Final Programmatic Environmental Assessment

Recurring Actions in California

December 2003

FEMA

U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, California 94607

This document was prepared by

Nationwide Infrastructure Support Technical Assistance Consultants
A Joint Venture of URS Group, Inc., and Dewberry & Davis LLC

1333 Broadway, Suite 800
Oakland, California 94612

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FINAL PROGRAMMATIC ENVIRONMENTAL ASSESSMENT (PEA)

FOR

TYPICAL RECURRING ACTIONS

FLOOD, EARTHQUAKE, FIRE, RAIN, AND WIND DISASTERS IN CALIFORNIA

Prepared for
Federal Emergency Management Agency

Prepared by

Nationwide Infrastructure Support Technical Assistance Consultants
(A Joint Venture of URS Group, Inc., and Dewberry & Davis LLC)

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FINAL

Programmatic Environmental Assessment (PEA) for Typical Recurring Actions

Flood, Earthquake, Fire, Rain, and Wind Disasters in California

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TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

Tables

Figures

TABLE OF CONTENTS

Appendices

TABLE OF CONTENTS

Acronyms

ºF	°Fahrenheit
ACHP	Advisory Council on Historic Preservation
ACCM	asbestos-containing construction material
ACM	asbestos-containing material
A-P Act	Alquist-Priolo Earthquake Fault Zoning Act
APCD	Air Pollution Control District
AQMD	Air Quality Management District
AST	aboveground storage tank
BACT	best available control technology
BFE	base flood elevation
BLM	Bureau of Land Management
BMPs	Best Management Practices
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CARA	California River Assessment
CARB	California Air Resources Board
CBC	California Building Code
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDF	California Department of Forestry and Fire Protection
CDFG	California Department of Fish and Game
CEPA	California Environmental Protection Agency
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act

CFR	Code of Federal Regulations
CNEL	community noise equivalent level
CO	carbon monoxide
CTC	California Transportation Commission
CVP	Central Valley Project
CWA	Clean Water Act
DBA	a-weighted decibel(s)
DNL(L_{dn})	day-night averaged sound level
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
ESA	(federal) Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
GCR	General Conformity Rule
HUD	Department of Housing and Urban Development
LBP	lead-based paint
Leq	equivalent sound level
MAF	million acre-feet
Mph	mile(s) per hour
NAAQS	National Ambient Air Quality Standards
NEHRP	National Earthquake Hazard Reduction Program
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act

NOAA Fisheries	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSR	New Source Review
O_3	ozone
OES	California Office of Emergency Services
OPR	California Governor's Office of Planning and Research
PA	Programmatic Agreement
PBO	Programmatic Biological Opinion
PCBs	polychlorinated biphenyls
PEA	Programmatic Environmental Assessment
PG&E	Pacific Gas and Electric
PITS	Programmatic Incidental Take Statement
PL	Public Law
PM_{10}	particulate matter smaller than 10 microns in diameter
$PM_{2.5}$	particulate matter smaller than 2.5 microns in diameter
PRC	Public Resources Code
PSD	Prevention of Significant Deterioration
RACM	regulated asbestos containing material
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SCE	Southern California Edison

SDG&E	San Diego Gas and Electric
SEA	Supplemental Environmental Assessment
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMUD	Sacramento Municipal Utility District
SO_2	sulfur dioxide
SWP	State Water Project
SWRCB	State Water Resources Control Board
TSCA	Toxic Substances Control Act
UBC	Uniform Building Code
URARPAPA	Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VOCs	volatile organic compounds
WDRs	Waste Discharge Requirements

1.1 DISASTER PROGRAMS

1.1.1 Overview

The Federal Emergency Management Agency (FEMA) administers federal programs for response to, recovery from, and preparation for disasters. Disasters can result from natural events, such as floods, earthquakes, wildland fires, rains, and windstorms, or human-caused events, such as fires and explosions. FEMA administers these programs under the following authorities:

- The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law (PL) 93-288, as amended (the Stafford Act), authorizes FEMA to administer response, recovery, and mitigation programs. The Stafford Act was amended by the Disaster Mitigation Act of 2000, PL 106-390. The Stafford Act includes the following FEMA programs: the Public Assistance Program; the Hazard Mitigation Grant Program, pre-disaster mitigation programs, the Fire Management Assistance Grant Program, and the Assistance for Individuals and Households Program. The implementing regulations for these programs are found in Title 44, Code of Federal Regulations (CFR), Parts 204 and 206.
- The National Flood Insurance Act, as amended, PL 90-448, and the Flood Disaster Protection Act, PL 93-234, authorize FEMA to administer programs for mapping flood hazards, providing flood insurance, and providing flood mitigation assistance. Implementing regulations for these programs are found in 44 CFR Parts 59–78.

Typical actions taken under these authorities are described below.

1.1.2 Response

In response to disasters, FEMA is authorized under the Stafford Act to provide state and local governments with the assistance that is essential to respond to immediate threats to life, public health and safety, and property. Response activities include emergency protective measures to save lives, protect public health and safety, and protect improved property. These actions may be undertaken directly by federal agencies or state and local agencies, with FEMA providing funding for extraordinary costs.

1.1.3 Recovery

Under the Stafford Act, FEMA may provide funds to repair, restore, or replace disaster-damaged public facilities as well as facilities owned by certain private nonprofit organizations. Eligible facilities include:

- Roads and associated features, such as lighting, curbs, and sidewalks
- Bridges, culverts, and associated features, such as abutments, headwalls, and erosion protection
- Water control facilities, such as embankments, retention basins, and canals
- Buildings and equipment

- Utilities, such as water and sewer lines and electrical distribution facilities
- Mass transit facilities
- Parks and recreational facilities

Often, the entity applying for assistance (referred to as the "subgrantee") wishes to take advantage of the opportunity presented by the necessary repair of a disaster-damaged facility to make improvements to, or change the design of, the facility. These actions are referred to as "improved projects." In other cases, the subgrantee determines that the public welfare would not be best served by restoring a damaged facility or the function of the facility. Funds originally available for the restoration of the damaged facility may be made available for the expansion or construction of other selected facilities, the purchase of capital equipment, or the funding of hazard mitigation measures. Such actions are referred to as "alternate projects."

1.1.4 Prevention and Mitigation

The Stafford Act, the National Flood Insurance Act, and the Flood Disaster Protection Act authorize FEMA to provide assistance with actions that reduce or eliminate threats to public health and safety and the risk of damage to public and private property during future disasters. FEMA may provide funds for mitigation measures applied to a specific facility, such as elevating a flood-prone building above flood elevation or reducing risks to the community at large through such measures as vegetation management to reduce the risk of wildfire. FEMA may also provide funds for the relocation or acquisition of facilities located in areas of hazard, such as floodplains, where repetitive damage is likely to occur.

Under the National Flood Insurance Act and the Flood Disaster Protection Act, FEMA administers a nationwide program for the sale of flood insurance. Under this program, called the National Flood Insurance Program (NFIP), the federal government makes available affordable flood insurance to participating communities if those communities agree to adopt certain minimum standards for the management of floodplains. In support of the NFIP, FEMA publishes and maintains Flood Insurance Rate Maps (FIRMs), which depict flood hazards. Communities use these maps for floodplain management, and the lending and insurance industries use the maps for insurance purposes. FEMA revises these maps periodically as conditions affecting floodplains change.

1.2 REGULATORY BACKGROUND

The National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR Parts 1500 through 1508) direct FEMA and other federal agencies to fully understand and take into consideration during decision making the environmental consequences of proposed federal actions (also referred to as projects). FEMA's regulations for NEPA compliance are described in 44 CFR Part 10. They specify that FEMA must comply with NEPA before making federal funds available for disaster response, recovery, and mitigation. Under these regulations, FEMA must use a systematic, interdisciplinary process that includes public involvement to evaluate the impacts of its actions on the environment.

The Stafford Act and FEMA's implementing regulations for NEPA provide for the exemption of certain actions from NEPA and the exclusion of other actions from full review under NEPA (as described in Section 1.4). For all other actions, FEMA ensures compliance with NEPA through the preparation of Environmental Assessments (EAs). The EA is a concise public document that serves to provide evidence of the environmental impacts of a proposed action. The assessment includes alternatives to aid in decision making and concludes with one of two findings: a Finding of No Significant Impact (FONSI) or a Notice of Intent to prepare an Environmental Impact Statement (EIS). FEMA must prepare an EIS when significant environmental impacts are anticipated and cannot be mitigated.

1.3 THE PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

FEMA has determined through experience that the majority of the typical recurring actions proposed for funding, and for which an EA is required, can be grouped by type of action or location. These groups of actions can be evaluated in a Programmatic Environmental Assessment (PEA) for compliance with NEPA and its implementing regulations without the need to develop and produce a time-consuming, stand-alone EA for every action.

This PEA evaluates typical recurring actions undertaken by FEMA within the State of California in preparation for, and in the wake of, disasters. The purpose of this document is to facilitate FEMA's compliance with NEPA by providing a framework to address the impacts of actions typically funded in response to flood, earthquake, fire, rain, and wind disasters and to prevent future disasters resulting from these types of events.

This PEA also provides the public and decision-makers with the information required to understand and evaluate the potential environmental consequences of these actions. In addition to meeting the goals of impact identification and disclosure, this PEA addresses the need to streamline the NEPA review process in the interest of FEMA's primary mission of disaster response, recovery, and mitigation.

This PEA applies immediately to all actions described in Section 2 of this document that have been proposed for FEMA funding under all open declared flood, earthquake, fire, rain, and wind disasters in California. Open declared disasters are defined as disasters for which FEMA is still providing federal assistance under the Stafford Act. This PEA also applies, at FEMA's discretion, to subsequent disasters to be declared by the president. FEMA would notify the participating interested public and government parties and agencies of the applicability of this PEA to subsequent disasters.

The analysis in this PEA has relied on FEMA's historical experience with action typology, description, and consequences, as described in environmental documents from 1994 to 2002. The analysis in this PEA is also based on a review of scientific literature, consultation with regulatory agencies, and expert opinion. A FONSI will be prepared for the proposed actions described and assessed in this PEA.

When FEMA has determined that an EA is required for a specific action, FEMA will use this PEA to determine if more site-specific information is available and what level of environmental analysis and documentation is required for the action to comply with NEPA. If the alternatives, levels of analysis, and site-specific information of an action proposed for FEMA funding are fully and accurately described in this PEA, FEMA would prepare a memorandum documenting

this determination. This memorandum would state that FEMA has reviewed the proposed action, alternatives, potential impacts, and mitigation and found them to be fully and accurately described by this PEA and the PEA FONSI. Therefore, no further documentation would be required to comply with NEPA. The memorandum would also state that cumulative impacts (as described below) would not occur from the proposed action and alternatives. Because FEMA and the subgrantee would be required to implement the mitigation measures contained in the PEA, the memorandum would summarize the mitigation measures to be undertaken for the action and alternatives. A sample memorandum is provided as Appendix A.

If the specific action is expected to (1) create impacts not described in the PEA; (2) create impacts greater in magnitude, extent, or duration than those described in the PEA; or (3) require mitigation measures to keep impacts below significant levels that are not described in the PEA, then a Supplemental Environmental Assessment (SEA) and corresponding FONSI would be prepared to address the specific action. The SEA would be tiered from this PEA, in accordance with 40 CFR Part 1508.28.[1] A sample SEA is presented in Appendix B.

If, during the preparation of the SEA, it is determined that a more detailed environmental review is required or that the specific action is really a poor fit for the typology described in the PEA, rather than trying to develop an SEA, it would be more effective to revert to the standard EA or EIS process, as required by NEPA and associated federal, state, tribal, and local statutes.

Cumulative impacts are defined as environmental effects that are greater in magnitude, extent, or duration than the direct and indirect effects of the proposed FEMA-associated action when combined with the effects of other current and future actions, regardless of the proponent. For example, cumulative impacts could occur to wildlife habitat if a FEMA-funded action to create a fuel-break for a municipality were to occur in the same vicinity and time frame as a prescribed burn undertaken by the U.S. Forest Service (USFS). Individually, these vegetation management actions might allow sufficient habitat for displaced species, but the loss of habitat in both areas could substantially affect wildlife. Similarly, cumulative impacts could occur to hydrology in the case of a FEMA-funded action to widen and harden a waterway upstream from a site where a private entity plans to install a culvert. In this case, each separate action might have negligible effects on a bridge downstream, but the combination of the actions could cause the bridge to be overtopped. Cumulative impacts are not addressed in this PEA because analysis of these impacts requires specific knowledge of other actions occurring or proposed to occur within or near the study area. This information cannot be determined because the study area for this PEA is statewide, and the list of current and future actions that could cause cumulative impacts with FEMA-associated actions is infinite. Cumulative impacts will be considered when determining the compatibility of this PEA for specific actions. If cumulative impacts would be created, these impacts will be considered in an SEA. If no cumulative impacts would be created and the specific action is found to be fully and accurately described in this PEA and PEA FONSI, a prepared memorandum (discussed above) would state that cumulative impacts would not occur from the proposed actions.

A description of proposed actions and alternatives is provided in Section 2 (Description of Proposed Actions and Alternatives).

[1] Tiering refers to incorporating, by reference, the general assessments and discussions from this PEA into a focused SEA. The SEA would focus on the particular effects of the specific action.

1.4 ACTIONS NOT COVERED BY THIS PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

This PEA does not cover any action that meets the criteria for a statutory exclusion, described in 44 CFR 10.8(c), or a categorical exclusion, described in 44 CFR 10.8(d). Also, the PEA does not cover any action that requires a stand-alone EA or EIS. Descriptions of such actions are explained below.

1.4.1 Statutory Exclusions

Section 316 of the Stafford Act exempts certain actions from review under NEPA. As listed in 44 CFR 10.8(c), these statutory exclusions include:

- Debris removal
- Emergency protective measures or other assistance essential to saving lives, protecting public health and safety, and protecting property
- Repair, restoration, or replacement actions that do not substantially alter the location, footprint, function, or size of the original facility

Improved and alternate actions, described in Section 1.1.3, and mitigation actions, described in Section 1.1.4, do not qualify as statutory exclusions.

Even though an action may be statutorily excluded from NEPA, FEMA must still ensure that it complies with other applicable laws and regulations, such as the Endangered Species Act (ESA). However, if FEMA chooses to prepare an EA for this action, the PEA may be applicable.

1.4.2 Categorical Exclusions

The CEQ regulations provide for the categorical exclusion of actions that do not individually or cumulatively have a significant impact on the human environment. Neither an EA nor an EIS is required for these actions. FEMA's has identified 19 categorical exclusions, which are described in 44 CFR 10.8(d)(2). Examples of these categorical exclusions include the following:

- Acquisition of properties, and associated demolition or removal of structures, in situations where the resulting sites will remain as open space
- Planting of indigenous vegetation
- Physical relocation of individual structures where FEMA has no involvement in relocation site selection or development
- Restoration or retrofit of a facility in a manner that substantially conforms to the predisaster design, function, and location of the facility
- Improvements to existing facilities and construction of small-scale mitigation measures in previously developed or disturbed areas with substantially completed infrastructure when those actions do not alter basic functions, exceed the capacity of, or modify the intended land use of the existing facility

Certain actions that would otherwise be categorically excluded may be affected by extraordinary circumstances, as described in 44 CFR 10.8(d)(3), such as the presence of endangered species or the presence of archaeological or historical resources. In such cases, the categorical exclusion may not apply, resulting in the need to prepare an EA. The PEA may be applicable to such actions.

1.4.3 Actions Requiring an Environmental Assessment Instead of a Programmatic Environmental Assessment

The PEA does not apply to actions:

- That do not fall within one of the types of actions described in Section 2
- For which the analysis of impacts of alternatives presented in Section 4 is not applicable or comprehensive

In such cases, a separate, stand-alone EA must be prepared.

1.4.4 Actions Requiring an Environmental Impact Statement

If FEMA has previously determined that an EIS-level of review is required for an action, that action would not be considered in this PEA. If, in preparing an SEA or a separate EA, FEMA reaches the conclusion that the action has the potential to result in a significant environmental impact that cannot be mitigated such that a FONSI cannot be issued, FEMA must issue a Notice of Intent to Prepare an Environmental Impact Statement.

1.5 ACTIONS COVERED BY THE PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

The PEA covers the following types of actions:

- Constructing, modifying, or relocating buildings and infrastructure (actions include construction of temporary facilities, restoration of disaster-damaged facilities, and mitigation actions)
- Modifying waterways, waterway crossings, and coastal features (category also includes temporary facilities, restored facilities, and mitigation measures)
- Vegetation management to reduce the risk of damage from flooding and from wildland fires

Specific types of actions are described in Section 2.

1.6 PURPOSE OF AND NEED FOR ACTION

FEMA's objectives are to:

- Reduce or eliminate immediate threats to life, public health and safety, and improved property resulting from major disasters or emergencies
- Repair, restore, or replace public facilities damaged in such events
- Reduce or eliminate the risk of future damage or loss associated with such events

Without FEMA action, the following would likely result:

- The threat of immediate harm or loss to individuals, families, communities, and properties would not be alleviated.
- Government agencies and private nonprofit organizations would not have the resources to restore essential public services or to restore, repair, or replace damaged facilities.
- Communities would not have the resources to reduce the risk of repetitive damage from future events. Facilities would not be retrofitted to resist future damage; homes, businesses, and public buildings would not be relocated out of high-hazard areas; and threats from hazards such as flooding and wildfire would not be reduced through mitigation actions.

1.7 CALIFORNIA ENVIRONMENTAL QUALITY ACT AND APPLICABLE PERMITS

FEMA is responsible for ensuring that its actions comply with all applicable federal laws and regulations. However, in accepting assistance from FEMA, state and local governments as well as private nonprofit organizations must ensure that their actions also comply with applicable state and local laws. It is the subgrantee's responsibility to ensure that an action meets the requirements of the California Environmental Quality Act (CEQA) and to obtain additional permits as applicable. For example, for an action that includes work in a stream channel, the subgrantee is responsible for obtaining a streambed alteration permit from the California Department of Fish and Game (CDFG).

Under the CEQ regulations (40 CFR 1500.4), federal agencies must reduce excessive paperwork when complying with NEPA. Methods to attain this goal include incorporating material by reference, integrating NEPA requirements with other environmental review and consultation requirements, and eliminating duplication with state and local documents by preparing joint documents. Therefore, FEMA and subgrantees may cooperate to incorporate NEPA and CEQA documents by reference and prepare joint documents whenever practicable. In many cases, this cooperation consists of the subgrantee referencing the PEA in the CEQA document, as appropriate, and adding action-specific information and impact analysis. FEMA then completely references the CEQA document and all other relevant environmental studies in preparing the SEA. In some instances, the CEQA document and the SEA could be combined into a joint federal-state SEA.

1.8 USING THE PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

1.8.1 Organization of the Programmatic Environmental Assessment

This PEA is organized into the following sections:

- Section 2 describes the actions that are covered by the PEA.
- Section 3 describes the affected environment that provides a basis for measuring the impacts of actions.

- Section 4 describes the potential environmental consequences of implementing actions and also provides an Impact Summary Matrix, which allows for convenient comparison of actions.
- Section 5 describes the process of public participation and agency coordination in the preparation of this PEA and for its future use.
- Section 6 provides the list of references.

In addition to the main text, the PEA includes appendices that provide a sample PEA compliance memorandum, a sample SEA, responses from federal and state agencies, and programmatic agreements.

1.8.2 Use of the Programmatic Environmental Assessment

The PEA covers the actions and alternatives described in Section 2. As stated above, FEMA will prepare stand-alone EAs for proposed actions and alternatives that cannot be categorized among those described in that section. As stated in Section 1.3, a specific proposed action fully described and assessed in this PEA and the FONSI to this PEA would only require a memorandum regarding the proposed action to comply with NEPA (Appendix A). This PEA will also serve as a general document for SEAs and their corresponding FONSIs to tier from a specific action to comply with NEPA. Actions that have been determined, during the preparation of the SEA, to require a more detailed or broader environmental review will be subject to a standard stand-alone EA or an EIS, as required by NEPA. A sample SEA is provided in Appendix B.

1.8.3 Other Complementary Programmatic Documents

FEMA has executed and is in the process of preparing additional programmatic documents and interagency coordination that support the material contained in this PEA. The following provides a brief summary of these documents and their implementation.

- Memorandum of Understanding with the U.S. Fish and Wildlife Service (USFWS): As described in more detail in Section 3.4.1.1 of this PEA, Section 7 of the ESA requires FEMA to consult with the USFWS before implementing or funding any action that may affect threatened or endangered species under the jurisdiction of the USFWS. To consolidate and streamline the Section 7 consultation process, FEMA and the USFWS have executed a Memorandum of Understanding that establishes a framework for consultation between FEMA and the USFWS (Appendix C).
- Programmatic Consultation with the USFWS: FEMA is in the process of conducting Programmatic Consultation with the USFWS for future disasters throughout California. FEMA anticipates that the Programmatic Consultation it is now conducting with the USFWS will result in a Programmatic Biological Opinion (PBO) and a Programmatic Incidental Take Statement (PITS) for all future flood, earthquake, fire, rain, and wind disasters in California. Details of the Programmatic Consultation process with the USFWS are provided in Section 3.4.1.1.

- Programmatic Consultation with National Marine Fisheries Service (NOAA Fisheries): As described in more detail in Section 3.4.1.1 of this PEA, Section 7 of the ESA requires FEMA to consult with NOAA Fisheries before implementing or funding any action that may affect threatened or endangered species under the jurisdiction of NOAA Fisheries. FEMA has conducted this Programmatic Consultation through an informal consultation process with NOAA Fisheries for future disasters throughout California. FEMA submitted a Programmatic Biological Assessment to NOAA Fisheries on August 28, 2003 for all future flood, earthquake, fire, rain, and wind disasters in California. NOAA Fisheries replied to this submission by issuing a letter of concurrence on October 14, 2003. Details of the Programmatic Consultation process with NOAA Fisheries are provided in Section 3.4.1.1.
- Agreement regarding Section 7 consultation on the ESA when the U.S. Army Corps of Engineers (USACE) serves as lead agency: Under the Public Assistance Program, situations exist where the estimated cost of the work is less than the amount specified for the fiscal year under 44 CFR 206.203 and published in the Federal Register.[2] The subgrantee is often responsible for preparing the application for FEMA grant funding. In some of these situations, a permit may be required or may have been applied for by the subgrantee under Section 404 of the Clean Water Act (CWA) and FEMA, due to the nature of the grant application process for these low-cost projects, is not able to review the action for its compliance or applicability to NEPA. In these situations, the USACE has agreed to be the federal agency responsible for complying with Section 7 of the ESA and the agency that conducts Section 7 consultation for such actions. A copy of this agreement is provided as Appendix D.
- Programmatic Agreement (PA) with the California State Historic Preservation Officer (SHPO): As described in more detail in Section 3.5.1.1 of this PEA, FEMA is required to comply with Section 106 of the National Historic Preservation Act (NHPA) before implementing or funding any action that may affect properties included in or eligible for inclusion in the National Register of Historic Places (NRHP). To streamline the Section 106 review process, FEMA, the SHPO, the California Office of Emergency Services (OES), and the Advisory Council on Historic Preservation (ACHP) have executed a disaster-specific PA for each recent disaster in California. In December 2003, these parties executed a PA for future disasters in California. Details of the PAs are provided in Section 3.5.1.1.

[2] The amount for the fiscal year ending September 30, 2002, is $52,000.

This section describes typical actions, including the No Action Alternative, undertaken by FEMA in response to or in preparation for flood, fire, wind, rain, and earthquake disasters. Any action, including the No Action Alternative, has the potential to be the preferred alternative (that is, the proposed action) or an alternative to the proposed action for a specific project being funded by FEMA. The funding level for a specific action or alternative varies in accordance with the circumstances associated with that action or alternative, such as program requirements, location, and other circumstances and contingencies. Actions are described independently of the source or amount of funding. In addition, actions may be reviewed separately unless a physical or functional interdependency exists.

All actions considered in this PEA assume that FEMA action is:

- Required as a result of a major disaster declaration and is administered in accordance with the Stafford Act and its implementing regulations in 44 CFR Part 206, or
- Funded under FEMA's authorities for floodplain management in accordance with the National Flood Insurance Act and the Flood Disaster Protection Act and their implementing regulations in 44 CFR Parts 59-78.

Several of the actions described in the following sections could be eligible for one of more categorical exclusions. As discussed in Section 1.4.2 of this PEA, actions that would normally be categorically excluded from NEPA review may have extraordinary circumstances that require an advanced analysis of impacts in the form of an EA. The evaluation of such actions in the PEA may be appropriate. Further, actions that may appear to be eligible for one or more categorical exclusions may involve improvements or other additional actions that would also require analysis in an EA. The PEA may also be applicable to these actions. Nonetheless, actions eligible for categorical exclusions (as described in 44 CFR 10.8[d][2]) should be categorically excluded; the listing of such actions below should not imply that a PEA is always necessary for these actions.

Some actions require federal, state, or local permits or coordination. It may be necessary for FEMA to coordinate with the following federal and state agencies when conducting environmental review:

- USACE
- State Water Resources Control Board (SWRCB)
- USFWS
- NOAA Fisheries
- CDFG
- State Lands Commission
- California Air Resources Board (CARB) and/or the applicable regional air quality jurisdictions

The agencies that FEMA or the subgrantee would need to coordinate with would vary depending on the particular action and the specific affected resources at the site where the action would occur. Some of the actions covered by this PEA and described below typically require

coordination with certain agencies. In the description of the proposed actions and alternatives below, this typical coordination activity, when applicable, is discussed.

2.1 NO ACTION ALTERNATIVE

Inclusion of a No Action Alternative in the environmental analysis and documentation is required under NEPA and is defined as maintaining the status quo, with no FEMA funding for any alternative action. This alternative evaluates the effects of not providing eligible assistance for a specific action and provides a benchmark against which the alternative actions may be evaluated.

Although FEMA would not fund any action under this alternative, it is assumed for the purposes of this PEA that disaster-damaged facilities would be repaired or otherwise restored to pre-disaster conditions with other public or private funds, including insurance payments. It is also assumed that no work would be undertaken on disaster-damaged facilities except for restoration to pre-disaster conditions. Damaged facilities would not be improved, and hazards would remain unmitigated at the disaster-damaged site. Further, no hazard mitigation measures would be undertaken to proactively reduce or prevent disaster damage from occurring in the future.

2.2 NONEMERGENCY DEBRIS REMOVAL

Debris removal that is necessary to reduce or eliminate an immediate threat to life, public health and safety, or property is statutorily excluded from the NEPA process by the Stafford Act. However, nonemergency situations, such as in the restoration of facilities, occur where debris removal is necessary. The statutory exclusion does not apply in such situations. For purposes of this document, debris removal performed in these situations is referred to as "nonemergency debris removal."

Nonemergency debris removal under this alternative includes:

- Removal of rock, silt, sediment, or woody debris that has been deposited by floodwaters in stream channels, bridge and culvert openings, canals, sedimentation basins, sewage treatment ponds, ditches, and other facilities in such a manner as to disrupt normal flows, navigation, recreation, or municipal services
- Removal of woody debris from public areas or facilities after wind or fire events that damage or destroy trees
- Removal of rock and earth from public areas or facilities after landslides caused by earthquakes or heavy rains
- Removal of building rubble from public areas or facilities after earthquakes

Removal of material from stream channels usually requires a streambed alteration permit from the CDFG and coordination with the USACE for compliance and permitting under the CWA. All removed debris would be disposed of at approved and licensed disposal sites, in compliance with existing laws and regulations. Any hazardous materials or other contaminants would be removed and disposed of in an appropriate manner. Woody debris and construction materials can be recycled, if recycling facilities exist.

2.3 CONSTRUCTING, MODIFYING, OR RELOCATING FACILITIES

Under 44 CFR 206, FEMA is authorized to provide funds for constructing, modifying, or relocating facilities. Relevant action categories are as follows:

- Upgrading or otherwise modifying buildings
- Providing temporary facilities
- Acquiring and demolishing existing facilities
- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines
- Constructing new facilities or relocating existing facilities
- Relocating the function of an existing facility
- Extending the pressurized water service area
- Developing demonstration projects

Actions involving facilities associated with watercourses or coastal features are described in Section 2.4.

2.3.1 Upgrading or Otherwise Modifying Buildings

Under this action, FEMA would provide funds to implement changes required by current building codes and standards or otherwise modify existing buildings. Often, these changes have the effect of making the structure more resistant to damage in future events. Typical activities include:

- Making buildings more fire resistant (e.g., by replacing roofs and doors with fire-resistant materials) or safer during fires (e.g., by installing sprinkler and alarm systems)
- Installing bracing, shear panels, shear walls, anchors, or other features so that buildings are better able to withstand earthquake shaking or high wind loads
- Modifying buildings to reduce the risk of damage during floods by elevating structures above the expected flood level or by floodproofing
- Modifying buildings to meet another need of a subgrantee, such as with an improved action or an alternate action

If a building is located in an identified floodplain and is substantially damaged, the NFIP requires that the building be elevated so that the lowest floor is at or above the base (100-year) flood elevation. Newly constructed buildings, such as those built to replace destroyed facilities must also meet this requirement, if located in floodplains. Structures can be elevated on extended foundation walls, piers, posts, columns, or compacted fill. All materials used below the base flood elevation must be flood resistant. Utilities, such as exterior compressors, must also be elevated above the base flood elevation.

A building can also be floodproofed so that floodwaters can encounter it without causing damage to the structure or its contents. “Dry floodproofing” methods involve the installation of flood shields, water-tight doors and windows, earthen barriers, and pumping systems to prevent water

from entering the structure. "Wet floodproofing" involves the installation of vents and flood-resistant materials so that water may enter and leave areas of the structure without causing damage. With both dry and wet floodproofing, utilities are modified, elevated, or relocated to prevent floodwaters from accumulating within them.

Buildings may also be upgraded to meet codes unrelated to damage from natural hazards, such as upgrades required by changes in capacity or function and upgrades necessary to meet the requirements of the Americans with Disabilities Act.

2.3.2 Providing Temporary Facilities

FEMA may provide temporary group housing sites when a disaster renders homes uninhabitable for long periods. Such sites are typically constructed using travel trailers or manufactured housing. Temporary housing that is located in a previously disturbed area and in an area of compatible residential use is categorically excluded from NEPA and, therefore, not covered in this PEA. However, temporary housing located on land not previously disturbed and/or not in a compatible residential area is evaluated in the PEA. Typical activities include:

- Developing the pads for dwellings
- Constructing ancillary facilities, such as roads, streets, and parking lots
- Installing utilities, such as potable water lines, sewer hookups, electricity (including proper street lighting), and telephones lines

This action would be implemented if other housing options, such as vacancies in hotel rooms or availability of rental units, are not feasible. Appropriate sites are not to be located in a floodplain, contain wetlands or critical habitat, affect historic properties or archaeological sites, or contain hazardous materials. Installation of housing units and utilities is accomplished in accordance with current codes and standards. After temporary housing is no longer needed at the disaster site, the temporary housing units and associated ancillary facilities are removed by FEMA and the land is restored to its original use. All removed materials would be stored for future use or disposed of in accordance with applicable laws and regulations.

FEMA may also provide funding for temporary relocation of essential public services, in the event that the structures housing those services are damaged, destroyed, or otherwise rendered inaccessible by a disaster. In most cases, the lease or purchase of facilities is eligible; however, construction of new facilities may be eligible if this action is cost-effective. Funds are also provided for the upgrades necessary to meet current codes and standards and the installation or modification of appurtenances necessary to operate facilities, such as utilities.

2.3.3 Acquiring and Demolishing Existing Facilities

FEMA may provide funds for the acquisition and demolition of existing facilities if they are located in high-hazard areas and are subject to repetitive loss. Typically, these facilities are at a high risk because of (1) damage from flooding; (2) erosion of stream banks, beaches, slopes, or bluffs; (3) landslides; or (4) wildfire. These facilities may consist of private properties, such as houses and commercial buildings, or publicly owned facilities, such as utilities, roads, and bridges. A local government entity purchases private properties on a willing-seller basis, and once the property has been purchased, the property will be dedicated and maintained in

perpetuity for uses compatible with open space, recreational, or wetlands management practices, pursuant to 44 CFR 206.434(d)

Existing facilities are either removed or demolished. All demolition materials are disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Any hazardous materials or other contaminants are removed and disposed of in an appropriate manner. Construction debris and household materials may be recycled, if recycling facilities exist. Once structures are removed, lots are graded to conform to the local topography and disturbed areas are revegetated with species approved for the local area. Frequently, the local government will develop the acquired land for recreational or open-space uses, such as parks, athletic fields, or walking and bike trails.

2.3.4 Repairing, Realigning, or Otherwise Modifying Roads, Trails, Utilities, and Rail Lines

Roads, trails, utilities, and rail lines are typically damaged when floods or heavy rains cause erosion, subsidence, or landslides. Earthquakes may cause similar damage. Repairs are accomplished by replacing earthen material lost during the disaster and replacing the damaged surface, utility line, or, in the case of rail lines, ballast and track. It may be necessary to stabilize the replacement fill using rock, grout, timber walls, or steel sheet piling. Hazard mitigation measures may be installed to prevent future damage. For example, a pipe may be installed to convey drainage beneath a road, thus preventing future washouts, or a utility line may be encased in concrete in an area vulnerable to erosion.

If the area of damage is unstable, does not allow for repair, or is subject to repetitive loss, a facility may be realigned so that the area of damage is avoided. Property acquisition or a change in easement may be necessary.

Facilities may also be modified as part of improved actions or alternate actions to meet additional needs of the subgrantee.

2.3.5 Constructing New Facilities or Relocating Existing Facilities

If a facility is located in a floodplain or other hazard area, is subject to repetitive damage, or has been damaged in such a way that restoration in the current location is not practical or cost-effective, FEMA may fund the construction of a new facility or the physical relocation of the existing facility. Examples of this action include construction of buildings, roads, trails, utilities and utility lines, and rail lines in a different area from the existing facility. The physical relocation of existing facilities is only practical with buildings. In cases of both new facility construction and physical relocation, FEMA may fund the cost of land acquisition and the construction of appurtenant features, such as access roads and utilities. For properties in the hazard area, FEMA would acquire damaged properties, demolish existing structures (except in cases of physical relocation), and place deed restrictions that would limit future uses to open space in perpetuity.

New facilities (including buildings, roads, trails, utilities and utility lines, and rail lines) could also be constructed as improved actions or alternate actions to meet additional needs of the subgrantee.

2.3.6 Relocating the Function of an Existing Facility

Under this action, FEMA would fund the relocation of the function of a facility to an existing facility that has adequate capacity to handle the additional load with minor modifications, if any. For structures, the occupants and materials would be relocated to alternative structures, traffic would use alternate routes, and utility services would be provided by alternative methods. This action would not entail any major physical construction or addition to the existing facility and, if any work would be required, it would consist of only minor modifications. A typical example is transferring students from a damaged or floodprone school to a suitable existing school nearby, if feasible in terms of capacity and convenience for students, families, and teachers. For properties in the hazard area, FEMA would acquire damaged properties, demolish existing structures, and place deed restrictions that would limit future uses to open space in perpetuity.

2.3.7 Extending the Pressurized Water Service Area

As a means of preventing future damage during wildfires, FEMA may fund the extension of pressurized pipelines to a developed area that is prone to repetitive fire damage. Under this action, an existing, pressurized system is extended so that fire hydrants can be installed in the area where damage is likely to occur. Installation, which involves excavation, is typically completed within the road right-of-way.

2.3.8 Developing Demonstration Projects

Demonstration projects focus on public education and are designed to highlight procedures that can be employed by the public to reduce property damage during flood, fire, wind, and earthquake disasters. Potential demonstration projects would involve the development of a model facility to demonstrate how hazard mitigation technologies can be used to reduce the potential damage during a disaster. Flood demonstration projects would involve items such as elevating a structure or waterproofing windows and doors that are below the elevation of the 100-year flood event. A fire demonstration project would include vegetation management around a facility and replacing roofs, doors, and windows with fire-resistant materials. Wind and earthquake demonstration projects would include changes to the structural design of buildings to allow them to withstand higher wind velocity or more movement during an earthquake.

2.4 ACTIONS INVOLVING WATERCOURSES AND COASTAL FEATURES

Many actions pertain to inland water sources, such as streams, rivers, canyons, and lakes, and coastal features, such as harbors and beaches. Inland water sources may be perennial or may be dry during the summer months. During construction, Best Management Practices (BMPs) are normally employed to reduce soil erosion and prevent or reduce the amount of sediment entering the water source. Work in a stream channel may involve temporary diversion of the channel using sandbags or a cofferdam constructed of fill. Heavy equipment is typically operated from an adjacent road, bank, or other feature; however, in some cases, it may be necessary to operate equipment in a channel area once flow has been diverted. A pipe or a temporary secondary channel may be used to convey the diverted water.

The PEA does not apply to flood control works in undeveloped areas or that directly or indirectly serve to protect undeveloped areas. Such an action would require preparation of an EA or an EIS.

If an action impacts a natural waterway, alters vegetation adjacent to a stream corridor, or impacts a floodplain, coordination with the USACE, CDFG, and SWRCB may be required. If the action affects a water source that supports anadromous fish species, such as salmon, coordination with the NOAA Fisheries is required. If the action involves channel modifications, changes to the capacity of bridges and culverts, or the installation of attenuation structures, it may be necessary to conduct hydraulic/hydrologic analyses to evaluate the potential effect of changes of downstream flow rates.

Relevant categories of actions are as follows:

- Repairing, stabilizing, or armoring embankments
- Creating, widening, clearing, or dredging a waterway
- Constructing or modifying a water crossing
- Constructing or modifying a water detention, retention, or storage facility
- Constructing or modifying other flood control structures
- Constructing or modifying a coastal feature

2.4.1 Repairing, Stabilizing, or Armoring Embankments

These actions would involve the repair of earthen or rock embankments damaged by floodwaters. Examples include natural stream banks (such as those in parks); road, trail, and rail line embankments; embankments for irrigation and navigation canals; and levees used for flood control and reclamation. In addition to repair of damaged features, FEMA may fund measures designed to prevent damage in future flood events.

In addition to replacing fill material, embankments may be stabilized or armored through:

- Placing of rock riprap
- Hardening with concrete or soil cement
- Installing retaining walls, gabions, or geotextile fabrics
- Using bioengineering techniques, such as planting vegetation, placing root wads, or placing willow bundles

A combination of these techniques may be employed. For example, rock and geotextiles, when used with root wads and willow bundles, may provide mitigation from erosion while enhancing the natural values of a stream corridor.

2.4.2 Creating, Widening, Clearing, or Dredging a Waterway

These actions would be employed to reduce the flood hazard to adjacent lands, facilities, or populated areas.

New channels would be constructed to convey excess flows around flood-prone areas during flood events. Drainage swales, earthen channels, concrete channels, or subsurface concrete pipes can be used as a means of conveyance. The new channel would be constructed in a dry environment and connected to the stream after the channel has been completed. The channel may have an inlet weir higher than the elevation of the normal flow so that normal flows would remain in the natural channel. The outlet may be armored with concrete or rock riprap to prevent excessive erosion of the existing channel.

Existing channels would be widened to allow a channel to convey a larger volume of water. Conveyance may also be increased by replacing earthen banks or channel bottoms with concrete. To the extent possible, the construction would be conducted from the top of the bank, but many actions would require construction equipment to work in the stream channel. In perennially flowing streams, work in a stream channel would generally be restricted to the low-flow period, and the flow would be diverted around the construction area. A pipe or a temporary secondary channel would be used to convey the diverted water.

As an alternative to constructing a bypass or modifying an existing channel, the existing channel may be cleared of vegetation or sediment to increase conveyance. This action is often used in developed areas where modifications are not feasible as well as in areas where years of inadequate maintenance have allowed trees and brush to grow within the channel or sediment and debris to accumulate in the channel or around culverts and bridges. Vegetation may be removed through mechanical means, by hand, or by application of herbicides (see Section 2.5). Vegetation may be removed not only from the channel but also from the banks and high-water areas, thus reducing the risk that floating debris will be trapped by trees or heavy brush. Sediment and debris may be removed by dredging, through use of heavy equipment, or by hand, as described in Section 2.2. All removed debris would be disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Woody debris and vegetation can be recycled, if recycling facilities exist.

2.4.3 Constructing or Modifying a Water Crossing

FEMA may fund the repair or replacement of damaged water crossings, the enlargement of openings to allow greater conveyance and to reduce the risk that debris will get trapped during floods, or the installation of bank protection or other means to reduce the risk of erosion. Crossings may also be relocated or improved to avoid high-hazard areas, repetitive damage, or areas where reconstruction is not cost-effective or feasible.

Culverts may consist of corrugated metal pipes, reinforced concrete pipes, or reinforced concrete box culverts. The capacity of a culvert crossing may be increased to reduce the risk of flooding to the surrounding area, or the culvert may be modified to prevent overtopping or erosion of the crossing. Typical measures include:

- Increasing the size of a culvert or adding additional culvert barrels
- Changing the type of culvert
- Changing the location or alignment of the culvert
- Adding features, such as a headwall, discharge apron, or riprap, to reduce the risk of erosion or damage to the culvert or the crossing

If a culvert's capacity is increased substantially, the reduced attenuation of flow could cause increased flooding or erosion downstream. These effects would be evaluated by conducting hydraulic and hydrologic analyses.

Similarly, bridges may be modified to increase capacity to reduce the risk of flooding or to reduce the risk of damage to the crossing. Typical actions include:

- Widening of existing openings or construction of new openings
- Reconfiguring bracing to reduce the risk that debris will be trapped
- Installing protective features, such as concrete abutments or riprap, to reduce the risk of damage due to erosion and scour
- Replacing a multispan structure with a clear-span structure

A bridge may be installed to replace a culvert as a means of increasing the flow capacity of a crossing.

If the piers of the bridge are located within the channel of the watercourse, it may be necessary to construct a temporary diversion, as described above. As with culverts, modifications to bridges may attenuate flow and require an analysis of downstream effects on erosion and flooding.

Low-water crossings may be installed or improved as an alternative to repairing or replacing a culvert or bridge. Constructing or upgrading a low-water crossing would typically involve hardening the banks and bottom of a water body. A temporary diversion may be necessary during construction activities. As for bridges and culverts, flow attenuation and downstream impacts to erosion and flooding would require evaluation.

2.4.4 Constructing or Modifying a Water Detention, Retention, or Storage Facility

Potential actions include the construction, enlargement, or restoration of detention basins, retention basins, sediment ponds, and reservoirs to reduce flood flows or to provide a water source for fighting fires in an area of high fire hazard. The creation and/or enlargement of water storage reservoirs would be most frequently associated with flood disasters, and to a lesser extent fire disasters.

Detention dams, retention dams, and sediment ponds would be routinely constructed to temporarily store flood flows so that downstream peak flows would be reduced. The stored water would be released at a slower rate so that the existing drainageways can convey the water without contributing to downstream flooding. All areas disturbed during the construction of the detention dams, retention dams, or sediment ponds would be revegetated with native plant species. This action would also include the repair or restoration of water retention structures. All sediment removed from detention dams, retention dams, and sediment ponds would be disposed of in a manner consistent with federal, state, and local laws and regulations.

Frequently in rural areas, fire fighting is heavily constrained by the lack of water that can be used by firefighters. In response to this need, proposed actions may also include the creation of retention dams in locations that can readily be accessed by firefighters either as a direct source of water or as a source of water to fill their water supply trucks. All areas disturbed during the construction of the retention dam would be revegetated with native fire-resistant plant species.

2.4.5 Constructing or Modifying Other Flood Control Structures

A flood control structure is a facility designed to prevent floodwaters from entering a flood-prone area. Typical examples include levees (also referred to as dikes) and floodwalls. Actions include:

- Repairing damaged facilities, usually during emergency situations
- Installing embankment protection, as described in Section 2.4.1
- Raising the height of existing facilities to prevent overtopping in future floods
- Constructing new facilities to protect flood-prone areas from damage during future floods
- Modifying or installing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on tributary streams

Levees would be repaired or constructed using compacted fill and, in some cases, riprap protection at the base. Bare earth would be seeded with grasses to prevent erosion. Typically, a road would be installed on the crest with gravel to allow for maintenance. Floodwalls, typically built in urban areas, would be constructed using reinforced concrete or grouted, reinforced concrete block. Excavation would be necessary to install footings. Both types of structures would include interior drainage systems that may include pumps for removing accumulated water.

2.4.6 Constructing or Modifying a Coastal Feature

These actions would involve the repair, replacement, or construction of facilities in coastal environments, such as estuaries, inlets, harbors, and beaches. These facilities include:

- Recreational facilities, such as piers and boat ramps
- Facilities for maritime use, such as docks and slips
- Shoreline protection devices, such as seawalls, groins, jetties, and revetments
- Coastal flood control structures, such as levees

Construction activities would be expected to occur in water and would involve driving piles, placing rock or soil, or dredging sand, mud, or other sediment.

2.5 VEGETATION MANAGEMENT

Vegetation management would be employed to reduce the risk of wildfire and, as described in Section 2.4, to increase the ability of channels to convey flows, thus reducing the risk of flood damage. These actions may be accomplished using mechanical means, hand clearing, application of herbicides, prescribed burning, or grazing. Some actions may include a combination of these methods.

Vegetation management actions in areas where threatened and endangered species are thought to exist would require coordination with the USFWS or NOAA Fisheries. Prescribed burns require coordination with the CARB and/or the applicable regional air quality jurisdictions.

Relevant categories of actions are as follows:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns
- Biological control

2.5.1 Mechanical or Hand Clearing of Vegetation

This action would involve construction, expansion, and/or maintenance of fuel breaks and fuel-reduction zones. For the purpose of this document, fuel breaks are corridors where all woody vegetation has been removed. The purpose of a fuel break would be to reduce the extent of fire and to provide a location in which firefighters can work safely and effectively. Fuel breaks can also be compacted or graded for use as fire access roads.

Unlike fuel breaks, fuel-reduction zones (also called shaded fuel breaks) would involve the selective removal of vegetation such that a certain proportion of vegetation is left in place. Fuel-reduction zones differ from untreated-forested areas because in fuel-reduction zones low- and mid-height vegetation has been removed or reduced and the density of mature trees has been reduced. The purpose of fuel-reduction zones is to reduce the speed at which a fire spreads and to create a safer environment for firefighters. To create fuel-reduction zones, dead and diseased trees would be removed, along with high-ignition-potential species, such as eucalyptus or Monterey pine. Low- and mid-height individual plants and limbs would be removed or reduced to minimize fire ladders (vegetation that permits fire to travel from the understory to the canopy).

Mechanical removal would use heavy equipment that can uproot, crush, pulverize, or cut the trees and brush being removed. Hand removal would involve the use of chainsaws, axes, and hoes to cut and uproot vegetation. Vegetation downed as a result of mechanical or hand removal would be piled and burned on site, chipped and spread on site, or loaded and hauled from the site. After the removal of the targeted vegetation, cleared areas may be revegetated with native fire-resistant species. The subgrantee would be responsible for the maintenance of created fuel breaks and fuel-reduction zones.

On occasion, mechanical and/or hand removal of vegetation would be employed around a much larger area that has been targeted for a prescribed burn, as discussed in Section 2.5.3, to reduce the potential that the set fire will escape from the burn area.

2.5.2 Herbicidal Treatments

Actions generally associated with herbicidal treatment include the removal of targeted exotic invasive species within specific areas and the prevention of growth and resprouting (e.g., eucalyptus removal) of undesirable vegetation once an area has been cleared of excessive vegetation by mechanical removal, hand removal, and/or prescribed burns. Only readily accepted and registered chemicals would be used to control the growth of undesired vegetation. After treatment, some areas may be revegetated with locally occurring, native vegetation that is fire resistant.

2.5.3 Prescribed Burns

Prescribed burns would be used in areas with high-fire-hazard potential due to the amount of fuel that is on the forest floor. The intent of a prescribed burn is similar to that of the fuel-reduction zones discussed in Section 2.5.1 except that the treatment area is typically larger. Prescribed burns would only be proposed and authorized in areas where it can be ensured that the fire can be controlled and contained within the proposed burn area. As discussed in Section 2.5.1, prescribed burn projects would be frequently combined with mechanical and/or hand removal of vegetation around the perimeter of the proposed burn area, which would help to ensure that the fire is contained. Generally, prescribed burns would be designed to minimize impacts on riparian vegetation adjacent to a perennial stream.

Prescribed burns would require interagency coordination by the subgrantee to ensure that all appropriate federal, state, and local agencies have been notified of the action and that all their concerns have been addressed. FEMA requires that the applicant follow the burn procedures outlined in the California Environmental Protection Agency's *Forest Management Burning Handbook* (CEPA 1994). The burn must be terminated if weather conditions become undesirable.

Burn actions can also include the burning of trees and brush that have been piled as the result of mechanical and/or hand removal activities. The burning of these piles would require a burn plan and interagency coordination prior to implementation.

2.5.4 Biological Control

Under this action, the subgrantee would allow cattle, horses, goats, sheep, or other livestock to graze on grasses and other vegetation as a means of control. The subgrantee would fence the area proposed for grazing, so that the animals would not graze outside of the proposed area. The type of animals, timing, duration, and stocking rate would be selected based on the targets of the vegetation management plan (i.e., the quantity and quality of residue to remain).

2.6 PUBLICATION AND REVISION OF FLOOD INSURANCE RATE MAPS

As described in Section 1, FEMA manages the NFIP. The program is based on an agreement between local communities and the federal government that if a community implements programs to reduce future flood risks, the federal government makes flood insurance available within the community as a financial protection against flood losses that occur. In support of the NFIP, FEMA has undertaken a nationwide effort to identify and map flood hazards. These flood hazards are shown on Flood Insurance Rate Maps (FIRMs), which FEMA produces for each community participating in the program. The FIRMs show identified Special Flood Hazard Areas (SFHAs), which are areas subject to inundation during a flood having a 1 percent chance of occurrence in a given year (also known as the base flood or 100-year flood).

FEMA periodically revises FIRMs to reflect changes in hydrologic and hydraulic conditions, to update map information based on more detailed data, or to reflect changes to the built environment, such as the placement of fill in the floodplain or the construction of a flood control channel. These revisions may result in changes to the base flood elevations and floodplain delineations shown on the FIRMs. Communities are required to update their floodplain management ordinances to reflect the revised maps.

Development may take place within the SFHA, provided that the development is in compliance with local floodplain ordinances, which must meet the minimum federal requirements (see Section 2.3.1). Local governments are responsible for implementing these floodplain management ordinances. If the community fails to adopt or enforce its floodplain management ordinance, FEMA may sanction the community or suspend it from the NFIP, thereby restricting the financial benefits of participating in the program. However, FEMA has no other authority or responsibility to govern whether and how this development occurs. FEMA's involvement in floodplain management is otherwise limited to publication and revision of the FIRMs, which are categorically excluded from the preparation of an EA or an EIS (44 CFR 10.8[d][2][iii]). Therefore, impacts resulting from the publication and revision of FIRMs are not evaluated further in this PEA.

The following subsections discuss the setting and affected environment of 12 resource areas in California:

- Geology, Seismicity, and Soils
- Air Quality
- Water Resources
- Biological Resources
- Cultural Resources
- Socioeconomics and Public Safety
- Land Use and Planning
- Public Services and Recreation
- Transportation
- Noise
- Hazardous Materials and Wastes
- Visual Resources

This discussion is broad and regional in nature. It does not include a complete inventory of each resource but does provide information to characterize those resources.

3.1 GEOLOGY, SEISMICITY, AND SOILS

Key resource categories and assessment variables described in this section include geology and physical processes, geologic resources, geologic hazards, geomorphology, seismicity and seismic hazards, and soils.

3.1.1 Regulatory Background

3.1.1.1 Federal Laws and Regulations

Executive Order 12699: Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction

The purposes of these requirements are to:

- Reduce risks to the lives of occupants of buildings owned by the federal government, leased for federal uses, or purchased or constructed with federal assistance and to persons who would be affected by the failures of federal buildings in earthquakes
- Improve the capability of essential federal buildings to function during or after an earthquake
- Reduce earthquake-related losses to public buildings in a cost-effective manner

A building means any structure, fully or partially enclosed, used or intended for sheltering persons or property.

Under this order each federal agency responsible for the design and construction of a federal or federally funded building must ensure that the building is designed and constructed in accord with appropriate seismic design and construction standards. These standards are promulgated through the National Earthquake Hazard Reduction Program (NEHRP) and are subsequently incorporated into the model building codes that are used as the basis for local building codes in most municipalities. NEHRP periodically publishes new standards; the latest NEHRP standards were published in 2000. This requirement pertains to all building projects for which detailed plans and specifications were initiated subsequent to the issuance of the order.

Each federal agency responsible for the construction and lease of a new building must also ensure that the building is designed and constructed in accord with appropriate seismic design and construction standards. Local building codes are used in design and construction and augmented when necessary to achieve appropriate seismic design and construction standards.

According to Office of Management and Budget Circular A-119 of January 17, 1980, entitled *Federal Participation in the Development and Use of Voluntary Standards,* nationally recognized private-sector standards and practices are to be used unless the responsible agency finds that none are available that meet its requirements. This circular states that design criteria should consider the seismic hazards in various areas of the country, as shown in the most recent edition of the American National Standards Institute Standards A58, *Minimum Design Loads for Buildings and Other Structures,* or subsequent maps adopted for federal use. Local building codes may be used if determined by the responsible agency or by the Interagency Committee for

Seismic Safety in Construction to provide adequately for seismic safety. Special seismic standards and practices may be used if required by a unique agency mission.

Farmland Protection Policy Act of 1981

The Farmland Protection Policy Act (7 United States Code [USC] 4201 et seq.) and the U.S. Department of Agriculture's implementing procedures require federal agencies to evaluate the effects (direct and indirect) of their activities before taking any action that could result in converting designated prime or unique farmland for nonagricultural purposes. If an action would adversely affect farmland preservation, alternative actions that could avoid or lessen adverse effects must be considered. Federal agencies also must ensure that their programs, to the extent practicable, are compatible with state, local, and private programs to protect farmlands. Determination of the level of impact to prime and unique farmland or farmland of statewide and local importance is done by the lead federal agency, which inventories farmlands affected by the proposed action and scores part of an AD 1006 Form, Farmland Conversion Impact Rating, for each alternative. Through consultation with the Natural Resources Conservation Service (NRCS) staff in the particular county of the proposed action, NRCS completes the AD 1006 Form and determines the level of consideration for protection of farmlands that needs to occur under the Act.

3.1.1.2 State and Local Laws and Regulations

1998 California Building Code

The CBC contains the minimum standards for design and construction in California. Local standards other than the CBC may be adopted if those standards are stricter. The CBC incorporates the standards associated with seismic engineering that are detailed in the Uniform Building Code (UBC) of 1997.

The 1997 UBC and therefore the 1998 CBC reflect the National Earthquake Loss Reduction Program provisions published in 1994. With the publication of the 2000 NEHRP standards, the 1998 CBC no longer reflects current standards. Consequently, until California adopts a building code reflecting the 2000 NEHRP standards, structures permitted after the 2000 standards became available will not be in compliance with Executive Order (EO) 12699.

California Public Resources Code § 25523(a), 20 California Code of Regulations § 1752(b) and (c), and the 1972 Alquist-Priolo Earthquake Fault Zoning Act (Amended 1994)

The Alquist-Priolo Earthquake Fault Zoning Act (A-P Act) was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. This state law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. Surface rupture is the most easily avoided seismic hazard.

The main purpose of the A-P Act is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Seismic Hazards Mapping Act,

passed in 1990, addresses nonsurface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.

The A-P Act requires the State Geologist to establish regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones, including all land divisions and most structures for human occupancy. Single-family wood-frame and steel-frame dwellings of up to two stories that are not part of a development of four units or more are exempt. However, local agencies can be more restrictive than state law requires.

Before a proposed action can be permitted, cities and counties must require a geologic investigation to demonstrate that proposed buildings will not be constructed across active faults. An evaluation and written report of a specific site must be prepared by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (generally 50 feet).

Earthquake Fault Zones are regulatory zones around active faults. The zones are defined by turning points connected by straight lines. Most of the turning points are identified by roads, drainages, and other features on the ground. Earthquake Fault Zones are plotted on topographic maps at a scale of 1 inch equals 2,000 feet. The zones vary in width, but average about 1/4 mile wide.

Effective June 1, 1998, the Natural Hazards Disclosure Act requires that sellers of real property and their agents provide prospective buyers with a "Natural Hazard Disclosure Statement" when the property being sold lies within one or more state-mapped hazard areas, including Earthquake Fault Zones.

California Public Resources Code Chapter 7.8 and the Seismic Hazards Mapping Act of 1990

This law addresses shaking, landsliding, and liquefaction hazards. It expands from the surface fault-rupture hazard addressed in the A-P Act to other seismic hazards, including shaking, landsliding, and liquefaction. This law requires the State Geologist to prepare seismic hazard maps that cities and counties must use in preparing their general plan safety elements and in regulating new development to avoid or mitigate these seismic hazards. The California Geological Survey (formerly the California Division of Mines and Geology) has adopted regulations for the mapping process under Title 14 of the California Code of Regulations (CCR).

The Seismic Hazards Mapping Act of 1990 allows the lead agency to withhold permits until geologic investigations are conducted and mitigation measures are incorporated into plans. This act not only addresses seismically induced hazards, but also includes such things as expansive soils, settlement, and slope stability. Cities and counties may adopt more stringent criteria and policies, as they see fit.

Field Act

After the 1933 Long Beach earthquake, statewide seismic design and construction requirements were mandated for public schools. Commonly known as the Field Act, these state requirements were extended to the evaluation and retrofitting of existing pre-Field Act buildings with the passage of the Garrison Act (1939) and the Greene Act (1967). The scope of the regulations is found in CBC, Part I, Title 24, Sec. 4-301 et seq.

Field Act buildings have stringent construction quality control procedures (required by CCR Title 24 Part 1). The requirements in this act have been reconsidered on several occasions and recommendations have been made for altering them to be more effective. For example, the California Earthquake Hazards Reduction Program in Initiative 1.3 in 1991 laid out a goal for all school districts to identify and reduce unacceptable earthquake hazards in public schools by the year 2000. The Northridge earthquake provided many observations of school damage that was not covered by the act. Privately owned schools are excluded from the Field Act requirements. Also, the requirements relating to hazard reduction of existing pre-act schools does not apply to the California State University or University of California systems, but it does apply to community colleges.

3.1.1.3 Local Laws and Regulations

Counties and cities have developed general plans that include county- or city-specific descriptions of existing geology and geologic resources.

Shortly after the 1971 San Fernando earthquake, the state legislature passed a requirement that all city and county general plans include a seismic safety element. During the mid-1970s local governments prepared and adopted seismic safety elements to meet statutory deadlines. In l984, the state legislature streamlined general plan requirements, combining the overlapping safety and seismic safety elements into a single safety element.

Each planning agency has to prepare, and the legislative body of each county and city has to subsequently adopt, a comprehensive, long-term general plan for the physical development of the county or city, and of any land outside its boundaries that in the planning agency's judgment bears relation to its planning.

3.1.2 Geology, Geologic Hazards, and Soils in California

3.1.2.1 Geomorphic Provinces

A brief examination of the rock types, geologic structure, and geomorphology (landscape features) of California shows some distinct regional differences. The term "geomorphic province" is generally defined to be any area that displays a distinctive geologic and landscape character as defined by the amount of relief, types of landforms, orientation of valleys and mountain ridges, and types of vegetation. As the underlying geology is one of the controlling factors that define the geomorphic character of each province, the geology of California is commonly described in terms of its geomorphic provinces. California comprises 12 geomorphic provinces (Figure 3.1-1). These provinces are described from north to south in the following sections.

Klamath Mountains Province

The Klamath Mountains Province is located in the northwestern corner of California and southwestern corner of Oregon between the northern Coast Ranges and Cascade Range Province. It is made up of several mountain ranges including the Trinity Alps, the Marble Mountains, the Salmon Mountains, and the Siskiyou Mountains. It is a north-trending area that covers approximately 11,800 square miles. This province consists of a rugged topography with peaks and ridges of similar elevations, between 4,900 to 6,900 feet above sea level.

No zoned active faults according to the A-P Act exist within this province (Hart 1994). However, many Quaternary and pre-Quaternary low-angle thrust faults occur, such as the South Fork Mountain thrust to the west of the province, which separates the province from the younger rocks of the Coast Ranges. None of these faults are considered active or potential earthquake sources. One substantial earthquake source exists in this region. Beneath the Klamath Mountains, the Gorda plate (a fragment of the Pacific plate) is being subducted[1] eastward beneath the North American plate (Ludwin, Weaver, and Crosson 1991; Urhammer 1991). Friction between the overriding North American plate and the Pacific plate has the potential to generate "megathrust" earthquakes, as does deformation within the downgoing plate itself (Heaton and Hartzell 1987).

Cascade Range Province

The Cascade Range comprises a 500-mile-long chain of volcanoes that extend from northern California into Oregon and Washington. The Cascade Range province in California is the southern tip of the chain and the geology is more similar to that of the Pacific Northwest than to the geology of California. Within California, the province is located between the Klamath Mountains to the west and the Modoc Plateau Province to the east and north of the Great Valley and Sierra Nevada Provinces. One of the most prominent volcanoes of the Cascade Range in California is Mount Shasta, which rises 14,162 feet above sea level. The southernmost peak of the Cascade Range and the second highest peak within the province is Mt. Lassen (10,453 feet), which last erupted sporadically between 1914 and 1921 (Miller 1989). The portion of the Cascade Ranges within California resulted from the subduction of the Gorda Plate. As the subducted plate is pushed into the mantle it heats up and the rocks eventually melt, producing magma. The molten magma is buoyant and rises through the overlying mantle and crust until it is erupted as lava. Successive lava eruptions eventually build up into volcanoes. Mount Shasta has been built up over the last 10,000 years, when at least 13 major eruptions have occurred. During the last 4,500 years, the average interval between eruptions has been 600 years. The most recent eruption occurred about 200 years ago (Miller 1989). Geologic evidence indicates that large eruptions from Mount Shasta are similar to the 1980 eruption of Mount St. Helens in Washington in that they involve explosive eruptions and are accompanied by large debris avalanches that inundate large areas up to several tens of kilometers away from the volcanic cone (Crandell et al. 1984). Evidence of the associated volcanic history can only be traced back to the Eocene Age; before that the geologic history and formations are similar to the Klamath Mountains.

[1] Subduction is the process in which one plate is pushed downward beneath another plate into the underlying mantle when plates move towards each other.

Three A-P Act zoned active faults are located within the province: the Cedar Mountain, Hat Creek, and McArthur faults, all of which make up the boundary between the Cascade Range Province and the Modoc Plateau. Each of these faults is capable of generating damaging earthquakes. In addition to these faults, movement of magma within the crust and volcanic eruptions can also be associated with damaging earthquakes.

Modoc Plateau Province

The Modoc Plateau is a table formed by thick accumulation of volcanic lava flows and tuff beds located to the east of the Cascades. It is an undulating plateau at an elevation of 4,000 to 6,000 feet above sea level. Occasional lakes, marshes, and slow-moving streams cut this plateau. The province is bounded by the Cascade Range on the west and the Basin and Range Province on the east and south. The boundary with the Cascades is marked by the active normal faults[2] of the Hat Creek fault zone.

Coast Ranges Province

The Coast Ranges Province extends from Lompoc in the south to the Oregon border. Northwest-trending ranges and intervening valleys that are generally parallel to major strike-slip faults (e.g., the San Andreas fault) and fold axes characterize the Coast Ranges. The mountains range from 2,000 to 4,000 feet above sea level. The province is bounded to the east by the Great Valley; to the north by the South Fork Mountain fault, which marks the southern extent of the Klamath Mountains; to the south by the Transverse Ranges; and to the west by the Pacific Ocean. The province is naturally divided into North and South Coast Ranges by the depression that is occupied by San Francisco Bay and the Sacramento-San Joaquin River Delta.

The Coast Ranges Province is traversed obliquely by the San Andreas fault system, a broad zone of strike-slip faulting[3] that marks the boundary between the Pacific and North American plates. This system of faults, including the San Andreas fault itself, has been responsible for the majority of damaging earthquakes in California during historical time.

In addition to the active strike-slip faults of the San Andreas system, the Coast Ranges also contain a number of active reverse or thrust faults[4], most notably the blind or buried faults that mark the boundary between the Coast Ranges and the Great Valley. These faults have been responsible for several damaging earthquakes during historical time (Wakabayashi and Smith 1994). The northern part of the Coast Ranges Province is dominated by landslide-prone formations.

[2] Normal faults form when the crust is extended and are inclined faults, where displacement is vertical, with slip occurring down the incline of the fault plane.

[3] Strike-slip faulting occurs when two adjacent blocks of rock slide past each other horizontally.

[4] Thrust faults form when the crust is compressed and are low-angle faults where displacement is vertical, with slip occurring up the incline of the fault plane.

San Francisco Bay Province

The San Francisco Bay area has a structurally controlled topography that consists primarily of north- to northwest-trending mountain ranges and intervening valleys that is characteristic of the Coast Ranges geomorphic province. This fabric is subparallel to the San Andreas fault. The Coast Ranges consist of the Mendocino Range to the north of San Francisco Bay, the Santa Cruz Mountains to the west of the Bay, and the Diablo Range to the east of the Bay.

San Francisco Bay is a topographic trough formed by a combination of warping and faulting and is underlain by a down-dropped or tilted block (the Bay Block), which acts as a water gap in the Coast Ranges to allow the San Joaquin and Sacramento rivers to drain to the ocean. The Bay is about 56 miles long and from 3 to 5 miles wide. Constrictions divide the Bay into Suisun, San Pablo, and North and South San Francisco bays. The bay is relatively shallow with depths of less than 10 feet except in locations of drowned drainage channels. The deepest point is within the main channel through the Golden Gate, at a depth of approximately 345 feet below sea level.

The geology of the Bay area is made up primarily of three different geologic provinces: the Salinian block, Franciscan complex, and the Great Valley sequence. The Salinian block is located west of the San Andreas fault. It is composed primarily of granitic plutonic rocks that are similar to those found in the Sierra Nevada and are believed to be rocks of the Sierra Nevada batholith that have been displaced along the San Andreas fault. To the east of the San Andreas fault and bounded on the west by the Hayward fault is the Franciscan complex. The rocks of the Franciscan complex are prone to landslides. To the east of the Hayward fault is the Great Valley sequence. These rocks are also prone to landsliding.

The Great Valley Province

The Great Valley Province comprises two elongate northwest- to southeast-trending basins: the Sacramento basin to the northwest and the San Joaquin basin to the southeast. These basins are located between the Coast Ranges to the west and the Sierra Nevada to the east. The Sacramento and San Joaquin rivers drain the basins respectively and both drain to the ocean through San Francisco Bay. The province is approximately 450 miles long and 45 to 55 miles wide and ranges in elevation from below sea level to approximately 400 feet above sea level.

Four faults around the boundary of the Great Valley Province have been zoned under the A-P Act: the Buena Vista and Plieto-Wheeler Ridge faults, which make up the boundary with the Coast Ranges and Transverse Ranges to the west and south, respectively, and the Kern Front and White Wolf faults, which mark the boundary with the Sierra Nevada and eastern Transverse ranges, respectively.

Sierra Nevada Province

The Sierra Nevada Province is a tilted fault block approximately 400 miles long that forms a mountain range 40 to 100 miles wide. It is bound to the west by the Great Valley Province, to the north by the Cascade Range, to the east by the Basin and Range Province, and to the south by the Garlock fault along the northern margin of the Mojave Desert. The eastern face of the Sierra Nevada is the high, steep fault scarp of the Sierra Nevada fault and others that form the Sierra Nevada block. The western side of the Sierra Nevada is the low-sloping back side of the uplifted

block containing rocks that disappear under the younger sediments of the Great Valley. Deep river canyons are cut into the western slope as they drain the Sierra Nevada. The northern boundary of the Sierra Nevada province is defined where the bedrock disappears under the Cenozoic volcanic cover of the Cascade Range. Elevations in the province range from 400 feet above sea level to 14,496 feet at the top of Mt. Whitney, the highest point in the lower 48 states.

The present topography of the Sierra Nevada is the result of extensive erosion by glaciers during the Holocene, and subsequent downcutting by high energy rivers, including the Kern, Kings, and Tuolumne.

The Sierra Nevada has 10 A-P Act zoned faults, 1 within and 9 along the province boundary. The Cleveland Hill fault is within the province. The Garlock fault is along the Mojave Desert boundary. The Honey Lake, Little Lake, Sierra Nevada, Fort Sage, Hilton Creek, and Owens Valley faults are along the boundary with the Basin and Range Province. The Kern Front fault is located along the Great Valley boundary.

Basin and Range Province

The Basin and Range Province extends from eastern California to central Utah, from southernmost Oregon and Idaho to the north to southern Arizona and southwestern New Mexico and further into Mexico in the south. Within California the province includes a small portion in the northeastern corner of the state and a much larger area in the southern part of the state bordered by the Sierra Nevada to the west and the Mojave Desert to the south. Throughout the Basin and Range province, range-front faults can be found along the base of the ranges. Recent movements on these faults have elevated the ranges relative to the basins. Recent volcanic eruptions have left young cinder cones, craters, and lava flows.

Numerous faults are zoned under the A-P Act within the Basin and Range Province: the Fort Sage, Hilton Creek, Sierra Nevada, and Honey Lake faults, which lie on the boundary with the Sierra Nevada, and the Death Valley fault, the Deep Springs fault, the Northern Death Valley fault, the Panamint Valley fault, the Surprise Valley fault, and the White Mountains fault.

Mojave Desert Province

The Mojave Desert is a region of isolated mountain ranges separated by expanses of desert plains. The Mojave Desert is located south of the Basin and Range Province and is bounded by the Garlock fault to the north, the Colorado River and the California-Nevada border to the east, and the San Gabriel and San Bernardino Mountains and the San Andreas fault to the southwest. The topography of the Mojave Desert is characterized by basins and ranges. However, the topography in the Mojave Desert is much more subdued than that of the Basin and Range Province. The ranges of the Mojave Desert are shorter and lower and the basins are wider. The topography is gentler than the sharp contrasts between ridge and valley of the Basin and Range Province.

Numerous faults within the Mojave Desert Province have been zoned by the A-P Act: the Garlock fault along the Sierra Nevada and Basin and Range boundary, the North Frontal and Pinto Mountain faults along the Transverse Ranges boundary, the Burnt Mountain fault, the Eureka Peak fault, the Helendale fault, the Lenwood fault, the Mesquite Lake fault, the Pisgah-

Bullion fault, the Calico fault, the Kickapoo fault, the Manix fault, the Newberry fracture zone, and the Upper Johnson Valley fault. These faults have generated three damaging earthquakes in the last 20 years, including the 1992 Moment Magnitude 7.3 Landers and 1999 Moment Magnitude 7.1 Hector Mine earthquakes.

Transverse Ranges Provinces

The Transverse Ranges Province is a long, narrow, east-west-trending province that consists of a series of mountain ranges and valleys. The province is bordered to the south by the Peninsular Ranges. This boundary is defined by the Santa Monica fault between the Santa Monica Mountains and the Los Angeles Basin. The Mojave Desert borders this province to the north and the east and the Salton Trough/Colorado Desert Province to the southeast.

Numerous active faults are zoned by the A-P Act in this province: the Pinto Mountain and North Frontal faults, which make up the Mojave Desert boundary, as well as the Cucamonga fault, the Red Mountain fault, the San Cayetano fault, the San Gabriel fault, the Raymond Hill fault, the San Andreas fault, the San Fernando fault, and the Ventura fault.

Los Angeles Basin Province

The Los Angeles Basin Province and the surrounding region are being deformed by several active faults that have generated a number of moderate-sized earthquakes, including the 1933 Long Beach, 1971 San Fernando, 1987 Whittier Narrows, and 1994 Northridge events. Faulting is dominated by both strike-slip and thrust motions, either of which is capable of generating damaging earthquakes.

The Los Angeles Basin Province is bounded by the San Andreas fault system to the east, the Transverse Ranges to the north, and the Continental Borderland and Peninsular Ranges provinces to the west and south, respectively. The tectonics of the Los Angeles Basin Province are transitional between those of the Transverse Ranges to the north and the Peninsular Ranges to the south. The Los Angeles Basin Province is an east-west elongate basin filled with Mesozoic and Cenozoic sediments that are highly deformed by a complex system of folds and thrust faults, many of which do not reach the earth's surface (so-called blind thrusts). In addition to these thrust faults, the Los Angeles Basin Province is traversed by a number of northwest-striking, right-lateral strike-slip faults, including the Newport-Inglewood, Elsinore, San Jacinto, and San Andreas faults. These strike-slip faults accommodate the majority of the plate motion between the Pacific and North American plates. The complex tectonics of the Los Angeles Basin Province are the result of a prominent left restraining bend ("The Big Bend") in the San Andreas fault as the fault exits Coachella Valley. This fault geometry creates a region of compression that is manifest as the folds and thrust faults of the Los Angeles Basin Province and the Transverse Ranges Province immediately to the north.

Peninsular Ranges Province

The Peninsular Ranges Province consists of a series of ranges separated by longitudinal valleys that trend northwest to southeast, subparallel to faults of the San Andreas system. These mountains are composed of granitic rock intruded by metamorphic rocks similar to the Sierra

Nevada. This province is located in the southwestern part of the state and is bounded to the north by the Transverse Ranges Province, to the east by the Salton Trough/Colorado Desert Province, to the south by Mexico, and to the west by the Continental Borderlands.

Five northwest-trending faults within the Peninsular Ranges Province have been zoned by the A-P Act: the Elsinore fault, the Rose Canyon fault, the Newport-Inglewood fault, the San Jacinto fault, and the Whittier fault.

Salton Trough/Colorado Desert Province

The Salton Trough/Colorado Desert Province is a low-lying barren desert basin about 245 feet below sea level that contains the Salton Sea and the Imperial Desert. It is bordered by the San Andreas fault to the northeast and the San Jacinto fault to the southwest. The trough is a pull-apart basin created by transform fault movement as the Peninsular Ranges pulled away from North America.

Four faults within the province have been zoned by the A-P Act: the Brawley fault, the Imperial fault, the San Andreas fault, and the Superstition Hills fault.

Continental Borderlands

To the west, the Los Angeles Basin is bounded by the Continental Borderlands. The Continental Borderlands seismotectonic province is located in the offshore region of Southern California, extending from offshore Baja to the Channel Islands. This region is characterized by moderate levels of seismicity, with epicenters often being aligned along active fault structures.

3.1.2.2 Geologic Hazards

The geologic environment of California comprises a number of potential geologic hazards, which are discussed in the following sections. The specific geologic hazards for each geomorphic province are described in Table 3.1-1.

Surface Fault Rupture

Surface fault rupture is defined as slip on a fault plane that has propagated upwards to, and has offset or disturbed, the earth's surface. Offset on a fault intersecting the ground surface can create a discrete step or fault scarp if fault slip occurs on a single fault plane or within a narrow fault zone. If fault slip is accommodated over a broader area, then the deformation may manifest as a zone of fracturing and ground cracking with minor amounts of offset on individual fractures; however, the cumulative offset across the entire zone may be substantial. Surface faulting may also arise as a secondary effect from other geologic processes. Secondary surface faulting can be triggered by aquifer compaction and subsidence (e.g., Bawden et al. 2001) or by the effects of strong ground shaking triggering slip on neighboring faults.

Surface fault rupture has occurred on a number of faults within the study region during the last 10,000 years (Jennings 1994): the San Andreas fault in 1857 and 1906 (Wallace 1990), the Hayward fault in 1868 (Yu and Segal 1996), the Owen fault in 1872 (Lubetkin and Clark 1988), the San Fernando fault in 1971 (Barrows et al. 1973), the Imperial and Superstition Hills faults in 1981

(Sharp, Rymer, and Lienkaemper 1986), the Landers fault zone in 1992 (Hart, Bryant, and Trieman 1993), and the Bullion Mountains-Lavic Lake faults in 1999 (U.S. Geological Survey, Southern California Earthquake Center, and California Division of Mines and Geology 2000) are examples of surface rupture associated with large, damaging earthquakes during historical time.

Areas subject to surface-faulting rupture hazard are zoned by the State of California under the A-P Act (Hart 1994). Maps of areas of potential surface faulting are prepared by and available from California Geological Survey (formerly Division of Mines and Geology). These maps depict the most recently active traces of active faults and a zone around these traces within which future surface faulting may occur. All geomorphic provinces in California, with the exception of the Klamath Mountains, contain active faults that pose a surface-faulting hazard. Because of the high slip rates and high density of faults in the Los Angeles Basin and San Francisco Bay Area, these two regions have the highest likelihood of experiencing surface faulting in the future.

Earthquake Ground Shaking

Strong earthquake ground shaking is probably the most important seismic hazard that can be expected almost anywhere in California. The amount of earthquake shaking at a particular site is a function of earthquake magnitude; the type of earthquake source (i.e., type of fault), distance between the site and the earthquake source, the geology of the site, and how the earthquake waves decrease or attenuate as they travel from their source to the site in question. The larger the earthquake and the shorter the distance between the earthquake source and the site, the greater the amount of shaking. The geologic materials through which the earthquake energy travels toward the site act to decrease, or attenuate, the amount of shaking. The amount of shaking is expressed in terms of "Peak Horizontal Acceleration" measured in percent of "g," the acceleration of gravity (approximately 9.81 feet per second squared).

California has experienced numerous damaging earthquakes during historical time (Stover and Coffman 1993; Toppozada et al. 2000). The 1868 earthquake on the Hayward fault caused widespread damage throughout the eastern San Francisco Bay Area; the 1906 earthquake on the San Andreas fault caused extensive damage in San Francisco and throughout Northern California. More recently, the 1989 Loma Prieta earthquake in the Santa Cruz Mountains and the 1994 Northridge earthquake in San Fernando Valley caused widespread damage in the San Francisco Bay and Los Angeles Basin regions, respectively. A more comprehensive list of damaging earthquakes is provided in Table 3.1-2.

Liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking. Liquefaction and related phenomena have been responsible for tremendous amounts of damage by historical earthquakes around the world.

Liquefaction is the transformation of a granular material from a solid state into a liquefied state as a consequence of increased pore pressure and decreased effective stress (Youd 1973). Increased pore pressures in unconsolidated sediment, especially in western California, are most typically seismically induced deformation. Observed types of ground failure resulting from liquefaction can include sand boils, lateral spreads, ground settlement, ground cracking, and ground warping (Youd and Hoose 1978). Liquefaction occurs in saturated soils.

Lateral spreading is the lateral displacement of surficial blocks of sediment as the result of liquefaction in a subsurface. Once liquefaction transforms the subsurface layer into a fluidized mass, gravity may cause the mass to move downslope toward a cut slope or free face (such as a river channel or a canal). Lateral spreads most commonly occur on gentle slopes that range between 0.3° and 3°. When liquefaction occurs, the strength of the soil decreases and the ability of a soil deposit to support foundations for buildings or other structures is reduced. Liquefied soil also exerts higher pressure on retaining walls, which can cause them to tilt or slide. This movement can cause settlement of the retained soil and destruction of structures on the ground surface.

The potential for liquefaction is a function of having susceptible soils, shallow groundwater to create saturated conditions, and high enough ground shaking. If any of these conditions are lacking, then the potential for liquefaction is considered low.

Subsidence and Uplift

Land surface subsidence can result from both natural and human-made phenomena. Natural phenomena include subsidence resulting from tectonic deformations and seismically induced settlements (see liquefaction), soil subsidence due to consolidation, subsidence due to oxidation or dewatering of organic-rich soils, and subsidence related to subsurface cavities. Subsidence or settlement related to human activities includes subsidence caused by decreased pore pressure due to the withdrawal of subsurface fluids, including water and hydrocarbons.

Subsidence and uplift are generally only considered a substantial hazard if they occur over human life time. Most of the mechanisms of subsidence and uplift described above occur over geologic time and, therefore, are not considered a potential hazard.

Expansive Soils

Expansive soils contain mixed-layer clay minerals that increase and decrease in volume on wetting and drying, respectively. Expansive soils are common throughout California and can cause damage to foundations and slabs unless properly treated during construction. Mixed layer clays and potentially expansive soils are present almost everywhere in California.

Mass Wasting

Mass wasting is downward movement of soils and rock under gravity, including landslides, rock falls, and debris flows. Mass wasting requires source materials, a slope, and a triggering mechanism. Source materials include fractured and weathered bedrock and loose soils. Triggering mechanisms include earthquake shaking, heavy rainfall, and erosion.

Volcanic Hazards

Potentially hazardous volcanic events can be categorized into three groups: flowage phenomena, eruption of tephra, and emission of volcanic gases. Flowage phenomena include debris avalanches

and flows, pyroclastic flows[5] and surges, directed blasts, lava flows, and floods. Any erupted volcanic material that moves down slope, such as lava, ash, water, and mud, away from the flanks of the volcano, or down adjacent valleys, constitutes flowage phenomena. The speed and distance at which they can flow is dependent on the composition of the erupted material, which varies for each volcano and type of flow. Most flowage phenomena are devastating, destroying everything in their path either by impact, burial, or ignition if the material is hot (Miller 1989). Floods occur if molten lava melts snow and ice on the volcano, consequently generating debris flows as lava ash and mud. Lahars, hot volcanic mud flows, are some of the most devastating consequences of volcanic activity. Such debris avalanches and flows, pyroclastic flows, and surges are difficult to avoid as their highly mobile, fluid nature allows them to move swiftly downslope away from their source (Miller 1989).

Tephra or ash fall consists of combinations of pumice, dense-rock material of various sizes, and mineral crystals. Ash fall is produced by explosive eruptions that propel material from a few meters to several tens of kilometers into the air (Miller 1989). Hazards related to tephra eruptions include high temperatures, burial, and impact of falling blocks. A substantial volume of tephra can collapse structures under its weight and, if it is hot, ignite fires. Hazards associated with ash fall decrease with distance from the volcano. The main hazard at considerable distances from the volcano would be the effects of ash on the respiratory system. Vehicles and machinery would be affected, possibly causing disruptions in transportation, communication, and electrical services (Miller 1989).

Gases are often emitted from vents preceding a volcanic eruption and can occur for hundreds or thousands of years after an eruption. Volcanic gases consist of steam with lesser amounts of carbon dioxide, sulfur, and chlorine. Gases are concentrated near vents but are also distributed downwind. As with tephra, hazards from volcanic gases decrease with distance from the vent. Oxidation of sulfur and chlorine gases can lead to the formation of sulfuric and hydrochloric acid aerosols. Such strong acid vapors can be harmful to plants, animals, and people if the vapors are in high concentrations (Miller 1989).

Tsunami and Seiche

A tsunami (Japanese word meaning “harbor wave”) is a water wave or a series of waves generated by an impulsive displacement of the surface of the ocean or other body of water. Tsunamis can travel across oceanic basins and cause damage several thousand miles from their sources. Most tsunamis are caused by a rapid vertical movement along a break in the Earth’s crust (i.e., a tectonic fault rupture on the bottom of the ocean resulting in the displacement of the column of water directly above it). The majority of tsunamis are triggered by earthquake rupture along subduction zones. The 1964 Alaska earthquake generated a tsunami that caused widespread damage along the coastline of Northern California. Paleoseismic investigations have also shown that tsunamis resulting from earthquakes on the subduction zone beneath Japan and the Cascadia subduction zone in the Pacific Northwest have also inundated the Pacific coast states (Atwater et al. 1995).

A seiche is a periodic oscillation or “sloshing” of water in an enclosed basin such as San Francisco Bay. The period of oscillation can range from minutes to hours.

[5] Lateral flowage of a turbulent mixture of hot gases and unsorted pyroclastic material (volcanic fragments, crystals, ash, pumice, and glass shards) that can move at high speed (50 to 100 miles an hour).

Erosion

Erosion is the gradual wearing away of land by water, wind, and general weather conditions. As with weathering, erosion is a natural geological process, but more rapid soil erosion results from poor land use practices, leading to the loss of fertile topsoil and to the silting of dams, lakes, rivers, and harbors.

Wind erosion can occur on any soil whose surface is dry, unprotected by vegetation (to bind it at root level and shelter the surface), and consists of light particles. The mechanisms include straightforward picking up of dust and soil particles by the airflow and the dislodging or abrasion of surface material by the impact of particles already airborne.

Three classes of erosion by water exist: (1) splash erosion occurs when raindrops strike bare soil, causing it to splash as mud, to flow into spaces in the soil, and to turn the upper layer of soil into a structureless, compacted mass that dries with a hard, largely impermeable crust; (2) surface flow occurs when soil is removed with surface runoff during heavy rain; and (3) channelized flow occurs when a flowing mixture of water and soil cuts a channel, which is then deepened by further scouring.

3.1.2.3 Soils

The formation of a soil profile is influenced by five primary factors: climate, topography, soil parent material, biotic influence, and time. Because a wide variation may exist between these factors, even within a relatively small area, any regionwide or statewide summary must be somewhat imprecise and inclusive. The soils descriptions in the following sections are intended to be general in nature and follow the taxonomic terminology used by the U.S. Department of Agriculture. Figure 3.1-2 is a map of California divided into ecological subregions that reflect differences due primarily to variations in climate, topographic relief, and the geographic relationships between subregions and the Pacific Ocean. The following text is modified from *Ecological Subregions of California: Section and Subsection Descriptions* (Miles and Goudey 1997).

Central California Coast

This section consists of mountains, hills, valleys, and plains in the southern Coast Ranges of California. It is close enough to the Pacific Ocean for the climate to be modified greatly by marine influence. This section is within the Coast Ranges Province (Figure 3.1-1). The bedrock is primarily Cenozoic marine and nonmarine sedimentary rocks and Mesozoic granitic and ultramafic rocks mantled by alluvial and colluvial deposits. Soils are Alfisols, Entisols, Inceptisols, Mollisols, Ultisols, and Vertisols. Table 3.1-3 provides a brief description of soil taxonomic terminology. Soil temperature regimes are isomesic, mesic, or thermic; soil moisture regimes are xeric, udic, ustic, or aquic.

Southern California Coast

This section contains mountains, hills, valleys, and plains of the Transverse Ranges and of the Peninsular Ranges that are close enough to the Pacific Ocean for the climate to be modified greatly by marine influence. This section is within both the Transverse and Peninsular Ranges

Provinces. The landscape consists of narrow ranges and broad fault blocks, alluviated lowlands, and coastal terraces. Cenozoic marine and nonmarine sedimentary rocks and alluvial deposits underlie the soils of this section. Soils are Alfisols, Entisols, Inceptisols, Mollisols, Ultisols, and Vertisols in combination with thermic, isothermic, or mesic soil temperature regimes and xeric, ustic, or aquic soil moisture regimes.

Great Valley

This section contains the alluvial plains of Sacramento and San Joaquin valleys. Summers are hot and dry and winters are mild. Oceanic influence on climate is slight in the middle of the Great Valley, which receives some marine air through Carquinez Strait, but little at the north and south ends of the valley. This section coincides with the low fluviatile plain of the Great Valley Province. Holocene and Pleistocene alluvial deposits cover nearly all of this ecological section. Soil orders found here are Alfisols, Aridisols, Entisols, Histisols, Inceptisols, Mollisols, and Vertisols. The soil temperature regime is thermic, and xeric, aquic, or aridic soil moisture regimes are common, depending on soil profile location.

Northern California Coast

This section encompasses mountains, hills, valleys, and plains in the Northern California Coast Ranges and small parts of the Klamath Mountains that are close enough to the Pacific Ocean for the climate to be modified greatly by marine influence. Summers are characterized by fog, cool temperatures, and higher humidity than found inland. Like the Central California Coast section described above, the Northern California Coast lies within the Coast Ranges geomorphic province typified by somewhat linear ranges, with rounded crests of subequal height separated by parallel valleys. Late Mesozoic rocks of the Franciscan Formation and shelf and slope sedimentary rocks have been folded, faulted, and metamorphosed in this section. Soils on the north coast are Alfisols, Inceptisols, Mollisols, Spodosols (Pygmy Forest), Ultisols, and Vertisols. Typically, soil temperature regimes are isomesic, mesic or thermic, and soil moisture regimes are aquic, udic, ustic, or xeric (moist end of range).

Klamath Mountains

The Klamath Mountains section is between the Southern Cascade Mountains and the Coast Ranges mountains. Its southern limit is the northern end of the Great Valley. This section coincides with the Klamath Mountains geomorphic province, an uplifted and dissected peneplain formed on strong rocks with extensive monadnock ranges. Mountains in this section have accordant or subequal summits and are generally, but not consistently, aligned north to south. Paleozoic sedimentary and volcanic rocks, and Mesozoic ultramafic, granitic, sedimentary, and volcanic rocks are found here. Soils are Alfisols, Entisols, Inceptisols, Mollisols, and Ultisols in combination with thermic, mesic, frigid, or cryic soil temperature regimes and xeric or aquic soil moisture regimes.

Northern California Coast Ranges

This section is the interior part of the Northern California Coast Ranges mountains, north of Carquinez Strait. Marine air modifies winter and summer temperatures, but the section is far enough inland from the coast that oceanic effects are greatly diminished and less prevalent than in the Northern California Coast section. This section lies within the Coast Ranges geomorphic province of parallel ranges, folded, faulted, and metamorphosed strata. Late Mesozoic rocks of the Franciscan Formation, Mesozic ultramafic rocks, and Cenozoic volcanic rocks are the common bedrock lithologies in this section. Soil orders found in this ecoregion are Alfisols, Entisols, Inceptisols, and Mollisols in combination with frigid, mesic, or thermic soil temperature regimes and a xeric soil moisture regime.

Northern California Interior Coast Ranges

This section is the southeastern edge of the Northern California Coast Ranges mountains (south of Cache Creek) and hills and terraces along the west side and north end of Sacramento Valley. Like the above section, this section is part of the Coast Ranges geomorphic province.

Bedrock in the Northern California Interior Coast Ranges is late Mesozoic marine shelf and slope sedimentary deposits. Soils are Alfisols, Inceptisols, Mollisols, and Vertisols in combination with thermic soil temperature regime and xeric soil moisture regime.

Southern Cascades

This section comprises the southern Cascade Ranges. The crest of the mountain chain is aligned toward the north-northwest between the Sierra Nevada and Mount Shasta and toward the north from Mount Shasta northward. The landscape in this section is dominated by volcanic mountains that are variously eroded. This section lies completely within the Cascade Ranges geomorphic province of California. Rocks in this section are Cenozoic volcanic rocks and alluvial deposits of these same rocks.

Numerous soil orders have been described in this section: Alfisols, Andisols, Aridisols, Entisols, Inceptisols, Mollisols, Ultisols, and Vertisols. The soil temperature regime is mesic, frigid, or cryic, and the soil moisture regime is xeric, aridic, or aquic.

Sierra Nevada

This section is the temperate to very cold parts of the Sierra Nevada, which is a north-northwest-trending tilt-block mountain range with a steep eastern side and gentler sloping western side. This ecoregion lies within the Sierra Nevada Range geomorphic province. Mesozoic granitic and ultramafic rocks, Paleozoic and Mesozoic strongly metamorphosed sedimentary and volcanic rocks, and Cenozoic volcanic rocks are present in this range. Locally glacial and fluvial deposits are present as well. Soils are Alfisols, Andisols, Aridisols, Entisols, Inceptisols, Mollisols, and Ultisols in combination with mesic, frigid, or cryic soil temperature regimes and xeric, udic, aridic, or aquic soil moisture regimes.

Sierra Nevada Foothills

This section comprises the foothills on the western side of the Sierra Nevada, and the southwestern end of the Cascade Ranges, adjacent to the Great Valley. Summers are hot and dry and winters are mild. This ecoregion lies within the Sierra Nevada Range geomorphic province. Mesozoic sedimentary, granitic, volcanic, and ultramafic bedrock is present. Soil orders found in this section include Alfisols, Aridisols, Entisols, Inceptisols, Mollisols, and Vertisols in combination with mostly thermic soil temperature regimes and xeric or aridic soil moisture regimes.

Modoc Plateau

This section corresponds to most of the Modoc Plateau, which is related structurally to the Basin and Range Province and lithologically to the Columbia Plateau. Northwest-trending fault-block mountains and ridges are common here with intervening basin-like grabens that commonly are interspersed with lakebed deposits, shield volcanoes, cinder cones, or lava flows. This ecoregion is also a separate geomorphic province: Modoc Plateau (part of the Basin and Range Province flooded with volcanics related to those of the Cascade Ranges Province). Cenozoic volcanic and nonmarine sedimentary rocks and alluvial deposits cover this landscape. Soil taxa are Alfisols, Andisols, Aridisols, Entisols, Histisols, Inceptisols, Mollisols, and Vertisols. Soil temperature regimes are mesic, frigid, or cryic, and soil moisture regimes are xeric, aquic, or aridic.

Central California Coast Ranges

This section is the interior part of the southern Coast Ranges of California, south of Carquinez Strait. It is inland from the coast far enough that the climate is modified only slightly by marine influence. It is bounded on the northeast by the alluvial plain of San Joaquin Valley and on the southwest by the coastal part of the southern Coast Ranges (Section 261A). It extends south to the Transverse Ranges. Like the northern Coast Ranges, the central Coast Ranges are part of the Coast Ranges Province and consist of parallel northwest-trending ranges, folded, faulted, and metamorphosed strata with rounded crests of subequal height separated by intervening valleys. The lithology of the rocks in this section varies from Cenozoic marine and nonmarine sedimentary rocks and alluvial deposits to late Mesozoic shelf, slope, and active tectonic margin sedimentary rocks and Mesozoic ultramafic rocks. Soils are Alfisols, Aridisols, Entisols, Inceptisols, Mollisols, and Vertisols in thermic or mesic soil temperature regimes and dry xeric or aridic soil moisture regimes.

Southern California Mountains and Valleys

This section includes mountains, hills, and valleys of the Transverse Ranges and the Peninsular Ranges that are near the Pacific Ocean, but not bordering it. Much of the section is close enough to the Pacific Ocean for the climate to be moderated by marine influence. The geomorphology in this area consists of narrow ranges and broad fault blocks, alluvial lowlands, and dissected westward sloping granitic uplands. This ecological region lies within the Transverse and Peninsular Ranges provinces. Rocks in this region consist of Cenozoic marine and nonmarine sedimentary rocks and alluvial deposits and Mesozoic granitic rocks. Soils of the Alfisol,

Aridisol, Entisol, Inceptisols, and Mollisol orders are found here. The soil temperature regime is thermic, mesic, or frigid; the soil moisture regime is xeric or aridic.

Mojave Desert

This section is the hot part of the Basin and Range Province from the southern end of the Sierra Nevada and the north-northeastern side of the Transverse Ranges to Nevada and Arizona. Widely separated short ranges jutting up from desert plains are the common landforms of this region. Isolated mountains and plateaus are flanked by broad alluvial fans, locally extending down to dry lake beds (playas) and dunes. The Mojave Desert ecoregion lies within the Basin and Range Province. Cenozoic nonmarine sedimentary and granitic rocks and alluvial deposits and Precambrian rocks of all types can be found throughout the Mojave Desert.

As can be expected in this hot, dry climate, Aridisols and Entisols are the prevalent soil types in combination with thermic or hyperthermic soil temperature regimes and aridic soil moisture regimes on foothills and valleys. Thermic or mesic soil temperature regimes and aridic or xeric soil moisture regimes can be expected on the mountains. Some low closed basin areas contain salt-affected soils.

Sonoran Desert

This section is the hot part of the Basin and Range Province from the eastern end of the Transverse Ranges and the Salton Trough east to Arizona. Some rain falls during the summer.

The geomorphology in this portion of the Basin and Range Province is dominated by widely separated short ranges in broad desert plains. Cenozoic sedimentary rocks, alluvial and eolian (wind blown) deposits, and Precambrian to Cenozoic granitic and metamorphic rocks are common. Aridisols and Entisols are the common soil taxa in thermic or hyperthermic soil temperature regimes and aridic soil moisture regimes.

Colorado Desert (Salton Trough)

This section is a very hot part of the Basin and Range Province that is sometimes called the Salton Trough. The surface of sediments in the middle of the trough are about 275 feet below sea level. The delta of the Colorado River is generally high enough to keep seawater out of the Salton Trough. In 1905, however, the Colorado River overflowed into the Salton Trough and the breach was not finally sealed until 1907. The current level of the Salton Sea is about 230 feet below sea level. An ancient lake, Lake Cahuilla, was higher long enough to produce shoreline features that persist and reveal its former size. This low area is covered by Cenozoic sedimentary rocks, alluvial fans, fine-grained lacustrine (lake) deposits, and eolian dunes and delta plain (Gulf of California). Aridisols and Entisols with hyperthermic soil temperature regimes and aridic soil moisture regimes are the common soils here.

Mono

This ecological section is in the western part of the Great Basin, just east of the Sierra Nevada. Isolated fault block mountain ranges are separated by aggraded desert plains (alluvial fans and

basins). The Mono ecological region lies within the Basin and Range Province. Cenozoic volcanic rocks and alluvial deposits, Mesozoic granitic rocks, and Paleozoic sedimentary and volcanic rocks are the common lithologies. Soils are widely variable between Alfisols, Aridisols, Entisols, Inceptisols, Mollisols, and Vertisols in combination with mesic, frigid, or cryic soil temperature regimes and aridic, xeric, or aquic soil moisture regimes.

Southeastern Great Basin

This section comprises the southern Great Basin in the Basin and Range Province. Like the rest of the Basin and Range Province, the southeastern Great Basin is dominated by widely separated short fault block ranges with intervening downdropped graben basins and plains. Common landforms include isolated mountains, plateaus, alluvial fans, playas, basins, and dunes. Quaternary and Tertiary alluvial deposits and volcanic rocks and Mesozoic granitic rocks are common in this region. The common soil orders are Aridisols, Entisols, Inceptisols, and Mollisols in combination with thermic, mesic, or frigid soil temperature regimes and aridic, xeric, or aquic soil moisture regimes.

Northwestern Basin and Range

This section comprises the northern, particularly the northwestern, part of the Great Basin in the Basin and Range Province. The landscape here is dominated by isolated ranges (largely dissected block mountains) separated by aggraded desert plains. Quaternary alluvial and lacustrine deposits and Pliocene and Miocene volcanic rocks cover this region. Aridisols, Entisols, Inceptisols, and Mollisols are the prevailing soil orders with frigid and mesic soil temperature regimes and aridic and xeric soil moisture regimes. This section includes localized areas of salt-affected soils, generally in closed basins where runoff accumulates and evaporates.

Tables

Table 3.1-1
Geologic Hazards

Table 3.1-2
Notable California Earthquakes

Table 3.1-3
Explanation of Selected Soil Taxonomic Terms

Soil Orders and Distinguishing Characteristics	
Alfisols	Naturally fertile soils in humid or subhumid regions, widely used for agriculture, with the following five characteristics: (1) Sufficient translocated clay particles to form an argillic Bt horizon; (2) Relatively high base saturation (>35 percent) that typically increases with depth; (3) Contrasting soil horizons O, A, E, and Bt; (4) Favorable moisture regime: water is available to mesophytic plants more than half of the year, or for three consecutive months in warm season; and (5) Little accumulation of organic matter.
Andisols	Soils formed from and having the characteristics identified as associated with volcanic ash.
Aridisols	Soils of deserts.
Entisols	Recently formed soils, soils that have little or no evidence of development of pedogenic horizons.
Histosols	Organic soils commonly with very high water content.
Inceptisols	Soils that have not developed features diagnostic of other orders but have some features in addition to those permitted in Entisols.
Mollisols	Grassland soils of steppes and prairies having deep dark (due to organic content) relatively fertile surface horizon.
Ultisols	Relatively old deep and highly weathered forest soils formed in humid areas on parent materials that have been unaffected by glaciation.
Vertisols	Soils with thick horizons of expansive clays. Deep vertical cracks form when the soil dries.

Soil Moisture Regimes	
Aquic	A reducing regime that is virtually free of dissolved oxygen because the soil is saturated
Aridic	(1) Dry more than half of the time that the soil temperature is above 5°C at a depth of 50 cm; (2) Never moist in some or all parts for as long as 90 consecutive days when soil temperature is above 8°C at a depth of 50 cm.
Udic	Not dry for as long as 90 days in most years. Common in humid climate or where summer rains plus storage exceed evapotranspirational losses.
Ustic	Intermediate between Aridic and Udic moisture regimes.
Xeric	Typical in Mediterranean climate: moist cool winters and warm dry summers.

Soil Temperature Regimes*	
Frigid	Below 8° C
Mesic	From 8° to 15° C
Thermic	From 15° to 22° C
Hyperthermic	22° C or higher

The term "Iso" is added to the above four temperature terms if the difference between mean winter and mean summer temperatures is less than 5° C.

* Note: soil temperature is measured at a depth of 50 cm.

Figures

Figure 3.1-1 California Geomorphic Provinces

Figure 3.1-2 California Ecological Subregions

3.2 AIR QUALITY

This section describes relevant air quality regulations and discusses attainment status for criteria pollutants by geographical region in California. This information is necessary to assess the air quality impacts of potential FEMA actions and alternatives.

3.2.1 Regulatory Background

3.2.1.1 Federal Laws and Regulations

Several federal and state laws regulate air quality in California. The federal Clean Air Act (CAA) of 1970 was enacted to regulate air emissions from area, stationary, and mobile sources. This law authorized the U.S. Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. The six most common criteria pollutants regulated by the CAA are carbon monoxide (CO), ozone (O_3), nitrogen oxides (NO_x), particulate matter smaller than 10 microns in diameter (PM_{10}), particulate matter smaller than 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). Other criteria pollutants include lead, sulfates, and hydrogen sulfide. If the levels of any of the criteria pollutants in a particular geographic area exceed the NAAQS established for those pollutants, the area is designated as "nonattainment" for those pollutants. Likewise, if standards for pollutants are met in a particular area, the area is designated as "attainment" for those pollutants. In areas where background monitoring data are not available for certain criteria pollutants, the areas are considered "unclassified" for those pollutants. The FAA also requires that nonattainment areas for criteria pollutants prepare and implement State Implementation Plans (SIPs) to achieve the standards. Under the New Source Review (NSR) permitting process, any new potential source of emissions exceeding a certain amount may have to be permitted by the air districts.

The federal General Conformity Rule (GCR) states that a federal action cannot:

- Adversely affect or delay air quality plan maintenance
- Contribute to any new violations of an air quality standard
- Increase the frequency or severity of an existing violation
- Delay achieving attainment or emission reductions in any area

This rule applies to all federal actions, with an extensive listing of exempted actions that include those listed below (The GCR includes a comprehensive set of exemptions and only a key subset of these is listed below.):

- Actions specifically included in a transportation plan, program, or project developed, funded, or approved under 23 USC or the Federal Transit Act (49 USC 1601 et seq.) and which are subject to their own unique set of transportation conformity requirements under a different set of federal regulations
- Actions resulting in emissions below the threshold levels specified in 40 CFR Part 51.583(b) and shown in Table 3.2-1.

- Actions specifically listed as exempt because they have been determined to result in no emissions increase or an emission increase that is clearly de minimis (e.g., routine maintenance and repair of facilities; issuance of licenses, leases, or permits to ongoing operations; etc.)
- Actions that would carry out a conforming program, such as prescribed burning actions, which are consistent with a conforming land management plan
- The portion of any actions associated with major new or modified stationary sources that require a permit under the NSR program or the Prevention of Significant Deterioration (PSD) program
- Actions taken in response to emergencies or natural disasters
- Planning studies, research, demonstrations, and training where no environmental detriment is expected
- Alterations to facilities specifically required to comply with environmental laws or regulations

Of the list of exempted actions above, the following are the most relevant to potential FEMA actions: actions that result in emissions below the thresholds specified in 40 CFR Part 51.853(b), actions involving major stationary sources under NSR, emergency and natural disaster response actions; prescribed burning; planning studies; and routine maintenance and repairs (40 CFR Part 51.853).

If an action is not exempted under the GCR, the action must be reviewed to determine if it conforms for each criteria pollutant. The conformity analysis generally involves a demonstration that:

- Expected emissions from the activity have been appropriately accounted for and/or will not exceed the emission budgets specified in the approved SIP.
- Expected emissions will not cause a new violation of an applicable NAAQS or significantly worsen an existing violation.

The GCR may apply to an action. Consequently, each action must be reviewed to determine whether it qualifies for one of the many GCR exemptions (40 CFR 51.853), or whether further analysis is required under the GCR to establish conformity with the SIP.

3.2.1.2 State Laws and Regulations

The CARB was formed to "attain and maintain healthy air quality, conduct research into the causes of and solutions to air pollution, and systematically attack the serious problem caused by motor vehicles, which are the major causes of air pollution in the state." CARB also assists local air districts with setting appropriate emissions limits, enforcing laws, and providing technical staff and equipment when needed.

The California Clean Air Act (CCAA) has established California Ambient Air Quality Standards (CAAQS). These standards are generally more stringent than those promulgated by the NAAQS. The CCAA requires attainment of CAAQS by the earliest practicable date. For air districts in

violation of the state O_3, CO, SO_2, or nitrogen dioxide (NO_2) standards at the time the CCAA was established, attainment plans were required by July 1991. The federal and state standards are summarized in Table 3.2-2.

3.2.1.3 Local Laws and Regulations

For air quality purposes, California is divided into 15 air basins based on meteorological and geographical conditions, and where possible, jurisdictional boundaries. Each air basin is divided into Air Quality Management Districts (AQMDs) or Air Pollution Control Districts (APCDs). Each district is responsible for controlling air pollution such that the district's air quality meets all state and federal air quality standards. Some AQMDs and APCDs are further broken down by county. The division of the state into air basins, air districts, and counties is shown on Figures 3.2-1, 3.2-2, and 3.2-3.

Each air district adopts its own statutes to deal with the air quality problems specific to that district, including setting emission limits for stationary sources. In addition, each district develops its own clean air plan and enforces local air pollution control laws. Because the air quality problems across the state vary, each district has its own requirements for managing air quality.

Local air quality districts require preconstruction permits for stationary sources, but do not have authority to issue permits for mobile sources. As part of the permitting process, local air districts may require the use of Best Available Control Technology (BACT) to decrease emissions and corresponding potential air quality impacts.

3.2.2 Air Quality in California

The current air quality status of each basin, district, and county is discussed in this section. The attainment status of the air basins with respect to the six key criteria pollutants—O_3, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$—is shown in Tables 3.2-3 through 3.2-17. For all counties, the status of $PM_{2.5}$ attainment has not yet been determined. When all the counties of a basin are classified the same with respect to their attainment status, the individual counties of an air basin are not listed in a table.

The following symbols apply to all air basin tables:

- A = Attainment
- N = Nonattainment
- NT = Nonattainment-Transitional
- U = Unclassified
- U/A = Unclassified or attainment

3.2.2.1 North Coast Air Basin

This basin is regulated by the North Coast Unified AQMD and the Mendocino County AQMD. This basin includes Sonoma, Del Norte, Humboldt, and Trinity counties in the North Coast

District and Mendocino County in the Mendocino District. The attainment status of the North Coast Air Basin is shown in Table 3.2-3.

The North Coast area has two major topographic features: the Klamath Mountains and the Coast Range. Both features are rugged, mountainous terrain. Winds are from a westerly or southwesterly direction and are restricted by a barrier created by the orientation of the topography. The Coast Range includes low-lying areas along the coastal strip. These low-lying areas constitute less than 10 percent of the basin. Under low-level inversion conditions when vertical air movement is restricted due to a layer of warm air acting as a lid over cooler air that is near the surface, the effective volume of air for dilution of pollutants in the coastal valleys is severely limited.

The weather in this basin is directly related to the elevation, latitude, and distance from the ocean and the nature of the terrain between an area and the ocean. Although some continental influence may exist in parts of Sonoma County and in some of the river valleys, the climate of the most highly populated sections of the basin is generally a marine climate. Fog and sea breezes are typical during the summer. The average July temperature is between 50 and 60 °Fahrenheit (°F). Winters are mild for the latitude with an overall small annual temperature range. Precipitation increases substantially northward over the basin.

3.2.2.2 San Francisco Bay Area Air Basin

This basin is regulated by the Bay Area AQMD and the Northern Sonoma County APCD. The Bay Area AQMD includes Contra Costa, San Francisco, Alameda, Marin, Napa, Santa Clara, San Mateo counties, the southern portion of Sonoma County, and the western portion of Solano County. The Northern Sonoma County APCD includes the northern portion of Sonoma County. The attainment status of the San Francisco Bay Area Air Basin is shown in Table 3.2-4.

The climate of the San Francisco Bay Area is classified as Mediterranean with mild, wet winters and warm, dry summers. The regional climate is controlled primarily by the Pacific high-pressure system over the eastern Pacific Ocean and by local topography. The local climate is strongly influenced by topography and proximity to the Pacific Ocean and San Francisco Bay. Cool, onshore winds blowing from the Pacific have a moderating effect, especially west of the Diablo Mountain Range. These mountains act as a barrier to onshore winds, resulting in the channeling of airflow along canyons, valleys, and through straits in the Bay and strong west-to-east temperature differences.

The resulting overall airflow patterns are complex, exhibiting much local variation. Large-scale winds, which are the wind patterns influenced by the general geographical and topographical features of the San Francisco Bay Area on a roughly 50-mile scale, are predominantly from the northwest. The Bay Area has a large range of temperatures on any given day (particularly in the summer) due to the influence of the marine layer. During the summer months, the mean maximum temperature can range from 55°F near the coast to 100°F in the inland valleys. The range in temperature is not as great in the winter.

3.2.2.3 North Central Coast Air Basin

This basin is regulated by the Monterey Bay Unified APCD. This basin includes Monterey, San Benito, and Santa Cruz Counties. The attainment status of the North Central Coast Air Basin is shown in Table 3.2-5.

This basin's climate is mild because of its proximity to the ocean. Winter temperatures average between 45 and 50°F, and summer temperatures average in the low 70s. The further from the ocean, the higher the temperature in the summer and the lower the temperature in the winter. Temperature inversions are characteristic of this basin. During the late summer and fall, the cool air typically becomes trapped under a warmer layer of air preventing the dispersion of air pollutants. The prevailing wind direction when the inland area is warmer than the coastal area is from west to east, which is caused by the uprising of air in the inland areas that results from the heating of the land. When the inland area is cooler than the coastal area, the prevailing wind direction is from east to west. The prevailing wind is directed through the troughs between the mountains.

3.2.2.4 South Central Coast Air Basin

This basin is regulated by the San Luis Obispo County, Ventura County, and Santa Barbara County APCDs. Each APCD governs air quality for its county only. The attainment status of the South Central Coast Air Basin is shown in Table 3.2-6.

This basin has cool winters and warm, dry summers tempered by cooling sea breezes. Summer, spring, and fall weather is generally a result of the movement and intensity of the semipermanent high-pressure area located several hundred miles to the west. Marine influences generally predominate during this period and cause afternoon onshore flow and evening offshore flow. Winter weather is generally a result of the size and location of low-pressure weather systems originating in the north Pacific Ocean. The winds are dominated by a diurnal land-sea breeze cycle. This cycle is broken only by occasional winter storms and infrequent strong Santa Ana winds from the northeast. The sea breeze is generally stronger than the land breeze and results in a net flow from west to east. Westerly sea breezes carry pollutants generated in the coastal areas into the inland valleys, where dispersion is restricted. The presence of temperature inversions and westerly transport result in meteorological conditions conducive to O_3 formation in the inland valleys. In particular, Simi Valley and Conejo Valley suffer from restricted vertical mixing caused by temperature inversions and the transport of pollutants from the South Coast Air Basin.

3.2.2.5 South Coast Air Basin

This basin is regulated by the South Coast AQMD. This AQMD includes Los Angeles County (except for the Antelope Valley APCD, which is in the Mojave Desert Air Basin), Orange County, and the western portions of San Bernardino and Riverside counties, as shown on Figure 3.2-4. The attainment status of the South Coast Air Basin in shown in Table 3.2-7.

This basin's climate is determined by its terrain and geographical location. It is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter. The basin generally lies in

the semipermanent high-pressure zone of the eastern Pacific. The climate is mild with cool sea breezes. Infrequently, periods of extremely hot weather, winter storms, or Santa Ana winds occur in the area. Most of the 14.24 inches of average annual rainfall in the basin occurs between November and March. The median temperature in the area is 64.3°F. However, in the spring, summer, and fall, the temperature variation from the coast to the inland areas is large. The basin has frequent strong, elevated inversions and low winds throughout the year. Air contaminants do not get dispersed well horizontally in this basin because of the low winds.

3.2.2.6 San Diego Air Basin

This basin is regulated by the San Diego APCD. This APCD governs air quality for San Diego County only. The attainment status of the San Diego Air Basin is shown in Table 3.2-8.

San Diego's climate is generally subtropical with large-scale wind and temperature regimes that are controlled by the Pacific Ocean and the seasonal migration of the Pacific high-pressure system. Summers and winters are mild. Temperatures rarely get below 32°F or over 100°F. The average temperatures (as indicated in observations at the weather station at Miramar Naval Air Station) are 57°F in December and 72°F in June. Winds are predominantly westerly in the spring, summer, and fall, with an average wind direction from the west-northwest from February through October. From November through January, the average wind flow is from the northeast. Wind speeds average less than 10 miles per hour (mph). Rainfall in this basin averages about 10.6 inches per year.

3.2.2.7 Northeast Plateau Air Basin

This basin is regulated by the Siskiyou County, Modoc County, and Lassen County APCDs. Each APCD governs air quality for its county only. The attainment status of the Northeast Plateau Air Basin is shown in Table 3.2-9.

The climate in this air basin is mainly controlled by the quasistationary high-pressure cell off the coast. In the western portion of the basin, winters are cloudy, cool, and rainy. An almost unbroken succession of winter storms passes through the extreme northern area. The Modoc Plateau is typically cloudy, but precipitation is light. Winds are often from a southerly quadrant for the entire basin. Winds vary from moderate to strong and gusty as frontal systems approach. In summer, a brief period of thunderstorms might interrupt the more typical clear warm weather.

3.2.2.8 Sacramento Valley Air Basin

This basin is regulated by the Shasta County AQMD, Tehama County APCD, Glenn County APCD, Butte County AQMD, Colusa County APCD, Feather River AQMD, Placer County APCD, Yolo-Solano AQMD, and Sacramento Metropolitan AQMD. The Shasta County AQMD includes Shasta County. The Tehama, Glenn, Butte, Colusa, Placer, and Sacramento districts each govern the air quality for their counties only. The Feather River AQMD includes Sutter and Yuba counties. The Yolo-Solano AQMD includes Yolo County and the eastern portion of Solano County. The attainment status of the Sacramento Valley Air Basin is shown in Table 3.2-10.

This basin's climate is Mediterranean with a dry, warm summer and a wet, mild winter. Diurnal winter temperatures range from 15 to 74°F, and averages range from 35 to 55°F. Diurnal summer

temperatures range from 39 to 115°F and averages range from 56 to 94°F. About 80 percent of the rainfall occurs from the beginning November through March. The average annual rainfall is 23 inches. Even a trace of rain is rare in June, July, August, and September. Prevailing winds in the area are south to southeasterly except during November, when they are from the north-northwest. During the winter months, frontal storm systems sometimes bring high-speed wind conditions.

3.2.2.9 San Joaquin Valley Air Basin

This basin is regulated by the San Joaquin Valley Unified APCD. This APCD includes Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties and the western portion of Kern County. The attainment status of the San Joaquin Valley Air Basin is shown in Table 3.2-11.

This basin is dominated by hot, dry summers and mild winters with relatively small amounts of precipitation. The semipermanent "Pacific High" over the eastern Pacific Ocean dominates the weather during the summer months, blocking low-pressure systems from passing through the area. The summers are usually quite warm, with average daily maximum temperatures during July of over 98°F.

During the winter months, the Pacific High weakens and migrates to the south allowing Pacific storms into California. The annual rainfall in the Bakersfield area is only 5.7 inches. In between storms, high pressure from the Great Basin High can block storms and result in persistent fog caused by temperature inversions. Daily maximums during the December–January months are a relatively mild 57°F, with lows averaging 38°F. At the Maricopa weather station, a record high of 115°F in the summer and a record low of 15°F in the winter has been measured.

Winds in the area are strongly influenced by the Temblor Range to the west and the marine air that enters the Central Valley through Carquinez Strait and Altamont Pass in the Bay Area to the north. During the summer, marine air entering the Central Valley results in northeasterly winds in the daytime hours. In the nighttime hours downslope drainage of air from the hills and mountains to the south and west results in winds from the southwest. This windflow pattern is fairly consistent throughout the year, although more variability to wind directions occurs during the winter with the passage of storms through the area. Winds are usually stronger during the summer because during the winter, calm and stagnant atmospheric conditions can occur between storms and the influence of the marine air from the coast is substantially diminished.

3.2.2.10 Great Basin Valley Air Basin

This basin is regulated by the Great Basin Unified APCD. The Great Basin district includes Alpine, Inyo, and Mono counties. The attainment status of the Great Basin Valley Air Basin is shown in Table 3.2-12.

This basin is located between the eastern Sierra Nevada Mountains and the Nevada border. It is a complex system of high-elevation mountain ranges and deep valleys. Death Valley (-279 feet) has the lowest elevation in the continental U.S. and Mount Whitney (14,494 feet) has the highest elevation in the continental U.S. The climate in the area varies dramatically with elevation. In the Sierra Nevada mountains, temperatures are cold, with glaciers at the highest elevations. Owens

Valley has a mild high-desert climate with temperatures in summer ranging from 45 to 103°F, and in winter from 18 to 70°F. Death Valley, which is the southernmost part of the Great Basin Valley, has some of the highest temperatures in the U.S., typically exceeding 120°F during the summer. Storms in the areas are typically generated over the Pacific Ocean and move from west to east across the Sierra Nevada mountain range on the western boundary of the basin. The amount of rainfall varies from 3 to 30 inches within several miles as the elevation changes. Winds can exceed an hourly average of 40 mph at 33 feet above ground level.

3.2.2.11 Mojave Desert Air Basin

This basin is regulated by the Mojave Desert AQMD, Kern County APCD, Antelope Valley AQMD, and South Coast AQMD. The Mojave Desert AQMD includes the northern portion of San Bernardino County and the eastern portion of Riverside County. The Kern County APCD includes the eastern portion of Kern County (the western portion of Kern County is governed by the San Joaquin Valley Unified APCD). The Antelope Valley AQMD includes the northeastern portion of Los Angeles County. The South Coast AQMD includes Los Angeles County except for the Antelope Valley AQMD, Orange County, and the western portions of San Bernardino and Riverside counties. The attainment status of the Mojave Desert Air Basin is shown in Table 3.2-13.

This basin, located in the southeastern portion of California, covers an area of over 18,000 square miles of desert. The area is mostly rural with a few sparsely populated urban centers. This basin exhibits a typical desert climate. The San Gabriel and San Bernardino mountain ranges block the desert from the cool, moist coastal air of the South Coast Air Basin. It is generally hot and dry in summer with mild winters with little annual rainfall (2 to 5 inches per year). The meteorology is affected by a moderately intense high-pressure circulation (sinking and warming of the air), except during periods of frontal activity during the winter. On average, 20 to 30 frontal systems move into the area each winter. Prevailing winds are from a westerly and southerly direction with the most common wind direction being west to east.

3.2.2.12 Salton Sea Air Basin

This basin is regulated by the Imperial County APCD and the South Coast AQMD. The Imperial County APCD governs Imperial County only. The South Coast AQMD includes Los Angeles County except for the Antelope Valley AQMD, Orange County, and the western portions of San Bernardino and Riverside counties. The attainment status of the Salton Sea Air Basin is shown in Table 3.2-14.

This basin is bordered on the south by Mexico, on the east by Arizona, on the west by San Diego County, and on the north by Riverside County. The area consists of more than 2 million acres of desert and mountains. Large-scale sinking and warming of air masses characterize the climatic conditions. The coastal mountains prevent the intrusion of any cool, damp marine air. The area typically has clear skies, very low humidity, very hot summers, mild winters, and little rainfall. The temperature in El Centro and the city of Imperial reaches an average annual high of 88°F and an annual average low of 59°F. Subsidence inversions, in which the air mass aloft sinks, causing compressional heating on the surface, are common in this area from November through June. These inversions can form a nearly impenetrable lid to vertical mixing of particulate

matter. The temperature in Palm Springs has an average maximum temperature of 70°F in January and 109°F in July. Wind conditions are from a westerly or west-northwesterly direction and are usually high in the desert. The winds are calmer in the winter than in other seasons.

3.2.2.13 Mountain Counties Air Basin

This basin is regulated by the Northern Sierra AQMD, Feather River AQMD, Placer County APCD, El Dorado APCD, Amador County APCD, Calaveras County APCD, Tuolumne County APCD, and Mariposa County APCD. The Northern Sierra AQMD includes Nevada, Plumas, and Sierra counties. The Feather River AQMD includes Sutter and Yuba counties. The Placer County, El Dorado, Amador County, Calaveras County, Tuolumne County, and Mariposa County APCDs govern air quality for their own counties only. The attainment status of the Mountain Counties Air Basin is shown in Table 3.2-15.

This basin is primarily located in the western portion of the Sierra Nevada Mountains and incorporates much of the Sierra foothills. Elevation varies from less than 1,000 feet above sea level in the west to about 6,000 feet in the east. Winters are longer and more severe as elevation increases and distance from the ocean increases. At above 4,000 feet, moderate to heavy snowfall is typical. The summers are typically mild to warm.

3.2.2.14 Lake County Air Basin

This basin is regulated by the Lake County AQMD, which includes Lake County. The attainment status of the Lake County Air Basin is shown in Table 3.2-18.

This basin lies entirely within the North Coast Range. It constitutes one of the major terrain depressions of the region. It is much cooler than the central valley and has a climate similar to that of the North Coast region in inland areas. Between storm periods, nighttime cooling usually leads to the formation of ground fog in sheltered inland valleys. Considerable air stagnation occurs when these fogs persist for several days. The winter weather in the region brings generally favorable ventilation conditions. Because the air aloft is still relatively cold in the spring months, the atmosphere tends to become unstable. This instability is conducive to vertical air motion and generally favorable ventilation. During summer, most of the storm tracks are deflected far to the north of California as the semipermanent Pacific high migrates northward. The Lake County area seldom receives precipitation from Pacific storms during this time of the year. In the fall, inversions with accompanying ground fog occur during the periods of clear skies and light winds. Pressure gradients are generally weak during the fall and result in the lowest mean wind speeds of the year.

3.2.2.15 Lake Tahoe Air Basin

This basin is regulated by the El Dorado County and Placer County APCDs. The El Dorado County APCD includes El Dorado County. The Placer County APCD includes Placer County. The attainment status of the Lake Tahoe Air Basin is shown in Table 3.2-17.

This basin is located in the Sierra Nevada Mountain Range at an elevation of 6,225 feet. It is set in a structural basin rimmed by ice-sculptured summits rising above conifer-forested slopes. It is more than 20 miles long and covers 193 square miles (partially in Nevada). Winters tend to be

longer and colder than in the surrounding areas. The area receives moderate to heavy snowfall. Summers are typically mild and cool.

Tables

Table 3.2-1
Emission Thresholds That Trigger Applicability of the General Conformity Rule in Tons Per Year Based on Air Quality Attainment Designation in California

Attainment Designation	NO_x or VOCs[1] (as a precursor to O_3)[2]	NO_x[3]	SO_2	PM_{10}	Lead
Extreme Nonattainment	10	NA[4]	NA[4]	NA[5]	NA[4]
Severe Nonattainment	25	NA[4]	NA[4]	NA[5]	NA[4]
Serious Nonattainment	50	NA[4]	NA[4]	70	NA[4]
Moderate or Marginal Nonattainment	100	100[4]	100[4]	100	25[4]
Maintenance[6]	100	100	100	100	100

[1] VOCs = volatile organic compounds.
[2] NO_x and VOC are regulated under the CAA as precursors to O_3, an atmospheric pollutant with an adopted NAAQS that is not directly emitted. The attainment designations for values in this column apply to O_3. The threshold quantities listed apply separately to NO_x and VOC emissions.
[3] NO_x is also separately regulated under the NAAQS for NO_2. The threshold values shown in this column apply to the attainment designation with respect to the NAAQS for NO_2.
[4] Only Nonattainment or Maintenance designations apply to NO_x, SO_2, and lead (i.e., the severity of nonattainment is not applicable because it is not separately categorized for these pollutants). The threshold values listed under "Moderate or Marginal Nonattainment" apply to all areas designated Nonattainment.
[5] Extreme and severe attainment designations are not applicable to PM_{10}, which is only categorized as either Serious or Moderate nonattainment.
[6] The "Maintenance " designation applies to areas that currently attain the NAAQS.

Table 3.2-2
State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[a] Concentrations[c]	National Standards[b] Primary[c, d]	National Standards[b] Secondary[c, e]
Ozone	8-hour	--	0.08 ppm	Same as primary
	1-hour[f]	0.09 ppm	0.12 ppm	
Carbon monoxide	8-hour	9.0 ppm	9 ppm	Same as primary
	1-hour	20.0 ppm	35 ppm	
Nitrogen dioxide	Annual mean	--	0.053 ppm	Same as primary
	1-hour	0.25 ppm	--	
Sulfur dioxide	Annual mean	--	0.03 ppm	--
	24-hour	0.04 ppm	0.14 ppm	--
	3-hour	--	--	0.5 ppm
	1-hour	0.25 ppm	--	--
Particulate matter (PM_{10})	Annual mean	--	50 $\mu g/m^3$	Same as primary
	Annual geometric mean	30 $\mu g/m^3$	--	--
	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as primary
Fine particulate matter ($PM_{2.5}$)	Annual mean	--	15 $\mu g/m^3$	Same as primary
	24-hour	--	65 $\mu g/m^3$	

Notes:
[a] California standards, other than CO, SO_2 (1-hour), and fine particulate matter, are values that are not to be equaled or violated. The CO, SO_2 (1-hour), and fine particulate matter standards are not to be violated.
[b] National standards, other than O_3, the 24-hour $PM_{2.5}$, the PM_{10}, and those standards based on annual averages, are not to be exceeded more than once a year. The 1-hour O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one. The 8-hour O_3 standard is attained when the 3-year average of the annual fourth highest daily maximum concentration is less than 0.08 ppm. The 24-hour PM_{10} standard is attained when the 99th percentile of 24-hour PM_{10} concentrations in a year, averaged over 3 years, at the population-oriented monitoring site with the highest measured values in the area, is below 150 $\mu g/m^3$. The 24-hour $PM_{2.5}$ standard is attained when the 98th percentile of 24-hour $PM_{2.5}$ concentrations in a year, averaged over 3 years, at the population-oriented monitoring site with the highest measured values in the area, is below 65 $\mu g/m^3$. The annual average $PM_{2.5}$ standard is attained when the 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations, from single or multiple community oriented monitors is less than or equal to 15 $\mu g/m^3$.
[c] All measurements of air quality are to be corrected to a reference temperature of 25° C and a reference pressure of 760 mm of mercury (Hg) (1013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
[d] National Primary Standards: The levels of air quality deemed necessary by the federal government, with an adequate margin of safety, to protect the public health.
[e] National Secondary Standards: The levels of air quality deemed necessary by the federal government, to protect the public welfare from any known or anticipated adverse effects from a pollutant.
[f] The 1-hour O_3 standard will be replaced by the 8-hour standard on an area-by-area basis when the area has achieved 3 consecutive years of air quality data meeting the 1-hour standard.
ppm = parts per million, $\mu g/m^3$ = micrograms per cubic meter
Source: CARB 2003.

Table 3.2-3
North Coast Air Basin Attainment Status

	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
County	**Nat**	**State**	**Nat**	**State**	**Nat**	**State**	**Nat**	**State**	**Nat**	**State**	**Nat**	**State**
Sonoma	*U/A*	*NT*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Del Norte	*U/A*	*A*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Humboldt	*U/A*	*A*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Mendocino	*U/A*	*A*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Trinity	*U/A*	*A*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*

Table 3.2-4
San Francisco Air Basin Attainment Status

	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
All Counties	**Nat**	**State**	**Nat**	**State**	**Nat**	**State**	**Nat**	**State**	**Nat**	**State**	**Nat**	**State**
Bay Area Basin	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*

Table 3.2-5
North Central Coast Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Monterey	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
San Benito	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Santa Cruz	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*

Table 3.2-6
South Central Coast Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
San Luis Obispo	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Santa Barbara	*N*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Ventura	*N*	*A*	*U/A*	*A*	*U/A*	*A*	*A*	*A*	*U*	*N*	*U*	*U*
Channel Islands	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*

Table 3.2-7
South Coast Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Los Angeles	*N*	*N*	*N*	*N*	*U/A*	*A*	*A*	*A*	*N*	*N*	*U*	*U*
Orange	*N*	*N*	*N*	*A*	*U/A*	*A*	*A*	*A*	*N*	*N*	*U*	*U*
Riverside	*N*	*N*	*N*	*A*	*U/A*	*A*	*A*	*A*	*N*	*N*	*U*	*U*
San Bernardino	*N*	*N*	*N*	*A*	*U/A*	*A*	*A*	*A*	*N*	*N*	*U*	*U*

Table 3.2-8
San Diego Air Basin Attainment Status

All Counties	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
San Diego Basin	***N***	***N***	*U/A*	*A*	*U/A*	*A*	*A*	*A*	*U*	*N*	*U*	*U*

Table 3.2-9
Northeast Plateau Air Basin Attainment Status

All Counties	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Northeast Plateau Basin	*U/A*	*A*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*

Table 3.2-10
Sacramento Valley Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Butte	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Colusa	*U/A*	*NT*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Glenn	*U/A*	*NT*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Placer	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Sacramento	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Shasta	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Solano	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Sutter	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Tehama	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Yolo	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Yuba	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*

Table 3.2-11
San Joaquin Valley Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Fresno	*N*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Kern	*N*	*N*	*U/A*	*A*	*U/A*	*A*	*A*	*A*	*N*	*N*	*U*	*U*
Kings	*N*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Madera	*N*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Merced	*N*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
San Joaquin	*N*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Stanislaus	*N*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Tulare	*N*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*

Table 3.2-12
Great Basin Valley Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Alpine	*U/A*	*U*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Inyo County Owens Valley Planning Area	*U/A*	*U*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Inyo County Searles Valley Planning Area	*U/A*	*U*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Inyo County (Except Searles and Owens)	*U/A*	*U*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Mono County Mammoth Lakes Planning Area	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Mono County Mono Lake Planning Area	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Mono (Except Mono and Mammoth Lakes Planning Areas)	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*

Table 3.2-13
Mojave Desert Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Kern County Searles Valley Planning Area	*N*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Kern County (except Searles Valley Planning Area)	*N*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Los Angeles County	*N*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Riverside	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
San Bernadino County Western Portion	*N*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
San Bernadino County Eastern Portion	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*

Table 3.2-14
Salton Sea Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Imperial County City of Calexico	*N*	*N*	*U/A*	*N*	*A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Imperial County (Except City of Calexico)	*N*	*N*	*U/A*	*U*	*A*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Imperial County (Except Imperial Valley Planning Area)	*N*	*N*	*U/A*	*U*	*A*	*A*	*U*	*U*	*U*	*N*	*U*	*U*
Riverside County AQMD Portion	*N*	*N*	*U/A*	*A*	*U*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Riverside County (Except AQMD Portion)	*U/A*	*N*	*U/A*	*A*	*U*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Riverside County Imperial Valley Planning Area	*N*	*N*	*U/A*	*A*	*U*	*A*	*U*	*A*	*N*	*N*	*U*	*U*
Riverside County (Except Imperial Valley Planning Area)	*U/A*	*N*	*U/A*	*A*	*U*	*A*	*U*	*A*	*U*	*N*	*U*	*U*

Table 3.2-15
Mountain Counties Air Basin Attainment Status

County	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Amador	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*U*	*U*	*U*
Calvaras	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
El Dorado	*N*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Mariposa County Yosemite Park	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Mariposa County (except Yosemite Park)	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*U*	*U*	*U*
Nevada	*U/A*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Placer	*N*	*N*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Plumas	*U/A*	*U*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Sierra	*U/A*	*U*	*U/A*	*U*	*U/A*	*A*	*U*	*A*	*U*	*N*	*U*	*U*
Tuolumne	*U/A*	*N*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*U*	*U*	*U*

Table 3.2-16
Lake County Air Basin Attainment Status

All Counties	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Lake County Air Basin	*U/A*	*A*	*U/A*	*A*	*U/A*	*A*	*U*	*A*	*U*	*A*	*U*	*U*

Table 3.2-17
Lake Tahoe Air Basin Attainment Status

All Counties	O_3		CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State	Nat	State
Lake Tahoe Air Basin	*U/A*	*A*	*U/A*	*A*	*U/A*	*A*	*A*	*A*	*U*	*N*	*U*	*U*

Figures

Figure 3.2-1 California Air Basins

Figure 3.2-2 California Air Districts

Figure 3.2-3 California Counties

Figure 3.2-4 South Coast Air Basin

3.3 WATER RESOURCES

Water resources refer to the occurrence, availability, and physical, chemical, and biological characteristics of surface water and groundwater, including hydrologic properties and water quality for aquatic communities and public water supplies. Water bodies include aquifers, springs, streams, rivers, lakes, reservoirs, estuaries, and nearshore and offshore marine water. Water quality encompasses the level of pollutants that affect the suitability of water for a given use. Water use classifications generally include public water supply, recreation, propagation of fish and other aquatic life, agricultural use, and industrial use.

3.3.1 Regulatory Background

3.3.1.1 Federal Laws and Regulations

Clean Water Act

The CWA is a 1977 amendment to the federal Water Pollution Control Act of 1972 (USC, Title 33), which established the basic structure for regulating pollutant discharges to navigable waters[1] of the United States. The CWA sets forth procedures for effluent limitations, water quality standards and implementation plans, national performance standards, and point source (e.g., municipal wastewater discharges) and nonpoint source programs (e.g., stormwater). The CWA also establishes the National Pollutant Discharge Elimination System (NPDES) under Sections 401 and 402 and permits for dredged or fill material under Section 404.

The USACE is charged with regulating the disposal of dredged and fill materials under Section 404 of the CWA. Certain waters of the U.S. are considered "special aquatic sites" under the CWA because they are generally recognized as having particular ecological value. Such sites include sanctuaries and refuges, mudflats, wetlands, vegetated shallow, eelgrass beds, coral reefs, and riffle and pool complexes. Special aquatic sites are defined in the CWA and may be afforded additional consideration in the USACE permit process for a project.

A Section 404 permit from the USACE must be obtained for any dredge or fill activities within jurisdictional waters of the U.S. During the permit review process, the USACE determines the type of permit appropriate for the proposed action. Two types of permits are issued by the USACE:

- General Permits are issued on a state, regional, and nationwide basis and cover a variety of activities, including minimal individual and cumulative adverse affects. These permits fit into specific categories established by the USACE.
- Individual Permits are issued for a case-specific activity.

[1] "Navigable waters" of the U.S. are those subject to the ebb and flow of the tide shoreward to the mean high water mark and/or presently used, or have been used in the past, or are susceptible for use to transport interstate or foreign commerce. The term includes coastal and inland waters, lakes, rivers and streams that are navigable, and the territorial seas.

Section 401 of the CWA specifies that states must certify that any activity subject to a permit issued by a federal agency, such as a CWA Section 404 permit, meets all state water quality standards. In California, the SWRCB or the appropriate Regional Water Quality Control Board (RWQCB) are responsible for reviewing activities under Section 401 of the CWA. A project proponent must obtain water quality certification (also known as 401 certification) from the SWRCB or RWQCB in order to receive a Section 404 permit. Water quality certification is also necessary when a project qualifies for a General Permit, even if the activity does not need to be reported to the USACE.

Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act of 1968 preserves selected rivers in a free-flowing condition and protects their local environments. These rivers possess outstanding scenic, recreation, geologic, fish and wildlife, historic, or cultural values. Three types of Wild and Scenic designations exist, depending on a river's characteristics:

- Wild–undeveloped, generally inaccessible except by trail, with essentially primitive watersheds or shorelines and unpolluted waters
- Scenic–undeveloped, occasionally accessible by road, with shorelines or watersheds largely undeveloped
- Recreational–some development, readily accessible by road or railroad, with some impoundment or diversion in the past

Selected rivers and streams have been placed into the National Rivers Inventory by acts of Congress. In California approximately 1,900 miles of river are under Wild and Scenic protection. Details about the designated rivers in California are shown in Table 3.3-1.

For particular actions that require the actual stream reach of a designated river and a description of the river and surrounding areas, contact the National Park Service (www.nps.gov/rivers) or other managing agency. Rivers and streams that are in the National Rivers Inventory or are proposed for inclusion must be considered during project planning.

The State of California also has a Wild and Scenic Rivers system. No legal requirement exist to consider state-listed Wild and Scenic Rivers and streams or unique areas during the planning for an action. However, it is recommended that impacts to state-listed or proposed-for-listing rivers and streams and unique areas be considered and addressed at levels comparable to the consideration given to rivers and streams protected by the Wild and Scenic Rivers Act.

Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act (33 USC 401 et seq.) requires authorization from the USACE for the construction of any structure in, over or under any navigable water of the U.S., the excavation/dredging or deposition of material in these waters, or any obstruction or alteration in a navigable water. Structure or work outside the limits defined for navigable waters of the U.S. requires a Section 10 permit if the structure or work affects the course, location, condition, or capacity of the water body. Section 10 and CWA Section 404 overlap in some activities

involving wetlands. Permits for activities regulated under both are processed simultaneously by the USACE.

Coastal Zone Management Act

In recognition of the increasing pressures of overdevelopment on the nation's coastal resources, Congress enacted the Coastal Zone Management Act in 1972 and the Coastal Zone Act Reauthorization Amendments of 1990. These laws encourage states by making federal funds available to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs as well as the fish and wildlife using those habitats. Participation by states in these laws is voluntary. To encourage states to participate, the act makes federal financial assistance available to any coastal state or territory, including those on the Great Lakes, that is willing to develop and implement a comprehensive coastal management program (U.S. Department of Energy 1996). These acts apply to all actions that are located within a designated coastal zone and state that any federal agency whose activities directly affect the coastal zone will, to the maximum extent practicable, be consistent with approved state management programs.

The California Coastal Commission implement these acts as they apply to federal activities, development projects, permits and licenses, and support to state and local governments. On certification of a state's coastal management program, a federal agency must conduct its activities (including federal development projects, permits, and licenses as well as assistance to state and local governments) in a manner consistent with the state's certified program. California has a federally approved coastal management program.

Executive Order 11988: Floodplain Management

Impacts related to floodplain management include potential damage to structures located in the floodplain and changes to the extent, elevation, or other features of the floodplain as a result of flood protection measures or other structures being sited in or removed from the floodplain.

The term floodplain generally refers to the 100-year floodplain, which designates the area subject to inundation from a flood having a 1 percent chance of occurring in a given year. This flood is also referred to as the "base flood" and may occur more or less often than once every 100 years. In circumstances known as "critical actions," the regulated flood-prone area is defined by the 500-year floodplain, which designates the area subject to inundation from a flood having a 0.2 percent chance of occurring in a given year.

FEMA has produced a nationwide system of FIRMs to show flood hazards for communities that participate in NFIP. The NFIP and its implementing regulations (44 CFR 59 through 78) stipulate minimum standards for floodplain development in communities that participate in the program. Local governments incorporate these standards, or in some cases more stringent standards, into their floodplain management ordinances. In addition to showing the locations of the 100-year and 500-year floodplains, many FIRMs show the base flood elevation, which is the estimated water-surface elevation during the 100-year flood. In addition to showing the 100- and 500-year floodplains, FIRMs may also show the following:

- Floodway – The channel of a river or other watercourse and adjacent land areas that are required to remain free from development to discharge the base flood without cumulatively increasing the water-surface elevation.
- Coastal high hazard area – An area subject to flooding accompanied by the additional hazards associated with wave action. The minimum construction standards of the NFIP are more restrictive in these areas.

The NEPA compliance process requires federal agencies to consider direct and indirect impacts to floodplains that may result from federally funded actions. EO 11988 requires federal agencies to take action to minimize occupancy and modification of floodplains. Furthermore, EO 11988 requires that federal agencies proposing to site an action in a 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. In accordance with 44 CFR Part 9, critical actions, such as developing hazardous waste facilities, hospitals, or utility plants, must be undertaken outside of a 500-year floodplain. If no practicable alternatives exist to siting an action in the floodplain, the action must be designed to minimize potential harm to or within the floodplain. Furthermore, a notice must be publicly circulated explaining the action and the reasons for siting it in the floodplain. When evaluating actions in the floodplain, FEMA applies the decision process described in 44 CFR Part 9, referred to as the Eight-Step Process, to ensure that its actions are consistent with EO 11988. By its nature, the NEPA compliance process involves the same basic decision-making process as the Eight-Step Process.

Executive Order 11990: Protection of Wetlands

As with EO 11988, EO 11990 requires federal agencies to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands. The implementation of EO 11990 is described in 44 CFR Part 9. As with EO 11988, the Eight-Step Process is also used to evaluate the potential effects of an action on wetlands. As discussed in the Clean Water Act subsection above, formal legal protection of jurisdictional wetlands is promulgated through Section 404 of the CWA. A permit from the USACE may be required if an action has the potential to affect wetlands.

3.3.1.2 State Laws and Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1969, which became Division 7 of the California Water Code, authorized the SWRCB to provide comprehensive protection for California's waters through water allocation and water quality protection. The SWRCB implements the requirement of CWA Section 303 that water quality standards be set for certain waters by adopting water quality control plans under the Porter-Cologne Act. In addition, the Porter-Cologne Act established the responsibilities and authorities of the nine RWQCBs. These responsibilities include preparing water quality plans for areas within the region (Basin Plans), identifying water quality objectives, and issuing NPDES permits pursuant to the Waste Discharge Requirements (WDRs).

NPDES permits, issued by RWQCBs pursuant to the CWA, also serve as WDRs issued pursuant to the Porter-Cologne Act. Generally, WDRs are issued for discharges that are exempt from the NPDES permitting program, discharges that may affect waters of the state that are not waters of the U.S. (i.e., groundwater), and/or wastes that may be discharged in a diffused manner. WDRs are established and implemented to achieve the Water Quality Objectives for receiving waters as established in the Basin Plans. Sometimes they are combined WDRs/NPDES permits.

California Coastal Act

The California Coastal Act of 1976 (California Public Resources Code [PRC], Division 20, Section 30000 et seq.) implemented the federally approved coastal management plan for California and established the California Coastal Commission as one of California's two designated coastal management agencies. The San Francisco Bay Conservation and Development Commission, which was established before this act was created, has authority within San Francisco Bay, while the California Coastal Commission exercises its authority for the rest of California's coastal zone. This act gave the responsibility to these agencies to plan and regulate land and water uses in the coastal zone consistent with its policies.

California Fish and Game Code

The California Fish and Game Code, Division 2, Section 1600 et seq. regulates alterations to natural waterways and gives regulatory and permitting authority to the CDFG. Modifications or new construction of facilities that may impact the volume or quality of water entering a natural waterway (such as a culvert discharging into a "dry wash" or a channel that carries intermittent or seasonal flows) may be required to obtain a Streambed Alteration Agreement.

3.3.1.3 Local Laws and Regulations

Counties and cities have developed general plans that include county-specific (or city-specific) descriptions of existing surface-water and groundwater resources.

Some urbanized counties and municipalities in California have countywide or areawide stormwater permits that offer guidelines and restrictions to new development that may impact modifications to existing facilities or construction of new facilities. These plans are generally administered by the local Flood Control District. If no areawide stormwater permit is in place and the facility is located near the coastline, the applicant must comply with the Coastal Zone Management Act (see Section 3.3.1.1).

Some municipalities have adopted Watershed Management Plans that may regulate or restrict modification and/or construction of facilities that discharge into waters within the plan area.

3.3.2 Discussion of Water Resources in California

3.3.2.1 Major Watersheds

The term "watershed" is generally defined to be any area of land that drains to a common point. A watershed is generally smaller than a river basin or subbasin but larger than a drainage or site.

In California, the definitions of watersheds are provided by the software titled CALWATER (Version 1.2). CALWATER is a geographic information system database that captures the SWRCB watershed delineations and further subdivision into smaller watershed units. The system is designed so that the smaller units are nested within the next larger unit. The hierarchy of the delineation system is organized from largest to smallest: region, hydrologic unit, hydrologic area, hydrologic subarea, super planning watersheds, and planning watersheds. The smallest units, planning watersheds, are approximately 3,000 to 10,000 acres, and the super planning watersheds are on the order of 50,000 acres or more in size (California Environmental Resources Evaluation System 1997).

California has ten watershed/hydrologic regions, as shown on Figure 3.3-1. Table 3.3-2 briefly describes each region and lists the hydrologic units located therein. For a particular action, it is recommended that regional water quality control plans be consulted for more specific water resource issues. The plans are issued by the appropriate RWQCB. Other sources of information can be found at www.ceres.ca.gov/watershed/geographic, which has links to the California River Assessment (CARA) Interactive Web Database and the USEPA's Office of Water.

3.3.2.2 Groundwater Basins

A groundwater basin is defined as an area underlain by permeable materials capable of furnishing a substantial supply of groundwater to wells or storing a substantial amount of water. A groundwater basin is three-dimensional and includes both the surface extent and all of the subsurface freshwater-yielding material. However, available data only permit two-dimensional delineations of groundwater basins. The current groundwater basin map, as shown on Figure 3.3-2, depicts a surface expression of groundwater basin boundaries and should not be used to construe the depths of these basins.

Groundwater basins are delineated and separated from each other by the following features or conditions:

- Impermeable Bedrock – consists of rocks of low-water-yielding capacity, including rocks of marine origin and crystalline/or metamorphic rock
- Constrictions in Permeable Materials – a narrow gap in impermeable material, even though filled with permeable stream channel materials, generally forms a basin boundary due to groundwater flow constriction in these areas
- Fault – crosses permeable materials and generally forms a barrier to groundwater movement; this condition usually indicated by a noticeable difference in water levels and/or flow patterns on either side of the fault
- Low-Permeability Zone – areas of clay or other fine-grained material that have substantial areal or vertical extent generally form a barrier to groundwater movement
- Groundwater Divide – generally forms a barrier to groundwater movement and has noticeably divergent groundwater flow directions on either side of the divide with the water table sloping away from the divide.
- Adjudicated Basin Boundaries – established by court order and used for all adjudicated basins

In many upland areas of the state, fractures, joints, and other spaces in crystalline rock can yield sufficient water for individual domestic supply or for stockwater. These areas were not identified on the current version of the groundwater basin map (Figure 3.3-2) because the availability of water in these formations can vary widely between areas, even if only a few feet apart.

The California Department of Water Resources provides information on groundwater recharge programs; subsidence caused by groundwater extraction; standards for the construction and destruction of water wells, monitoring wells, and cathodic protection wells; and resource evaluation. The state is divided into four groundwater districts: the Northern, Central, Southern, and San Joaquin. These districts provide general groundwater information, groundwater levels, groundwater quality, well completion reports, and publications (California Department of Water Resources n.d.).

3.3.2.3 Water Supply

Water supply in California comes primarily from two sources: groundwater or surface water. Groundwater is extracted through either private or public wells and provides for approximately half of the state's drinking water and is also a major source for agricultural needs. Surface water supplies drinking water, agricultural water, flood control, water quality control, environmental water, recreational opportunities, and hydropower generation.

California has two major water projects: the Central Valley Project (CVP) and the State Water Project (SWP). The CVP and SWP consist of dams, reservoirs, aqueducts, and canals. The CVP primarily supplies irrigation water to farmers throughout the Central Valley, and the SWP is the state's major distribution system for urban water supplies. The CVP and SWP facilities stretch from Shasta Dam in the north to Perris Lake in Southern California.

In Southern California, the Metropolitan Water District brings Colorado River water to their area (Water Education Foundation 1987). The six California water agencies that receive Colorado River water are the Imperial Irrigation District, Palo Verde Irrigation District, Metropolitan Water District, Los Angeles Department of Water and Power, San Diego County Water Authority, and Coachella Valley Water District.

Tables

Table 3.3-1
California Wild and Scenic Rivers

River	Designation	Miles	Year Designated	Managing Agency[1]
American (Lower)	Recreational	23.0	1981	California
American (North Fork)	Wild	38.3	1978	BLM/USFS
Big Sur	Wild	19.5	1992	USFS
Eel	Wild Scenic Recreational	97.0 28.0 273.0	1981	BLM/USFS/ California
Feather (Middle Fork)	Wild Scenic Recreational	32.9 9.7 35.0	1968	USFS
Kern	Wild Scenic Recreational	123.1 20.9 7.0	1987	NPS/USFS
Kings	Wild Recreational	65.5 15.5	1987	NPS/USFS
Klamath	Wild Scenic Recreational	12.0 24.0 250.0	1981	BLM/NPS/USFS/ California
Merced	Wild Scenic Recreational	71.0 16.0 35.5	1987, 1992	BLM/NPS/USFS
Sespe Creek	Wild Scenic	27.5 4.0	1992	USFS
Sisquoc	Wild	33.0	1992	USFS
Smith	Wild Scenic Recreational	78.0 31.0 216.4	1981, 1990	USFS/California
Trinity	Wild Scenic Recreational	44.0 39.0 120.0	1981	BLM/USFS/ California
Tuolumne	Wild Scenic Recreational	47.0 23.0 13.0	1984	BLM/NPS/USFS

[1]BLM = Bureau of Land Management, NPS = National Park Service, USFS = U.S. Forest Service
Source: National Park Service 2003

Insert

Table 3.3-2
California Watershed Hydrologic Areas

Figures

Insert

Figure 3.3-1 California Watersheds

Insert

Figure 3.3-2 California Groundwater Basins

3.4 BIOLOGICAL RESOURCES

This section presents a general description of resources, including endangered or threatened species and their habitats, wildlife, wetlands, and other key biological resources.

3.4.1 Regulatory Background

3.4.1.1 Federal Laws and Regulations

Federal Endangered Species Act

The ESA defines "endangered" species as those in danger of extinction throughout all or a substantial portion of their range. A "threatened" species is any species that is likely to become an endangered species within the foreseeable future throughout all or a substantial portion of its range. "Candidate species" are those for which the USFWS and NOAA Fisheries have enough information on file to propose listing as endangered or threatened and are protected through a Candidate Conservation Program until they are formally listed as threatened or endangered. An additional category defined, but not afforded protected status, in the ESA, is "species of concern." "Species of concern" are those for which listing is possibly appropriate but the USFWS and NOAA Fisheries lack sufficient information to support a listing proposal. All of these designations (endangered, threatened, proposed, candidate, and species of concern) are referred to as "special-status species." A "delisted" species is one whose population has met its recovery goal target and is no longer found to be in jeopardy of extinction.

Section 7 of the ESA requires that federal agencies consult with the USFWS or NOAA Fisheries when taking action that has the potential to affect species listed as endangered or threatened or proposed for threatened or endangered listing. "Taking" of a federally listed species is prohibited under Section 9 of the ESA. "Take" is defined in ESA Section 3(19) as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Therefore, any action which could result in an "incidental take" of a listed species requires consultation with the USFWS or NOAA Fisheries. Federally listed species may be addressed for an action in one of two ways: (1) a nonfederal government entity may resolve potential adverse impacts to species protected under Section 10 of the ESA or (2) a federal lead agency regulates the action in accordance with Section 7 of the ESA. Both require consultation with the USFWS, which administers the ESA and issues a final opinion determining whether the federally listed species will be adversely affected by the action. Under the second process, the federal lead agency is responsible for preparing a biological assessment, which evaluates the potential adverse effects to a federally listed species, and coordinating with state and federal biological resource agencies to assess impacts and propose mitigation. In addition, the federal lead agency is responsible for developing mitigation for all substantial impacts to federally listed species. Whenever acting as the federal lead agency, FEMA requests consultation with the USFWS and NOAA Fisheries regarding potential impacts to listed species.

As mentioned in Section 1.8.3 of this PEA, FEMA is in the process of conducting a Programmatic Consultations with the USFWS and has completed a Programmatic Consultation

with NOAA Fisheries for future disasters throughout California. These Programmatic Consultations cover typical actions proposed for FEMA funding for several types of disasters, including fires, earthquakes, floods, rain, and wind. The Programmatic Consultations establish a framework for FEMA to comply with Section 7 requirements in California in cases where species or critical habitat are involved. The Programmatic Consultations allow FEMA and the USFWS or NOAA Fisheries to consult on multiple projects that are grouped and analyzed together by either project type or location.

The Programmatic Consultation benefits FEMA by allowing FEMA to comply with Section 7 requirements in the least amount of time and to more quickly satisfy its mission to assist local communities in responding to, recovering from, and preparing for disasters. The USFWS and NOAA Fisheries benefit from the Programmatic Consultation by ensuring that FEMA activities protect threatened and endangered species in compliance with the ESA and by obviating the need for USFWS and NOAA Fisheries personnel to spend valuable time consulting on individual action.

FEMA's Programmatic Consultation with the USFWS is modeled after the Programmatic Consultation that FEMA conducted with the USFWS for a previous disaster (FEMA-115-DR-CA, a severe storms/flooding disaster declared on January 4, 1997). The Programmatic Consultation for FEMA-1155-DR-CA resulted in the USFWS issuing a PBO and a PITS. A copy of this PBO/PITS is provided in Appendix E. FEMA anticipates that the Programmatic Consultation it is now conducting with the USFWS will result in a PBO/PITS for all future flood, earthquake, fire, rain, and wind disasters in California. Because the Programmatic Consultation is still ongoing, the impact analysis presented in Section 4.4 considers both the current situation, in which no PBO/PITS for disasters other than FEMA-1155-DR-CA exists, and the future situation in which a PBO/PITS for any disaster throughout the state has been executed by the USFWS.

The Programmatic Consultation between FEMA and NOAA Fisheries was an informal consultation process where FEMA submitted a Programmatic Biological Assessment, provided in Appendix F, on August 28, 2003 and NOAA Fisheries issued a concurrence letter, provided in Appendix G, on October 14, 2003, concluding the Programmatic Consultation process. The concurrence letter from NOAA Fisheries states that under the criteria, guidelines, and consultation program described in the Programmatic Biological Assessment, the proposed recurring actions would not be likely to adversely affect ESA-listed salmonids and/or critical habitat. The consultation program that is established in the Programmatic Biological Assessment involves grouping specific actions proposed for FEMA funding into three categories based on the associated project effects to salmonids. Category 1 actions would have no effect upon ESA-listed salmonids and would not require further Section 7 consultation. Category 2 actions would not be likely to adversely affect ESA-listed salmonids and/or critical habitat and would require informal Section 7 consultation. Category 2 actions would be grouped together by location and their project descriptions would be submitted to NOAA Fisheries for review prior to funding. NOAA Fisheries would issue a single concurrence letter for the grouped submission which would conclude informal Section 7 consultation. If necessary, NOAA Fisheries would identify specific actions within the grouped submission that NOAA Fisheries determines would be likely to adversely affect listed salmonids and/or critical habitat and would require an individual Section 7 consultation. Category 3 actions would be likely to adversely affect ESA-listed

salmonids and/or critical habitat and would require individual informal or formal Section 7 consultation.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (16 USC 703–711) makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandoning eggs or young) may be considered a take and is potentially punishable by fines and/or imprisonment. If an action is determined to cause a potential take, as described above, of migratory birds, then a consultation process with the USFWS needs to be initiated to determine measures to minimize or avoid these impacts. This consultation should start as an informal process.

Fish and Wildlife Coordination Act

This act was enacted to protect fish and wildlife when federal actions result in the control or modification of a natural stream or body of water. The statute requires federal agencies to take into consideration the effect that water-related projects would have on fish and wildlife resources, take actions to prevent loss or damage to these resources, and provide for the development and improvement of these resources. For an action resulting in the control or modification of a body of water, the federal agency must consult with the USFWS or NOAA Fisheries (as appropriate) and the CDFG to develop measures to mitigate action-related losses of fish and wildlife resources. These measures need to be included in some kind of public documentation for the action, and where possible, the federal lead agency must incorporate the measures in the plans for the action.

Magnuson-Stevens Fisheries Act

The Amended Magnuson-Stevens Fishery Conservation and Management Act, also known as the Sustainable Fisheries Act (PL 104-297), requires all federal agencies to consult with the NOAA Fisheries on activities or proposed activities authorized, funded, or undertaken by that agency that may adversely affect Essential Fish Habitat (EFH). The EFH provisions of the Sustainable Fisheries Act are designed to protect fisheries habitat from being lost due to disturbance and degradation.

Marine Mammal Protection Act

Under the Marine Mammal Protection Act of 1972 (16 USC 1371), it is unlawful to take or import marine mammals and marine mammal products. Under Section 101(a)(5)(D) of the act, an incidental harassment permit may be issued for activities other than commercial fishing that may impact small numbers of marine mammals. An incidental harassment permit covers activities that last for no more than 1 year and that will have a negligible impact on the impacted species. If an action has been determined to potentially harass marine mammals, a consultation process must be initiated with the NOAA Fisheries to obtain a harassment permit.

Executive Order 13112: Invasive Species

EO 13112 of 1999 was created to prevent the introduction of invasive species and to provide for their control. Under this order, the federal government may "not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions." Federal agencies must also consult with the Invasive Species Council consistent with the Invasive Species Management Plan.

3.4.1.2 State and Local Laws and Regulations

California Endangered Species Act (CESA)

Similar to the ESA, this act authorizes the California Fish and Game Commission to designate, protect, and regulate the taking of special-status species in California. CESA (codified in California Fish and Game Code Sections 2050–2116) defines "endangered" species as those whose continued existence in California is jeopardized. State-listed "threatened" species are not presently threatened with extinction but may become endangered if their environments change or deteriorate. Any action that may adversely impact state-listed threatened or endangered species must formally consult with the CDFG.

Section 2080 of the California Fish and Game Code prohibits the taking of state-listed plants and animals. The CDFG also designates "fully protected" or "protected" species as those that may not be taken or possessed without a permit from the California Fish and Game Commission and/or the CDFG. Species designated as fully protected or protected may or may not be listed as endangered or threatened.

In addition to listed species, the CDFG maintains a list of "Species of Special Concern," most of which are species whose breeding populations in California may face extirpation. To avoid the future need to list these species as endangered or threatened, the CDFG recommends consideration of these species, which do not yet have any legal status, during analysis of the impacts of an action.

Native Plant Protection Act

The legal framework for conserving plants merits clarification due to the existence of an early state law protecting plants. The Native Plant Protection Act of 1977 directed the CDFG to carry out the legislature's intent to "preserve, protect, and enhance rare and endangered plants in this State." This act (codified in California Fish and Game Code Sections 1900–1913) gave the California Fish and Game Commission the power to designate native plants as "endangered" or "rare" and protect endangered and rare plants from take. In addition to state regulations, many counties have local biological regulations and ordinances. Local statutes normally concern tree retention and habitat quality issues.

3.4.2 Biological Resources in California

This section summarizes California resources that could be affected by FEMA programs. It does not provide site-specific information on all plant and wildlife species that may be affected. Instead, information is presented on a broad regional level appropriate for a programmatic approach to environmental review.

California is one of the most biologically diverse areas in the world. Within its 160,000 square miles, California harbors more plant and animal species than any other state in the U.S. The diversity of climates and landscapes, and barriers to migrations such as rivers, mountains, and deserts, have led to the evolution of a large number of isolated (endemic) species and varieties of animals, many of which are found only in the state. For example, California has approximately 30,000 insect species, 63 freshwater fish species, 46 amphibians, 96 reptiles, 563 birds, 190 mammals, and about 8,000 plants on record (Steinhart 1990).

California's mountain ranges, deserts, and extensive coastline, along with its unusual summer-dry (Mediterranean) climate, set the stage for a complex vegetative community system. In the coastal mountains, heavy winter precipitation and summer fog support dense needleleaf evergreen forests, with needleleaf-broadleaf forests as far south as the Transverse Ranges. Broadleaf forests are common in the higher elevations from the Transverse Ranges south to the Mexican border. Eastward across the Cascades and Sierra Nevada mountains, the increase of precipitation with higher elevations leads to an orderly succession of plant communities, from grasslands to mixed hardwood and conifer woodlands and forests and finally to an even higher elevation sequence of coniferous and subalpine communities. The structural complexity of forest/woodland communities makes them important for wildlife diversity. In the high mountains of Southern California, the forest succession is similar except at the lower slopes, which are commonly dominated by chaparral. Compared to the mountainous areas, the California lowlands are relatively dry even on the coast. Consequently, lowland areas support mainly treeless grasslands and marshes, particularly in the Central Valley, or scrub formations, such as those in the eastern deserts. The diverse vegetation habitats in California support a wide variety of wildlife species.

Another habitat feature that is important to wildlife is riparian drainages. Riparian communities occur along creeks and rivers and are found throughout California. These communities are adapted to wide seasonal and annual fluctuations in flow volumes, abundant floodplain soil moisture, and a dynamic erosion-deposition cycle. Riparian communities are usually in a constant state of ecological succession because of the dynamic nature of hydrologic flows over unique topographical features. Fluvial (riverine) processes such as flooding, with its bank erosion and sediment deposition, create gravel bars and terraces. The resulting succession is responsible for the plant species and structural diversity in riparian areas.

Riparian vegetation is important because of its scarcity and resource values. It serves humans directly by forming a buffer between rivers and streams and intensively managed farmlands and urban landscapes, enhancing water quality by filtering surface runoff, stabilizing streambanks, and moderating flood flows. Riparian communities typically support great wildlife diversity because they present a unique combination of surface water and groundwater, fertile soils, high nutrient availability, and thermal and predation cover.

Wetlands, similar to riparian areas, occur along lakes, ponds, marshes, rivers, streams, hill/mountainside seeps, perched water tables, and plow pans. They are often inundated by water and normally have saturated or seasonally saturated soil conditions within 18 inches of the surface. Common wetland plants range from cottonwoods and willows to sedges, rushes, and cattails. The width of the areas may vary from a few feet along small streams to several hundred feet along major rivers. Because of the presence of moisture and abundant nutrients, wetlands and riparian areas are often the most productive areas of vegetative growth and have high wildlife habitat value. Two broad categories of wetland communities occur in California: freshwater emergent wetlands and saline emergent wetlands. Freshwater emergent wetlands include freshwater marshes, vernal pools, and wetlands that are managed and maintained impoundments associated with flood control/water supply structures. Saline emergent wetland vegetation is dominated by water-seeking (hydrophytic and/or halophytic) vegetation that lives in brackish or saline waters or soils such as those found along the California coast. Open-water and tidal flat communities are generally unvegetated but are associated with wetland communities.

California can be divided into 12 bioregional provinces that consist of vegetation communities based on topographical and geomorphological features. These bioregions, or habitats, are adapted from the California Division of Mines and Geology and relate to climate as it is affected by terrain and results in the formation of habitat (see Section 3.1.2, Figure 3.1-1). The habitat types included in this document, condensed from Mayer and Laudenslayer (1988), are defined as follows.

Coniferous Forest

This habitat consists of an assemblage of conifer species with multilayered canopy structure and spacing. Older stands are characterized by a diversity of tree sizes and shapes, light gaps and associated understory growth, snags, fallen limbs, and branches close to the ground. Typical species include Douglas fir (*Pseudotsuga menziesii*), incense cedar (*Calocedrus decurrens*), white fir (*Abies concolor*), ponderosa pine (*Pinus ponderosa*), and redwood (*Sequoia sempervirens*). Coniferous forests are typically associated with mountainous regions and are habitat to numerous bird, mammal, reptile, and amphibian species.

Hardwood Forest

This habitat contains an assemblage of hardwood trees including oak (*Quercus* spp.), Pacific madrone (*Arbutus menziesii*), black walnut (*Juglans nigra*), and big-leaf maple (*Acer macrophyllum*). Hardwood stands with multilayered canopy structures and spacing provide valuable habitat for wildlife, offering opportunities for thermal and predation cover, forage, resting, and denning. Hardwood forests can contain a mix of conifer and shrub species and are generally associated with lower-elevation foothills and areas where forest stands were once routinely converted from cone-bearing to acorn-producing trees through the use of fire.

Woodland

Woodland habitats contain a mixed community of trees and grassland with a poorly developed shrub subcanopy stratum and relatively open spacing between individual trees. Generally, the

dominant species of this habitat consist of an oak overstory with an annual grass sublayer but can also consist of a juniper (*Juniperus occidentalis)* overstory with a curl-leaf mountain mahogany (*Cercocarpus ledifolius*) sublayer or a Monterey cypress (*Cupressus macrocarpa*) overstory with a perennial grass understory.

Riparian

Riparian habitats consist of variable, structurally diverse vegetation associated with perennial and intermittent stream and creek channels. An important component of this habitat type is the predominance of a canopy layer that provides excellent microclimatic regulation, cover, denning, and forage opportunities. Many species of wildlife use riparian corridors as avenues for movement, and these habitats are a critical component of an overall landscape matrix that allows for population connectivity.

Wet Meadow

The wet meadow habitat consists of a single layer of herbaceous growth associated with water. This habitat is poorly drained and has water at or near the surface all year. Shrub and tree layers are generally absent or extremely sparse, except along the edges. Species composition will vary throughout the state depending upon elevation and climatic factors.

Chaparral

Chaparral habitats contain structurally homogeneous brushland dominated by shrubs with thick, stiff, heavily cutinized evergreen leaves. Fire suppression policies over the past century have resulted in many California chaparral areas becoming decadent and matted, with tight spacing and poor forage opportunities for large game animals. Chaparral habitats usually dominate south-facing slopes. Common chaparral species include chamise (*Adenostoma fasciculatum*), redshank (*Tringa tetanus*), wedge-leaf ceanothus (*Ceanothus cuneatus*), California buckthorn (*Rhamnus californica*), and hollyleaf cherry (*Prunus ilicifolia*).

Grassland

Introduced and native open grassland is commonly associated with livestock grazing and is usually void of trees and shrubs except near the edges. Seasonal variations in precipitation promote physiognomic changes in structure. The structure of this habitat depends on the composition of species present. Introduced grass species include wild oat (*Avena fatua*), foxtail fescue (*Festuca megalura*), turkey mullein (*Eremocarpus setigerus*), and ripgut brome (*Bromus diandrus*). Vernal pools, seasonally flooded depressions found on soils with an impermeable layer such as a hardpan, are frequently present in grasslands in the Central Valley and support species such as downingia (*Downingia cuspidate*) and meadowfoam (*Limnanthes alba)*. Perennial grasslands typically occur on ridges and south-facing slopes and are dominated by California oatgrass (*Danthonia californica)* and curly-cup gumweed (*Grindelia squarrosa*).

Sagebrush

Sagebrush habitats typically contain large, open, discontinuous stands of vegetation of comparatively uniform height. The sagebrush can consist of small, widely spaced plants or big, overlapping brush with touching canopies. Trees are generally sparse. Sagebrush (*Artemisia tridentate*) has a deep and well-developed lateral root system, which results in stands of uniform size and spacing. Variant species of sagebrush include western chokecherry (*Prunus virginiana demissa*), curl-leaf mountain mahogany, and bitterbrush (*Purshia tridentate*).

Desert

This habitat type can consist of chaparral brush, succulent shrubs, oasis palms, alkali soils, and sand. Succulent floristic components and oasis desert conditions offer a greater array of structural complexity than adjacent desert areas, which generally results in greater species diversity at these locations.

Cropland/Orchard

Cropland/orchard habitat contains managed lands that consist of commercial agricultural fields, pastures, vineyards, and fruit orchards, depending upon ownership and season. This habitat is often located on flat to gently rolling hills, with rolling terrain usually watered via sprinkler system and flat land usually irrigated. The types of crops grown in this habitat depend on soil composition. Wildlife that has adapted to introduced croplands and orchards are generally not welcomed by growers, and control measures have historically been implemented to keep those populations away. The only county in California to be void of large agricultural cropland is San Francisco.

Lacustrine

Lacustrine habitats are inland depressions or dammed rivers and streams that contain standing water. They can vary from small ponds to large water bodies covering several square miles. Notable habitats include Shasta Lake reservoir and Lake Tahoe. Plankton are a key component of open-water food webs. Submerged and floating vegetation near the shoreline offer support for herbivorous wildlife that feed upon phytoplankton and plants. Invertebrate aquatic species are frequently present.

Riverine

Riverine habitats consist of intermittently or continually running rivers, creeks, or streams. Headwaters originate at higher elevations and flow downward relative to slope and volume of surface runoff. The substrates generally become smaller as slope gradient decreases and volume accumulates. Water temperature and turbidity increases, resulting in a change of the types of organisms that can survive. The shoreline produces emergent vegetation used by vertebrate species of aquatic and terrestrial wildlife for foraging, egg-laying, nesting, and cover.

Emergent Wetland

Emergent wetlands generally consist of a single-stratum layer of herbaceous hydrophytes or perennial graminoids and forbs that depend upon saltwater or freshwater influences. Tidal-

influenced wetlands are often associated with estuarine habitats and are composed of brackish waters with salt-tolerant root systems. Typical saline wetland vegetation includes cordgrass (*Spartina* spp.), pickleweed (*Salicornia virginica*), and shoreweed (*Littorella uniflora*). Freshwater wetlands are typically dominated by perennial monocots including nutsedge (*Cyperus* spp.), Baltic rush (*Juncus balticus*), and willow (*Salix* spp). Bulrush (*Scirpus* spp.) and cattail (*Typha* spp.) can be found in both types. Wetlands have gradually diminished in California as a result of commercial agriculture and real estate development. Many species of birds, mammals, reptiles, and amphibians are dependent upon this habitat type for survival.

Estuarine

Estuarine habitats consist of lagoons with periodically and permanently flooded substrates and open-water portions of semienclosed coastal zones where tidal seawater is diluted by flowing freshwater. Estuarine environments generally support a lower diversity of species but higher population numbers compared to other habitat types due to the adaptive stress associated with changing salinity gradients. Estuarine wildlife organisms are often marine in origin. Numerous bird and mammal species use estuarine habitats, including cormorant (*Phalacrocorax* spp.), gull (*Larus* spp.), brown pelican (*Pelecanus occidentalis*), harbor seal (*Phoca vitulina*), California sea lion (*Zalophus califonianus*), and sea otter (*Enhydra lutris* spp).

Coastal

Four basic subzones are included in this category. The shoreline subzone is characterized by the substrates that compose the barren land from the edge of the spray zone to where vegetative cover exceeds 10 percent. Typical formations are sandy beaches and rocky cliffs. The tidal subzone includes the area exposed by low tides. The subtidal subzone extends from the low-tide exposure point seaward to the area where kelp forests (*Nereocystis* spp.) can propagate given the correct substrate. The pelagic subzone is the depth beyond the kelp forest toward the open ocean.

3.5 CULTURAL RESOURCES

Cultural resources include archaeological and historical objects, sites, and districts; historic buildings and structures; cultural landscapes; and sites and resources of concern to local Native Americans and other ethnic groups.

3.5.1 Regulatory Background

3.5.1.1 Federal Laws and Regulations

National Historic Preservation Act, as amended (1966)

The NHPA declares federal policy to protect historic sites and values in cooperation with other nations, states, and local governments. Subsequent amendments designated the SHPO as the individual responsible for administering state-level programs. The act also created the ACHP. Section 106 of the NHPA and implementing regulations (36 CFR 800) outline the procedures to be followed in the documentation, evaluation, and mitigation of impacts for cultural resources. The Section 106 process applies to any federal undertaking that has the potential to affect cultural resources. The Section 106 process includes identifying significant historic properties and districts that may be affected by an action and mitigating adverse effects to properties listed, or eligible for listing, in the NRHP (36 CFR 60.4).

As mentioned in Section 1.8.3 of this PEA, FEMA, the SHPO, the OES, and the ACHP have executed a disaster-specific PA for each recent disaster in California to streamline the Section 106 review process. FEMA, the SHPO, OES, and ACHP have executed a nondisaster-specific PA for future disasters in California. A copy of this agreement is provided in Appendix H. The impact analysis presented in Section 4.5 assumes that a disaster-specific PA would be used for actions associated with disasters that already occurred and that the nondisaster-specific PA that has been executed would be used for any nonemergency work for any future disasters.

American Indian Religious Freedom Act (1978)

The American Indian Religious Freedom Act (42 USC 1996 et seq.), regulated under 43 CFR 7, was established to protect religious practices, ethnic heritage sites, and land uses of Native Americans. The act makes it a policy to protect and preserve for Native Americans, Eskimos, Aleuts, and Native Hawaiians their inherent right to believe, express, and exercise their traditional religions. The act allows them access to sites, use and possession of sacred objects, and freedom to worship through ceremonial and traditional rights. It further directs federal departments, agencies, and other instrumentalities responsible for administering relevant laws to evaluate their policies and procedures in consultation with Native American traditional religious leaders to determine changes necessary to protect and preserve Native American cultural and religious practices.

3.5.1.2 State and Local Laws and Regulations

California Native American Graves Protection and Repatriation Act (2001)

California Health and Safety Code, Division 7, Part 2, Chapter 5 (Sections 8010–8030), makes broad provisions for the protection of Native American cultural resources. The act sets the state policy to ensure that all California Native American human remains and cultural items are treated with due respect and dignity.

California Public Resources Code

The PRC contains several sections relevant to cultural resources, as described below:

- Section 5097.9 details procedures that should be taken whenever Native American remains are discovered. No public agency, and no private party using or occupying public property, or operating on public property, under a public license, permit, grant, lease, or contract made on or after July 1, 1977, shall in any manner whatsoever interfere with the free expression or exercise of Native American religion as provided in the United States Constitution and the California Constitution; nor shall any such agency or party cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property, except on a clear and convincing showing that the public interest and necessity so require.
- Section 7050.5 establishes that every person who knowingly mutilates or disinters, wantonly disturbs, or willfully removes any human remains in or from any location other than a dedicated cemetery without authority of law is guilty of a misdemeanor, except as provided in PRC Section 5097.99. In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains should take place until the coroner of the county in which the human remains are discovered has determined whether the remains are under his or her jurisdiction. If the coroner determines that the remains are not subject to his or her authority and recognizes the human remains to be those of a Native American, or has reason to believe that they are those of a Native American, he or she shall contact the Native American Heritage Commission by telephone within 24 hours.
- Section 7051 establishes that every person who removes any part of any human remains from any place where it has been interred, or from any place where it is deposited while awaiting interment or cremation, with intent to sell or dissect it, without authority of law or written permission of the person or persons having the right to control the remains under Section 7100, or with malice or wantonness, has committed a public offense that is punishable by imprisonment in the state prison.

14 California Code of Regulations 4308

Under this state preservation law, no person shall remove, injure, disfigure, deface, or destroy any object of archaeological or historical interest or value.

Local Regulations

Some counties and cities have developed general plans that include county-specific or city-specific ordinances or guidelines related to the treatment of cultural resources.

3.5.2 Cultural Resources in California

Table 3.5.1 provides summary descriptions of cultural resources sites in California. The information in the table and the description below is primarily from Chartkoff and Chartkoff's 1994 book, *The Archaeology of California*. Table 3.5-1 is not intended to be a definitive statement on archaeological or historic site types but rather provides a broad overview of California's cultural past subject to ongoing revisions and refinement by other researchers. Four major time periods are identified: Paleo-Indian, Archaic, Pacific, and Historical. These periods have been developed as an organizing device and not as a model of evolutionary stages of development. These arbitrary divisions highlight times of shared traits and shared trends toward particular styles of adaptation rather than mark major breaks in California's past. Table 3.5-1 describes the characteristics of archaeological sites from these periods and the geographical region where these sites may be located. The table also suggests the importance of these sites, but all sites should be considered significant until evaluated by a professional archaeologist.

Paleo-Indians were the first humans to live in California. They tended to restrict themselves to a single kind of environment and practiced a focal economy based on the exploitation of a few resources for food, typically megafauna. The Paleo-Indians used generalized and multifunctional tools, each designed for many tasks. Climate change at the end of the Pleistocene epoch caused megafauna populations to decline, and the Paleo-Indians gradually gave way to the Archaic way of life. The Archaic period, unlike the Paleo-Indian period, witnessed considerable change over time and displayed growing variability across space. By the end of the Archaic period, the native groups were far more complex than in Paleo-Indian times and could support far more people. The Archaic period is characterized by a diffuse economy, in which people used many kinds of resources for food. As a result of this increase and diversification of resources, Archaic people needed to exploit many kinds of environments and resources that were more affected by seasonal availability than the megafauna had been. Seasonal migrations began to develop and dispersal into new ecological niches around California took place, resulting in the development of specialized technologies necessary for the processing of newly exploited resources. The Archaic people elaborated on and refined Paleo-Indians tools and also created ritual objects and personal ornaments.

Pacific period societies took certain practices begun in the Archaic period and refined them to extraordinary degrees, which ultimately transformed their whole way of life. The Pacific period marked a return toward a more focal subsistence economy concentrated on a few staples. The subsistence involved the use of more species than in Archaic time, though many species were used for craft materials, medicines, and rituals, rather than for food. Pacific period groups learned to support more people by collecting crops in surplus and storing them for other seasons when food was less abundant. This high productivity gave rise to large complex societies such as tribes, chiefdoms, and kingdoms, and highly developed systems of trade between communities. The Pacific period groups also greatly expanded the exploitation of riverine fish, acorns, and deep-seawater resources.

Native Californians had successfully occupied every region of the state by the time Spanish and European settlers arrived, which marked the beginning of the Historical period. The Historical period resulted in the breakdown of traditional society in California, the pioneer settlement of other cultures, and the development of an urbanized, multiethnic society. The clash of cultures between Native Californians and different groups of immigrants resulted in the collapse of most Native Californian societies. A rise toward urbanism was based on the production of agricultural and ranch products, timber, and mineral resources, stimulated by a tremendous influx of people due to the Gold Rush. The emergence of industrial cities and technologies is the most recent phenomenon.

Tables

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Table 3.5-1
Summary Descriptions of Cultural Resources Sites in California

3.6 SOCIOECONOMICS AND PUBLIC SAFETY

Under NEPA, potential impacts to socioeconomic resources include changes to demographics, housing, employment, the local economy, and public safety. The general basis for socioeconomic considerations is data obtained from the U.S. Department of Commerce Bureau of the Census. Additional data obtained from state and local resources may be used as well

3.6.1 Regulatory Background

3.6.1.1 Federal Laws and Regulations

Executive Order 12898: Environmental Justice

EO 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," was issued to all federal departments on February 11, 1994. This order requires federal lead agencies to ensure rights established under Title IV of the Civil Rights Act of 1964 are considered as part of analyzing environmental effects. FEMA and most federal lead agencies determine impacts to low-income and minority communities as part of the NEPA compliance process. Agencies are required to identify and correct programs, policies, and activities that have disproportionately high and adverse human health or environmental effects on minority or low-income populations. EO 12898 also tasks federal agencies with ensuring that public notifications regarding environmental issues are concise, understandable, and readily accessible.

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (URARPAPA, PL 91-646) and Title IV Uniform Relocation Act (U.S. Bureau of Reclamation)

These regulations provide uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal or federally assisted programs. These regulations also establish uniform and equitable land acquisition policies for federal and federally assisted programs. Agencies are required to reimburse for and provide relocation planning, assistance coordination, and advisory services to persons displaced by such programs.

3.6.1.2 State Laws and Regulations

California Environmental Quality Act

CEQA (PRC Sections 21000-21178) and the CEQA Guidelines (CCR Sections 15000-15387) are the primary policies that require proponents of an action to analyze its potential socioeconomic impacts to communities resulting from the implementation of the action.

Relocation Assistance: Chapter 16 of the California Government Code

Whenever an action undertaken by a California public entity results in the displacement of any person, the displaced person is entitled to payment for relocation and related expenses.

Procedures guiding relocation assistance are detailed in Chapter 16 of the California Government Code (Sections 7260-7277).

3.6.2 Socioeconomic Conditions in California

Much of the relevant data on demographics and housing in California is provided by the U.S. Department of Commerce Bureau of the Census. Census data are provided for the political subdivisions of the country, that is, states, counties, and cities. In addition, census data are provided by statistical subdivision that include (in order of decreasing size) tracts, block numbering areas, block groups, and blocks. These statistical subdivisions of counties are delineated to be homogeneous with respect to demographics, economic status, and living conditions. Most local governments have basic demographic, economic, and employment data based on political subdivisions. California is a diverse state demographically. Given the programmatic nature of this document, socioeconomic data are presented in broad terms for the state.

The poverty rate in the state is 14 percent, based on the 3-year average from 1998 to 2000. In California, people living in predominantly rural areas tend to have lower incomes, higher poverty rates, and higher unemployment rates than those living in urban areas. However, in San Francisco and Los Angeles counties high income levels coexist with some of the highest poverty rates in the state. Poverty rates are higher among minority ethnic groups. Throughout the state, pockets of prosperity have an "averaging effect," that is, they raise average personal income and lower average poverty and unemployment rates. Annual per capita income in California ranges from $10,000 in Yuba County to $28,000 in Marin County. Unemployment rates vary considerably from county to county, as they depend on the local availability of work. At the state level, unemployment rates respond to general economic trends and conditions. The California Employment Development Department issues monthly unemployment rate reports. The statewide unemployment rate for June 2002 was 6.3 percent.

Table 3.6-1 provides a summary of state and county demographic data.

Tables

Insert

Table 3.6-1
State and County Demographics

3.7 LAND USE AND PLANNING

Under NEPA, this resource category evaluates land uses and zoning designations in areas where an action would take place. Proposed alternatives can contradict or be in harmony with designated uses. Impacts can occur if changes to real and designated use areas are necessary to implement an alternative or if implementation results in an unbalanced land use. This resource category also evaluates the issue of land ownership.

3.7.1 Regulatory Background

Land use, the existing function of real property, is regulated by all levels of government. However, the majority of land use control and zoning is implemented by local authorities. State regulations include California's Planning and Zoning Law. Local regulations are described in county general plans.

3.7.1.1 State and Local Laws and Regulations

It is the intent of the State of California to give as much control over land use as possible to local authorities. California's Planning and Zoning Law (California Government Code Sections 65000–66037) requires each city and county jurisdiction in the state to prepare a local general plan. The general plan is the primary planning document that establishes policies to regulate the development, function, and use of land within the jurisdictional boundaries of each city or county. General plans are required to contain the following elements or chapters: land use, circulation, housing, conservation, open space, noise, and safety. Although all seven elements carry equal weight, the land use element is integral to carrying out local planning because it designates the pattern and scope of development. In the general plan, all public and private property within the county or city's jurisdiction is designated with a specific land use. Examples of land use designations include residential, commercial, industrial, public (or institutional), recreational, agricultural, and open (or undeveloped). The designations are often further subdivided, for example, high-, medium-, and low-density residential or light and heavy industrial.

General plan policies and county or city zoning ordinances define permissible land uses within each designated land use area or zone. These policies and ordinances prohibit development that is inconsistent with land uses in a given zone. For example, the construction of an industrial facility in a low-density residential zone would be prohibited in most city or county zoning ordinances. Compliance with zoning ordinances is normally enforced by local governments as part of the building permit process. Under most zoning ordinances, land uses that are compatible with a land use designation require a simplified land use permitting process. A "conditional use" is the term given to land uses that do not completely conform to the land use designation but are allowable within the zoning ordinance provided that certain conditions are met. For example, in many cities small retail properties such as a coin-operated laundry facility or a convenience store may be allowable in a medium-density residential zone when a conditional use permit is obtained by the owner of the retail property. Finally, land uses may be designated as "nonconforming" uses, which occurs when a land use does not meet the requirements of the zoning ordinance for that land use area and a conditional use is not permitted. Often a "zoning variance" is obtained

by the owner of the nonconforming land use property. Frequently nonconforming uses occur when a land use designation for a given area has been changed and an existing property maintains its original land use, such as a commercial farm that operates in an area that has been rezoned as residential.

3.7.2 Land Uses in California

Land use throughout California is extremely varied. This section provides an overview of regional land use patterns in California.

3.7.2.1 Bay-Delta Region

Prior to the 1940s the most substantial urban area in the Bay-Delta Region was the city of San Francisco; most of the other portions of the region were rural. During the last 50 years, however, land uses throughout the region have shifted, becoming progressively more urbanized. Post-World War II urbanization in the metropolitan San Francisco area was the principal catalyst for this development, along with growth in the cities of Oakland and San Jose, which are the other major urban areas in the region. Since the 1970s, the South Bay region has become a hub for companies that provide high-technology products and services. Suburban sprawl, characterized by low-density residential and light manufacturing land uses, occupies much of the Bay-Delta Region outside the city of San Francisco. Land uses in the region are diverse and include the Napa Valley and Sonoma County wine industry; international business and tourism in San Francisco; technological development and production in Silicon Valley; and urban, suburban, and rural residential uses. Urban land accounts for about 23 percent (655,600 acres) of the land area (CALFED 2000).

3.7.2.2 Central Valley Region

Agriculture and open space historically have constituted the most important land uses in the Sacramento River and San Joaquin Valley areas that comprise the Central Valley Region. Since the 1970s, however, urban land uses in the greater metropolitan Sacramento area have begun to supplant some agricultural uses. Except for Sacramento County, the region generally contains large quantities of parkland, forests, and other open space and has preserved its traditionally rural nature. Urban development accounts for approximately 863,000 acres (about 4 percent) of total land use in the region. Land uses in the Sacramento River area are still principally agricultural and open space, with urban development focused in and around the city of Sacramento. More than half the region's population lives in the greater metropolitan Sacramento area. Other fast-growing communities include Vacaville, Dixon, Redding, Chico, and several Sierra Nevada foothill towns. Urban development along major highway corridors in Placer, El Dorado, Yolo, Solano, and Sutter counties has taken some irrigated agricultural land out of production.

Land uses in the San Joaquin River area are predominantly open space in the mountains and foothills and agricultural in the San Joaquin Valley area. Urban land usage in 1990 totaled 295,300 acres, or about 2 percent of the region's area. Urban areas include the cities of Stockton, Modesto, Merced, and Tracy, as well as smaller communities such as Lodi, Galt, Madera, and Manteca. In contrast to the urban centers of the valley, separated by flat agricultural fields and

linked by freeways, the foothills are sprinkled with small communities that are connected by two-lane roads. The western side of the Central Valley Region, south of Tracy, is sparsely populated. Many small agricultural communities dot the eastern side of the southern San Joaquin Valley, with urban development and anticipated population growth focused in the cities of Fresno, Bakersfield, Visalia, and Tulare.

3.7.2.3 South Coast Region

The South Coast Region is the most urbanized area in California. The Los Angeles metropolitan area is now the second largest in the nation. Of the approximately 7 million acres in the area, about 1.7 million acres are urbanized. Most of the area's coastal plains and valleys are densely populated. The largest cities are Los Angeles, San Diego, Long Beach, Santa Ana, and Anaheim. Areas undergoing increased urbanization include the coastal plains of Orange and Ventura counties, Santa Clarita Valley in northwestern Los Angeles County, Pomona/San Bernardino/Moreno Valleys, and the valleys north and east of the city of San Diego. To the north of the area are the cities of Santa Barbara, Lompoc, Santa Maria, Morro Bay, and San Luis Obispo. The eastern portion of Kern County, northeastern portion of Los Angeles County, and western San Bernardino County contain many desert valleys and small mountain ranges. Although not densely populated, these areas contain growing urban areas, including the city of Lancaster.

3.7.2.4 Other Regions

In addition to the more urban Bay-Delta, Central Valley, and South Coast regions, California is composed of large expanses of rural, less-developed country. These more rural areas include the Klamath, Modoc, and Sierra regions to the north, the Central Coast region to the center west, and the Colorado and Mojave Desert regions in the southeast of the state. In general, these areas are characterized by large expanses of public lands (e.g., lands administered by the BLM and USFS). Typical land uses in these areas include forestry, agriculture, recreation, geothermal power, and open space. Despite the comparatively substantial amount of undeveloped land in these regions, urbanization is encroaching from the urban centers of Orange County and Los Angeles, Sacramento, and the San Francisco Bay Area.

3.8 PUBLIC SERVICES AND RECREATION

Public services in California include fire protection, police protection, public schools, parks, and other services at public facilities. Guidelines and statutes regarding public services and recreation are generally found at the local level. Local jurisdictions frequently establish building codes and other construction standards and prescribe requirements for local police and fire protection. Local planning agencies may establish goals or ordinances for parks or keeping areas undeveloped. Although California and the federal government constrain aspects of school policy decision making, local school boards determine school operations.

3.8.1 Fire Protection

Fire protection at the state level is under the direction of the California Department of Forestry and Fire Protection (CDF). The CDF has the responsibility for fire protection and stewardship of over 31 million acres of California's privately owned wildlands. In addition, the CDF provides varied emergency services in 33 of the state's 58 counties via contracts with local governments. Beyond its wildland fire-fighting role, the CDF responds to an average of nearly 273,000 nonwildfire emergencies each year. The CDF responds to medical emergencies of all types, hazardous material spills, swiftwater rescues, search and rescue missions, civil disturbances, and other emergencies (see www.fire.ca.gov).

Because of the CDF's size and major incident management experience, it is often asked to assist or take the lead in disasters, including the northern and central California floods of 1997 and 1998, the 1991 Cantara train derailment and toxic spill, the 1994 Northridge earthquake, 1989 Loma Prieta earthquake, and the 1991 Tunnel Fire in the Oakland/Berkeley Hills.

A part of the CDF team since 1996, the Office of the State Fire Marshal supports the CDF mission to protect life and property through fire prevention engineering programs, law and code enforcement, and education. The office provides for fire prevention by enforcing fire-related laws in state-owned or -operated buildings, investigating arson fires in California, licensing those who inspect and service fire protection systems, approving fireworks for use in California, regulating the use of chemical flame retardants, evaluating building materials against fire safety standards, regulating hazardous liquid pipelines, and tracking incident statistics for local and state government emergency response agencies.

In addition to the state fire-fighting capabilities, the Fire and Aviation Management part of the USFS works to advance technologies in fire management and suppression, maintain and improve the efficient mobilization and tracking systems in place, and reach out in support of federal, state, and international fire partners.

The National Fire Plan, released in May 2002, is a cooperative, long-term effort by the USFS, Department of the Interior, and National Association of State Foresters. The National Fire Plan is a collaborative 10-year comprehensive strategy to reduce the risk of wildland fire to communities and the environment. The need for a 10-year fire plan is the result of:

- A high level of growth in the wildland-urban interface that is placing more citizens and property at risk of wildland fire

- Increasing ecosystem health problems across the landscape
- Millions of acres of land nationwide are presently classified as being at high risk from wildland fire (see www.fireplan.gov)
- An awareness that many of the past century's traditional approaches to land management, the development of unnaturally dense, diseased or dying forests, and treatment of wildland fire have contributed to more severe wildland fires and created widespread threats to communities and ecosystems

In addition to state and federal fire-fighting services, local communities often provide fire protection in the form of municipal or community-based fire districts. Volunteer fire districts may also serve a community, but they are often in small cities or remote areas and are not as common as in the past.

Within California there is also an organization called the California Fire Alliance. This is a collaborative effort between the USFS, BLM, the Bureau of Indian Affairs, USFWS, FEMA, CDF, OES, and a local government representative. The California Fire Alliance coordinates the various grants available for fuel reduction projects. It lends support and technical assistance and facilitates the National Fire Plan's Firewise Program. The California Fire Alliance also monitors 100 communities involved in the Fire Safe Community Program.

3.8.2 Police Protection

Throughout the state various departments within the cities and counties provide police protection and emergency services to members of their respective communities. One of the major agencies providing police protection in the state is the California Highway Patrol. The California Highway Patrol was created to ensure safety and provide service to the public as they use the highway transportation system in the state and to assist local government during emergencies when requested.

3.8.3 Public Schools

California has 8,761 public schools, with as few as 10 public schools in Alpine County and as many as 3,484 in Los Angeles County. The California School Board Association represents 1,000 school districts and county offices of education throughout the state.

3.8.4 Public Parks

The California State Parks system comprises over 260 state parks, beaches, historic sites, and recreational areas. The California State Parks Department contains the largest and most diverse natural and cultural heritage holdings of any state agency in the nation. State park units include underwater preserves, reserves, and parks; redwood, rhododendron, and wildlife reserves; state beaches, recreation areas, wilderness areas, and reservoirs; state historic parks, historic homes, Spanish-era adobe buildings, including museums, visitor centers, cultural reserves, and preserves; lighthouses, ghost towns, waterslides, conference centers, and off-highway vehicle parks. These park units protect and preserve an unparalleled collection of culturally and environmentally sensitive structures and habitats, threatened plant and animal species, ancient

Native American sites, historic structures, and artifacts. Numerous county and regional parks also exist in California.

3.8.5 Public Utilities

3.8.5.1 Water-Related Infrastructure

California has two major water projects: the CVP and the SWP. Construction of the CVP began during the Depression. The CVP stores and transports water from the Sacramento and San Joaquin rivers for use primarily in the Central Valley for irrigation. The federal CVP is the largest water storage and transfer system in the state. It stores up to 12 million acre-feet (MAF) and delivers 7.3 MAF annually. About 90 percent of these deliveries are used to irrigate about 3 million acres of farmlands south of the Delta, with the remaining 10 percent of CVP water used for wildlife refuges.

The SWP consists of large dams, reservoirs, and a major aqueduct (the California Aqueduct). The SWP stretches from Oroville Dam on the Feather River in the north to Perris Lake in Southern California (Water Education Foundation 1987). About 20 million Californians get some portion of their water from the SWP, the state's major distribution system for urban water supplies. The 29 water agencies that buy SWP water have contracted for long-term deliveries of about 4 MAF of water. The existing facilities allow the SWP to deliver between 2.5 and 3 MAF in a normal water year and 1.1 MAF in dry years (Water Education Foundation 2003).

In addition to the two large water projects, California has nearly 600 special purpose local governments that provide water to their areas through imported supplies. Some water districts provide domestic and industrial water and others serve agricultural needs. Since the early 1900s, local water import programs have made possible the development of the San Francisco Bay Area, Los Angeles, other Southern California cities, and agricultural areas statewide. Major local projects in the north include the Hetch Hetchy Aqueducts, which transport Tuolumne River water to San Francisco and the Peninsula, and the Pardee and Comanche reservoirs, which supply the East Bay. In Southern California, a group of southern cities formed the Metropolitan Water District to bring Colorado River water to their area (Water Education Foundation 1987). California is permitted to use 4.4 MAF of Colorado River water annually.

3.8.5.2 Electric Utility and Communication Infrastructure

The electric utility infrastructure in California consists primarily of Pacific Gas and Electric (PG&E) in the northern and central parts of the state and Southern California Edison (SCE) in the southern and central portions. San Diego Gas and Electric (SDG&E) in Southern California and the Sacramento Municipal Utility District (SMUD) are also important providers of electric utility service. Communication infrastructure throughout the state includes underground cable, fiber optic lines, and communication/transmission towers.

In the Sacramento-San Joaquin River Delta, power transmission facilities have developed in parallel with the population growth of various communities near the Delta. PG&E and the Western Area Power Administration have developed power transmission lines across Delta islands and waterways. Many of these corridors are within the periphery of the Delta upland

areas, including several natural-gas-fired plants. Power-generating facilities are absent from the central Delta.

In the San Francisco Bay Area electric infrastructure consists of a large and complex grid of power plants, transmission lines, and substations. Generating facilities in the region primarily are fired with natural gas and oil. Major power generation facilities and oil refineries are located along Carquinez Strait.

In the Sacramento area, infrastructure consists primarily of hydroelectric and natural-gas-fired generating facilities, transmission lines, substations, distribution lines, fiber optic and cable lines, and communication towers. SMUD is the nation's sixth largest community-owned electric utility in terms of customers served. SMUD generates, transmits, and distributes electric power to a 900-square-mile service area that includes Sacramento County and a small portion of Placer County.

In the San Joaquin area, infrastructure consists primarily of natural-gas-fired and hydroelectric-generating facilities, transmission lines, substations, distribution lines, fiber optic and cable television lines, and communication towers.

In the Sacramento and San Joaquin valley areas, hydropower generation levels fluctuate substantially with reservoir releases, which are in turn affected by droughts (and other climatic conditions), minimum streamflow requirements, flow fluctuation restrictions, and water quality requirements. Changes in power generation affect coordinated operations of both PG&E and CVP facilities.

A complex system of generating facilities, substations, and transmission infrastructure exists in the South and Central Coast regions. Natural gas, nuclear, oil, hydroelectric, and other technologies are used for power production.

Located in Southern California, SCE is one of the largest electric utilities in the U.S. On an average day, SCE provides power for 11 million individuals, 800 communities and cities, 5,000 large businesses, and 280,000 small businesses in Central and Southern California. Delivering that power takes 16 utility interconnections, 4,900 transmission and distribution circuits, and 365 transmission and distribution crews (see www.sce.com).

SDG&E is a regulated public utility that provides service to 3 million consumers through 1.3 million electric meters and 775,000 natural gas meters in San Diego and southern Orange counties. SDG&E is part of Sempra Energy Utilities, the umbrella for Sempra Energy's regulated business units (see www.sdge.com/aboutus/).

3.8.5.3 Natural Gas Infrastructure

Approximately 43 percent of California's electricity is generated by combusting natural gas that was obtained from the state's gas resources. Natural gas is generally distributed throughout the state (including to residential homes) by pipelines. Of the 58 counties in California, 28 had some form of oil and/or gas production in 2000. Natural gas is produced in two basic forms, associated gas and nonassociated gas. Associated gas is produced along with crude oil while nonassociated gas is produced from gas fields that do not produce any crude oil. Of the 288 active oil and gas fields in the state, 284.6 billion cubic feet of associated gas, which is generally produced in

Southern California, and 94.5 billion cubic feet of nonassociated gas, which is generally produced in Northern California, was produced in 2000 (California Department of Conservation 2001; California Energy Commission 2001). Throughout the state the natural gas infrastructure consists of gas fields, pipelines, compressor stations, underground storage areas, storage facilities owned by oil and gas companies, public utilities, various independent leaseholders, and other related infrastructure (CALFED 2000).

3.9 TRANSPORTATION

3.9.1 Regulatory Background

The California Transportation Commission (CTC) was established in 1978 by Assembly Bill 402 (Chapter 1106, Statutes of 1977). The CTC is responsible for programming and allocating funds for the construction of highway, passenger rail, and transit improvements throughout California. The CTC also participates in the initiation and development of state and federal legislation that seeks to secure financial stability for the state's transportation needs.

The California Department of Transportation (Caltrans) is responsible for the design, construction, and maintenance of the California State Highway System as well as the portion of interstate highways within California's boundaries.

The California legislature strives for an integrated state and regional transportation planning process. A State Transportation Plan, issued in 2000, sets the standards and requirements for local transportation plans. The transportation planning agencies of local governments and regional authorities are responsible for the design, construction, and maintenance of county and local roads. These agencies include the Regional Transportation Planning Agencies designated under Section 29532 of the California Government Code, the Local Transportation Commissions designated under Section 29535 of the Government Code, and the Metropolitan Planning Organizations designated by the governor and required by federal provisions for urbanized areas under the Federal Highway Act of 1962.

The use of California state highways and freeways for other than normal transportation purposes may require written authorization from Caltrans. If activities are to be conducted within the right-of-way of a state highway, Caltrans reviews the request, which must be submitted on a Standard Encroachment Permit Application and forwarded to the appropriate Caltrans district.

Caltrans also issues special permits for the movement of vehicles/loads exceeding statutory limitations on the size, weight, and loading of vehicles contained in Division 15 of the California Vehicle Code. These special permits require the completion of an application for a Transportation Permit. Local authorities often have their own rules and regulations for local roads.

3.9.2 Transportation in California

Transportation is vital to the California and its economy. Work commutes, shipping and distribution, and routine daily tasks rely on a dependable and safe transportation system. The state includes two major transportation hubs: the Bay Area and the South Coast. These hubs function as gateways for international trade. California includes dense urban cores with suburban and rural peripheries. A system of federal and state highways provides regional connections, and a network of local major and arterial roads provides internal circulation.

A full description of the California road and highway systems is beyond the scope of this PEA. The California State Highway Code defines a number of different types of highways, including special designations for portions of routes. The California Scenic Highway System includes

those portions of highway that together with their adjacent scenic corridors require special scenic conservation treatment (State Highway Code Section 260). The California Historic Parkway System includes those portions of highways that (1) were constructed prior to 1945; (2) have been recognized by Caltrans or the Office of Historic Preservation in the Department of Parks and Recreation as having historical significance, including notable landmarks, historical sites, etc.; (3) are bounded by federal, state, or local parkland, Native American lands or monuments, or other open space dedicated to historical or recreational uses; and (4) are traversed by no fewer than 40,000 vehicles per day on an annual daily average basis (State Highway Code 280). The concerns raised by these designations are also addressed under the cultural resources, public services and recreation, and visual resources sections of this PEA.

The State of California finances the operation of passenger routes within the state, including both operating and capital grants for station and equipment improvement. Numerous privately operated freight and passenger rail lines exist in the state. Many of these operations operate on the same rail lines. Key railway corridors include the Central Valley, Donner Pass, Cajon Pass, and routes crossing the Mojave and Colorado deserts. Some of the primary railway hubs are Los Angeles, Oakland, Sacramento, and Barstow. Rail lines are often owned by a private company and any crossing of a rail line right-of-way typically requires the approval of the rail line owner.

3.10 NOISE

Commonly defined as unwanted and/or unwelcome sound, noise could be associated with actions that are part of this PEA. Sound is most commonly measured in decibels on the A-weighted scale (a scale based on the range of sounds that the human ear can hear) and expressed as dBA. The day-night averaged sound level (DNL or L_{dn}) is an average measure of sound for a 24-hour period expressed in dBA. It takes into account the volume of each sound incident, the number of times each incident occurs, and the time of day each incident occurs (nighttime sound being weighted more heavily because it is assumed to be more annoying to the community). The DNL descriptor is accepted by federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses.

3.10.1 Regulatory Background

3.10.1.1 Federal Laws and Regulations

The Noise Control Act of 1972

The Noise Control Act (42 USC Chapter 4901 et seq.) tasked the USEPA to develop noise level guidelines that would be designed to protect the population from the adverse effects of environmental noise and make recommendations for acceptable noise level limits. The USEPA (1974) guidelines (and those of many federal agencies) state that outdoor sound levels in excess of 55 decibel DNL are "normally unacceptable" for noise-sensitive land uses such as residences, schools, and hospitals. The guideline for indoor sound levels is 45 dBA L_{dn}[1].

Noise Emission Standards for Transportation Equipment

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 CFR, Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters (approximately 50 feet) from the vehicle pathway centerline (Crocker 1997). Vehicle noise limits are implemented through regulatory controls on vehicle manufacturers.

Department of Housing and Urban Development (HUD) Standards

FEMA, along with many other federal agencies, does not have its own standards for acceptable noise levels. Of the federal agencies that do have standards for noise levels, HUD's standards are considered the most appropriate for residential use. HUD standards define L_{dn} below 65 dBA as acceptable for residential use (HUD 1985). Levels up to 75 dBA L_{dn} can be made acceptable through the use of insulation in buildings.

[1] The L_{dn} is the 24-hour equivalent sound level (L_{eq}) obtained after addition of 10 dBA to the sound levels from 10 P.M. to 7 A.M. The L_{eq} is a steady-state sound that has the same energy and A-weighted level as the community noise over a given time interval.

3.10.1.2 State Laws and Regulations

The California Noise Control Act of 1973

Chapter 14 of the California Health and Safety Code delegates the authority to regulate ambient noise to local jurisdictions.

Noise Insulation Standards

Relevant state regulations are contained in the CCR. Part 2 of Title 24 establishes the limit for interior community noise level for multifamily dwellings, hotels, motels, dormitories and long-term care facilities as 45 dBA L_{dn}.

California Governor's Office of Planning and Research (OPR) Guidelines

In 1998, the OPR published its most recent edition of the *General Plan Guidelines*, which advise local jurisdictions in preparing their comprehensive long-term general plans. The noise element is a mandatory component of the general plan and includes general community noise guidelines and specific planning guidelines for noise/land use compatibility developed by the local jurisdiction.

The OPR guidelines are presented on Figure 3.10-1. Selected relevant levels are:

- Community noise equivalent level (CNEL) below 60 dBA–acceptable for low-density residential use
- CNEL below 65 dBA–normally acceptable for high-density residential use
- CNEL of 60 to 70 dBA–conditionally acceptable for churches, educational, and medical facilities
- CNEL below 70 dBA–normally acceptable for playgrounds and neighborhood parks

California Vehicle Code

The State of California also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the state pass-by noise standard is consistent with the federal limit of 80 dBA. The state pass-by noise standard for light trucks and passenger cars (less than 4.5 tons gross vehicle weight rating) is also 80 dBA at 15 meters from the centerline. As with federal regulations, vehicle noise limits are implemented through regulatory controls on vehicle manufacturers and by legal sanction of vehicle operators enforced by state and local peace officers.

3.10.1.3 Local Laws and Regulations

Regulatory noise standards employed by local jurisdictions generally fall into two categories: noise control ordinances and noise/land use compatibility guidelines. Noise produced by nontransportation-related noise sources is usually regulated using ordinances that limit the amount of noise such sources may produce, as measured at the nearest sensitive receptor or at

property lines. Standards in local noise ordinances may be in the form of quantitative noise performance levels, or they may simply be in the form of a qualitative prohibition against creating a nuisance. Many ordinances employ both approaches. Local ordinances typically specify daytime and nighttime limits of statistical noise levels for various land uses or zoning categories. Nighttime limits are usually lower than daytime limits, accounting for the lower ambient noise levels at night and people's increased sensitivity to nighttime noise.

Because local jurisdictions are preempted from regulating noise emissions from transportation noise sources such as cars, trucks, trains, airplanes, and ferries, such jurisdictions also typically implement noise controls through adoption and implementation of noise/land use compatibility guidelines. Noise/land use compatibility guidelines identify the range of noise levels with which various land uses are deemed compatible, which permits local jurisdictions to achieve noise/land use compatibility for the land uses exposed to noise, even if the noise sources themselves cannot be regulated. Also, when existing noise and land uses are not compatible, local jurisdictions might provide aid to local residents to protect them from extreme noise levels.

3.10.2 Existing Noise in California

Land use categories throughout California range from undeveloped rural to densely developed urban land. The noise levels associated with the range of land uses occurring in the state range from quiet to very noisy. Based on the results of environmental noise studies, planners and decision-makers generally accept that a consistent and direct relationship exists between population density and the associated noise level environment. The more rural and less populated (and less developed) areas typically have lower noise levels than the more urban and densely populated (and more developed) areas. Table 3.10-1 shows the relationship between population density and noise levels.

A potential for higher noise levels exists in areas adjacent to transportation corridors or airports or adjacent to industrial or commercial land uses. Noise levels associated with transportation activities are shown in Table 3.10-2.

Tables

Table 3.10-1
Population Density and Average Day-Night Noise Levels Correlation

Location	Persons/ Sq.Km.	L_{dn} (dBA)
Rural		
Undeveloped	8	35
Partially Developed	23	40
Suburban		
Quiet	77	45
Normal	230	50
Urban		
Normal	770	55
Noisy	2300	60
Very Noisy	7700	65

Source: CALFED 2000

Table 3.10-2
Estimating Existing Noise Exposure

Distance from Major Noise Source [1] (feet)				Noise Exposure Estimates (dBA)			
Interstate Highways [2]	Other Roadways[3]	Railroad Lines [4]	Population Density (people per sq. mile)	L_{eq} (day)	L_{eq} (evening)	L_{eq} (night)	L_{dn}
10 - 49				75	70	65	75
50 - 99				70	65	60	70
100 - 199				65	60	55	65
200 – 399				60	55	50	60
400 - 799				55	50	45	55
800 and up				50	45	40	50
	10 - 49			70	65	60	70
	50 - 99			65	60	55	65
	100 - 199			60	55	50	60
	200 - 399			55	50	45	55
	400 and up			50	45	40	50
		10 – 29					75
		30 – 59					70
		60 – 119					65
		120 – 239					60
		240 – 499					55
		500 – 799					50
		800 and up					45
			1 - 99	35	30	25	35
			100 - 299	40	35	30	40
			300 - 999	45	40	35	45
			1,000 - 2,999	50	45	40	50
			3,000 - 9,999	55	50	45	55
			10,000 - 29,999	60	55	50	60
			30,000 and up	65	60	55	65

Notes:

[1] Distances do not include shielding from intervening rows of buildings. General rule for estimating shielding attenuation in populated areas: Assume 1 row of buildings every 100 feet; -4.5 dB for the first row, -1.5 dB for every subsequent row up to a maximum of -10 dB attenuation.

[2] Roadways with four or more lanes that permit trucks, with traffic at 60 mph.

[3] Parkways with traffic at 55 mph, but without trucks, and city streets with the equivalent of 75 or more heavy trucks per hour and 300 or more medium trucks per hour at 30 mph.

[4] Main line railroad corridors typically carrying 5 to 10 trains per day at speeds of 30 to 40 mph.

Source: Federal Transit Administration 1995.

3.11 HAZARDOUS MATERIALS AND WASTES

Under NEPA, actions involving hazardous materials or generating hazardous wastes must be in compliance with applicable regulations. A proposed action would have an impact if it interferes with ongoing or planned remediation programs or if it introduces or contributes to existing contamination.

3.11.1 Regulatory Background

The terms hazardous material and hazardous waste are defined by both federal and state regulations and often can encompass different materials depending on which regulation is being referred to and which state this site is located in. For the purposes of this document, hazardous material is defined as any solid, liquid, or gas that when improperly handled or released will have acute or chronic effects on human health or the environment. Hazardous waste is defined as any solid liquid, or gas that is a hazardous material and is discarded or is intended to be discarded.

3.11.1.1 Federal Laws and Regulations

Hazardous materials and wastes are regulated in the U.S. under a variety of federal and state laws. Federal laws and subsequent regulations governing the assessment, transportation, and disposal of hazardous materials and wastes include the Resource Conservation and Recovery Act (RCRA); the RCRA Hazardous and Solid Waste Amendments; Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Solid Waste Act; the Toxic Substances Control Act (TSCA); and the Clean Air Act (CAA).

Resource Conservation and Recovery Act

RCRA is the federal law that regulates hazardous waste. RCRA regulates hazardous waste from "cradle to grave," that is, from the time the waste is generated through its management, storage, transport, treatment, and final disposal. The USEPA is responsible for implementing this law and may delegate this responsibility to the states to implement it. The State of California has been delegated with this responsibility. RCRA also sets forth a framework for the management of nonhazardous wastes. The 1986 amendments to RCRA enable the USEPA to address the environmental problems that can result from underground tanks storing petroleum and hazardous substances. RCRA focuses only on active and proposed facilities and does not address abandoned or historical sites.

Hazardous and Solid Waste Amendment of 1984

The federal Hazardous and Solid Waste Amendments to RCRA require phasing out the land disposal of hazardous waste. Some of the other mandates of this law include increased enforcement authority for the USEPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank (UST) program.

Toxic Substances Control Act

TSCA was enacted by Congress to give the USEPA the ability to track the approximately 75,000 industrial chemicals currently produced or imported into the U.S. The USEPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. The USEPA may ban the manufacture and import of those chemicals that pose an unreasonable risk. The USEPA may also control these chemicals as necessary to protect human health and the environment. TSCA supplements other federal statutes, including CAA and the Toxic Release Inventory under the Emergency Planning and Community-Right-to-Know Act. TSCA included regulations regarding asbestos and polychlorinated biphenyls (PCBs).

Comprehensive Environmental Response Compensation and Liability Act of 1980 and the Superfund Amendments and Reauthorization Act (SARA)

CERCLA and SARA are the federal laws that govern the process of identifying and prioritizing the cleanup of abandoned or other sites not regulated under RCRA contaminated by the release of hazardous materials to the environment. The process is conducted though the National Contingency Plan, which ranks sites and determines whether a site should be placed on the National Priority List. Sites on the list are commonly referred as Superfund sites. The USEPA is responsible for enforcing CERCLA and SARA. The USEPA was given power to seek out those parties responsible for any release and ensure their cooperation in the cleanup. Superfund site identification, monitoring, and response activities in states are coordinated through the state environmental protection or waste management agencies.

Clean Air Act

Section 112 of the CAA requires the USEPA to develop emission standards for hazardous air pollutants. In response to this section the USEPA published a list of hazardous air pollutants and promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations. Because lead and asbestos present a substantial risk to human health as a result of air emissions from one or more source categories, they are considered hazardous air pollutants and, thus, hazardous materials. The Asbestos NESHAP (40 CFR 61, Subpart M) addresses milling, manufacturing, and fabricating operations; demolition and renovation activities; waste disposal issues; active and inactive waste disposal sites; and asbestos conversion processes.

3.11.1.2 State and Local Laws and Regulations

In addition to the powers granted to California by the Federal Government, several state and local laws and regulations affect the management of hazardous materials and wastes. State hazardous waste statutes are contained in of the California Health and Safety Code, Chapter 6.5, Hazardous Waste Control. The California hazardous waste regulations are found in CCR Title 22. The CEPA, Department of Toxic Substances Control, and CARB are the major state agencies charged with the regulation of hazardous materials and hazardous wastes. California has laws and regulations that cover the use of aboveground storage tanks (ASTs) and USTs, and the generation and storage of hazardous waste. Oversight of both ASTs and USTs is provided by state and local agencies because California has a cooperative agreement with the USEPA to implement AST and UST regulations through the SWRCB and RWQCBs. These boards may, in

turn, delegate authority to county and city agencies for local implementation and enforcement of AST and UST regulations.

NESHAP regulations, including asbestos, are delegated by the USEPA to the CARB. California regulates asbestos content of building materials to 0.1 percent, lower than the USEPA 1 percent definition of asbestos-containing material (ACM); building materials above 0.1 percent asbestos are classified as asbestos-containing construction materials (ACCMs) by California. California also limits the asbestos content of imported surface fill for naturally occurring asbestos to 0.25 percent. The CARB delegates authority to some AQMDs and APCDs, which at the local level are primarily responsible for the management of asbestos in their regions in accordance with the federal asbestos NESHAP (40 CFR Part 61). Some of the 17 air districts have developed their own, more stringent statutes for managing asbestos removal (Table 3.11-1). These regulations differ from district to district, so that the local district rules should be reviewed before any public, commercial, federal, or private demolition or renovation activity is started.

Lead materials in construction are regulated primarily under the federal Occupational Safety and Health Administration regulations (29 CFR 1910.1025 and 1926.62) and are for worker protection. The California Department of Industrial Relations, Division of Occupational Safety and Health and the Department of Health Services administer additional regulations in California. Building materials with lead-based paint (LBP) in good condition can be disposed of as normal construction debris, according to California regulatory interpretation, although federal RCRA hazardous waste characterization requirements still apply. Buildings, such as schools, public housing, and day-care centers, that will be occupied by children under the age of 7 are regulated by the USEPA for lead content under TSCA.

3.11.2 Hazardous Materials and Wastes and the Affected Environment

Hazardous materials and wastes are grouped into the following four categories based on their properties: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), and reactive (causes explosions or generates toxic gases) (CCR Title 22, Division 4.5, Chapter 11, Article 3). Although petroleum products are not considered a hazardous material under federal regulations, they are regulated as hazardous materials in California.

As discussed in Section 3.11.1, a hazardous material is defined in many ways according to different federal and state regulations. In California, hazardous material is defined as:

- Any substance designated pursuant to CWA Section 311(b)(2)(A), as amended (33 USC Section 466 et seq.)
- Any element, compound, mixture, solution, or substance designated pursuant to CERCLA Section 102, as amended (42 USC Section 9601 et seq.)
- Any substance as defined by the California Health and Safety Code, Chapter 6.5, Hazardous Waste Control
- Any toxic pollutant listed under CWA Section 307(a), as amended (33 USC Section 466 et seq.)

- Any hazardous air pollutant listed under CAA Section 112, as amended (42 USC Section 1857 et seq.)
- Any imminently hazardous chemical substance or mixture with respect to which the USEPA has taken action pursuant to TCSA Section 7, as amended (15 USC Section 2601 et seq.)

A hazardous material in California includes petroleum, natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel. As defined previously, a hazardous waste is any hazardous material that is discarded, abandoned, or transported and stored prior to being recycled. The criteria that render a material hazardous also make a waste hazardous. Hazardous materials and wastes can result in public health hazards if released to the soil or groundwater or through airborne releases in vapors, fumes, or dust. Hazardous wastes must be disposed of in accordance with all federal and California hazardous waste regulations.

Hazardous materials and wastes may be part of the affected environment of FEMA's actions considered in this PEA. In general, actions that are foreseen to involve hazardous materials or wastes include:

- Demolition or modification of building components coated with leaded paint
- Demolition or modification of building components that are or contain asbestos
- Demolition, acquisition, or modification of structures containing fluorescent or high-insensity discharge lighting (PCBs and mercury)
- Acquisition of or construction on sites containing hazardous materials or wastes
- Acquisition of or construction on sites containing USTs or ASTs
- Acquisition of structures that contain leaded paint or asbestos

3.11.2.1 Demolition or Modification of Building Components Coated with Lead-Based Paint

Lead is commonly found in painted and varnished surfaces in older buildings. Less common is the presence of lead in water supply pipes, pipe solder, and shielding in large, high-voltage electrical cables. Lead is a known human health hazard, particularly to children.

Debris resulting from the demolition or modification of building components with LBP can be disposed of as normal construction debris, according to California regulatory interpretation, although federal RCRA hazardous waste characterization requirements still apply. If any component with LBP is to be cut with a flame, sanded, or abraded, the LBP should be removed prior to the work. Renovated buildings, particularly schools, containing LBP should be decontaminated by the use of wet wiping and HEPA vacuums to remove lead-containing dusts before occupants are allowed to use the building. Buildings that will be occupied by children under the age of 7 must be decontaminated to below the USEPA and HUD clearance levels of 40 micrograms per square foot for floors and 250 micrograms per square foot for interior window sills. Lead roof flashing, sewer pipes, waste vent pipes, water supply pipes, and electrical cable shielding, which are usually pure lead, should be removed prior to building demolition or modification and either recycled or disposed of as hazardous waste.

3.11.2.2 Demolition or Modification of Building Components with Asbestos-Containing Material

Asbestos was banned from friable materials such as spray-on fireproofing, acoustical tile, and pipe/boiler insulation by the USEPA in the early 1980s, and may be present in buildings that were constructed prior to the ban. Nonfriable ACMs may be present in many common building materials, including floor tile, sheet flooring, caulks and putties, mastics (including carpet mastics), transite (asbestos-cement), drywall (gypsum board), drywall joint compound, roof felts and papers, shingles, roof tar, and insulation around plumbing and heating ducts of any construction date.

USEPA/NESHAP has classified ACM into three categories: Friable, Category I Nonfriable, and Category II Nonfriable. A friable ACM is defined as any material containing more than 1 percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. Nonfriable ACMs are classified as either Category I or Category II materials. Category I material is defined as asbestos-containing resilient floor covering (tile), asphalt roofing products, packings, and gaskets. Category II material is defined as all remaining types of nonfriable ACM not included in Category I that, when dry, cannot be crumbled, pulverized, or reduced to powder. A Category I or II material may become a Regulated ACM (RACM) if it has become friable, for example a Category I or II material that has been or will be subjected to sanding, cutting, grinding, or abrading or a Category II material that has been crumbled, pulverized, or reduced to powder by the mechanical forces expected to act on the material in the course of demolition or renovation operations. An example of Category II material is nonfriable asbestos-cement products such as transite. Also, any structure that will be demolished by intentional burning must have all ACM removed prior to demolition.

In cases where demolition or modification of ACCMs is part of an action, the appropriate air district or the CARB and USEPA must be notified before beginning the action. In accordance with the asbestos NESHAP (40 CFR Part 61, Subpart M), Category I materials that are not in poor condition and are not friable do not have to be removed before building demolition or modification; however, in California each air district has jurisdiction and rules on what may be left in place. Any material that is a Category I or II material cannot be recycled by any method that crushes, sands, breaks, cracks, or abrades the ACM. The local air district should be contacted before any building demolition or modification is conducted. Further information and handling procedures for the removal of Category I materials are included in *A Guide to Normal Demolition Practices Under the Asbestos NESHAP* (USEPA 1992) and are available from the air pollution districts associated with the action. Category I and II materials that have not become friable during building demolition or modification may be disposed of in a landfill that normally accepts construction debris, according to the asbestos NESHAP in 40 CFR Part 61. However, disposal plans should be confirmed with the local California air district.

Friable ACM and material that may potentially become friable during demolition must be removed before building modification or demolition begins in accordance with the asbestos NESHAP, 40 CFR Part 61, Subpart M. If the ACM is to be disposed of, disposal must occur in an approved facility. If Category I or II material is sanded, ground, cut, or abraded before it is buried at the landfill, it is subject to the asbestos NESHAP disposal regulations. RACM must be disposed of in a landfill that operates in accordance with 40 CFR Parts 61.150 and 61.154, or in a

USEPA-approved conversion facility described in 40 CFR Part 61.155 of the asbestos NESHAP regulations. Further information and handling procedures for the removal of RACM and Category II material are included in the USEPA (1992) guidance.

If friable or nonfriable ACM is to be removed, a licensed and trained ACM abatement (removal) contractor must conduct the removal. Third party oversight and area air monitoring/clearance during the ACM removal is recommended and may be required by state or local regulation. Buildings that will be occupied for use as educational facilities for children from kindergarten through high school, including any temporary facilities such as trailers or manufactured housing, will be required to be inspected for ACM according to federal Asbestos Hazard Emergency Response Act regulations.

RACM must be removed and disposed of off site as a regulated waste before building demolition or modification is started, to prevent the regulated ACM from contaminating the nonhazardous demolition debris. If asbestos contamination of nonhazardous debris occurs, it must all be disposed of as asbestos-regulated waste (a hazardous waste).

In California, if any detectable concentration of asbestos is present in the material to be removed, workers must be provided training and proper personal protective equipment according to federal and state occupational safety and health regulations.

3.11.2.3 Demolition, Acquisition, or Modification of Structures Containing Fluorescent or High-Intensity Discharge Lighting

Fluorescent and high-intensity discharge light bulbs and tubes contain metals, particularly mercury, in concentrations that if not properly handled, would render them a hazardous waste. Federal and state regulations required these light tubes to be handled as either hazardous waste or universal waste. The difference between the two is whether they will be discarded/disposed (hazardous) or recycled (universal).

The starter, capacitors, and ballasts for these lights may contain PCB or a PCB replacement chemical (DEHP). Federal and state regulations require these items to be handled in a manner similar to the bulbs and tubes – as either a hazardous or universal waste.

3.11.2.4 Acquisition of or Construction on Sites Containing Hazardous Materials or Wastes

Hazardous materials or wastes may be used, generated, or stored in facilities associated with acquisition or construction actions, such as manufacturing, maintenance, or repair facilities; pipeline and fueling areas; wastewater treatment; or legal or illegal disposal sites. Actions involving ground disturbance have the potential to encounter hazardous materials or wastes if they were discharged to or disposed of in the ground. Liability for existing hazardous materials or wastes is of concern whenever property is acquired since the liability is joint and several. Several federal, state, and local environmental information databases can be accessed to determine the possible presence and approximate location of known hazardous materials or wastes in the areas where actions would be implemented. Reconnaissance surveys should also be conducted to search for evidence of hazardous materials release, such as stained soils, basic topographic conditions, and current and past uses of the subject and adjacent properties. The

owner of a facility is responsible for notifying the Department of Toxic Substances Control when a release of a hazardous substance is discovered.

3.11.2.5 Acquisition of or Construction on Sites Containing Underground or Aboveground Storage Tanks

Similar to impacts described in Section 3.11.2.4, actions involving ground disturbance have the potential to encounter USTs or ASTs. Several federal, state, and local UST environmental databases can be accessed to determine the possible presence and approximate location of known USTs and ASTs. Reconnaissance surveys should also be conducted to search for evidence of USTs and ASTs.

The USTs in California are managed by the SWRCB. One SWRCB and nine RWQCBs across the state oversee compliance with the UST and AST laws. The local agencies are in charge of the UST/AST-permitting program and issue operating and closure permits as necessary. If USTs are no longer to be used, such as for acquisition actions, closure permits must be secured and the tank removed or closed in place. If a UST or AST problem (such as a leak) is identified, the RWQCB or local agency locates the responsible party, determines cleanup activities, and oversees the activities until complete. The SWRCB also administers the UST Cleanup Fund Program (created by the Underground Storage Tank Cleanup Fund Act of 1988), which funds corrective actions at leaking UST sites and third party liability costs (SWRCB 1997).

3.11.2.6 Acquisition of Structures that Contain Lead-Based Paint and Asbestos-Containing Material

The areas where actions would be implemented may include the acquisition of structures containing LBP and ACM. The presence, quantity, and condition of these materials should be evaluated prior to acquisition for the property so cost to abate or maintain these materials can be factored into the acquisition costs. If the structures are to be demolished or renovated, then requirements described in Sections 3.11.2.1 and 3.11.2.2 would be applicable to the action.

Properties and structures in the areas where actions would be implemented may also contain miscellaneous hazardous materials, including but not limited to gasoline, oils, greases, pesticides, herbicides, ammunition, cleaners, degreasers, solvents, medical waste, and small quantity radioactive sources (smoke detectors). All of these miscellaneous hazardous materials are commonly referred to as regulated building contents. The presence, quantity, and condition of these materials should be evaluated prior to acquisition since the disposition of these materials may impact the costs of the actions.

Tables

Table 3.11-1
California Asbestos NESHAP Air Pollution Control Districts

Delegated Districts (region-specific statutes)[1]	Nondelegated Districts (NESHAP)[2]
Bay Area AQMD	Amador County APCD
Great Basin Unified APCD	Butte County APCD
Lake County AQMD	Calaveras County APCD
Mendocino County APCD	Colusa County APCD
Modoc County APCD	El Dorado County APCD
Monterey Bay APCD	Feather River Unified APCD
North Coast Unified AQMD	Glenn County APCD
Northern Sonoma County APCD	Imperial County APCD
Sacramento Metro AQMD	Lassen County APCD
Mojave Desert APCD	Mariposa County APCD
San Diego County APCD	Northern Sierra County AQMD
San Joaquin Valley Unified APCD	Placer County APCD
San Luis Obispo County APCD	Shasta County APCD
Santa Barbara County APCD	Siskiyou County APCD
South Coast AQMD	Tehama County APCD
Ventura County APCD	Tuolumne County APCD
Yolo-Solano County APCD	

Notes:
[1] Contact the air district before project inception.
[2] Contact the CARB and USEPA before project inception.
Source: CARB, Compliance Division, November 1997.

3.12 VISUAL RESOURCES

This section describes visual and scenic resources. The visual impacts resulting from an action may be perceived by stationary or mobile viewers.

3.12.1 Regulatory Background

Scenic values have historically not had the same level of policy recognition as other environmental values. However, a diverse set of federal and state laws recognize scenic and aesthetic values, and courts nationwide have ruled favorably for aesthetic regulation. Several federal and state laws contain some reference to scenic beauty or aesthetics. Federal regulations include NEPA, the Federal Lands Policy Management Act of 1976, National Forest Management Act, Transportation Equity Act for the 21st Century, National Highway System Act of 1995, Highway Beautification Act of 1965, Wild and Scenic Rivers Act, National Trails Act, Antiquities Act, and Wilderness Act of 1964. State regulations include the California General Plan Law, Williamson Act, California Scenic Highways Legislation, CEQA, Visual Impact Assessment, and California Outdoor Advertising Act. California regulations support local land use planning, and the counties manage several open-space conservation incentive and purchasing programs that promote scenic conservation.

3.12.2 Visual Resources in California

The state of California contains many varying landscapes and thus has a large variety of visual resources. In a programmatic analysis, visual resources can only be characterized in general terms. The visual resources at a particular project site vary. A visual assessment would be required to identify, describe, and map visual resources that may be affected by an action. Like many other federal agencies, FEMA does not have its own guidance for visual resources. Therefore, FEMA follows visual resource study methodologies developed by both the USFS (1974) and the Federal Highway Administration (1986). The main concepts utilized by these methodologies are briefly presented below.

3.12.2.1 Visual Character and Quality

To assess the potential effects an action may have on scenic resources, it is first necessary to describe the visual environment of the project area. The scenic qualities of a landscape are determined through an analysis of the landscape character type. Landscape character type is a unit of physiographic area having common landscape features of landforms, rock formations, water form, and vegetative patterns.

Landscape features can be broken down into four factors: form, line, color, and texture. The form of an object is its visual shape or mass. Lines are often defined by edges of objects, landforms, or vegetation. Color is defined by both the value or reflective brightness (light, dark) and its hue (red, green). Texture is apparent surface coarseness.

The degrees of diversity in a landscape are called variety classes and are a measure of the scenic quality of a landscape. Three variety classes have been established:

- Class A - Distinctive: areas where features of landform, vegetative patterns, water features, and rock forms are of unusual or outstanding visual quality. Representative of this class are the state's renowned parks, peaks, lakes and reservoirs, e.g., Mount Diablo, Yosemite National Park, Lassen Volcanic National Park, Clear Lake.
- Class B - Common: areas where features contain variety in form, line, color, or texture or combinations thereof, but which tend to be common throughout the character type and are not outstanding in visual quality.
- Class C - Minimal: areas where features in the landscape have little change in form, line, color or texture. Includes all areas not found under Classes A or B. Most agricultural and urbanized areas belong in this category.

Visual relationships between elements in a landscape can often be traced to four factors: dominance, scale, diversity, and continuity. Specific elements or components in a landscape may dominate the view because of position within the landscape, contrast, or importance. Scale is the apparent size relationship between landscape components. Diversity is a function of the number, variety, and intermixing of visual patterns. Continuity is the uninterrupted flow of patterns in a landscape and the maintenance of the visual relationships of connected or related landscape patterns.

Other evaluative criteria of the quality of a landscape include three perceptual factors: vividness, intactness, and unity. Vividness is the visual power or memorability of a landscape scene, for instance, the view of the Golden Gate Bridge in San Francisco or Mount Shasta in Northern California. Intactness is the visual integrity of the natural and human-made landscape and its freedom from visual encroachments, for instance, a well-kept pastoral landscape. Unity is the visual coherence and compositional harmony of the landscape considered as a whole, often the result of carefully designed individual components within a landscape.

3.12.2.2 Viewshed and Sensitivity

A viewshed is the surface area visible from a viewpoint or series of viewpoints. It is that portion of the landscape that would be potentially visually impacted by project activities. Often, the potential effects of an action are assessed from selected viewpoints within a viewshed to describe the visual change or contrasts that would result from the action. Viewpoints may be selected due to the sensitivity of a location or because they present a view that is representative of the landscape.

Visual sensitivity is a measure of people's concern for scenic quality. It is a function of the type and number of viewers, activities of viewers, visual exposure of the action, and its distance from sensitive viewing locations. Three sensitivity levels are defined by the USFS:

- Level 1 – Highest Sensitivity: includes lands seen from primary travel routes where a substantial number of viewers have major concerns for scenic qualities; primary recreation areas; scenic byways; views from residences; and areas of geological, botanical, or historical importance

- Level 2 – Average Sensitivity: includes primary travel routes where a smaller volume of travelers have concerns for scenic qualities and/or the travel route or use area is of only local importance and has a low use volume
- Level 3 – Lowest Sensitivity: includes all areas seen from travel routes and use areas where few users or travelers would have a concern for scenic quality

This section describes impacts expected from potential FEMA actions and alternatives and prescribes mitigation measures that would be implemented to limit adverse impacts. The first subsection of each resource area describes the impacts associated with the No Action Alternative. The second subsection of each resource area evaluates impacts and prescribes the mitigation measures that would be expected to occur for all actions ("General Consequences of Proposed Actions"). Some impacts for all actions can be assessed together because many impacts and associated mitigation measures are common to all actions. Typically, these impacts and mitigation measures are associated with construction or other ground-disturbing activities. The third subsection describes the impacts and mitigation measures associated with specific actions ("Consequences Attributable to Specific Actions"). The actions described in this subsection correspond to the major action types described in Section 2 (e.g., nonemergency debris removal; constructing, modifying, or relocating facilities, etc.).

The discussion of the impacts of the actions occurs in terms related to the conditionality of the impacts. For instance, an impact may be discussed with the term "would," stating that an impact "would" occur. This is intended to mean that the action under discussion would result in that impact. In this circumstance, if the impact is adverse, the subgrantee would be required to implement mitigation to reduce the adversity of the impact for a FONSI to be applicable for the action. An impact may be discussed in terms that it "could," "might," "can," or "may" occur, or that the impact "would" occur "if" some other described event occurs. These types of conditional statements are intended to describe impacts that, based on FEMA's historical experience with typical disasters in California, often occur as a result of an action. If impacts described by these conditional statements actually occur for a specific action, then an SEA would be prepared to document these impacts and list specific mitigation measures that would be implemented to reduce all impacts to a nonsignificant levels. This documentation would provide clarification to FEMA program staff and the subgrantee as to the conditions of the grant.

BMPs are general construction practices that can be employed to reduce adverse effects associated most often with ground-disturbing activities and potential impacts to water quality. BMPs would be employed during the implementation of actions described in this PEA to reduce the impacts of these actions. Typical construction BMPs are described in Table 4-1, which is located at the end of Section 4, and are referred to throughout this section. These BMPs are practices that are typically employed for FEMA-related projects in California. These BMPs are typical stipulations of the SWRCB for reducing impacts to water quality under Section 401 of the CWA. Using its historical experience in California, FEMA can apply these BMPs to reduce the impacts of actions in many resource areas, such as biological resources. These BMPs are generally accepted by other resource agencies, such as the USFWS.

"Construction activities," as used in Section 4, refer to any action involving the repair, modification, or demolition of existing human-made facilities or the production of new human-made facilities. Human-made facilities include buildings; roads; floodwalls; levees; bridges; culverts; water storage devices; human-modified waterways; coastal features; and railroads lines, utility lines, or other structures associated with electricity, natural gas, domestic water, wastewater, or stormwater transport, generation, or processing.

4.1 GEOLOGY, SEISMICITY, AND SOILS

4.1.1 No Action Alternative

Geology and soils would not be affected by construction activities, except for minor temporary impacts associated with restoration activities. Erosion would not be reduced or eliminated through actions that would stabilize soils or remove facilities that exacerbate erosion. Erosion and the resulting loss of soil would be increased in areas subject to future wildfires, high winds, floods, and rains. Failing to remove debris could cause soil contamination from hazardous substances leaching into the soil.

4.1.2 General Consequences of Proposed Actions

As a result of construction activities related to most of the actions, area soils would be disturbed through excavation; heavy equipment use; demolition; site construction; vegetation removal; or similar actions. Soil loss would occur directly from disturbance or indirectly via wind or water. The subgrantee would implement BMPs, such as developing and implementing an erosion and sedimentation control plan, using silt fences or hay bales, revegetating disturbed soils, and maintaining site soil stockpiles, to prevent soils from eroding and dispersing off-site. Other typical construction BMPs are listed in Table 4-1.

In some cases, landslides could be triggered by some ground-disturbing actions occurring on steep slopes. To mitigate this potential, the subgrantee would review an area's landslide potential (for example, slopes greater than 45 percent, presence of hillside seeps, or historical slides) before implementing the ground-disturbing actions. The subgrantee would mitigate potential effects by appropriate siting of facilities and using proper geotechnical construction practices.

The potential exists for many actions to convert agricultural land to other uses, such as by constructing a new facility or creating a waterway. For any action involving the conversion of farmland, FEMA would prepare the appropriate sections of an AD-1006 Farmland Conversion Impact Rating Form for the action and would coordinate with the NRCS to determine the overall impact of the conversion, to ensure compliance with the Farmland Protection Act.

4.1.3 Consequences Attributable to Specific Actions

4.1.3.1 Nonemergency Debris Removal

Impacts and appropriate mitigation measures related to geology, seismicity, and soils for this action are discussed in Section 4.1.2.

4.1.3.2 Constructing, Modifying, or Relocating Facilities

Impacts in this section incorporate the following types of actions:

- Upgrading or otherwise modifying buildings

- Providing temporary facilities
- Constructing new facilities or relocating an existing facility

For actions involving human-occupied structures, the subgrantee would review seismic hazard maps to evaluate the risk of earthquakes in the area where the action would be implemented. The subgrantee would also review local building codes and standards to determine seismic safety requirements. The subgrantee would conduct all building construction and modification in compliance with the CBC, the A-P Earthquake Fault Zoning Act, the Seismic Hazards Mapping Act, the Field Act, seismic-related chapters of the PRC and CCR, and any appropriate county or city ordinances regarding geology or geologic resources. Construction to these standards would ensure FEMA's compliance with EO 12699.

4.1.3.3 Actions Involving Watercourses and Coastal Features

Impacts in this section incorporate the following types of actions:

- Repairing, stabilizing, or armoring embankments
- Creating, widening, clearing, or dredging a waterway
- Constructing or modifying a water crossing
- Constructing or modifying a water detention, retention, or storage facility
- Constructing or modifying other flood control structures
- Constructing or modifying a coastal feature

Actions that involve work in stream channels or areas with high erosion potential may be especially susceptible to soil loss through erosion, bank failure, or landslides. The subgrantee would employ temporary mitigation measures to reduce this potential, such as the use of sand bags, silt fences, coffer dams, and temporary diversion channels. After the completion of construction activities, the subgrantee would apply stream restoration measures to restore the site of the action to conditions that are as natural as possible.

4.1.3.4 Vegetation Management

Impacts in this section incorporates the following types of actions:

- Mechanical or hand clearing of vegetation
- Prescribed burns
- Biological control

Mechanical or Hand Clearing of Vegetation

Mechanical clearing and hand clearing of vegetation would increase soil loss and erosion through the removal of ground cover. The subgrantee would install erosion protection measures, as appropriate, to minimize soil loss. In addition, the subgrantee would avoid the use of mechanized equipment on slopes or unstable soils.

Prescribed Burns

Hydrophobic layer development could occur during high- or medium- intensity prescribed burns. Hydrophobic soils repel water, which saturates surface and shallow soils and can cause severe soil erosion. To mitigate this effect, the subgrantee would take measures to ensure a low-intensity prescribed burn. The subgrantee would use climatic data, soil moisture data, and vegetation moisture data during the planning of the prescribed burn and maintain low soil temperatures during the action to produce a low-intensity burn. Soil productivity would be expected to increase following a low-intensity prescribed burn as nutrients are cycled into the soils. Soil acidity would likely decrease and organic matter would likely increase in soils, also increasing the productivity. Loss of groundcover resulting from a prescribed burn would increase erosion.

Biological Control

Livestock grazing has the potential to increase erosion and soil loss through the removal of ground cover. The subgrantee would install erosion protection measures, as appropriate, to minimize soil loss. The subgrantee would monitor grazing locations and modify grazing practices to ensure that livestock does not deplete vegetation.

4.2 AIR QUALITY

4.2.1 No Action Alternative

Heavy equipment would only be used for activities associated with facility restoration. Ground-disturbing activities would similarly only consist of actions associated with restoration of existing facilities. Consequently, emissions from heavy equipment would be minor, and these activities would create minimal quantities of fugitive dust.

No vegetation management activities would occur. Consequently, fire risk in prone areas would remain high. Wildfires substantially increase levels of most criteria pollutants and many hazardous air pollutants.

Particulate matter emissions would increase as a result of future wildfires, floods, and winds damaging vegetation and leaving soils exposed to wind erosion.

4.2.2 General Consequences of Proposed Actions

Short-term, local impacts to air quality from construction activities would likely include fossil fuel use for construction equipment, use of materials containing VOCs, and PM_{10} emissions from soil disturbance and demolition. Fossil-fuel use for construction equipment would produce emissions of CO, NO_x, SO_2, VOCs, PM_{10}, $PM_{2.5}$, and hazardous air pollutants. VOCs and hazardous air pollutants emissions could also occur at construction sites from the use of paving materials, paints, thinners, solvents, and other materials. Long-term emissions impacts could also occur as a result of relocation or reconstruction of facilities that might include an expansion of an existing activity (for example, the relocation/expansion of a power-generating facility).

The relocation or other modifications of previously permitted facilities or the construction of a new facility that includes new or modified stationary sources (for example, fossil fuel-fired electrical generators) would have the potential to increase the level of air pollutants beyond the threshold established by the local air quality district. If this situation occurs, the subgrantee would apply for and obtain a preconstruction permit from the local air quality district and use BACT, if required. The subgrantee would also be responsible for applying for and obtaining permits required under NSR and PSD review, if required. Regardless of whether a permit is needed, the subgrantee would employ minimization measures to limit emissions, including watering disturbed areas, maintaining and covering spoil piles, scheduling staging area siting to minimize fugitive dust, and keeping construction equipment properly tuned. Some local air quality districts enforce general prohibitory rules that require such good housekeeping measures to be implemented.

Before approval of any federal action, the GCR requires that the responsible federal agency make a determination of conformity with the SIP. FEMA would review all actions to determine whether they qualify for one of the exemptions listed in the GCR. Many of the contemplated actions would likely qualify for an exemption either because the action would be one of the specifically exempted activities under the GCR or because expected emissions from the activity would fall below specific emission thresholds at which a conformity analysis is required. In the event that a proposed action is not found to be exempt, FEMA would conduct an air quality

analysis in conformance with GCR requirements to demonstrate that the proposed action would not result in any of the following:

- Adversely affect or delay air quality plan maintenance
- Contribute to any new violations of an air quality standard
- Increase the frequency or severity of an existing violation
- Delay achieving attainment or emission reductions in any area

FEMA would document the results of this air quality analysis in an SEA.

4.2.3 Consequences Attributable to Specific Actions

4.2.3.1 Nonemergency Debris Removal

Haul vehicles associated with debris removal would result in fossil fuel emissions. These would likely only be problematic at staging areas or at intersections in residential/commercial areas where local CO "hot spots" could occur. Particulate matter emissions would likely increase from debris handling, as would emissions of asbestos and other hazardous air pollutants.

4.2.3.2 Constructing, Modifying, or Relocating Facilities

Impacts in this section incorporate the following types of actions:

- Upgrading or otherwise modifying buildings
- Providing temporary facilities
- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines
- Constructing new facilities or relocating existing facilities
- Relocating the function of an existing facility

Upgrading or Otherwise Modifying Buildings; Repairing, Realigning, or Otherwise Modifying Roads, Trails, Utilities, and Rail Lines

New heating systems and insulation in buildings are likely to be more energy efficient than older facilities and hence reduce fossil-fuel emissions. New utility systems such as power plants, electricity transmission stations, and wastewater treatment plants are also expected to be more energy efficient than older facilities.

Providing Temporary Facilities

Impacts from this action would include the operation of fossil-fuel burning equipment to provide heat and hot water to the facilities. Increased emissions would also result from automobile and truck traffic associated with the use of the facilities, particularly if they are not located in the immediate area previously occupied by the populations that the facilities served.

Once the temporary facilities are no longer needed, the facilities would be removed and the land would be restored to its original use. These activities may result in short-term local emissions from heavy equipment, ground disturbance, and demolition.

Constructing New Facilities or Relocating Existing Facilities; Relocating the Function of an Existing Facility

New heating systems and insulation in buildings are likely to be more energy efficient than older facilities and hence reduce fossil-fuel emissions. New utility systems such as power plants, electricity transmission stations, and wastewater treatment plants are also expected to be more energy efficient than older facilities.

In addition to the short-term impacts associated with construction and demolition, relocation of facilities or functions could impact air quality by increasing traffic or altering traffic patterns, increasing utility use, or introducing new activities with the potential to affect air quality.

4.2.3.3 Actions Involving Watercourses and Coastal Features

Impacts and appropriate mitigation measures related to air quality for these actions are discussed in Section 4.2.2.

4.2.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns

Mechanical or Hand Clearing of Vegetation

The use of mechanical vehicles and fuel-powered chain saws to clear vegetation would also increase emissions

Herbicidal Treatments

The application of herbicides could increase emissions of VOCs, federal hazardous air pollutants, or state toxic air contaminants. Use of USEPA-approved herbicides according to manufacturer's specifications would result in negligible emissions.

Prescribed Burns

The use of prescribed burns would likely have a negative impact on air quality by causing a temporary increase in emissions of CO, PM_{10}, $PM_{2.5}$, NO_x and VOCs. Unless substantial acreages are involved, the quantity of emissions associated with routine prescribed burning is generally negligible. The subgrantee would contact the local air district and obtain a burn permit before initiating this action. Burn permits issued by the air district typically authorize prescribed

burning for a defined period of time. Preauthorized burning is only permissible on days that are designated "Burn Days" by the air district. Burn permits also stipulate certain measures that must be taken to ensure effective combustion and dispersal of emissions, which the subgrantee would follow.

4.3 WATER RESOURCES

4.3.1 No Action Alternative

Since no new facilities would be built and existing facilities would not be improved, the No Action Alternative would not impact water resources excepting minor, temporary impacts associated with restoration activities. Existing patterns of drainage would remain, and wetlands would not be permanently affected. Because no hazard mitigation measures would be implemented, flood-prone areas and the facilities located in those areas would remain subject to future flooding. Water quality would continue to be subject to degradation from erosion, sedimentation, and contamination from pollutants released when floods affect buildings, equipment, and utilities.

The potential for large-scale wildfires would remain. If such fires were to occur, the hydrology in the burned watersheds would be substantially affected. Runoff volume and velocity would increase due to the lack of vegetation and the presence of hydrophobic soils. Runoff would cause unstable soils and debris to wash into streams and other water bodies, affecting water quality.

4.3.2 General Consequences of Proposed Actions

Temporary impacts to water quality could occur due to the operation of heavy equipment, disturbance of soils, placement of rock or soil in water sources, and dewatering of water sources during construction activities. The subgrantee would employ BMPs, as necessary, to limit these impacts. BMPs would consist of one or more of the following: developing and implementing an erosion and sedimentation control plan; using silt fences, hay bales, and similar measures to prevent soils from entering water bodies; revegetating disturbed soils to provide stability and runoff filtration after construction activities are complete; and maintaining soil stockpiles adjacent to waterways. Other typical construction BMPs are listed in Table 4-1.

Actions taken to prevent future flood damage to facilities, including acquisition and demolition; upgrading to meet current codes and standards, particularly through structure elevation; floodproofing; realignment; relocation; and bank stabilization using bioengineering techniques would have generally beneficial impacts on water quality. These actions would reduce the potential for erosion and sedimentation, and reducing the risk of flood damage to facilities would reduce potential exposure to debris and sources of pollutants.

If an action would take place within or affect identified flood hazard areas, FEMA would ensure that the action complies with EO 11988 and 44 CFR Part 9. Such an action would only be selected if no practicable alternative to the action exists and the action would decrease the risk of future flood damage. Under EO 11988 and 44 CFR Part 9, FEMA would notify the public and minimize potential impacts. The subgrantee would be required to conduct detailed engineering analysis of floodplain changes, obtain concurrence from affected communities, individually notify all property owners affected by increases in flood elevations, and request that FEMA update the NFIP maps to reflect changes in flood hazard information. The subgrantee would budget appropriate additional funds for operation and maintenance of the facility. Because actions that would occur within or affect identified flood hazard areas require public notification

of the details of the actions, FEMA would prepare an SEA for any such activities. FEMA would conduct the public notification required under EO 11988 and 44 CFR Part 9 as part of the public involvement process for the SEA and SEA FONSI.

If an action would take place within or affect a wetland, FEMA would ensure that the action complies with EO 11990 and 44 CFR Part 9. Such an action would only be selected if no practicable alternative to the action exists. Under EO 11990 and 44 CFR Part 9, FEMA would notify the public and minimize potential impacts. Such an action would also require FEMA to prepare an SEA to satisfy the requirement that FEMA notify the public of the details of the action, as discussed for all actions that occur within or affect a floodplain. FEMA would conduct the public notification required under EO 11990 and 44 CFR Part 9 as part of the public involvement process for the SEA and SEA FONSI.

Actions that affect natural waterways or stormwater runoff patterns would require a Streambed Alteration Agreement from the CDFG. The subgrantee would apply for and obtain the necessary permit before initiating any work. The subgrantee would also comply with any stormwater or effluent permitting requirements under Section 401 and 402 of the CWA, such as NPDES, or the Porter-Cologne Act.

Actions that affect wetlands and other waters of the United States or navigable waters of the United States would require coordination with the USACE to ensure compliance with Section 404 of the CWA and Section 10 of the Rivers and Harbor Act. The subgrantee would be responsible for applying for and obtaining required Section 404 and Section 10 permits. Further, the subgrantee would be responsible for obtaining a water quality certification from the SWRCB or RWQCB for any project subject to Section 404 permitting.

Actions that affect a wild, scenic, or recreational river, as defined by the Wild and Scenic Rivers Act, would require that FEMA prepare an SEA.

For actions that occur within or affect the coastal zone, the subgrantee would be responsible for coordinating with the California Coastal Commission and obtaining a federal consistency determination from the California Coastal Commission in compliance with the CZMA and the California Coastal Act.

4.3.3 Consequences Attributable to Specific Actions

4.3.3.1 Nonemergency Debris Removal

Impacts and appropriate mitigation measures related to water resources for this action are discussed in Section 4.3.2.

4.3.3.2 Constructing, Modifying, or Relocating Facilities

Impacts and appropriate mitigation measures related to water resources for these actions are discussed in Section 4.3.2.

4.3.3.3 Actions Involving Watercourses and Coastal Features

Impacts in this section incorporate the following types of actions:

- Repairing, stabilizing, or armoring embankments
- Creating, widening, clearing, or dredging a waterway
- Constructing or modifying a water crossing
- Constructing or modifying a water detention, retention, or storage facility
- Constructing or modifying other flood control structures
- Constructing or modifying a coastal feature

Repairing, Stabilizing, or Armoring Embankments

Using natural materials, vegetation, and bioengineering techniques to repair, stabilize, or armor embankments could result in impacts to water quality and hydrology. These impacts would not likely be adverse because planted vegetation and root wads may provide mitigation from erosion of fill material and can restore a more historical hydrological flow pattern to a waterway. The use of "hard" engineering techniques could have adverse effects to water quality and hydrology. A technique to mitigate these impacts could be to use bioengineering techniques in combination with hard engineering techniques. For instance, vegetation could be planted among rock and geotextiles on a repaired stream embankment to reduce the potential for soil erosion and to alter hydrology so as to reduce the potential for downstream scouring impacts.

Creating, Widening, Clearing, or Dredging a Waterway

This action would beneficially impact water quality if the floodplain is altered to draw floodwaters away from developed areas and into a watercourse. Watercourses constructed or modified using natural materials and vegetation and bioengineering techniques would also have beneficial impacts on water quality. Adverse impacts would occur if the realignment of existing channels, removal of material from existing channels, or construction of concrete channels increases flows beyond the capacity of natural waterways, causing sedimentation and increased flooding effects at downstream locations. Increased flow rates under such conditions would also prevent settling of silt and other suspended materials and could increase scouring and erosion if nearby in-stream features exist. Water quality could also be adversely impacted if the new or improved waterway prevented floodwaters from occupying natural floodplains, where silt and other suspended material would otherwise settle out.

Constructing or Modifying a Water Crossing

Modifications to water crossings typically involve measures to increase flow efficiency and reduce the potential for scour and erosion. By increasing flow efficiency, such measures would reduce the risk of flooding to areas adjacent to the crossing, which could have a beneficial impact on water quality by potentially moving waters away from developed areas and reducing the area exposed to pollutant sources. Measures that reduce scour and erosion would also have a beneficial impact on water quality by reduction of sedimentation. Adverse impacts would occur

if the modifications caused discharges downstream of the structure to increase substantially, causing increased flooding at downstream locations. Water quality could also be adversely impacted if the new or modified water crossing prevented floodwaters from occupying natural floodplains, where silt and other suspended material would otherwise settle out.

New water crossings have the potential to impact water quality and hydrology by increasing flow velocities around in-stream features such as piers and headwalls. This scenario would increase the potential for scour and erosion, which would increase sedimentation and worsen water quality. In-stream features also increase the potential for debris to be trapped, which could also impact water quality.

Constructing or Modifying a Water Detention, Retention, or Storage Facility

Constructing a detention or retention basin would alter the floodplain characteristics by decreasing the extent of the floodplain downstream of the basin and increasing the extent of the floodplain around the sediment pool. Depending on the design of the storage structure inlet, this action could alter the volume and velocity of watercourses downstream from the structure and could also affect the natural flow of sediment and hence water quality. The potential for filling or draining wetlands is especially high for this action.

This action could beneficially impact water quality by potentially moving waters away from developed areas, reducing the area exposed to pollutant sources, and into other land uses consistent with floodplain management. In addition, this action would allow particulate matter carried in stormwater runoff to settle and would increase the potential for groundwater recharge.

Constructing or Modifying Other Flood Control Structures

Constructing or modifying a flood control structure would alter floodplain characteristics by decreasing the extent of the floodplain. This action may beneficially impact water quality by potentially moving waters away from developed areas, reducing the area exposed to pollutant sources, and into other land uses consistent with floodplain management. Adverse impacts would occur if discharges downstream of the structure were increased substantially, causing erosion and increased flooding at downstream locations, or if flood elevations on adjacent properties were increased. Water quality could also be adversely impacted if the structure prevented floodwaters from occupying natural floodplains, where silt and other suspended material would otherwise settle out.

Constructing or Modifying a Coastal Feature

Measures to stabilize coastlines have the potential to beneficially impact water quality by reducing erosion. However, some coastal features, such as seawalls, revetments, groins, jetties, and levees, would accelerate erosion by disrupting the natural flow of sediments or by concentrating the force of waves. Activities to construct or modify a coastal feature must comply with the CZMA and California Coastal Act, as described in Section 4.3.2.

4.3.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns
- Biological control

Vegetation management actions have the potential to result in adverse impacts to hydrology and water quality due to the following:

- Reduction in vegetation to hold soils in place
- Soil disturbances and pollutant spills caused by use of vehicles and construction equipment
- Waste from animals, such as goats, used to clear vegetation
- Release of herbicides into water bodies

The subgrantee would implement the following mitigation measures, as applicable, to minimize impacts to hydrology and water quality:

- Expansion of fuel breaks in a blended mosaic fashion to integrate more densely vegetated areas with areas of thinned vegetation
- Designation of vehicle parking areas on paved surfaces and established roads
- Management of grazing to minimize the number of animals required to control vegetative growth and use of alternate methods before allowing grazing within 100 feet of water bodies
- Use of herbicides approved by the USEPA and application of chemicals using manufacturer's recommended methods and methods that minimize chemical use and runoff
- Revegetation of cleared areas with native fire-resistant species

4.4 BIOLOGICAL RESOURCES

4.4.1 No Action Alternative

Repair, restoration, and continued use of a facility would occur within the existing footprint of the facility, and the facility would continue to operate at the same capacity. Existing access routes to the facility would continue to be used. No vegetation, wetlands, or wildlife would be adversely affected in the long term. Minor, temporary impacts could occur from restoration activities. Federally listed threatened or endangered species would not be adversely affected, nor would suitable habitat for such species be adversely affected, except where degradation of the environment, including critical habitat, continues after the disaster or where restoration activities cause an impact. No federal undertaking would occur under this alternative; therefore there is no requirement for compliance with Section 7 of the ESA.

Because fire hazard mitigation would not be implemented, if a fire were to occur in the future due to the lack of vegetation management, it would result in the loss of terrestrial wildlife habitat. Furthermore, indirect impacts would occur to aquatic habitat and resources as fire residue and eroded soils would be washed into local streams and reservoirs. These indirect impacts associated with the loss of existing vegetation would continue until adequate vegetation is reestablished within the burnt area. Without vegetation management, fires would be anticipated to burn hotter and faster and affect a wider area, resulting in more tree kills, trapped species, and damage to the natural environment.

4.4.2 General Consequences of Proposed Actions

Except for actions affecting riparian habitat or waterways, actions that involve modification or construction within or immediately adjacent to the footprint of an existing facility would not substantially disturb the biology of the area of the action, assuming that the facility would not substantially increase in size; existing access routes are used; and staging areas are returned to original conditions. Wildlife resources in the immediate vicinity of the activities could be adversely affected by the ingress and egress of equipment and personnel during construction. Potential impacts would be short term and could include displacement or mortality of individual wildlife. Displaced individuals would likely return following construction, except in instances where increased use raises noise levels, quantities of light pollution, or frequency of human presence.

Actions undertaken in previously undisturbed areas, such as realignment or relocation of facilities or construction of temporary or permanent facilities, could adversely affect biological resources. Vegetation would be removed and displacement or mortality of individual wildlife could occur. The subgrantee would minimize impacts to biological resources through proper siting and design. Except for staging areas on hardened surfaces, the subgrantee would seed or sod staging areas with native vegetation. Beneficial effects would be expected in the areas previously occupied by relocated facilities, assuming that these areas are restored to natural conditions once demolition is complete.

For all actions, FEMA would be responsible for evaluating the area in which the action is implemented for the presence of federally listed or proposed threatened or endangered species and their habitat. If FEMA determines that a special-status species or its habitat has the potential to be affected by an action, FEMA would comply with Section 7 of the ESA, as appropriate. Toward this end, if a PBO/PITS from the USFWS exists that covers the species that could be impacted, FEMA and the subgrantee would ensure that conditions contained in the appropriate PBO/PITS are met. If FEMA and the subgrantee cannot meet the conditions in the PBO/PITS for the species in question, FEMA would consult with the USFWS under Section 7 of the ESA, as appropriate, and document the results of the consultation in an SEA. Similarly, if a PBO/PITS that covers the potentially impacted species does not exist, FEMA would consult with the USFWS under Section 7 of the ESA, as appropriate, and document the results of the consultation in an SEA. If ESA-listed salmonids and/or critical habitat could be affected, FEMA and the subgrantee would follow the specific criteria and guidelines agreed to by FEMA and NOAA Fisheries in their Programmatic Consultation under Section 7 of the ESA to avoid adverse impacts to salmonids and/or critical habitat. If an action cannot meet the specific criteria and guidelines developed by FEMA and NOAA Fisheries; if the action would be likely to adversely affect salmonids and/or critical habitat, which would be considered a Category 3 action as defined in the August 2003 Programmatic Biological Assessment; or if NOAA Fisheries determines that a Category 2 action would be likely to adversely affect listed salmonids and/or critical habitat, FEMA would consult with NOAA Fisheries under Section 7 of the ESA, as appropriate, and document the results of the consultation in an SEA. Please refer to Appendix F for a copy of the Programmatic Biological Assessment sent to NOAA Fisheries and Appendix G for a copy of the NOAA Fisheries concurrence letter.

For actions that have the potential to adversely affect EFH, FEMA would ensure consultation with NOAA Fisheries to comply with the Sustainable Fisheries Act. In most instances, consultation with NOAA Fisheries in compliance with the Sustainable Fisheries Act would be conducted as part of the Section 7 (ESA) consultation process. In instances where the Section 7 consultation process does not fully address FEMA's need to consult with NOAA Fisheries under the Sustainable Fisheries Act, FEMA would prepare an SEA documenting the results of this consultation.

If the action has the potential to affect migratory birds, marine mammals, or species protected under the CESA or National Plant Protection Act, the subgrantee would be responsible for coordination with the USFWS, NOAA Fisheries, or CDFG, as appropriate.

4.4.3 Consequences Attributable to Specific Actions

4.4.3.1 Nonemergency Debris Removal

Debris removal activities have the potential to spread invasive species by facilitating the movement of invasive species that may be a part of the removed debris to areas not previously occupied by those particular species. To facilitate compliance with EO 13112, the subgrantee would be responsible for ensuring that all trucks carrying debris are covered while in transit. For actions the involve removing debris from riparian habitat and waterways, short-term impacts would include decreases in water quality due to discharge of sediment into waters when

conducting work directly in or adjacent to water; disruption of flow patterns through dewatering part or all of a stream channel; removal of riparian vegetation and riparian wildlife habitat through the use of machinery; and displacement or mortality of individual wildlife through the use of machinery. Impacts to water quality and hydrology would indirectly affect hydrophytic plants in or near the affected waters and wildlife species that live in or drink from the affected water or use the affected vegetation for habitat or food due to actions conducted directly in water.

To minimize adverse impacts, the subgrantee would not operate heavy equipment in flowing water whenever other methods are feasible. The subgrantee would employ BMPs, such as those shown in Table 4-1, to limit the effects of erosion and sedimentation.

In the event that nonemergency debris operations may occur in a natural stream or other water body or be facilitated by the control or modification of the water body, the action would be required to comply with the Fish and Wildlife Coordination Act. FEMA would consult with the USFWS or NOAA Fisheries (as appropriate) and the CDFG to develop measures to mitigate action-related losses of fish and wildlife resources. FEMA would document these measures in an SEA.

4.4.3.2 Constructing, Modifying, or Relocating Facilities

Impacts in this section incorporate the following type of actions:

- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines

Activities related to these actions, such as working on roads adjacent to waterways, could affect riparian habitat and waterways. Impacts to riparian habitats and waterways as a result of these actions are discussed in Section 4.4.3.1. Appropriate mitigation measures are discussed in Section 4.4.3.1. An additional mitigation for these actions when they affect riparian habitat and waterways is for the subgrantee, when feasible, to substitute bioengineering techniques for "hard" engineering solutions such as riprap.

4.4.3.3 Actions Involving Watercourses and Coastal Features

Impacts in this section incorporate the following types of actions:

- Repairing, stabilizing, or armoring embankments
- Creating, widening, clearing, or dredging a waterway
- Constructing or modifying a water crossing
- Constructing or modifying a water detention, retention, or storage facility
- Constructing or modifying other flood control structures
- Constructing or modifying a coastal feature

These actions could affect riparian habitat and waterways. Impacts from these actions occurring within riparian habitats and waterways are partially discussed in Section 4.4.3.1. Appropriate mitigation measures are discussed in Section 4.4.3.1. In addition, long-term impacts would

include altering flow patterns and discharge rates with culverts, bridge piers, in-stream weirs, concrete channels, or channel excavations. Permanent indirect impacts resulting from potential water quality and hydrology changes discussed in Section 4.4.3.1 would occur to vegetation and wildlife.

Expanding or constructing water storage structures has the potential to permanently convert vegetation types within the footprint of the area to be permanently or seasonally inundated.

A potentially beneficial impact to vegetation and wildlife would occur as the result of actions such as stabilizing an embankment or modifying a water crossing that reduce scour and sedimentation. Decreased scour and sedimentation could allow the development of late successional growth and multilayered, multiaged habitats.

4.4.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Prescribed burns
- Herbicide treatment
- Biological control

Under these actions, invasive, nonnative species have the potential to become established in areas where vegetation management has been performed. Therefore, the subgrantee would be responsible for monitoring and maintaining fuel breaks and fuel management zones and continuing to treat these areas as necessary to maintain appropriate vegetation densities and species composition. Without proper maintenance, these areas could create an increased fire risk compared to pre-action conditions. An alternative to periodic clearing is planting native, fire-resistant species.

Sensitive plant populations such as federal or state threatened and endangered plants in the vicinity of vegetation management activities could be impacted by these actions. Actions would be designed to avoid native plant species populations and individuals.

Vegetation management activities could eliminate individual mature native trees such as oaks that are often a resource of local concern. The subgrantee would implement locally identified mitigation measures to reduce or avoid impacts where possible. If native trees cannot be salvaged, the subgrantee would compensate for their loss in accordance with local mitigation guidelines.

Mechanical or Hand Clearing of Vegetation

Mechanical-clearing and hand-clearing activities would not necessarily disturb the overall biology of an area because thinning and removing vegetation would decrease the quality of habitat for some species and increase the quality of habitat for others. These changes would be expected to be small when compared to the overall habitat quality in the general area.

Prescribed Burns

Potential short-term impacts to wildlife, such as displacement or mortality of individuals, could occur from implementing a prescribed burn. Some biological communities are evolutionarily adapted to periodic fires, and many native species reproduce or forage most effectively several years after a fire. Fire suppression practices for the past 100 to 150 years have led to the alteration of habitats and ecosystems that evolved with periodic fire disturbances. Fire-intolerant species have thrived in areas once dominated by fire-resistant and fire-tolerant species, thereby changing the species composition of the community (wildlife and vegetation), the nutrient distribution of the soil, and the spatial and canopy structure of the community. Therefore, prescribed burns would have a beneficial impact on fire-tolerant species or biological communities by returning burned areas to more natural states.

Prescribed burns would allow the opportunity for type conversion, i.e., a situation where one vegetation category is permanently replaced by another. Where invasive species dominate an area to be burned and when measures are taken to ensure that invasive species do not recolonize the area, this impact can be considered beneficial. However, desirable native species can also be eradicated, especially when native seed stock is damaged or depleted by the reoccurrence of wildfire soon after a prescribed burn.

Generally, all but the smallest animals are able to avoid the direct effects of a prescribed burn. The availability of nearby habitat and the regeneration rate of the burnt area would determine whether displaced wildlife will survive to repopulate the area after the prescribed burn.

The season and intensity of prescribed burns can greatly influence a fire's effect on individual species and biological communities. For example, conducting prescribed burns in summer or fall is less damaging to native plants and wildlife than in spring. Where possible, the subgrantee would conduct prescribed burns to replicate historic fire patterns and to maximize eradication of nonnative, highly flammable species while retaining native, fire-resistant species.

Herbicide Treatment

Herbicide treatment has the potential to directly affect nontarget plant and animal species by causing mortality and morbidity. Indirect impacts to wildlife include loss of habitat due to effects on nontarget plant species. These activities could eliminate individual mature native trees such as oaks that are often a resource of local concern. To minimize these potential impacts, the subgrantee would ensure that herbicide treatments are only applied by licensed applicators who follow the manufacturer's specifications for use. Actions would be designed to avoid native plant species populations and individuals.

Biological Control

The potential exists for livestock (especially sheep and goats) to deplete vegetation in an area proposed for grazing. Further, the presence of grazing livestock has the potential to displace natural wildlife species or disrupt their usual feeding and nesting patterns.

The subgrantee would select the livestock breed, stocking rate, and grazing duration and monitor the quantity and quality of residual vegetation to obtain the desired amount of vegetation management without overgrazing. To avoid loss of desirable plants, such as sensitive species or

locally protected species (e.g., oak trees), the subgrantee would fence or otherwise protect the area to be grazed to avoid such plants. The subgrantee would avoid grazing programs during seed production of nontarget species.

4.5 CULTURAL RESOURCES

4.5.1 No Action Alternative

Under the No Action Alternative, no cultural resources review would be required under Section 106 of the NHPA or the appropriate PA.

Damaged historic structures would be repaired or otherwise restored to predisaster conditions. Structures located in high hazard areas, such as floodplains, could continue to be at risk from damage in future events. If damaged in future events, some structures could be demolished and replaced through undertakings by state or local governments or private entities, causing the loss of irreplaceable resources. Other structures could be repaired without adherence to guidelines to ensure that the work would be sensitive to the historic characteristics of the structure or its surroundings. If activities under the No Action Alternative do not include a federal role, then no consideration of the action's impact on historic structures may be required and buildings could likely be demolished or repaired before identification, evaluation, or treatment studies. Archaeological resources associated with built environment resources, or coincidentally in close proximity to such resources, could also be affected by repair, demolition, or other related activities that could result in ground disturbance.

4.5.2 General Consequences of Proposed Actions

Direct physical impacts could occur when historic structures are demolished, modified, upgraded, realigned, or relocated. These impacts could occur not only to buildings but also to historic bridges, roads, rail lines, and other facilities. The original setting, design, and construction materials of such facilities may be affected. Direct physical impacts could occur to subsurface historic and prehistoric archaeological sites when ground-disturbing activities are conducted. Indirect impacts to historic properties could occur when nearby facilities are modified or relocated or when temporary facilities are constructed.

For all actions, FEMA would be responsible for complying with Section 106 of the NHPA. Toward this end, FEMA would consult with the SHPO, federally recognized Native American groups, and any other interested parties, as directed in the appropriate disaster-specific PA for actions associated with disasters that have already occurred, to identify the area of potential effect, the presence or absence of cultural resources, the effects the action would have on cultural resources, and the appropriate measures to avoid or mitigate impacts to cultural resources. Similarly, as described in the nondisaster-specific PA, FEMA would consult with the SHPO, Native American groups, and any other interested parties as directed in the nondisaster-specific PA. If FEMA is unable to consult with these parties within the framework of an existing disaster-specific PA or the nondisaster-specific PA, FEMA would consult with SHPO, Native American groups, and any other interested parties following the standard Section 106 process and document the results of this consultation in an SEA.

As part of the NHPA Section 106 process detailed in the applicable PA, FEMA would consult with federally recognized Native American groups and other Native American groups identified by the Native American Heritage Commission regarding all legitimate concerns involving Native

American groups' access to sites, use and possession of sacred objects, and ability to worship. This consultation would result in FEMA's compliance with the American Indian Religious Freedom Act.

As stated in Section 3.5.1.1, the actions described in this PEA typically do not occur on federally managed lands. If an action were to occur on federally managed land that would invoke the requirement to comply with additional cultural resource management or protection laws (such as the Archaeological Resources Protection Act or the Antiquities Act), the land-managing agency would be responsible for compliance with such laws.

The subgrantee would be responsible for compliance with the California Native American Graves Protection and Repatriation Act, cultural resource-related sections of the PRC, 14 CCR 4308, and any applicable county or city ordinances.

4.5.3 Consequences Attributable to Specific Actions

4.5.3.1 Nonemergency Debris Removal

Impacts and appropriate mitigation measures related to cultural resources for this action are discussed in Section 4.5.2.

4.5.3.2 Constructing, Modifying, or Relocating Facilities

Impacts and appropriate mitigation measures related to cultural resources for these actions are discussed in Section 4.5.2.

4.5.3.3 Actions Involving Watercourses and Coastal Features

Impacts and appropriate mitigation measures related to cultural resources for these actions are discussed in Section 4.5.2.

4.5.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Prescribed burns

Mechanical or Hand Clearing of Vegetation

Mechanical clearing of vegetation could cause direct physical impacts to cultural resources such as historic fences, abandoned cabins, and archaeological sites due to surface disturbance from the use of heavy equipment. Indirect effects may also result if vegetation is removed and archaeological sites are openly exposed, increasing the likelihood of vandalism, looting, and natural hazards such as erosion. Hand clearing of vegetation would be less likely to result in direct impacts to cultural resources, because the action involves the use of hand tools and physical effort instead of heavy equipment. However, similar indirect impacts could occur.

Prescribed Burns

Prescribed burns may have direct physical effects on cultural resources as well as the indirect effects described above for other methods of vegetation management. Measures to avoid or mitigate impacts to cultural resources would be developed as part of an SEA.

4.6 SOCIOECONOMICS AND PUBLIC SAFETY

4.6.1 No Action Alternative

Disasters disrupt the social and economic framework of the communities they strike. Communities would rely on insurance, lending, and state and local revenues to restore their socioeconomic infrastructures. The use of insurance, loan, and state and local treasury funds would have an adverse impact on the local economic health.

If a substantial number of residents and businesses are affected to a substantial degree, the indirect economic consequences could be felt by entire communities. Residents and businesses that suffer financial hardships from damage are likely to alter their purchasing habits by reducing expenditures, especially on nonessential goods and services. Residents and businesses that migrate out of the area would likely terminate financial transactions in the community. The profitability of businesses providing these goods and services would then decrease. Businesses that decline or fail would lay off employees, thus increasing unemployment. Failing businesses, reduced expenditures, and migration of residents would decrease local tax revenues and, therefore, either increase tax rates or decrease budgets for local governments' services.

Private contractors would receive economic benefits from repairing damaged facilities under this action. If local companies are used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large actions, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

4.6.2 General Consequences of Proposed Actions

The proposed actions would have beneficial impacts on socioeconomic resources and safety. These impacts consist of restoring disaster-damaged facilities and patterns of traffic, residential use, and commercial activity; reducing the potential for disaster-related losses to residents, businesses, and government facilities; decreasing risks to human safety for persons inhabiting or using facilities that are protected from future damage as a result; and reducing the corresponding indirect impacts described in Section 4.6.1. The proposed actions could have the effect of increasing property values.

Private contractors would receive economic benefits from construction activities. If local companies are used for labor and materials, some economic benefits would accrue to other sectors of the community. Except for unusually large actions, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Most actions would generally have localized effects and are not expected to have adverse impacts on a disproportionate number of minority or low-income persons. To comply with EO 11898, FEMA would study demographic and economic indicators for local residents to determine if minority or low-income persons would be disproportionately affected. If an action would result in impacts to minority or low-income persons that do not comply with EO 11898, these effects would be documented in an SEA.

For all actions, the subgrantee would be responsible for compliance with CEQA.

4.6.3 Consequences Attributable to Specific Actions

4.6.3.1 Nonemergency Debris Removal

Impacts and appropriate mitigation measures related to socioeconomics and public safety for this action are discussed in Section 4.6.2.

4.6.3.2 Constructing, Modifying, or Relocating Facilities

Impacts in this section incorporate the following types of actions:

- Acquiring and demolishing existing facilities
- Constructing new facilities or relocating existing facilities; relocating the functions of existing facilities

Acquiring and Demolishing Existing Facilities

Participation in an acquisition program is a voluntary choice. By choosing to participate, many owners of acquired properties would migrate from their current locations. An adverse impact would occur to residents and business owners whose compensated property value, savings, and credit are not sufficient to purchase or build comparable structures. Residents who migrate to distant communities could be subject to financial burdens as a result of changes in commutes and possibly employment. Additional impacts to businesses that move to distant communities include potential losses of customers, employees, and site-specific resources or services. Nonetheless, the choice to participate would be up to the individual. The subgrantee would be responsible for implementing property acquisition actions in compliance with the Uniform Relocation Act, URARPAPA, and Chapter 16 of the California Government Code, which would mitigate these potential impacts to some extent. The subgrantee would work with other federal agencies (such as the Small Business Administration) and lending institutions to mitigate impacts to displaced residents and businesses by attempting to secure partially subsidizing loans, offering low-interest loans, and granting rent subsidies to renters forced to relocate. The migration of residents and businesses outside of the community and the financial burden on residents and businesses that remain would indirectly affect the local economy as described in Section 4.6.1.

Renters and home/business owners that are not offered buyouts could be affected to a greater extent because of their lack of choice regarding acquisition actions. Tenants in rental properties that are acquired could be adversely affected if their income is not sufficient to pay rent in comparable units or if rental units are not available. Similarly, home owners and business owners that are not part of acquisition programs may find it economically infeasible to relocate and must remain in the community. The relocation of employers, employees, customers, and businesses selling goods and providing services could present substantial economic impacts to residents and business owners. Specific impacts and potential mitigation for these impacts would be discussed in an SEA.

Conversely, acquisition and demolition actions would decrease potential property damage and risk to human safety from future disasters. For property owners and tenants who relocate out of high-hazard areas, property acquisition actions would also decrease potential property damage

and risk to human safety from future disasters. These measures would prevent future financial losses to residents, businesses, and governments, and the indirect impacts described in Section 4.9.1 would be less likely to occur.

Constructing New Facilities or Relocating Existing Facilities; Relocating the Functions of Existing Facilities

Relocating the function of buildings to alternative structures has little potential to adversely affect socioeconomic resources. In most cases, this action would result in people and property being relocated outside of high-hazard areas and therefore decreasing the potential for future damage and risk to human safety. The indirect impacts described in Section 4.6.1 would be less likely to occur. Residents would likely require interim housing, and businesses would be impacted by loss of sales due to momentary closings. However, these temporary impacts would be mitigated by the subgrantee relocating residents and businesses in compliance with the Uniform Relocation Act, URARPAPA, and Chapter 16 of the California Government Code.

Nonetheless, relocating public facilities could adversely impact demographics and housing in some extreme cases, which would be evaluated in an SEA, where appropriate. Examples of such cases would include residents of a community that react to their school being relocated by moving closer to the site of the alternate school, or the relocation of a county jail resulting in jail employees moving closer to the alternate jail. Businesses that depend on the proximity of their offices to the building proposed for relocation may also be affected; for example, notary publics and bail-bond providers are usually located within blocks of a courthouse. Residents and businesses that move under these circumstances would suffer economic consequences; most would not be eligible for funding under the Uniform Relocation Act, URARPAPA, and Chapter 16 of the California Government Code. If a substantial number of residents and businesses are affected to a substantial degree, the indirect economic consequences could be felt by entire communities, as described in Section 4.6.1.

Providing alternate roads and water crossings would impact road users. For road users other than residents, businesses, and governmental agencies that front on roads to be closed, socioeconomic impacts are expected to be minor changes in transportation costs due to increased distance traveled. Substantial impacts on residents, businesses, and governmental agencies that front on roads to be relocated would be documented in an SEA. The subgrantee would mitigate for those affected by constructing private driveways to connect properties with existing roads and by acquiring or relocating properties. Acquisition and relocation in such circumstances would be mitigated by the subgrantee through compliance with the Uniform Relocation Act, URARPAPA, and Chapter 16 of the California Government Code.

4.6.3.3 Actions Involving Watercourses and Coastal Features

Impacts in this section incorporate the following types of actions:

- Repairing, stabilizing, or armoring embankments
- Creating, widening, clearing, or dredging a waterway
- Constructing or modifying a water crossing

- Constructing or modifying a water detention, retention, or storage facility
- Constructing or modifying other flood control structures
- Constructing or modifying a coastal feature

These actions could result in increased flood elevations on private property. This situation would lead to decreased property values, increased flood insurance premiums, and increased cleanup and repair costs from future floods. As stated in Section 4.3.2, concurrence from property owners is required to increase flood elevations. Therefore, these impacts would occur to voluntary recipients. Where entire communities are affected, the indirect impacts described in Section 4.6.1 could occur.

4.6.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns
- Biological control

Vegetation management actions would decrease the hazard of wildfires and, thus, positively impact public safety and reduce property damage. These actions would not have population impacts because they would not require the relocation of people or induce a large influx in population. None of the vegetation management actions would create a need for new housing. These actions would potentially impact property values if visual resources in the area of the actions are affected or if noise levels are permanently increased. In cases where visual resources or noise are adversely affected in residential areas, the subgrantee would conduct an economic analysis to determine potential impacts to property values. The local economy would potentially be positively impacted if materials are purchased at local businesses and local contractors are hired.

The subgrantee would be responsible for maintenance of areas treated by vegetation management actions. Unless actions are designed to require little long-term maintenance, subgrantees would incur a financial burden to pay the annual costs to maintain these areas. Without proper maintenance, the threat of future fire could even be increased as a result of these actions, thus adversely impacting public safety and increasing property damage.

4.7 LAND USE AND PLANNING

4.7.1 No Action Alternative

Because no new facilities would be built and existing facilities would not be modified, the No Action Alternative would not affect land use or zoning. Restoration of exiting facilities would not impact land use or zoning.

4.7.2 General Consequences of Proposed Actions

Any action that includes constructing, modifying, or relocating facilities has the potential to result in a direct change in land use or cause a conflict with the local zoning ordinance or general plan. In addition, actions that include creating or widening a waterway or constructing or modifying a water detention, retention, or storage facility have the potential to affect land use. Before implementing any action, the subgrantee would be required to review zoning ordinances and the local county and city (if applicable) general plan(s) to ensure that the action is compatible. If the action is not compatible with zoning ordinances and the general plan, the subgrantee would be responsible for obtaining a conditional use permit, a zoning variance, or some other legal solution to rectify the nonconforming use, such as having the local planning authority amend land use maps or the general plan.

The subgrantee or a legal representative must have ownership or other legal authority (such as possessing an easement) to undertake any action.

4.7.3 Consequences Attributable to Specific Actions

Impacts and appropriate mitigation measures related to land use for all specific actions are discussed in Section 4.7.2.

4.8 PUBLIC SERVICES AND RECREATION

4.8.1 No Action Alternative

Under the No Action Alternative, no improvements would be made to public facilities. Restoration of exiting facilities would not impact public services or recreational opportunities. However, public services would not be protected from damage caused by future disasters. Without the benefit of mitigation measures, these public services may be adversely impacted to a greater degree.

4.8.2 General Consequences of Proposed Actions

Temporary construction impacts to public services and recreation may be expected; however, these impacts would be short term and negligible. Mitigation measures to avoid temporary impacts to public services may include timing construction activities to minimize impacts to public utility users or providing alternate locations for recreational opportunities. The subgrantee would be responsible for implementing such measures. In many cases, the proposed actions would lead to positive impacts to public services by reducing the impact caused by future natural disasters.

The sites of properties that are acquired and demolished are frequently made into public parks, resulting in a beneficial impact to recreational services.

4.8.3 Consequences Attributable to Specific Actions

4.8.3.1 Nonemergency Debris Removal

Impacts and appropriate mitigation measures related to public services and recreation for this action are discussed in Section 4.8.2.

4.8.3.2 Constructing, Modifying, or Relocating Facilities

Impacts in this section incorporate the following types of actions:

- Constructing new facilities or relocating existing facilities
- Relocating the functions of existing facilities
- Upgrading or otherwise modifying buildings
- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines

Constructing New Facilities or Relocating Existing Facilities; Relocating the Functions of Existing Facilities

Relocating the function of flood-prone facilities to existing facilities would likely directly affect public services. Beneficial impacts would occur by reducing the risk of future flood damage to

the relocated facility. Adverse impacts associated with this action would involve changes in the time and distance required to access public services. Relocation of schools would involve students having longer or shorter bus rides or students being bused instead of walking. The relocation of police and fire stations to existing facilities would likely increase average response times for some and decrease them for others. Recreational facilities would be closer to some users and more distant to others. Because utility service is not as dependent on proximity to users, no direct impacts would occur.

School functions are frequently relocated to an operating school. Impacts from this action could include increasing class size and school density, holding classes in trailers, phasing classes or grades to share space, and integrating students from disparate grades. These impacts could adversely influence the educational experience for students but would allow schools to operate during flood events.

Relocating flood-prone facilities could cause indirect impacts to public services. For example, a relocated school or other public facility with a substantial number of occupants could require changes to existing fire or police services and utility connections. Utilities would have to be removed from acquired property, including buildings with utility connections and roads that share easements with utility lines.

Upgrading or Otherwise Modifying Buildings

Improving public facilities and utilities by elevating or floodproofing has the potential to directly impact public services. These improvements would benefit the public service facility by reducing the risk of future flood damage. On the other hand, the public service facility would likely be forced to close temporarily so that the improvements can be made. In many cases, the function of the temporarily closed facilities would be relocated to an existing facility for the duration of the improvements.

Repairing, Realigning, or Otherwise Modifying Roads, Trails, Utilities, and Rail Lines

Repairing, realigning, or modifying roads would indirectly affect public services because of the temporary closure of roads. School buses and police and fire vehicles could be forced to take alternate routes and could likely experience delays.

4.8.3.3 Actions Involving Watercourses and Coastal Features

Impacts in this section incorporate the following types of actions:

- Constructing or modifying a water crossing

Constructing or modifying a water crossing would indirectly affect public services because of the temporary closure of roads or water crossings. School buses and police and fire vehicles could be forced to take alternate routes and could likely experience delays.

4.8.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns
- Biological control

Expanding fuel breaks or fire reduction zones could affect public services by causing the temporary closure of a public facility, road, or bridge. School buses and police and fire vehicles could be forced to take alternate routes or experience delays; however, these impacts are expected to be temporary. Additionally, the time period that public services would be temporarily impacted from this action would be less than the time period of impact in the case of a wildfire in the same area.

More than other public services, some recreational facilities have the potential to be impacted by this action, particularly by prescribed burns. A natural park or forest could experience an extended closure to conduct a burn or mechanized clearing or even implement a grazing program. The natural beauty of the facility and its enjoyment for users could be damaged for many years following the action. Smoke from prescribed burns and noise from mechanical equipment could decrease a natural experience for recreational users who are not even in the immediate vicinity of such an action. The subgrantee would be responsible for adequately notifying the public of vegetation management actions that have the potential to impact recreational users. Methods of notification could include posting fliers at information centers, trailheads, and restrooms of recreational areas and updating recorded telephone and radio information. With implementation of these mitigation measures, the benefits of decreasing the risk of future wildfires would outweigh these impacts.

4.9 TRANSPORTATION

4.9.1 No Action Alternative

Restoration activities to damaged facilities would potentially result in temporary detours, delays, and congestion. Under this alternative, FEMA would not assist with actions that would reduce damage in future disasters; therefore, any benefit to transportation would not be realized. Without these actions, future disaster events have the potential to cause additional damage and, therefore, additional congestion, delays, and detours from repair equipment and closures.

4.9.2 General Consequences of Proposed Actions

In general, the implementation of the proposed actions would result in temporary, minor impacts to transportation. To minimize adverse impacts to traffic and circulation, the subgrantee would be required to implement the following mitigation measures or more stringent measures if so required by local law or ordinance:

- Traffic along adjacent roadways would be temporarily rerouted as necessary during construction activities. Traffic lane closures would be coordinated with appropriate community officials.
- To the maximum extent feasible, construction-related vehicles would be prohibited from parking on residential streets.
- Construction equipment and vehicle staging would be located to hinder the traffic flow as little as possible in the areas where the actions are implemented.
- Adjacent residential neighborhoods and commercial/industrial areas would be notified in advance of construction activities and any rerouting of local traffic. Notification would identify a local contact.

4.9.3 Consequences Attributable to Specific Actions

4.9.3.1 Nonemergency Debris Removal

Debris removal has the potential to result in temporary traffic congestion and delay. The subgrantee would be responsible for planning haul routes and siting staging areas to minimize inconvenience to the community.

4.9.3.2 Constructing, Modifying, or Relocating Facilities

Impacts in this section incorporate the following types of actions:

- Providing temporary facilities
- Constructing new facilities or relocating existing facilities
- Relocating the functions of existing facilities

- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines

Providing Temporary Facilities; Constructing New Facilities or Relocating Existing Facilities; Relocating the Functions of Existing Facilities

These actions have the potential to affect traffic and transportation. Traffic volumes would increase in the vicinity of the replacement facility and decrease in the vicinity of the existing facility. The subgrantee would review affected roads and public transportation routes to determine if existing roads and services would adequately handle the proposed actions.

Detouring road users to alternate routes would also impact transportation networks. The subgrantee would review affected roads and public transportation systems using these roads to determine if proposed detours could serve an increased number of users. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies.

Repairing, Realigning, or Otherwise Modifying Roads, Trails, Utilities, and Rail Lines

Construction, realignment, or modification of roads would directly impact the road being constructed, realigned, or modified. However, these actions would also indirectly impact other transportation routes in the area. The subgrantee would review traffic patterns to determine if modifications are required to other roads. The subgrantee would coordinate these actions with appropriate transportation planning agencies.

4.9.3.3 Actions Involving Watercourses and Coastal Features

Impacts in this section incorporate the following types of actions:

- Constructing or modifying a water crossing

Construction or modification of water crossings would directly impact the water crossing being constructed or modified. However, these actions would also indirectly impact other transportation routes in the area. The subgrantee would review traffic patterns to determine if modifications are required to other roads or water crossings. The subgrantee would coordinate these actions with appropriate transportation planning agencies.

4.9.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns
- Biological control

Prescribed burns, vegetation removal, and other vegetation management actions would cause congestion, delays, and possible detours from heavy equipment where roads would be used to access areas scheduled for vegetation management. Public and private roads passing through or

bordering areas proposed for prescribed burns would be temporarily closed during the burn. The degree of congestion, delays, and detours would depend on the location and extent of the activities associated with an action, but all impacts would be temporary. The subgrantee would coordinate detour routes and signs with the appropriate transportation planning agencies.

4.10 NOISE

4.10.1 No Action Alternative

Under the No Action Alternative, no permanent changes to noise levels are expected. Activities associated with facility restoration would likely temporarily increase noise levels.

4.10.2 General Consequences of Proposed Actions

Construction activities would typically result in temporary noise from construction equipment. Demolition of structures on property acquired by FEMA would also create temporary noise. Construction activities would comply with local noise ordinances and state and federal standards and guidelines. Special precautions may be required around noise-sensitive receptors such as funeral homes, schools, or hospitals. These precautions, which would be implemented by the subgrantee, may include special work hours or public notification.

Construction of new facilities may introduce permanent noise sources, including traffic; however, the impact of this change depends on the land uses involved. The subgrantee would comply with local noise ordinances and state and federal standards and guidelines for potential impacts caused by constructing noise-generating facilities.

4.10.3 Consequences Attributable to Specific Actions

4.10.3.1 Nonemergency Debris Removal

Impacts and appropriate mitigation measures related to noise from this action are discussed in Section 4.10.2.

4.10.3.2 Constructing, Modifying, or Relocating Facilities

Impacts and appropriate mitigation measures related to noise from these actions are discussed in Section 4.10.2.

4.10.3.3 Actions Involving Watercourses and Coastal Features

Impacts and appropriate mitigation measures related to noise from these actions are discussed in Section 4.10.2.

4.10.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns

- Biological control

Vegetation attenuates noise more than open space. Therefore, removal of vegetation could increase noise at some receptors, such as in an area where a forest separates residences from a highway.

4.11 HAZARDOUS MATERIALS AND WASTES

4.11.1 No Action Alternative

The restoration of exiting facilities is not expected to impact hazardous materials and wastes. In general, hazardous materials at the sites of potential actions (for example, USTs and toxic release sites) would not be altered from their existing condition under this action. In circumstances where hazardous materials and wastes are involved in restoration activities, public or private entities responsible for restoration are expected to follow all applicable local, state, and federal regulations for use, storage, handling, and disposal of these substances.

4.11.2 General Consequences of Proposed Actions

Construction activities may disturb hazardous materials present at the site of an action. The subgrantee would conduct a site assessment (such as a Phase I Environmental Site Assessment) to determine if such materials are present. USTs would also be identified as part of this study. The subgrantee would follow local, state, and federal regulations for the handling and disposal of hazardous materials or for removing USTs. The subgrantee would coordinate with the AQMD, SWRCB, CARB, and USEPA, as appropriate. The removal and proper disposal of the materials would result in a beneficial effect to the community.

4.11.3 Consequences Attributable to Specific Actions

4.11.3.1 Nonemergency Debris Removal

Debris removal would likely result in the transport and disposal of hazardous waste. The subgrantee would be responsible for ensuring that all disaster debris is handled, transported, and disposed of in compliance with federal, state, and local regulations.

4.11.3.2 Constructing, Modifying, or Relocating Facilities

Existing facilities may have been constructed using materials considered hazardous such as asbestos and lead. The following actions may be affected by the presence of such materials:

- Upgrading or otherwise modifying buildings
- Acquiring and demolishing existing facilities
- Relocating the functions of existing facilities
- Constructing new facilities or relocating existing facilities

Construction and demolition activities could release dust-containing contaminants or cause workers to come in contact with contaminants. Additionally, contaminated materials must be disposed of properly. The subgrantee would complete testing, abatement, handling, and disposal in accordance with local, state, and federal regulations. The subgrantee would coordinate with the AQMD, CARB, and USEPA, as appropriate.

4.11.3.3 Actions Involving Watercourses and Coastal Features

Impacts and appropriate mitigation measures related to hazardous materials and waste for these actions are discussed in Section 4.11.2.

4.11.3.4 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns
- Biological control

Vegetation management actions may involve the storage and use of potentially hazardous materials, such as chemical treatments, fuel, and fire-suppression materials. If used and stored in accordance with local, state, and federal regulations, herbicides and other chemical treatments would not be expected to result in adverse impacts related to human health or the natural environment. Prescribed burns could ignite hazardous materials or wastes within the burn area. Similarly, mechanical clearing could also disturb hazardous materials or wastes. Therefore, the subgrantee would be responsible for conducting a Phase I Environmental Site Assessment on areas proposed for prescribed burning or mechanical treatment before any action is taken.

4.12 VISUAL RESOURCES

4.12.1 No Action Alternative

Restoration activities would result in minor, temporary visual impacts associated with construction equipment. No impacts would occur to existing visual resources from improvements or new construction. The potential for future damage, and the effects of that damage on visual resources, would remain.

No vegetation management activities would occur. Consequently, risk in fire-prone areas would remain high. Future wildfires would have substantial short-term (air quality) and long-term (burnt vegetation) impacts on visual resources.

4.12.2 General Consequences of Proposed Actions

Short-term impacts to visual resources would be expected due to the presence of heavy equipment, the presence of debris and construction materials, and the disruption of the site during construction. However, the subgrantee would implement BMPs during construction activities and conduct site cleanup and restoration following the completion of construction, which would limit these impacts.

Modifications to existing facilities would generally not have substantial impacts on visual resources. Impacts that do occur would be limited to the immediate vicinity of the action. For example, use of concrete to armor the bank of the stream in an area that was riprapped before the disaster would affect the visual quality of the immediate area of the action.

Construction of new facilities and relocation or realignment of existing facilities could affect visual resources if the action is undertaken in an area that was previously undisturbed or in a developed area where land use differs substantially from that of the action. For example, construction of a rock revetment to limit shoreline erosion could have an impact on visual resources associated with the shoreline. Similarly, construction of a floodwall to protect a developed area could have an impact on visual resources if the presence of that wall would have an effect on the views from, and of, that area. These impacts would be limited to the immediate vicinity of the action. The subgrantee would take prudent measures, such as maintaining existing stands of trees and revegetating with native plants where possible, to minimize long-term impacts to visual resources.

FEMA would evaluate each action using USFS, Federal Highway Administration, or other federal agency guidelines, as appropriate. If visual impacts are found to be an issue for an action, the results of the evaluation would be documented in an SEA.

4.12.3 Consequences Attributable to Specific Actions

4.12.3.1 Nonemergency Debris Removal

Impacts and appropriate mitigation measures related to visual resources for this action are discussed in Section 4.12.2.

4.12.3.2 Constructing, Modifying, or Relocating Facilities

Impacts in this section incorporate the following types of actions:

- Providing temporary facilities
- Acquiring and demolishing existing facilities
- Upgrading or otherwise modifying buildings

Providing Temporary Facilities

Temporary facilities located on land not previously disturbed or on a site that is not located in a compatible residential area would have a potentially adverse impact on the visual resources of the area where the action is implemented. This impact would be short-term in the event that temporary facilities are removed when no longer needed and the land is restored to its original use.

Acquiring and Demolishing Existing Facilities

Existing facilities would be demolished and removed. The resulting space would be graded to conform with adjacent topography and converted to open space, parks, or recreational use. If the adjacent areas consist of vegetated areas or other open space, this conversion from the built environment to the natural environment would have a beneficial impact on visual resources. However, the removal of structures from a neighborhood could disrupt continuity; the resulting gaps would impair the view of the neighborhood and could result in blight in the long term.

Upgrading or Otherwise Modifying Buildings

Exterior modifications to structures would have an impact on visual resources. In most cases, the impact would be minor and would not include effects to neighboring structures. However, the elevation of a structure above flood levels could adversely impact the surrounding structures, if they are not similarly elevated, by cutting off views and disrupting continuity in the profile of adjacent structures.

4.12.3.3 Vegetation Management

Impacts in this section incorporate the following types of actions:

- Mechanical or hand clearing of vegetation
- Herbicidal treatments
- Prescribed burns
- Biological control

The removal of vegetation along highways and in residential, commercial, and recreational areas, such as through the expansion of existing fuel breaks or fuel-reduction zones, has the potential to impact visual resources. A fuel-reduction zone or shaded fuel break would have a lesser impact

on visual resources than a fuel break because the former involves only the selective removal of understory vegetation.

Depending on the maintenance schedule of the fuel break or fuel-reduction zone, the impact to visual resources could be short term or permanent. Actions that include revegetation with native, fire-resistant species would yield long-term beneficial impacts to visual resources, while a poorly maintained action could cause permanent adverse impacts to visual resources if invasive, nonnative species come to dominate the cleared or burned area. The subgrantee would be responsible for any long-term monitoring of the area affected by a vegetation management action.

Implementation of a prescribed burn could reduce visual quality from highways, residences, businesses, and recreational areas because of the presence of highly visible blackened areas. Although this impact would decrease over time, the impact could be noticeable for several years.

The use of biological control would change the visual context of an area by adding livestock and fencing to the viewshed. The visual texture of areas under biological control could be changed relative to adjacent areas not being controlled in a way that results in a patchwork-type pattern in the viewshed.

4.13 COMPARISON OF ENVIRONMENTAL CONSEQUENCES

Table 4-2 provides a matrix and summary of impacts by resource area for each action. The table shows the general consequences of all actions and the impacts attributable to the specific actions.

Tables

Table 4-1
Typical Construction BMPs

General Principles	Fit grading to the surrounding terrain.
	Time grading operations to minimize soil exposure.
	Retain existing vegetation whenever feasible.
	Vegetate and mulch or otherwise stabilize disturbed areas.
	Direct runoff away from disturbed areas.
	Minimize the length and steepness of slopes.
	Keep runoff velocities low.
	Prepare drainageways and outlets to handle concentrated runoff until permanent drainage structures are constructed.
	Trap sediment on site.
	Inspect and maintain control measures frequently.
Structural Control Measures	Where possible maintain runoff water within its natural course and direction of flow.
	Design and maintain access roads to prevent ponding and damage from water flow.
	Limit cut and fill slopes to an inclination of 2:1 or flatter, and include benching to reduce slope length on longer slopes.
	Direct concentrated flow to stabilized channels and drains.
	Roughen slope surfaces to slow down flow velocities and enhance water infiltration, which in turn will enhance vegetation establishment
	Divert stormwater away from denuded areas and use properly installed temporary berms, earth dikes, silt fences, sediment traps, inlet protection, and sediment basins to limit the discharge of sediment and pollutants from the site.
Soil Stabilization Practices	The following methods typically apply to areas that are disturbed by grading and will not be redisturbed for a minimum of 21 days. These areas should be stabilized by the 14th day after the last disturbance: • Use of a hydraulically applied bonded fiber matrix on slopes 3:1 or steeper • Use of a 3-step straw mulch application on slopes 4:1 to 3:1 • Use of a one-step hydraulic mulch, seed, and binder application on slopes 4:1 or flatter
Stormwater Management Controls	Wherever possible, stormwater runoff from undeveloped areas should be kept separate from runoff from developed areas, and should be retained in natural conveyances or routed through properly lined drainage conveyances. Discharge locations should be provided with appropriate energy dissipation to prevent scour.

Table 4-2
Impact Matrix of Actions and Alternatives by Resource Area

The Draft PEA was circulated to the interested public and government agencies for review and comment. Initially, the Draft PEA was circulated for agency review from April 30, 2003 to June 2, 2003. A list of these agencies is provided in Appendix I. The Draft PEA was then circulated throughout California and posted on the FEMA website for general public review from July 14, 2003 to July 29, 2003. Two comment letters were received during these comment periods on the Draft PEA. Copies of these letters are provided in Appendix J. Comments which offered new information, addressed errors, or addressed facts relevant to the content of the Draft PEA resulted in revisions to the text of the Draft PEA. These revisions to the Draft PEA have not resulted in substantial changes to the proposed actions or alternatives, to the environmental impact analysis, or in mitigation activities. This Final PEA document contains the revisions made to the original Draft PEA. This Final PEA will be circulated to all recipients of the Draft PEA and will be posted in the FEMA website.

In addition to the circulation of the Draft PEA, subsequent SEAs will go through the appropriate level of public review before individual FONSIs are issued, and a Cumulative Public Notice will be published at the Presidential Declaration of each future disaster subject to this PEA. Appendix K contains the Cumulative Public Notice for the initial disaster (FEMA-1203-DR-CA) which is provided as an example of Cumulative Public Notices that will be published for future disasters.

6.1 DESCRIPTION OF PROPOSED ACTIONS AND ALTERNATIVES (SECTION 2.0)

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Appendix A

Example of a Memorandum for an Action Where the PEA Is the Only Documentation Necessary to Comply with NEPA

Appendix B
Example of a Supplemental Environmental Assessment

Appendix C

Memorandum of Understanding With the U.S. Fish and Wildlife Service

Appendix D

Agreement Regarding Section 7 Consultation on the Endangered Species Act When the U.S. Army Corps of Engineers (USACE) Serves as Lead Agency

Appendix E

Programmatic Biological Opinion/Programmatic Incidental Take Statement for FEMA-1155-DR-CA

Appendix F

Programmatic Biological Assessment for the National Marine Fisheries Service

Appendix G

National Marine Fisheries Service Concurrence Letter

Appendix H

Programmatic Agreement With the California State Historic Preservation Officer (SHPO) for Future Declared Disasters

Appendix I

List of Agencies to Receive Copies of Draft and Final Programmatic Environmental Assessments

Appendix J
Comment Letters On The Draft PEA

Appendix K

Cumulative Public Notice Published For The FEMA 1203-DR-CA Disaster