CNDDB—occurrences 660 and 820—are on the Mangels property north of SR 12W. Occurrence 660 is associated with the intermittent drainage containing small plunge pools surrounded by grasslands adjacent to the BSA, and occurrence 820 is in the large perennial pond on the Mangels property. The remaining 14 records are from 2–5 miles west and south of the BSA at the SR 12/I-80/I-680 interchange (Figure 3.3-3b). These occurrences are 1602, 896, 228, 403, 402, 77, 290, 237, 416, 289, 917, 950, 857, and 306.).

Affected Environment

Monk & Associates (2003 and 2004) conducted site assessments and protocol-level surveys for CRLF in several locations within the current BSA. These assessments and surveys examined ponds, seasonal wetlands, and seasonal drainages on the Mangels property north of SR 12W, Jameson Canyon Creek, Dan Wilson Creek, and Suisun Creek. Monk & Associates found CRLF tadpoles in the pond just north of W-150 and a CRLF adult in an intermittent drainage (OW-161, which includes W-177 and W-178 on the Mangels property) (Figure 3.3-4, Sheet 5).

ICF conducted a CRLF site assessment in 2007 using aerial images and, where accessible, site visits within 1 mile of the construction footprint (ICF Jones & Stokes 2009a). The site assessment was submitted to USFWS for review on March 3, 2009. The biologists assessed habitat suitability at 17 sites within the BSA, including one creek and 14 ponds within the CRLF study area. No CRLFs were observed during the site assessment surveys.

Aquatic habitat includes creeks, ponds, marshes, and seasonal drainages which may not all be suitable for breeding but may be used for other essential behaviors including foraging, dispersing, and cover. Potential aquatic breeding habitat for CRLF is defined as still or slow-moving water more than 2.3 feet deep with emergent vegetation. The most suitable riparian vegetation is willow (*Salix* spp.), although cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.) can also provide potential habitat (Jennings 1988). Potential upland habitat is defined to include all alkali seasonal marsh, woodlands, annual grassland, riparian woodland, upland scrub, and seasonal wetlands that are too shallow and ephemeral to provide aquatic habitat (Figure 3.3-4). Cultivated lands and developed lands do not provide potential CRLF upland habitat.

Upland habitat was defined as suitable if it was within one mile of aquatic habitat and there were no substantial barriers to CRLF movement including heavily traveled roads, development, and railroads. Suitable upland habitat includes all alkali seasonal marsh, woodlands, annual grassland, riparian woodland, upland scrub, and seasonal wetlands that were too shallow and ephemeral to provide aquatic habitat.

In an email dated July 15, 2010, USFWS contract biologist John Cleckler informed STA that USFWS considers all undeveloped habitat north of I-80 as potential CRLF habitat, comprising potential upland and aquatic (breeding and non-breeding) habitats. USFWS also stated they consider the Jameson Canyon Creek location south of I-80 (OW-8 on Figure 3.3-4, Sheet 9) as potential CRLF aquatic habitat. Mr. Cleckler stated that effects on CRLF aquatic and upland habitat at this location would likely be offset by the benefit to the species from bridging the creek. USFWS also stated that several areas considered not to be potential CRLF habitat in the 2007 CRLF site assessment conducted by ICF should be considered potential: Jameson Canyon Creek in two locations (OW-8a and OW-8) and upland habitat between the creek and I-80 (Figure 3.3-4, Sheets 3 and 7).

Alternative B

Suitable aquatic habitat for CRLF occurs in the following locations of the Alternative B study area (Volume 2, Figure 3.3-4a).

- The perennial marsh mitigation area east of Green Valley Creek (W-45e-1) (Sheets 17 and 18)
- Perennial marsh (W-150) (Sheet 5)
- Four locations in Jameson Canyon Creek, including OW-8a upstream from Red Top Road, OW-8 at I-80, OW-8 upstream from I-680, and at I-80 (Sheets 4, 7)
- OW-8 tributaries (OW-8a, OW-8b, OW-8d) (Sheets 4, 7)
- Mangels pond (Sheet 5)
- Drainages 177 and 178, the unnamed drainage north of SR 12W (OW-161) (Sheet 5)
- Green Valley Creek (W-45) (Sheets 17, 18)
- Dan Wilson Creek (W-53 and OW-53) (Sheet 21)
- Suisun Creek (OW-56) (Sheet 22)

The portion of the study area in the realignment for Red Top Road north of SR 12W is within critical habitat for CRLF.

Alternative B, Phase 1

There are five locations for CRLF aquatic habitat under Alternative B, Phase 1: Green Valley Creek (W-45), an adjacent perennial marsh (W-45e-1), and Jameson Canyon Creek (OW-8) at I-80, and Dan Wilson Creek (W-53 and OW-53), (Volume 2, Figure 3.3-4b, Sheets 7, 17, 18, and 21).

There is no critical habitat for CRLF in the footprint of this alternative.

Alternative C

Suitable habitat under Alternative C is the same as that described above for Alternative B except for two locations on Jameson Canyon Creek, Jameson Canyon Creek upstream of I-680 is in Alternative C study area but will not be affected by the proposed action because the freeway will be elevated at this location. In addition, there will be no effect from Alternative C on the Jameson Canyon Creek crossing at Red Top Road.

Alternative C, Phase 1

Suitable aquatic habitat for CRLF occurs in the following locations of the Alternative C, Phase 1 study area (Volume 2, Figure 3.3-4d).

- A perennial marsh north of SR 12W (W-150) (Sheet 5).
- Seasonal drainages south of SR 12-W (OW-8b and OW-8d) (Sheet 3).
- A seasonal drainage (OW-161) (Sheet 5).
- Mangels pond (Sheet 5).
- Seasonal wetlands (W-177 and W-178) (Sheet 5).
- Green Valley Creek (W-45) (Sheets 17 and 18).
- Perennial marsh (W-45e-1) (Sheets 17 and 18).
- Jameson Canyon Creek in 3 locations (OW-8a, OW-8, and OW-8) (Sheet 4, 7, and 9).

Of the noted aquatic habitat locations only perennial marshes (W-150 and W-45e-1) and Mangels pond provide potential breeding habitat based on the presence of water of a duration that is long enough to support CRLF breeding.

The portion of the study area in the realignment for Red Top Road north of SR 12W is within critical habitat for CRLF (Figure 3.3-5).

Environmental Consequences

Potential Loss of CRLF and its Habitat Resulting from Construction

Both build alternatives could result in temporary and permanent effects to CRLF and its habitat from construction. In addition, both build alternatives are likely to adversely affect CRLF critical

habitat. The USFWS has determined that the project **"may affect, likely to adversely affect"** CRLF under the Section 7 FESA process. Construction activities associated with road construction and bridge widening in potential CRLF habitat in the project area could result in indirect effects on water quality downstream from the construction work area. Increased sedimentation could reduce the suitability of CRLF habitat downstream of the construction area by filling in pools and smothering eggs. Accidental spills of toxic fluids also could result in the subsequent mortality of CRLFs if these substances flow downstream from the construction area and CRLFs are present. Under Alternative B, Alternative C, and Alternative C, Phase 1, construction of the project would fill in a portion of a drainage (OW-161) that is upstream from CRLF occurrences (W-177 and W-178) (Volume 2, Figures 3.3-4a, Sheet 5; 3.3-4c, Sheet 5; and 3.3-4d, Sheet 5).

Under the No-Build Alternative, no construction activities would occur, and no impacts on CRLF or its habitat would occur.

Alternative B

Construction of Alternative B would result in both temporary disturbance and permanent loss of both aquatic and upland habitat for CRLF in the following locations within the project footprint (Volume 2, Figure 3.3-4a).

- The perennial marsh mitigation area east of Green Valley Creek (W-45e-1) (Sheets 17 and 18), for a new off-ramp from westbound I-80 to Green Valley Road.
- Perennial marsh (W-150) (Sheet 5) for road widening on SR 12W.
- Replacement and lengthening of culverts in Jameson Canyon Creek (OW-8) (Sheet 7) and its tributaries (OW-8a, OW-8b) (Sheets 3 and 4) for the realignment of Red Top Road and construction of on- and off-ramps for SR 12W.
- Widening of SR 12W and construction of westbound on- and off-ramps for SR 12W (OW-8d) (Sheets 3 and 4).
- Grading and culverting of the unnamed drainage within the extension of Red Top Road north of SR 12W (OW-161) (Sheet 5).
- Green Valley Creek for the Green Valley Creek bridge (W-45) (Sheets 17 and 18).
- Removal and replacement of the bridge over Dan Wilson Creek (W-53 and OW-53) (Sheet 21)).
- Suisun Creek for the widening of I-80 (OW-56) (Sheet 22).

Construction within the potential CRLF sites identified above would result in the temporary disturbance of 2.16 acres and the permanent loss of 2.11 acres of potential CRLF aquatic habitat. Additionally, Alternative B would result in the loss of 109.23 acres and temporary disturbance of 37.58 acres of upland habitat within one mile of suitable aquatic habitat. Most of this habitat occurs within a highly disturbed area along I-80/I-680/SR 12W and SR 12E.

Construction in the portion of the study area in the extension of Red Top Road north of SR 12W is within critical habitat for CRLF (Volume 2, Figure 3.3-4a, Sheets 4–7). Approximately 18.24

acres of critical habitat would be permanently affected and 1.98 acres would be temporarily affected by construction. In addition, the new road would reduce migration opportunities and increase mortality for CRLF for the approximately 65 acres of critical habitat surrounding Mangels pond. There will be an undercrossing paralleling the creek to allow cattle access. Although this undercrossing will provide a movement corridor, because CRLFs do not travel in straightline movements, there could still be substantial mortality from the new road. CRLFs could be directly affected by construction activities occurring in or adjacent to all of the locations described above. If CRLFs are present within the construction work area, they could be inadvertently killed or wounded by construction vehicles, construction personnel, and accidental spill of toxic fluids (e.g., gasoline and other petroleum-based products). If CRLFs must be captured and relocated outside the construction work area, they could be exposed to increased risks of disease, predation, and competition that could result in increased mortality.

Alternative B, Phase 1

Construction of Alternative B, Phase 1 would affect CRLF aquatic habitat in the three locations described above in the affected environment (Volume 2, Figure 3.3-4b).

Potential upland habitat occurs within one mile of the aquatic habitat (Volume 2, Figure 3.3-4b, all sheets). Construction within the potential CRLF site identified above would result in the temporary disturbance of 0.96 acres and the permanent loss of 0.58 acre of potential CRLF aquatic habitat. Additionally, Alternative B, Phase 1 would result in the loss of 21.09 acres and temporary disturbance of 0.74 acres of upland habitat. This habitat occurs within a highly disturbed area along I-80/I-680/SR 12W and SR 12E.

Construction for this alternative would not affect critical habitat.

Construction effects under Alternative B, Phase 1 would be similar to those described for Alternative B.

Alternative C

Construction of Alternative C would result in temporary disturbance and permanent loss of both aquatic and upland habitat for CRLF in the following locations within the project footprint (Volume 2, Figure 3.3-4c).

- Perennial marsh (W-150) (Sheet 5) for road widening on SR 12W.
- Replacement and lengthening of culverts in Jameson Canyon Creek (OW-8) (Sheet 7) and its tributaries (OW-8a, OW-8b) (Sheets 3 and 4) for the realignment of Red Top Road and construction of on- and off-ramps for SR 12W.
- Widening of SR 12W and construction of westbound on- and off-ramps for SR 12W (W-8d) (Sheets 3 and 4).
- Grading and culverting of the unnamed drainage for the extension of Red Top Road north of SR 12W (OW-161) (Sheet 5).
- Green Valley Creek for the Green Valley Creek bridge (W-45) (Sheets 17 and 18).
- Removal and replacement of the bridge over Dan Wilson Creek (W-53 and OW-53) (Sheet 21).

- Suisun Creek for the widening of I-80 (OW-56) (Sheet 22).
- The perennial marsh mitigation area east of Green Valley Creek (W-45e-1) (Sheets 17 and 18) for a new off-ramp from westbound I-80 to Green Valley Road.

Construction in the potential CRLF sites identified above would result in the temporary disturbance of 1.25 acre and the permanent loss of 1.68 acres of potential CRLF aquatic habitat. Additionally, Alternative C would result in the loss of 142.63 acres and temporary disturbance of 12.99 acres of upland habitat for CRLF.

Construction on the extension of Red Top Road north of SR 12W would temporarily affect 0.13 acre and permanently affect 22.89 acres of critical habitat. In addition, approximately 65 acres of critical habitat would be isolated from critical habitat to the north of the road extension.

Construction effects under Alternative C would be similar to those described for Alternative B.

Alternative C, Phase 1

Construction of Alternative C, Phase 1 would result in project effects of CRLF habitat in the following locations within the project footprint (Volume 2, Figure 3.3-4d).

- Grading and culverting of the unnamed drainage for the extension of Red Top Road north of SR 12W (OW-161) (Sheet 5).
- Replacement and lengthening of culverts in Jameson Canyon Creek (OW-8) (Sheet 7) and its tributaries (OW-8a, OW-8b, W-8d) (Sheets 3 and 4) for the realignment of Red Top Road and construction of on- and off-ramps for SR 12W.
- Green Valley Creek (W-45) for the Green Valley Creek bridge (Sheets 17 and 18).

Construction in the potential CRLF habitat identified above would result in the temporary disturbance of 0 acres and the permanent loss of 2.86 acres of potential CRLF aquatic habitat. Additionally, Alternative C, Phase 1 would result in the loss of 78.48 acres and temporary disturbance of 19.32 acres of upland habitat. Most of this habitat occurs within a highly disturbed area along I-80/I-680/SR 12W and SR 12E.

Construction on the extension of Red Top Road north of SR 12W would temporarily affect 0.47 acres and permanently affect 22.38 acres of critical habitat. In addition, approximately 65 acres of critical habitat would be isolated from critical habitat to the north of the road extension.

Construction effects under Alternative C, Phase 1 would be similar to those described for Alternative B.

Indirect Effects from Habitat Fragmentation and Vehicle-Related Mortality

Potential indirect effects on CRLF are degradation of water quality from the installation of additional impervious surfaces, increased vehicle-related mortality, isolation of the aquatic breeding site at the Mangels property from upland dispersal and aestivation habitat, and hydrologic modification to the water source feeding the Mangels pond and perennial marsh (OW-150). These indirect effects are discussed below.

- Construction activities associated with road construction and bridge widening in potential CRLF habitat could result in indirect effects on water quality downstream from the construction work area. Increased sedimentation could reduce the suitability of CRLF habitat downstream of the construction area by filling in pools and smothering eggs. Accidental spills of toxic fluids also could result in the subsequent take of CRLF if these materials enter the aquatic system from the construction area. Hydrocarbon and heavy metal pollutants associated with roadside runoff also have the potential to enter the aquatic system, affecting water quality and CRLF.
- The proposed project is not expected to degrade water quality and will adhere to the provisions of the California Regional Water Quality Control Board 401 Certification and Basin Plan to treat nonpoint source pollutants associated with the increase in impervious surface area. Permanent treatment BMPs (such as biostrips and bioswales) will be incorporated into the project, along with a SWPPP and erosion control BMPs to minimize any potential indirect effects on downstream resources from sedimentation transport or point source pollutants resulting from construction activities in the study area. Through the use of the Department standard BMPs, there will be no anticipated degradation in water quality that would indirectly affect CRLF or potential CRLF habitat.
- Roads are known to affect amphibian populations through population isolation, habitat fragmentation, and vehicle mortality. Most of the effects of the proposed project on CRLF would occur through the modification of potential CRLF upland habitat adjacent to existing highways due to grade modification related to cut-and-fill limits. The Department and STA will revegetate these locations adjacent to the highway with the appropriate plant/seed mix to facilitate use by CRLF post construction. However, the proposed Business Center Drive extension (Figure 3.3-4, Sheets 2–8) crosses through critical habitat Units SOL-2 and SOL-3 (Figure 3.3-5) and may isolate an existing CRLF breeding pond on the Mangels property from upland dispersal habitat and designated critical habitat. While all areas, except those specifically converted to local roadway use, would still be available to CRLF, the placement of the local road at this site may result in the impediment to CRLFs dispersing northwest–southeast to and from the Mangels breeding pond.
- Highways that support in excess of 26 vehicles per hour from 10 p.m. to 4 a.m. have been found to constitute barriers to the dispersal of other amphibian species (U.S. Fish and Wildlife Service 2002). Traffic counts on the new local road would likely exceed 26 vehicles per hour from 10 p.m. to 4 a.m. based on traffic studies. CRLFs are likely to disperse to potential habitat west of the Mangels pond (Figure 3.3-4, Sheet 5), potentially resulting in increased mortality if frogs attempt to disperse across the proposed Business Center Drive extension. Construction of the new road would likely present a barrier to CRLF dispersal, with indirect effects due to increased vehicle-related mortality and habitat fragmentation.
- As a measure to minimize and avoid indirect effects and potential mortality of CRLF, the Department and STA have designed the Business Center Drive extension to include an oversized culvert, two large span undercrossings, and approximately 2.5 miles of directional fencing (Figure 3.3-8) to guide CRLFs to the undercrossing locations. These features are intended to facilitate dispersal of CRLFs under the Business Center Drive extension and to minimize mortality of CRLFs attempting to disperse across the road. Because this area of

Mangels property is somewhat hilly and will have large cuts and fills, additional culverts are not a practical solution.

- The proposed Business Center Drive extension will require large areas of earth moving to accommodate the cut-and-fill requirements for this local road. The Business Center Drive extension can be described in general terms as up-gradient from the Mangels pond. Large-scale earth movement could potentially modify the water table and groundwater depth in this vicinity. The Department and STA will ensure that the water source for this CRLF breeding pond is not altered. The Department and STA will conduct a hydrologic analysis of the Mangels property and the surrounding watershed to confirm the Mangels pond is fed by surface runoff and that the project will not significantly affect water quality and hydrology of the pond.
- STA has proposed utilizing the excess barrow material from the Business Center Drive extension as fill material for earlier construction packages. The first phase of construction is scheduled for 2012–2014, while the area of borrow material and construction is scheduled for 2018–2020. There will be a period of approximately 5 years that excavated areas will be idle before construction of the roadway for Business Center Drive extension actually occurs. Currently, the Department and STA are considering all the area within the cut-and-fill lines at the location of the Business Center Drive extension as permanent effects. Consequently, the impact analysis will not change.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08), the USFWS standardized avoidance and minimization efforts for CRLF, construction BMPs, and the compensatory mitigation identified below would minimize effects on CRLF and potential habitat that could occur in the vicinity of the aquatic and upland habitat locations identified in the study area.

Conduct Preconstruction Surveys and **Monitor Construction Occurring near Potential California Red-Legged Frog Habitat**

- No more than 20 working days prior to any ground disturbance that could reasonably affect CRLF, preconstruction CRLF surveys will be conducted by a USFWS-approved biologist. These surveys will include both day and nighttime surveys and include the project limits and adjacent areas accessible to the public to determine presence of the species. The USFWS-approved biologists will investigate potential CRLF cover sites. This includes full investigation of mammal burrows. The entrances will be collapsed following investigation.
- Wildlife exclusion fencing will be placed at the edge of active construction areas (cleared by biological surveys) to restrict wildlife access from the adjacent upland and riparian habitat. The fencing will consist of taut silt fabric: 24 inches high, staked at 10-foot intervals, with the bottom buried 6 inches below grade. The silt fencing will be maintained such that it is intact during rain events and 24 hours after any rain event.
- In addition to the silt fencing, the active construction area will be delineated with high-visibility temporary ESA-type fencing at least 4 feet in height, flagging, or other barrier to

prevent encroachment of construction personnel and equipment outside the described project footprint. Such fencing will be inspected and maintained daily by the onsite biologist until completion of the project. The fencing will be removed from areas only after all construction equipment is removed. No project activities will occur outside the delineated project construction area.

- The USFWS-approved biologist(s) shall perform a California red-legged frog clearance survey immediately prior to the initial ground disturbance. Safety permitting, the USFWS-approved biologist(s) will investigate areas of disturbed soil for signs of the listed species within 30 minutes following the initial disturbance of that given area.
- If a CRLF is encountered with the study area, the Department Resident Engineer will direct all work in the surrounding area to stop and the monitor will assess the situation to select a course of action that will minimize adverse effects to the individual and contact USFWS once the site is secure.
- CRLFs encountered that are not in danger will be left undisturbed and allowed to move out of the study area and hazardous situation on its own to a safe location. The animal should not be picked up and moved based on it not moving fast enough or an inconvenience for construction activities. This guidance only applies to situations where a California red-legged frog is encountered on the move during conditions that make their upland travel feasible. This does not apply to California red- legged frogs that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to support the life history of the California red- legged frog should the frogs move outside the immediate area.
- Any CRLFs encountered that are in danger will be relocated outside the silt fence within the same riparian area or watershed by the approved biological monitor. If relocation of the CRLF outside the fence is not feasible (i.e., there are too many frogs observed per day), the approved biological monitor will relocate frogs to a preapproved location determined by the Department and USFWS. Prior to construction, the Department will obtain approval of the relocation protocol from USFWS in the event that CRLFs are encountered and need to be relocated away from the immediate project area (Caltrans 2007b).
- USFWS-approved biologist(s) will be onsite during all activities that may result in take of a CRLF. The qualifications of the biologist(s) will be presented to USFWS for review and written approval prior to groundbreaking at the project site where the project could reasonably affect CRLF. The Resident Engineer will stop work at the request of the USFWS-approved biologist(s) if activities are identified that may result in take of a CRLF. Should the biologist(s) or Resident Engineer exercise this authority, USFWS will be notified by telephone and email within 1 working day. The USFWS contact will be the Coast-Bay Branch Chief in the Sacramento Fish and Wildlife Office at (916) 414-6600.
- The Resident Engineer will halt work immediately and contact the USFWS-approved project biologist and the USFWS in the event that a CRLF is found within the construction zone. The Resident Engineer will suspend all construction activities in the immediate construction zone until the animal leaves the site voluntarily or is removed by the biologist to a release site using USFWS-approved transportation techniques.
- A USFWS-approved biologist will conduct environmental education training for all construction employees working on ground-disturbing activities. The program will include

the following: a description of CRLF and its habitat needs, photographs of the species, an explanation of its legal status and protection under FESA, and a list of the measures that will be implemented to minimize and avoid potential effects on CRLF.

- Project employees will be provided with written guidance governing vehicle use, speed limits on unpaved roads, fire prevention, and other hazards.
- Project-related vehicles will observe a 20 mph speed limit within construction areas, except on county roads and state and federal highways; this is particularly important at night when CRLFs are most active.
- To the maximum extent practicable, nighttime construction will be minimized.
- To eliminate attracting predators of CRLF, all food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in closed containers and removed at least once a day from the entire project site.
- To avoid injury or death of CRLFs, no firearms will be allowed on the project site except for those carried by authorized security personnel or local, state, or federal law enforcement officials.
- To prevent harassment, injury, or mortality of CRLFs or destruction of their cover sites by dogs or cats, no canine or feline pets will be permitted in the active construction area.
- To the extent practicable, in areas, or adjacent to areas, of potential CRLF habitat, initial ground-disturbing activities will be avoided between November 1 and March 31 to avoid the period when CRLFs are most likely to be moving through upland areas. When ground-disturbing activities must take place between November 1 and March 31, daily monitoring will occur for CRLF.
- If requested through the Resident Engineer or Construction Inspector before, during, or upon completion of groundbreaking and construction activities, the Department will ensure that USFWS and/or its designated agents can, immediately and without delay, access and inspect the project site for compliance with the proposed project description, conservation measures, and terms and conditions of the BO, and to evaluate project effects on CRLF and their habitat.
- To prevent inadvertent entrapment of CRLFs during construction, all excavated, steep-walled holes or trenches more than 1 feet deep will be covered at the close of each working day with plywood or similar material, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the onsite biologist will immediately place escape ramps or other appropriate structures to allow the animal to escape, or USFWS will be contacted by telephone for guidance. USFWS will be notified of the incident by telephone and email within 1 working day.
- Plastic monofilament netting (erosion control matting) or similar material will not be used at the project site because CRLFs may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.
- Injured CRLFs will be cared for by a licensed veterinarian or other qualified person such as the onsite biologist; dead individuals of any listed species will be preserved according to

standard museum techniques and held in a secure location. USFWS will be notified within 1 working day of the discovery of death or injury to a listed species that results from project-related activities or is observed at the project site. Notification will include the date, time, and location of the incident or of the finding of a dead or injured animal clearly indicated on a USGS 7.5-minute quadrangle and other maps at a finer scale, as requested by USFWS, and any other pertinent information. Dead individual animals will be placed in a sealed plastic bag with a piece of paper containing information on where and when the animal was found along with the name of the person who found it, the bag will be frozen in a freezer located in a secure location until instructions are received from USFWS regarding the disposition of the specimen or USFWS takes custody of the specimen. The USFWS contacts are the Division Chief of the Endangered Species Program in the Sacramento Fish and Wildlife Office at (916) 414-6600 and the Resident Agent-in-Charge of USFWS's Law Enforcement Division at (916) 414-6660.

- For onsite storage of pipes and conduits and other materials that could provide shelter for California red-legged frogs, an open-top trailer will be used to elevate the materials above ground. This is intended to reduce the potential for animals to climb into the conduits and other materials.
- Construction crews shall review the dewatering plan prior to any in-stream work within the bed and banks that requires the construction of coffer dams and/or dewatering.
- If pumping is used for dewatering, intakes shall be completely screened with wire mesh no larger than 0.2 inch to prevent frogs from entering the pump.
- Removal of vegetation shall be accomplished by a progressive cutting of vegetation from the overstory level to the ground level to allow California red-legged frogs more opportunity move out of the work area under their own volition. Vegetation shall be cleared only where necessary and will be cut approximately 4 inches above soil level except in areas that will be excavated for roadway construction. This is intended to encourage plants that reproduce vegetatively to resprout after construction. All clearing and grubbing of woody vegetation shall be done using hand tools, small mechanical tools, or backhoes and excavators. All cleared vegetation shall be removed from the project footprint to prevent attracting animals to the project site.
- Materials left onsite overnight will be inspected for CRLF. All construction pipes, culverts, or similar structures; construction equipment; or construction debris left overnight in areas that may be occupied by CRLF will be inspected by the USFWS-approved biological monitor prior to the beginning of each day's activities.
- Use of rodenticides and herbicides will be utilized in such a manner to prevent primary or secondary poisoning of listed species and depletion of prey populations on which they depend. All uses of such compounds will observe label and other restrictions mandated by EPA, the California Department of Pesticide Regulation, and other appropriate state and federal regulations, as well as additional project-related restrictions deemed necessary by USFWS or the California Department of Fish and Game.
- The USFWS-approved biologist(s) shall permanently remove, from the project site, any aquatic exotic wildlife species, such as bullfrogs and crayfish, to the extent possible.

- Following construction, temporarily disturbed areas will be restored to preproject conditions or enhanced to compensate for the removal of vegetation.

Compensate for Loss and Disturbance of California Red-Legged Frog Habitat

The Department will compensate for harm resulting from adverse effects on the California red-legged frog and its habitat, and the adverse effects critical habitat for the California red-legged frog by providing appropriate habitat compensation.

The compensation will be based on the amount of permanent and temporary loss of red-legged frog habitat (Table 3.3.5-17). Temporary habitat loss will be compensated at rates based on the amount of time it takes to restore the habitat to baseline conditions following the date of initial habitat disturbance and whether the restored habitat will be subjected to ongoing Department routine maintenance activities, e.g., mowing, that may affect the species.

Table 3.3.5-17. California Red-legged Frog Compensation

Level of Effect	Location of Disturbance	Duration[a]	Compensation Ratio
Permanent	Within or beyond maintained ROW	Permanent	3:1
	Within maintained ROW and excluded by directional fence	Permanent	2:1
Temporary	Within the maintained ROW	Within 1 year	1:1 onsite 1:1 offsite
	Beyond the maintained ROW	Within 1 year	1:1 onsite 0.5:1 offsite
	Within the maintained ROW	Within 2 year	1:1 onsite 1.5:1 offsite
	Beyond the maintained ROW	Within 2 year	1:1 onsite 1:1 offsite
	Within or beyond maintained ROW	Greater than 2 years	3:1 onsite OR 2:1 offsite AND 1:1 onsite

[a] period of time from the date of initial ground disturbance until the success criteria described in the restoration/revegetation plan are met.

The maintained ROW is defined as the ROW between the edge of pavement or denuded road shoulder and the Department ROW fence. Permanent effects will occur in areas of maintained ROW that include barriers to frog movement. Areas of ROW within and adjacent to retaining walls will be permanently affected by the project. The Department commits to installing a USFWS-approved frog barrier fence along the proposed Business Center Drive Extension from the existing Business Center Drive to Jameson Canyon Road in order to direct California red-legged frogs to the three proposed undercrossings. Since the barrier fence will likely prevent individuals of this threatened species from entering the maintained ROW, the entirety of the ROW within this area will be permanently affected by the proposed project. However, less compensation is necessary as the directional fence also results in a beneficial effect to California red-legged frogs by directing them to safe undercrossings. Off-site compensation is proposed to offset temporary impacts within the maintained ROW since habitat will continue to be impacted by on-going routine maintenance activities, e.g., mowing. Lastly, additional off-site compensation is necessary for temporal loss of habitat.

Compensation implemented within areas that are both California red-legged frog habitat and callippe silverspot butterfly habitat may be overlaid on common acreage as long as the area is appropriate habitat for each species. With USFWS approval, the conservation lands would receive compensation credit from the USFWS for both species.

Compensation will be implemented with in-perpetuity preservation of California red-legged frog habitat with high conservation values, consistent with the parameters described in the Draft Solano HCP (SCWA 2009) within sixty (60) calendar days prior to the date of initial ground disturbance at the project.

California red-legged frog habitat used for conservation will be: (1) preferably located within the California Red-Legged Frog Conservation Area defined in the Draft Solano HCP (SCWA 2009), (2) within 0.7 mile of unobstructed California red-legged frog breeding habitat and non-breeding aquatic habitats, (3) within a California red-legged frog critical habitat unit or within the vicinity of frog critical habitat, and (4) approval by USFWS.

The Department will provide a Funding Assurance Letter stating that sufficient funds for habitat compensation have been budgeted in the Phase 1 Project Expenditure Authorization. The Funding Assurance Letter will be signed by the District Deputy Director of Project Management and the District Deputy Director of Environmental Planning and Engineering.

3.3.5.7 California Tiger Salamander

The central population of CTS was federally listed as threatened on August 4, 2004 (69 FR 47212–47248). Distinct population segments in Santa Barbara and Sonoma Counties are federally listed as endangered (U.S. Fish and Wildlife Service 2005). CTS is also listed as threatened under the California Endangered Species Act.

The species is endemic to the San Joaquin–Sacramento River valleys, bordering foothills, and coastal valleys of central California (Barry and Shaffer 1994). The species' range is from Sonoma County and the Colusa-Yolo County line south to Santa Barbara County in the Coast Ranges, and from southern Sacramento County south to Tulare County in the Central Valley (Jennings and Hayes 1994).

CTS is a lowland species restricted to grasslands and low foothill regions where its breeding habitat occurs. CTSs inhabit both aquatic and terrestrial habitats at different stages in their life cycle. Although the larval salamanders develop in vernal pools and ponds in which they were born, they are otherwise terrestrial and spend most of their lives in widely dispersed underground retreats (Trenham et al. 2001). Juveniles and adults spend the dry summer and fall months of the year in burrows of small mammals, such as California ground squirrels and pocket gophers; they may also use leaf litter or desiccation cracks in soil as refugia (Storer 1925; Loredo and Van Duren 1996; Loredo et al. 1996; Alvarez pers. comm.).

Adults move from subterranean burrow sites to breeding pools from November through February, after warm winter and spring rains (Jennings and Hayes 1994). Breeding habitat consists of temporary ponds or pools, slower portions of streams, and some permanent waters (Stebbins 2003). Permanent aquatic sites are unlikely to be used for breeding unless they lack

fish predators (Jennings and Hayes 1994). Typically, 3–6 months are needed to complete development through metamorphosis (Petranka 1998).

CTSs are known to travel large distances from breeding ponds into upland habitats. They have been observed in upland habitat approximately 0.75 mile from the nearest breeding pond (Ibis Environmental 2007). Although CTSs can travel relatively long distances, they are typically found closer to breeding ponds.

In studies at Olcott Lake and through population modeling, Trenham and Shaffer (2005) suggested a minimum protected upland area of at least 2,100 feet around a single breeding site, or approximately 328 acres. The results of this study showed increased potential for local extirpations with increasing upland loss because of reduced salamander abundance (e.g., individuals lost to the potential breeding population inhabiting lost uplands). It is also important to note that CTSs disperse in straight lines and so any barriers within the uplands surrounding potential breeding habitat can effectively eliminate the upland habitat beyond the barrier as available to the salamanders (Shaffer and Searcy 2007).

There are no known occurrences of CTS within the BSA or project footprint. There is one historic record approximately 1 mile northeast of the BSA on the north side of SR 12E and Suisun City (Figure 3.3-9). Dr. Arthur Shapiro, professor at U.C. Davis, observed CTS larvae in aquatic habitat at this location. Dr. Shapiro does not remember the year, but estimates it to have been from the late 1970s or early 1980s (Searcy pers. comm.). This sighting was not recorded in the CNDDB. Dr. Brad Shaffer and Mr. Searcy (Searcy pers. comm.) subsequently visited the site in 2008 and believed CTS to be extirpated at this location because the breeding site is no longer extant.

The nearest known occupied habitat is approximately 5 miles southeast of the BSA where there are several records for CTS from 1999 to 2006 in the Potrero Hills (California Natural Diversity Database 2011). As reported in the Vollmar study (Vollmar Consulting 2010), the Potrero Hills area is one of four areas that represent geographically distinct concentrations of documented CTS breeding occurrences that are both sufficiently isolated to limit breeding exchange and are also separated by apparent movement barriers or restrictions that would limit regular breeding exchange. Dispersal between the BSA and the nearest occupied CTS habitat in the Potrero Hills area is completely blocked by SR 12E, Peytonia Slough, Suisun Marsh, and Suisun City (Figures 3.3-9 and 3.3-10).

Affected Environment

Suitable upland habitat for CTS occurs in nonnative annual grassland, seasonal wetland, and alkali seasonal marsh habitats in the project area east of Ledgewood Creek and south of SR 12E (Volume 2, Figure 3.3-2a, Sheets 32, 33, and 35).

Alternative B

Suitable upland (non-native annual grassland) and aquatic (seasonal wetland and alkali seasonal marsh) habitat for CTS occurs in the following locations of the Alternative B study area (Volume 2, Figure 3.3-2a, Sheets 32, 33, and 35).

Alternative B, Phase 1
Suitable upland habitat for CTS occurs in non-native grassland habitat in the Alternative B study area (Volume 2, Figure 3.3-2b, Sheet 32). No aquatic habitat will be directly affected.

Alternative C
Suitable habitat under Alternative C is the same as that described above for Alternative B

Alternative C, Phase 1
Suitable upland habitat for CTS occurs in non-native grassland habitat in the Alternative C/Phase 1 study area (Volume 2, Figure 3.3-2d, Sheets 32, 33, and 35). No aquatic habitat will be affected.

Direct Effects
Construction would affect potential CTS aquatic habitat for Alternatives C and B and would affect upland habitat for all 4 alternatives through excavation and road construction.

Indirect Effects
Indirect effects on potential CTS habitat that could result from construction include altered hydrology, soil compaction, and degradation of water quality from increased sediment loading and point source pollutants. Proper design and installation of the grading and hydrologic design will ensure that velocity and runoff volumes are maintained in the current condition. Installation of bio-swales and bio-filtration systems included in the project description as standard water quality BMPs will minimize and avoid potential indirect effects on potential CTS habitat.

Environmental Consequences
There are no known occurrences of federally listed CTS within the BSA or the project footprint. The USFWS determination in the BO for Tiger Salamander was "may affect, not likely to adversely affect". Measures will be taken to avoid and minimize effects on potential CTS upland and seasonal wetland habitat. The Department or STA will conduct protocol-level surveys in the seasonal wetland / pools south of the BSA located between SR 12E, Pennsylvania Avenue, Ledgewood Creek, and the SPRR rail line for CTS prior to construction. Should these surveys find occurrences of CTS within the study area, the Department and STA will reinitiate formal Section 7 consultation with USFWS. As appropriate, the Department would work with USFWS to develop additional measures to ensure that the proposed construction activities would minimize and avoid direct and indirect effects on CTS and potential CTS habitat.

Potential Loss of CTS and its Habitat Resulting from Construction

If CTS are found to be present during surveys project construction would affect CTS and its habitat through excavation and road construction.

Alternative B
Construction within potential CTS habitat identified above would result in the temporary disturbance of 0.95 acres and the permanent loss of 6.21 acres of potential CTS aquatic habitat. Additionally, Alternative B would result in the loss of 23.06 acres and temporary disturbance of 6.96 acres of upland habitat within the study area.

Alternative B, Phase 1
Construction within potential CTS habitat identified above would result in the temporary disturbance of no acres and the permanent loss of 0.49 acres of potential CTS upland habitat. There would be no loss or temporary disturbance on potential aquatic habitat.

Alternative C
Construction within potential CTS habitat identified above would result in the temporary disturbance of 0.49 acres and the permanent loss of 4.47 acres of potential CTS aquatic habitat. Additionally, Alternative C would result in the loss of 12.58 acres and temporary disturbance of 3.35 acres of upland habitat within the study area.

Alternative C, Phase 1
Construction within potential CTS habitat identified above would result in the temporary disturbance of no acres and the permanent loss of 0.76 acres of potential CTS upland habitat. There would be no loss or temporary or permanent disturbance of potential aquatic habitat.

Under the No-Build Alternative, no construction activities would occur, and no effects on CTS would occur.

Avoidance, Minimization, and/or Mitigation Measures
Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08), the USFWS standardized avoidance and minimization efforts for CTS, and construction BMPs, and measures identified below would minimize effects on CTS and potential habitat that could occur in the vicinity of the aquatic and upland habitat locations identified in the study area.

Conduct Protocol-level Surveys for California Tiger Salamander

The Department or STA will survey the seasonal wetland/pools south of the BSA located between SR 12E, Pennsylvania Avenue, Ledgewood Creek, and the SPRR rail line for California tiger salamander prior to construction. Should these surveys find occurrences of California tiger salamander within the study area, the Department and STA will reinitiate formal Section 7 consultation with the USFWS.

Avoid and Minimize Potential Disturbance of California Tiger Salamander Habitat

- A USFWS-approved biologist will develop and conduct environmental education training for construction employees working on ground-disturbing activities. The program will include the following: a description of CTS and its habitat needs, photographs of the species, an explanation of its legal status and protection under FESA and CESA, and a list of the measures that will be implemented to minimize and avoid potential effects on CTS and its potential habitat.
- The Department will construct a retaining wall along SR 12E between Ledgewood Creek and Suisun City. This design feature will limit the roadway expansion to the existing raised

roadbed and avoid permanent intrusion into the immediately adjacent seasonal wetland (Gentry Suisun Wetland) that provides potential CTS habitat.

- A high-visibility ESA-type fencing will be installed to protect potential CTS habitat adjacent to the defined project footprint. The ESA-type fencing will be shown on the final construction plans.
- All work will be performed in accordance with a SWPPP. BMPs will be implemented and may include the use of silt fences, sandbags, detention basins, and other means as appropriate to prevent sedimentation and degradation of water quality down-gradient from the proposed project.
- All trenches will be covered overnight with boards or metal plates placed flush to the ground.
- No pets will be allowed on the project site during construction.
- All foods and food-related trash items will be enclosed in sealed trash containers at the end of each day and removed from the site every day.
- To the maximum extent practicable, affected potential CTS upland habitat will be restored to preconstruction conditions. Following construction, affected upland areas will be replanted with the appropriate plant palette comprised of native grasses, forbs, and small shrubs.

3.3.5.8 Swainson's Hawk

Swainson's hawk is listed as threatened under CESA and is protected under the MBTA and CFGC Section 3503.5. The MBTA and CFGC Section 3503.5 prohibit take of migratory birds, nests, and young. In the Central Valley, this species typically nests in oak or cottonwood trees in or near riparian habitats, in oak groves, in roadside trees, and in solitary trees. Swainson's hawks prefer nesting sites that provide sweeping views of nearby foraging grounds (grasslands, irrigated pasture, alfalfa, hay, and row and grain crops). Swainson's hawks are migratory, wintering from Mexico to Argentina and breeding in California and elsewhere in the western United States. They generally arrive in the Central Valley in mid-March and begin courtship and nest construction immediately after arrival at the breeding sites. The young fledge in early July, and most Swainson's hawks leave their breeding territories by late August or early September.

Affected Environment

There is one Swainson's hawk nest site in the study area, approximately 0.5 mile southeast of the I-80/680 interchange (California Natural Diversity Database 2010a). Large trees, suitable for nesting Swainson's hawks, are present in riparian woodland, eucalyptus, blue oak woodland, live oak woodland, other woodland, and valley oak woodland, and eucalyptus trees in the study area. However, it is unlikely that Swainson's hawks would nest in the study area because of the area's proximity to I-80, I-680, and SR 12W and 12E. Foraging habitat (row crops, ruderal, and nonnative annual grasslands) occurs in portions of the study area that would be affected by the proposed project.

Environmental Consequences

Potential Loss of Swainson's Hawk Nesting and Foraging Habitat Resulting from Construction

Both build alternatives would result in permanent and temporary effects to Swainson's hawk nesting habitat and permanent effects to foraging habitat. Temporary effects on foraging habitat are not considered because the habitat will return to baseline conditions once construction is complete.

Although there is a low likelihood that Swainson's hawks would nest adjacent to I-80/I-680/SR 12, tree removal or noise associated with construction activities could result in the disturbance of nesting Swainson's hawks if active nests are present in or near the construction area. These disturbances could cause nest abandonment and death of young or loss of reproductive potential at active nests located in or near the study area. Any of the build alternatives could result in a substantial adverse effect, through loss of eggs or young, on a species listed as threatened under CESA.

Alternative B

Alternative B would result in a permanent loss of approximately 12.45 acres and temporary disturbance of 6.83 acre of potential nesting habitat in and adjacent to the study area.

Alternative B would result in a permanent loss of approximately 231.52 acres of foraging habitat that occurs in the study area: 36.16 acres within one mile of a known nest and 195.36 acres within one to five miles of a nest.

Alternative B, Phase 1

Alternative B, Phase 1 would result in a permanent loss of approximately 5.40 acre and temporary disturbance of 0.59 acre of potential nesting habitat for Swainson's hawks.

Alternative B, Phase 1 would result in a permanent loss of approximately 53.94 acres of foraging habitat that occur in portions of the study area: 32.46 acres within one mile of a nest and 21.48 acres within one to five miles.

Alternative C

Alternative C would result in a permanent loss of approximately 21.42 acres and temporary disturbance of 7.17 acre of potential nesting habitat.

Alternative C would result in a permanent loss of approximately 224.60 acres of foraging habitat that occurs in the study area: 33.03 acres within one mile of a known nest, 191.57 acres within one to five miles of a nest, and 0.24 acre within five to ten miles of a known nest.

Alternative C, Phase 1

Alternative C, Phase 1 would result in a permanent loss of approximately 15.94 acre and temporary disturbance of 3.07 acre of potential nesting habitat.

Alternative C, Phase 1 would result in a permanent loss of approximately 169.64 acres of foraging habitat that occur in portions of the study area: 31.30 acres within one mile of a nest and 138.34 acres within one to five miles.

Loss of a substantial amount of foraging habitat within ten miles of a known Swainson's hawk nest is considered to be an adverse effect. This adverse effect can be offset through the acquisition of conservation lands that will preserve significant amounts of suitable foraging habitat for the species and the management and monitoring of these lands for Swainson's hawk habitat values.

Under the No-Build Alternative, no construction activities would occur, and no effects on Swainson's hawk would occur.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of Standard Specification and Standard Provision measures mentioned in Section 3.3.1.1 to prohibit construction work in environmentally sensitive areas (SS 14-1.02A), to install ESA fencing (SS 14-1.03), to monitor construction activities (SSP 14-6.05) and to conduct environmental awareness training (SSP 14-6.08),, the measure to conduct preconstruction nesting bird and raptor surveys and establish no-disturbance buffers if necessary, in Section 3.3.4.2 are expected to avoid disturbance of or injury to Swainson's hawks. Therefore no 2081 ITP would be necessary. However, should it be impossible to avoid impacts to Swainson's Hawk, the measure listed below would be implemented to reduce adverse effects on nesting Swainson's hawks.

Compensate for Loss of Swainson's Hawk Foraging Habitat

The CDFG requires that loss of foraging habitat for the species be replaced at different ratios depending on the habitat's distance from a known nest. Compensatory mitigation will be completed as agreed upon with CDFG prior to construction and be based on the presence or absence of active nests.

3.3.5.9 Central California Coast Steelhead

Affected Environment

Review of available literature and data sources of species occurrence indicates that central California coast steelhead were both historically and recently present in several streams in the project area. A recent comprehensive review of existing steelhead occurrence within San Francisco Bay Estuary can be found in Leidy et al. (2005), which is the basis for some of the species occurrence information presented below. Hanson Environmental (2002) was also reviewed for information on Suisun Creek. On January 18, 2006, NMFS provided a list of threatened, endangered, and special-status fish species potentially found in the project area which included central California coast steelhead (Appendix F).

Dan Wilson Creek near the I-80 bridge has a modified channel bed and bank. Under the I-80 bridge, the channel bottom has natural substrates composed primarily of mud/silt. At the time of the survey (August 8, 2007), the channel was choked with cattails, and riparian and SRA cover vegetation was observed to be largely absent—with the exception of approximately 15 linear feet

of SRA cover vegetation on the east bank downstream of the I-80 bridge. Stream flow was visually estimated to be 0.1 cfs or less. No suitable habitat for steelhead was observed in Dan Wilson Creek in the vicinity of the I-80 bridge crossing. The relatively small size and low elevation of the watershed, combined with the general lack of riparian vegetation, extensive emergent vegetative growth in the channel, and low stream flow, further suggest that this stream in the vicinity of the I-80 stream crossing does not support steelhead migration, spawning, and rearing habitat.

American Canyon Creek near the I-680 and Ramsey Road bridges also has a modified channel bed and bank. Overall, the channel is moderately incised and numerous cattails line the channel bottom. In the vicinity of the I-680 and Ramsey Road bridges, riparian and SRA cover vegetation is absent. Stream flow is conveyed under the I-680 and Ramsey Road bridges through concrete box culverts; presently, mud substrates line the bottom of both culverts. A concrete apron on the downstream side of the box culvert is perched above the adjacent, downstream channel bed, creating a vertical drop of approximately 0.75 foot. At the time of the survey (August 8, 2007), stream flows were visually estimated to be less than 0.1 cfs. A large beaver dam was observed at the upstream end of the frontage road west of I-680 and was determined to be a barrier to fish passage at the observed stream flow conditions. No suitable habitat for steelhead was observed in American Canyon Creek in the vicinity of the I-680 bridge crossing. The relatively small size and low elevation of the watershed, combined with the general lack of riparian vegetation, extensive emergent vegetative growth in the channel, and low stream flow, further suggest that this stream in the vicinity of the I-680 stream crossing does not support suitable conditions for steelhead. Surveys conducted in 1981, 1997, and 2002 did not find any steelhead in American Canyon Creek (Leidy et al. 2005).

To the north of American Canyon Creek, Jameson Canyon Creek flows west to east and drains the adjacent watershed north of American Canyon. This creek channel is moderately incised with a high terrace floodplain and exhibits evidence of past disturbance, including channel straightening and levee construction. Substrate in the creek is predominantly sand, and gravel is present at isolated locations or in combination with sand. A stand of riparian vegetation consisting primarily of mature willows is present along both banks, creating a 50- to 75-foot-wide riparian corridor. Stream flow is conveyed under I-680 in box culverts. At the time of the survey (August 8, 2007), the creek was dry throughout the entire study area, which extends from immediately downstream of I-680 to near SR 12 upstream of the I-80 crossing. For the same reasons as those discussed for American Canyon Creek, habitat conditions in Jameson Canyon Creek in the vicinity of the I-680 stream crossing likely do not support steelhead.

Green Valley Creek flows north to south and drains the watershed area north of Cordelia. Green Valley Creek at the I-80 crossing has a concrete-lined bed and bank throughout the study area. The concrete-lined channel contains a low flow channel with concrete weirs every 20 feet for the entire length of the channel to facilitate fish passage. At the time of the surveys (July 5 and August 8, 2007), sediment deposits were observed over much of the length of channel under the I-80 bridges. Very little riparian vegetation occurs in the study area and is limited to vegetation that is growing in sediments deposited on the engineered channel. Leidy et al. (2005) indicated that steelhead were collected from Green Valley Creek from the 1950s to the present. Unpublished sampling data indicated that steelhead were collected about one mile upstream from I-80 in January 1997 (Leidy et al. 2005). Although data documenting specific occurrences of

steelhead are lacking, Leidy et al. (2005) suggests that this creek's connection to the Suisun Marsh and its close proximity to the Suisun Creek drainage provides habitat opportunities for migratory steelhead. A fish passage assessment was conducted on the current channel configurations in Green Valley, Ledgewood, and Suisun Creeks, the results of which were compared to postproject conditions. This assessment concluded that, under existing conditions at low flows, the passage criteria related to minimum water depth for adult Chinook salmon and steelhead are not currently being met at the Green Valley Creek stream crossing because excessive sediments deposited in the constructed (i.e., concrete-lined) low-flow channel cause the water to spread out and become too shallow.

Suisun Creek flows north to south and drains the largest watershed area of any of the creeks in the study area. Although levees top the banks of Suisun Creek upstream and downstream of the I-80 crossing, riparian vegetation is dense in the study area up to the bridge. The Suisun Creek channel at the I-80 crossing is an earthen channel and consists of abutments on each bank of the creek. Two pier columns supporting the I-80 bridge spans intercept the channel at the interface between the creek and each bank. Historical evidence dating back as far as 1940 indicates that steelhead were present throughout the Suisun Creek watershed. Following the construction of Gordon Valley Dam (Lake Curry) in 1926 and subsequent water developments, steelhead populations in the watershed declined. Although the distribution and abundance of steelhead throughout Suisun Creek and its tributaries may have fluctuated over the years, recent surveys found that both adult and juvenile steelhead are still present in this system. An adult steelhead (26.5 inches) was found approximately 0.25 mile downstream of the Wooden Valley Creek confluence in March 2001, while two other adult steelhead (20.9–25.2 inches) were observed in June and early July 2001 approximately six and 11 miles downstream of Lake Curry (Leidy et al. 2005); these locations are well upstream of the I-80 stream crossing. This same survey also noted the occurrence of juvenile steelhead (6.3–6.7 inches) downstream from the dam.

Historical evidence from 1965 (Leidy et al. 2005) suggested that Wooden Valley Creek, a tributary of Suisun Creek, contained the highest concentration of steelhead in the watershed. Surveys of Wooden Valley Creek conducted in 2002 indicated that juvenile steelhead were present at both headwater and various other survey locations along the creek (Leidy et al. 2005), suggesting the possibility of an existing steelhead population. Additionally, NOAA's NMFS believes that Suisun and Wooden Valley Creeks currently support a steelhead population and that sufficient migration, spawning, and rearing habitat exist (50 FR 52504, September 2, 2005). Hanson Environmental (2002) performed a more detailed analysis of steelhead habitat quality in Suisun Creek. The study surveyed approximately 95% of the stream from Cordelia Road to Lake Curry during summer low-flow period. Results of this study indicate that significant habitat constraints are present; these include migration barriers, limited spawning gravel availability, high summer water temperatures, and low habitat diversity. The study concluded that Suisun Creek was unlikely to consistently support self-sustaining steelhead populations. Instead, habitat would be best available during wet years when winter flows were high enough to allow upstream passage for adults and summer stream temperatures remained cool enough to support juvenile rearing. During dry years, summer rearing habitat would be constrained to upstream areas immediately below the reservoir, where temperatures would most likely remain suitable to support salmonids.

Ledgewood Creek at the SR 12E crossing is highly modified. Levees line both banks of the channel, and the channel has a trapezoidal cross section. Riparian and SRA cover vegetation is limited to areas downstream of the SR 12E bridge; no riparian or SRA cover vegetation is present in the immediate vicinity upstream of the bridge. SRA cover vegetation included six linear feet of willow on the west bank, and 15 linear feet of weeping willow and four feet of dying weeping willow along the east bank. Stream flow is conveyed through concrete-lined box culverts under the five-span bridge. At low flows, stream flow is conveyed through the second box culvert from the east bank. The concrete invert in this box culvert is notched and forms a V-shaped channel, which maximizes water depths at low flows. At the time of the survey (August 8, 2007), stream flow was measured at 0.67 cfs with a maximum depth of 0.4 foot. Based on the results of a fish passage assessment conducted as part of this proposed project, excessively shallow water depths in the box culvert under SR 12E create an impediment to migrating steelhead in Ledgewood Creek. Although specific data of steelhead occurrence in Ledgewood Creek are lacking, its connection to the Suisun Marsh and close proximity to Suisun Creek suggest that steelhead are potentially present in Ledgewood Creek.

The field survey and literature review results indicate that steelhead occur in Green Valley, Ledgewood, and Suisun Creeks. The effects discussion is limited to these creeks because they support special-status fish species in the project area.

Environmental Consequences

Potential Effects on Steelhead Resulting from Construction

Construction of either build alternative could affect water quality, fish habitat, channel morphology, water temperature, steelhead movement, and steelhead spawning habitat in streams containing steelhead. In addition, both build alternatives could result in disturbance and direct injury of steelhead. Alternatives B and C include construction of crossings over Green Valley, Suisun, and Ledgewood Creeks. Alternative B would additionally include construction of a second, new bridge over Ledgewood Creek. The fundable first phases of the alternatives would not include construction of crossings over Suisun Creek and would have potential impacts only on Green Valley and Ledgewood Creeks. Under the No-Build Alternative, although no construction activities would occur, existing channel morphology in Green Valley and Ledgerwood Creek results in sedimentation that results in a low flow passage barrier which could have potential impacts on steelhead or its habitat.

Water Quality

As described above in Section 3.3.4.10, the temporary effects of construction on water quality include increased sedimentation and turbidity and possible release of contaminants into Green Valley, Suisun, and Ledgewood Creeks from construction equipment. These water quality effects could increase steelhead mortality; reduce feeding opportunities, including those for rearing steelhead; and cause steelhead to avoid important habitat. Increased pollutant concentrations could limit steelhead reproduction, abundance, and distribution by direct mortality of steelhead or their prey. Steelhead in the study area require relatively clean, cold, well-oxygenated water for successful growth, reproduction, and survival and are not well adapted for survival in degraded aquatic habitats.

Implementation of the measure to prepare and implement a SWPPP in Section 3.2.3 and measures to prevent contaminants from entering streams and to restrict in-water work to avoid the migration and spawning seasons in Section 3.3.4.10 would address this impact.

Habitat and Channel Morphology

As described above in Section 3.3.4.10, project construction activities would affect fish habitat and could also change the channel morphology by disturbing the streambed substrate. However, revegetation would mitigate the loss of vegetation and SRA cover, and the channel beds would be restored to a natural substrate wherever possible.

At Green Valley Creek, all existing bridges would be replaced with clear span structures under Alternative B, Alternative B, Phase 1, and Alternative C. Under Alternative C, Phase 1, the westbound off-ramp bridge would be replaced with a clear span bridge and the channel restored to a natural substrate, but the eastbound bridges would not be replaced. At Suisun Creek, the existing overcrossings would be replaced with freespan structures and the substrate restored to natural conditions under both full build alternatives. No construction would occur at Suisun Creek under Phase 1 for either alternative.

At Ledgewood Creek, the culvert would be widened under Alternative B and Alternative C, and Alternative C, Phase 1. Under all three alternatives, existing habitat and channel conditions would persist with the widened culvert. However, though fish passage impediments on Ledgewood Creek would be addressed with the implementation of the culvert retrofit described in the *Avoidance, Minimization and/or Mitigation* section below. No construction would occur at Ledgewood Creek under Alternative B, Phase 1.

Implementation of the measure in Section 3.3.4.10 to minimize impacts on creek channels would address this impact.

Water Temperature

Under existing conditions, habitat for juvenile steelhead rearing in the study area is likely marginal to unsuitable during summer (Hanson Environmental 2002). Water temperature is an important variable that determines the suitability of fish habitat for growth, reproduction, survival, and migration. This is especially true for steelhead, which have relatively narrow temperature requirements for carrying out their life history. Any increase in water temperatures could further reduce the suitability of habitat for steelhead in the study area.

As described above in Section 3.3.4.10, the proposed project would have a minor effect on SRA cover. Revegetation of the disturbed areas, combined with the shading provided by the bridge extension, would be expected to maintain existing water temperatures in the study area, and the project would not adversely affect water temperature.

Implementation of the measure in Section 3.3.4.10 to minimize impacts on creek channels would reduce water temperature effects as a result of the project.

Interference with Movement

As described above in Section 3.3.4.10, construction activities associated with the project alternatives would require the use of cofferdams and pipelines, which could block the migration

of adult and juvenile steelhead. However, the timing of construction activities to avoid the primary migration time of adult and juvenile steelhead and maintenance of fish passage through the construction site during stream dewatering activities would reduce the potential for impacts on fish movement. Therefore, temporary stream diversions associated with construction are not likely to adversely affect the migration of adult and juvenile steelhead.

Based on the fish passage assessment, modification of the bridge structures at Green Valley and Suisun Creeks along I-80 would not create new fish passage barriers or reduce existing fish passage conditions. The proposed modification of the bridge structure at Ledgewood Creek along SR-12 would exacerbate existing fish passage constraints associated with shallow water depths.

Implementation of measures in Section 3.3.4.10 to minimize impacts on creek channels and to maintain a migration corridor through creek channels would address this impact.

Disturbance to Potential Spawning Habitat

As described above in Section 3.3.4.11, a potential spawning gravel bed was observed in Suisun Creek approximately 20 feet downstream of the existing bridge, which is proposed for removal and reconstruction under Alternatives B and C. It is anticipated that the gravel bed would not be disturbed by the proposed project. All construction equipment would access the construction site from the existing bridge and road. If the gravel cannot be avoided, it would be temporarily removed and replaced to preconstruction conditions—using, to the extent practicable, gravel removed from the site.

Because no construction is proposed on Suisun Creek under the fundable first phase of either alternative or under the No-Build Alternative, there would be no effect on spawning habitat under these alternatives.

Implementation of measures listed in Section 3.3.4.10 to minimize impacts on creek channels and in Section 3.3.4.11 to avoid spawning habitat would address this impact.

Disturbance and Direct Injury

As described above in Section 3.3.4.10, noise, vibrations, artificial light, and other physical disturbances can harass fish, disrupt or delay normal activities, and cause injury or mortality. Under Alternative B, short-term noise disturbance caused by pile driving would occur within Ledgewood Creek. Potential direct effects of pile-driving activities include increased noise and turbidity. Researchers have suggested that salmonids can hear pile-driving noise approximately 2,000 feet from the source (Feist et al. 1992). Feist et al. (1992) observed that pile driving altered the distribution and behavior of juvenile pink and chum salmon. The potential impact on salmonids from pile-driving activities depends on the distance separating the noise-generating activity from fish and the duration of these activities. Evidence suggests that, although pile-driving noise may affect the distribution and behavior of juvenile pink and chum salmon, no significant changes occurred in their overall abundance (Feist et al. 1992).

Implementation of measures in Section 3.3.4.10 to restrict in-water activities to avoid spawning season and to minimize noise impacts on fish would address this impact.

Potential Effects on Steelhead Resulting from Operations

Water Quality

As described above in Section 3.3.4.10, all build alternatives would result in increased impervious surfaces and contaminated runoff. The potential increase in contaminated runoff entering the creeks could adversely affect steelhead that use the creeks for migration, spawning, and rearing. Pollutants could also cause mortality to and reduced growth of the egg, larval, and juvenile life stages of steelhead.

Implementation of the measure in Section 3.2.3 to prepare and implement a SWPPP and measures listed in Section 3.3.4.10 to prevent contaminants from entering the stream channel would address this impact.

Potential Interference with Movement

As described above in Section 3.3.4.11, the proposed extension of the culvert under SR 12E would exacerbate existing shallow water conditions at Ledgewood Creek during the migration season and would worsen fish passage conditions relative to current conditions. Bridge widening would occur under both build alternatives. Implementation of 'Implement culvert retrofit at the SR12E crossing on Ledgewood Creek' in Section 3.3.4.11 to address shallow water depths would improve fish passage conditions at Ledgewood Creek.

In summary, effects to central California coast steelhead could occur from construction and operation. Construction effects will be temporary and include change in water quality, habitat and channel morphology, and water temperature, interference with movement, disturbance of potential spawning habitat, and disturbance and direct injury. These temporary effects will occur during construction when steelhead are not in the study area. Operational effects which are permanent include a degradation in water quality and potential interference with movement on Ledgewood Creek. Implementation of measures to address water quality and fish passage will reduce the severity of this effect.

Avoidance, Minimization, and/or Mitigation Measures

Implementation of the Water Pollution Control Standard Specification measures pertaining to water pollution control programs (SS 13-2), stormwater pollution prevention plans (SS 13-2), and measures in Section 3.3.4. 10 to restrict in water work, minimize impacts on creek channels, provide alternate migration corridors, retain a biologist for instream construction, and minimize noise impacts and the measures provided in Section 3.3.4.11 to avoid spawing habitat and implement a culvert retrofit on Ledgewood Creek would avoid and minimize effects on Steelhead salmon related to water quality, habitat and channel morphology, interference with movement and disturbance.

3.3.6 Invasive Species

Regulatory Setting

On February 3, 1999, President Clinton signed Executive Order 13112 requiring federal agencies to combat the introduction or spread of invasive species in the United States. The order defines invasive species as "any species, including its seeds, eggs, spores, or other biological material

capable of propagating that species, that is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health." Federal Highway Administration guidance issued August 10, 1999, directs the use of the State's invasive species list, currently maintained by the California Invasive Species Council to define the invasive plants that must be considered as part of the NEPA analysis for a proposed project.

Affected Environment

Table 3.3.6-1 identifies the invasive plant species located in the study area. These species occur in areas mapped as annual grassland, landscaped, riparian woodland, drainage, and seasonal wetland. The infestation of the study area by these species is limited, occurring primarily on isolated patches of ruderal vegetation on the edges of roadways or scattered in the annual grassland.

Table 3.3.6-1. Invasive Plant Species Identified in the Study Area

Species	CDFA	Cal-IPC
Giant reed (*Arundo donax*)	B	High
Slender wild oat (*Avena barbata*)	–	Moderate
Wild oat (*Avena fatua*)	–	Moderate
Mediterranean linseed (*Bellardia trixago*)	–	Limited
Black mustard (*Brassica nigra*)	–	Moderate
Common mustard (*Brassica rapa*)	–	Limited
Rattlesnake grass (*Briza maxima*)	–	Limited
Ripgut brome (*Bromus diandrus*)	–	Moderate
Soft chess (*Bromus hordeaceus*)	–	Limited
Red brome (*Bromus madritensis* ssp. *rubens*)	–	High
Italian thistle (*Carduus pycnocephalus*)	C	Moderate
Iceplant (*Carpobrotus edulis*)	–	High
Purple star-thistle (*Centaurea calcitrapa*)	B	Moderate
Yellow star-thistle (*Centaurea solstitialis*)	C	High
Bull thistle (*Cirsium vulgare*)	C	Moderate
Poison hemlock (*Conium maculatum*)	–	Moderate
Bindweed (*Convolvulus arvensis*)	C	–
Pampas grass (*Cortaderia jubata*)	B	High
Silverleaf cotoneaster (*Cotoneaster pannosus*)	–	Moderate
Brass buttons (*Cotula coronopifolia*)	–	Limited
Artichoke thistle (*Cynara cardunculus*)	B	Moderate
Bermuda grass (*Cynodon dactylon*)	C	Moderate
Orchard grass (*Dactylis glomerata*)	–	Limited
Fuller's teasel (*Dipsacus sativus*)	–	Moderate
Red-stemmed filaree (*Erodium cicutarium*)	–	Limited
Fig (*Ficus carica*)	–	Moderate
Fennel (*Foeniculum vulgare*)	–	High
Mediterranean barley (*Hordeum marinum* var. *gussoneanum*)	–	Moderate
Hare barley (*Hordeum murinum* ssp. *leporinum*)	–	Moderate
Klamathweed (*Hypericum perforatum*)	C	Moderate
Smooth cat's ear (*Hypochaeris glabra*)	–	Limited
Broad-leaved pepper-grass (*Lepidium latifolium*)	B	High
Italian ryegrass (*Lolium multiflorum*)	–	High
Water primrose (*Ludwigia peploides*)	–	High
Hyssop loosestrife (*Lythrum hyssopifolium*)	–	Moderate
Alkali mallow (*Malvella leprosa*)	C	–

Species	CDFA	Cal-IPC
White horehound (*Marrubium vulgare*)	–	Limited
Bur-clover (*Medicago polymorpha*)	–	Limited
Pennyroyal (*Mentha pulegium*)	–	Moderate
Olive (*Olea europaea*)	–	Limited
Harding grass (*Phalaris aquatica)*	–	Moderate
Bristly ox-tongue (*Picris echioides*)	–	Limited
Smilo grass (*Piptatherum millaceum*)	–	Limited
Narrow-leaved plantain (*Plantago lanceolata*)	–	Limited
Rabbit-foot grass (*Polypogon monspeliensis*)	–	Limited
Firethorn (*Pyracantha angustifolia*)	–	Limited
Wild radish (*Raphanus sativus*)	–	Limited
Black locust (*Robinia pseudoacacia*)	–	Limited
Himalayan blackberry (*Rubus discolor*)	–	High
Sheep sorrel (*Rumex acetosella*)	–	Moderate
Curly dock (*Rumex crispus*)	–	Limited
Russian thistle (*Salsola tragus*)	C	Limited
Milk thistle (*Silybum marinum*)	–	Limited
Charlock (*Sinapis arvensis*)	–	Limited
Spanish broom (*Spartium junceum*)	–	High
Medusahead (*Taeniatherum caput-medusae*)	C	High
Saltcedar (*Tamarix ramosissima*)	B	High
Hedgeparsley (*Torilis arvensis*)	–	Moderate
Puncture vine (*Tribulus terrestris*)	C	–
Rose clover (*Trifolium hirtum*)	–	Moderate
Bigleaf periwinkle (*Vinca major*)	–	Moderate
Foxtail fescue (*Vulpia myuros*)	–	Moderate

Notes: The California Department of Agriculture (CDFA) and California Invasive Plant Council (Cal-IPC) lists assign ratings that reflect the CDFA and Cal-IPC views of the statewide importance of the pest, likelihood that eradication or control efforts would be successful, and present distribution of the pest in the state. These ratings are guidelines that indicate the most appropriate action to take against a pest under general circumstances. The Cal-IPC species list is more inclusive than the CDFA list; however, FHWA requires adherence to Executive Order 13112, which requires the use of only the CDFA list.

The CDFA categories indicated in the table are defined as follows:

- **B:** Eradication, containment, control or other holding action at the discretion of the county agricultural commissioner.
- **C:** State-endorsed holding action and eradication only when found in a nursery; action to retard spread outside nurseries at the discretion of the county agricultural commissioner.

The Cal-IPC categories indicated in the table are defined as follows:

- **High:** Species with severe ecological impacts, high rates of dispersal and establishment, and usually widely distributed.
- **Moderate:** Species with substantial and apparent ecological impacts, moderate to high rates of dispersal, establishment dependent on disturbance, and limited to widespread distribution.
- **Limited:** Species with minor ecological impacts, low to moderate rates of invasion, limited distribution, and locally persistent and problematic.

Environmental Consequences

Potential Introduction and Spread of Invasive Plant Species Resulting from Construction

Invasive weed species in the study area are present along roadsides, which are routinely disturbed by shoulder maintenance and vegetation management activities. The proposed project would create additional disturbed area for a temporary period, but it would not substantially increase the area subject to repeated disturbance because the new road shoulders would replace existing road shoulders. Therefore, the project alternatives are not anticipated to increase or decrease the area currently occupied by invasive weeds or the potential for spreading invasive weed species.

Implementation of the measure to conduct environmental awareness training provided in Section 3.3.1.1 and the measure below would address this impact.

Under the No-Build Alternative, no construction activities would occur, and no effects associated with the spread of invasive species would occur.

Avoidance, Minimization, and/or Mitigation Measures

Avoid the Introduction and Spread of Invasive Plants

To avoid the introduction of new invasive plants and reduce the spread of invasive plants previously documented in the study area, the following measures will be implemented during construction.

- Surface disturbance within the construction work area will be minimized to the greatest extent possible.
- All disturbed areas will be seeded with certified weed-free native mixes and mulched with certified weed-free mulch (rice straw may be used in upland areas). If seeding is not possible, the area of disturbance will be covered to the extent practicable with heavy black plastic solarization material until the end of project construction.
- Native, noninvasive species will be used in erosion control plantings to stabilize site conditions and prevent invasive species from colonizing.

In the event that noxious weeds are disturbed or removed during construction- related activities, the contractor will be required to contain the plant material associated with these noxious weeds and dispose of them in a manner that will not promote the spread of the species. The contractor will be responsible for obtaining all permits, licenses, and environmental clearances for properly disposing of materials.

3.3.7 Native Trees

Regulatory Setting

The City of Fairfield Tree Conservation ordinance (FCC 25.36) protects native trees, including native oaks, bay laurel, madrone, and California buckeye, that are greater than six inches in diameter at breast height (dbh). This ordinance protects native trees located inside the City Limit Line on public property or on private property developed or landscaped with City approval, but not those located within the Department right-of-way. Solano County has no specific tree protection requirements outside of hillsides and visually sensitive areas.

Most native trees in the study area occur in or adjacent to riparian and oak woodland communities. These trees are still considered sensitive resources because they occur in natural communities of special concern and were discussed above in Sections 3.3.1.1 and 3.3.1.2.

Affected Environment

Mature native trees (dbh of six inches or more) that are not located within riparian or oak woodland were individually mapped in the study area. The sheet and tree numbers shown in parentheses below correspond to Figures 3.3-2a, 3.3-2b, 3.3-2c, and/or 3.3-2d in Volume 2. Information for each tree is listed in Appendix G. Individually mapped native trees occur at the following locations in and adjacent to the study area.

- Along Jameson Canyon Creek near the industrial area west of I-680 (three coast live oaks) (Trees 1–3 on Sheets 9 and 14).
- Near the I-80 EB on-ramp from NB I-680 (one coast live oak and three valley oaks) (Trees 4–7 on Sheets 16 and 17).
- The intersection of Green Valley Road and Business Center Drive (17 coast live oaks and two valley oaks) (Trees 8–24 on Sheet 17).

Native trees outside the City Limit Line and outside the Department right-of-way occur at the following locations in the study area.

- Red Top Road extension (six interior live oaks) (Trees 100–105 on Sheets 2-3).
- Between Dan Wilson Creek and the previous site of the I-80 eastbound Cordelia truck scales (one interior live oak, one valley oak, and an undetermined number in the area replanted after construction of the new eastbound truck scales) (Trees 34 and 35 on Sheets 21 and 22).

Environmental Consequences

Native trees are not protected under any applicable federal statute. Impacts on native trees are discussed as CEQA impacts in Chapter 4.

3.3.8 Suisun Marsh Secondary Management Area

Regulatory Setting

Pursuant to the Nejedly-Bagley-Z'berg Suisun Marsh Preservation Act of 1974, the San Francisco Bay Conservation and Development Commission (BCDC) and the CDFG prepared the Suisun Marsh Protection Plan. In 1977, the Suisun Marsh Preservation Act was enacted to incorporate the findings and policies contained in the plan into state law. The Suisun Marsh Preservation Act established two management areas within the marsh. The Primary Management Area includes tidal marshes, seasonal marshes, managed wetlands, and lowland grasslands. The Secondary Management Area is the adjacent upland grasslands and cultivated lands that serve as a buffer between the Primary Management Area and developed land. As required by the Suisun Marsh Protection Act, Solano County prepared the Suisun Marsh Local Protection Program (SMLPP), which includes policies, programs, and regulations to preserve and enhance wildlife habitat in the Suisun Marsh and retain adjacent upland areas in uses compatible with protection of the marsh. The BCDC regulates uses in the Secondary Management Area through Marsh Development Permits to ensure that proposed uses are consistent with the SMLPP.

Affected Environment

The study area east of I-680 between the Gold Hill Road overpass and just south of Jameson Canyon Creek is within the Suisun Marsh Secondary Management Area. The location is shown in Figures 3.3-2a through 2d, Sheets 10–14 in Volume 2.

This part of the study area is primarily nonnative annual grassland, with stands of eucalyptus trees, several seasonal wetlands, seasonal drainages, and ruderal vegetation adjacent to I-680.

Environmental Consequences

The Suisun Marsh Secondary Management Area is not protected under any applicable federal statute. Effects on this resource are discussed per CEQA requirements in Chapter 4 Land Use and Planning section (4.2.1.9). Implementation of measures to protect sensitive natural communities; to protect water quality and restore wetland habitats; and to compensate for loss of Swainson's hawk foraging habitat as described in Sections 3.3.1.1, 3.3.2.1, and 3.3.5.8 would reduce adverse effects on this area.

Table 3.3.3-1. Sensitive Plant Species with the Potential to Occur in the I-80/I-680/SR 12 Project Region

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	–/–/1B.1	Historical range included the Central Valley from Butte to Alameda County but currently only occurs in Butte, Glenn, Colusa, and Yolo Counties.	Seasonally wet areas in meadows and seeps, subalkaline flats in valley and foothill grassland; 16-245 feet	April–May	Yes	Suitable vegetation communities, soils, and hydrologic conditions are present in nonnative annual grasslands on alkali soils the study area, but study area is outside current known range and the species was not observed during blooming-period surveys.
Alkali milk-vetch *Astragalus tener* var. *tener*	–/–/1B.2	Merced, Solano, and Yolo Counties. Historically more widespread.	Grassy flats and vernal pool margins on alkali soils below 200 feet.	March–June	Yes	**Species is present in the study area.** Suitable vegetation communities and soils are present, and the species was observed in the area south of SR 12E between Ledgewood Creek and Pennsylvania Avenue.
Heartscale *Atriplex cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills.	Alkali grassland, alkali meadow, and alkali scrub below 650 feet.	April–October	Yes	Suitable vegetation communities and soils are present in nonnative annual grasslands on alkali soils the study area, but the species was not observed during blooming-period surveys.
Brittlescale *Atriplex depressa*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills on west side of Central Valley.	Alkali grassland, alkali meadow, alkali scrub, chenopod scrub, playas, and valley and foothill grasslands on alkaline or clay soils below 650 feet	May–October	Yes	Suitable vegetation communities and soils are present in nonnative annual grasslands on alkali and clay soils the study area, but the species was not observed during blooming-period surveys.
San Joaquin spearscale *Atriplex joaquiniana*	–/–/1B.2	West edge of Central Valley from Glenn County to Tulare County.	Alkali grassland, alkali meadow, alkali scrub, and saltbush scrub below 1,000 feet.	April–October	Yes	Suitable vegetation communities and soils are present in nonnative annual grasslands on alkali soils the study area, but the species was not observed during blooming-period surveys.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Vernal pool smallscale *Atriplex persistens*	–/–/1B.2	Central Valley, from Glenn to Tulare County.	Dry beds of vernal pools on alkaline soils; 33-380 feet.	July–October	Yes	Suitable vernal pool habitat is present in the study area south of SR 12E, but species was not observed during blooming-period surveys.
Big-scale balsamroot *Balsamorhiza macrolepis* var. *macrolepis*	–/–/1B.2	Scattered occurrences in Coast Ranges and Sierra Nevada foothills.	Chaparral, cismontane woodland, valley and foothill grassland, sometimes on serpentine soils, at 300–4,600 feet.	March–June	Yes	Suitable habitat is present in oak woodlands and nonnative annual grasslands in the study area, but species was not observed during blooming-period surveys.
Sonoma sunshine *Blennosperma bakeri*	E/E/1B.1	Endemic to Sonoma County.	Vernal pools, mesic valley and foothill grassland; 33-360 feet.	March–May	No	Suitable habitat is present in nonnative annual grasslands and seasonal wetlands in the study area, but species occurs only in Sonoma County and was not observed during blooming-period surveys.
Big tarplant *Blepharizonia plumosa*	–/–/1B.1	San Francisco Bay area, with occurrences in Alameda, Contra Costa, San Joaquin[b], Stanislaus, and Solano Counties.	Valley and foothill grassland; 100-1,650 feet.	July–October	Yes	Suitable habitat is present in nonnative annual grasslands in the study area, but species was not observed during blooming-period surveys.
Narrow-anthered California brodiaea *Brodiaea californica* var. *leptandra*	–/–/1B.2	Lake, Napa, and Sonoma Counties.	Broadleaved upland forest, chaparral, and lower montane coniferous forest at 300 to 3,000 feet.	May–July	No	No suitable vegetation communities are present in the study area.
Mt. Diablo fairy-lantern *Calochortus pulchellus*	–/–/1B.2	Alameda, Contra Costa, and Solano Counties.	Cismontane woodland and chaparral, 100–2,750 feet.	April–June	Yes	Suitable habitat is present in undisturbed oak woodlands in the study area, but species was not observed during blooming-period surveys.
Tiburon Indian paintbrush *Castilleja affinis* ssp. *neglecta*	E/T/1B.2	San Francisco Bay Area. Marin, Napa, and Santa Clara Counties.	Serpentine grasslands, 200–1,300 feet.	April–June	No	No suitable vegetation communities or soils are present in the study area.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Holly-leaved ceanothus *Ceanothus purpureus*	–/–/1B.2	Inner north Coast Ranges. Napa and Solano Counties.	Chaparral on volcanic, rocky substrate, 400–2,100 feet.	February–April	No	No suitable vegetation communities or soils are present in the study area.
Congdon's tarplant *Centromadia [Hemizonia] parryi* ssp. *congdonii*	–/–/1B.2	East San Francisco Bay Area, Salinas Valley, Los Osos Valley.	Annual grassland, on lower slopes, flats, and swales, sometimes on alkaline or saline soils; below 750 feet.	June-November	Yes	Suitable habitat is present in nonnative annual grasslands in the study area, but species was not observed during blooming-period surveys.
Pappose tarplant *Centromadia [Hemizonia] parryi* ssp. *parryi*	–/–/1B.2	Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, and Sonoma Counties.	Coastal prairie, meadows and seeps, coastal salt marshes and swamps, alkaline soils in vernally mesic valley and foothill grassland; 6–1,400 feet.	May–November	Yes	**Species is present in the study area.** Suitable vegetation communities and soils are present, and the species was observed in the area north and south of SR 12E, between Beck Avenue and Pennsylvania Avenue.
Bolander's water-hemlock *Cicuta maculata* var. *bolanderi*	–/–/2.1	Southern Sacramento Valley, Central Coast, South Coast.	Coastal, freshwater, or brackish marshes and swamps; below 660 feet.	July–September	Yes	Suitable habitat is present in perennial marsh in the study area, but species was not observed during blooming-period surveys.
Suisun thistle *Cirsium hydrophilum* var. *hydrophilum*	E/–/1B.1	Suisun Marsh. Solano County.	Salt marsh, 0–3 feet.	July–September	No	No suitable vegetation communities are present in the study area.
Hispid bird's-beak *Cordylanthus mollis* ssp. *hispidus*	–/–/1B.1	Central Valley. Alameda, Kern, Merced, Placer, and Solano Counties.	Meadow, grassland, and playa on alkaline soils below 500 feet.	June–September	Yes	Suitable habitat is present in nonnative annual grasslands in the study area, but species was not observed during blooming-period surveys.
Soft bird's-beak *Cordylanthus mollis* ssp. *mollis*	E/R/1B.2	San Francisco Bay region and Suisun Marsh. Contra Costa, Marin,[b] Napa, Solano, Sacramento,[b] and Sonoma[b] Counties.	Tidal salt marsh, 0–10 feet.	July–September	No	No suitable vegetation communities or hydrologic conditions are present in the study area.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Subalpine cryptantha *Cryptantha crymophila*	–/–/1B.3	Alpine, Mono, and Tuolumne Counties.	Subalpine coniferous forest on volcanic, rocky substrates; 8,500–10,500 feet.	July–August	No	No suitable vegetation communities are present in the study area. Species is included in the Allendale quadrangle in the CNPS database (2010), but this is a high-elevation species unlikely to occur in the valley or Bay Area.
Recurved larkspur *Delphinium recurvatum*	–/–/1B.2	San Joaquin Valley and central valley of the south Coast Ranges. Contra Costa County to Kern County.	Subalkaline soils in annual grassland, saltbush scrub, cismontane woodland, and vernal pools at 100–2,000 feet.	March–May	Yes	Suitable habitat is present in nonnative annual grasslands and oak woodlands in the study area, but species was not observed during blooming-period surveys.
Western leatherwood *Dirca occidentalis*	–/–/1B.2	San Francisco Bay region, Alameda, Contra Costa, Marin, Santa Clara, San Mateo, and Sonoma Counties.	Moist areas in broadleaved upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, North Coast coniferous forest, riparian forest, riparian woodland; 165–1,300 feet.	January–April	No	Potentially suitable habitat is present in riparian woodland in the study area, but study area is below known elevation range and species was not observed during blooming-period surveys.
Dwarf downingia *Downingia pusilla*	–/–/2.2	Central Valley.	Vernal pools and valley and foothill grasslands; 3–1,500 feet.	March–May	Yes	Potentially suitable habitat is present in nonnative annual grasslands and seasonal wetlands in the study area, but species was not observed during blooming-period surveys.
Streamside daisy *Erigeron biolettii*	–/–/3	North Coast, from Humboldt County to Marin County, Solano County.	Moist, rocky areas in broadleaved upland forest, cismontane woodland, North Coast coniferous forest, and ledges along rivers; 100–3,600 feet.	June–October	Yes	**Species was present in the study area, but has been subsequently removed.** Suitable vegetation communities and soils are present, and the species was observed in the area north of I-80 and east of Dan Wilson Creek. This area has been graded for construction of a development project.
Greene's narrow-leaved daisy *Erigeron greenei*	–/–/1B.2	Lake, Napa, and Sonoma Counties.	On serpentinite or volcanic soils in chaparral; 260–950 feet.	May–September	No	No suitable plant communities or soils (serpentinite or volcanic) are present in the study area.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Tiburon buckwheat *Eriogonum luteolum* var. *caninum*	–/–/1B.1	Central inner north Coast Range, northern Central coast, and northern San Francisco Bay area: Alameda, Colusa, Lake, Marin, Napa, Santa Clara, San Mateo, Solano, and Sonoma[b] Counties.	On serpentinite in chaparral, coastal prairie, valley and foothill grassland; 0–2,300 feet.	June–September	No	No suitable soils (serpentinite) are present in the study area.
Mt. Diablo buckwheat *Eriogonum truncatum*	–/–/1B.1	Historically known from Alameda, Contra Costa, and Solano counties; recently rediscovered on Mt. Diablo.	Coarse, sandy soils in chaparral, coastal scrub, valley and foothill grassland; elevation 10–1,150 feet.	April–September	No	CNDDB includes an historic record from 1888 near Suisun City, but no suitable undisturbed nonnative annual grassland or coarse, sandy soils are present in the study area.
Fragrant fritillary *Fritillaria liliacea*	–/–/1B.2	Coast Ranges from Marin County to San Benito County.	Adobe soils of interior foothills, coastal prairie, coastal scrub, annual grassland, often on serpentinite; 10–1,345 feet.	February–April	Yes	Suitable habitat is present in nonnative annual grasslands in the study area, and heavy clay soils may occur in the study area, but species was not observed during blooming-period surveys.
Adobe lily *Fritillaria pluriflora*	–/–/1B.2	Northern Sierra Nevada foothills, inner Coast Ranges foothills, and Sacramento Valley. Butte, Colusa, Glenn, Lake, Napa, Plumas, Solano, Tehama, and Yolo Counties.	Chaparral, cismontane woodland, valley and foothill grassland, often on adobe soils; 200–2,300 feet.	February–April	Yes	Suitable habitat is present in nonnative annual grasslands in the study area, and heavy clay soils may occur in the study area, but species was not observed during blooming-period surveys.
Woolly-headed gilia *Gilia capitata* ssp. *tomentosa*	–/–/1B.1	Coastal California: Sonoma and Marin Counties.	Coastal bluff scrub; 50–510 feet.	May–July	No	No suitable vegetation communities are present in the study area.
Boggs Lake hedge-hyssop *Gratiola heterosepala*	–/E/1B.2	Inner north Coast Ranges, Central Sierra Nevada foothills, Sacramento Valley and Modoc Plateau: Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, and Tehama Counties; also Oregon.	Clay soils in areas of shallow water, lake margins and vernal pool margins, 330–7,800 feet.	April–August	Yes	Potentially suitable habitat is present in seasonal wetlands in the study area, but species generally occurs in large vernal pools, which do not occur in the study area. Species was not observed during blooming-period surveys.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Diablo helianthella *Helianthella castanea*	–/–/1B.2	San Francisco Bay area: Alameda, Contra Costa, Marin [b], San Francisco [b], and San Mateo Counties; also reported from San Diego County.	At chaparral/oak woodland ecotone, often in partial shade, on rocky soils, also coastal scrub, riparian woodland, grassland; 200–4,300 feet.	March–June	Yes	Marginally suitable habitat is present in riparian woodland in the study area, but species is not known from Solano County. Species was not observed during blooming-period surveys.
Pale yellow hayfield tarplant *Hemizonia congesta* ssp. *congesta*	–/–/1B.2	Coastal California: Mendocino, Sonoma and Marin Counties.	Coastal scrub, valley and foothill grassland, often in fallow fields; 82–1,500 feet.	April–October	Yes	Suitable habitat is present in nonnative annual grasslands and fallow row crop fields in the study area, but species was not observed during blooming-period surveys.
Brewer's western flax *Hesperolinon breweri*	–/–/1B.2	Southern north inner Coast Ranges, northeast San Francisco Bay region, and Mt. Diablo. Contra Costa, Napa, and Solano Counties.	Serpentine slopes in chaparral and grasslands at 100–2,000 feet.	May–July	No	No suitable soils (serpentine) are present in the study area.
Napa western flax *Hesperolinon serpentinum*	–/–/1B.1	Alameda, Lake, Napa, and Stanislaus Counties.	Chaparral on serpentinite; 164–2,600 feet.	May–July	No	No suitable vegetation communities or soils (serpentinite) are present in the study area.
Santa Cruz tarplant *Holocarpha macradenia*	T/E/1B.1	Coastal slope of the Santa Cruz Mountains, Monterey and Santa Cruz Counties.	Coastal terrace grasslands, coastal scrub, often on light sandy to sandy clay soils, 30–720 feet.	June–October	No	No suitable vegetation communities or soils (sandy or sandy clay) are present in the study area.
Carquinez goldenbush *Isocoma arguta*	–/–/1B.1	Deltaic Sacramento Valley and Suisun Slough. Contra Costa and Solano Counties.	Annual grassland on alkaline soils and flats generally below 70 feet.	August–December	Yes	Suitable habitat is present in nonnative annual grasslands in the study area, but species was not observed during blooming-period surveys.
Northern California black walnut *Juglans hindsii*	–/–/1B.1	Last two native stands in Napa and Contra Costa Counties; historically more widespread through southern north inner Coast Range, southern Sacramento Valley, northern San Joaquin Valley, and San Francisco Bay region.	Riparian forest, riparian woodland, 0–1,450 feet.	April–May	Yes	No native stands present in study area.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Contra Costa goldfields *Lasthenia conjugens*	E/–/1B.1	Napa and Solano Counties.	Alkaline or saline vernal pools and swales, below 1,550 feet.	March–June	Yes	**Species is present in the study area.** Suitable vegetation communities and soils are present, and the species was observed in the area south of SR 12E, west and east of Pennsylvania Avenue.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	–/–/1B.2	Central Valley and San Francisco Bay region. Alameda, Contra Costa, Fresno, Marin, Napa, Sacramento, San Benito, Santa Clara, San Joaquin, and Solano Counties.	Coastal and estuarine marshes below 1,000 feet.	May–September	No	No suitable vegetation communities are present in the study area.
Legenere *Legenere limosa*	–/–/1B.1	Central Valley.	Vernal pools.	April–June	Yes	Potentially suitable habitat is present in seasonal wetlands in the study area, but species was not observed during blooming-period surveys.
Heckard's pepper-grass *Lepidium latipes* var. *heckardii*	–/–/1B.2	Southern Sacramento Valley, Glenn, Solano, and Yolo Counties.	On margins of alkali scalds in annual grassland; below 656 feet.	March–May	No	No suitable soil conditions (alkali scalds) present in annual grasslands in the study area.
Jepson's leptosiphon *Leptosiphon jepsonii*	–/–/1B.2	Lake, Napa, and Sonoma Counties.	Chaparral and cismontane woodland, typically in volcanic soils, 320–1,640 feet.	March–May	No	No suitable soils (volcanic) are present in the study area.
Woolly-headed lessingia *Lessingia hololeuca*	–/–/3	Southern north Coast Ranges, southern Sacramento Valley, northern San Francisco Bay region, Alameda, Monterey, Marin, Napa, Santa Clara, San Mateo, Solano, Sonoma, and Yolo Counties.	Clay or serpentinite soils of coastal scrub, lower montane coniferous forest, valley and foothill grassland; 49–1,000 feet.	June–October	Yes	Suitable habitat is present in nonnative annual grasslands on clay soils in the study area, but species was not observed during blooming-period surveys.
Mason's lilaeopsis *Lilaeopsis masonii*	–/R/1B.1	Southern Sacramento Valley, Sacramento River–San Joaquin River Delta, and northeast San Francisco Bay Area. Alameda, Contra Costa, Marin,[b] Napa, Sacramento, San Joaquin, and Solano Counties.	Freshwater or brackish marsh, in tidal zone, generally at sea level.	April–November	No	No suitable hydrologic conditions (tidal areas) are present in the study area.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Sebastopol meadowfoam *Limnanthes vinculans*	E/E/1B.1	Napa? and Sonoma Counties.	Vernal pools, vernally mesic grasslands and wet meadows; 50–1,000 feet.	April–May	Yes	Potentially suitable habitat is present in seasonal wetlands in the study area, but species was not observed during blooming-period surveys.
Delta mudwort *Limosella subulata*	–/–/2.1	Deltiac Central Valley: Contra Costa, Sacramento, San Joaquin, and Solano Counties; Oregon.	Muddy or sandy intertidal flats and marshes, streambanks in riparian scrub generally at sea level; 0–10 feet.	May–August	No	No suitable hydrologic conditions (tidal areas) are present in the study area.
Mt. Diablo cottonweed *Micropus amphibolus*	–/–/3.2	Coast Ranges from Lake County to Santa Barbara County.	Rocky sites in broadleafed upland forest, mixed evergreen forest, oak woodland, chaparral, Valley and foothill grasslands; 150–2,700 feet.	March–May	No	No suitable soils are present in the study area, and study area is outside known range.
Robust monardella *Monardella villosa* ssp. *globosa*	–/–/1B.2	North Coast Ranges and Eastern San Francisco Bay Area: Alameda, Contra Costa, Humboldt, Lake, Mendocino, Napa, Santa Clara, Santa Cruz, San Mateo, and Sonoma Counties.	Grassy openings in oak woodland and chaparral, coastal scrub and grassland, 330–3,000 feet	June–July	No	Study area is below known elevational range for species. Not observed during blooming-period surveys.
Little mousetail *Myosurus minimus* ssp. *apus*	–/–/3.1	Central Valley and South Coast from Butte County south to San Diego County; Baja California, Oregon.	Valley and foothill grassland, alkaline vernal pools at 66–2,100 feet.	March–June	Yes	Suitable vegetation communities and soils are present in seasonal wetlands on alkali soils the study area, but the species was not observed during blooming-period surveys.
Baker's navarretia *Navarretia leucocephala* ssp. *bakeri*	–/–/1B.1	Inner North Coast Range, western Sacramento Valley: Colusa, Glenn, Lake, Mendocino, Marin, Napa, Solano, Sonoma, Tehama, and Yolo Counties.	Vernal pools and swales in woodland, lower montane coniferous forest, mesic meadows, and grassland; generally below 5,740 feet.	May–July	Yes	Potentially suitable habitat is present in seasonal wetlands in the study area, but species was not observed during blooming-period surveys.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Colusa grass *Neostapfia colusana*	T/E/1B.1	Central Valley. Colusa,[b] Glenn,[b] Merced, Solano, Stanislaus, and Yolo Counties.	Adobe soils of vernal pools generally below 660 feet.	May–September	Yes	Potentially suitable habitat is present in seasonal wetlands in the study area, and heavy clay soils may occur in the study area, but species was not observed during blooming-period surveys.
Antioch Dunes evening-primrose *Oenothera deltoides* ssp. *howellii*	E/E/1B.1	Northeast San Francisco Bay region, known from 3 native occurrences; Contra Costa and Sacramento Counties.	Inland dunes generally below 100 feet.	March–September	No	No suitable vegetation communities or soils are present in the study area.
San Joaquin Valley orcutt grass *Orcuttia inaequalis*	T/E/1B.1	Scattered locations along east edge of the San Joaquin Valley and adjacent foothills, from Stanislaus County to Tulare County.	Vernal pools, 30–2,500 feet.	April–September	Yes	Potentially suitable habitat is present in nonnative annual grasslands in the study area, but species was not observed during blooming-period surveys.
Bearded popcorn-flower *Plagiobothrys hystriculus*	–/–/1B.1	Endemic to Solano[b] County. Last recorded in 1892 (California Natural Diversity Database 2010a); rediscovered in 2005.	Mesic grasslands and vernal pools, 30–165 feet.	April–May	Yes	Potentially suitable habitat is present in seasonal wetlands in the study area, but species was not observed during blooming-period surveys.
Marin knotweed *Polygonum marinense*	–/–/3.1	Coastal Marin, Marin, Napa, Solano, and Sonoma Counties.	Coastal salt marsh, brackish marsh; 0–30 feet.	April–October	Yes	Suitable marsh habitat is present on south side of SR 12E, but not observed during blooming-period surveys.
Slender-leaved pondweed *Potamogeton filiformis*	–/–/2.2	Scattered locations in California: Contra Costa, El Dorado, Lassen, Merced, Mono, Modoc, Mariposa, Placer, Santa Clara*, and Sierra Counties; Arizona, Nevada, Oregon, Washington.	Freshwater marsh, shallow emergent wetlands and freshwater lakes, drainage channels; 980–7,050 feet.	May–July	Yes	Potentially suitable habitat is present in perennial marshes in the study area, but study area is below the known elevation range and the species was not observed during blooming-period surveys.
California beaked-rush *Rhynchospora californica*	–/–/1B.1	Scattered occurrences in northern California. Butte, Mariposa, Marin, and Sonoma Counties.	Freshwater marshes and seeps, bogs and fens, and lower montane coniferous forest, 131–3,310 feet.	May–July	Yes	Potentially suitable habitat is present in perennial marshes in the study area, but species was not observed during blooming-period surveys.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Rayless ragwort *Senecio aphanactis*	–/–/2.2	Scattered locations in central western and southwestern California, from Alameda County to San Diego County.	Oak woodland, coastal scrub, open sandy or rocky areas, on alkaline soils; 50–2,600 feet.	January–April	Yes	Suitable habitat is present in undisturbed oak woodlands in the study area, but species was not observed during blooming-period surveys.
Napa checkerbloom *Sidalcea hickmanii* ssp. *napensis*	–/–/1B.1	Napa county	Rhyolitic soils in chaparral; 1,360–2,000 feet.	April-June	No	No suitable vegetation communities or soils are present in the study area, and study area is below the known elevation range.
Marin checkerbloom *Sidalcea hickmanii* ssp. *viridis*	–/–/1B.3	Sonoma County to San Mateo County.	Openings in chaparral on volcanic or serpentinite substrates, 165–1,410 feet.	May–June	No	No suitable vegetation communities or soils are present in the study area.
Keck's checkerbloom *Sidalcea keckii*	E/–/1B.1	Fresno and Tulare Counties.	Serpentine clay soils in cismontane woodland, valley and foothill grassland; 400–1,400 feet.	April-May	No	No suitable soils are present in the study area, and study area is below the known elevation range.
Suisun marsh aster *Symphyotrichum lentum* [*Aster lentus*]	–/–/1B.2	Sacramento River–San Joaquin River Delta, Suisun Marsh, and Suisun Bay. Contra Costa, Napa, Sacramento, San Joaquin, and Solano Counties.	Tidal brackish and freshwater marsh below 500 feet.	May–November	No	No suitable hydrologic conditions (tidal areas) are present in the study area.
Napa bluecurls *Trichostema ruygtii*	–/–/1B.2	Lake and Napa Counties.	Cismontane woodland, lower montane coniferous forest, valley and foothill grassland, vernal pools; 100–200 feet.	June-October	Yes	Potentially suitable habitat is present in nonnative annual grasslands and seasonal wetlands in the study area, but species was not observed during blooming-period surveys.
Showy Indian clover *Trifolium amoenum*	E/–/1B.1	Coast Range foothills in the San Francisco Bay region, currently known from Marin County.	Low elevation grasslands, including swales and disturbed areas, sometimes on serpentinite soils; 13–1,360 feet.	April–June	Yes	Potentially suitable habitat is present in nonnative annual grasslands in the study area, but species was not observed during blooming-period surveys of all areas except the area north of SR 12W. The species has potential to occur in this area, and surveys of the area will be needed prior to construction.

Common Name *Scientific Name*	Legal Status[a] Federal/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Habitat Present in Study Area?	Rationale
Saline clover *Trifolium depauperatum* var. *hydrophilum*	–/–/1B.2	Alameda, Monterey, Napa, San Benito, Santa Clara, San Luis Obispo, San Mateo, Solano, and Sonoma Counties.	Salt marsh, mesic alkaline areas in grasslands, vernal pools; 0–1,000 feet.	April–June	Yes	**Species is present in the study area.** Suitable vegetation communities and soils are present, and the species was observed in the area south of SR 12E, west and east of Pennsylvania Avenue.
Greene's tuctoria *Tuctoria greenei*	E/R/1B.1	Scattered distribution along eastern Central Valley and foothills from Shasta County to Tulare County.	Dry vernal pools at 100–3,510 feet.	May–September	Yes	Potentially suitable habitat is present in seasonal wetlands in the study area, but species was not observed during blooming-period surveys.
Oval-leaved viburnum *Viburnum ellipticum*	–/–/2.3	Northwest California, San Francisco Bay Area, and north and central Sierra Nevada foothills. Contra Costa, Fresno, El Dorado, Glenn, Humboldt, Mendocino, Napa, Shasta, and Sonoma Counties, as well as Oregon and Washington.	Chaparral, cismontane woodland, and lower montane coniferous forest; 705–4,600 feet.	May–June	No	No suitable habitat in the study area, and study area is below elevational range for the species.

Sources: California Natural Diversity Database (CNDDB) 2010a and 2010b; CNPS 2010; Huffman-Broadway Group, Inc. 2007; Jones & Stokes study area surveys 2004 and 2007.

[a] Status explanations:

– = no listing.

Federal

E = listed as endangered under the federal Endangered Species Act.

T = listed as threatened under the federal Endangered Species Act.

State

E = listed as endangered under the California Endangered Species Act.

T = listed as threatened under the California Endangered Species Act.

R = listed as rare under the California Native Plant Protection Act; this category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.

California Native Plant Society

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.

2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.

3 = List 3 species: plants about which more information is needed to determine their status.

CNPS Code Extensions:

.1 = seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)

.2 = fairly endangered in California (20- 80% of occurrences threatened)

.3 = not very endangered in California (<20% of occurrences threatened or not current threats known)

[b] Known populations believed extirpated from that county.

Table 3.3.4-1. Special-Status Wildlife and Fish Species with the Potential to Occur in the I-80/I-680/SR-12 Project Region

Common Name, *Scientific Name*	Legal Status[a]		Geographic Distribution	Habitat Requirements	Habitat Present in Study Area?	Comments
	Federal	State				
Invertebrates						
Conservancy fairy shrimp *Branchinecta conservatio*	E	–	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties.	Large deep vernal pools in annual grasslands.	Absent	Suitable habitat (large, deep vernal pools) is not present in or near the study area.
Vernal pool fairy shrimp *Branchinecta lynchi*	T	–	Central Valley and central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County.	Common in vernal pools. Also found in sandstone rock outcrop pools.	Present	Suitable habitat (vernal pools) is present in or near the study area.
Vernal pool tadpole shrimp *Lepidurus packardi*	E	–	Shasta County to Merced County.	Vernal pools and ephemeral stock ponds.	Present	Suitable habitat (vernal pools) is present in or near the study area.
Delta green ground beetle *Elaphrus viridus*	T	–	Restricted to Olcott Lake and other vernal pools at Jepson Prairie Preserve in central Solano County.	Sparsely vegetated edges of vernal lakes and pools, occurring up to 250 feet from pools.	Absent	Outside known range of the species. Closest record occurs approximately 13 miles east of the study area at Jepson Prairie Preserve.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T	–	Streamside habitats below 915 meters (3,000 feet) above sea level throughout the Central Valley.	Riparian and oak savanna habitats with elderberry shrubs and streamside habitats below 915 meters (3,000 feet) above sea level. Elderberries are the host plant.	Present	Twenty-two elderberry shrubs are present in the study area.
Callippe silverspot butterfly *Speyeria callippe callippe*	E	–	San Bruno Mountains, San Mateo County, and a single location in Alameda County.	Open hillsides where Johnny jump-ups (*Viola pendunculata*) grows. Larvae feed on Johnny jump-up plants, whereas adults feed on native mints and non-native thistles.	Present	Seven populations of 1,350 Johnny jump-up plants were located in three distinct locations in the study area in March 2012 floristic surveys (H.T. Harvey & Associates 2012).

Common Name, *Scientific Name*	Legal Status[a]		Geographic Distribution	Habitat Requirements	Habitat Present in Study Area?	Comments
	Federal	State				
Amphibians						
California red-legged frog *Rana draytonii*	T	SSC	Along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County.	Permanent and semi-permanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation. May aestivate in rodent burrows or cracks during dry periods.	Present	Perennial and seasonal drainages and ponds and adjacent habitat in the study area provide potential aquatic and upland habitat. Species found in Mangels pond and a nearby intermittent drainage (North Connector EIR 2007).
California tiger salamander *Ambystoma californiense*	T	T	Central Valley, including Sierra Nevada foothills, up to 1,600 feet above sea level and coastal region (up to 3,900 feet) from Butte County to northeastern San Luis Obispo County.	Valley floor grasslands or low foothill elevations where lowland aquatic sites like large vernal pools, playa pools, sag ponds, and stock ponds are available for breeding. Upland habitat consists of small mammal burrows within approximately 2,200 feet of breeding habitat.	Present	Annual grassland and seasonal wetlands along SR 12-E provide potential upland and aquatic habitat.
Reptiles						
Giant garter snake *Thamnophis gigas*	T	T	Central Valley from the vicinity of Burrel in Fresno County to near Chico in Butte County. Extirpated from areas south of Fresno.	Sloughs, canals, low-gradient streams, and freshwater marshes where there is a prey base of small fish and amphibians. Also irrigation ditches and rice fields. Requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter.	Absent	Study area is on the edge of the species' range. No suitable habitat (perennial marsh and slough) that is hydrologically connected to GGS populations is present in the study area.

Common Name, *Scientific Name*	Legal Status[a]		Geographic Distribution	Habitat Requirements	Habitat Present in Study Area?	Comments
	Federal	State				
Western pond turtle *Actinemys marmorata*	–	SSC	Occurs from the Oregon border of Del Norte and Siskiyou Counties along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of the Sierra Nevada.	Ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests.	Present	Suitable aquatic habitat is present within the study area. The species is present within the Dan Wilson Creek/Green Valley Creek watershed (Solano County Water Agency 2009). Western pond turtles have been observed in a pond north of SR 12W (CNDDB 2010a) and in Ledgewood Creek during a swallow nest survey in March 2008 for the I-80 HOV project (Caltrans 2007).
Birds						
Northern harrier *Circus cyaneus*	–	SSC	Throughout lowland California. Has been recorded in fall at high elevations.	Grasslands, meadows, marshes, and seasonal and agricultural wetlands.	Present	Suitable nesting and foraging habitat is present in the study area. A northern harrier was observed in grassland habitat north of SR 12W (North Connector EIR 2007).
White-tailed kite *Elanus leucurus*	–	FP	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills, to western San Diego County at the Mexico border.	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging.	Present	Riparian habitat along the perennial and seasonal drainages provides potential nesting habitat in the study area.
Swainson's hawk *Buteo swainsoni*	–	T	Lower Sacramento and San Joaquin Valleys, Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland, Yolo County.	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields.	Present	Riparian habitat throughout the study area provides potential nesting habitat. Annual grassland, row crops, and ruderal vegetation provides suitable foraging habitat.

Common Name, *Scientific Name*	Legal Status[a]		Geographic Distribution	Habitat Requirements	Habitat Present in Study Area?	Comments
	Federal	State				
Western burrowing owl *Athene cunicularia hypugea*	–	SSC	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas. Rare along south coast.	Level, open, dry, heavily grazed or low-stature grassland or desert vegetation with available burrows. Also occurs along ag ditches and abandoned lots.	Present	Suitable nesting habitat is present in the study area. Burrowing owls were observed in grassland habitat north of SR 12W (North Connector EIR 2007).
Loggerhead shrike *Lanius ludovicianus*	–	SSC	Resident and winter visitor in lowlands and foothills throughout California. Rare on coastal slope north of Mendocino County, occurring only in winter.	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches.	Present	Suitable nesting habitat is present in the study area.
California clapper rail *Rallus longirostris oboletus*	E	FP	Marshes around San Francisco Bay and east through the Sacramento River–San Joaquin River Delta to Suisun Marsh.	Restricted to salt marshes and tidal sloughs. Usually associated with heavy growth of pickleweed. Feeds on mollusks removed from the mud in sloughs.	Absent	No suitable habitat (marsh and slough) is present in the study area.
California black rail *Laterallus jamaicensis coturniculus*	–	T, FP	Known from the San Francisco Bay area and the delta of the Sacramento and San Joaquin rivers south along the coast to northern Baja California and in Yuba County.	Inhabits saltwater, brackish, and freshwater marshes.	Absent	No suitable habitat is present in the study area.
California least tern *Sterna antillarum*	E	E	Nests on beaches along San Francisco Bay and along the southern California coast from southern San Luis Obispo County to San Diego County.	Nests on sandy, upper ocean beaches, and occasionally uses mudflats. Forages on adjacent surf line, estuaries, or the open ocean.	Absent	No suitable habitat (sandy beaches and mudflats) is present in the study area.
Western Snowy plover *Charadrius alexandrines nivosus*	T	SSC	Population defined as those birds that nest adjacent to or near tidal waters, including all nests along the mainland coast, peninsulas, offshore islands, and adjacent bays and estuaries. Twenty breeding sites are known in California from Del Norte to Diego County.	Coastal beaches above the normal high tide limit in flat, open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent	Absent	No suitable habitat (sandy beaches) present in the study area.

Common Name, *Scientific Name*	Legal Status[a]		Geographic Distribution	Habitat Requirements	Habitat Present in Study Area?	Comments
	Federal	State				
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	–	SSC	The breeding range of salt marsh common yellowthroat as described by Grinnell and Miller (1944) is bounded by Tomales Bay on the north, Carquinez Strait on the east, and Santa Cruz County on the south.	In California, yellowthroats are found in freshwater marshes, coastal swales, swampy riparian thickets, brackish marshes, salt marshes, and the edges of disturbed weed fields and grasslands that border soggy habitats (Shuford 1993).	Absent	No suitable habitat is present in the study area.
Suisun song sparrow *Melospiza melodia maxillaris*	–	SSC	The Suisun song sparrow is a distinct subspecies completely endemic to Suisun Bay.	Intermixed stands of bulrush, cattail, and other emergent vegetation provide ideal habitat.	Absent	No suitable habitat is present in the study area.
Tricolored blackbird *Agelaius tricolor*	–	SSC	Permanent resident in the Central Valley from Butte County to Kern County. Breeds at scattered coastal locations from Marin County south to San Diego County; and at scattered locations in Lake, Sonoma, and Solano Counties. Rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields. Habitat must be large enough to support 50 pairs. Probably requires water at or near the nesting colony	Present	Suitable nesting habitat is present in the study area.
Mammals						
Suisun shrew *Sorex ornatus sinuosus*	–	SSC	Found in the tidal marshes of the northern shores of San Pablo and Suisun bays, as far east as Grizzly Island, and as far west as Sonoma Creek and Tubbís Island. Also observed near Petaluma and north of San Rafael.	Occupies tidal marshes that provide dense cover, abundant food (primarily invertebrates), suitable nesting sites, and fairly continuous ground moisture.	Absent	No suitable saltmarsh habitat occurs on site.
Salt marsh harvest mouse *Reithrodontomys raviventris*	E	E, FP	Vicinity of San Francisco, San Pablo, and Suisun Bays and the Sacramento River–San Joaquin River Delta.	Salt marshes with a dense plant cover of pickleweed and fat hen. Adjacent to an upland site.	Absent	No suitable habitat (saltmarsh) is present in the study area based on survey by Phil Leitner (letter to ICF 2007)).
Pallid bat *Antrozous pallidus*	–	SSC	Throughout California.	Day roosts include rock outcrops, mines, caves, hollow trees, buildings and bridges. Recent research suggests high reliance on tree roosts.	Present	Bridges and trees in study area provide potential roosting sites.

Common Name, *Scientific Name*	Legal Status[a]		Geographic Distribution	Habitat Requirements	Habitat Present in Study Area?	Comments
	Federal	State				
Western red bat *Lasiurus blossevillii*	–	SSC	Scattered throughout much of California at lower elevations	Found primarily in riparian and wooded habitats. Occurs at least seasonally in urban areas. Day roosts in trees within the foliage. Found in fruit orchards and sycamore riparian habitats in the central valley	Present	Suitable roosting habitat in riparian woodlands and orchards.
Long-eared bat *Myotis evotis*		WBWG: Medium priority	Found throughout California.	Day roosts in hollow trees under exfoliating bark, and crevices in rock outcrops. Found roosting under bark of small black oaks in northern California.	Present	Suitable roosting habitat occurs in trees.
Fringed myotis bat *Myotis thysanodes*		WBWG: High priority	Found throughout most of California.	Roosts in colonies in caves, cliffs and attics of old buildings. Will also use trees as day roosts.	Present	Suitable roosting habitat occurs in trees.
Yuma myotis *Myotis yumanensis*	–	WBWG: Low-medium priority	Considered common and widespread in northern California up to 5,000 feet above sea level. Colonies known from Marin and San Francisco Counties.	Found in desert scrub, pinyon-juniper woodlands, and other open woodlands and forests. Open water is a key habitat element for this species. Roosts colonially in a variety of natural and artificial sites, including caves, mines, buildings, bridges, and trees.	Present	Bridges and trees in study area provide potential roosting sites.
Fish						
Delta smelt *Hypomesus transpacificus*	T	T	Sacramento River–San Joaquin River Delta	Euryhaline estuary channels.	Absent	Ledgewood Creek in the project area connects to Peytonia Slough which does not support delta smelt (Schroeter et al. 2006).
Central California coast steelhead distinct population segment (DPS) *Oncorhynchus mykiss*	T	–	Coastal streams from Russian River to Aptos Creek; tributaries to San Francisco, San Pablo, and Suisun Bays; Suisun Marsh; and coastal marine waters off California.	Coldwater anadromous streams.	Present	The project is located in inland freshwater stream habitats draining to Suisun Marsh. Species occurrence documented in Suisun, Green Valley and Ledgewood Creeks. Study area is not included in critical habitat.

Common Name, *Scientific Name*	Legal Status[a]		Geographic Distribution	Habitat Requirements	Habitat Present in Study Area?	Comments
	Federal	State				
Central Valley steelhead DPS *Oncorhynchus mykiss*	T	–	Sacramento River and tributary Central Valley rivers	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 7.8 to 18°C (Moyle 2002). Habitat types are riffles, runs, and pools.	Absent	Outside of species range.
Central California coast coho *Oncorhynchus kisutch*	E	E	Includes naturally spawned populations from Punta Gorda in northern California south to and including the San Lorenzo River in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River system	Occur in coastal streams with water temperatures < 15°C. Need cool, clear water with instream cover. Spawn in tributaries to large rivers or streams directly connected to the ocean (Moyle 2002).	Absent	Outside of species range.
Sacramento River winter-run Chinook salmon *Oncorhynchus tshawytscha*	E	E	Mainstem Sacramento River below Keswick Dam (Moyle 2002)	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C. Habitat types are riffles, runs, and pools. (Moyle 2002.)	Absent	Outside of species range.
Central Valley spring-run Chinook salmon *Oncorhynchus tshawytscha*	T	T	Upper Sacramento River and Feather River	Have the same general habitat requirements as winter-run Chinook salmon. Coldwater pools are needed for holding adults (Moyle 2002).	Absent	Outside of species range.
River lamprey *Lampetra ayresi*	–	SSC	Exact range unknown, but includes coastal streams from Alaska to San Francisco Bay. In California, within lower Sacramento and San Joaquin Rivers, Napa River, Sonoma Creek, Alameda Creek, Salmon Creek, Russian River tributaries, and tributaries to San Francisco Bay.	Habitat requirements poorly understood, but include anadromous streams with gravel riffle for spawning and soft-bottomed areas for rearing.	Present	The project is located in inland freshwater anadromous stream habitats draining within the range of the species.
Sacramento splittail *Pogonichthys macrolepidotus*	–	SSC	Largely confined to Sacramento River–San Joaquin River Delta, Napa River, Petaluma River, Sacramento River, and Suisun Marsh.	Shallow-water, low-salinity habitats throughout slow areas of rivers and sloughs; areas of flooded vegetation for spawning and rearing.	Present	Ledgewood Creek in the project area connects to Peytonia Slough which supports splittail (Schroeter et al. 2006).

Common Name, *Scientific Name*	Legal Status[a]		Geographic Distribution	Habitat Requirements	Habitat Present in Study Area?	Comments
	Federal	State				
Green sturgeon *Acipenser medirostris*	T	SSC	In marine waters of the Pacific Ocean from the Bering Sea to Ensenada, Mexico. In rivers from British Columbia south to the Sacramento River, primarily in the Klamath/Trinity and Sacramento Rivers.	Primarily marine, using large anadromous freshwater rivers and associated estuaries for spawning and rearing.	Absent	The project area does not include large rivers and is not within the primary range of the species.
Central Valley fall/late fall–run Chinook salmon *Oncorhynchus tshawytscha*	SC	–	Sacramento and San Joaquin Rivers and their tributaries, as well as some tributaries to San Francisco Bay.	Lower-elevation coldwater anadromous streams.	Present	The project is located in inland freshwater anadromous stream habitats draining to Suisun Marsh, designated essential fish habitat. Species occurrence documented in Suisun, Green Valley and Ledgewood Creeks.

[a] Status explanations:
– = no listing.

Federal
- E = listed as endangered under the federal Endangered Species Act.
- T = listed as threatened under the federal Endangered Species Act.
- SC = species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.
- P = officially proposed (in the Federal Register) for listing as endangered or threatened.
- C = candidate to become a proposed species.

State
- E = listed as endangered under the California Endangered Species Act.
- T = listed as threatened under the California Endangered Species Act.
- FP = fully protected under the California Fish and Game Code.
- C = formally designated as a candidate for threatened or endangered status; extending its legal protection for 1 year (until February 2010).
- SSC = species of special concern in California.
- WBWG = Western Bat Working Group (http://www.wbwg.org/spp_matrix.html)

High priority = species are imperiled or at high risk of imperilment
Moderate priority = This designation indicates a level of concern that should warrant closer evaluation, more research, and conservation actions of both the species and possible threats. A lack of meaningful information is a major obstacle in adequately assessing these species' status and should be considered a threat
Low priority = While there may be localized concerns, the overall status of the species is believed to be secure.

3.4 Relationship between Local Short-Term Uses of the Human Environment and the Maintenance of Long-Term Productivity

Implementation of either of the project alternatives (and their fundable first phases) will result in attainment of short-term and long-term transportation, safety, and economic objectives at the expense of some long-term social, aesthetic, biological, noise, parkland, and other land use impacts. Implementation of Alternative B or Alternative C would further address the objectives as well as long-term inspection and enforcement objectives with the construction of the improved westbound truck scales facility. The attainment of these objectives (long-term productivity) comes at the expense of some short-term costs that would be incurred during construction and some long-term term losses of valuable uses of the environment. These long-term losses include impacts on biological resources, agricultural and community land uses, air quality, and noise.

3.4.1 Build Alternatives

The build alternatives would have similar impacts. Because of the magnitude of the proposed project, the fundable first phase of the alternatives would have similar impacts and the full build alternatives would have similar impacts.

Alternative B, Phase 1 and Alternative C, Phase 1

The fundable first phase of the alternatives would have similar impacts.

- **Short-term losses would include**: economic losses experienced by businesses that relocate; construction impacts such as noise, traffic detours or delays; access inconveniences; temporary disturbance to biological resources; visual impacts during construction.
- **Short-term benefits would include:** increase in jobs and revenue due to construction.
- **Long-term losses would include:** permanent loss of plant and wildlife resources; loss of agricultural land; noise increase; displaced businesses and a displaced residence; use of construction materials and energy; possible decreased air quality or increase in greenhouse gas emissions.
- **Long-term gains would include:** improvement of transportation network in the vicinity; reduction of congestion on local roads and highways.

Alternative B and Alternative C

These alternatives would have similar impacts.

- **Short-term losses would include:** economic losses experienced by businesses that relocate; construction impacts such as noise, traffic detours or delays; access inconveniences; temporary disturbance to biological resources; visual impacts during construction.
- **Short-term benefits would include:** increase in jobs and revenue due to construction.

- **Long-term losses would include:** permanent loss of plant and wildlife resources; loss of agricultural land; noise increase; displaced businesses and a displaced residence; use of construction materials and energy; possible decreased air quality or increase in greenhouse gas emissions.
- **Long-term gains would include:** improved truck weight and safety inspection and enforcement system; improvement of transportation network in the vicinity; reduction of congestion on local roads and highways; encouragement of use of HOV lanes.

3.4.2 No-Build Alternative

This alternative would not result in any of the gains or losses listed under the above alternatives. It would not address the issues of worsening traffic and truck congestion, increasingly unreliable freight transport, or worsening traffic safety.

3.5 Irreversible and Irretrievable Commitments of Resources

Irretrievable commitments of resources would occur as a result of implementing any of the proposed project alternatives because all of the project alternatives involve a commitment of natural, physical, human, and fiscal resources. Land converted from its present uses to a transportation facility is considered an irreversible commitment. However, if a greater need arises for use of the land or if the highway facility is no longer needed, the land can be converted to another use. At present, there is no reason to believe such a conversion would ever be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material would be expended in the construction of any of the alternatives. Additional building materials would be used in the construction of the westbound truck scales facility under both Alternative B and C. Additionally, extensive expenditure of labor and natural resources (e.g., woodlands, wetlands, and other natural habitat) are used in the production of construction and building materials. These materials are typically not retrievable. However, they are generally not in short supply and their use would not have an adverse effect on continued availability of these resources. Any construction would also require a substantial one-time expenditure of both state and federal funds, which are not retrievable. In addition to the costs of construction and right-of-way, costs for roadway maintenance, including pavement maintenance and resurfacing, roadside, litter/sweeping, signs and markers, electrical and storm maintenance would be incurred. However, savings in energy use, travel time, and a reduction of accidents would offset these costs.

The commitment of these resources is based on the concept that the residents in the immediate area, region, and state, as well as commuters would benefit from the improved quality of the transportation system. In the case of the ultimate alternatives, the safety of the nation would benefit from the improved security and enforcement at the new westbound truck scales facility. These benefits would consist of improved accessibility, functioning, safety, and homeland security, which are expected to outweigh the commitment of these resources.

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3.6 Cumulative Impacts

3.6.1 Regulatory Setting

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of the proposed 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 on 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 the introduction or promotion of predators. They also can 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.

3.6.2 Approach to Cumulative Impact Analysis

The cumulative impacts analysis was conducted using Caltrans standard 8 step approach as presented in *Guidance for Preparers of Cumulative Impact Analysis* (Standard Environmental Reference, SER). The following eight steps listed below were taken from the on line SER and serve as guidelines for identifying and assessing cumulative impacts:

1. Identify the resources to consider in the cumulative impact analysis by gathering input from knowledgeable individuals and reliable information sources. This process is initiated during project scoping and continues throughout the NEPA/CEQA analysis.
2. Define the geographic boundary or RSA for each resource to be addressed in the cumulative impact analysis.
3. Describe the current health and the historical context of each resource.
4. Identify the direct and indirect impacts of the proposed project that might contribute to a cumulative impact on the identified resources.

5. Identify the set of other current and reasonably foreseeable future actions or projects and their associated environmental impacts to include in the cumulative impact analysis
6. Assess the potential cumulative impacts.
7. Report the results of the cumulative impact analysis.
8. Assess the need for mitigation and/or recommendations for actions by other agencies to address a cumulative impact.

The cumulative analysis for the proposed project takes into consideration the other ongoing projects in the same geographic area as the proposed project, as well as planned land uses and transportation and circulation projections identified in city and county general plan and policy documents.

The existing and proposed transportation projects listed below in order of anticipated completion have been included in this analysis because they either are close to the project area or could affect regional resources. This information represents the most up-to-date information available as of the date of publication of this document.

- **North Connector Project:** The North Connector Project would construct a parallel route to the north of I-80 between Abernathy Road at I-80 on the east and SR 12 at Red Top Road on the west. This project would provide increased east/west capacity and provide an alternative to I-80 for local traffic. The East End (or the Suisun Parkway Segment of the North Connector) and the Central and Hook Segment (Business Center Drive) has been constructed and opened to traffic in November 2010.
- **Interstate 80 High-Occupancy Vehicle Lanes Project:** Eastbound and westbound high-occupancy vehicle (HOV) lanes have been constructed along an approximately 8.5-mile-long segment of I-80 from the Red Top Road interchange in Solano County to approximately 0.5 mile east of the Air Base Parkway interchange in Fairfield. This project (EA-04-0A5304) increases the overall carrying capacity of I-80 in the project area and facilitates the already high demand for ridesharing on I-80. Construction of this project was completed in November 2009.
- **Jepson Parkway:** This project would provide a route for local Vacaville-Fairfield traffic to bypass I-80 in Fairfield and instead enter Fairfield from the east on Air Base Parkway or from the south on State Route 12. The project would include widening of existing roads, and could include construction of new roadway through an existing area of grassland and wetlands. Design of the project is currently underway and should be completed in late 2012.
- **2010 State Highway Operation and Protection Program (SHOPP) Projects:** These projects include two collision reduction projects scheduled for construction in program year 2010/11 and one mobility project scheduled for construction in program year 2012/2013. One collision reduction project is to construct a concrete barrier on I-80 in Vallejo between the Redwood Street on-ramp and the Route 37 connector. The other collision reduction project is to widen the shoulder on SR 12 near Rio Vista between Azevedo Road and Liberty Island Road. The mobility project includes lengthening an on-ramp and widening a bridge on I-80 in Vacaville, from west of the Alamo Creek Bridge to the Alamo west-bound on-ramp.

- **I-80 Eastbound Cordelia Truck Scales Relocation Project:** The I-80 Eastbound Cordelia Truck Scales Relocation Project (EA-04-0A5350) would include the construction of a larger, more efficient truck scales facility on eastbound I-80, approximately 2,500 feet east of the existing facility. The project would also include the construction of on- and off-ramps to both I-80 and eastbound SR 12E. The environmental document for the project was approved in fall 2009. The anticipated construction start date is August 2014.
- **Jameson Canyon (SR 12) Widening from I-80 to SR 29:** This project would provide a continuous four-lane expressway between I-80 and SR 29. The project is currently in the final design phase and construction is planned to begin in late 2012.
- **Jameson Canyon Corridor Study:** This project is currently underway and will study how connections with the interchanger improvements can be achieved.
- **I-80 Express Lanes Projects:** Two projects are planned as part the construction of the I-80 express lanes. The I-80 Express Lanes (HOV Conversion) Project would convert the existing HOV lanes between Red Top Road and Airbase Parkway Project to express lanes. The I-80 Express Lanes (New Lanes) Project would construct new express lanes between Airbase Parkway and I-505. These improvements are in the early planning phase. No construction dates have been determined.
- **I-80 Improvements through Fairfield:** Several projects are planned between SR 12W and Air Base Parkway. They include the removal of existing hook ramps at Auto Mall Parkway and construction of westbound auxiliary lanes on I-80 between Green Valley Road and SR 12W, Waterman Boulevard and Travis Boulevard, and West Texas Street and Abernathy Road. These improvements are in the early planning phases. No construction date has been determined.
- **Transit Improvements:** To support increased transit ridership and expanded bus routes in the county, the *I-80/I-680/I-780 Transit Corridor Study* identifies numerous potential locations for park-and-ride lots in these major corridors, four of which could be located in the project area: Red Top Road at I-80, a surface lot at Abernathy Road between I-80 and SR 12 or an expanded parking structure at the Fairfield Multimodal Transportation Center, and Gold Hill Road at I-680. The Red Top Road park and ride lot will be constructed along Red Top Road near the westerly City limits in Fairfield, consisting of 215 spaces located on approximately 3 acres. This new park and ride lot will replace the existing park and ride lot located at the Green Valley Road interchange with I-80. The new park and ride lot received environmental clearance in April 2010 and will be constructed and opened prior to closing the existing park and ride lot located at the Green Valley Road interchange.

Additionally, local non-transportation projects currently planned and underway in the general project area are provided in Tables 3.1.1-1 and 3.1.1-2. These projects represent development covered in county and city planning documents and approved under building permits. The cumulative analysis for the individual resource areas are based on analysis of different geographic boundaries or resource study areas. The resource study area and pertinent projects are identified under each resource area.

3.6.3 Assessment of Cumulative Impacts

The project alternatives would not contribute to a cumulative impact in the following resource areas because the resources are in generally good health and the project alternatives would result in either beneficial impacts, no impacts, or minor impacts that would be fully mitigated (to a less than significant level) and the alternatives' contribution to the cumulative impact would not be considerable.

- Land Use
- Growth
- Community Impacts
- Utilities and Emergency Services
- Visual and Aesthetic Resources
- Cultural Resources
- Hydrology and Floodplain
- Water Quality and Stormwater Runoff
- Geology/Soils/Seismic/Topography
- Paleontology
- Hazardous Waste/Materials
- Air Quality
- Noise
- Energy
- Biological Resources (Plant Species and Animal Species)

3.6.3.1 Human Environment

Farmlands

Farmland resources are most commonly managed at the County and Statewide level. For the proposed project the study area for cumulative farmlands effects is Solano County. As discussed in Section 3.1.3, Solano County had a total of 360,562 acres of land under cultivation in 2006. Of this total, 139,536 acres were designated as Prime Farmland, 7,164 acres were designated as Farmland of Statewide Importance, 11,036 acres were designated as Unique Farmland, and 202,826 acres were used for grazing purposes (California Department of Conservation 2006). Between 1984 and 2006, 40,537 acres (1,843 acres per year) of agricultural land was converted to non-agricultural uses in Solano County. This conversion included 23,221 acres of Important Farmland at a rate of 1,056 acres per year. Approximately half of the converted acreage, or 12,689 acres, was considered Prime Farmland (California Department of Conservation 2006). During this same period, about 13,000 acres inside the cities' (Fairfield and Suisun City) spheres of influence were converted to non-agricultural uses. This trend has caused local and regional

governments to implement measures to preserve farmland (see discussion in Section 3.1.3, County of Solano).

As discussed in Section 3.1.3, the project alternatives would result in the conversion of farmlands to non-farm uses. Alternative B would convert roughly 140 acres of agricultural land to roadway, while Alternative B, Phase 1 would not affect agricultural land. Alternative C would convert roughly 122 acres of agricultural land, while Alternative C, Phase 1 would convert roughly 77 acres of agricultural land.

The direct impact of the project alternatives is not considered adverse, as measured by its LESA score (see discussion at page 3.1.3-8).

The project alternatives in combination with other ongoing and reasonably foreseeable projects in the study area (see discussion under 3.6.2 above and Tables 3.1.1-1 and 3.1.1-2) would contribute to additional conversion of farmland to non-farm uses. The amount of farmland conversion could cause a cumulatively adverse effect. However, farmland conversion in the County of Solano is governed by the County General Plan which has strong policies and guidelines for the protection and mitigation of impacts to farmland including the following implementation measure:

> "AG.I-1: Create and adopt a farmland conversion mitigation program and ordinance."

Implementation of this measure will limit the cumulative impact on farmlands on a county wide basis. The project alternatives would also be required to mitigate farmland impacts (see discussion at page 3.1.3-9).

Given the strong policies of the Solano County General Plan to limit and mitigate impacts to farmlands and the project alternatives would also include mitigation that would preserve additional farmland within the County, the long-term health of the resource would be preserved and maintained and therefore no cumulative effect to farmlands would occur.

Traffic and Transportation/Pedestrian and Bicycle Facilities

The resource study area for cumulative traffic and transportation impacts is the same as that used for the traffic analysis. Projects that would contribute to potential cumulative impacts include all the transportation projects listed in section 3.6.2 and development projects included in local planning documents. These impacts are analyzed in Section 3.1.6 for each alternative in 2035. Because the project alternatives, to varying degrees, would result in net beneficial effects on traffic and transportation, they would not contribute to a cumulative impact on traffic and transportation.

The resource study area for cumulative impact to pedestrian and bicycle facilities includes those facilities within the project area and the local planning areas. Projects that may contribute to a potential cumulative impact would include the development projects in Section 3.1.1 and the transportation projects listed in Section 3.6.2. Pedestrian and bicycle facilities in the area are accounted for in local planning documents. Effects to bicycle and pedestrian facilities during construction of the project would be temporary. Project design will ensure that existing facilities

can be maintained or replaced and that planned facilities can be provided. The proposed project would not contribute to a cumulative impact on pedestrian and bicycle facilities.

3.6.3.2 Biological Environment

Natural Communities

Implementation of the project alternatives would directly impact riparian woodlands and native trees, and in combination with other local and regional projects, would contribute to the cumulative loss of riparian woodland and native trees in the project vicinity. Historic loss of riparian vegetation and native trees in Solano County has occurred from conversion of riparian and native tree habitat for agriculture and development. Although riparian vegetation and native trees remains along some of the major streams in the county and in isolated areas, including Suisun Creek, these riparian corridors are substantially narrower than historically because of development. The project alternatives would contribute incrementally to cumulative impacts on riparian woodland and native trees in Solano County by directly impacting 2.5 acres of riparian habitat, although this contribution on a regional basis is relatively small (<1% on an acreage basis). Other existing and reasonably foreseeable projects within the county, such as Fairfield Corporate Commons, Green Valley Corporate Park, and other business and residential projects in the area, have the potential to contribute to the cumulative loss of riparian habitat.

Avoidance, minimization, and/or mitigation measures identified in Section 3.3.1.1 to avoid and minimize disturbance and to compensate for loss of riparian vegetation and native trees that would be impacted by the project alternatives would reduce this impact. The proposed mitigation for this project includes creation of riparian habitat (Section 3.3.1.1) and oak woodlands (Section 3.3.1.2) to replace acreage, as well as functions and values, thus mitigating for the project's potential contribution to cumulative impacts. However, to fully address the cumulative impact to the resource from implementation of other projects, various agencies such as Solano County, City of Fairfield and Suisun City would need to require and implement similar mitigation to protect and restore riparian woodlands impacted by other existing and reasonably foreseeable projects in the study area.

Wetlands and Other Waters

Implementation of the proposed project, in combination with other local and regional projects, without mitigation, would contribute to the cumulative loss of wetlands and drainages that are waters of the United States within the Suisun Bay hydrologic unit (HUC 18050001). Most drainages that historically occurred in the rivers in the Solano County have been modified over the last century or more to improve water transport, flood protection, and agricultural development (Solano County Water Agency 2009). Wetlands and drainages have been filled for development and agricultural improvements, including features that are waters of the United States.

California now has approximately 2.9 million acres of wetlands, which is approximately 10% of the wetland area that was present two hundred years ago. Around the San Francisco Estuary, almost 200,000 acres of tidal marshes existed historically, much of which were large marshes of 50,000 acres or more in Suisun, North Bay, and South Bay. Approximately half of the grasslands above the tidal marshes were seasonally moist. By the 1950s, there were only about 50,000 acres of tidal marshes in the entire estuary, about 25% of the historical amount. Loss has continued

more slowly since then. Currently, less than 1% of the non-saline historic wetlands and about 15% of the historic salt marsh in the San Francisco Estuary remain due to direct conversion of wetlands to other land uses and changes in watershed land use that indirectly result in wetland loss. Since the mid-1800s, moist grasslands in the Estuary have declined from about 60,000 acres to about 7,000 acres, and moist grassland/vernal pool habitat has declined from about 24,000 acres to about 15,000 acres, as a result of farming and urban uses.

In the eastern part of Suisun Marsh, wetlands were first diked in 1865 to be used for livestock grazing, and by the early 1900s, these areas were also farmed to produce various crops. Natural marsh ponds in the western portion of the marsh were established as duck clubs in the 1870s and 1880s. Today, Suisun Marsh is the largest contiguous protected area in the San Francisco Estuary, and includes a primary management area (89,000 acres of wetlands, channels, and bays) and a secondary management area (22,500 acres of adjacent uplands). (California Natural Resources Agency 2009; Goals Project 1999.)

Direct loss of waters of the United States in drainages and wetlands would be caused by the proposed project, and indirect effects on waters of the United States due to sedimentation could also occur. Additional projects proposed within the hydrologic unit, such as Fairfield Corporate Commons, Green Valley Corporate Park, and other business and residential projects in the area, have the potential to cause cumulative direct and indirect impacts on wetlands and drainages. Direct impacts can result from the placement of fill within a wetland or drainage. Indirect impacts can be caused by the accumulation of sediment in wetlands and drainages resulting from adjacent disturbances. Both direct and indirect impacts have the potential to add to the cumulative loss of wetland and drainage habitat.

The project alternatives would result in the direct and indirect loss of up to 21.55 acres of wetland habitat and 4.67 acres of drainage habitat. Indirect impacts on wetlands and drainages associated with this project would be minimized through avoidance and minimization measures in Section 3.3 and also through BMPs required under Section 404 permit conditions. Cumulative impacts of the proposed project, in combination with other existing and reasonably foreseeable projects, on wetland resources would be reduced through compliance with requirements under Section 404 of the Clean Water Act and the Porter-Cologne Water Quality Control Act,. In addition, federal policy establishes a goal of no net loss of the function or value of the nation's wetlands. While this may not be achieved on every individual project, this goal does ensure that, on the whole, cumulative impacts to wetlands under federal jurisdiction are reduced over time. The proposed mitigation for this project includes creation of wetlands and other waters habitats (Section 3.3.2) to replace acreage, as well as functions and values, thus mitigating for the project's potential contribution to cumulative impacts. With implementation of these mitigations, the project will be in full compliance with the state and federal no net loss policies.

3.6.3.3 Threatened and Endangered Species

Eight threatened or endangered species occur or have the potential to occur within the project area. These species include:

- Contra Costa goldfields
- Callippe silverspot butterfly

- Vernal pool fairy shrimp
- Vernal pool tadpole shrimp
- Valley elderberry longhorn beetle
- California red-legged frog
- Swainson's hawk
- Central California coastal steelhead

Project alternatives would result in both direct and indirect impacts to these species. Avoidance, minimization and/or mitigation measures have been identified in Chapter 3.3. In addition, consultation under Section 7 of the Endangered Species Act has been finalized and a Biological Opinion was issued for the project on April 16, 2012.

The proposed mitigation for this project includes a wide variety of mitigation measures (see Chapter 3.3) specific to each of the threatened and endangered species, including acquisition of existing habitat and management to enhance the existing populations, and creation of new habitat. These mitigation measures will replace acreage, as well as functions and values, of habitats impacted by the project and, along with the project's avoidance and minimization measures, and measures identified in the project's biological opinion, the project's potential cumulative impacts to threatened and endangered species will be fully mitigated.