Final Programmatic Environmental Assessment (PEA) For Typical Recurring Actions Resulting from Flood Disasters in California as Proposed by the Federal Emergency Management Agency

FEMA-1203-DR-CA

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TABLE OF CONTENTS

LIST OF TABLES, EXHIBITS, AND APPENDICES

Tables

Exhibits

Appendices

1 INTRODUCTION

1.1 Program Background

The Federal Emergency Management Agency (FEMA) proposes to administer Federal disaster assistance pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 93-288, as amended (the Act), its implementing regulations in 44 Code of Federal Regulations (CFR) Part 206 (Federal Disaster Assistance), and the National Flood Insurance Reform Act of 1994 (PL 103-325).

The National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR Parts 1500 through 1508), and FEMA regulations for NEPA compliance (44 CFR Part 10) direct FEMA and other Federal agencies to fully understand and take into consideration during decision-making, the environmental consequences of proposed Federal actions (projects). Therefore, FEMA must comply with NEPA before making Federal funds available for disaster recovery and mitigation actions.

FEMA has determined through experience that the majority of the typical recurring actions proposed for funding, and for which an Environmental Assessment (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) to comply with NEPA and its implementing regulations without having to produce a time-consuming stand-alone EA for every action.

Three FEMA programs fund these actions (projects): the Public Assistance Program, Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance Program (FMA). The Public Assistance Program (Act Section 406) provides assistance to local governments and private non-profit organizations (PNPs) to help them respond to and recover from a disaster. The HMGP (Act Section 404) provides communities with cost-share funds for projects that can help reduce future all hazard disaster-related property damages and loss of human lives. The FMA (Title V of the National Insurance Reform Act of 1994) provides communities with cost-share funds for projects that can reduce future flood-related property damages and loss of human lives.

1.1.1 Public Assistance Program

Many Public Assistance Program projects consist of restoring facilities to predisaster conditions. When these projects are on the same site as the damaged facility and conform substantially to the predisaster design, they are "statutorily excluded" or exempted from further NEPA review and documentation, per Act, Section 316. Other Public Assistance Program projects that are considered "Statutory Exclusions" include debris removal and actions to protect lives and property from immediate threats.

Similarly, several types of Public Assistance Program projects are "categorically excluded" (CATEXd) from preparation of an EA or Environmental Impact Statement (EIS). FEMA's list of "Categorical Exclusions" (CATEXs) is in 44 CFR 10.8(d). These categories of projects were

determined to typically have no significant environmental impact. Categorically excluded Public Assistance Program projects generally include acquisition (buyout), relocation, demolition, and small scale hazard mitigation construction, but have conditions that minimize the potential effects on the environment. When these conditions are not met or when "extraordinary circumstances" (44 CFR 10.8(d)(3)) exist, which make the project not typical of other projects in the exclusion category, the Categorical Exclusion does not apply and an EA must be prepared.

Because the California Office of Emergency Services (OES) coordinates FEMA's disaster assistance funding, the local agency or applicant is referred to as the subgrantee. Often 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." There are also cases where 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, purchase of capital equipment, or funding hazard mitigation measures. Such actions are known as "alternate projects." In addition, mitigation projects are funded through the Public Assistance Program to prevent or ameliorate future disaster damage.

Improved, alternate, and mitigation projects do not qualify for Statutory Exclusions and usually require NEPA review at the EA level and occasionally at the EIS level. The determination of site-specific alternatives and details are more within the subgrantee's decision-making process than FEMA's because of the subgrantee's knowledge of the community's needs and preferences, previous disasters, and other local issues. In addition, FEMA is usually the last agency to review the project in the approval process under the current process. Before implementation of the PEA, FEMA has had more difficulty complying with the spirit and intent of NEPA because the action has been well defined, evaluated, and designed before any input from FEMA. Use of the PEA is expected to help facilitate alternative development because projects are not as likely to be predetermined by the applicant.

1.1.2 Hazard Mitigation Grant Program

The HMGP projects differ from Public Assistance Program mitigation projects because of their funding source. These projects are generally larger in scope and cost than Public Assistance mitigation projects. Although no Statutory Exclusions exist for HMGP projects, the CATEXs described for the Public Assistance Program also apply to HMGP projects. Examples of CATEXs for HMGP projects include: (1) acquisition of properties and associated demolition or removal of structures when the action has a willing seller, a buyer who coordinated with affected authorities, and a deed restriction that the acquired property remain as open space use in perpetuity; (2) physical relocation of individual structures where FEMA has no involvement in relocation site selection or development; and (3) repair, reconstruction, restoration, elevation, retrofitting, upgrading, or replacement of a facility in a manner that substantially conforms to the predisaster design, function, and location. When specific conditions are not met or when extraordinary circumstances exist, the Categorical Exclusion is not applicable, and an EA must be

prepared. Similar to the Public Assistance Program application process, HMGP application process requires the subgrantee to send its' application to OES, which evaluates and prioritizes all applications before sending the applications to FEMA for review. FEMA funding is also sent to the applicant through OES.

Many HMGP projects require an EA because they do not meet the criteria of applicable CATEXs. Subgrantees often conduct their own environmental reviews in association with obtaining permits to comply with state and/or Federal environmental laws and other statutes. By the time a project is sent to FEMA, the project has already been defined, and costs, as well as some potential impacts have been determine, and available alternatives are limited. As discussed for the Public Assistance Program, use of the PEA will help facilitate alternative development for HMGP projects.

1.1.3 Flood Mitigation Assistance Program

Under the FMA, FEMA provides grants to subgrantees for two types of projects: developing or updating Flood Mitigation Plans or implementing measures to reduce flood losses. Like HMGP projects, FMA projects can be covered by several CATEXs but no Statutory Exclusions. Because these projects often do not meet the criteria of applicable CATEXs, FMA projects usually require an EA. FMA projects are similar to HMGP projects in many other regards, including the role of OES, applicable CATEXs, and limited environmental reviews by subgrantees.

1.2 Purpose and Scope of the Document

This PEA discusses the potential environmental impacts from implementing various project alternatives fully or partially funded by FEMA while administering flood disaster assistance in the State of California (California). This PEA also provides the public and decision-makers with the information required to understand and evaluate these potential environmental consequences. In addition to meeting these 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.

This PEA applies immediately to all projects described in Chapter 2 of this document that have been proposed for FEMA funding under this initial disaster (FEMA-1203-DR-CA) and all open previously declared flood disasters in California. Open declared disasters are defined as disasters for which FEMA is still providing Federal assistance under the Act. This PEA also applies to subsequent flood disasters to be declared by the President, when FEMA so notifies the participating interested public and government parties and agencies.

The description of proposed actions by project type and alternative action category is provided in Section 2 (Description of the Proposed Actions and Alternatives).

1.3 Programmatic Process

This PEA covers typical actions which are eligible for FEMA funding via implementing the Act and which provide flood disaster assistance in California. A Programmatic Finding of No Significant Impact (FONSI) will be executed for typical actions covered by this PEA that would not result in significant impacts. For these projects, a memorandum would be prepared, stating that the project, alternatives, potential impacts, and mitigation were reviewed and found to be fully and accurately described by the PEA and the PEA FONSI and no further documentation is required to comply with NEPA.

If a project is expected to create impacts not described in the PEA; create impacts greater in magnitude, extent, or duration than described in the PEA; or require mitigation measures to keep impacts below significant levels that are not described in the PEA; a SEA and corresponding FONSI will be issued to address such projects. Projects for which it has been determined, during the preparation of the SEA, that a more detailed environmental review is required, or projects which do not fit into the typology included in this PEA, will be subject to the standard EA or EIS process as required by NEPA and associated Federal, state, Tribal, and local statutes. A sample SEA is in Appendix B.

This PEA should apply to most actions proposed for FEMA funding as a result of flooding in California. The analysis in this PEA has relied upon FEMA's historic experience of project typology, description, and consequences described in environmental documents (CATEXs and EAs) from 1994 to 1998. When a specific project is ready for decision, FEMA will have an opportunity to review this PEA to determine if more site-specific information is available and what level of environmental analysis and documentation would be required at that time. If the level of analysis in the PEA is insufficient for the specific project, then additional analysis would be tiered off this PEA, in accordance with 40 CFR Part 1508.28.

Cumulative impacts, defined as project effects that are greater in significance than the sum of the direct and indirect effects when combined with the total effects of other actions, are not addressed in this PEA, because analysis of these impacts requires specific knowledge of other projects occurring within or near the study area. Based on the scope of this PEA, such information cannot be determined since the study area is state-wide. Cumulative impacts will be considered when determining the compatibility of the PEA for specific projects. If cumulative impacts would be created, these would be considered in a SEA.

1.4 Purpose of and Need for Action

FEMA's objectives with respect to public assistance and hazard mitigation from flood disasters, are to repair or replace damaged public facilities; reduce the risk of future flood loss; minimize flood impacts on public safety, health, and welfare; and restore and preserve natural resources and floodplain functions.

Without FEMA action, many individuals and communities would not have the resources to rebuild or relocate flood damaged homes, businesses, and public facilities. Necessities such as

homes, potable water systems, roads, and schools would not be functional after flood events. Furthermore, many flood protection measures would not be improved or constructed without FEMA action, resulting in no reduction of injuries and loss of lives and property from future floods.

1.5 Complementary Programmatic Documents

1.5.1 Endangered Species Act

Section 7 of the Endangered Species Act of 1973 requires FEMA to consult with the United States Fish and Wildlife Service (USFWS) to determine if proposed FEMA funded projects may affect threatened and endangered (T&E) species and/or their suitable habitat. In California, there are more than 200 Federally listed T&E species. In order to consolidate and streamline the Section 7 consultation process, FEMA Region IX began implementing a Formal Programmatic Consultation (FPC) with USFWS that covers typical actions proposed for FEMA funding for several types of disasters, including floods.

Instead of consulting on each individual project, the FPC allows consultation for projects grouped and analyzed together by either project type or location. The result of the FPC is the issuance of a Programmatic Biological Opinion (PBO) and Programmatic Incidental Taking Statement (PITS) by USFWS. This opinion includes certain avoidance and/or mitigation measures ("Terms and Conditions" of the PITS) during project implementation to reduce adverse impacts on T&E species. Appendix C contains copies of the FPC, PBO, and PITS for a previous disaster in California. FEMA plans to consult with USFWS so that the FPC, PBO, and PITS are revised for disaster (FEMA 1203-DR-CA) and future flood disasters.

1.5.2 National Historic Preservation Act

"Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires a Federal agency with jurisdiction over a Federal, Federally assisted, or Federally licensed undertaking to take under account the effects of the agency's undertaking on properties included in or eligible for the National Register of Historic Places (NRHP) and, prior to approval of an undertaking, to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on the undertaking" (36 CFR Part 800.1a).

In order to streamline the Section 106 review process, FEMA has implemented a disaster specific Programmatic Agreement (PA) for each recent disaster. The fully executed PA for a previous disaster is attached as Appendix D. A draft of the PA for disaster FEMA 1203-DR-CA has been distributed for review and comment. Recently, FEMA has been working on a State Model PA, that applies to all FEMA undertakings (actions or projects) in each participating state. The State Model PA would identify specific actions that are considered exempt from Section 106 review and encourage the active involvement of the SHPO to expedite identification of historic properties and effects.

To further streamline the review process, disaster specific Programmatic Memoranda of Agreement (PMOA) and Programmatic Standard Mitigation Measures (PSMM) are currently under consideration between FEMA, ACHP, and California. Similar to the programmatic documents implemented under the Endangered Species Act, they will address potential impacts by group and type of action, providing clearance under the NHPA without having to prepare extensive documents or undergo individual consultation for each project.

1.6 Public Participation Process

The Draft PEA has been circulated to the interested public and government agencies for review and comment, in addition to the cumulative Public Notice (Appendix E) published at the Presidential Declaration of each disaster subject to this PEA. Public scoping meetings may be held when there is a requirement to summarize the findings of the analysis and to solicit input from the affected public and governmental agencies, for example, compliance with Executive Order (EO) 11988. This PEA has been produced to facilitate providing responses to comments, as well as changes to the document. When a SEA is produced for each specific site and project, it will be circulated according to CEQ requirements (40 CFR Part 1506.6) and EOs 11988 and 11990, when applicable.

Responses to comments offering new information or changes to data concerning environmental impacts will be included and circulated, as necessary. Comments stating opinions or facts irrelevant to impact analysis, although appreciated, will not solicit specific responses. Appropriate methods and levels of outreach to minority and low-income populations have been, and will continuously be conducted regarding environmental justice issues. A list of agencies that received a copy of the Draft and Final PEAs is in Appendix F. Letters received from public agencies, individuals, and organizations as a result of the consultation process are included as Appendix G. The California Office of Emergency Services also submitted comments on the Draft PEA, and these comments were taken into consideration in the preparation of this Final PEA.

1.7 Relationship of the Document to the California Environmental Quality Act

According to CEQ's NEPA implementing 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 cooperate to incorporate NEPA and California Environmental Quality Act (CEQA) documents by reference and prepare joint documents whenever practicable. In many cases, this cooperation consists of the subgrantee referencing the PEA, as appropriate, and adding project specific information and impact analysis into the CEQA document. FEMA then completely references the CEQA document and all other relevant environmental studies in preparation of the SEA. In some instances, the CEQA document and the SEA could be combined into a joint Federal-state SEA.

1.8 Organization of the Document

This PEA is organized into the following chapters and technical appendices:

Chapter 2 describes project types and programmatic alternative actions. Chapter 2 also briefly discusses alternatives eliminated from further consideration, and concludes with a comparative summary of the effects of alternative actions on the local community and the natural environment.

Chapter 3 describes the affected environment, providing a basis for measuring the impacts of the alternative actions for each project type. The baseline is needed for analytical comparisons. The baseline year for this PEA is 1995/1996. Specific sections may use different baseline years depending on data availability (e.g., population data for last census in a specific area, or database for T&E species available from USFWS).

Chapter 4 describes potential environmental consequences of implementing the alternative actions. This chapter forms the basis for the Impact Summary Matrix at the end of Chapter 2.

A list of references is in Chapter 5.

In addition to the PEA body the following appendices are included:

- Appendix A: List of Acronyms and Abbreviations Used in the Programmatic Environmental Assessment
- Appendix B: Example of Supplemental Environmental Assessment
- Appendix C: Example of Formal Programmatic Consultation, Programmatic Biological Opinion, and Programmatic Incidental Taking Statement under Section 7 of the Endangered Species Act
- Appendix D: Example of Programmatic Agreement under Section 106 of the National Historic Preservation Act
- Appendix E: Cumulative Public Notice Published for the Initial Disaster
- Appendix F: List of Agencies to Receive Copies of Draft and Final Programmatic Environmental Assessments
- Appendix G: Letters Received from Public Agencies, Individuals, and Organizations
- Appendix H: Office of Management and Budget Memorandum on Floodplain Management

2 DESCRIPTION OF PROPOSED ACTIONS AND ALTERNATIVES

2.1 Introduction

This section describes typical projects executed with flood disaster assistance and explains alternative actions, including the Proposed Action and the No Action Alternative. Other alternatives that were identified but eliminated from further consideration are briefly described. The potential environmental impacts of each alternative are summarized in the Summary Impact Matrix (Table 2-1) and described in Chapter 4. It should be noted that the level of funding available for each project is highly variable depending on the type of program, project location, and other circumstances and contingencies. Furthermore, funding may be specific to individual situations. Projects are described independent of the source of funding (FMA, HMGP, or Public Assistance Program).

2.2 Project Types

Through FEMA's past experience with flood disasters, five typical projects have been frequently implemented. Classifying local agencies' Proposed Actions into one of these categories is necessary to develop alternatives and identify potential environmental impacts.

All alternatives considered in this PEA assume that FEMA action is required as a result of a major disaster declaration, the administration of the Act, and its implementing regulations in 44 CFR Part 206. Furthermore, each action is assumed to comply with the Act and FEMA's implementing regulations.

The following sections describe the five typical project types that FEMA frequently implements.

2.2.1 Buildings, Roads, and Utilities

Public facilities that suffer minor damage are usually repaired to pre-disaster condition. As stated in Section 1.1.1, these actions are statutorily excluded from NEPA review. However, facilities damaged beyond feasible and cost effective repairs may be eligible for replacement under the Public Assistance Program. If the damaged facility was in a floodplain, floodway, or any other hazard-prone area, FEMA may require relocation of the new structure to avoid future repetitive damages. Under the Public Assistance Program, structure relocation may be the result of the necessity to combine different facilities into one new facility for cost effective or practical reasons beyond the actual requirements of the Act, as described in Section 1.1. FEMA may require supporting evidence of the reasons behind the Proposed Action. Relocation may also be implemented as a hazard mitigation measure under the HMGP for structures not actually damaged but subject to damage in future disaster events. Facilities considered under this project type include, but are not limited to, public buildings, certain private non-profit buildings, residences, businesses, utilities (water, sewer, co-op electricity), roads, and bridges.

2.2.2 Drainage Channels

During flood events, floodway capacities are usually exceeded, causing bank erosion and excess sedimentation in conjunction with flooding surrounding areas. Channelization and associated stream bank stabilization projects often involve building concrete-lined trapezoidal or other geometric channels within the existing floodway, usually within the watercourse's primary alignment. Also very common is the installation of either surface or subsurface reinforced concrete pipes (RCPs) of varying diameters, when compatible with waterflow size and capacity. Normally, construction of these structures requires the coordination and permitting of the United States Army Corps of Engineers (USACE) in compliance with Sections 401 and 404 of the Clean Water Act of 1977 (CWA), in addition to coordination with local flood control agencies.

2.2.3 Detention and Retention Basins

Detention and retention or desilting basins are typically used along creeks and rivers to detain silt laden water during high flows and allow silt to settle out of the water before it passes downstream. Silt in the basin is then removed during regularly scheduled maintenance. Detention and retention basins also reduce flow over time. Projects can include constructing new detention and retention basins or the enlargement of existing basins. The construction of these structures usually requires coordination with the Natural Resources Conservation Service (NRCS) and the USACE for compliance and permitting under the CWA.

2.2.4 Culverts

Culverts are usually constructed to carry surface runoff away from buildings and infrastructure, under roads and paths, to natural drainage ways. Culvert construction may require coordination with the USACE for CWA compliance and permitting.

2.2.5 Dams

Dams have generally been constructed for flood control, to prevent high water from flooding nearby and downstream areas. Dam construction requires coordination with NRCS, the USACE for CWA compliance and permitting, and the State Dam Safety Office.

Additional projects associated with flooding disasters are likely to be funded by FEMA, however the five mentioned above are the most common. Any other projects that do not qualify for categorical or statutory exclusion would require an EA or EIS.

2.3 Alternative Action Categories

As part of this PEA, five alternatives will be considered for each of the five project types described in the previous section.

2.3.1 No Action Alternative

Inclusion of a No Action Alternative in the environmental analysis and documentation is required under NEPA. The No Action Alternative is defined as maintaining the status quo with no FEMA funding for any actions. Under this alternative, no funds would be available to implement proposed actions. For projects otherwise determined eligible for FEMA funding under the FMA, HMGP, and the Public Assistance Program, the No Action Alternative is in conflict with FEMA's mission and the purpose of the programs. For these reasons, the No Action Alternative evaluates the effects of not providing eligible assistance for each specific project, thus providing a benchmark against which project action alternatives may be evaluated.

Under this alternative, FEMA would not fund any alternative action. Facilities would be used in damaged condition or abandoned. If local governments are unable to implement the proposed project for lack of Federal assistance, a flood hazard would remain unmitigated at the project site.

2.3.2 Non-Structural Alternative

No new construction would take place. Natural bypasses, relocations, acquisitions, and public education programs would be considered. The term "natural bypass," as used in this PEA, refers to a waterway that is free of human-made materials or alterations in course.

2.3.3 Improvement Alternative

This category of alternatives consists of improving existing structures to better perform their functions. Improvements also mean upgrading structures to ensure continuity of the functions performed in them or by them. This alternative, for example, would consider increasing the capacity of an existing flood control device or elevating an existing structure.

2.3.4 Structural Alternative

This alternative consists of new construction of a facility. Examples include constructing a new flood protection device or relocating or building a facility outside of a high hazard area, such as a floodway.

2.3.5 Combination Alternative

For this alternative, mixed solutions of different alternative actions or project types are combined. An example is constructing a detention basin and public education in the community.

2.4 Alternatives Eliminated from Further Consideration

Alternatives usually dismissed from further consideration in any of the environmental documents are those that require considerably more funding than available through FEMA programs or those that do not pass a cost-benefit analysis. Other alternatives usually eliminated, after proper review and analysis, are those dismissed or rejected by the applicant for various reasons or for incompatibility with local and state statutes.

The SEA to be attached to this PEA for each proposed project will address alternatives eliminated from further consideration, if any, and the justifications for rejection.

2.5 Description of Alternatives, Including the Proposed Action and the No Action Alternative

The Proposed Action is typically the alternative that has been proposed by the subgrantee as its preferred alternative. The Proposed Action relies on the knowledge and experience of the local agency to determine the alternative that is best suited to the community's requirements and preferences.

The following describes the alternatives.

2.5.1 Buildings, Roads, and Utilities

2.5.1.1 No Action Alternative

Floodprone buildings, roads, and utilities would not be rebuilt, improved, or relocated. Facilities would be used in damaged conditions or abandoned. If local governments are unable to implement the proposed project without Federal assistance, flood hazards would remain at project sites.

2.5.1.2 Non-Structural Alternative

Under this alternative, the function of the floodprone facility would be relocated 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 alternate structures; traffic would use alternate routes; and utility services would be provided by alternate 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 suitable existing school nearby, when this is feasible in terms of capacity and convenience for students, families, and teachers. For properties in the floodplain, FEMA would acquire damaged properties, demolish existing structures, and place deed restrictions limiting future uses to open space in perpetuity.

2.5.1.3 Improvement Alternative

Under this alternative, projects would improve the existing damaged or floodprone facilities by elevating or floodproofing structures, roads, or utilities, as practical. Elevated structures would be raised on foundation walls, compacted fill, piers, posts, pilings, or columns. Frequently, the improved alternative is more cost effective than relocation, which usually requires additional expenditures, such as infrastructure improvements. If these improvements impact a natural waterway, alter vegetation adjacent to a stream corridor, or impact a floodplain, permits from USACE and the California Department of Fish and Game (CDFG) and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Improvements to non-

conforming uses may require zoning changes or variances. Temporary or permanent changes to transportation networks would require coordination with appropriate transportation planning agencies.

2.5.1.4 Structural Alternative

This alternative consists of constructing new buildings, roads, or utilities in new locations outside of the 100-year floodplain. Furthermore, critical actions, as defined in 44 CFR Part 9, would be sited outside of the 500-year floodplain. In some limited situations, reconstruction can be done at the same site, if proper flood protection can be provided. Property acquisition, however, is frequently required for this alternative. Public health and safety factors, as well as cost-effectiveness, are important elements in support of this alternative. Structure relocation is very commonly a sequence of implementing EO 11988 and its implementing regulations.

Permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Temporary and permanent changes to transportation systems would be coordinated with appropriate transportation planning agencies. Coordination with the Air District, the State Water Resource Control Board, the California Air Resources Board (ARB), and the United States Environmental Protection Agency (EPA) would be required as appropriate.

2.5.2 Drainage Channels

2.5.2.1 No Action Alternative

Existing channels would not be improved or relocated and new channels would not be built. Channel banks damaged by floods would continue to erode. Floodprone areas would be subject to flood hazards.

2.5.2.2 Non-Structural Alternative

This alternative consists of voluntary property acquisitions, voluntary property relocations, natural bypasses and public education programs. Property relocations would include FEMA funding for siting and developing the future location of the relocated properties; under property acquisition, property owners would be responsible for their own relocation. Property acquisition or relocation project components include demolishing existing floodprone structures, placing deed restrictions on acquired properties limiting future uses to open space uses, and constructing new buildings. The relocation component of this alternative would likely also include infrastructure improvements at the proposed site, including roads and utilities. Based on FEMA policy and on the Memorandum on Floodplain Management issued on February 18, 1997, by the Office of Management and Budget (OMB) (Appendix H), the Non-Structural Alternative is the preferred alternative compared to any type of work that would attempt to control a natural watercourse.

2.5.2.3 Improvement Alternative

The following improvements would be considered under this alternative: adding concrete linings to existing channels, installing RCPs to existing channels, armoring the channel with riprap or gabions, installing geotextile fabrics, and increasing the size of existing channels. All of these projects would take place within the existing channel alignment. If these improvements impact a natural waterway, alter vegetation adjacent to a stream corridor, or impact a floodplain, permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Improvements to non-conforming uses may require zoning changes or variances.

2.5.2.4 Structural Alternative

The structural alternative entails new construction of concrete channels, surface or subsurface RCPs, or drainage swales to control otherwise free-flowing water courses. These devices prevent flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways. In addition, realignment of existing drainage channels would be considered under this alternative. Classified as a Flood Control Work (FCW), this alternative is subject to restrictions under FEMA policies and the OMB Memorandum of February 18, 1997, on the subject. The Structural Alternative(s) may entail constructing channels, swales, and RCPs for reasons other than flood control.

Permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Temporary and permanent changes to transportation systems would be coordinated with appropriate transportation planning agencies. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate.

2.5.3 Detention and Retention Basins

2.5.3.1 No Action Alternative

Detention and retention basins would not be enlarged or constructed. Areas prone to flood damage due to silt-laden stream and river water would be subject to flood hazards.

2.5.3.2 Non-Structural Alternative

This alternative consists of voluntary property acquisitions, voluntary property relocations, natural bypasses and public education programs. Property relocations would include FEMA funding for siting and developing the future location of the relocated properties; under property acquisition, property owners would be responsible for their own relocation. Property acquisition or relocation project components include demolishing existing floodprone structures, placing deed restrictions on acquired properties limiting future uses to open space uses, and constructing new buildings.

The relocation component of this alternative would likely also include infrastructure improvements at the proposed site, including roads and utilities. Based on FEMA policy and on the Memorandum on Floodplain Management issued on February 18, 1997, by the OMB (Appendix H), the Non-Structural Alternative is the preferred alternative compared to any type of work that would attempt to control a natural watercourse.

2.5.3.3 Improvement Alternative

This alternative consists of improvements to existing detention and retention basins. For example, the capacity of an existing basin could be increased by constructing higher berms or increasing the basin's size or depth. Other examples would be constructing multi-stage sedimentation ponds from an existing single-pond basin or converting a dry basin into a basin with a permanent pool (pond). If these improvements impact a natural waterway, alter vegetation adjacent to a stream corridor, or impact a floodplain, permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Improvements to non-conforming uses may require zoning changes or variances. If improvements affect existing roads, coordination with local transportation planning agencies would be required. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate.

2.5.3.4 Structural Alternative

This alternative consists of constructing new detention, retention, or desilting basins. Permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Temporary and permanent changes to transportation systems would be coordinated with appropriate transportation planning agencies. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate.

2.5.4 Culverts

2.5.4.1 No Action Alternative

Culverts would not be enlarged or built. Floodprone areas would be subject to flood hazards.

2.5.4.2 Non-Structural Alternative

This alternative consists of voluntary property acquisitions, voluntary property relocations, natural bypasses and public education programs. Property relocations would include FEMA funding for siting and developing the future location of the relocated properties; under property acquisition, property owners would be responsible for their own relocation. Property acquisition or relocation project components include demolishing existing floodprone structures, placing deed restrictions on acquired properties limiting future uses to open space uses, and constructing new buildings. The relocation component of this alternative would likely also include infrastructure

improvements at the proposed site, including roads and utilities. Based on FEMA policy and on the Memorandum on Floodplain Management issued on February 18, 1997, by the OMB (Appendix H), the Non-Structural Alternative is the preferred alternative compared to any type of work that would attempt to control a natural watercourse.

2.5.4.3 Improvement Alternative

This alternative consists of improvements to existing culverts, such as increasing the capacity of an existing culvert, adding a concrete headwall, or regrading an existing culvert. If these improvements impact a natural waterway, alter vegetation adjacent to a stream corridor, or impact a floodplain, permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Detours and signs would be coordinated with local transportation planning agencies.

2.5.4.4 Structural Alternative

Under this alternative, new construction of culverts would occur. Permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Detours and signs would be coordinated with appropriate transportation planning agencies.

2.5.5 Dams

2.5.5.1 No Action Alternative

Dams would not be improved or built. Floodprone areas would be subject to flood hazards.

2.5.5.2 Non-Structural Alternative

This alternative consists of voluntary property acquisitions, voluntary property relocations, natural bypasses and public education programs. Property relocations would include FEMA funding for siting and developing the future location of the relocated properties; under property acquisition, property owners would be responsible for their own relocation. Property acquisition or relocation project components include demolishing existing floodprone structures, placing deed restrictions on acquired properties limiting future uses to open space uses, and constructing new buildings. The relocation component of this alternative would likely also include infrastructure improvements at the proposed site, including roads and utilities. Based on FEMA policy and on the Memorandum on Floodplain Management issued on February 18, 1997, by the OMB (Appendix H), the Non-Structural Alternative is the preferred alternative compared to any type of work that would attempt to control a natural watercourse.

2.5.5.3 Improvement Alternative

Improving existing dams would provide greater control over reservoir elevations by allowing discharges of floodwaters or by increasing the reservoir capacity to reduce future flooding. Depending on the specific improvement to the dam, one or more of the following methods would be used to achieve the satisfactory level of dryness upstream of the dam: dewatering the existing reservoir, installing a temporary bypass for upstream flows, or installing a temporary cofferdam.

Permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. If the proposed land use as a reservoir does not comply with local zoning statutes, the local government would amend the zoning ordinance appropriately or grant a variance. If existing roads are determined to be within the boundaries of the enlarged reservoir or the revised 100-year floodplain, solutions would be determined with input from appropriate transportation planning agencies.

2.5.5.4 Structural Alternative

Under this alternative, new construction of dams would occur. Permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities may be required. Coordination with the local air district must occur to ensure compliance with California air quality statutes. Temporary and permanent changes to the transportation network would be coordinated with appropriate transportation planning agencies.

2.5.6 Combination Alternative

This alternative would consist of combinations of alternative actions, combinations of project types, or combinations of both. An example of combining alternative actions is constructing additional culverts and improvements to existing culverts (both project components are considered culvert projects). Another example is increasing the capacity of a culvert and increasing the capacity of a detention basin (both are Improved Alternatives). Constructing a new detention basin and installing a concrete channel in an existing drainage ditch would be a combination of both project type and alternative action.

2.6 Comparison of Environmental Impacts

A summary comparison of the influencing factors and environmental impacts, along with programmatic mitigation measures, is in Table 2-1. Environmental impacts are described briefly in the summary table and discussed at length in Chapter 4.

Table 2-1
Impact Summary Matrix

	Buildings, Roads, and Utilities	Drainage Channels	Detention and Retention Basins	Culverts	Dams
Description of Alternative	Some facilities elevated, reconstructed, or floodproofed; others abandoned, demolished, or used in damaged conditions. The function, occupants, and materials of a flood-prone facility may be relocated to an existing facility. Minor changes to existing facility may be made. New facilities may be constructed outside of the floodplain. Alternatives includes property acquisition, proper flood protection for reconstruction, and deed restrictions. Infrastructure improvements may be required.	Some drainage channels improved or relocated; others abandoned or used in damaged conditions. New concrete drainage channels, surface or subsurface RCPs, or drainage swales may be constructed. Realignment of existing channels may be considered. Alternatives include voluntary property acquisition, voluntary property relocations, natural bypasses, deed restrictions, and public education programs. Infrastructure improvements may be required.	Some basins improved**;** others abandoned or used in damaged conditions. New basins may be constructed. Alternatives include voluntary property acquisition, voluntary property relocations, natural bypasses, deed restrictions, and public education programs. Infrastructure improvements may be required.	Some culverts improved**;** others abandoned or used in damaged conditions**.** New culverts may be constructed. Alternatives include voluntary property acquisition, voluntary property relocations, natural bypasses, deed restrictions, and public education programs. Infrastructure improvements may be required.	Some dams improved. New dams may be built. Improvements may include allowing discharges of floodwaters, increasing reservoir capacity, dewatering of existing reservoir, installing bypass for upstream flows, or installing a temporary cofferdam. Alternatives include voluntary property acquisition, voluntary property relocations, natural bypasses, deed restrictions, and public education programs. Infrastructure improvements may be required.
Potential Impacts					
Geology, Geohazards, and Soils Geology, Geohazards, and Soils (continued)	No action: No impact. Non-Structural: No impact. Improvement: Minimal impact to geology and soils for facilities repaired in place, assuming appropriate control of soil erosion and that repaired buildings follow codes designed to minimize earthquake effects. Structural: Erosion control measures minimize short-term soil loss and siltation. Projects would be evaluated to determine whether measures would be needed to mitigate impacts to protected geologic resources and/or soils, or impacts from geohazards. Combined: Previously listed issues may have cumulative impacts greater in magnitude, extent, or duration.	No action: Unrepaired drainage channels could cause increased soil erosion. Non-Structural: Using natural bypasses result in beneficial impacts. Use of a previously unused or under-used natural bypass may result in soil erosion, scouring, and increased streambed load. Erosion control measures minimize short-term soil loss and siltation during construction. Actions would comply with regulations protecting prime farmlands. Improvement: Beneficial impact to soils due to more efficient conveyance of floodwaters. Possible increased in soil deposit downstream. Erosion control measures minimize short-term soil loss and siltation. Structural: Same as for Buildings, Roads and Utilities; in addition, actions would comply with regulations protecting prime farmlands. Combined: Same as for Buildings, Roads and Utilities.	No action: Unrepaired basins could cause increased soil erosion. Non-Structural: Same impacts as for Drainage Channels. Improvement: Beneficial impact of overall reduction in soil loss. Floodplain characteristics would be altered with possible local impacts to prime farmland. Erosion control measures minimize short-term soil loss and siltation. Structural: Same as for Buildings, Roads and Utilities; in addition, potential geohazards, such as failure of basin and flooding in event of earthquake, can be mitigated by using appropriate building techniques. Combined: Same as for Buildings, Roads and Utilities.	No action: Unrepaired existing culverts could alter the floodplain features and cause increased soil erosion. Non-Structural: Same impacts as for Drainage Channels. Improvement: Reduces downstream erosion due to more efficient conveyance of floodwaters. Minimal impact to geology and soils during repairs, assuming appropriate control of soil erosion. Erosion control measures minimize short-term soil loss and siltation. Structural: Same as for Buildings, Roads and Utilities; in addition, actions would comply with regulations protecting prime farmlands. Combined: Same as for Buildings, Roads and Utilities.	No action: Failed or unrepaired dams may alter floodplain characteristics and cause increased soil erosion. Non-Structural: Same impacts as for Drainage Channels. Improvement: Increasing reservoir size may impact prime farmland. Increased downstream channel flow may increase soil erosion and stream scouring. Erosion control measures minimize short-term soil loss and siltation. Structural: Same as for Detention and Retention Basins. Combined: Same as for Buildings, Roads and Utilities.

Table 2-1
Impact Summary Matrix

	Buildings, Roads, and Utilities	Drainage Channels	Detention and Retention Basins	Culverts	Dams
Air Quality	All alternatives: Adverse impacts to air quality could occur affecting both the short- and the long-term. Coordination with the air district would occur prior to project inception to ensure compliance with California air quality regulations.	All alternatives: Same as for Buildings, Roads and Utilities.	All alternatives: Same as for Buildings, Roads and Utilities.	All alternatives: Same as for Buildings, Roads and Utilities.	All alternatives: Same as for Buildings, Roads and Utilities.
Hydrology and Water Quality Hydrology and Water Quality (continued)	No Action: No impact. Non-Structural: Relocating the function of the facility, acquiring facilities and demolishing floodprone properties, and limiting future uses of properties to open space purposes would remove potential point and non-point contaminant sources. Improvement: Elevating or floodproofing facilities would reduce the exposure of floodwaters to pollution sources. Structural: Constructing new facilities would remove potential sources of pollution from the waterway and floodplain area. Combined: In cases where the cumulative impacts would be greater in magnitude, extent, or duration than the sum of the separate impacts, the SEA would identify these cumulative impacts.	No Action: Unrepaired channels may exacerbate future flooding and alter streambed characteristics. Non-Structural: Relocation and property acquisitions have the same impact as for Buildings, Roads, and Utilities. Property owners not participating in program would have same impacts as for No Action Alternative. Educating the public would increase protection of water quality. A permit from USACE and CDFG and coordination with USFWS, CDFG, and local agencies may be required. Improvement: A permit from USACE and CDFG and coordination with USFWS, CDFG, and local agencies may be required. Structural: Beneficial impacts may occur to floodplain if floodwaters were drawn away from developed areas into channelized floodways. A Streambed Alteration Plan may be required from CDFG, Section 404 permit required by USACE, and local/areawide Stormwater Management Plans and Watershed Plan should be consulted for restrictions and guidelines. Coordination with USFWS, CDFG, and local authorities may be necessary. Combined: Same as for Buildings, Roads, and Utilities.	No Action: No impact. Non-Structural: Same as for Drainage Channels. Improvement: Improvements may reduce soil loss. Beneficial impacts to agricultural land and other land uses consistent with floodplain management may occur. Possible negative impact if prime farmland is required for basin construction. Structural: Constructing a basin may increase settling of particulate matter from stormwater runoff. Beneficial impacts may occur by moving waters away from developed areas and into other land uses consistent with floodplain management. Proper maintenance and dredging of basin is important. A Streambed Alteration Plan may be required from CDFG, and local/areawide Stormwater Management Plans and Watershed Plan should be consulted for restrictions and guidelines. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Unrepaired culverts could alter floodplain features and result in soil erosion. Non-Structural: Same as for Drainage Channels. Improvement: Improvements may reduce area exposed to pollutant sources. A permit from USACE, CDFG, and local/municipal agencies may be required. Structural: Runoff into natural waterways will be affected and stormwater runoff patterns will be impacted. A Streambed Alteration Plan may be required from CDFG, and local/areawide Stormwater Management Plans and Watershed Plan should be consulted for restrictions and guidelines. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Unrepaired dams may increase downstream water volume and possibly increase sediment load. Non-Structural: Same as for Drainage Channels. Improvement: Improvements would provide greater control over reservoir elevations, allow particulate matter to settle, reduce exposure of floodwaters to pollutant sources, alter streamflow quantity, and impact natural waterways. A permit from USACE, CDFG, and local/municipal agencies may be required. Structural: Constructing a dam would reduce flooding downstream, sediment load, and exposure to contaminant sources. If inundated areas contain pollutants, impacts are negative. A Streambed Alteration Plan may be required from CDFG, and local/areawide Stormwater Management Plans and Watershed Plan should be consulted for restrictions and guidelines. Combined: Same as for Buildings, Roads, and Utilities.
Floodplain Management	No Action: No impact. Non-Structural: Acquiring flood-	No Action: Unrepaired channels could result in the extent, elevation, or other	No Action: Basins that were not dredged or adequately maintained could result in downstream	No Action: Unrepaired culverts could result in the extent, elevation, or other features of the	No Action: Unrepaired dams could result in floodplain

Table 2-1
Impact Summary Matrix

	Buildings, Roads, and Utilities	Drainage Channels	Detention and Retention Basins	Culverts	Dams
	prone properties, demolishing corresponding structures, and placing deed restrictions limiting future would have a beneficial impact on the floodplain. Downstream land uses would be evaluated for potential impacts. Alternative would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Improvement: Drainage patterns of the floodplains would be restored. There is a potential to increase flow. downstream. Improvements would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Structural: New construction and removal of structures would change floodplain characteristics, increase storage capacity of floodplain, and improve flow within floodway. There is a potential to increase downstream flow. All activities would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Combined: In cases where the cumulative impacts would be greater in magnitude, extent, or duration than the sum of the separate impacts, the SEA would identify these cumulative impacts.	features of the floodplain being altered. Non-Structural: Natural bypasses would impact floodplain beneficially and structures in developed areas would be less prone to future flood damage. Relocation and property acquisition has the same impact as for Buildings, Roads, and Utilities. Alternative would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Improvement: Demonstrated studies/implemented improvements would reduce future flooding and related damages. Measures would beneficially impact floodplain. All activities would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Structural: Demonstrated studies/implemented improvements would reduce future flooding and related damages. Floodwaters will be drawn away from developed areas and into channelized floodways. All activities would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Combined: Same as for Buildings, Roads, and Utilities.	sedimentation and impact floodplain characteristics. Non-Structural: Same as for Drainage Channels. Improvement: Improvements may alter the floodplain characteristics above and below the basin, and reduce flooding and damages in downstream floodprone areas. Beneficial impacts to agricultural land and other land uses consistent with floodplain management may occur. All activities would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Structural: Same as for Improvements Alternative, Detention and Retention Basins. Combined: Same as for Buildings, Roads, and Utilities.	floodplain being altered. Non-Structural: Same as for Drainage Channels. Improvement: Improvements may alter the floodplain characteristics above and below the culvert, and reduce flooding and damages in downstream floodprone areas. Downstream land uses would be evaluated. All activities would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Structural: Impacts would decrease flooding potential, flood related damages, and cause better conveyance of floodwaters away within the floodplain. All activities would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Combined: Same as for Buildings, Roads, and Utilities.	characteristics being altered. Non-Structural: Same as for Drainage Channels. Improvement: Increasing discharges would change floodplain characteristics and increase flooding in the receiving body. All activities would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Structural: Impacts would alter floodplain characteristics above and below dam. Potentially affected land would be evaluated for impacts and management of the project would ensure that flood damage is minimal. All activities would comply with the NFIP, local flood ordinances, EO 11988, and 44 CFR Part 9. Combined: Same as for Buildings, Roads, and Utilities.
Biological Resources	No Action: No impact. Non-Structural: A beneficial impact of increasing net acreage of native habitat occurs, assuming facility footprint is restored with native vegetation. Improvement: Improvements encroaching in new areas may disturb the biology. Permits with USACE and CDFG, and	No Action: Drainage channels that are not repaired could cause streambed scouring and sedimentation. Non-Structural: Permits from USACE and CDFG and coordination with USFWS, CDFG, and local authorities would likely be required. Loss wetland and riparian vegetation and associated wildlife would occur in waterway. A	No Action: Basins that are not dredged or adequately maintained could cause downstream sedimentation. Non-Structural: Same as for Drainage Channels. Improvement: Same as for Buildings, Roads, and Utilities. Structural: Permits with USACE	No Action: No impact. Non-Structural: Same as for Drainage Channels. Improvement: Improvements may reduce scour and sedimentation. Same as for Structural. Structural: Same as for Detention and Retention Basins.	No Action: Unrepaired dams may cause catastrophic flooding, scouring, sedimentation, and native habitat removal. Non-Structural: Same as for Drainage Channels. Improvement: An open water surface creates a beneficial impact to migrating waterfowl. A decrease in downstream winter

Table 2-1
Impact Summary Matrix

	Buildings, Roads, and Utilities	Drainage Channels	Detention and Retention Basins	Culverts	Dams
	coordination with USFWS, CDFG, and local authorities would likely be required for projects. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local levels. Structural: Permits with USACE and CDFG, and coordination with USFWS, CDFG, and local authorities would likely be required for projects. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local levels. Combined: In cases where the cumulative impacts would be greater in magnitude, extent, or duration than the sum of the separate impacts, the SEA would identify these cumulative impacts.	beneficial impact of increasing net acreage of native habitat occurs, assuming facility footprint is restored with native vegetation. Improvement: Where natural stream conditions occur, improvements may cause the same impacts as for Buildings, Roads, and Utilities. Structural: Channel realignments and channelization activities may cause the same impacts as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	and CDFG would be required. and coordination with USFWS, CDFG, and local authorities and compliance with local statutes would be required. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local levels. Combined: Same as for Buildings, Roads, and Utilities.	Combined: Same as for Buildings, Roads, and Utilities.	flows could impact aquatic resources. Other impacts are the same as for Detention and Retention Basins. Structural: A reservoir surface creates a beneficial impact to migrating waterfowl. A decrease in downstream winter flows could impact aquatic resources. Other impacts are the same as for Detention and Retention Basins. Combined: Same as for Buildings, Roads, and Utilities.
Threatened and Endangered Species Threatened and Endangered Species (continued)	No action: Due to ingress and egress of equipment and personnel, potential impacts would be short-term and may include disturbance or displacement of individuals, incidental disruption of suitable habitat, and mortality of individuals. Adherence to stipulations for species that have the potential to occur in the project area as outlined in the programmatic biological opinion would minimize potential impacts on proposed and listed species. Non-Structural: Relocation activities or demolishing may result in the same impacts as listed above in the No-Action Alternative. Improvement: Elevating or floodproofing a facility, widening roads, using areas as borrow material sources may result in the	No action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Improving existing channels or disturbing new areas may result in the same impacts as in Buildings, Roads, and Utilities. Structural: New construction activities , realignment of existing drainage channels, and moving footprint of existing channel may result in the same impacts as in Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	No action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Improvements or disturbances in new areas may result in the same impacts as in Buildings, Roads, and Utilities. Conversion of a dry basin to a pond may create a wetland habitat. Structural: New basin construction may result in the same impacts as in Buildings, Roads, and Utilities. If created basins have a pond, wetland vegetation may develop around perimeter. Combined: Same as for Buildings, Roads, and Utilities.	No action: If damaged culverts are not repaired, the hydrology of the stream channel could be altered and impact suitable habitat along streambanks and may result in the same impacts as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Improvements may result in the same impacts as in Buildings, Roads, and Utilities. Structural: New culvert construction may result in the same impacts as in Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	No action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Improvements or disturbances in new areas may result in the same impacts as in Buildings, Roads, and Utilities. Structural: New construction activities may result in the same impacts as in Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.

Table 2-1 Impact Summary Matrix					
	Buildings, Roads, and Utilities	**Drainage Channels**	**Detention and Retention Basins**	**Culverts**	**Dams**
	same impacts as listed above in the No-Action Alternative. Structural: New construction of a facility outside the 100-year floodplain may result in the same impacts as listed above in the No-Action Alternative. Combined: In cases where the cumulative impacts would be greater in magnitude, extent, or duration than the sum of the separate impacts, the SEA would identify these cumulative impacts.				
Cultural Resources Cultural Resources (continued)	No Action: Since no funding from FEMA, local or state governments would likely demolish or repair historic structures prior to identification, evaluation, or treatment studies. Non-Structural: Coordination with the SHPO and ACHP would be required, pursuant to the PA. Improvement: Actions would be evaluated pursuant to the PA. Structural: Actions would be evaluated pursuant to the PA. Combined: Each alternative would be evaluated pursuant to the PA. Cumulative impacts would be addressed in the SEA.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Same as for Buildings, Roads, and Utilities. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Detention and Retention Basins. Improvement: Same as for Buildings, Roads, and Utilities. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Detention and Retention Basins. Improvement: Same as for Buildings, Roads, and Utilities. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Detention and Retention Basins. Improvement: Same as for Buildings, Roads, and Utilities. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.
Socioeconomics and Public Safety	No Action: The need to rebuild, repair, or relocate damaged facilities would cause adverse financial impacts to residents, businesses, and governments which have no or inadequate flood insurance or which must elevate or floodproof, in accordance with the NFIP. Non-Structural: Relocation would reduce risk for flood damage and risk to human safety. Road	No Action: No impact. Non-Structural: Adverse impacts would occur to renters, residents, and businesses owners due to housing, employment availability, and financial burdens due to relocation. Impacts would be mitigated by complying with the Uniform Relocation Act and the California Government Code. Property relocation projects, natural bypasses, and public education programs would decrease potential property damage and risk to	No Action: No impact. Non-Structural: Same as for Drainage Channels. Improvements: Improvements would reduce potential for flood-related losses to residents, businesses, and government facilities removed from floodplain, decrease risk to human safety for persons using facilities in floodplain, and increase property values of	No Action: No impact. Non-Structural: Same as for Drainage Channels. Improvements: Improvements would reduce potential for flood-related losses to residents, businesses, and government facilities removed from floodplain, decrease risk to human safety for persons using facilities in floodplain, and	No Action: No impact. Non-Structural: Same as for Drainage Channels. Improvements: Same as for Detention and Retention Basins. Structural: Actions would reduce potential for flood-related losses to residents, businesses, and government facilities removed from floodplain, decrease risk to human safety for persons using

Table 2-1
Impact Summary Matrix

	Buildings, Roads, and Utilities	Drainage Channels	Detention and Retention Basins	Culverts	Dams
Socioeconomics and Public Safety (continued)	closures and relocation of services would adversely impact housing and demographics. Impacts would be mitigated by complying with the Uniform Relocation Act and the California Government Code. Demographic and economic indicators for local residents would be studied to determine if greater than 50 percent of minority or low-income persons have the potential to be adversely affected. Improvements: Floodproofing and elevating facilities would reduce risk for future flood damage and related losses, risk to human safety, and increase property values. Adverse impacts could occur to residential and local government expenditures. Impacts would be mitigated by complying with the Uniform Relocation Act and the California Government Code. Demographic and economic indicators for local residents would be studied to determine if more than 50 percent of minority or low-income persons have the potential to be adversely affected. Structural: Relocation outside the floodplain would decrease potential property damage, risk to human safety from future floods, and prevent future losses to business, residents, and governments. Impacts would be mitigated by complying with the Uniform Relocation Act and the California Government Code. Road closures and relocation of services would adversely impact housing and demographics. Demographic and economic indicators for local residents would be studied to determine if a more than 50 percent of minority or low-income persons have the potential	human safety from future floods. Demographic and economic indicators for local residents would be studied to determine if greater than 50 percent of minority or low-income persons have the potential to be adversely affected. Improvements: Improvements would reduce potential for flood-related losses to residents, businesses, and government facilities removed from floodplain, decrease risk to human safety for persons using facilities in floodplain, and increase property values of structures removed. Property values of homes on or within view of channels may have decreased property value. If actions include property acquisition, impacts to property owners are same as listed in Non-Structural Alternative, Drainage Channels. Demographic and economic indicators for local residents would be studied to determine if more than 50 percent of minority or low-income persons have the potential to be adversely affected. Structural: Actions would reduce potential for flood-related losses to residents, businesses, and government facilities removed from floodplain, decrease risk to human safety for persons using facilities in floodplain, and increase property values of structures removed. Property values of homes on or within view of channels may have decreased property value. If actions include property acquisition, impacts to property owners are same as listed in Non-Structural Alternative. Demographic and economic indicators for local residents would be studied to determine if a more than 50 percent of minority or low-income persons have the potential to be adversely affected. Combined: Same as for Buildings, Roads, and Utilities.	structures removed. For projects increasing extent of basin or convert a dry basin to a pond, acquisition of land may be required. Impacts are similar as those listed for Non-Structural Alternative, Drainage Channels. Property owners may be able to use property consistent with floodplain management. Demographic and economic indicators for local residents would be studied to determine if more than 50 percent of minority or low-income persons have the potential to be adversely affected. Structural: Actions would reduce potential for flood-related losses to residents, businesses, and government facilities removed from floodplain, decrease risk to human safety for persons using facilities in floodplain, and increase property values of structures removed. Acquisition of properties would be required, impacts landowners as listed in Non-Structural, Drainage Channels. Demographic and economic indicators for local residents would be studied to determine if a more than 50 percent of minority or low-income persons have the potential to be adversely affected. Combined: Same as for Buildings, Roads, and Utilities.	increase property values of structures removed. Demographic and economic indicators for local residents would be studied to determine if more than 50 percent of minority or low-income persons have the potential to be adversely affected. Structural: Actions would reduce potential for flood-related losses to residents, businesses, and government facilities removed from floodplain, decrease risk to human safety for persons using facilities in floodplain, and increase property values of structures removed. Demographic and economic indicators for local residents would be studied to determine if more than 50 percent of minority or low-income persons have the potential to be adversely affected. Combined: Same as for Buildings, Roads, and Utilities	facilities in floodplain, and increase property values of structures removed. Acquisition of land may be required, impacts to property owners are similar as those listed for Non-Structural Alternative, Drainage Channels. Additional indirect impacts could occur, inducing development in the area surrounding the reservoir. SEA would need to analyze indirect impacts. Demographic and economic indicators for local residents would be studied to determine if more than 50 percent of minority or low-income persons have the potential to be adversely affected. Combined: Same as for Buildings, Roads, and Utilities.

Table 2-1 Impact Summary Matrix					
	Buildings, Roads, and Utilities	**Drainage Channels**	**Detention and Retention Basins**	**Culverts**	**Dams**
	to be adversely affected. Combined: In cases where the cumulative impacts would be greater in magnitude, extent, or duration than the sum of the separate impacts, the SEA would identify these cumulative impacts.				
Land Use and Zoning Land Use and Zoning (continued)	No action: No impact. Non-Structural: Projects would be evaluated for compliance with local zoning ordinance. If necessary, local governments would amend their zoning ordinance or grant variances so that areas proposed for relocation and acquisition comply with land uses of relocated properties. Improvement: If necessary, local governments would grant variances for improvements to properties with non-conforming uses so that floodproofing or elevation measures would comply with local regulations. Structural: New construction projects would be evaluated for compliance with local zoning ordinance. If necessary, local governments would amend their zoning ordinance or grant variances so that areas proposed for relocation and acquisition comply with land uses of relocated properties. Combined: Projects that combine two or more alternatives would have impacts as described separately for each alternative component.	No action: No impact. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Projects that increase channel width would be evaluated for compliance with local zoning ordinance. If necessary, local governments would grant variances for improvements to properties with non-conforming uses so that flood protection measures would comply with local regulations. Structural: New construction projects would be evaluated for compliance with local zoning ordinance. If necessary, local governments would grant variances for improvements to properties with non-conforming uses so that flood protection measures would comply with local regulations Combined: Same as for Buildings, Roads, and Utilities.	No action: No impact. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Projects that increase extent of a sedimentation pool would be evaluated for compliance with local zoning ordinance. If necessary, local governments would amend their zoning ordinance or grant variances. Structural: New construction projects would be evaluated for compliance with local zoning ordinance. If necessary, local governments would amend their zoning ordinance or grant variances. Combined: Same as for Buildings, Roads, and Utilities.	No action: No impact. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: No impact. Structural: No impact. Combined: Same as for Buildings, Roads, and Utilities.	No action: No impact. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Projects that increase extent of a reservoir would be evaluated for compliance with local zoning ordinance. If necessary, local governments would amend their zoning ordinance or grant variances Structural: Same as for Detention and Retention Basins. Combined: Same as for Buildings, Roads, and Utilities.
Public Services	No Action: Impacts from future flooding include the closing of schools, hospitals, and recreational facilities; police and fire	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings,	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for

Table 2-1
Impact Summary Matrix

	Buildings, Roads, and Utilities	Drainage Channels	Detention and Retention Basins	Culverts	Dams
Public Services (continued)	departments not having full and safe access to equipment; and utilities not functioning to capacity. Non-Structural: Beneficial impacts would occur by reducing the risk of future flood. Adverse impacts involve changes in proximity between public facilities and their customers. Individual projects would be evaluated for potential effects and mitigated appropriately. Improvements: Beneficial impacts would occur by reducing the risk of future flood. Adverse impacts for improved facilities and public services involve the temporary closure or relocation of the facilities. Structural: Same as for Non-Structural. Combined: In cases where the cumulative impacts would be greater in magnitude, extent, or duration than the sum of the separate impacts, the SEA would identify these cumulative impacts.	Roads, and Utilities. Improvement: Beneficial impacts would occur by reducing the risk of future flood. Structural: Beneficial impacts would occur by reducing the risk of future flood. If roads or bridges are temporarily closed as a result of an action, public services may be forced to take detours and likely be delayed. Combined: Same as for Buildings, Roads, and Utilities.	Buildings, Roads, and Utilities. Improvement: Beneficial impacts would occur by reducing the risk of future flood. Adverse impacts involve changes in proximity between public facilities and their customers. Structural: Same as for Drainage Channels. Combined: Same as for Buildings, Roads, and Utilities.	Buildings, Roads, and Utilities. Improvement: Same as for Detention and Retention Basins. Also, if roads or bridges are temporarily closed as a result of an action, public services may be forced to take detours and likely be delayed. Structural: Same as for Drainage Channels. Combined: Same as for Buildings, Roads, and Utilities.	Buildings, Roads, and Utilities. Improvement: Same as for Culverts. Structural: Same as for Drainage Channels. In addition, development may be induced in the area surrounding the reservoir. Indirect impacts, providing services for new community, would need to be analyzed by SEA. Combined: Same as for Buildings, Roads, and Utilities.
Transportation	No Action: Repairs to damaged facilities would cause temporary congestion, delays, and possible detours. Roads that are not repaired would impact traffic by being closed, functioning below capacity, or decreasing the comfort of road users. Non-Structural: Actions would temporarily increase traffic causing congestion, delays, and possible detours. Affected roads/routes would be reviewed to determine if existing roads/services would adequately handle permanent relocations.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. In addition, constructing new structures could permanently affect traffic and transportation. The creation of new roads/routes would be coordinated with appropriate transportation planning agencies. Improvement: No impact. Structural: If proposed alignment requires new road or bridge, the proposed action would be coordinated with appropriate transportation planning agencies.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Drainage Channels. Improvement: If roads are within area of action or within 100-year floodplain, alternates routes, road elevation, and new road construction would be considered. Structural: Same as Improvement. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Drainage Channels. Improvement: Improvements to culverts that carry water under roads may cause temporary congestion, delays, and possible detours. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies. Structural: Construction of culverts that carry water under roads may cause temporary	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Drainage Channels. Improvement: Same as for Detention and Retention Basins. Structural: Same as for Detention and Retention Basins. Combined: Same as for Buildings, Roads, and Utilities.

Table 2-1
Impact Summary Matrix

	Buildings, Roads, and Utilities	Drainage Channels	Detention and Retention Basins	Culverts	Dams
Transportation (continued)	Improvement: Improvements would cause temporary congestion, delays, and possible detours. Subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies. Structural: Actions would temporarily increase traffic congestion, delays, and possible detours. Subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies. Affected services would be reviewed to determine if they would adequately handle permanent relocations. Combined: Where cumulative impacts would be greater in magnitude, extent, or duration than the sum of the separate impacts, SEA would identify these cumulative impacts.	Combined: Same as for Buildings, Roads, and Utilities.		congestion, delays, and possible detours. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies. Combined: Same as for Buildings, Roads, and Utilities.	
Noise	No Action, Non-Structural, and Improvement: Temporary noise sources are expected to be operated in compliance with local noise ordinance. No permanent noise would be created. Structural: Temporary noise sources are expected to be operated in compliance with local noise ordinance. No permanent noise would be created. Local noise ordinances would be reviewed for potential impacts caused by relocating permanent noise-generating land uses. Combined: In cases where the cumulative impacts would be greater in magnitude, extent, or duration than the sum of the separate impacts, the SEA would identify these cumulative impacts.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities; in addition, local noise ordinances would be reviewed for potential impacts caused by relocating permanent noise-generating land uses. Improvement: Same as for Buildings, Roads, and Utilities Structural: Same as for Buildings, Roads, and Utilities Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Same as for Buildings, Roads, and Utilities. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Same as for Buildings, Roads, and Utilities. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Buildings, Roads, and Utilities. Non-Structural: Same as for Buildings, Roads, and Utilities. Improvement: Same as for Buildings, Roads, and Utilities. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.

Table 2-1
Impact Summary Matrix

	Buildings, Roads, and Utilities	Drainage Channels	Detention and Retention Basins	Culverts	Dams
Hazardous Materials and Wastes Hazardous Materials and Wastes (continued)	No Action: Abandoning buildings could result in improper abatement of asbestos and lead. Non-Structural: Demolishing existing structures would be completed in compliance with the applicable regulations associated with asbestos and lead abatement and UST closures. Coordination with the Air District, the Water Resource Board, ARB, and the USEPA would be required. Improvement: Same as Non-Structural. Structural: Same as Non-Structural. In addition, an ESA would be conducted on the proposed site. Combined: When combined actions include demolition or acquiring new property, an ESA would be conducted on the proposed site, closure and handling requirements relating to asbestos and lead abatement and UST closures must be followed. Coordination with the Air District, the Water Resource Board, ARB, and the USEPA would be required.	No Action: An adverse impact may occur if flooding would continue to affect areas where USTs were located. Inundated soils may cause shifting of USTs and associated piping may burst. Non-Structural: Same as for Buildings, Roads, and Utilities. Also, an ESA would be conducted on the proposed site. Improvement: No impact. Structural: When actions include acquisition of property, an ESA would be conducted on the proposed site. Coordination with the Air District, the Water Resource Board, ARB, and the USEPA would be required. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Drainage Channels. Non-Structural: Same as for Drainage Channels. Improvement: Improvements may require additional land be used. An ESA would be conducted on the proposed site. Coordination with the Air District, the Water Resource Board, ARB, and the USEPA would be required. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Drainage Channels. Non-Structural: Same as for Drainage Channels. Improvement: No impact. Structural: An ESA would be conducted on the proposed site. Combined: Same as for Buildings, Roads, and Utilities.	No Action: Same as for Drainage Channels. Non-Structural: Same as for Drainage Channels. Improvement: Improvements may require additional land be used. An ESA would be conducted on the proposed site. Structural: Same as for Buildings, Roads, and Utilities. Combined: Same as for Buildings, Roads, and Utilities.

This chapter describes the existing conditions for each resource category, including applicable statutes. Some resources have more or less information than others concerning the existing conditions and regulatory background. The difference between resources depends on the nature of the resource and is not an indicator of the resource's importance. For example, geology, geohazards, and soils are easily described on a regional basis and have Federal statutes that apply to development; therefore this section is relatively long. By contrast, land use and zoning are primarily contingent on local plans and statutes, which are impossible to describe in a document that considers the entire state; therefore, this section is relatively short.

California has many unique geological features, including: the Sierra Nevada Mountains, major volcanoes, the San Andreas Fault, Death Valley, the Salton Sea, extensive sand dune fields, and the La Brae Tar Pits. Additionally, state-designated mineral resource areas are commonly located in areas subject to flooding, such as designated aggregate resource areas in stream and river beds. The presence and locations of unique geologic resources and designated mineral resources are included on maps in county and city general plans.

3.1 Geology, Geohazards, and Soils

3.1.1 Geology

California is an area of complex geology and diverse geologic terranes. The state is divided into eleven geomorphic sections (refer to Exhibit 3-1).

3.1.1.1 Klamath Mountains, Modoc Plateau, and Cascade Range

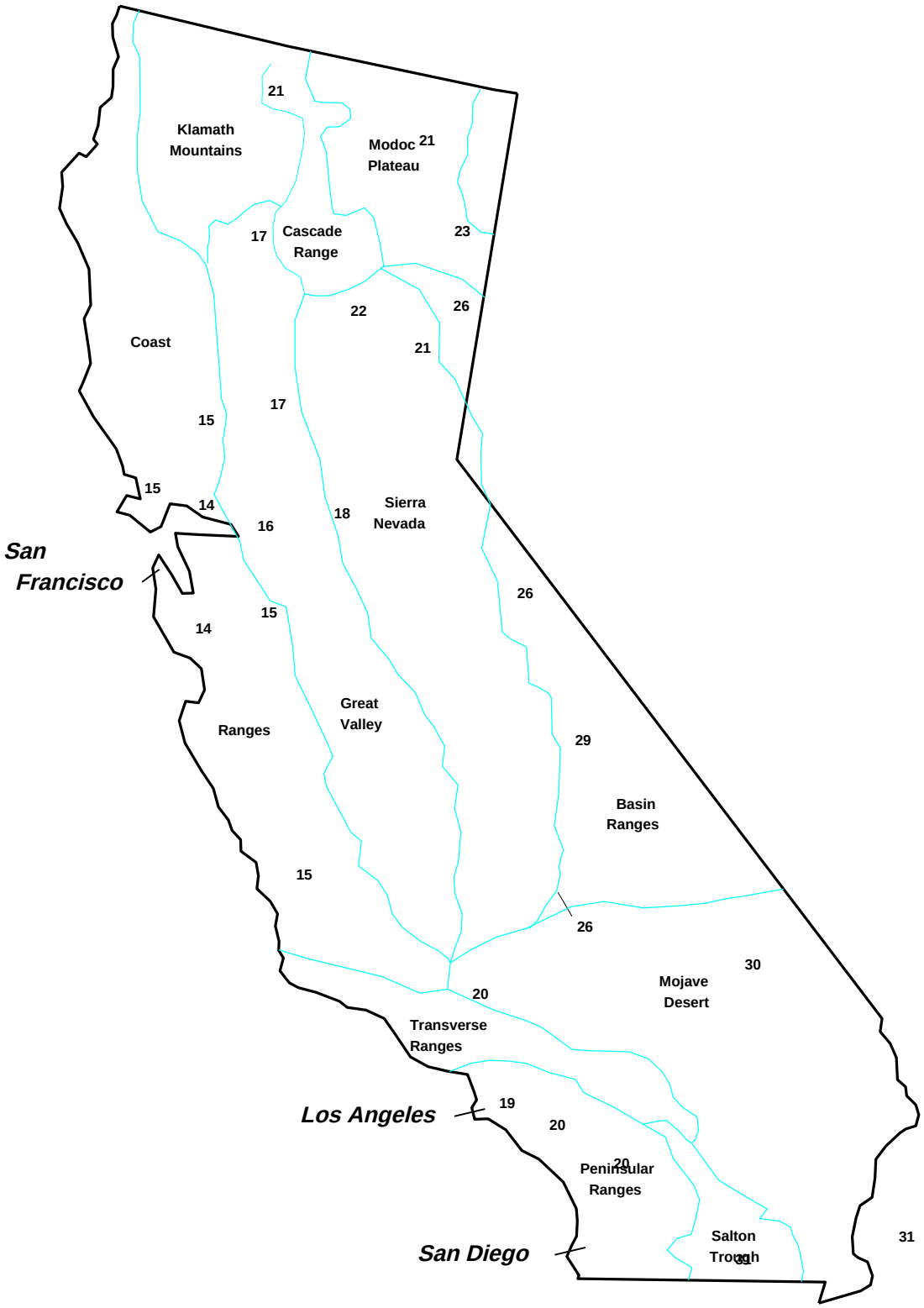
These are mountainous sections comprised of metamorphosed sedimentary and volcanic rocks, as well as more recent volcanic cones, lava (basalt) flows, and tuff (volcanic ash) beds. These include Mount Lassen (an active volcano) and Mount Shasta (active), which reaches an elevation of 14,162 feet above mean sea level.

3.1.1.2 Coast Ranges

A series of relatively parallel mountain ranges and valleys which comprise the Coast Ranges. These ranges are dissected by many active faults, including the San Andreas.

3.1.1.3 Great Valley

A vast sedimentary alluvial plain on the west side of the Sierra Nevada Mountains. This plain is the drainage basin for most of California's rivers which originate in the mountains.



CLIENT	CEMAT	TITLE	GEOMORPHIC PROVINCES GEOMORPHIC SECTIONS	
PROJ	PEMAC-PEA			
REVISION NO	REVNO	DES BY	DES	DESDATE
SCALE	SCALE	DR BY	DML	DRAWDATE
FILE	DRAWING NAME	CHK BY	CHECKER	CHKDATE

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PROJ NO PROJNO
EXHIBIT 3-14

3.1.1.4 Sierra Nevada

Westward-tilted fault block of Paleozoic and Mesozoic metasediments and volcanics intruded by a Mesozoic granitic batholith which now form the Sierra Nevada Mountains. The Sierra Nevada Mountains have a gentle western slope and a steep eastern slope.

3.1.1.5 Basin Ranges

East of the Sierra Nevada Mountains is an area of tilted fault blocks forming parallel north-south trending mountains with basins between.

3.1.1.6 Transverse Ranges

Transverse Ranges are a series of parallel ranges and valleys trending east-west in contrast to the north-south pattern of other geomorphic sections.

3.1.1.7 Mojave Desert

The Mojave Desert, in southeastern California, is a vast area of isolated mountains separated by expanses of alluvial fans.

3.1.1.8 Peninsular Ranges

Geologically similar to the Sierra Nevada Mountains, comprised of granitic intrusive rocks, but geomorphically similar to the Coast Ranges Province.

3.1.1.9 Salton Basin (Colorado Desert)

Low-lying basin located east of the Peninsular Ranges. Part of the basin lies below mean sea level.

3.1.2 Geohazards

Geohazards may affect project facilities including pipelines or linear structures, new facilities, and detention/retention basins through landslides, subsidence, and earthquake-related effects such as surface fault rupture, ground shaking, and liquefaction.

3.1.2.1 Landslides

Landslides are common after flooding events and after earthquakes of sufficient magnitude to disturb slope stability. Landslides can cause significant damage to structures of any type. The placement of critical structures or inhabited buildings in landslide-prone areas can be avoided by appropriate planning. County and city general plans include maps of areas considered to be at risk from slope failure.

3.1.2.2 Subsidence

Land surface subsidence can be induced by both natural and human phenomena. Natural phenomena include soil subsidence due to consolidation, hydrocompaction, or rapid sedimentation. Human activity can induce subsidence through removal of subsurface fluid or sediment, including mining or removal of groundwater from underlying aquifers. Subsidence of the ground surface can affect linear features, such as pipelines or lined channels. County and city general plans include maps of areas impacted by subsidence.

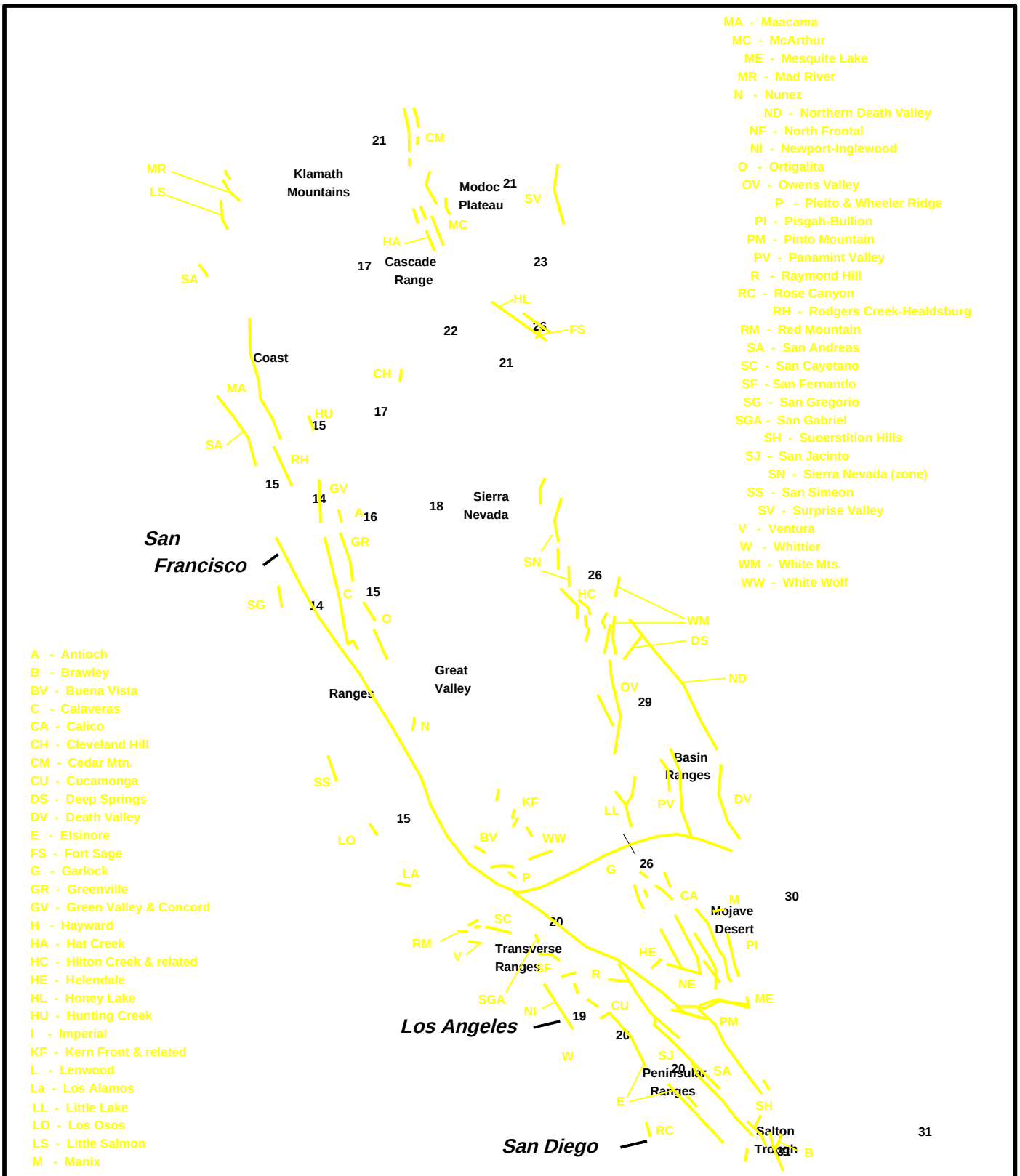
3.1.2.3 Earthquakes

California is dissected by many earthquake-producing faults, large and small. As a result, most of California is subject to earthquake hazards. Earthquakes are sudden releases of strain energy stored in the earth's bedrock. Information on earthquakes and fault traces (courses) can be obtained from the U.S. Geological Survey's National Earthquake Information Center in Denver, and the California Division of Mines and Geology in Sacramento. The major effects of earthquakes are surface rupture, ground shaking and other forms of ground failure including liquefaction and subsidence. These effects are described below.

Surface fault rupture: The ground surface within 50 feet of an active fault trace is considered to be in the fault rupture hazard zone and therefore subject to possible rupture from fault movement. No structure for human occupancy is permitted on the trace of an active fault. Active faults are considered faults which have been active during the Holocene period, approximately the last 10,000 years (Hart, 1992). Potentially active faults are those faults which have been active during the Quaternary period, approximately the last 3 million years. In addition to faults which have been classified as active or potentially active, there are others whose activity has not been clearly established by currently available information. Identified active faults in California have been mapped under the Alquist-Priolo Special Studies Zones Act and are indicated in Exhibit 3-2.

Ground shaking: Solid ground or rock tends to dampen seismic motion while poorly consolidated and water-saturated materials amplify seismic motion. Areas situated on hard bedrock with little soil cover may be expected to perform satisfactorily during earthquakes. Areas underlain by weakly consolidated materials, such as alluvial fans, large floodplains, bay and delta deposits, and artificial fill are generally considered more vulnerable to damage due to groundshaking.

Liquefaction: Liquefaction is a form of ground failure caused by earthquake motion in water-saturated, unconsolidated, relatively clay-free silts and sands. The result is a "quicksand-like" condition caused by hydraulic pressure (from earthquake motion) forcing soil particles apart and into quicksand-like liquid suspension. Normally firm, but wet, ground materials thus like liquids and can cause catastrophic ground failure including: landslides; settling and tilting of structures; water, sewer, natural gas pipeline ruptures; and failure of dams and other water-retaining structures.



CLIENT	CEMAT	TITLE	ACTIVE FAULTS IN CALIFORNIA AND THE ADJACENT ACTIVE FAULTS	
PROJ	PEER-PEA			
REVISION NO	REVNO	DES BY	DES	DESDATE
SCALE	SCALE	DR BY	DML	DRAWNDATE
FILE	DRAWING	CHK BY	CHECKER	CHKDATE

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Partnership for Response and Recovery

PROJ NO PROJNO
EXHIBIT 3-12

3.1.3 Regulatory Framework for Geology and Geohazards

3.1.3.1 Federal

EO 12699 (Seismic Safety) requires new buildings to be constructed according to current and appropriate seismic design and construction standards in order to reduce the likelihood of damage due to earthquakes.

3.1.3.2 California State

The major state legislation regarding earthquake fault zones is the Alquist-Priolo Special Studies Zones Act of 1972. The purpose of the Alquist-Priolo Special Studies Zones Act is to regulate development near active faults to mitigate the hazard of surface fault rupture. Under this act, the State Geologist is required to delineate "special studies zones" along known active faults in California. Cities and counties affected by the zones must regulate development projects within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface rupture from future earthquakes. The Alquist-Priolo Special Studies Zones Act states that "no structure for human occupancy defined as a 'project' is permitted on the trace [course] of an active fault." A statewide map indicating the principal active faults that are zoned for special studies under the Alquist-Priolo Special Studies Zones Act is shown in Exhibit 3-2.

3.1.3.3 County and City

Counties and cities have developed general plans that include county (or city) specific descriptions of the geology and seismic hazards as well as specific building restrictions. As part of the environmental review process and as part of general plan requirements, a site-specific geologic report may be required in areas with known or suspected active faults; additionally, implementing mitigation measures to offset seismic hazards, especially for facilities considered as critical, may be required.

3.1.4 Soils

California has been divided by the U.S. Department of Agriculture (USDA) into three broad land resource regions including the "Northwestern Forest, Forage, and Specialty Crop Region", the "California Subtropical Fruit, Truck and Specialty Crop Region" and the "Western Range and Irrigated Region"; each of these is further subdivided. These land resource regions and general soil categories are summarized on Table 3-1.

The California Department of Conservation maintains a Farmland Mapping and Monitoring Program for planning present and future use of agricultural land resources. Using Land Inventory and Monitoring (LIM) criteria and maps begun under the Important Farmland Mapping project by the NRCS, California has identified 8 mapping categories as described on Table 3-1. This is a non-regulatory program and is intended to provide consistent, impartial analysis of agricultural land use.

Table 3-1 Soil Mapping Categories	
Prime Farmland:	The soils have relatively dry (xeric, ustic, or aridic (torric)) moisture regimes in which the available water capacity is at least 4.0 inches per 40 to 60 inches of soil, and agriculture requires developed irrigation water supplies that are dependable and of adequate quality. A dependable water supply is one that is available for the production of the common crops in 8 out of 10 years. The soils have a temperature regime that range from frigid (cold), mesic, thermic, through hyperthermic (very warm). These are soils that, at a depth of 20 inches, have a mean annual temperature higher than 32 degrees Fahrenheit (°F). In addition, the mean summer temperature at this depth in soils with an O (top soil) horizon is higher than 47 °F; in soils that have no O horizon, the mean summer temperature is higher than 59 °F. The soils have a pH that range between 4.5 (moderately acidic) and 8.4 (moderately alkaline) in all soil horizons within 40 inches of the surface. The soils have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow common crops to be grown.
Farmland of Statewide Importance:	Land similar to Prime Farmland that has a good combination of physical and chemical characteristics for agricultural crop production. This land has minor shortcomings, such as greater slopes or less soil moisture storage capacity than Prime Farmland. Land must have been used for production of irrigated crops at some time during the four-year period before the mapping date.
Unique Farmland:	Lesser quality soils used for production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards in some climatic zones. Land must have been cropped at some time during the four-year period before the mapping date.
Farmland of Local Importance:	Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee.
Grazing Land:	Land with existing vegetation that is suitable for livestock grazing. This category is used only in California and was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. The minimum mapping unit for Grazing Land is 40 acres.
Urban and Built-up Land:	Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel.
Other Land:	Land that does not meet the criteria of any other category.
Water:	Water areas covering at least 40 acres.

3.1.5 Regulatory Framework for Soils

3.1.5.1 Federal

NRCS Important Farmland mapping produced agricultural resource maps using a series of definitions known as the LIM criteria to designate land suitability for agricultural production. These maps are available from the NRCS offices located in each state.

3.1.5.2 State

The Office of Land Conservation, under the California Department of Conservation, maintains four programs that monitor and protect California's farmland and soil resources: the Agricultural Land Stewardship Program, the Soil Resource Protection Program, the Williamson Act Program, and the Farmland Mapping and Monitoring Program. Each of these programs must be considered in reviewing impacts to farmland soils.

- *Agricultural Land Stewardship Program* - This program is designed as an incentive to promote long-term protection of the state's productive agricultural lands from urban development and provides funding to purchase development rights from agricultural landowners.
- *Soil Resource Protection Program* - The Soil Resource Protection Program operates under the guidelines of the state's Soil Conservation Plan for California, which identifies ways to deal with soil resource problems such as soil erosion, salinity, and contamination.
- *Williamson Act Program* - The Williamson Act was created to balance the pressure of urban growth on farmlands, by providing incentives for farmers and ranchers to remain in agriculture. This voluntary land conservation program is administered by counties and cities.
- *Farmland Mapping and Monitoring Program* - This program monitors land use change affecting California's agricultural land. The program produces and provides maps and data for assessing and planning agricultural resources.

3.1.5.3 County/City

Under the California Farmland Mapping and Monitoring Program, each county defines lands to be considered Farmland of Local Importance; this land is either currently producing, or has the capability of production but does not meet the criteria of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The relevant county/city general plan or the California Department of Conservation Farmland Maps should be reviewed.

3.1.6 Potential Impacts

Potential impacts related to geology and soils are primarily related to relocation of structures into geologically sensitive areas; to geohazards and resulting potential earthquake damage to proposed new facilities; and to possible impacts to soils depending on facility siting and construction requirements.

To avoid potential impacts to unique geologic resources and designated mineral resource areas, the relevant county and city general plan should be consulted before siting new facilities. Local general plans will also include maps showing areas permitted for mining under Conditional Use Permits.

Geohazards may affect a project through landslides, subsidence, and earthquake-related effects including surface fault rupture, ground shaking, and liquefaction. Depending on the severity of the geologic event (e.g., earthquake), secondary effects such as localized flooding and structural damage could occur. Potential risks associated with geohazards can normally be reduced to acceptable levels via proper design. Appropriate geotechnical studies and engineering designs should be used to design earthquake resistant facilities and to mitigate liquefaction and other seismic hazards to acceptable levels.

Impacts to soils are generally due either to soil disturbance as a result of the project type, disturbance during construction (increased or accelerated erosion), or loss of prime agricultural soils due to development.

3.2 Air Quality

3.2.1 Background in air quality management in California

Air quality in California is managed through the Clean Air Act of 1970, the 1990 Clean Air Act Amendments, and the California Clean Air Act of 1988. The Federal and state Clean Air Acts are implemented through a 3-point strategy: local controls for managing stationary, non-vehicular sources and permitting; state controls for setting emissions for motor vehicles, fuels, and consumer products; and Federal controls for interstate pollutants (Marvin, 1997). To further support the goal of reduced emissions, the State Implementation Plan (SIP) was adopted in 1994 as an approach to reduce air pollution region by region in future years. This plan contains measures that would allow each region to reach attainment status (meet the primary standard for all air quality criteria). Although the Federal and the state government play a role in managing California's air quality, the acts are implemented primarily at the local level.

California has 58 counties, and county air quality is managed by one of the 35 Air Quality Management Districts (AQMDs) located across the state. California is divided geographically into 14 air basins to manage air quality on a regional basis. Each air district is responsible for controlling air pollution within the district to meet all state and Federal air quality standards. Using regional air quality data, each air district adopts its own statutes to deal with the air quality problems particular to that region. This includes setting emission limits for stationary sources, such as factories and power plants. In addition, each district develops its own clean air plan and enforces local pollution control laws. Because the air quality problems vary from county to county, each air district has its own requirements for managing air quality.

The California ARB assists air districts with setting appropriate emissions limits, enforcing laws, and providing technical staff and equipment when needed. The ARB also sets air quality

standards; identifies and sets control measures for toxic air contaminants; and oversees and assists the air quality districts (ARB, 1997c).

3.2.2 Applicable air quality statutes

Several statutes exist to manage California air quality, and many may apply to a particular project, however two statutes in particular are perhaps the most applicable to potential Federal projects: the New Source Review (NSR) permitting process statutes; and the Federal General Conformity Rule (GCR). The NSR is part of the Federal Clean Air Act, but was more stringently adopted in California (Popejoy, 1997). Under this permitting process, any new potential source of emissions may have to be permitted by the air districts. Even temporary sources, such as increased particulate matter less than 10 micrometers in diameter (PM-10) due to construction, may require a permit, depending on the district and their air quality. In most cases, a permit may not be required for temporary, small-scale construction measures. However, the air district associated with the project must be contacted to ultimately determine regulation applicability, regardless of project scale.

The Federal GCR was established in 1994 to implement the Clean Air Act Amendments of 1990. This rule 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, except:

- Actions specifically included in a transportation plan or program
- Actions resulting in emissions below the specified threshold level
- Other actions that are exempt or presumed to conform.

Of the listed actions, the following are the most relevant to FEMA projects: projects under NSR; emergency actions; mitigation specifically required by environmental laws; planning studies; routine maintenance and repairs; and permits or licenses for activities that will be similar to ongoing activities (40 CFR Part 51.853).

If a project is not exempted under the GCR, a project must be reviewed to determine if it conforms for each criteria pollutant. The GCR, its exemptions, or the need for further analysis under the GCR may apply to the project. As with any new project, coordination with the appropriate air district is necessary before project inception to determine which statutes apply to the project (Parker, 1997).

The requirement to comply with California air quality varies depending on which air district the project is taking place. As a general rule, projects involving construction or demolition may increase the level of air pollutants beyond the established threshold. If this is the case, the air

district could require that a permit be obtained, and suggest methods to decrease potential air quality impacts. As an example, the district may determine that dam construction would increase local particulate and carbon monoxide levels during construction. A district may then mandate that watering practices be used to reduce the amount of dust and dirt in the area, and regulate the use of large engine vehicles to certain time periods. In order to ensure compliance with these regional-specific laws, coordination with the air district must take place before project inception. A brief project description will be required for the district to determine if a permit is needed.

3.2.3 Summary of California air quality for the criteria air pollutants

In general, California's air quality is managed so that its regions may meet attainment for each of the criteria air pollutants. Although the air quality for the individual regions could vary widely, California's air quality has improved greatly since 1947. Table 3-2 shows current attainment and non-attainment counties or air basins in California.

3.3 Hydrology And Water Quality

About 75 percent of California's available water originates north of Sacramento and approximately 75 percent of its water requirements occur south of this area. Furthermore, most of the state's precipitation falls during the winter, while the highest need is during the spring and summer. Of the annual runoff, approximately 32 percent flows into rivers and ultimately into the ocean, 29 percent is protected under the wild and scenic river system or used for delta fresh water and fish flow requirements, 6 percent is used for municipalities and industry. Agriculture uses 31 percent of the state's runoff (85 percent of the developed water supply) (Water Education Foundation, California Water Map, 1997).

Water storage, diversion, and distribution systems handle about 60 percent of the state's water requirement; included in these systems are the Federal Central Valley Project, the State Water Project, and miscellaneous regional and local water agency projects. Water quality is vitally important in California and is carefully monitored and regulated by numerous Federal, state, and local agencies.

3.3.1 Regulatory Framework for Hydrology and Water Quality

Water quality and the beneficial uses of water are protected by Federal statutes and EOs, state statutes, and state agency regulations and directives. Many statutes control activities that indirectly impact water quality, such as EOs 11990 and 11988 on Floodplain and Wetlands Protection. These statutes are described in other sections of this PEA, where relevant.

Table 3-2
Attainment and Nonattainment Status in California

Pollutant	Air Basin or County Designation

Table 3-2
Attainment and Nonattainment Status in California

Pollutant	Air Basin or County Designation
Ozone	All air basins are in N for this pollutant except: North Coast (A), Northeast Plateau (A), Butte County (T), Glenn County (T), Alpine County (U), Inyo County (U), Plumas County (U), Sierra County (U), and Lake Tahoe and Lake County Air Basins (both A).
Carbon Monoxide	Most areas are U for this pollutant. Counties and basins designated as being in A: San Francisco air basin, South Central Coast air basin, Lake County air basin, and Humboldt, Mendocino, Monterey, Orange, Riverside, San Bernardino, Butte, Placer, Sacramento, Solano, Sutter, Yolo, rural Fresno, Kern, San Joaquin, Stanislaus, Tulare, Inyo, Mono, Los Angeles, Riverside, Plumas, and Tuolomne. Counties in T: portion of Los Angeles County, Fresno urbanized area, and El Dorado County.
Nitrogen Dioxide	All air basins are in A for this pollutant
Sulfur Dioxide	All air basins are in A for this pollutant
PM-10	All air basins are in N for this pollutant except Lassen (U), Amodor (U), Mariposa (U), Tuolomne counties, and the Lake Tahoe Air Basin.
Sulfates	All basins are in A except for Searles Valley Planning area in the Mojave Desert Air Basin.
Lead	All basins are in A for this pollutant
Hydrogen Sulfide	All basins are U for this pollutant, except for parts of Humboldt (A), Geyser Geothermal Area (A), San Luis Obispo (A), Santa Barbara (A), Mono (A), Inyo (A), Searles Valley Planning Area (N), City of Sutter Creek (N) Counties, and the Lake Tahoe Air Basin (A).
Visibility Reducing Particles	All basins are U for this pollutant, except the Lake County Air Basin (A).

A - Attainment (an area that did not violate the state standard in 3 years)

N - Nonattainment (an area that violated the state standard for that pollutant at least once in 3 years)

T - Nonattainment-Transitional (an area that has violated the state standard 2 or fewer times at each test site in the area in the previous year)

U - Unclassified (an area that cannot be designated A or N due to lack of data)

Source: ARB, 1997d.

3.3.1.1 Federal

The CWA regulates water quality of all discharges into "waters of the United States (US)". Both wetlands and "dry washes" (channel that carry intermittent or seasonal flow) are considered "waters of the US". California has adopted equivalent or more stringent statutes than the Federal statutes and these are enforced by the California State Water Resources Control Board and Regional Water Quality Control Boards (RWQCBs).

3.3.1.2 State of California

The State Water Resources Control Board and the RWQCB work together to protect California's water resources and are responsible for establishing water quality standards and objectives which protect the beneficial uses of different waters. The nine RWQCBs are responsible for protecting the surface, ground, and coastal waters from pollution originating from point sources (i.e., sewage treatment plant discharge) and non-point sources (i.e., runoff from urban paved areas, mines, cattle farms). Modifications and/or new construction of a facility may require one or more of the following permits from the RWQCB; the applicant should contact the RWQCB if there is any possibility of needing one of the following permits:

- National Pollution Discharge Elimination System (NPDES) General Permit

  This permit may be required if an industrial, agricultural, or commercial facility is constructed or moved and if the facility discharges any waters other than to the sanitary sewer.

- NPDES Stormwater Construction Permit

  This permit is required for any construction activity that will affect 5 acres or more, unless there are local restrictions that impose a smaller acreage. Specifically excluded is construction activity that includes "routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility." Applicants should contact the local RWQCB if they are not sure whether a permit is required.

- NPDES Stormwater Industrial Permit

  Stormwater Permits are currently required for most industrial properties. If modifications are made or if an industrial facility is relocated, the permit must be modified to reflect these changes.

For additional information, the locations and addresses of the RWQCB offices are indicated on Exhibit 3-3.

The CDFG regulates alterations made to natural waterways. 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") may be required to obtain a Streambed Alteration Permit. "Natural waterways" includes channels that carry only intermittent or seasonal flow.

The USACE may need to be contacted.

1. North Coast Region
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403
(707) 576-2220

2. San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612
(510) 286-1255

3. Central Coast Region
81 Higuera Street, Suite 200
San Luis Obispo, CA 93401-5427
(805)-549-3147

4. Los Angeles Region
101 Centre Plaza Drive
Monterey Park, CA 91754-2156
(213) 266-7500

5. Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098
(916) 255-3000

Fresno Branch Office
3514 East Ashlan Avenue
Fresno, CA 93726
(209) 445-5116

Redding Branch Office
415 Knollcrest Drive
Redding, CA 96002
(916) 224-4845

6. Lahonton Region
2092 Lake Tahoe Blvd., Suite 2
South Lake Tahoe, CA 96150
(916) 542-5400

Victorville Branch Office
15428 Civic Drive, Suite 100
Victorville, CA 92392-2383
(619) 241-6583

7. Colorado River Basin
73-720 Fred Waring, Suite 100
Palm Desert, CA 92260
(619) 345-7491

8. Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339
(714) 782-4130

9. San Diego Region
9771 Clairemont Mesa Blvd., Suite A
San Diego, CA 92124
(619) 467-2952

FEMA

FEMA - PEA

REGIONAL WATER QUALITY CONTROL BOARD OFFICES

REVNO	DES	DESDATE
N.T.S.	DML	1-14-98
DRAWINGS\R953129\CALF.DWG	SI	1-14-98

R953129

3-3

3.3.1.3 County and City

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

Some urbanized counties and municipalities in California have countywide or areawide stormwater permits which offer guidelines and restrictions to new development that may impact modifications 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 administered by the California Coastal Commission.

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

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

Floodplains are designated on National Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) for communities that are members of the National Flood Insurance Program (NFIP). The NFIP and its implementing regulations (44 CFR 59 through 77) stipulate minimum standards for floodplain development in communities which participate in the program. Local governments incorporate these standards, or in some cases more stringent standards, into their floodplain ordinances. In addition to showing the locations of the 100-year and 500-year floodplains, many FIRMs and FHBMs show the base flood elevation (BFE), which is the estimated elevation of the 100-year flood. FIRMs and FHBMs delineate floodplains with other descriptors; the most important of these are the floodway and the 100-year coastal, high hazard floodplain. The floodway is 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. The coastal floodplain incorporates storm surges and has more stringent statutes for development than the normal 100-year floodplain because of the velocity of waves associated with coastal flooding.

The NEPA compliance process requires Federal agencies to consider direct and indirect impacts to floodplains which 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 a project in the 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. According to 44 CFR Part 9, critical actions, such as developing hazardous waste facilities, hospitals, or utility plants, must occur outside of the 500-year floodplain. If no practicable alternatives exist to siting a project in the floodplain, the project must be designed to minimize potential harm to or within the floodplain. Furthermore, a notice must be publicly circulated explaining the project and the reasons for the project being sited in the floodplain. FEMA applies the Eight-Step Decision-Making Process to ensure that it funds projects consistent with EO 11988. By its nature, the NEPA compliance process involves the same basic decision-making process as the Eight-Step Decision-Making Process. Therefore, the Eight-Step Decision-Making Process has been applied through implementing the NEPA process.

3.5 Biological Resources

This summary identifies vegetation, wildlife, and wetland resources that could be affected by the FEMA programs. Potentially applicable Federal, state, and local statutes that have been designed to preserve and protect biological resources are also reviewed in this summary. 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. A review of special status species of plants, wildlife, and rare natural communities are presented in a separate section of this report.

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 US. The diversity of climates and landscapes, and barriers to migrations such as rivers, mountains, and deserts, have led over million of years 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, there are approximately 30,000 species of insects, 63 freshwater fishes, 46 amphibians, 96 reptiles, 563 birds, 190 mammals, and about 8,000 plants recorded from California (Steinhart, 1990).

3.5.1 Vegetation Resources and Associated Wildlife

California's mountain ranges, deserts, and extensive coastline, along with its unusual summer-dry (Mediterranean) climate, set the stage for a complex and fascinating flora (Skinner and Pavlik, 1994). In the coastal mountains, heavy winter precipitation and summer fog support dense needleleaf evergreen forests, such as redwood, pine, and fir, and needleleaf-broadleaf forests as far south as the Transverse Ranges. Broadleaf forests, typically dominated by oak, 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 elevation leads to an orderly succession of plant communities, from grasslands (California prairie),

to mixed oak and pine woodlands and forests, and finally to an even higher elevation sequence of pine, fir, and subalpine communities. In the high mountains of Southern California, the forest succession is similar, with the exception of the lower slopes which are commonly dominated by extensive sagebrush and chaparral (Hornbeck, 1983).

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. These desert communities are frequently dominated by creosote bush, saltbrush, and Joshua tree woodlands (Hornbeck, 1983).

The diverse vegetation habitats in California support a wide variety of wildlife species. The structural complexity of forest/woodland communities makes them important for wildlife diversity. Conifers, for example, provide excellent nesting platforms for raptors and support woodpeckers, jays, crossbills, kinglets, and grouse. Mule deer, black bear, squirrels, voles, and chipmunks are common mammals that find forage and cover in forested areas. Common amphibian and reptile species include the black salamander, western fence lizard, ensatina, garter snakes, king snake, and Pacific treefrog. Grassland areas provide important foraging habitat for the coyote and badger because they support large populations of small prey species, such as the deer mouse, California vole, pocket gopher, and California ground squirrel. Common reptiles and amphibians of grassland habitats include western fence lizard, common kingsnake, western rattlesnake, gopher snake, common garter snake, western toad, and western spadefoot toad.

Drier communities associated with shrub/scrub communities support rabbits, black-tailed and mule deer, gray fox, coyote, western rattlesnakes and several species of birds including California quail, wrentit, orange-crowned warbler, and towhees. Wildlife resources associated with desert communities include mammals such as coyote, badger, gray fox, bobcat, skunk, black-tailed jackrabbit, cottontail rabbit, California ground squirrel, woodrat, and pocket mice; birds such as raven, horned lark, scrub jay, mourning dove, and western meadowlark; and amphibian and reptile species such as horned lizard, desert iguana, side-blotched lizards, western whiptails, western fence lizards, and western rattlesnakes.

3.5.2 Riparian Resources and Associated Wildlife Species

"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 ecological successional state because of the dynamic nature of topography and hydrology (Campbell and Green, 1968). The resulting succession is responsible for the plant species and structural diversity in riparian areas. Fluvial (riverine) processes such as flooding, with its bank erosion and sediment deposition, create gravel bars and terraces. 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 vegetation layering (Warner 1979). Wildlife species that forage on seeds (granivores) and foliage (foliavores) in scrub and herb habitats along creeks and rivers include squirrel, gopher, vole, quail, dove, starling, goldfinch, and blackbird. Aquatic areas within the river channel provide foraging areas for carnivores and omnivores such as river otter, waterfowl, and gulls. Riparian areas provide nesting sites for a variety of specially adapted species such as the bank swallow, belted kingfisher, northern rough-winged swallow, and owls. Riparian (and also wetland) vegetation also support an abundance of insects that feed on fresh foliage and stems. These insects in turn support a high density and diversity of migratory and resident insectivorous birds and bats.

3.5.3 Wetland Resources and Associated Wildlife Species

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. Open-water and tidal flat communities are generally unvegetated but are associated with wetland communities.

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 (hydrophytes and/or halophytes) vegetation living in brackish or saline waters or soils such as those found along the California coast. These saline wetlands provide habitat for birds, such as salt marsh yellowthroat, song sparrow, marsh wren, American coot, and shorebirds, and migratory waterfowl. Raccoon, opossum, striped skunk, red fox, and coyote forage along the edges of saline emergent wetlands.

3.5.4 Regulatory Context

Section 404 of the CWA authorizes the USACE to issue permits, after notice and opportunity for public hearing, for the discharge of dredged or fill material into the waters of the US at specified disposal sites. These waters include navigable waters and other waters such as intrastate lakes, rivers, and streams (including intermittent streams wetlands, sloughs etc.). Therefore, a 404 permit can be required for discharging dredged or fill material in many watercourses in California.

The Fish and Wildlife Coordination Act (FWCA) of 1958 Section 1 and 2 mandates that fish and wildlife species receive equal consideration with water resource development programs

throughout planning, development, operation, and maintenance. Whenever Federal agencies propose to impound, divert, channelize, or otherwise alter or modify any stream, river, or other body of water in California, for any purpose, the Federal agency must first consult and coordinate its actions and projects with the USFWS and CDFG. This consultation and coordination addresses ways to conserve wildlife resources by preventing loss of and damage to such resources as well as to further develop and improve these resources.

Section 1601 of the California Fish and Game Code requires notification to the CDFG when activities will "substantially divert or obstruct the natural flow of, or substantially change the bed, channel, or bank of, or use material from the streambed of a natural watercourse." Consistency with CDFG statutes is determined on a case-by-case basis, culminating in either project-specific agreements or 1-year blanket agreements when impacts are minimal. Wetland mitigation is required as part of the 1601 permit when impacts to wetlands are unavoidable.

Counties and cities have general plans that include county/city-specific descriptions of the biological resources as well as specific development restrictions to protect these resources. As part of the environmental review process and as part of the general plan requirements, a site-specific biological report may be required in areas with known or suspected sensitive biological resources; additionally, mitigation measures to off-set biological impacts may be required. Oak trees are specifically a protected resource in California both at a local and state level and frequently require mitigation when oaks are impacted from projects.

3.6 Threatened And Endangered Species

The Endangered Species Act of 1973 (16 United States Code (USC) Sections 1531 to 1534) requires Federal agencies to determine the effects of their actions on T&E species of fish, wildlife, and plants, and their habitats, and take steps to conserve and protect these species. This EA assumes that FEMA has requested formal consultation under Section 7 of the Endangered Species Act, as amended for the declared national disaster. It is also assumed that USFWS and National Marine Fisheries Service (NMFS) in accordance with Section 7 of the act has or will provide a PBO on the effects on both emergency flood actions that have already occurred, and non-emergency flood repairs that are planned for the future, on listed and proposed species.

In California, there are over 200 listed T&E species plus numerous species proposed and candidate species. Only the species that may be adversely affected by emergency and non-emergency flood repair actions are included in the PBO. In a previous disaster that included 49 counties in California, 159 species (124 listed as threatened or endangered, 32 proposed species, and 3 candidate species) were included in the PBO issued by the USFWS (White and Noda 1997; Appendix C). Of these 159 species, 132 were classified as "at risk" by the USFWS and avoidance was the only approach that was allowed under the PBO. If impacts to "at risk" species could not be avoided, FEMA was required to consult separately on these projects. For the remaining 27 species, under specific conditions a limited amount of take was authorized by the USFWS. The take was limited to no more than 5 acres of suitable habitat per proposed or listed species per county, with no more than a cumulative total of 50 acres of suitable habitat per county. Projects

that would have a larger area of impact than addressed in the opinion required special consultation with the USFWS.

The evaluation for T&E species in this EA assumes all avoidance and/or impact minimization conditions for each listed-species identified by the USFWS and NMFS in the PBO(s) are implemented by each FEMA approved project. If the avoidance and/or impact minimization conditions identified in the PBO cannot be achieved by a specific project, the project cannot be solely covered by this PEA and a project specific NEPA document (SEA, EA, or EIS) will need to be prepared before the project can receive FEMA approval and funding.

3.7 Cultural Resources

In addition to review under NEPA, consideration of impacts to cultural resources is mandated under Section 106 of the NHPA and implemented by 36 CFR Part 800. Requirements include identifying significant historic properties and districts that may be affected by the proposed actions or alternatives. Historic properties are defined as archaeological sites, standing structures, or other historic resources listed on, or determined potentially eligible to, the NRHP (36 CFR 60.4).

FEMA, in cooperation with the ACHP and the SHPO, acknowledges that the disaster assistance would be more effective if specific procedures are developed to exclude from Council and SHPO review routine activities with little potential to adversely affect historic properties. To facilitate compliance with NHPA, FEMA typically executes a PA, which replaces the standard Section 106 compliance process so that the effects of proposed disaster relief undertakings that involve historic properties can be considered while delays to FEMA's delivery of assistance to qualified applicants are minimized. As discussed in Section 1.5.2, the executed PA for a previous disaster is attached as Appendix D.

For all alternatives, except the No Action Alternative, if no potential for significant cultural resources is determined before a particular action and the requirements pursuant to the PA are implemented, SHPO coordination would still be required in the event that cultural resources are discovered during any ground-disturbing activity in order to identify, evaluate, and mitigate adverse effects to those historic properties.

3.8 Socioeconomics And Public Safety

Impacts related to socioeconomic resources include changes to demographics, housing, employment, the local economy, and public safety hazards.

Much of the relevant data on demographics and housing is provided by the U.S. Department of Commerce Bureau of the Census. Although only conducted every 10 years, the U.S. census provides the most accurate and detailed information for the years that data was acquired. In addition, the census provides the basis for most projections and estimates prepared by national, state, local, and private organizations. Census data is provided for political subdivisions of the country, for example, by state, county, and city. In addition, census data is provided by statistical

subdivision that include (in order of decreasing size) tracts, block numbering areas, block groups, and blocks. These statistical subdivisions of counties were 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.

EO 12898 requires Federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse public health or environmental effects of its programs, policies, and activities on minority and low-income populations. EO 12898 also tasks Federal agencies to ensure that public notifications regarding environmental issues are concise, understandable, and readily accessible.

3.9 Land Use And Zoning

Generally, land use refers to the existing function of real property. Examples of the most common land use categories include residential, commercial, industrial, public (or institutional), recreational, agricultural, and open (or undeveloped). Many of these categories are further subdivided, for example, high, medium, and low-density residential or light and heavy industrial. Land uses are frequently regulated by management plans, policies, ordinances, and statutes which determine the types of uses that are allowable or protect specifically designated or environmentally sensitive uses. Land use is regulated by virtually every level of government. At the Federal level, for example, land use statutes range from the USDA restrictions to avoid soil erosion to the designation of wilderness areas. California's Planning and Zoning Law (Chapter 7 of the California Government Code) designates areas to be protected because of scenic and scientific value, forest and agricultural importance, and potentially hazardous conditions.

Land use regulation is most common at the local level. This local land use regulation, or zoning, is defined herein as the designation given by a governmental unit to classify and regulate development. These zones generally use the same terms listed above for land uses. Most incorporated cities and the incorporated areas of many counties are subject to zoning ordinances. In addition to geographically defining these zones, zoning ordinances prohibit development that is inconsistent with land uses in the given district. For example, building an industrial facility in a low-density residential district would be prohibited in most city or county zoning ordinance. Compliance with zoning ordinances is enforced by local governments as part of the building permit process.

This section focuses on land uses regulated by human, rather than environmental, constraints. For example, cities and counties in the floodplain frequently specify an overlay zone that designates the floodplain and corresponding statutes prohibiting development in the floodplain. Because these statutes are based on the NFIP, these issues are addressed in sections that discuss Floodplain Management. Similarly, issues such as prime farmlands and coastal zone management are discussed in sections concerning Geology, Soils, and Seismicity and Water Quality and Hydrology, respectively.

3.10 Public Services

This section considers the impacts to services provided by political jurisdiction, including police, fire, recreation, and education. Although usually provided by the private sector, medical services and utilities (including water, sewage, electricity, telephone, and natural gas) are considered public services when assessing a community's ability to handle infrastructure or demographic changes.

Impacts to these resources could be caused in two manners. First, public facilities in floodprone areas could be directly affected through relocation or flood-improvement projects. Second, changes to demographic or housing could indirectly affect a community's requirements for public services.

Guidelines and statutes regarding these resources are 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 the amount of parks or undeveloped areas. Although California and the Federal government constrain aspects of school policy decision-making, local school boards determine school operations. Many components of utility services are also regulated at the Federal and state level; however, these regulation do not generally apply to impacts caused by FEMA actions considered in this PEA.

3.11 Transportation

The California Department of Transportation (Caltrans) is responsible for the design, construction, and maintenance of the California State Highway System, in addition to that portion of interstate highways within California's boundaries. The U.S. Department of Transportation Federal Highway Administration provides funding and oversight of projects involving Federal highways. Transportation planning agencies of local governments are responsible for design, construction, and maintenance of county and local roads. Public transportation is managed by private, public, and quasi-governmental agencies at the local level.

3.12 Noise

Sound is most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sounds that the human ear can hear. The Day-Night Average Sound Level (DNL) is an average measure of sound, taking into account the volume of each sound incident, the number of times each incident occurs, and the time of day each incident occurs (night-time 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.

Noise, defined herein as unwanted or unwelcome sound, is Federally regulated by the Noise Control Act of 1972 (NCA). Although the NCA tasks EPA to prepare guidelines for acceptable

ambient noise levels, it only charges those Federal agencies that operate noise-producing facilities or equipment to implement noise standards. By nature of its mission, FEMA does not have statutes defining noise. The EPA's guidelines (and those of many Federal agencies) state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for noise-sensitive land uses such residences, schools, and hospitals. The California NCA of 1973 (Chapter 14 of the California Health and Safety Code) delegates the authority to regulate ambient noise to local jurisdictions.

Most noise associated with flood-disaster projects is emitted from mechanical equipment used in repair, improvement, construction, and demolition.

3.13 Hazardous Materials And Wastes

Hazardous materials and wastes are regulated in California via a combination of Federally-mandated laws and region-specific laws developed by the California Environmental Protection Agency, Department of Toxic Substances, and the California ARB. The hazardous waste statutes are contained as part of the California Health and Safety Code, Chapter 6.5, Hazardous Waste Control. Hazardous waste statutes applicable to the majority of FEMA's projects considered in this PEA are summarized below and detailed in this section:

- Demolition of lead-containing material
- Demolition of asbestos-containing material (ACM)
- Closure of sites containing hazardous substances
- Closure of underground storage tanks (USTs)

3.13.1 Demolition of asbestos-containing material

The ACMs in residential homes and commercial buildings may include shingles, tiles, transite (asbestos-cement), or insulation around plumbing and heating ducts. EPA has classified ACM into several categories. Non-friable ACMs are classified as either Category I or Category II material. Category I material is defined as asbestos-containing resilient floor covering (title), asphalt roofing products, packings, and gaskets.

The EPA has defined Category II materials as all remaining types of non-friable ACM not included in Category I that, when dry, cannot be crumbled, pulverized, or reduced to powder by the 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. Friable ACM is defined as any material containing more than one percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. Regulated asbestos-containing material (RACM) may be one of the following:

- Friable asbestos material
- Category I non friable ACM that has become friable

- Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading
- Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations

3.13.2 Demolition of non-friable ACM

California manages asbestos through the ARB, which is part of the California Environmental Protection Agency. Working with the ARB are the AQMD and the air pollution control districts (APCD) which, at the local level, are primarily responsible for the management of asbestos in their region. Sixteen air districts manage asbestos in accordance with the Federal asbestos National Emissions Standard for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, and 17 air districts have developed their own, more stringent statutes for managing asbestos removal (Table 3-3). In cases where demolition of buildings containing asbestos is part of a project, the appropriate air district, or the ARB and the EPA must be contacted before the inception of the project.

In accordance to the asbestos NESHAP, 40 CFR Part 61, Subpart M, Category I materials which are not in poor condition, are not friable, and do not may become friable do not have to be removed before demolition. Further information and handling procedures for the demolition of Category I material are included in the EPA guidance document entitled A Guide to Normal Demolition Practices Under the Asbestos NESHAP (EPA 340/1-92-013), and from the air pollution districts associated with the project.

3.13.3 Demolition of friable or potentially friable ACM

Friable ACM and material which may potentially become friable material during demolition must be removed before demolition begins in accordance with the asbestos NESHAP, 40 CFR subpart 61, Subpart M. Category II nonfriable ACM which has not become friable during demolition may be disposed of in a landfill that normally accepts construction debris, according to the asbestos NESHAP in 40 CFR Part 61. If the ACM is to be disposed of, disposal must occur in an approved facility. However, if Category 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 to 40 CFR 61.150 and Part 61.154, or in a EPA-approved conversion facility described in 40 CFR Part 61.155 of the asbestos NESHAP regulations. Further information and handling procedures for the demolition of RACM and Category II material are included in the EPA guidance document titled A Guide to Normal Demolition.

Table 3-3 California Asbestos NESHAP Air Pollution Control Districts	
Delegated Districts (region-specific statutes)*	**Non-Delegated Districts (NESHAP)†**
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 Sonomo 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	

* Contact the air district before inception of the project

† Contact the ARB and EPA before inception of the project

Source: ARB, Compliance Division, November 1997.

3.13.4 Closure of sites containing hazardous substances

The owner of a facility is responsible for notifying the Department of Toxic Substances (DTSC) when a release of a hazardous substance is discovered. Preventive of corrective action should also follow

appropriate regulations under the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) as amended (40 CFR 300).

A release is defined as any intentional or unintentional act or omission resulting in the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, including without limitation the abandonment or discarding of barrels, containers, and other closed receptacles, of any hazardous waste, hazardous constituent, or hazardous substance; provided however, that such term shall not include any release which results in exposure to person solely within a workplace, with respect to a claim which such persons may assert against the employer of such person; emission from the engine exhaust of any motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station; or the normal application of fertilizer (ONR-EP 391-3-19-02).

A hazardous substance is defined as:

- Any substance designated pursuant to Section 311(b)(2)(A) of the CWA, as amended (33 USC Section 466 et seq.)
- Any element, compound, mixture, solution, or substance designated pursuant to Section 102 of CERCLA, as amended (42 USC Section 9601 et seq.)
- Any substance as defined by the California Code, Chapter 6.5, Hazardous Waste Control
- Any toxic pollutant listed under Section 307(a) of the CWA, as amended (33 USC Section 466 et seq.)
- Any hazardous air pollutant listed under Section 112 of the Clean Air Act, as amended (42 USC Section 1857 et seq.)
- Any imminently hazardous chemical substance or mixture with respect to which the EPA has taken action pursuant to Section 7 of the Toxic Substance Control Act, as amended (15 USC Section 2601 et seq.)

A hazardous substance does not include petroleum, natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel. Hazardous substances should be disposed of in accordance with all Federal and California hazardous waste regulations.

3.13.5 Closure of underground storage tanks

The USTs in California are managed by the State Water Resource Control Board, through their Underground Storage Tank Program. There is one State Board and nine RWQCBs across the state, which oversee compliance with the tank laws. The local agencies are in charge of the tank-permitting program and issue operating and closure permits as necessary. If tanks are to be no longer used, closure permits must be secured and the tank removed or closed in place. If an UST problem (such as a leak) is identified, the Regional Water Board or local agency locates the responsible party, determines cleanup activities, and oversees the activities until complete. The State Water Resources Control Board also operates the UST Cleanup Fund, which funds corrective action and third party liability costs (State Water Resources Control Board, 1997).

California does not have statutes for the abatement of lead, and therefore, the Federal standard is followed (Preston, 1997).

This chapter explains impacts expected from each alternative and prescribes mitigation measures that would be implemented to restrain adverse impacts below significant levels.

4.1 Buildings, Roads, and Utilities

4.1.1 Geology, Geohazards, and Soils

4.1.1.1 No Action Alternative

Since no new facilities would be built and existing facilities would not be improved, the no action alternative would not affect geology or soils.

4.1.1.2 Non-Structural Alternative

Under this alternative, the function of the floodprone facility would be relocated to an existing facility that has adequate capacity to handle the additional load with minor modifications, if any. Since no new construction would occur, no impacts to geology and soils would occur under this alternative.

4.1.1.3 Improvement Alternative

This alternative would consist of elevating or floodproofing structures, roads, or utilities, as practical. For facilities repaired in-place, impacts to geology and soils would be minimal assuming that appropriate construction techniques are used to control soil erosion and that repaired buildings follow codes designed to minimize earthquake effects.

4.1.1.4 Structural Alternative

This alternative consists of constructing new structures, roads, or utilities in locations different from the original locations and outside of the 100-year floodplain. Furthermore, critical actions, as defined in 44 CFR Part 9, would be sited outside of the 500-year floodplain. Possible consequences to geology and soils of new construction of structures, roads and utilities include possible impacts to protected geologic resources, impacts from geohazards, and impacts to soils. state maps and county/city general plans should be reviewed to determine whether measures will be needed to mitigate impacts of construction.

Short-term erosion and sediment impacts can normally be mitigated by applying appropriate control measures during construction. Impacts to geological resources and impacts from geohazards can be minimized by appropriate siting of facilities and by appropriate geotechnical construction.

4.1.1.5 Combination Alternative

Many actions that combine two or more alternatives would have impacts as described separately for each alternative component. In some cases, however, implementing two or more alternative components would cause cumulative impacts greater in magnitude, extent, or duration than the sum of the separate impacts. In such cases, the SEA would identify and evaluate these cumulative impacts.

4.1.2 Air Quality

Under components of the No Action Alternative, Non-Structural Alternative, Improvement Alternative, Structural Alternative, and Combined Alternative, adverse impacts to air quality could have both short and long-term effects. In the short-term, a proposed project could consist of construction, demolition, or even in-place repairs. Under these actions, use of heavy equipment and earthmoving activities could increase the levels of some of the priority pollutants managed in the associated air districts (such as carbon monoxide and particulates) for the duration of the project activity. In the long-term, constructing a new road, for example, would not only affect the air quality in the short-term during construction, but also in the long-term with increased local carbon monoxide levels from the increased motor vehicle use along the new road. Regardless of the expected duration of the potential effect, coordination with the air district must occur before project inception to ensure compliance with California air quality statutes. Based on the project description, the air district would determine if additional measures would be needed to manage the project to minimize adverse impacts to air quality in the project area.

4.1.3 Hydrology and Water Quality

4.1.3.1 No Action Alternative

Since no new facilities would be built and existing facilities would not be improved, the no action alternative would not impact hydrology and water quality. Floodprone areas would remain subject to future flooding and any attendant water quality issues would remain the same.

4.1.3.2 Non-Structural Alternative

Under this alternative, the function of the floodprone facility would be relocated to an existing facility that has adequate capacity to handle the additional load with minor modifications, if any. If facilities are industrial in nature, relocating the function of the facility to an area outside of the floodplain may beneficially impact water quality by reducing the potential introduction of contaminants to the waterway.

Because FEMA would acquire floodprone properties, demolish corresponding structures, and place deed restrictions limiting future uses to open space purposes, this alternative would beneficially impact water quality by removing potential point and non-point contaminant sources

from the floodplain. This alternative may be supported by local and area-wide watershed management plans.

4.1.3.3 Improvement Alternative

This alternative would consist of elevating or floodproofing structures, roads, or utilities, as practical. Elevating structures above the BFE or floodproofing areas of these facilities below the BFE would reduce future flood damages and may benefit water quality by preventing the flooding of pollution sources.

4.1.3.4 Structural Alternative

This alternative consists of constructing new structures, roads, or utilities in locations different from the original locations and outside of the 100-year floodplain. This alternative would beneficially impact water quality by removing potential sources of pollution from the waterway and floodplain area.

4.1.3.5 Combined Alternative

Many actions that combine two or more alternatives would have impacts as described separately for each alternative component. In some cases, however, implementing two or more alternative components would cause cumulative impacts greater in magnitude, extent, or duration than the sum of the separate impacts. In such cases, the SEA would identify these cumulative impacts.

4.1.4 Floodplain Management

4.1.4.1 No Action Alternative

Because buildings, roads, and utilities would not be improved or relocated, these facilities would continue to be subject to flooding and associated damages. Because no new facilities would be built and existing facilities would not be improved, the no action alternative would not affect the BFE or the extent or other characteristics of the floodplain.

4.1.4.2 Non-Structural Alternative

Under this alternative, the function of the floodprone facility would be relocated to an existing facility that has adequate capacity to handle the additional load with minor modifications, if any. When the facilities that these floodprone facilities are replacing are located outside of the floodplain, a beneficial impact would occur from decreasing potential damage from future flood events.

Because FEMA would acquire floodprone properties, demolish corresponding structures, and place deed restrictions limiting future uses to open space purposes, this alternative would beneficially impact floodplains by improving the floodplain's storage capacity and improving flow within the floodway (where acquired facilities are in the floodway). The potential exists,

however, for increased downstream flow. Downstream land uses would be evaluated for potential impacts. Other than these potential effects, floodplain characteristics would not be changed because no new development or substantial improvements would occur as a result of this alternative. This alternative would comply with the NFIP, local floodplain ordinances, EO 11988, and 44 CFR Part 9.

4.1.4.3 Improvement Alternative

This alternative would consist of elevating or floodproofing structures, roads, or utilities, as practical. Elevating structures above the BFE or floodproofing areas of these facilities below the BFE would reduce future flood damages. Elevation and floodproofing of structures would comply with the NFIP and local floodplain ordinances. Both of these measures would also comply with EO 11988 and 44 CFR Part 9 because no new structures would be built in the floodplain. Structures elevated above the BFE on piers, posts, or pilings and constructed with only non-supporting breakaway walls, open-wood lattice work, or insect screening below the BFE would provide a beneficial impact to the floodplain because more natural flow and drainage patterns of the floodplain would be restored. The potential exists, however, for an increase in downstream flow. Downstream land uses would be evaluated for potential impacts. Floodproofing structures would not affect the extent, elevation, or other features of the floodplain because these structures already exist in the floodplain.

4.1.4.4 Structural Alternative

This alternative consists of constructing new structures, roads, or utilities in locations different from the original locations and outside of the 100-year floodplain. Furthermore, critical actions, as defined in 44 CFR Part 9, would be sited outside of the 500-year floodplain. There would be a slight change in floodplain characteristics because floodprone structures would be removed from the floodplain and, depending on the location, the floodway. Because floodprone properties would be placed under deed restriction limiting future uses, this alternative would beneficially impact floodplains by improving flow within the floodway (if applicable) and increasing storage capacity within the floodplain. The potential exists, however, for increased downstream flow. Downstream land uses would be evaluated for potential impacts.

Removing structures from the floodplain would have a beneficial impact by reducing future flood damages. All new construction would comply with the NFIP, local floodplain ordinances, EO 11988, and 44 CFR Part 9.

4.1.4.5 Combination Alternative

Many actions that combine two or more alternatives would have impacts as described separately for each alternative component. In some cases, however, implementing two or more alternative components would cause cumulative impacts greater in magnitude, extent, or duration than the sum of the separate impacts. In such cases, the SEA would identify these cumulative impacts.

4.1.5 Biological Resources

4.1.5.1 No Action Alternative

With the No Action Alternative, some buildings, roads, and utilities would be repaired and/or restored to predisaster conditions and functions but would not be improved or relocated. Because no new facilities would be constructed and any repaired/restored facility would have the same footprint as the predisaster facility, no vegetation, wetlands, or wildlife should be adversely affected in the long-term. For those projects that are repaired/restored to pre-disaster conditions, existing access would be utilized; no impacts to vegetation or wetlands are anticipated. Wildlife resources in the immediate vicinity of the activities could be adversely affected by the ingress and egress of equipment and personnel during construction repairs. Potential impacts would be short-term and may include displacement or mortality (death) of individual wildlife species. Potentially affected species are common to the area, and displaced individuals would likely return following construction.

4.1.5.2 Non-Structural Alternative

Under this alternative, the function of the floodprone facility would be relocated to an existing facility. When facilitates are relocated, a beneficial impact to biological resources would occur by increasing the net acreage of native habitat, assuming that the relocated facility footprint is restored with native vegetation.

Potential short-term impacts to adjacent wildlife species, such as displacement or mortality (death) of individual species could occur during construction activities. These species are common to the area, and displaced individuals would likely return following construction. In addition, these impacts would be further reduced by mitigation measures for threatened and endangered species, as described in the following section.

4.1.5.3 Improvement Alternative

This alternative consists of improving or upgrading existing buildings, roads, and utilities to better perform their functions. Activities associated with this alternative would not necessarily disturb the biology of an area assuming that the facility would not be significantly increased in size and assuming the construction area would be restored to original conditions. In the case where improvements would encroach into native vegetation types or waterways, impacts would occur. Impacts would be small in comparison to constructing a new road, building, or utility. A USACE Section 404 permit and a CDFG Section 1601 permit and coordination with local authorities would likely be required if wetlands are affected. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local levels.

Potential short-term impacts to adjacent wildlife species, such as displacement or mortality (death) of individual species could occur during construction activities. These species are common to the area, and displaced individuals would likely return following construction. In addition, these

impacts would be further reduced by mitigation measures for threatened and endangered species, as described in the following section.

Permits with USACE and CDFG would be required if any streams or other watercourses are impacted. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local level. Coordination with USFWS, CDFG, and local authorities and compliance with local statutes would be required.

4.1.5.4 Structural Alternative

This alternative consists of constructing new structures, roads, or utilities in new locations outside of the 100-year floodplain. Impacts to biological resources could be avoided or minimized through proper project design. This alternative would impact fewer, or no wetland areas, because new facilities and roads would be out of the floodplain, where wetlands more commonly occur. Upland vegetation and associated wildlife would be impacted from the addition of the new structure or road if constructed in undeveloped areas.

Potential short-term impacts to adjacent wildlife species, such as displacement or mortality (death) of individual species could occur during construction activities. These species are common to the area, and displaced individuals would likely return following construction. In addition, these impacts would be further reduced by mitigation measures for threatened and endangered species, as described in the following section.

Permits from USACE and CDFG would be required if any streams or other watercourses are impacted. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local level. Coordination with USFWS, CDFG, and local authorities and compliance with local statutes would be required.

4.1.5.5 Combination Alternative

For this alternative, mixed solutions of different alternative actions are combined. Environmental consequences for each alternative are described under alternative actions in the previous sections (Sections 4.1.5.1 through 4.1.5.4). In some cases, however, implementing two or more alternative components would cause cumulative impacts greater in magnitude and/or extent than the sum of the separate impacts. In such cases, the SEA would identify cumulative impacts.

4.1.6 Threatened and Endangered Species

4.1.6.1 No Action Alternative

With the No Action Alternative, some buildings, roads, and utilities would be repaired and/or restored to predisaster conditions and functions, but not be improved or relocated. Since no new facilities would be constructed and since any repaired/restored facility would have the same footprint as the predisaster facility, no suitable habitat for proposed or listed species should be adversely affected on the long-term. For those projects that are repaired/restored to predisaster

conditions, threatened or endangered species in the immediate vicinity of the activities could be adversely affected by the ingress and egress of equipment and personnel. Potential impacts would be short-term and may include disturbance/displacement of individuals, incidental disruption of suitable habitat, and mortality (death) of individuals. Adherence to stipulations for species that may occur in the project area as outlined in the PBO (for example, no construction in spotted owl nesting habitat during nesting season or no construction in salmon streams during spawning period of salmon) would minimize potential impacts on proposed and listed species.

4.1.6.2 Non-Structural Alternative

Under this alternative, the function of a floodprone building, road, or utility would be relocated to an existing facility that has adequate capacity to handle the additional load with minor modification, if any. FEMA would acquire and demolish floodprone structures, and place deed restrictions limiting future uses to open space purposes. This alternative is expected to have little effect on proposed and listed species as the structures demolished would not be expected to support proposed or listed species or their suitable habitat. It is possible that the area converted to open space use could be used by a proposed or listed species at a future date. There is a low probability that proposed and listed species present in the immediate vicinity of structures to be demolished could be adversely affected by the ingress and egress of equipment and personnel. Potential impacts would be short-term and may include disturbance/displacement of individuals, incidental disruption of suitable habitat, and mortality of individuals. Adherence to stipulations for species that may occur in the project area as outlined in the PBO would minimize potential impacts on proposed and listed species.

4.1.6.3 Improvement Alternative

This alternative would consist of elevating or floodproofing buildings, roads, or utilities as practical. Areas that are to be disturbed by widening the road or used as a source of borrow material would be evaluated for the presence of proposed or listed species suitable habitat. If suitable habitat for an “at risk” species is present, it would be avoided. If suitable habitat for one or more of the other identified species is present, consideration would be given to avoidance and if it cannot be avoided, the affected area would be quantified and the project approved with the stipulations contained in the PBO. In addition, proposed or listed threatened or endangered species in the immediate vicinity of the activities could be adversely affected by the ingress and egress of equipment and personnel. Potential impacts would be short-term and may include disturbance/displacement of individuals, incidental disruption of suitable habitat, and mortality of individuals. Adherence to stipulations for species that may occur in the project area as outlined in the PBO (for example, no construction in spotted owl nesting suitable habitat during nesting season or no construction in salmon streams during spawning period of salmon) would minimize potential impacts on proposed and listed species.

4.1.6.4 Structural Alternative

This alternative includes constructing buildings, roads, and utilities in locations different from the original location and outside the 100-year floodplain. The construction of new facilities involves a new footprint for the replaced facility which generally relates to new areas being disturbed. Areas that would be disturbed would be evaluated for the presence of proposed or listed species and/or their suitable habitat. If suitable habitat for an "at risk" species is present, it would be avoided. If suitable habitat for one or more of the other identified species is present, consideration would be given to avoidance and if it cannot be avoided, the affected area would be quantified and the project approved with the stipulations contained in the PBO.

In addition, proposed or listed threatened or endangered species in the immediate vicinity of the activities could be adversely affected by the ingress and egress of equipment and personnel. Potential impacts would be short-term and may include disturbance/displacement of individuals, incidental disruption of suitable habitat, and mortality of individuals. Adherence to stipulations for species that may occur in the project area as outlined in the PBO (for example, no construction in spotted owl nesting habitat during nesting season or no construction in salmon streams during spawning period of salmon) would minimize potential impacts on proposed and listed species.

4.1.6.5 Combination Alternative

Many proposed projects may combine two or more the alternatives described and evaluated previously. In most instances, the resulting impacts would be the addition of the impacts identified for the single alternatives. However, in some cases the cumulative impacts may be greater in magnitude, extent, or duration than the sum of the separate impacts. In such cases, the SEA would identify these cumulative impacts.

4.1.7 Cultural Resources

4.1.7.1 No Action Alternative

Under this alternative, FEMA would not fund any alternative action. If no Federal funds are provided for specific actions, as is the case with the No Action Alternative, then no further cultural resources studies would be required under Section 106 of the NHPA or under the PA. However, under the No Action Alternative, the lack of property relocations and construction or improvement of flood control measures could result in potential impacts to historic properties from future floods.

If damaged by future flooding, some structures would likely be demolished through private, local government, or state government undertakings, thus causing the loss of irreplaceable resources. Other structures would be repaired but without statutes or guidelines to ensure the work would be sensitive to the historic characteristics of the structure or its surroundings. If subsequent activities under the No Action Alternative do not include a Federal role, then no consideration of

the project's impact on historic structures would be required and buildings would likely be demolished or repaired before identification, evaluation, or treatment studies.

4.1.7.2 Non-Structural Alternative

No new construction would take place. While no new construction would occur under this alternative, coordination with the SHPO and ACHP on the scope of work for a particular project that is eligible for funding by FEMA would be required, pursuant to the PA. Additionally, if structures are demolished, or if damaged properties are acquired, documentation of any historic resources would be required under the PA.

4.1.7.3 Improvement Alternative

This category consists of elevating or floodproofing structures, roads, or utilities, which could adversely impact cultural resources. Downstream land uses would also be evaluated for potential impacts to cultural resources. Each proposed action would be evaluated pursuant to the PA regarding potential impacts to cultural resources.

4.1.7.4 Structural Alternative

This alternative involves new construction. Under this alternative, there may be impacts to historic properties that are listed on, or potentially eligible for, the NRHP. The PA would be implemented under this alternative, and any mitigation procedures would adhere to that document.

4.1.7.5 Combination Alternative

This alternative would potentially involve cumulative impacts that are greater than the sum of the separate impacts from one alternative. Under the PA, each of the alternatives selected under the combination alternative would need to be evaluated regarding potential impacts to cultural resources. Cumulative impacts would be evaluated in the SEA, as appropriate.

4.1.8 Socioeconomics and Public Safety

4.1.8.1 No Action Alternative

Floodprone areas would remain subject to future flooding, and risks to human safety would remain. Residences, businesses, and local governments would rely on flood insurance or other sources as compensation for property damage. The need to rebuild, repair, or relocate damaged structures, roads, or utilities would cause adverse financial impacts to residents, businesses, and governments which have no or inadequate flood insurance or which must elevate or floodproof, in accordance with the NFIP. Residents and local governments would expend funds for temporary facilities. Businesses would be impacted by loss of sales due to infrastructure damage, migration of customers, and temporary closings for repairs or replacement of inventory. Similar impacts

would occur to residents, businesses, and governments that were impacted by a historic, as opposed to a future, flood.

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 suffered financial hardships from flood damage are likely to alter their purchasing habits by reducing expenditures, especially on non-essential 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 layoff 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 flood-damage facilities under this alternative. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

4.1.8.2 Non-Structural Alternative

Relocating the function of buildings to alternative structures has little potential to adversely affect socioeconomic resources. In most cases, this alternative would result in people and property being relocated outside of the floodplain and therefore decreasing the potential for future flood damage and risk to human safety. The indirect impacts described in Section 4.1.8.1 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 relocating in compliance with the Uniform Relocation Act and Chapter 16 of the California Government Code. These laws provide funding for persons and businesses displaced due to government action.

Nonetheless, relocating public facilities would 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 near 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 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 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 described in Section 4.1.8.1.

Providing alternate roads would impact road users. For 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. Mitigation for residents, businesses, and governmental agencies that front on roads to be relocated would include constructing private driveways to connect properties with existing roads and the acquisition or relocation of properties. Acquisition and relocation in such circumstances would by mitigated by complying with the Uniform Relocation Act and Chapter 16 of the California Government Code.

Providing alternate utilities would potentially affect businesses and individuals through increased costs. Depending on the marginal cost increase, these impacts would be negligible for most actions; however adverse economic effects would likely occur to businesses that require large quantities of the affected utility for production.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.1.8.3 Improvement Alternative

Floodproofing and elevating facilities would create beneficial impacts to socioeconomic resources. These actions would reduce the potential for flood-related losses to residents, businesses, and governments; decrease risks to human safety; increase property values; and limit the corresponding indirect impacts described in Section 4.1.8.1.

Potential adverse impacts would occur as well. Residents and local government would expend resources for substitute facilities, and businesses would loose revenue while these improvements are made; however, compliance with the Uniform Relocation Act and Chapter 16 of the California Government Code would mitigate these temporary impacts. Closure of roads and utilities during improvements would temporarily impact road and utility users similar to the manner described for these facilities in Section 4.1.8.1.

Private contractors would receive economic benefits from floodproofing and elevating. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.1.8.4 Structural Alternative

This alternative would consist of structures, roads, and utilities being relocated outside of the floodplain. Such action would decrease potential property damage and risk to human safety from future floods; prevent future financial losses to residents, businesses, and governments; and

reduce the indirect impacts described in Section 4.1.8.1. On the other hand, the relocation of residents and businesses outside of the community and the financial burden on those residents and businesses that remain would indirectly affect the local economy as described in Section 4.1.8.1. Residents and local government would expend resources for interim facilities, and businesses would be impacted by loss of sales due to momentary closings; however these temporary impacts would be mitigated by administration of the Uniform Relocation Act and Chapter 16 of the California Government Code. These projects would also require expenditures of funds for roads, utilities, and other infrastructure improvements.

Relocating roads and utilities would impact road and utility users similar to the manner described for these facilities in Section 4.1.8.1.

Private contractors would receive economic benefits from construction and demolition of buildings, roads, and utilities. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.1.8.5 Combination Alternative

Many actions that combine two or more alternatives would have impacts as described separately for each alternative component. In some cases, however, implementing two or more alternative components would cause cumulative impacts greater in magnitude, extent, or duration than the sum of the separate impacts. For example, relocating a major employer to a distant town and implementing a voluntary acquisition program would likely cause socioeconomic impacts substantially different from implementing either of these actions singularly. In such cases, the SEA would identify these cumulative impacts.

4.1.9 Land Use and Zoning

4.1.9.1 No Action Alternative

Because no new facilities would be built and existing facilities would not be improved, the No Action Alternative would not affect land use or zoning.

4.1.9.2 Non-Structural Alternative

Detouring road users to alternate routes and providing utilities by alternate methods would not impact land use or zoning. Relocating the function of floodprone buildings to alternate structures has the potential to affect existing land use and zoning. Local zoning ordinance would be reviewed to determine if the proposed land use would be consistent with statutes. The zoning

designation of properties to be acquired would be changed to reflect the open space use described in the corresponding deed restriction.

4.1.9.3 Improvement Alternative

For road and utility improvement projects, this alternative would not impact land use or zoning. Buildings that currently comply with local zoning ordinances would not impact land use or zoning from elevation or floodproofing. However, improvements are generally prohibited for properties with non-conforming uses unless the structure is brought into compliance. A non-conforming use is one that is currently out of compliance with the zoning ordinance usually because the structure was built before the current zoning regulation was executed. In such cases, local governments would consider granting variances so that properties with non-conforming uses could be elevated or floodproofed without making other structural changes necessary to comply with the zoning ordinance.

4.1.9.4 Structural Alternative

Construction of new buildings, roads, and utilities would comply with local zoning ordinance. The zoning designation of properties or easements to be acquired would be changed to reflect the open space use described in the corresponding deed restriction. Construction of buildings, roads, and utilities has the potential to impact land use and zoning; however, cities and counties with zoning ordinances would enforce these statutes on new development. If necessary, local governments would amend their zoning ordinance or grant variances so that areas proposed for new development comply with the land uses of the relocated properties.

4.1.9.5 Combination Alternative

Projects that combine two or more alternatives would have impacts as described separately for each alternative component.

4.1.10 Public Services

4.1.10.1 No Action Alternative

Floodprone areas would remain subject to future flooding under the No Action Alternative. Floodprone facilities that provide public services, such as schools, fire stations, police stations, gymnasiums, hospitals, and utilities, could sustain future damage from flooding. In addition to the monetary cost of damage, future flooding would likely compromise the ability of these services to perform their duties adequately. Impacts could include the temporary or permanent closing of schools, hospitals, and recreational facilities; police and fire departments not having full and safe access to equipment; and utilities not functioning to capacity. Future flooding and associated repair of buildings, roads, and utilities would indirectly affect public services that may not have even been directly damaged by flooding. For example, school bus routes could require detours due to damaged roads, fire and police departments would be strained from participating in flood

assistance efforts, and emergency medical services could be unable to quickly access emergency sites and hospitals due to congestion from building repair or damaged roads. Except for catastrophic floods, changes to demographics and housing are not expected to affect communities' requirements for public services.

4.1.10.2 Non-Structural Alternative

Relocating the function of floodprone 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 alternative involve changes in time and distance. 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. Recreational and medical 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.

Frequently school functions are relocated to an operating school. Impacts from this project component 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.

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

Because the potential impacts described for this alternative are site and project specific, general mitigation measures are not applicable. Individual projects would be evaluated for potential effects and mitigated appropriately.

4.1.10.3 Improvement Alternative

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. Impacts to public services from relocation are provided in Section 4.1.10.2; however, in this case, impacts would be temporary.

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

4.1.10.4 Structural Alternative

Demolishing floodprone public facilities and building replacement facilities out of the floodplain would likely directly impact the users of associated public services. Beneficial impacts would occur by reducing the risk of future flood damage to the relocated facility. Adverse impacts associated with this alternative involve changes in time and distance. Constructing new schools would involve students having longer or shorter bus rides or students being bused instead of walking. Constructing new police and fire stations would likely increase average response times. Recreational and medical 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. Because the potential impacts described above are site and project specific, general mitigation measures are not applicable. Individual projects would be evaluated for potential effects and mitigated appropriately.

Demolishing floodprone residences, businesses, and other governmental facilities and building replacement facilities out of the floodplain may cause indirect impacts to public services. New structures would require utility extensions to the future site. Existing system capacities and utility use of the properties scheduled for construction would be evaluated to determine if additional service is required. Depending on the number and type of properties, number of occupants, and distance from the original location, other public services may be impacted. Specific projects would be evaluated for proximity and availability of public schools, response times for police and fire protection services, proximity of recreational facilities, and proximity and availability of medical services. In addition to evaluating the need for new or increased service at the proposed construction site, projects would evaluate whether services could be decreased as a result of restricting future uses of the acquired properties. Utilities would be removed from acquired properties, including buildings with utility connects and roads that share easements with utility lines.

Constructing new roads would indirectly affect public services if existing roads or bridges cannot remain open until the replacement roads or bridges are complete. School buses, police and fire vehicles, and ambulances could be forced to take alternate routes.

4.1.10.5 Combination Alternative

Many proposed projects may combine two or more of the alternatives described and evaluated previously. In most instances, the resulting impacts would be the addition of the impacts identified for the single alternatives. However, in some cases the cumulative impacts may be greater in magnitude, extent, or duration than the sum of the separate impacts. In such cases, the SEA would identify these cumulative impacts.

4.1.11 Transportation

4.1.11.1 No Action Alternative

Roads that are not repaired would impact traffic by being closed, functioning below capacity, or decreasing the comfort of road users. It is assumed that any roads or bridges determined to be unfeasible to repair to safe conditions would be closed. Closed roads would result in detours, potential delays, and potential congestion. The potential also exists for future flooding to damaged and closed roads.

Repairs to damaged facilities would cause congestion, delays, and possible detours from repair equipment, especially in the case of repairs to roads and bridges. The degree of congestion, delays, and detours depends upon the location, magnitude, and extent of damage, but all impacts from repair would be temporary. Future flooding has the potential to cause additional damage and, therefore, additional congestion, delays, and detours from repair equipment.

4.1.11.2 Non-Structural Alternative

Relocating the function of buildings to alternate structures has the potential to affect traffic and transportation. Traffics volumes would be increased in the vicinity of the alternate structures and decreased in the vicinity of the acquired properties. Affected roads and public transportation routes would be reviewed to determine if existing roads and services would adequately handle the relocation.

Detouring road users to alternate routes would also impact transportation networks. Affected roads and public transportation systems using these roads would be reviewed to determine if proposed detours could service increased users. Detour routes and signs would be coordinated with appropriate transportation planning agencies. Minor modifications to alternate facilities may cause temporary congestion, delays, and detours.

4.1.11.3 Improvement Alternative

Elevating or floodproofing buildings would cause congestion, delays, and possible detours from equipment. The degree of congestion, delays, and detours depends upon the location and extent of floodprone structures to be improved, but all impacts from improvements would be temporary. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies. Elevating or floodproofing a bridge or a road would probably require the closure of the bridge or road, and detouring traffic to an alternate route. This is likely to cause temporary congestion and delay. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies. Elevating and floodproofing roads and bridges would be coordinated with appropriate transportation planning agencies.

4.1.11.4 Structural Alternative

Construction of new structures and demolition of floodprone structures would cause congestion, delays, and possible detours from construction and demolition equipment. The degree of congestion, delays, and detours depends upon the location and extent of construction and demolition, but impacts from these components would be temporary. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies. Constructing new structures also has the potential to permanently affect traffic and transportation by creating a need for new or improved roads or public transportation services. Furthermore, existing roads and services may need to be altered based on the acquisition of floodprone properties. Affected roads and public transportation systems would be reviewed to determine if existing roads and services would adequately handle the development of new structures and open-space uses.

In many cases, construction of new roads and bridges would allow traffic to use existing floodprone roads and bridges until the new roads and bridges are complete. In cases where new roads would replace damaged roads that were not repaired, temporary impacts would be similar to those described for the no action alternative (Section 4.1.10.1). Construction of roads and bridges would be coordinated with appropriate transportation planning agencies.

4.1.11.5 Combination Alternative

Many actions that combine two or more alternatives would have impacts as described separately for each alternative component. In some cases, however, implementing two or more alternative components would cause cumulative impacts greater in magnitude, extent, or duration than the sum of the separate impacts. For example, increasing the elevation of a bridge (necessitating its temporary closure) and installing culverts under the road of an alternate route (necessitating its temporary closure) would likely cause impacts to traffic and transportation substantially different from implementing either of these actions singularly. In such cases, the SEA would identify these cumulative impacts.

4.1.12 Noise

4.1.12.1 No Action Alternative

Equipment used to repair facilities would cause temporary noise. Noise is expected to remain within legal limits for repairs conducted by professionals. No other sources of noise would directly result from the No Action Alternative. Future flooding has the potential to cause additional damage and, therefore, additional noise from future repair.

4.1.12.2 Non-Structural Alternative

Equipment used to repair facilities would cause temporary noise. Noise is expected to remain within legal limits for repairs conducted by professionals. No other sources of noise would

directly result from the No Action Alternative. Future flooding has the potential to cause additional damage and, therefore, additional noise from future repair.

4.1.12.3 Improvement Alternative

Equipment used to repair facilities would cause temporary noise. Noise is expected to remain within legal limits for repairs conducted by professionals. No other sources of noise would directly result from the No Action Alternative. Future flooding has the potential to cause additional damage and, therefore, additional noise from future repair.

4.1.12.4 Structural Alternative

Construction of new facilities would result in temporary noise from construction equipment. Demolition of structures on property acquired by FEMA would also create temporary noise. Noise generated by these sources would comply with local noise ordinances. Construction of new facilities may introduce permanent noise sources, including traffic; however, the impact of this change depends on the land uses involved. Local noise ordinances would be reviewed for potential impacts caused by constructing noise-generating facilities.

4.1.12.5 Combination Alternative

Many actions that combine two or more alternatives would have impacts as described separately for each alternative component. In some cases, however, implementing two or more alternative components would cause cumulative impacts greater in magnitude, extent, or duration than the sum of the separate impacts. For example, improving a dam to allow greater control over the reservoir elevation and demolishing existing floodprone structures in the same area would likely create noise patterns substantially different from implementing either of these actions singularly. In such cases, the SEA would identify these cumulative impacts.

4.1.13 Hazardous Materials and Wastes

4.1.13.1 No Action Alternative

Under this alternative, some buildings may be abandoned without Federal or local assistance to facilitate repairs. In these cases, an adverse impact would occur because proper closure requirements associated with asbestos and lead (if present) would not be followed, and the risk associated with these materials would remain.

4.1.13.2 Non-Structural Alternative

Under this alternative, FEMA would acquire properties and demolish existing buildings. The demolition of existing structures would have to be completed in compliance with the applicable California and Federal regulations associated with asbestos and lead abatement and UST closures.

Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate.

4.1.13.3 Improvement Alternative

This alternative has little potential to affect the status of hazardous waste and materials. However, if asbestos or lead are encountered during the building improvements, all applicable abatement laws must be followed. Abating asbestos and lead from the existing buildings would have a beneficial impact.

4.1.13.4 Structural Alternative

Under this alternative, FEMA may acquire and demolish properties and associated structures. These activities which would require an Environmental Site Assessment (ESA) to be performed to determine whether any recognizable environmental conditions exist at or around the site. In addition, demolition of existing structures would have to be completed in compliance with the applicable California and Federal regulations associated with asbestos and lead abatement, and UST closures. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate. If asbestos and lead are abated from the existing buildings, a beneficial impact would occur.

4.1.13.5 Combination Alternative

In general, if the combined alternative consists of demolishing buildings or using new property, then an ESA would have to be completed on the new property, and closure and handling requirements relating to asbestos, lead, and USTs must be followed. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate. In all cases, abating hazardous materials from a community would have beneficial results.

4.2 Drainage Channels

4.2.1 Geology, Geohazards, and Soils

4.2.1.1 No Action Alternative

Since no new channels would be built and existing channels would not be improved, the no action alternative would not affect geology or soils. Floodprone areas would remain subject to future flooding. If channels are not repaired, however, future flooding may be exacerbated and could result in soil erosion adjacent to the floodplain.

4.2.1.2 Non-Structural Alternative

This alternative consists of natural bypasses, voluntary property acquisitions, voluntary property relocations, and public education programs.

Natural bypasses that change watercourses from their current alignments would impact soils beneficially because these projects would divert waterways to natural floodways. However, if the alternative involves using a previously unused or under-used natural waterway as a bypass, possible adverse impacts to soils (alluvium in this case), such as increased scouring of stream beds and increased sediment load, may occur.

By implementing property acquisitions, FEMA would demolish existing floodprone structures. When the property owners of acquired property relocate out of floodprone areas, this component of the alternative may have an adverse impact to soils by disturbing soil during construction and possibly by decreasing acreage available for prime farmland. Appropriate construction techniques would be used to prevent soil loss during construction. Applicable city, county, and state guidelines would be followed to minimize loss of prime farmland. For property owners who choose not to participate in acquisition or relocation projects, impacts would be similar to those described for the no action alternative.

Public education programs would not impact geology and soils.

4.2.1.3 Improvement Alternative

Hydrology and hydraulic studies would be conducted to demonstrate that this alternative, as described in Section 2.5.2.3., would ameliorate flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways. Because these improvements may more efficiently convey floodwaters, these measure would beneficially impact soils. However, this effect could be partially countered by increased soil deposit downstream.

For channels that are already concrete-lined and are undergoing repairs, impacts related to geology and soils would be minimal assuming that appropriate construction techniques are used to control soil erosion. Short-term erosion and sedimentation (siltation) impacts can normally be mitigated by applying appropriate erosion and sediment control measures during construction.

For channels that are improved either by concretizing, enlarging, or relocating the channel, impacts would be the same as described under Structural Alternative (Section 4.2.1.4).

4.2.1.4 Structural Alternative

Hydrology and hydraulic studies would be conducted to demonstrate that the re-alignment of existing channels or constructing concrete channels, drainage swales, or surface or subsurface RCPs would ameliorate flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways.

Possible consequences to geology and soils from construction of new channels include siting channels within areas of protected geologic resources or within areas designated as important farmland soils as well as impacts from geohazards (such as the potential failure of the channel during an earthquake). State maps and county/city general plans should be reviewed to determine whether measures will be needed to mitigate impacts of construction. Short-term erosion and

sediment impacts can normally be mitigated by applying appropriate control measures during construction.

4.2.1.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.1.5.

4.2.2 Air Quality

Impacts would be identical to those described in Section 4.1.2.

4.2.3 Hydrology and Water Quality

4.2.3.1 No Action Alternative

Since no new channels would be built and existing channels would not be improved, the no action alternative would not impact long term hydrology and water quality. If channels are repaired to pre-disaster conditions, floodprone areas would remain subject to future flooding. Additionally, channel banks may require stabilizing or excess sediment or other debris may require removal prior to repairs. In these situations, short term impacts to water quality may occur, and an analysis of the potential short term impacts to water quality may be required. If channels are not repaired, however, future flooding may be exacerbated and streambed characteristics could be altered because the damaged channels may not adequately control floodwaters. In this situation, there may be increased bank instability and a subsequent increase in soil erosion; impacts to water quality may occur, and an analysis of the potential impacts to water quality may be required.

4.2.3.2 Non-Structural Alternative

This alternative consists of natural bypasses, voluntary property acquisitions, voluntary property relocations, and public education programs.

Natural bypasses that change watercourses from their current alignments would impact water quality beneficially because these projects would divert waterways to natural floodways. Alterations or modifications that impact a natural waterway may require a permit from USACE and CDFG and coordination with USFWS, CDFG, and local agencies.

By implementing property acquisitions, FEMA would demolish existing floodprone structures. If facilities are industrial in nature, relocating the function of the facility to an area outside of the floodplain may beneficially impact water quality by reducing the potential introduction of contaminants to the waterway. For property owners who choose not to participate in acquisition or relocation projects, impacts would be similar to those described for the no action alternative.

Public education programs would beneficially impact water quality by informing the public, especially those with properties located in floodprone areas, of the need to protect water quality by using appropriate best management practices (BMPs).

4.2.3.3 Improvement Alternative

Hydrology and hydraulic studies would be conducted to demonstrate that this alternative, as described in Section 2.5.2.3., would ameliorate flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways. Because these improvements may more efficiently convey floodwaters, and thus may prevent widespread flooding of industrial and urban areas, these measure would beneficially impact water quality by reducing floodwater exposure to contaminants. If these improvements impact a natural waterway, a permit from USACE and CDFG and coordination with USFWS, CDFG, and local agencies may be required.

4.2.3.4 Structural Alternative

Hydrology and hydraulic studies would be conducted to demonstrate that the re-alignment of existing channels or constructing concrete channels, drainage swales, or surface or subsurface RCPs would ameliorate flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways. This alternative may beneficially impact water quality if the floodplain is altered to draw floodwaters away from developed areas and into the channelized floodway. This alternative would affect runoff into natural waterways and would impact stormwater runoff patterns; a Streambed Alteration Permit may be required from the CDFG, and local/areawide Stormwater Management Plans and Watershed Plan should be consulted for restrictions and guidelines. Furthermore, a Section 404 permit would likely be required by USACE, and coordination with USFWS, CDFG, and local authorities may be necessary.

4.2.3.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.3.5.

4.2.4 Floodplain Management

4.2.4.1 No Action Alternative

Current drainage channels would not be improved or relocated, and new channels would not be constructed. Floodprone areas would remain subject to future flooding. If facilities are located in these areas, future flood damage is expected. The floodplain would not be altered because no changes would be made to existing conditions, except in the case of channels that are not repaired. This scenario could result in the extent, elevation, or other features of the floodplain being altered.

4.2.4.2 Non-Structural Alternative

This alternative consists of natural bypasses, voluntary property acquisitions, voluntary property relocations, and public education programs.

Natural bypasses that change watercourses from their current alignments would impact floodplains beneficially by diverting waterways from developed areas to natural floodways. Furthermore, structures in the developed areas would be less prone to future flood damage.

By implementing property acquisitions, FEMA would demolish existing floodprone structures and place deed restrictions on acquired properties limiting future uses to open space purposes. When the property owners of acquired property relocate out of floodprone areas, this component of the alternative would beneficially impact floodplains by decreasing future flood damages and returning floodplains to more appropriate land uses. The potential exists, however, for an increase in downstream flow. Downstream land uses would be evaluated for potential impacts. Real property relocations would have the same impact described for property acquisition. However, FEMA's involvement in the selection of the relocated area would ensure that no new structures would be built in the floodplain or floodway. For property owners who choose not to participate in acquisition or relocation projects, impacts would be similar to those described for the no action alternative.

Public education programs would not impact the BFE, floodplain extent, or other floodplain characteristics. Such programs may decrease damages, for example, by educating homeowners to elevate valuable household items above the BFE.

All components of this alternative would comply with the NFIP, EO 11988, and 44 CFR Part 9.

4.2.4.3 Improvement Alternative

Hydrology and hydraulic studies would be conducted to demonstrate that implementing this alternative, as described in Section 2.5.2.3., would reduce flooding and related damages in case of high flows or natural events beyond the capacity of natural waterways. Because these improvements more efficiently convey floodwaters, these measures would beneficially impact floodplains. To comply with EO 11988 and 44 CFR Part 9, this alternative would only be selected if no practicable alternative exists and the risk of future flood damage would be decreased. Public notification and minimization of potential impacts would comply with EO 11988 and 44 CFR Part 9.

4.2.4.4 Structural Alternative

Hydrology and hydraulic studies would be conducted to demonstrate that the realignment of existing channels or constructing concrete channels, drainage swales, or surface or subsurface RCPs would ameliorate flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways. Because these measures would decrease the potential for flooding, flood-related damages would be decreased. Furthermore, the floodplain would be altered to draw floodwaters away from developed areas and into the channelized floodway. To comply with EO 11988 and 44 CFR Part 9, this alternative would only be selected if no practicable alternative exists and this alternative would decrease the risk of future flood

damage. Furthermore, public notification and minimization of potential impacts would comply with EO 11988 and 44 CFR Part 9.

4.2.4.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.4.5.

4.2.5 Biological Resources

4.2.5.1 No Action Alternative

No impacts to vegetation, wetlands, or wildlife would occur if drainage channels are not altered or improved. Floodprone areas would remain subject to future flooding. In the event that damaged drainage channels are not repaired and flood flow alterations occur, environmental consequences such as vegetation and wetland loss due to streambed scouring and sedimentation could occur.

Eroded areas on the existing channels may be repaired/restored to predisaster conditions. For the channels that are repaired/restored, the footprint of the channel would be the same as the predisaster footprint, therefore, there is no potential for long-term impacts to biological resources. However, repair/restoration activities may adversely affect adjacent wildlife species, particularly aquatic species. Potentially affected species are common to the area, and displaced individuals would likely return following construction.

4.2.5.2 Non-Structural Alternative

This alternative consists of natural bypasses, voluntary property acquisitions and relocations, and public education programs. Natural bypasses that change watercourses from their current alignments would divert waterways from developed areas to natural floodways. Loss of wetland and riparian vegetation and associated wildlife would occur in the relocated waterway. Where existing floodprone structures are relocated, the site would be restored as open space, thus, constituting a beneficial impact to biological resources. Public education programs would not impact biological resources. A USACE 404 permit and CDFG Section 1601 permit and coordination with USFWS, CDFG, and local authorities would likely be required for these projects.

Potential short-term, construction-related impacts to wildlife species are discussed previously in Section 4.1.5.2.

4.2.5.3 Improvement Alternative

For channels that are already concrete-lined and are undergoing repairs, environmental consequences related to biological resources would be minimal. However, where natural stream conditions occur, altering vegetation adjacent to or within the stream corridor could impact riparian, wetland and associated wildlife resources. In either case, a USACE Section 404 permit

and a CDFG Section 1601 permit would be required. Coordination with USFWS, CDFG, and local authorities would also be required. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local levels.

Potential short-term, construction-related impacts to wildlife species are discussed previously in Section 4.1.5.3.

4.2.5.4 Structural Alternative

Channel realignments or channelization activities would alter native vegetation, aquatic resources and associated fish and wildlife. Riparian and wetland vegetation associated with stream corridors would be altered or removed as a result of this alternative. A USACE Section 404 permit and a CDFG Section 1601 permit would be required. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local level. Coordination with USFWS, CDFG, and local authorities would also be required.

Potential short-term, construction-related impacts to wildlife species are discussed previously in Section 4.1.5.4.

4.2.5.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.5.5.

4.2.6 Threatened and Endangered Species

4.2.6.1 No Action Alternative

Damaged drainage channels would not be improved or relocated nor would new channels be constructed with the No Action Alternative. Eroded areas on the existing channels may be repaired/restored to predisaster conditions. For the channels that are repaired/restored to predisaster conditions, the footprint of the channel would be the same as the predisaster footprint; therefore, there is no potential for long-term impacts to proposed or listed species. However repair/restoration activities may adversely affect proposed and listed species in the short-term as discussed in Section 4.1.6.1.

4.2.6.2 Non-Structural Alternative

This alternative consists of natural bypasses, voluntary property acquisitions, voluntary relocations, and public education programs. As part of the property acquisition program, FEMA would demolish existing floodprone structures and place deed restrictions on acquired properties limiting future uses to open space purposes. For the reasons discussed in Section 4.1.6.2, this alternative is expected have little if any effect on proposed and listed species. As discussed previously, there is a low probability that proposed and listed species present in the immediate vicinity of structures to be demolished could be adversely affected by the ingress and egress of

equipment and personnel. Adherence to stipulations for species that may occur in the project area as outlined in the PBO would minimize potential impacts on proposed and listed species.

For property relocation projects, areas proposed for disturbance would be evaluated for the presence of proposed or listed species and/or their suitable habitat. If suitable habitat for an "at risk" species is present, it would be avoided. If suitable habitat for one or more of the other identified species is present, consideration would be given to avoidance and if it cannot be avoided, the affected area would be quantified and the project approved with the stipulations contained in the PBO. In addition, proposed or listed threatened or endangered species in the immediate vicinity of the activities could be adversely affected by the ingress and egress of equipment and personnel. Potential impacts would be short-term and may include disturbance/displacement of individuals, incidental disruption of suitable habitat, and mortality of individuals. Adherence to stipulations for species that may occur in the project area as outlined in the PBO (for example, no construction in spotted owl nesting habitat during nesting season or no construction in salmon streams during spawning period of salmon) would minimize potential impacts on proposed and listed species.

4.2.6.3 Improvement Alternative

With this alternative existing drainage channels would be improved by adding concrete linings, installing RCPs, armoring with riprap or gabions, installing geotextile fabrics, or by increasing the size of the channel. This alternative is expected to have little effect on proposed and listed species because the footprint of the channel would change little if any. If new areas are disturbed, it would be determined if the areas contain suitable habitat for proposed or listed species and if suitable habitat is present, procedures discussed in Section 4.1.6.3 would be implemented. Potential impacts associated with the ingress and egress of equipment and personnel would be handled as discussed in Section 4.1.6.3.

4.2.6.4 Structural Alternative

This alternative entails new construction of concrete channels, surface or subsurface RCPs, or drainage swales to control otherwise free-flowing water courses. Realignment of existing drainage channels would also be considered under this alternative. Moving the footprint of an existing drainage channel and constructing new channels may adversely affect proposed and listed T&E species. Areas that would be disturbed would be evaluated for the presence of proposed or listed species and/or their suitable habitat. If suitable habitat is present within areas that could be affected by the proposed project, procedures as discussed in Section 4.1.6.4 would be implemented. Potential impacts associated with the ingress and egress of equipment and personnel would be handled as discussed in Section 4.1.6.4.

4.2.6.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.6.5.

4.2.7 Cultural Resource

4.2.7.1 No Action Alternative

Impacts under this alternative would be identical to those described in Section 4.1.7.1

4.2.7.2 Non-Structural Alternative

Property acquisition, property relocation, and natural bypasses would require some level of compliance with Section 106 of the NHPA, pursuant to the PA. Since there would be proposed actions, such as demolition of existing floodprone structures, development of the future location of floodprone properties, and improvements to roads and utilities, coordination with the SHPO and ACHP would be warranted, depending on the types of actions proposed so that impacts to potentially significant cultural resources are mitigated.

4.2.7.3 Improvement Alternative

Drainage channel hydrology and hydraulics impacts on significant cultural resources may need to be assessed. However, because proposed projects take place within an existing channel alignment, the potential for impacting significant cultural resources would be low. Specific actions proposed under this alternative for the improvement of drainage of floodwaters would be evaluated pursuant to the PA.

4.2.7.4 Structural Alternative

Under this alternative, constructing new drainage channels and related devices would require evaluation pursuant to the PA.

4.2.7.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.7.5.

4.2.8 Socioeconomic and Public Safety

4.2.8.1 No Action Alternative

Under this alternative, impacts would be similar to those described in Section 4.1.8.1.

4.2.8.2 Non-Structural Alternative

Under the property acquisition component, many owners and tenants 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. Renters would be adversely affected if their income is not sufficient to pay rent in comparable units or if rental units are not available. 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 which move to distant communities include potential losses of customers, employees, and site-specific resources or services. Implementing property acquisition in compliance with the Uniform Relocation Act and Chapter 16 of the California Government Code would mitigate these potential impacts to some extent. Additional strategies to mitigate these impacts by acquiring comparable facilities for displaced residents and businesses include 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 those residents and businesses that remain would indirectly affect the local economy as described in Section 4.1.8.1.

Property relocation projects, natural bypasses, and public education programs would decrease potential property damage and risk to human safety from future floods. For property owners and tenants who relocate out of the floodplain, property acquisition projects would also decrease potential property damage and risk to human safety from future floods. These measures would prevent future financial losses to residents, businesses, and governments and the indirect impacts described in Section 4.1.8.1 would be less likely to occur.

For property relocation projects, residents and local governments would expend funds for interim facilities, and businesses would be impacted by loss of sales due to momentary closings; however these impacts would be temporary. Adherence to the Uniform Relocation Act and Chapter 16 of the California Government Code would mitigate these potential impacts. Property relocation projects would also require expenditures of funds for roads, utilities, and other infrastructure improvements.

Private contractors would receive economic benefits from construction and demolition under the acquisition, relocation, and natural bypass components of this alternative. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.2.8.3 Improvement Alternative

Improvements to existing channels (as described in Section 2.5.2.3) would create beneficial impacts to socioeconomic resources. These actions would reduce the potential for flood-related losses to residents, businesses, and government facilities removed from the floodplain; decrease risks to human safety for persons inhabiting or using facilities removed from the floodplain; increase property values of structures removed from the floodplain; and reduce the corresponding indirect impacts described in Section 4.1.8.1.

On the other hand, properties that front on or have views of existing natural waterways may decrease in value as a result of this alternative. Project components that would alter a natural

channel bed to one with concrete linings, RCPs, or other synthetic conveyance system would likely at least partially offset the increase in property value resulting from removing the property from the floodplain. This is especially true of residential property or commercial property that benefits from a view, such as a restaurant or a hotel.

If this alternative requires property acquisition, impacts to property owners would be similar to those described in Section 4.2.8.2.

Private contractors would receive economic benefits from channel improvement projects. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.2.8.4 Structural Alternative

The creation of drainage channels or the realignment of existing channels (as described in Section 2.5.2.4) would create beneficial impacts to socioeconomic resources. These actions would reduce the potential for flood-related losses to residents, businesses, and government facilities removed from the floodplain; decrease risks to human safety for persons inhabiting or using facilities removed from the floodplain; increase property values of structures removed from the floodplain; and reduce the corresponding indirect impacts described in Section 4.1.8.1.

On the other hand, properties that front on or have views of the proposed channel may decrease in value as a result of this alternative. Project components that would create a visible channel bed with concrete linings, RCPs, or other synthetic conveyance system would likely at least partially offset the increase in property value resulting from removing the property from the floodplain. This is especially true of residential property or commercial property that benefits from a view, such as a restaurant or a hotel. One exception to this would be the creation of drainage swales that maintain a natural appearance.

If this alternative requires property acquisition, impacts to property owners would be similar to those described in Section 4.2.8.2.

Private contractors would receive economic benefits from channel construction projects. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.2.8.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.8.5.

4.2.9 Land Use and Zoning

4.2.9.1 No Action Alternative

Because no new facilities would be built and existing facilities would not be improved, the No Action Alternative would not affect land use or zoning.

4.2.9.2 Non-Structural Alternative

For property acquisition and relocation projects, the zoning designation of properties to be acquired would be changed to reflect the open space use described in the corresponding deed restriction. Property acquisitions and relocations may impact land use and zoning; however, cities and counties with zoning ordinances would enforce these statutes on new development. If necessary, local governments would amend their zoning ordinance or grant variances so that areas proposed for relocation comply with the land uses of the relocated properties. Neither public education nor natural bypasses would affect land use or zoning.

4.2.9.3 Improvement Alternative

Improvements to existing drainage channels would not impact land use or zoning, except for projects that would increase the width of the channel. These projects would be evaluated for compliance with local zoning ordinance. If necessary, local governments would amend their zoning ordinance or grant variances so that these flood protection measures would comply with local statutes.

4.2.9.4 Structural Alternative

The new construction of drainage channels and associated waterway control projects has the potential to impact land use or zoning. These projects would be evaluated for compliance with local zoning ordinance. If necessary, local governments would amend their zoning ordinance or grant variances so that these flood protection measures would comply with local statutes.

4.2.9.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.9.5.

4.2.10 Public Services

4.2.10.1 No Action Alternative

This alternative would cause impacts identical to those described in Section 4.1.10.1.

4.2.10.2 Non-Structural Alternative

Relocating public facilities would likely directly impact the users of associated public services. Beneficial impacts would occur by reducing the risk of future flood damage to the relocated facility. Adverse impacts associated with this alternative involve changes in time and distance. 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. Recreational and medical 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. Because the potential impacts described above are site and project specific, general mitigation measures are not applicable. Individual projects would be evaluated for potential effects and mitigated appropriately.

Relocation and acquisition of residences, businesses, and other governmental facilities cause indirect impacts to public services. Many relocation projects would require utility extensions to the future site. Existing system capacities and utility use of the properties scheduled for relocation would be evaluated to determine if additional service is required. Depending on the number and type of properties, number of occupants, and distance from the original location, other public services may be impacted. Specific projects would be evaluated for proximity and availability of public schools, response times for police and fire protection services, proximity of recreational facilities, and proximity and availability of medical services. In addition to evaluating the need for new or increased service at the proposed relocation site, projects would evaluate whether services could be decreased as a result of restricting future uses of relocated properties. All of these impacts might also occur for acquisition projects as well; however, the uncertainty regarding the future of acquired property owners makes it difficult to assess impacts. For both project types, utilities would be removed from acquired properties, including buildings with utility connects and roads that share easements with utility lines.

Implementing natural bypasses and public education programs is not expected to affect public services.

4.2.10.3 Improvement Alternative

Improvements to drainage channels that reduce the risk of future flood damage at public facilities would create a beneficial impact. Because improvements to drainage channels would occur within existing channels, no other impacts to public services would occur.

4.2.10.4 Structural Alternative

Construction or realignment of drainage channels that reduce the risk of future flood damage at public facilities would create a beneficial impact.

Although property acquisition may be necessary to implement this alternative, this project component is not expected to affect public services, except by removing utilities from acquired properties.

If roads or bridges are temporarily closed as a result of these projects, school buses, police and fire vehicles, and ambulances could be forced to take detours and likely experience delays.

4.2.10.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.10.5.

4.2.11 Transportation

4.2.11.1 No Action Alternative

Facilities in floodprone areas may incur additional flood damage; roads and public transportation would then be subject to congestion, delays, and detours from repair equipment. The potential also exists for future flooding to damage and close roads.

4.2.11.2 Non-Structural Alternative

Property acquisition and relocation projects would impact traffic and transportation. These projects would increase traffic in the vicinity of new construction and property acquisition, causing congestion, delays, and possible detours from construction and demolition equipment. The degree of congestion, delays, and detours depends upon the location and extent of construction and demolition, but impacts from these components would be temporary. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies.

Constructing new structures also has the potential to permanently affect traffic and transportation by creating a need for new or improved roads or public transportation services. Furthermore, existing roads and services may need to be altered based on the acquisition of floodprone properties. Affected roads and public transportation systems would be reviewed to determine if existing roads and services would adequately handle the development of new structures and open-space uses. The creation of new roads and public transportation routes and alterations to existing roads and public transportation routes would be coordinated with appropriate transportation planning agencies.

Natural bypasses and public education would not impact traffic or transportation.

4.2.11.3 Improvement Alternative

Because improvements to drainage channels would occur within existing channels, impacts to traffic or transportation are not expected to occur.

4.2.11.4 Structural Alternative

The construction of concrete channels, RCPs, or swales to control free-flowing waterways is not expected to impact traffic or transportation. However, the realignment of existing drainage channels has the potential to impact roads and bridges. If the proposed realignment requires

constructing new road or bridge (per Section 2.5.2.4), the proposed route would be coordinated with appropriate transportation planning agencies. The potential impacts of road and bridge relocation have been addressed elsewhere in this document.

4.2.11.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.11.5.

4.2.12 Noise

4.2.12.1 No Action Alternative

If repair occurs on damaged drainage channels, repair equipment would create temporary noise. Noise is anticipated to remain within legal limits. Future flooding has the potential to cause additional damage and, therefore, additional noise from future repair.

4.2.12.2 Non-Structural Alternative

For property acquisition and property relocation projects, temporary noise would be generated by construction and demolition equipment. Additional noise would be generated as a result of property relocation projects that include infrastructure improvements. Noise generation from all of these components would comply with local noise ordinances. Property acquisition and relocation projects would also change the location of permanent noise sources; however, the impact of this change depends on the land use involved. Local noise ordinances would be reviewed for potential impacts caused by relocating noise-generating land uses. Noise created from public education projects and natural bypasses are expected to be negligible.

4.2.12.3 Improvement Alternative

The project components described in Section 2.5.2.3 are expected to generate temporary noise when improvements to existing channels are being made. Although some project components would create more noise than others, all would comply with local noise ordinances.

4.2.12.4 Structural Alternative

Constructing drainage channels or realigning existing channels would cause temporary noise. All improvements described in Section 2.5.2.4 would generate noise within legal limits based on local noise ordinances.

4.2.12.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.12.5.

4.2.13 Hazardous Materials and Wastes

4.2.13.1 No Action Alternative

In most cases, this alternative would not change the status of existing hazardous waste and materials. However, if flooding would continue to affect areas where USTs are located, there is the potential for inundated soils to cause the USTs to shift, and their associated piping may burst. This would have an adverse impact.

4.2.13.2 Non-Structural Alternative

Under this alternative, FEMA may site locations to support relocation and the necessary infrastructure improvements. These activities would require an ESA to be performed to determine whether any recognizable environmental conditions exist at or around the site(s). In addition, demolition of existing structures would have to be completed in compliance with the applicable California and Federal regulations associated with asbestos and lead abatement, and UST closures. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate.

4.2.13.3 Improvement Alternative

Hazardous waste and materials are not expected to be of issue under this alternative.

4.2.13.4 Structural Alternative

Under this alternative, FEMA may acquire property for the construction or realignment of a drainage channel. These activities would require an ESA to be performed to determine whether any recognizable environmental conditions exist at or around the site. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate.

4.2.13.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.13.5.

4.3 Detention and Retention Basins

4.3.1 Geology, Geohazards, and Soils

4.3.1.1 No Action Alternative

Detention and retention basins would not be enlarged or constructed as a result of this alternative. Areas prone to flood damage would continue to be subject to the same flood hazards.

4.3.1.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to those described in Section 4.2.1.2.

4.3.1.3 Improvement Alternative

Improving an existing detention or retention basin as described in Section 2.5.3.3 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. The floodplain would likely be shifted from developed areas, downstream of the basin, to agricultural or other land uses consistent with floodplain management surrounding the improved basin. Although this effect would be beneficial in an overall reduction of undue soil loss through flooding, possible negative impacts may occur locally if prime farmland is required for basin. Short-term erosion and sediment impacts from construction can normally be mitigated by applying appropriate control measures during construction.

4.3.1.4 Structural Alternative

Constructing a detention or retention basin would decrease the downstream floodplain and increase the extent of the floodplain around the sediment pool. The area surrounding the proposed basin pool would be evaluated for potential impacts to protected geologic resources and impacts to protected farmland soils. State maps and county/city general plans should be reviewed to determine whether measures will be needed to mitigate impacts of construction. Short-term erosion and sediment impacts can normally be mitigated by applying appropriate control measures during construction.

Impacts may result from geohazards, such as failure of the basin and resultant flooding in the event of a major earthquake. The potential for failure can be mitigated by using appropriate building technologies.

4.3.1.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.1.5.

4.3.2 Air Quality

Impacts would be identical to those described in Section 4.1.2.

4.3.3 Hydrology and Water Quality

4.3.3.1 No Action Alternative

Detention and retention basins would not be enlarged or constructed as a result of this alternative. Areas prone to flood damage would continue to be subject to future flooding.

4.3.3.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.3.2.

4.3.3.3 Improvement Alternative

Improving an existing detention or retention basin as described in Section 2.5.3.3 would alter the characteristics of the floodplain by decreasing the extent of the floodplain downstream of the basin and increasing the extent of the floodplain around the sediment pool. The floodplain would likely be shifted from developed areas, downstream of the basin, to agricultural or other land uses consistent with floodplain management surrounding the improved basin. Although this effect would be beneficial in an overall reduction of undue soil loss through flooding, possible negative impacts may occur locally if prime farmland is required for basin construction. Short-term erosion and sediment impacts from construction can normally be mitigated by applying appropriate control measures during construction.

4.3.3.4 Structural Alternative

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. This alternative may beneficially impact water quality by potentially moving waters away from developed areas and into other land uses consistent with floodplain management as well as by allowing particulate matter carried in stormwater runoff to settle and thereby improving the water quality. Proper maintenance and dredging of the basin is important. This alternative will affect runoff into natural waterways and will impact stormwater runoff patterns; a Streambed Alteration Permit may be required from the CDFG, and local/areawide Stormwater Management Plans and Watershed Plan should be consulted for restrictions and guidelines.

4.3.3.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.3.5.

4.3.4 Floodplain Management

4.3.4.1 No Action Alternative

Detention and retention basins would not be enlarged or constructed as a result of this alternative. Areas prone to flood damage would continue to be subject to future flooding. The floodplain would not be altered because no changes would be made to existing basins. However, if the no action alternative results in basins not being dredged or adequately maintained, sediment normally trapped by the damaged retention basin could cause sedimentation further downstream and therefore impact floodplain characteristics.

4.3.4.2 Non-Structural Alternative

Impacts described in Section 4.2.4.2 would be created by this alternative.

4.3.4.3 Improvement Alternative

Improving an existing detention or retention basin as described in Section 2.5.3.3 would alter the characteristics of the floodplain by decreasing the extent of the floodplain downstream of the basin and increasing the extent of the floodplain around the sediment pool. Other floodplain characteristics, such as the BFE, are also expected to change. Because the floodplain would likely be shifted from developed areas, downstream of the basin, to agricultural or other land uses consistent with floodplain management surrounding the improved basin, this effect would be beneficial. Land uses affected by the improved basin would be evaluated for potential impacts. Floodprone areas downstream from the basin would be less likely to flood and therefore would receive less flood damage from future events.

To comply with EO 11988 and 44 CFR Part 9, this alternative would only be selected if no practicable alternative exists and this alternative would decrease the risk of future flood damage. Furthermore, public notification and minimization of potential impacts would comply with EO 11988 and 44 CFR Part 9. The local government would be required to conduct detailed engineering analysis of floodplain changes, obtain concurrence from affected communities, and individually notify all property owners affected by changes in the floodplain. Furthermore, the responsible agency would budget appropriate additional funds for routine maintenance of the improved basin.

4.3.4.4 Structural Alternative

Constructing a detention or retention basin would alter the characteristics of the floodplain by decreasing the extent of the floodplain downstream of the basin and increasing the extent of the floodplain around the sediment pool. Other floodplain characteristics, such as the BFE, are also expected to change. Because the floodplain would likely be shifted from developed areas, downstream of the basin, to agricultural or other land uses consistent with floodplain management surrounding the basin, this effect would be beneficial. Land uses on and surrounding the proposed basin pool would be evaluated for potential impacts. Floodprone areas downstream from the basin would be less likely to flood and therefore would receive less flood damage from future events.

To comply with EO 11988 and 44 CFR Part 9, this alternative would only be selected if no practicable alternative exists and this alternative would decrease the risk of future flood damage. Furthermore, public notification and minimization of potential impacts would comply with EO 11988 and 44 CFR Part 9. The local government would be required to conduct detailed engineering analysis of floodplain changes, obtain concurrence from affected communities, and individually notify all property owners affected by changes in the floodplain. Furthermore, the responsible agency would budget appropriate additional funds for routine basin maintenance.

4.3.4.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.4.5.

4.3.5 Biological Resources

4.3.5.1 No Action Alternative

No impacts to vegetation, wetlands, or wildlife would occur under this alternative because no basin construction would occur. However, if the no action alternative results in basins not being dredged or adequately maintained, silt normally trapped by the damaged basin could cause sedimentation further downstream, thus, impacting those biological resources. For the basins that are repaired/restored to predisaster conditions, adjacent wildlife species may be adversely affected in the short-term as discussed in Section 4.1.5.1.

4.3.5.2 Non-Structural Alternative

This alternative would create impacts identical to those described in Section 4.2.5.2.

4.3.5.3 Improvement Alternative

For detention and retention basins requiring normal maintenance, such as desilting or repairs, impacts to biological resources would be minimal to none and should already be covered under existing contracts and permits. In the case that a basin would be enlarged, impacts to biological resources, particularly wetlands, would need to be evaluated. Permits with USACE and CDFG would be required. Impacts to wetlands and other sensitive resources, such as oak, would require mitigation most likely at the Federal, state, and local levels. Coordination with USFWS, CDFG, and local authorities and compliance with local statutes would be required.

Potential short-term, construction-related impacts to wildlife species are discussed previously in Section 4.1.5.3.

4.3.5.4 Structural Alternative

Detention and retention basin construction would occur at selected sites to provide greater control over floodwaters. Downstream habitats would benefit from reduced flood flows due to the reduction of scour and sedimentation. More stable stream flows would support later successional growth and multi-layered, multi-aged streamside habitats. Constructing a new debris basin would inundate existing vegetation and wetland resources and associated wildlife species and alter aquatic habitat within the existing stream corridor. Alterations to native terrestrial and aquatic habitats and sensitive wildlife resources would result. A debris basin is unlikely to impact fish migration, depending on the design of the structure. Potential short-term, construction-related impacts to wildlife species are discussed previously in Section 4.1.5.4.

Permits with USACE and CDFG would be required. Impacts to aquatic resources, wetlands and other sensitive resources would require mitigation at the Federal, state, and local level. Coordination with USFWS, CDFG, and local authorities and compliance with local statutes would be required.

4.3.5.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.5.5.

4.3.6 Threatened and Endangered Species

4.3.6.1 No Action Alternative

Since detention and retention basins would not be enlarged and no new basins would be constructed, there is no potential for long-term impacts to proposed or listed species with this alternative. For the basins that are repaired/restored to predisaster conditions, proposed and listed species may be adversely affected in the short-term as discussed in Section 4.1.6.1.

4.3.6.2 Non-Structural Alternative

Impacts caused by this alternative would be identical to those described in Section 4.2.6.2.

4.3.6.3 Improvement Alternative

Improvements included within this alternative include increasing the height of the berms, increasing depth by excavation, increasing the areal size of the basin, constructing a multi-stage sediment basin from an existing single-stage basin, or converting a dry basin to a basin with a permanent pool (pond). This alternative is expected to have little if any adverse effect on proposed and listed species because the basin footprint would change little if any. If new areas are disturbed, it would be determined if the areas contain suitable habitat for proposed or listed species and if suitable habitat is present, procedures discussed in Section 4.1.6.3 would be implemented. Potential impacts associated with the ingress and egress of equipment and personnel would be handled as discussed in Section 4.1.6.3.

Conversion of a dry basin to a pond may create wetland habitat around the pond perimeter. Since many of the proposed and listed plant and animal species use wetland habitats, this alternative may have a small beneficial effect on one or more of these species.

4.3.6.4 Structural Alternative

New detention, retention, or desilting basins would be constructed with this alternative and as discussed previously new areas are expected to be disturbed and these areas mat contain suitable habitat occupied by one or more proposed or listed T&E species. Areas that would be disturbed would be evaluated for the presence of proposed or listed species and/or their habitat. If suitable habitat is present within areas that could be affected by the proposed project, procedures as discussed in Section 4.1.6.4 would be implemented. Potential impacts associated with the ingress and egress of equipment and personnel would be handled as discussed in Section 4.1.6.4.

If the created basins have a pond, wetland vegetation may develop around the pond perimeter. Since many of the proposed and listed plant and animal species use wetland habitats, this alternative may have a small beneficial effect on one or more of these species.

4.3.6.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.6.5.

4.3.7 Cultural Resources

4.3.7.1 No Action Alternative

Impacts under this alternative would be identical to those described in Section 4.1.7.1

4.3.7.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.7.2.

4.3.7.3 Improvement Alternative

Drainage channel hydrology and hydraulics impacts on significant cultural resources may need to be assessed. However, because proposed projects take place within an existing channel alignment, the potential for impacting significant cultural resources would be low. Specific actions proposed under this alternative for the improvement of drainage of floodwaters would be evaluated pursuant to the PA.

4.3.7.4 Structural Alternative

Under this alternative, constructing new detention and retention basins would require evaluation pursuant to the PA.

4.3.7.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.7.5.

4.3.8 Socioeconomics and Public Safety

4.3.8.1 No Action Alternative

Under this alternative, impacts would be similar to those described in Section 4.1.8.1.

4.3.8.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to impacts described in Section 4.2.8.2.

4.3.8.3 Improvement Alternative

Improvements to existing detention and retention basins (as described in Section 2.5.3.3) would create beneficial impacts to socioeconomic resources. These actions would reduce the potential for flood-related losses to residents, businesses, and government facilities removed from the floodplain; decrease risks to human safety for persons inhabiting or using facilities removed from

the floodplain; increase property values of structures removed from the floodplain; and reduce the corresponding indirect impacts described in Section 4.1.8.1.

For projects that increase the extent of the basin or convert a dry basin into a pond, acquisition of properties may be required. Impacts to property owners of acquired properties would be similar to those described in Section 4.2.8.2. In addition to the mitigation measures listed in Section 4.2.8.2, this project component would also consider using easements or lease-back provisions to allow property owners to use their properties consistent with floodplain management, for example, agriculture or grazing.

Private contractors would receive economic benefits from basin improvement projects. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.3.8.4 Structural Alternative

Construction of detention and retention basins would create beneficial impacts to socioeconomic resources. Impacts include reducing the potential for flood-related losses to residents, businesses, and government facilities removed from the floodplain; decreasing risks to human safety for persons inhabiting or using facilities removed from the floodplain; increasing property values of structures removed from the floodplain; and reducing the corresponding indirect impacts described in Section 4.1.8.1.

Acquisition of properties would likely be required on and around the proposed basin area. Impacts to property owners of acquired properties would be similar to those described in Section 4.2.8.2. In addition to the mitigation measures listed in Section 4.2.8.2, this project component would also consider using easements or lease-back provisions to allow property owners to use their properties consistent with floodplain management, for example, agriculture or grazing.

Private contractors would receive economic benefits from basin construction. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.3.8.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.8.5.

4.3.9 Land Use and Zoning

4.3.9.1 No Action Alternative

Because no new facilities would be built and existing facilities would not be improved, the No Action Alternative would not affect land use or zoning for any project type.

4.3.9.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.9.2.

4.3.9.3 Improvement Alternative

Increasing the extent of the sedimentation pool has the potential to impact land use and zoning. If the proposed land use as a basin does not comply with local zoning statutes, the local government would amend the zoning ordinance appropriately or grant a variance. Other components of this alternative would not affect land use or zoning.

4.3.9.4 Structural Alternative

Creating a detention or retention basin may impact land use and zoning. If the proposed land use as a basin does not comply with local zoning statutes, the local government would amend the zoning ordinance appropriately or grant a variance.

4.3.9.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.9.5.

4.3.10 Public Services

4.3.10.1 No Action Alternative

This alternative would cause impacts identical to those described in Section 4.1.10.1.

4.3.10.2 Non-Structural Alternative

Impacts caused by this alternative would be identical to those described in Section 4.2.10.2.

4.3.10.3 Improvement Alternative

Improvements to detention and retention basins that reduce the risk of future flood damage at public facilities would create a beneficial impact.

If roads are relocated as a result of enlarging a basin, school buses, police and fire vehicles, and ambulances could be forced to take alternate routes. Although property acquisition may be necessary to implement this alternative, this project component is not expected to affect public services, except by removing utilities from acquired properties.

4.3.10.4 Structural Alternative

Installation of detention and retention basins that reduce the risk of future flood damage at public facilities would create a beneficial impact.

If roads are relocated as a result of enlarging a basin, school buses, police and fire vehicles, and ambulances could be forced to take alternate routes. Although property acquisition may be necessary to implement this alternative, this project component is not expected to affect public services, except by removing utilities from acquired properties.

4.3.10.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.10.5.

4.3.11 Transportation

4.3.11.1 No Action Alternative

Facilities in floodprone areas may incur additional flood damage; roads and public transportation would then be subject to congestion, delays, and detours from repair equipment. The potential also exists for future flooding to damage and close roads.

4.3.11.2 Non-Structural Alternative

This alternative would create impacts identical to those described in Section 4.2.11.2.

4.3.11.3 Improvement Alternative

Improvements to detention and retention basins which consist of increasing the extent of the permanent pool may affect traffic and transportation. If existing roads are determined to be within the boundaries of the enlarged permanent pool or the revised 100-year floodplain, alternate routes (Section 2.5.2.1), road elevation (Section 2.5.3.1), and new road construction (Section 2.5.4.1) would be considered. A proposed action would be determined with input from appropriate transportation planning agencies. Impacts from these actions have been addressed elsewhere in this document.

4.3.11.4 Structural Alternative

The construction of detention and retention basins has the potential to affect roads. If existing roads are determined to be within the boundaries of the permanent pool or the revised 100-year floodplain, alternate routes (Section 2.5.1.2), road elevation (Section 2.5.1.3), and new road construction (Section 2.5.1.4) would be considered. A proposed action would be determined with input from appropriate transportation planning agencies. Impacts from these actions have been addressed elsewhere in this document.

4.3.11.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.11.5.

4.3.12 Noise

4.3.12.1 No Action Alternative

Dredging of detention and retention basins with excess sediment would cause minimal, temporary noise well within legal limits. Future flooding has the potential to cause additional damage and, therefore, additional noise from future repair.

4.3.12.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to those described in Section 4.2.12.2.

4.3.12.3 Improvement Alternative

Equipment used to improve existing detention and retention basins would create temporary noise. Noise generated by this alternative would comply with local noise ordinances.

4.3.12.4 Structural Alternative

Equipment used to construct detention and retention basins would create temporary noise. Noise created by this alternative would comply with local noise ordinances.

4.3.12.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.12.5.

4.3.13 Hazardous Materials and Wastes

4.3.13.1 No Action Alternative

In most cases, this alternative would not change the status of existing hazardous waste and materials. However, if flooding would continue to affect areas where USTs are located, there is the potential for inundated soils to cause the USTs to shift, and their associated piping may burst. This would have an adverse impact.

4.3.13.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.13.2.

4.3.13.3 Improvement Alternative

Under this alternative, improvements to existing detention and retention basins may require that additional land be used. If this is the case, an ESA must be performed to determine whether any

recognizable environmental conditions exist at or around the new land. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate.

4.3.13.4 Structural Alternative

Under this alternative, FEMA would construct a detention and retention basin. This activity would require an ESA to be performed to determine whether any recognizable environmental conditions exist at or around the proposed site(s). In addition, if structures would need to be demolished, compliance with the applicable California and Federal regulations associated with asbestos and lead abatement, and UST closures must be followed. Coordination with the Air District, the State Water Resource Control Board, ARB, and the EPA would be required as appropriate. Abating asbestos and lead from the existing buildings would have a beneficial impact.

4.3.13.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.13.5.

4.4 Culverts

4.4.1 Geology, Geohazards, and Soils

4.4.1.1 No Action Alternative

Existing culverts would not be improved and new culverts would not be built. Floodprone areas would remain subject to the same flood hazards. Culverts that remain damaged could alter floodplain features and result in soil erosion.

4.4.1.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to those described in Section 4.2.1.2.

4.4.1.3 Improvement Alternative

Improving a culvert, as described in Section 2.5.4.3, would decrease the risk of future flood damage. Because these improvements may more efficiently convey floodwaters, these measures would beneficially impact soils by reducing downstream erosion from flooding. For culverts undergoing repairs, impacts on geology and soils would be minimal assuming appropriate construction techniques are used to control erosion. Short-term erosion and sediment impacts can normally be mitigated by applying appropriate control measures during construction.

4.4.1.4 Structural Alternative

The construction of new culverts would prevent flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways. Possible consequences to geology and soils may result from siting culverts within areas of protected geologic resources or within areas designated as important farmland soils as well as impacts from geohazards (such as the damage to the culvert during an earthquake event). State maps and county/city general plans should be reviewed to determine whether measures will be needed to mitigate impacts of construction. Short-term erosion and sediment impacts can normally be mitigated by applying appropriate control measures during construction.

4.4.1.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.1.5.

4.4.2 Air Quality

Impacts would be identical to those described in Section 4.1.2.

4.4.3 Hydrology and Water Quality

4.4.3.1 No Action Alternative

Existing culverts would not be improved, and new culverts would not be built. Floodprone areas would remain subject to future flooding. Culverts that remain damaged could alter floodplain features and result in soil erosion.

4.4.3.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.3.2.

4.4.3.3 Improvement Alternative

Improving a culvert, as described in Section 2.5.4.3, would decrease the risk of future flood damage. Because these improvements may more efficiently convey floodwaters thereby reducing the area of exposure to pollutant sources, these measures would beneficially impact water quality. The floodplain would likely be altered by decreasing the extent of the floodplain upstream of the culvert and possibly increasing the extent of the floodplain and the BFE downstream, especially in the floodway; because of these potential impacts, a permit from USACE and CDFG may be required as well as local or municipal permits.

4.4.3.4 Structural Alternative

The construction of new culverts would prevent flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways. This alternative will affect runoff into natural waterways and will impact stormwater runoff patterns; a Streambed

Alteration Permit may be required from the CDFG, and local/areawide Stormwater Management Plans and Watershed Plan should be consulted for restrictions and guidelines.

4.4.3.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.3.5.

4.4.4 Floodplain Management

4.4.4.1 No Action Alternative

Existing culverts would not be improved, and new culverts would not be built. Floodprone areas would remain subject to future flooding. Culverts that remain damaged could alter the floodplain's size, elevation, or other features. Otherwise no change would occur to the floodplain.

4.4.4.2 Non-Structural Alternative

Impacts described in Section 4.2.4.2 would be created by this alternative.

4.4.4.3 Improvement Alternative

Improving a culvert, as described in Section 2.5.4.3, would decrease the risk of future flood damage. Because these improvements may more efficiently convey floodwaters, these measures would beneficially impact floodplains. The floodplain would likely be altered by decreasing the extent of the floodplain upstream of the culvert and possibly increasing the extent of the floodplain and the BFE downstream, especially in the floodway. Downstream land uses would be evaluated for potential impacts. To comply with EO 11988 and 44 CFR Part 9, this alternative would only be selected if no practicable alternative exists and this alternative would decrease the risk of future flood damage. Furthermore, public notification and minimization of potential impacts would comply with EO 11988 and 44 CFR Part 9.

4.4.4.4 Structural Alternative

The construction of new culverts would prevent flooding and related damages in case of high flows or natural events of intensities beyond the capacity of natural waterways. Because culvert installation would decrease the potential for flooding, flood-related damages would be decreased. Furthermore, the floodplain would be altered to better convey floodwaters away within the floodway. To comply with EO 11988 and 44 CFR Part 9, this alternative would only be selected if no practicable alternative exists and this alternative would decrease the risk of future flood damage. Furthermore, public notification and minimization of potential impacts would comply with EO 11988 and 44 CFR Part 9.

4.4.4.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.4.5.

4.4.5 Biological Resources

4.4.5.1 No Action Alternative

If damaged culverts are not repaired, the hydraulics and hydrology of a stream channel could be altered potentially causing environmental consequences, such as vegetation and wetland loss due to channel bank erosion. For the culverts that are repaired/restored to predisaster conditions, adjacent wildlife may be adversely affected in the short-term as discussed in Section 4.1.5.1. In addition, repairs could result in a loss of vegetation, sedimentation of wetlands, and long-term impacts to aquatic organisms downstream from increased erosion.

4.4.5.2 Non-Structural Alternative

This alternative would create impacts identical to those described in Section 4.2.5.2.

4.4.5.3 Improvement Alternative

Improving culverts would more efficiently convey floodwaters, reducing scour and sedimentation. A potentially beneficial impact to vegetation and wildlife would occur if the decreased scour and sedimentation allowed development of late successional growth and multi-layered, multi-aged habitats. Potential short-term, construction-related impacts to wildlife species are discussed previously in Section 4.1.5.3.

Permits with USACE and CDFG would likely be required. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local levels. Coordination with USFWS, CDFG, and local authorities, and compliance with local statutes would be required.

4.4.5.4 Structural Alternative

Constructing new culverts would provide more efficient conveyance of floodwaters, reducing scour and sedimentation. A potentially beneficial impact to vegetation and wildlife would occur if the decreased scour and sedimentation allowed for the development of later successional growth and multi-layered, multi-aged habitats. Potential short-term, construction-related impacts to wildlife species are discussed previously in Section 4.1.5.4.

Permits with USACE and CDFG would likely be required. Impacts to wetlands and other sensitive resources would require mitigation at both the Federal, state, and local level. Coordination with USFWS, CDFG, and local authorities, and compliance with local statutes would be required.

4.4.5.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.5.5.

4.4.6 Threatened and Endangered Species

4.4.6.1 No Action Alternative

With the No Action Alternative, no new culverts would be installed and existing culverts would not be improved. If damaged culverts are not repaired, the hydraulics and hydrology of a stream channel could be altered. Although the probability is low, proposed and listed species could be adversely affected in the long term if the damaged culvert caused suitable habitat along the streambank to be eroded or prevented a fish species from migrating to their spawning areas. For the culverts that are repaired/restored to predisaster conditions, proposed and listed species may be adversely affected in the short-term as discussed in Section 4.1.6.1.

4.4.6.2 Non-Structural Alternative

Impacts caused by this alternative would be identical to those described in Section 4.2.6.2.

4.4.6.3 Improvement Alternative

This alternative consists of one or more of the following improvements to culverts: increasing capacity, adding headwall, and regrading. These activities have little potential to effect proposed or listed species. If new areas are disturbed, it would be determined if the areas contains habitat for proposed or listed T&E species; and if suitable habitat is present, procedures discussed in Section 4.1.6.3 would be implemented. Potential impacts associated with the ingress and egress of equipment and personnel would be handled as discussed in Section 4.1.6.3.

4.4.6.4 Structural Alternative

This alternative involves constructing new culverts; and since culverts are frequently constructed in areas that have been disturbed previously and require a relatively small footprint, these activities have little potential to effect proposed or listed threatened or endangered species. The gradient within the culvert should be low enough to allow upstream migration of fish. If new areas are disturbed, it would be determined if the areas contain habitat for proposed or listed species and if suitable habitat is present, procedures discussed in Section 4.1.6.4 would be implemented. Potential impacts associated with the ingress and egress of equipment and personnel would be handled as discussed in Section 4.1.6.4.

4.4.6.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.6.5.

4.4.7 Cultural Resources

4.4.7.1 No Action Alternative

Impacts under this alternative would be identical to those described in Section 4.1.7.1

4.4.7.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.7.2.

4.4.7.3 Improvement Alternative

Proposed actions would not likely impact significant cultural resources if the actions occur within or immediately adjacent to the existing culvert. The proposed action, however, would still be evaluated pursuant to the PA.

4.4.7.4 Structural Alternative

Under this alternative, constructing new culverts would require evaluation pursuant to the PA.

4.4.7.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.7.5.

4.4.8 Socioeconomics and Public Safety

4.4.8.1 No Action Alternative

Under this alternative, impacts would be similar to those described in Section 4.1.8.1.

4.4.8.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to impacts described in Section 4.2.8.2.

4.4.8.3 Improvement Alternative

Improvements to existing culverts (as described in Section 2.5.4.3) would create beneficial impacts to socioeconomic resources. These actions would reduce the potential for flood-related losses to residents, businesses, and government facilities removed from the floodplain; decrease risks to human safety for persons inhabiting or using facilities removed from the floodplain; increase property values of structures removed from the floodplain; and reduce the corresponding indirect impacts described in Section 4.1.8.1.

Private contractors would receive economic benefits from culvert improvement projects. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.4.8.4 Structural Alternative

The construction of culverts would create beneficial impacts to socioeconomic resources. These effects consist of reducing the potential for flood-related losses to residents, businesses, and government facilities removed from the floodplain; decreasing risks to human safety for persons inhabiting or using facilities removed from the floodplain; increasing property values of structures removed from the floodplain; and reducing the corresponding indirect impacts described in Section 4.1.8.1.

Private contractors would receive economic benefits from culvert construction projects. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.4.8.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.8.5.

4.4.9 Land Use and Zoning

4.4.9.1 No Action Alternative

Because no new facilities would be built and existing facilities would not be improved, the No Action Alternative would not affect land use or zoning for any project type.

4.4.9.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.9.2.

4.4.9.3 Improvement Alternative

Improvements to existing culverts would not impact land use or zoning.

4.4.9.4 Structural Alternative

Construction of culverts would not affect land use or zoning.

4.4.9.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.9.5.

4.4.10 Public Services

4.4.10.1 No Action Alternative

This alternative would cause impacts identical to those described in Section 4.1.10.1.

4.4.10.2 Non-Structural Alternative

Impacts caused by this alternative would be identical to those described in Section 4.2.10.2.

4.4.10.3 Improvement Alternative

Culvert improvements that reduce the risk of future flood damage at public facilities would create a beneficial impact.

If roads are temporarily closed as a result culvert improvements, school buses, police and fire vehicles, and ambulances could be forced to take detours and likely experience delays.

4.4.10.4 Structural Alternative

Installation of culverts that reduce the risk of future flood damage at public facilities would create a beneficial impact.

If roads are temporarily closed as a result of installing culverts, school buses, police and fire vehicles, and ambulances could be forced to take detours and likely experience delays.

4.4.10.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.10.5.

4.4.11 Transportation

4.4.11.1 No Action Alternative

Repair to culverts that carry water under roads may result in the temporary closure of lanes or roads, potentially causing detours, congestion, and delays. Under the No Action Alternative, facilities in floodprone areas may incur additional flood damage; roads and public transportation would then be subject to congestion, delays, and detours from repair equipment. The potential also exists for future flooding to damage and close roads.

4.4.11.2 Non-Structural Alternative

This alternative would create impacts identical to those described in Section 4.2.11.2.

4.4.11.3 Improvement Alternative

Improvements to culverts that carry water under roads may result in the temporarily closure of lanes or roads, potentially causing detours, congestion, and delays. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies.

4.4.11.4 Structural Alternative

Installation of culverts that carry water under roads are expected to result in the temporarily closure of lanes or roads, potentially causing detours, congestion, and delays. The subgrantee would coordinate detour routes and signs with appropriate transportation planning agencies.

4.4.11.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.11.5.

4.4.12 Noise

4.4.12.1 No Action Alternative

Repair to damaged culverts would result in the temporary noise generation. Noise sources are expected to be operated to comply with local noise ordinance. Future flooding has the potential to cause additional damage and, therefore, additional noise from future repair.

4.4.12.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to those described in Section 4.2.12.2.

4.4.12.3 Improvement Alternative

Improvements to existing culverts are expected to generate temporary noise. This alternative would comply with local noise ordinances.

4.4.12.4 Structural Alternative

Installing new culverts would cause temporary noise. All improvements described in Section 2.5.4.4 would generate noise within legal limits based on local noise ordinances.

4.4.12.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.12.5.

4.4.13 Hazardous Materials and Wastes

4.4.13.1 No Action Alternative

In most cases, this alternative would not change the status of existing hazardous waste and materials. However, if flooding would continue to affect areas where USTs are located, there is the potential for inundated soils to cause the USTs to shift, and their associated piping may burst. This would have an adverse impact.

4.4.13.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.13.2.

4.4.13.3 Improvement Alternative

It is unlikely that the status of hazardous waste and materials would be affected under this alternative.

4.4.13.4 Structural Alternative

Under this alternative, FEMA would construct a culvert. This activity would require an ESA to be performed to determine whether any recognizable environmental conditions exist at or around the proposed site(s).

4.4.13.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.13.5.

4.5 Dams

4.5.1 Geology, Geohazards, and Soils

4.5.1.1 No Action Alternative

Dams would not be improved or constructed. Floodprone areas would be subject to the same flood hazards. This alternative would not affect geology and soils except in the case of unrepaired or failed dams. Unrepaired or failed dams may impact the characteristics of the floodplain by not offering the same level of flood protection as before they were damaged and thus may result in increased soil erosion in the floodplain.

4.5.1.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to those described in Section 4.2.1.2.

4.5.1.3 Improvement Alternative

Dam improvements would provide greater control over reservoir elevations by allowing discharges of floodwaters or increasing the reservoir capacity to reduce future flooding. Increasing the reservoir size would increase the extent of the floodplain around the reservoir, which may impact prime farmland soils. Additionally, an increase in downstream channel flow may result, especially during storm events, and may adversely impact soils through increased erosion and stream scouring. Short-term erosion and sediment impacts can normally be mitigated by applying appropriate control measures during construction. Construction and maintenance of the improved dam would ensure management of the floodplain so that flood damage would be minimized.

4.5.1.4 Structural Alternative

Constructing dams would decrease the downstream floodplains and increase the extent of the floodplains around the dams. The area surrounding proposed dams would be evaluated for potential impacts to protected geologic resources and protected farmland soils. State maps and county/city general plans should be reviewed to determine whether measures will be needed to mitigate impacts of construction. Short-term erosion and sediment impacts can normally be mitigated by applying appropriate control measures during construction.

Impacts may result from geohazards, particularly dam failures and resultant floods after major earthquakes. The potential for failure can be mitigated by using appropriate building technologies.

4.5.1.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.1.5.

4.5.2 Air Quality

Impacts would be identical to those described in Section 4.1.2.

4.5.3 Hydrology and Water Quality

4.5.3.1 No Action Alternative

Dams would not be improved or constructed. Floodprone areas would be subject to future flooding. This alternative would not affect hydrology and water quality except in the case of unrepaired dams. Unrepaired dams may impact the characteristics of the floodplain by not offering the same level of flood protection as before they were damaged and thus may increase downstream water volume and possibly increase sediment load.

4.5.3.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.3.2.

4.5.3.3 Improvement Alternative

Improvement to existing dams would provide greater control over reservoir elevations by allowing discharges of floodwaters or increasing the reservoir capacity to better prevent future floods. These measures may beneficially impact water quality by allowing particulate matter to settle and by reducing the exposure of floodwaters to pollutant sources. However, this alternative would alter the stream flow quantity and will therefore impact natural waterways and thus permits from USACE and CDFG may be required as well as other local or municipal permits.

4.5.3.4 Structural Alternative

Construction of a dam would decrease the extent of the floodplain downstream of the dam and increase the extent of the floodplain upstream. Impacts to the water quality may be negative if the inundated areas contain pollutant sources. Beneficial impacts to water quality may result from reduced flooding and subsequent reduction in sediment load and reduction of exposure to possible downstream contaminant sources. This alternative will affect runoff into natural waterways and will impact stormwater runoff patterns; a Streambed Alteration Permit may be required from the CDFG, and local/areawide Stormwater Management Plans and Watershed Plan should be consulted for restrictions and guidelines.

4.5.3.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.3.5.

4.5.4 Floodplain Management

4.5.4.1 No Action Alternative

Dams would not be improved or constructed. Floodprone areas would be subject to future flooding. This alternative would not affect the floodplain except in the case of unrepaired dams. These structures would impact the characteristics of the floodplain because they would not offer the same level of flood protection as before they were damaged.

4.5.4.2 Non-Structural Alternative

Impacts described in Section 4.2.4.2 would be created by this alternative.

4.5.4.3 Improvement Alternative

Improvement to existing dams would provide greater control over reservoir elevations by allowing discharges of floodwaters or increasing the reservoir capacity to better prevent future floods. This alternative would change the characteristics of the floodplain to decrease the extent of floodprone areas that have been developed; however, the BFE or the extent of the floodplain would likely be increased elsewhere. In the case of discharging floodwaters from the improved dam before or during storm events, the receiving water body and its tributaries could flood from

the increased flow. Increasing the reservoir size would increase the extent of the floodplain around the reservoir. Potentially affected land uses would be evaluated for impacts from increased channel flow (downstream) or increased floodplain extent (upstream). Provided the areas of increased flooding are agricultural or other land uses consistent with floodplain management, the result would be decreased flood damage during future events. Furthermore, construction and maintenance of the improved dam would ensure management of the floodplain so that flood damage would be minimal.

The local government would be required to conduct detailed engineering analysis of floodplain changes, obtain concurrence from affected communities, and individually notify all property owners affected by changes in the floodplain. Furthermore, the responsible agency would budget appropriate funds to manage and perform routine maintenance of the improved dam. To comply with EO 11988 and 44 CFR Part 9, this alternative would only be selected if no practicable alternative exists and this alternative would decrease the risk of future flood damage. Furthermore, public notification and minimization of potential impacts would comply with EO 11988 and 44 CFR Part 9.

4.5.4.4 Structural Alternative

Construction of a dam would decrease the extent of the floodplain downstream of the dam. Other floodplain characteristics, such as the BFE, are also expected to change. Upstream of the dam, the floodplain would be increased in extent and other floodplain characteristics would likely change as a result of permanently inundating the upstream area. Potentially affected land uses would be evaluated for impacts. Provided the areas of increased flooding are agricultural or other land uses consistent with floodplain management, the result would be decreased flood damage during future events. Furthermore, design, construction, and maintenance of the improved dam would ensure management of the floodplain so that flood damage would be minimal.

The local government would be required to conduct detailed engineering analysis of floodplain changes, obtain concurrence from affected communities, and individually notify all property owners affected by changes in the floodplain. Furthermore, the responsible agency would budget appropriate funds to manage and perform routine maintenance of the new dam. To comply with EO 11988 and 44 CFR Part 9, this alternative would only be selected if no practicable alternative exists and this alternative would decrease the risk of future flood damage. Furthermore, public notification and minimization of potential impacts would comply with EO 11988 and 44 CFR Part 9.

4.5.4.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.4.5.

4.5.5 Biological Resources

4.5.5.1 No Action Alternative

Unrepaired dams could fail resulting in catastrophic flooding, scouring, sedimentation, and native habitat removal. For those dams that are repaired/restored to predisaster conditions, wildlife, particularly aquatic species, in the immediate vicinity of the activities could be adversely affected as discussed in Section 4.1.5.1. In addition, repairs could result in a loss of vegetation, sedimentation of wetlands, and long-term impacts to aquatic organisms downstream from increased erosion.

4.5.5.2 Non-Structural Alternative

This alternative would create impacts identical to those described in Section 4.2.5.2.

4.5.5.3 Improvement Alternative

Improvements to existing dam structures would occur at selected sites to provide greater control over reservoir elevations through discharging floodwaters downstream or increasing the reservoir capacity to prevent flooding. Increasing downstream discharges would change the characteristics of the floodplain, vegetation and associated wildlife from increased scour and flooding to the downstream corridor and tributaries. These impacts can sometimes move up tributaries, causing increased scour and streambank cutting where tributaries join the main floodplain corridor.

Increasing the reservoir capacity would inundate existing vegetation and wetland resources and associated wildlife species and alter aquatic resource habitat. Potential short-term impacts to wildlife species directly related to construction are discussed previously in Section 4.1.5.3. Ultimately, wetland habitats would develop around the perimeter of the new reservoir and along upstream reaches of the reservoir tributaries, although the type, quality and extent of the natural restoration would be difficult to forecast. Fish and amphibian resources would relocate and repopulate new areas within the reservoir and tributaries. Nesting birds would return to wetlands habitats after their re-establishment. Beneficial impacts to migrating waterfowl could occur as a result of a larger reservoir surface area. Downstream impacts due to potential flow reductions in the winter months of wet year could impact aquatic resources. Altering dam design could act as a fish migration barrier, further reducing fish passage. Proper dam design would alleviate this problem.

Permits with USACE and CDFG would be required. Impacts to wetlands and other sensitive resources would require mitigation at the Federal, state, and local level. Coordination with USFWS, CDFG, and local authorities and compliance with local statutes would be required.

4.5.5.4 Structural Alternative

Dam construction would occur at selected sites to provide greater control over floodwaters. Upstream of the dam, the floodplain would increase due to permanently flooding wetland, riparian

and upland habitats and converting them to open water reservoir. Downstream of the dam, the floodplain would decrease as a result of reduced flooding events.

Constructing a new dam and reservoir would inundate existing vegetation and wetland resources and associated wildlife species and alter aquatic resource habitat. Alterations to native terrestrial and aquatic habitats and sensitive wildlife and fishery resources would result. Potential short-term impacts to wildlife species directly related to construction are discussed previously in Section 4.1.5.3.

Ultimately, wetland habitats would develop around the perimeter of the new reservoir and along upstream reaches of the reservoir tributaries, although the type, quality and extent of the natural restoration would be difficult to forecast. A deepwater fishery would develop in the reservoir, although, likely dominated by non-native species. Nesting birds would return to wetlands habitats after their re-establishment. Beneficial impacts to migrating waterfowl could occur as a result of creating open water habitat for nesting and foraging. Downstream impacts due to potential flow reductions in the winter months of wet years could negatively impact aquatic resources. Impacts to the migration of fish species and wildlife movement would occur as a result of constructing a new dam.

Permits with USACE and CDFG would be required. Impacts to aquatic resources, wetlands and other sensitive resources would require mitigation at the Federal, state, and local level. Coordination with USFWS, CDFG, and local authorities and compliance with local statutes would be required.

4.5.5.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.5.5.

4.5.6 Threatened and Endangered Species

4.5.6.1 No Action Alternative

With this alternative existing dams would not be improved and new dams would not be constructed and repaired/restored dams would have the same footprint they had before the disaster. Therefore, proposed and listed species do not have the potential to be adversely affected in the long term. For those dams that are repaired/restored to predisaster conditions, proposed or listed species present in the immediate vicinity of the activities could be adversely affected as discussed in Section 4.1.6.1.

4.5.6.2 Non-Structural Alternative

Impacts caused by this alternative would be identical to those described in Section 4.2.6.2.

4.5.6.3 Improvement Alternative

This alternative involves improvements to the discharge capacity of a dam or increasing the temporary storage capacity of an existing reservoir. Both items would require modifications to the dam and/or its outlet works. To accommodate the needed changes, the working area would need to be void of water which can be accomplished by dewatering the structure, installing a bypass upstream, or constructing a temporary coffer dam. Before adoption of this alternative, a determination would be made regarding the presence of habitat for proposed and listed species including the reservoir and the stream downstream from the dam. Reservoirs can provide habitat for proposed and listed aquatic species as well as foraging habitat for bird species. The stream downstream from the dam may also represent spawning and rearing habitat for listed fish species such as the salmons. If suitable habitat is present within areas that could be affected by the proposed project, procedures as discussed in Section 4.1.6.3 would be implemented. Potential impacts associated with the ingress and egress of equipment and personnel would be handled as discussed in Section 4.1.6.3.

4.5.6.4 Structural Alternative

New dams would be constructed with this alternative. Existing vegetation within the dam and high water line of the reservoir would be lost. In addition, flow patterns of the stream would be altered by operation of the reservoir and water quality of the stream can be adversely affected during reservoir construction. Areas that would be disturbed or otherwise adversely affected would be evaluated for the presence of proposed or listed species and/or their suitable habitat. If suitable habitat for an "at risk" species is present, it would be avoided. If the stream downstream from the dam is used as spawning and rearing habitat for a listed salmon species, instream activities would be curtailed during the period they are in the stream. If suitable habitat for one or more of the other identified species is present, consideration would be given to avoidance and if it cannot be avoided, the affected area would be quantified and the project approved with the stipulations contained in the PBO. Potential impacts associated with the ingress and egress of equipment and personnel would be handled as discussed in Section 4.1.6.4.

4.5.6.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.6.5.

4.5.7 Cultural Resources

4.5.7.1 No Action Alternative

Impacts under this alternative would be identical to those described in Section 4.1.7.1

4.5.7.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.7.2.

4.5.7.3 Improvement Alternative

Depending on the specific improvement to an existing dam, the potential impact to significant cultural resources is considered moderate. Each dam should be evaluated pursuant to the PA (Appendix D), to determine its National Register eligibility. Additionally, each improvement made to an existing dam would be evaluated pursuant to the PA (Appendix D). Actions that occur outside the areas already impacted by previous construction should also be evaluated pursuant to the PA. Coordination with the USACE would be required for permitting and compliance.

4.5.7.4 Structural Alternative

Under this alternative, constructing new dams would require evaluation pursuant to the PA.

4.5.7.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.7.5.

4.5.8 Socioeconomics and Public Safety

4.5.8.1 No Action Alternative

Under this alternative, impacts would be similar to those described in Section 4.1.8.1.

4.5.8.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to impacts described in Section 4.2.8.2.

4.5.8.3 Improvement Alternative

Improvements to existing dams (as described in Section 2.5.5.3) would create beneficial impacts to socioeconomic resources. These actions would reduce the potential for flood-related losses to residents, businesses, and government facilities removed from the floodplain; decrease risks to human safety for persons inhabiting or using facilities removed from the floodplain; increase property values of structures removed from the floodplain; and reduce the corresponding indirect impacts described in Section 4.1.8.1.

For projects that increase the extent of the dam, acquisition of properties may be required. Impacts to property owners of acquired properties would be similar to those described in Section 4.2.8.2. In addition to the mitigation measures listed in Section 4.2.8.2, this project component would also consider using easements or lease-back provisions to allow property owners to use their properties consistent with floodplain management, for example, agriculture or grazing.

Private contractors would receive economic benefits from dam improvement projects. Provided local companies would be used for labor and materials, some economic benefits would trickle

down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.5.8.4 Structural Alternative

Construction of dams would create beneficial impacts to socioeconomic resources. Impacts include reducing the potential for flood-related losses to residents, businesses, and government facilities removed from the floodplain; decreasing risks to human safety for persons inhabiting or using facilities removed from the floodplain; increasing property values of structures removed from the floodplain; and reducing the corresponding indirect impacts described in Section 4.1.8.1.

Acquisition of properties would likely be required on and around the proposed dam's reservoir. Impacts to property owners of acquired properties would be similar to those described in Section 4.2.8.2. In addition to the mitigation measures listed in Section 4.2.8.2, this project component would also consider using easements or lease-back provisions to allow property owners to use their properties consistent with floodplain management, for example, agriculture or grazing.

Additional indirect socioeconomic impacts could result from constructing a dam and reservoir. The creation of a large, multi-purpose reservoir could induce development in the area surrounding the reservoir; this would be especially true of a reservoir that could support recreational activities. Demographics, housing, employment, and the local economy may be affected by such projects. These indirect impacts would be analyzed in the SEA, where appropriate.

Private contractors would receive economic benefits from construction of dams. Provided local companies would be used for labor and materials, some economic benefits would trickle down to other sectors of the community. Except for unusually large projects, however, these beneficial impacts would have a negligible effect on the local economy as a whole.

Demographic and economic indicators for local residents would be studied to determine if a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative.

4.5.8.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.8.5.

4.5.9 Land Use and Zoning

4.5.9.1 No Action Alternative

Because no new facilities would be built and existing facilities would not be improved, the No Action Alternative would not affect land use or zoning for any project type.

4.5.9.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.9.2.

4.5.9.3 Improvement Alternative

Increasing the extent of a reservoir has the potential to impact land use and zoning. If the proposed land use as a reservoir does not comply with local zoning statutes, the local government would amend the zoning ordinance appropriately or grant a variance. Other components of this alternative would not affect land use or zoning.

4.5.9.4 Structural Alternative

Building a dam and reservoir has the potential to impact land use and zoning. If the proposed land use does not comply with local zoning statutes, the local government would amend the zoning ordinance appropriately or grant a variance.

4.5.9.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.9.5.

4.5.10 Public Services

4.5.10.1 No Action Alternative

This alternative would cause impacts identical to those described in Section 4.1.10.1.

4.5.10.2 Non-Structural Alternative

Impacts caused by this alternative would be identical to those described in Section 4.2.10.2.

4.5.10.3 Improvement Alternative

Improvements to dams that reduce the risk of future flood damage at public facilities would create a beneficial impact.

If roads are relocated as a result of enlarging a dam's reservoir, school buses, police and fire vehicles, and ambulances could be forced to take alternate routes. Although property acquisition may be necessary to implement this alternative, this project component is not expected to affect public services, except by removing utilities from acquired properties.

4.5.10.4 Structural Alternative

Construction of a dam that reduces the risk of future flood damage at public facilities would create a beneficial impact.

If roads are relocated as a result of creating a dam and reservoir, school buses, police and fire vehicles, and ambulances could be forced to take alternate routes. Additional indirect impacts to

public services could occur from constructing a dam and reservoir. The creation of a large, multi-purpose reservoir could induce development in the area surrounding the reservoir; this would be especially true of a reservoir that could support recreational activities. The need for schools, police, fire protection, recreational facilities, medical services, and utilities to serve the new community would be considered. These indirect impacts would be analyzed in the SEA, where appropriate.

Although property acquisition may be necessary to implement this alternative, this project component is not expected to affect public services, except by removing utilities from acquired properties.

4.5.10.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.10.5.

4.5.11 Transportation

4.5.11.1 No Action Alternative

Facilities in floodprone areas may incur additional flood damage; roads and public transportation would then be subject to congestion, delays, and detours from repair equipment. The potential also exists for future flooding to damage and close roads.

4.5.11.2 Non-Structural Alternative

This alternative would create impacts identical to those described in Section 4.2.11.2.

4.5.11.3 Improvement Alternative

Improvement to dams which consist of increasing the extent of the reservoir may affect traffic and transportation. If existing roads are determined to be within the boundaries of the enlarged reservoir or the revised 100-year floodplain, alternate routes (Section 2.5.1.2), road elevation (Section 2.5.1.3), and new road construction (Section 2.5.1..4) would be considered. A proposed action would be determined with input from appropriate transportation planning agencies. Impacts from these actions have been addressed elsewhere in this document.

4.5.11.4 Structural Alternative

The construction of dams has the potential to affect roads. If existing roads are determined to be within boundaries of the dam, its reservoir, or the revised 100-year floodplain, alternate routes (Section 2.5.2.1), road elevation (Section 2.5.3.1), and new road construction (Section 2.5.4.1) would be considered. A proposed action would be determined with input from appropriate transportation planning agencies. Impacts from these actions have been addressed elsewhere in this document.

4.5.11.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.11.5.

4.5.12 Noise

4.5.12.1 No Action Alternative

If damaged dams are repaired, repair equipment would cause temporary noise. Noise is anticipated to remain within legal limits. Future flooding has the potential to cause additional damage and, therefore, additional noise from future repair.

4.5.12.2 Non-Structural Alternative

Impacts associated with this alternative would be identical to those described in Section 4.2.12.2.

4.5.12.3 Improvement Alternative

This alternative is expected to cause temporary noise within legal limits of local noise ordinances.

4.5.12.4 Structural Alternative

Equipment used to construct dams would create temporary noise. Noise created by this alternative would comply with local noise ordinances.

4.5.12.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.12.5.

4.5.13 Hazardous Materials and Wastes

4.5.13.1 No Action Alternative

In most cases, this alternative would not change the status of existing hazardous waste and materials. However, if flooding would continue to affect areas where USTs are located, there is the potential for inundated soils to cause the USTs to shift, and their associated piping may burst. This would have an adverse impact.

4.5.13.2 Non-Structural Alternative

This alternative would create impacts as described in Section 4.2.13.2.

4.5.13.3 Improvement Alternative

It is unlikely that improvements to an existing dam would impact the status of hazardous waste and materials. However, if additional land is required for improvements, an ESA must be performed to determine whether any recognizable environmental conditions exist at or around the new land.

4.5.13.4 Structural Alternative

Under this alternative, FEMA would construct new dam(s). This activity would require an ESA to determine whether any recognizable environmental conditions exist at or around the proposed site(s). In addition, if structures would be demolished, compliance with the applicable California and Federal regulations associated with asbestos and lead abatement, and UST closures must be followed. Abating asbestos and lead from the existing buildings would have a beneficial impact.

4.5.13.5 Combination Alternative

Impacts from this alternative would be identical to those described in Section 4.1.13.5.

5 REFERENCES

Air Resources Board. 1997a. Directory of the California Local Air Pollution Districts. <http://www.arb.ca.gov/html/geninfo.htm> Visited November 21.

Air Resources Board. 1997b. District map and Air Basin map. <http://www.arb.ca.gov/emisinv/maps/statemap/dismap (and) abmap/htm> Visited November 20.

Air Resources Board. 1997c. Brochure (What the ARB Does). <http://www.arb.ca.gov/html/brochure/arb.htm> Visited November 24.

Air Resources Board. 1997d. Proposed Amendments to the Area Designations for State Ambient Air Quality Standards, and Proposed Maps for the Area Designations for the State and National Ambient Air Quality Standards. November.

Association of Bay Area Governments. 1981. Manual of Standards for Erosion and Sediment Controls.

California Department of Conservation Farmland Mapping and Monitoring Program. 1994. A Guide to the Farmland Mapping and Monitoring Program. November.

California Department of Resources Conservation. Undated. Erosion and Sediment Control Handbook.

Campbell, C.J. and W. Green. 1968. Perpetual Succession of Stream-Channel Vegetation in a Semi-Arid Region. *Journal Arizona Academy of Science* 5:86-88.

Federal Emergency Management Agency. 1996. Environmental Impact Statement for Flood Recovery Activities in Albany, Georgia. Appendix D - Regulatory Guidance for Disposal of Hazardous Wastes.

Hart, Earl. 1992. Fault Rupture Hazard Zones in California, Division of Mines and Geology, Special Publication 42.

Hornbeck, D. 1983. California Patterns: A Geographical and Historical Atlas. Mayfield Publishing: Palo Alto, California.

Marvin, Cynthia. 1997. Air Pollution Specialist, Air Resources Board. Personal Communication with Erica McLean, PaRR. November 20.

Moore, Roy. 1997. Air Pollution Specialist, Air Resources Board. Personal Communication with Erica McLean, PaRR. November 21.

Parker, Terry. 1997. Associate Air Pollution Specialist, Air Resources Board. Personal Communication with Erica McLean, PaRR. November 20.

Popejoy, Debra. 1997. Air Pollution Specialist, Air Resources Board. Personal Communication with Erica McLean, PaRR. November 20.

Preston, Terone. 1997. Air Resources Board, Compliance Division. Personal Communication with Erica McLean, PaRR.

Skinner, M.W. and B.M. Pavlik. 1994. *Inventory of Rare and Endangered Vascular Plants in California*. 5th edition. Special Publication No. 1. California Native Plant.

State of California. 1997. Health and Safety Code, Chapter 6.5 - Hazardous Waste Control. <http:// www.leginfo.ca.gov/cgi/bin>. Visited November 20.

State Water Resources Control Board. 1997. Policies. <http://www.swrcb.ca.gov.policies.htm> Visited November 24.

Steinhart, P. 1990. California's Wild Heritage: Threatened and Endangered Animals in the Golden State. Prepared for California Department of Fish and Game and California Academy of Sciences. Published by Sierra Club Books.

U.S. Environmental Protection Agency. 1973. Processes and Methods to Control Pollution Resulting from All Construction Activity.

Warner, R.E. 1979. California Riparian Study Program, Background Information and Proposed Study Design. Unpublished report. Prepared for California Department of Fish and Game, Sacramento, California.

Water Education Foundation. 1997. California Water Map.

White, Wayne and Diane Noda. 1997. Field Supervisors, U.S. Fish and Wildlife Service. Personal correspondence to Sandro Amaglio, FEMA Region IX Environmental Officer. Regarding Programmatic Formal Section 7 Consultation on FEMA-Funded Repairs for Disaster DR-1155-CA. September 30.

Appendix A

List of Acronyms and Abbreviations Used in the Programmatic Environmental Assessment

Appendix A: List of Acronyms and Abbreviations Used in the Programmatic Environmental Assessment

ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL93-288)
APCD	Air Pollution Control District
AQMD	Air Quality Management District
ARB	Air Resources Board
BFE	base flood elevation
BLM	Bureau of Land Management
BMP	Best management practice
CATEX	Categorical Exclusion
CATEXd	categorically excluded
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980
CFR	Code of Federal Regulations
CWA	Clean Water Act
DNL	Day-Night Average Sound Level
^{o}F	degrees Fahrenheit
DTSC	California Department of Toxic Substances Control
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U. S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary map
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FONSI	Programmatic Finding of No Significant Impact
FPC	Formal Programmatic Consultation
FPPA	Farmland Protection Policy Act
HMGP	Hazard Mitigation Grant Program
LIM	Land Inventory and Monitoring
NCA	Noise Control Act of 1972
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emissions Standard for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act of 1966
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination system
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NSR	New Source Review
OES	California Office of Emergency Services
PA	Programmatic Agreement
PBO	Programmatic Biological Opinion
PEA	Programmatic Environmental Assessment
PITS	Programmatic Incidental Taking Statement
$PM_{2.5}$	particulate matter less than 2.5 micrometers in diameter
PM_{10}	particulate matter less than 10 micrometers in diameter
PNP	private nonprofit organization
ROG	reactive organic gas
RWQCB	Regional Water Quality Control Board
SEA	Supplemental Environmental Assessment
SHPO	State Historic Preservation Officer

SWRCB	State Water Resources Control Board
T&E	threatened and endangered species
USACE	U. S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

Appendix B

Example of Supplemental Environmental Assessment

Appendix C

Example of Formal Programmatic Consultation, Programmatic Biological Opinion, and Programmatic Incidental Taking Statement under Section 7 of the Endangered Species Act

Appendix D

Example of Programmatic Agreement under Section 106 of the National Historic Preservation Act

Appendix E

Cumulative Public Notice Published for the Initial Disaster

Appendix F

List of Agencies to Receive Copies of the Draft and Final Programmatic Environmental Assessments

Appendix G

Letters Received from Public Agencies, Individuals, and Organizations

Appendix H

Office of Management and Budget Memorandum on Floodplain Management