# ANNEX 1 - GUIDE TO COMMUNITY PLANNING AND HAZARD MITIGATION

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## 1.1. INTRODUCTION

The purpose of the guide is to provide general information about community planning to the emergency management community. It highlights the numerous components of community planning that help protect communities from hazards and mitigate their impacts.

In California, community planning is required and offers opportunities for managing hazards at the local level. Community planning tools include general plans, building codes, and development project reviews as well as infrastructure development. In addition, the planning process offers opportunities for input from the public and members of the emergency management community such as fire departments. This guide identifies those opportunities so that members of the emergency management community can more actively engage in community planning to further promote hazard mitigation and resilience within their communities.

This guide contains summaries of state laws and codes that apply to both community planning and emergency management functions. The guide focuses on pre-disaster and post-disaster hazard mitigation as the main emergency management function in which community planning plays a significant role. The guide also examines the connection between federal and state laws regarding hazards management. For more detailed information on many of the laws described here, see Chapter 3, Section 3.1, and Annex 2, Guide to California Hazard Mitigation Laws, Policies and Institutions.

## 1.2. WHAT IS COMMUNITY PLANNING?

Community planning is a process by which local governments and citizens determine the long-term development pattern of a community in terms of land use, housing, infrastructure, open space, and protection of natural and cultural resources. Decision-makers determine what will be built, where it will be located, and what function it will serve. As described further below, in California, general plans are the vehicle used to outline the policies and regulations for land use decisions at the local level.
Five major dimensions provide the foundation for the community planning process: design, laws and regulations, environmental analysis, socioeconomic analysis, and political approval. These five dimensions are connected and interdependent, forming a comprehensive and symbiotic relationship.

### Design

Design focuses on the physical layout of the community or a specific development project. Design includes site planning and urban design of buildings. At the community level, many design guidelines and policies are implemented through general plans. When specific development projects are proposed, the design is assessed based on the policies established in the general plan.

### Laws and Regulations

Laws and regulations provide the regulatory framework that shapes the planning process. These are primarily state and local, but in some cases federal laws and regulations apply to community planning as well.

### Environmental Analysis

A major dimension of the planning process in California is environmental analysis, due in part to state and federal laws and regulations intended to ensure environmental protection. In community planning, environmental analyses are performed to determine the impact that a plan or development project will have on the environment. These analyses include assessments of the potential for exposure of people or property to environmental conditions such as natural hazards.

### Socioeconomic Analysis

Socioeconomic analyses fulfill a vital need for community planning. The analyses examine the social structure of the community and the impact that a proposed plan or development will have on it. Another feature of these analyses is assessment of the community's fiscal health and the effects of proposed plans or developments on fiscal conditions. In addition, such analyses often include a comprehensive assessment of the regional economy. Plans and projects are likely to affect not only the specific community, but also surrounding communities with potential changes in transportation systems, housing, and jobs.

### Political Approval

Community planning is a process embedded in the political system and guided largely by state laws as well as the U.S. Constitution. As proposed plans and development projects go through the planning process, there are numerous opportunities for public input. The final step is approval or denial of the plan or project by the elected board for the community (e.g., city council, board of supervisors). Therefore, political support (or lack of objection) from the public and elected officials is critical for proposed plans and projects to be approved.

## 1.3. ROLE OF COMMUNITY PLANNING IN EMERGENCY MANAGEMENT

Community planning is important for several reasons. The political, social, economic, and physical environment surrounding communities is continually changing. One of the largest aspects of this change is population growth. Other shifts include changes in demographics, transportation systems, regional economy, political climate, and landscapes. Each of these changes creates burdens and challenges for land use, and community planning is the system in place for managing these challenges.

As the population of California continues to grow, the demand for new housing and public services will increase. This places pressures on communities to provide space to accommodate this growth. One of the most pressing challenges today is that land availability for outward expansion has dramatically decreased over time.

There are two primary ways that communities can provide space for the new growth. Over the past five decades, the most common answer was to expand outward, creating urban sprawl. This approach can force people much farther away from job centers, require more extensive transportation systems, and push

development into hazardous areas such as floodplains and areas of high fire hazard. The other alternative is for communities to renovate built areas to increase density. Often this means tearing down older neighborhoods and placing taller or more expansive buildings in their place, a form of redevelopment that commonly called infill development.

The challenge of limited land availability is further complicated by natural hazards. Communities may be pressured into developing areas that are more hazardous, including areas vulnerable to wildfires, earthquakes, landslides, and floods. Placing new developments in these areas can increase the dangers to people and property while also placing more burdens on public safety officials to protect them. In many communities, development has already occurred in hazardous areas. Examples include cities in the San Francisco Bay and Los Angeles metropolitan areas that are at substantial risk of earthquakes. Increasing density within these and other hazardous areas increases the population and property that are subject to hazards. These are the kinds of decisions community leaders will need to consider when determining the future of their communities.

Community planning can have a profound impact on how cities and counties use the land within their jurisdictions. One of the most effective ways to reduce or minimize the impacts of hazards is to responsibly develop land in hazardous areas. Designing communities so that most new development is located in non-hazardous areas can significantly reduce future costs of disasters. Improving building codes and adopting these codes as the standards for new construction can also increase the resilience of built structures within the community. Determining what can be built and at what intensity can increase or decrease risks.

## 1.4. KEY PARTICIPANTS

In community planning, multiple participants are involved at different stages in the process. Some participants are involved through most of the process, while others may only have specific roles at specific stages. The following is a summary of the key participants in community planning.

### Local Governments

In California, there are more than 7,000 local government institutions. Most of these are special districts. The remaining entities include 58 counties, 478 cities, and approximately 1,000 school districts. Each of these institutions is involved in local planning, but cities and counties have the most prominent role.

The authority for cities and counties comes from Article XI, Section 7 of the California Constitution, which states that "A county or city may make and enforce within its limits all local, police, sanitary and other ordinances and regulations not in conflict with general laws." Thus, cities and counties are given the power to develop and enforce land use regulations. State law also requires that each county and city have a legislative body and a planning agency.

#### *Elected Officials*

Local elected officials primarily include city councils and county boards of supervisors. These boards and councils act as the state-mandated legislative bodies. City councils and county boards of supervisors have two discretionary roles, legislative and quasi-judicial. Legislative acts include creating local laws and making policy decisions. In community planning, these acts include zoning ordinance changes and general plan revisions. Quasi-judicial acts include actions on appeals of decisions made by the planning commission, which include the approval or denial of conditional use permits or zoning variances.

Another important role of city councils and boards of supervisors is to appoint the members of the local planning commission. Proposed projects and plans are brought before the planning commission for approval or denial. Traditionally, the planning staff will provide a presentation of the proposed project to the commission along with a recommendation for approval or denial. After the recommendation is heard, a representative of the project is invited to speak on behalf of the development. Since the planning

commission meetings are an open forum, time is also allotted for the public to present comments. Thus, the planning commission is presented with different views and can make a decision on the project after consideration of these opinions. For projects that could potentially lead to increased risks to people and property, members of the emergency management community are encouraged to participate in the approval process and present comments at public meetings.

### *Planning Agencies*

Local planning agencies include the planning director who oversees the planning agency and the staff who work within the planning agency. Local planning staffs are tasked with a variety of planning responsibilities that include reviewing proposed developments, processing building permits, and enforcing codes. In each of these tasks, the staff work with developers and members of the public involved. For example, if corrections are needed in a building permit, the staff will work with the applicant to make the corrections before submitting the permit application for approval. Staff similarly may work with developers on proposed projects to ensure consistency with the general plan and state and local regulations.

How involved the staff is in working with the public or with emergency management agencies can vary greatly depending on several factors, such as the personalities involved and goals of the planning director. It can also depend on how much the developer or the land owner wishes to work with the staff. For example, if the developer feels that the staff is against the proposal, they may seek approval before the planning commission with minimal consultation with staff or changes to the proposed project. In either case, it is up to planning staff to recommend to the planning commission that a project be approved or denied and explain why the staff selected this recommendation.

## Private Real Estate Industry

Private real estate interests are the movers and shakers in the public planning process. They own the land, develop the projects, and provide the financial capital for construction and completion. There are six key players in the real estate industry: land owners, developers, builders, lenders, investors, and home buyers.

### *Land Owners*

Land owners are the people who own the property that is influenced by the planning process. Often, these individuals are passive participants in the process. This means that they are not directly involved in the development of zoning ordinances, development projects, or site plans. Planners may hold charrettes or other public meetings to incorporate input and ideas from land owners and the public, but this is not always the case. When plans, ordinances, and development projects come before a public body such as the planning commission or city council, the public has a right to present their views and opinions of the proposals. It is in this role that land owners may be most involved in the planning process.

### *Developers*

Developers often do not own the property that they are trying to develop. Instead, they enter into partnerships with land owners or other investors to develop the land. They are the participants who create the development plans, such as parcel maps and site plans, and present them for approval. Developers work with planning staffs to ensure that the plans are consistent with the general plan and applicable laws and regulations. The size of development companies can vary greatly, from one person to large organizations.

### *Builders*

When approval for a project is granted, developers will often sell the site or pieces of it to builders who are responsible for construction. In some cases, building companies that are large enough may also act as the developer. In this case, they can ensure that the project will be built to their wishes. In larger subdivision and neighborhood projects, it is common for a single builder to construct the development in phases.

### *Investors and Lenders*

Without financial capital, many of the projects that are proposed could never be built. Even before construction begins, there are several steps to the development process that can involve costs. Fees for applications, permits, and environmental impact reviews can be costly, especially for larger projects.

Investors and lenders look at development as business investments. They are willing to take on risk if they believe the investment will yield a profitable return in the future.

For risky projects, it may be difficult to find investors and lenders willing to provide the needed financial capital. In order to help protect their investment, lenders and investors may place demands or requirements on the development in return for their capital. Examples could include requiring a minimum number and size of homes in the subdivision, or requiring that commercial space be included. These requirements can sometimes significantly change the outcome of the development, highlighting the important role investors and lenders have in the planning process.

## State Government

The state government of California has been actively involved in community planning since the late 1800s, when the state legislature passed some of the earliest planning laws in the nation. As the state experienced increased growth in the decades since, the role of state government in community planning has also increased. The following subsections provide a brief summary of the role of state legislature and state agencies in community planning.

### *Legislature*

The state legislature in California has a very powerful role in shaping planning and hazard mitigation at the local level. As early as 1893 when it passed the predecessor to the Subdivision Map Act, the California legislature has been involved in developing the framework for local planning decisions and regulations. In addition to the Subdivision Map Act, other examples include the Community Redevelopment Law, and the California Environmental Quality Act. California does not have a single law that provides all of the guidelines for local planning. Rather, the state operates according to a complex system of multiple laws and policies adopted over the past several decades. Many of these have been amended and changed over time.

### *Agencies*

Numerous state agencies are involved in or influence planning in cities and counties (see Annex Chart 1.A). These agencies fall into three broad categories: development and infrastructure agencies, conservation agencies, and regional agencies.

Development and infrastructure agencies are involved in the construction of buildings and infrastructure in California. These agencies have a wide variety of functions, ranging from managing state-owned infrastructure to enforcing development regulations, laws, and codes. These agencies include the California Department of Transportation (Caltrans), the Department of Water Resources (DWR), the Department of Housing and Community Development (HCD), and the Department of General Services (DGS).

Agencies involved in conservation that affects community planning include the Department of Fish and Wildlife, the Department of Forestry and Fire Protection (CAL FIRE), the Department of Conservation, and the Department of Parks and Recreation. They are tasked with protecting and conserving natural resources by enforcing laws and regulations or are involved in land use decisions that affect state-owned land. Most of these agencies are within the California Resources Agency.

There are four regional state agencies in California: the Coastal Commission, the San Francisco Bay Conservation and Development Commission (BCDC), the Tahoe Regional Planning Agency (TRPA), and the

Delta Protection Commission. Each is involved with land use and development issues in their regions. Nevada is also a partner in TRPA since Lake Tahoe is partially within the state of Nevada.

**Annex Chart 1. A: State Agencies Involved in Community Planning**

| State Agency | Role in Community Planning | Related Laws |
|---|---|---|
| Caltrans | Constructs and maintains the state highway system | |
| Department of Water Resources | Oversees the State Water Project | |
| Department of Housing and Community Development | Provides funding for affordable housing; approves housing elements | |
| Department of General Services | Manages the state's real estate and facility planning | |
| Department of Fish and Wildlife | Enforces the California Endangered Species Act; manages land reserved for wildlife | California Endangered Species Act |
| CAL FIRE | Influences subdivision planning in forested communities | |
| Department of Conservation | Preserves agriculture land through the Williamson Act; oversees mining operations | Williamson Act; Surface Mining and Reclamation Act |
| Department of Parks and Recreation | Participates in land use activities that affect state parks | |
| Coastal Commission | Review for consistency with the California Coastal Act the planning, permitting and conservation activities of local governments along the California coast. | California Coastal Act; Coastal Zone Management Act |
| San Francisco Bay Conservation and Development Commission | Regulates bay fill and waterfront development along the San Francisco Bay | |
| Tahoe Regional Planning Agency | Influences land use planning and development in the Lake Tahoe area | |
| Delta Protection Commission | Influences land use and development in the Delta region | Delta Protection Act |

## Federal Government

The federal government is involved in community planning and hazards management through multiple means. These include federal laws passed by the United States Congress and functions within several federal agencies. The following subsections provide a summary of the federal role in community planning.

### *U.S. Congress*

Article X of the U.S. Constitution declares that powers not delegated to the federal government in the Constitution are reserved for the states. One of those powers is the ability to control land use decisions. As a result, Congress has not directly been involved in governing land use at the state and local levels. However, Congress has been involved in related issues such as transportation and environmental protection. The reason for this is that these issues transcend political boundaries and affect larger regions or the nation as a whole. Examples include the federal Environmental Protection Act, Clean Water Act, Clean Air Act, Coastal Zone Management Act, and Federal-Aid Highway Act. For a summary of federal legislation that influences planning and hazard mitigation, see Annex 2, Guide to California Hazard Mitigation Laws, Policies and Institutions.

*Agencies*

The role of federal agencies in community planning focuses on enforcing federal laws, managing federally owned property, and providing financing for community development projects (see Annex Chart 1.B). Federal development agencies include the Bureau of Reclamation, U.S. Department of Transportation (US DOT), Department of Housing and Urban Development (HUD), General Services Administration, and Department of Defense (DOD). Federal conservation agencies include the Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers (USACE), Bureau of Land Management, and U.S. Forest Service.

**Annex Chart 1. B: Federal Agencies Involved in Community Planning**

| Federal Agency | Role in Community Planning | Related Laws |
|---|---|---|
| Bureau of Reclamation | Building and maintaining water systems; dams; Central Valley Project | |
| U.S. Department of Transportation (USDOT) | Funding highway and transportation projects | |
| Department of Housing and Urban Development (HUD) | Subsidizing public housing; administering Community Development Block Grants (CDBG) | Stafford Act |
| General Services Administration | Leasing and real estate activities of federal government | |
| Department of Defense (DOD) | Operating defense installations; closed base redevelopment | |
| Environmental Protection Agency (EPA) | Regulating federal environmental protection laws | Clean Air Act, National Environment-al Policy Act |
| U.S. Fish and Wildlife Service | Regulating sensitive habitats for endangered species | Endangered Species Act |
| U.S. Army Corps of Engineers (USACE) | Regulating wetlands and dams | Clean Water Act |
| Bureau of Land Management | Managing large areas of desert and mountain areas in California | |
| U.S. Forest Service | Conserving land conservation and managing resources in national forests | |

## Courts

In California, the courts are involved in planning primarily through litigation. Cases are divided into two types, constitutional and statutory. In constitutional cases, a land owner may sue if he or she believes that his or her constitutional rights had been violated. Examples could include instances in which a land owner believes that an ordinance has created undue hardships or that he or she has not been equally protected under the law. Statutory cases involve a plaintiff arguing that a state or federal law has been violated. This is common in California, with interest groups or home owners suing if there are believed to be inconsistencies between zoning ordinances and general plans, or if an environmental review was not performed for a project under the California Environmental Quality Act (CEQA) when the plaintiff believes it should have been. (See Section 1.8 for more information on CEQA.) In either case, the courts can have an influential role by interpreting and determining the legality of laws and ordinances. Often, the courts may rule only on small sections or a technicality.

## Special Interests

Special interest groups serve a variety of functions in the planning process. One of the most common is the watchdog function. These groups are involved because they have a vested interest in the planning process or the effects of the planning. Examples include neighborhood or citizen groups who wish to preserve the

interests of their community. Environmental groups often are heavily involved since development will one way or another affect the environment. Other interest groups involved in local public planning include the local business community, the private real estate industry, and the agriculture industry. Reasons for their involvement vary as much as the nature of each organization. Sometimes a group is involved merely to protect its interests; other times, it may seek to stop a development from going forward.

## 1.5. GENERAL PLANS

In California, general plans are the vehicle used to outline the policies and regulatory framework for land use decisions at the local level. Tools used to implement local general plans include zoning, development review, subdivision review, capital improvement programs, land acquisitions and redevelopment. The following is a brief summary of the provisions of California law regarding general plans, implementation tools, and hazard mitigation.

### Statutory Mandates

Government Code Section 65300 requires that each municipality develop a general plan as a guide to the long-term development of the community. A general plan must also be adopted by the local legislative body so that it is implemented with the weight of law. General plans may also be known as comprehensive plans or master plans.

The purpose of the general plan is to provide goals, objectives, and policy statements that outline the vision of what a municipality plans to be in the future. The general plan will then be the guide for future development and growth for each respective municipality. Community growth can involve a number of different issues, such as housing, transportation, natural resources, and hazards.

Since each city and county is required to have a general plan that guides growth and development, the plan provides an important tool to local governments for hazards management. Local governments can place policies within their general plans that require new development to be at minimal or no susceptibility to hazards. Growth can then be controlled and concentrated in areas where hazards are far less likely to affect buildings and people.

The California Governor's Office of Planning and Research is the principal state agency that oversees community planning issues for the state. One of its tasks is to develop guidelines for counties and cities to follow for developing general plans. The most recent version of the general plan guidelines was published in 2003 and includes detailed information on what needs to be included in each mandated element. Of most relevant importance to hazards management is the guideline for developing a safety element (and all elements of a general plan, whether mandatory or optional, must be consistent with one another). In addition, there are summaries of laws and government codes that apply to community planning.

### Mandated General Plan Elements

In accordance with Government Code Section 65302, a general plan must contain seven elements: Land Use, Circulation, Housing, Conservation, Open Space, Noise, and Safety. The Government Code specifies requirements for what each of these elements must contain. Each of the requirements is just the minimum that is needed. Local governments are welcome to go beyond the minimum requirements and to include other elements or sections. In addition, the elements can be organized in whichever method best fits the policies of that municipality, as long as all the required components are addressed. The following is a brief description of the elements that are most relevant to hazard mitigation.

#### *Safety Element*

The safety element is the most important element for hazards management since it contains the most significant requirements to protect people and property from hazards. At a minimum, the safety element

must address seismic, geologic, fire, and flood hazards. Local governments often include other components such as crime, hazardous materials, airports, and emergency operations. The safety element includes components from other elements, but it is important to unify these into a single element to more effectively guide policy- and decision-making. General plan law requires all elements to be consistent with each other, thus requirements of the safety element must align with guidance provided in each of the other elements. One example of this alignment is the required consistency between hazards shown in safety element maps and allowed zoning shown in land use element maps. Zoning defined in land use element maps must take into account hazards defined in safety element maps.

The first priority for the local government is to identify the hazards that are within its boundaries. Hazard identification will include mapping of the hazardous areas. Then, the local government must determine the strategies and policies that will reduce the risks from these hazards.

## Other Mandated Elements

### *Land Use Element*

The land use element outlines land use categories and their locations within the community. The categories can include residential, commercial, agriculture, and public facilities. Included in the requirements for this element is a statement of the population density and building intensity for each of the identified land use categories. A recently added requirement (AB 162) is that areas within the community that are subject to flooding must be identified and mapped. This must be reviewed each year. See Section 1.7.4 for more details on AB 162.

In addition to providing the required flood mapping, the land use element offers other opportunities for hazard mitigation. In their land use elements, local governments can include policies that land uses of higher value, such as commercial or residential, be located outside likely hazardous areas, which might encompass areas subject to hazards such as landslides, wildfires, and floods or potential human-made hazards. Keeping high-value land uses such as industrial plants and rail yards out of potentially hazardous locations can greatly reduce the loss of life and property.

### *Circulation Element*

The circulation element involves the transportation routes within a city and county. This element can include policies on what the transportation routes will be in the future and where they are located. Transportation can be both vehicular and pedestrian. Vehicular circulation includes local roads, highways, bicycles, and rail. Road widths, street parking, and intersections are a few of the components to planning for vehicular circulation. Pedestrian circulation may include sidewalks, walking trails, and crosswalks. Public utilities to support circulation, such as street signs and traffic lights, are also addressed within this element. Also included are transit facilities, such as bus terminals and railway lines and stations.

The circulation element has substantial potential to promote hazard mitigation within the community. Many transportation routes will be used by emergency services to respond to incidents. They will also be used as evacuation routes for people leaving areas that have been or are about to be affected by a disaster. In their circulation elements, local governments can include requirements that critical roads be wide enough to allow larger vehicles (such as emergency crews) to pass other vehicles so that there are no traffic jams during an event. The element could also require that new developments have multiple access points to expedite response and evacuation. This is important if particular access points or roads are blocked or inaccessible.

### *Housing Element*

The housing element includes projected housing needs for the community and strategies for the community to increase housing supply. The housing projections and strategies analyze a variety of factors,

including population projections and market conditions. Once a strategy is adopted, the city or county may implement the strategy through zoning ordinance modifications or through housing development project approvals.

Under California law, the housing element is the only general plan element requiring periodic review by the State of California and updating every five years. Since the element must be updated every five years, the housing development strategy is a five-year plan of actions to implement the goals and objectives of the element. Under AB 162, local governments must add the latest flood hazard information to their housing elements before forwarding the elements to the State Department of Housing and Community Development for review.

### *Conservation Element*

The conservation element covers natural resources within the city or county. In addition to conservation of natural resources, this element also addresses the responsible development and utilization of these natural resources. Because growth and development can lead to increased demand for natural resources such as open land, the strategies within this element are developed in accordance with the strategies of other elements such as housing, open space, and transportation. Natural resources are also an important component in safety elements in that they include the natural conditions that could lead to hazards for the community. Examples include forested areas within high-fire severity zones, rivers and streams within floodplains, coastal regions susceptible to tsunamis, and hills with landslide risks. Under AB 162, conservation elements must include information on waterways that contribute to or support floodplains. See Section 1.7.4 for more details on AB 162 requirements regarding conservation.

### *Open Space Element*

The open space element contributes to hazard mitigation primarily through policies for setting aside land for non-development. The motivations behind these policies could include preventing development in hazardous areas. Instead of accommodating development, high-hazard areas could be preserved as open space. Examples include land along earthquake fault zones or within floodplains. Setting aside land can reduce current risk through protection and preservation of natural resources in floodplains. Natural resources such as wetlands and marshes can provide a buffer and absorb the impact of floods. If development is permitted in hazardous areas, open space could serve as a buffer between the development and the hazard. For protection from wildfires, this buffer would provide a built-in fire break surrounding the development.

### *Noise Element*

The noise element addresses excessive noise levels in areas of the community. The noise element is included for the purpose of minimizing unhealthful impacts from sources of excessive commercial, industrial, and transportation noise. Although the noise element does not directly address natural hazards, it has a bearing on placement of noise-sensitive land uses such as schools, hospitals, and retirement centers that may also be vulnerable to hazards and risks. Areas near the ends of airport runways are characterized not only by extreme noise but also by higher risk of airplane crashes and therefore are not suitable for such land uses.

## General Plan Consistency

The required general plan elements are an important component of community planning, but their value can easily be negated if they are in conflict with one another. For this reason, state general plan law requires both internal and external consistency. A general plan is internally consistent if the content of each individual element is consistent with other parts of the same element and with other general plan elements. For example, maps and diagrams must be consistent with the text within the element. External consistency refers to the consistency of the general plan with zoning and other general plan implementation programs and actions.

*Consistency Among General Plan Elements*

According to Government Code Section 65300.5, each element of the general plan must be consistent and compatible with the others. Therefore, the policies outlined in the general plan must be unified and support one another. Components governing land use must not conflict with circulation, housing, or safety policies. For example, a land use element map designating a high-density residential area in the middle of a landslide area identified on a safety element map would conflict with safety element policies calling for protection of housing from landslide hazards.

*Consistency of Implementing Actions*

As will be seen in greater detail in later sections, actions implementing general plans, such as rezonings, site plan reviews, subdivision map approvals, and capital improvement programs, must be consistent with the general plan. This an important underpinning of hazard mitigation because it requires that policies related to minimizing impacts of natural hazards identified in the general plan be followed in the day-to-day actions of city and county governments.

## 1.6. ADOPTION OF LOCAL HAZARD MITIGATION PLANS WITH SAFETY ELEMENTS

Under the federal Disaster Mitigation Act of 2000 (DMA2K), each municipality must develop a Local Hazard Mitigation Plan (LHMP) or participate in a multi-jurisdictional LHMP in order to be eligible for pre-disaster mitigation grants or post-disaster recovery assistance from the federal government.

At the state level, AB 2140 (2006) authorizes local governments to integrate their LHMPs into the safety elements of their general plans. Such integration is not mandated by this law. Instead it is encouraged through a post-disaster financial incentive which authorizes the state to use available California Disaster Assistance Act funds to cover local shares of the 25% non-federal portion of grant-funded post-disaster projects..

AB 2140 is one of the most important links between general plans and hazard mitigation in California. As mentioned earlier, California has enormous opportunity to implement hazard management strategies within the safety elements of general plans. Integration of the LHMP into the safety element provides an excellent vehicle for implementation of the LHMP. This integration allows hazard mitigation strategies to be implemented and local hazard awareness to be upgraded and enhanced. In addition, all other elements of the general plan, as well as implementation programs (such as zoning, subdivision maps, specific plans, and capital improvement programs), would be required to comply with an LHMP that it is adopted with the safety element.

## 1.7. HAZARD-SPECIFIC LEGISLATIVE MANDATES

California is at risk to a host of natural hazards, most notably earthquakes, fires, and floods. Over the past century, a number of these have become major disasters resulting in significant losses of life and property. In order to increase public safety and community resilience, California has responded by passing numerous laws and modifying state codes to address these hazards. These hazards are primarily addressed in general plan safety elements (and all elements of a general plan, whether mandatory or optional, must be consistent with one another), which must be reviewed by the California Governor's Office of Emergency Services (Cal OES) prior to adoption (Government Code Section 65302(g)). The following sections discuss the legal mandates for addressing the three most prominent natural hazards and their influence on community planning. These legal mandates affect the development of general plans, including safety elements, as well as some of the implementation tools discussed later in this guide.

### Earthquake Fault Zoning Act

The Earthquake Fault Zoning Act was enacted in 1972. Its purpose is to protect homes and other buildings designed for continuous human occupancy from earthquakes by preventing them from being built across

identified fault zone surface ruptures. Under this act, the State Geologist under the Department of Conservation's California Geological Survey is required to identify and map all fault zones in California classified as "active" – Holocene era or later, where movement has occurred within the last 11,000 years. These maps are published and available for local governments to use for policy- and decision-making. The act requires that development be prohibited over surface traces of active fault zones. Before a development is approved, a geologic investigation must be conducted to determine whether structures proposed for human occupancy are set back at least 50 feet from an identified fault surface rupture, as prescribed by state regulations implementing the act. If so, development may proceed. If not, the proposed development must be denied.

The State Geologist periodically updates the fault zone maps. When the maps are updated and disseminated, local governments are required to provide this information to people who may be living in mapped fault zones. Disclosure can be made in general plans, specific plans, property maps, or other plans or maps accessible to the public. Disclosure is also required to all buyers of real estate within these mapped fault zones before transactions are completed.

## Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was passed by the state legislature in 1990. Under this act, the State Geologist under the Department of Conservation's California Geological Survey is required to identify and map all areas at risk for ground shaking, landslides, and liquefaction. These maps must be published and made available to the public so that local governments can use them in local planning decision-making. Developers in areas of seismic hazard risk must produce a geotechnical report for that location and identify the mitigation actions that will be incorporated into the proposed development. In addition, anyone wishing to sell real estate in seismic hazard areas must disclose to the buyer that the property is located within a seismic hazard area.

While a principal purpose of this act was to provide state mapping leading to more detailed geological mapping and site investigation for use with structural mitigation, another important function is to flag potential hazardous areas where development should not occur, or where land uses allowed by the general plan or zoning should be restricted to minimize exposure to hazards and risk. Designation of these areas can be coupled with land acquisition by a public agency in areas where no development is allowable.

## Flood Hazards

Hurricane Katrina in 2005 was a wake-up call to the nation that the United States is not immune to catastrophic disasters. States and local communities began reevaluating hazards and increasing their hazard management efforts, and California was no exception.

One area that was of significant concern to state leaders was the Sacramento-San Joaquin Delta region and the over 1,100 miles of levees that protect it. Levee failure – a critical issue in New Orleans during Hurricane Katrina – became a key issue for the state. Among the efforts that California implemented was new legislation for flood and levee protection in the Delta region and throughout the state. The following is a summary of legislation passed in recent years that affect community planning and flood hazards.

### *AB 162*

AB 162 (2007) requires that land use, conservation, safety, and housing elements of local general plans include provisions that will reduce the risk from floods and flood-related issues. Each of the requirements for the elements specified in this bill must be fulfilled before the next revision of the housing element for the local jurisdiction's general plan.

Land use elements are required to include flood maps that are produced by the Federal Emergency Management Agency (FEMA) or the California Department of Water Resources (DWR). These must be

updated each year. In addition, the determination of land available for urban development may exclude land that is not adequately protected by flood management infrastructure.

Conservation elements must contain detailed information about the floodplain, such as the rivers, creeks and streams that contribute to it. In addition, information on flood corridors, riparian corridors, and land capable of sustaining floodwater must be identified. This information should be used to inform conservation element policies addressing groundwater recharge and storm water management.

AB 162 also adds requirements for addressing floods in the safety element. Source information includes historical data and flood hazard zone mapping. The safety element (and all elements of a general plan, whether mandatory or optional, must be consistent with one another) must include policies and goals that state how flooding risks for existing and planned development will be reduced, including strategies for deciding how new development can be placed in flood hazard zones, if at all. New development in these areas may be subject to design requirements that reduce the risk from flooding. In addition, the safety element must include policies for protecting public facilities from the risks of flooding and ensuring their continuity during flood events.

### *AB 70*

AB 70 (2007) addresses increased risk to floods as a result of new development in a community. If a city or county approves new development that increases the flood risk to the state, then the city or county must be responsible for a reasonable amount of the liability it has increased. This applies to land that was previously undeveloped and protected by a state flood control project.

### *SB 5*

Under SB 5, (2007) cities and counties within the Sacramento-San Joaquin Valley are required to include information from the Central Valley Flood Protection Plan (CVFPP) to be adopted by the Central Valley Flood Protection Board. Within 24 months of the flood protection plan adoption, each local jurisdiction must include these amendments in its general plans. Each jurisdiction is also required to develop goals and policies in its general plan for protecting people and property from floods and flood-related issues.

### *Related Flood Mitigation Laws*

The CVFPP was adopted in July 2012. In related actions, the Legislature passed SB 1278 (2012) and AB 1965 (2012) extending the time originally provided by SB 5 for localities to make their general plans consistent with the CVFPP. Among other things, these bills established a July 2013 deadline for DWR to complete 200-year floodplain mapping within this area, allowed cities and counties in this area to take up to two years after July 2013 to amend their general plans to be consistent with the CVFPP, added a year beyond that to amend their zoning, required amended city and county general plans to include data and analysis contained in the CVFPP and other flood hazard zones mapping, and required cities and counties after July 2016 to make findings related to urban flood protections levels using criteria developed by DWR.

## Wildfire Hazards

The California Governor's Office of Planning and Research has developed a guide to fire hazard planning. It provides recommendations and considerations for addressing fire hazards in general plans. This includes integration of fire hazard mitigation strategies developed in Local Hazard Mitigation Plans and coordinating these with community planning strategies established in the general plan.

### *Government Code Section 65302.5*

Under Government Code Section 65302.5, any county that has state responsibility areas (SRAs) within its boundaries must adhere to Public Resources Code Section 4128.5, which requires that counties with SRAs submit a copy of the proposed safety element of a general plan to any agency with responsibility for fire

protection in the county prior to adoption or amendment. The fire protection agencies may then provide comments on or recommendations for the proposed safety element. The board of supervisors reviewing the general plan must consider these comments and recommendations. If any or all of the recommendations are not accepted, the board must provide written communication to the agency stating why it is not including the recommendations. The board must also state how its own actions regarding land and policies within state responsibility areas will reduce the risk of fire for people, property, and natural resources.

### *Public Resources Code Section 4290*

California Public Resources Code Section 4290 provides authority to State Board of Forestry and Fire Protection to develop and implement fire safety standards for defensible safety on State Responsibility Area (SRA) lands. All residential, commercial, and industrial construction on SRA lands approved after January 1, 1991, must follow the regulations established by this board. At a minimum, the regulations will include road standards for fire equipment access; standards for street, road, and building identification signage; minimum levels for private water supply reserves that could be used for emergency fire use; and fuel breaks and greenbelts.

### *Public Resources Code Section 4291*

Public Resources Code Section 4291 provides regulations for protecting properties from wildfires. The code applies to all lands that have flammable vegetation. Any person with ownership or control of buildings on these lands must abide by these regulations. The regulations include several different requirements for how the vegetation surrounding buildings and structures should be managed to create defensible space. Within 100 feet of any building or structure, a firebreak must be created by removing brush, flammable vegetation, or combustible growth. If the distance is required to be greater than 100 feet by any other law or regulation, then that law or regulation supersedes this code section. In areas where soil stabilization is critical, vegetation can be maintained up to 18 inches in height but still must not be within 30 feet of any building or structure. Trees must be maintained to ensure that no part of the tree is within 10 feet of a chimney or stovepipe. Dead or dying parts of trees near buildings must also be removed. Roofs should be maintained so that accumulation of leaves, needles, or other dead vegetation is removed.

Public Resources Code Section 4291 also establishes requirements for building permits. Before construction on any building or rebuilding, a certification must be obtained from the local building official that the structure design adheres to the current code. In addition, after the building construction has been completed, a final inspection must be performed by the building official to verify that the building was built to state and local codes.

### *Fire Hazard Severity Zones*

Public Resources Code Sections 4201-4204 and Government Code Sections 51175-89 direct CAL FIRE to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. Adopted in 2008 in all SRAs and lands referred to as Fire Hazard Severity Zones (FHSZs), such zones define application of various mitigation strategies to reduce risk associated with wildland fires, especially for Very High Fire Hazard Severity Zones (VHFHSZs).

### *SB 1241*

In a manner somewhat similar to previously mentioned flood hazard mitigation legislation SB 1241 (2012) is a significant new law further mandating wildfire planning responsibilities of local governments in SRAs and VHFHSZs regarding: 1) wildfire updates to general plans; 2) mandatory findings for subdivision approvals in SRAs and Very High Fire Hazard Severity Zones; and 3) California Environmental Quality Act (CEQA) checklist updates for wildfire safety. Among other things, it: 1) revises safety element requirements in SRAs and VHFHSZs; 2) requires local general plans safety elements to be updated as necessary to address the risk of fire in SRAs and VHFHSZs upon the next revision of the housing element from January 1, 2014; 3) requires

each safety element update to take into account the most recent version of the Office of Planning and Research (OPR) "Fire Hazard Planning" document, to be updated by the next update of OPR's general plan guidelines, and 5) requires CAL FIRE review of updated safety elements prior to local adoption.

## 1.8. THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) was passed in 1970 and since that time has evolved into one of the most prominent components of community planning in California. CEQA applies to any discretionary action, such as a development proposal or general plan amendment.

CEQA has four mandated functions: informing decision-makers about environmental impacts, identifying activities that can mitigate the impact, preventing damage to the environment, and disclosing reasons for approving the discretionary action if it will cause environmental degradation. Through the CEQA process, decision-makers are informed of the natural hazards at proposed development locations and the impacts these hazards may have on people and property.

### Overview of Process

State CEQA guidelines mandate a three-step process for local governments to follow. The first step is to determine if the discretionary action qualifies as a project under CEQA. If the project does not fall under the allowed exemptions and is not discretionary, then the project does not have to continue in the CEQA process. If the project does not fall under either of these qualifications, then an initial study must be performed. The initial study will assess the project to determine if it may have a significant impact on the environment. If so, then an environmental impact report must be prepared.

One exemption from the CEQA process is the reconstruction or restoration of damaged or deteriorated buildings or structures to meet current public safety standards. Examples of using this exemption for public safety include the strengthening and improving levees along the Sacramento and San Joaquin rivers and in the Delta region. Because of this exemption, these projects were not subject to further steps in the CEQA process.

### Environmental Impact Reports

The environmental impact report (EIR) is a comprehensive and detailed report explaining the potential environmental impacts of a project. The planning agency is responsible for overseeing the preparation of the environmental impact report. Given their complexity and amount of time required to complete EIRs, a consultant is often brought in to assist. The consultant can be hired by the developer directly or be selected and overseen by the planning agency. Either way, the costs for preparing the EIR are passed on to the developer. Once an EIR is prepared, it is up to the planning agency to adopt the findings. Depending on the size and complexity of the discretionary action, an EIR can take up to 12 months to prepare and cost several hundred thousand dollars.

## 1.9. GENERAL PLAN IMPLEMENTATION

General plan development is just the first significant phase in community planning. The next phase is to implement the general plan. The following sections discuss the tools and processes that are involved in achieving the goals and objectives set by the general plan.

### Zoning

Zoning is one of the methods communities use to achieve the goals and objectives of the general plan.

Government Code Section 65850 establishes the legal authority for cities and counties in California to enact zoning ordinances. A community's zoning ordinance places land into a variety of use categories, known as

zones. Examples of zones include residential, commercial, public facility, industrial, open space, and agriculture. It is common to find different types of zones for each land use category; for example, residential zones may include single-family, multi-family, and rural. For each zone, the zoning ordinance establishes building requirements, including restrictions on the range of uses allowed, limits on building size and type, requirements for building setbacks (how far a built structure must be from the property lines), and minimum parcel sizes.

In addition to regulating land use, zoning has other functions that relate to hazard management, as summarized below.

### *Hazard Overlay Zones*

Overlay zones establish additional regulations beyond those established by the base zoning of a property. Generally, they are used to help resolve issues that typical zoning classifications do not address.

Hazard overlay zones address risks created by a defined hazard. Common Sources of overlay zone mapping include Special Flood Hazard Areas (SFHA), Fire Hazard Severity Zones (FHSZ), and seismic/geologic hazard zones. The purpose of these zones is to identify the location of the hazards and their potential risks to the community.

Restrictions on development and land use are developed locally for each hazard overlay zone. Local governments can use hazard overlay zones to implement mitigation strategies of their Local Hazard Mitigation Plans (LHMPs).

### *Zone Changes*

Land owners who wish to develop or build on their property may be restricted because of its current zoning. For example, land zoned for agriculture may have minimum lot size requirements and restrictions on how many houses can be built. In these cases, the land owner could request a zoning change. Local legislative bodies such as city councils and boards of supervisors have the authority to change zoning on parcels. This means that the zone change request is brought before a public meeting where anyone can comment on the proposed change. Significant opposition to a zoning change from the public could sway the council or board to deny the change. Any changes in zoning must be consistent with the general plan and other requirements placed on that property. Otherwise, the change may be challenged in court as illegal.

### *Variances*

A variance allows variation from a standard zoning requirement. California law does not allow variances from the permitted land uses specified by zoning, but it does allow variances from other zoning requirements if certain conditions are met. An example would be a variance from standard building setback requirements on a lot on which a geologic obstruction, such as a fault zone or landslide, would prohibit construction of a home that complies with the standard requirements.

Usually variances are only granted if it is proven that compliance with the standard zoning requirements would create a hardship for the land owner. In the case of the geologic obstruction, being forced to build a much smaller house or no house at all could reasonably be considered a hardship for the land owner.

### *Site Plan Review*

A local planning agency reviews proposed site plans to confirm that they comply with zoning requirements. Site plan review offers the planning staff the opportunity to apply lessons learned from previous disasters to proposed new development. This could include assessing drainage, vegetation landscaping, building design and locations, soil integrity, and adequate access.

*Down-Zoning*

Down-zoning refers to a zoning change in which the range or density of allowable uses has been decreased. For example, if the zoning of a parcel is changed so that the allowed number of housing units per acre or other building density is decreased, then the parcel has been down-zoned. This is a relatively common practice and is sometimes necessary to make zoning consistent with the general plan as required by state law. In the 1980s, for example, the City of Los Angeles down-zoned approximately one-third of the city in order to achieve consistency with the general plan.

Challenges of down-zoning include the consequences it has for the land owner. Decreasing the potential density of a parcel can decrease the economic value to the land owner. Land owners are quite sensitive to losing property value and have challenged down-zonings in court as "regulatory takings." Supreme Court rulings of the past several decades have established guidance for local governments in determining the extent to which properties can be reasonably down-zoned.

## Specific Plans

California Government Code Section 65450 establishes the legal authority for specific plans, stating that a specific plan may be used to implement the general plan in a certain area. Specific plans are created when unique development standards may be needed for a project site. While general plans must meet specific mandated requirements, specific plans are subject to more general legal guidance. This flexibility allows specific plans to establish zoning and other development standards appropriate for the development project.

Specific plans are required by law to be consistent with general plans. According to Government Code Section 65455, all zoning ordinances, tentative subdivision maps, parcel maps, and public works projects in an area subject to a specific plan must be consistent with the specific plan.

## Subdivision Map Act

The Subdivision Map Act (Map Act) is the overarching law for development of subdivisions in California. The first version of Map Act was written in 1907, making it one of the oldest planning laws in California and in the United States. It was written in response to rapid growth in California at the time and provides a process for local governments to follow in order to grow responsibly.

The Map Act has been amended several times during its history, and at present provides authority to local governments to regulate proposed subdivisions within their jurisdiction. Local procedures under the Map Act are uniform and applied statewide. Subdivisions are defined as having more than four lots and are required to include a map that shows approximately what the subdivision would look like if completed.

A key requirement of the Map Act is that a city or county must deny any tentative subdivision map if the map, design, or improvements are inconsistent with the general plan or any applicable specific plan. Thus, if a general plan contains requirements to protect communities from hazards, any subdivision must follow these requirements. For example, a general plan may include policies requiring that subdivisions have adequate water supply for fire suppression, multiple access points, and building design that protects people from earthquakes, fires, and floods.

These provisions are further strengthened by the stipulation that a city or county must deny any tentative subdivision map if the design or improvements are likely to cause environmental damage, substantially and avoidably injure fish or wildlife or their habitat, or cause public health problems. This language provides a basis for linking natural hazards to environmental damage and public health, thereby giving city and county planners the ability to deny or modify maps not meeting these criteria.

## Building Codes

Building codes are one of the most effective tools for hazard mitigation. The adoption of strengthened building codes in California is the primary reason why earthquakes over the last two decades have not been more destructive. Newer buildings built to the updated codes reduce loss of life and property damage. Building codes can also provide mitigation for other hazards, such as fires and floods. For fires, building codes have been upgraded to require new development in high-fire areas to include fire-resistant materials. Floods can be mitigated through building codes by requiring the first floor of habitable structures to be above the base-flood elevation.

The current building code law for California was adopted in January 2009 as Health and Safety Code Sections 18901 through 18949.31. This law establishes the Building Standards Commission (BSC) as the official state agency for building codes. The BSC has the authority to modify or change the building standards.

Under the building code law, the Uniform Code for Building Conservation of the International Conference of Building Officials was adopted as the minimum standard for new construction. All new construction must conform to the building standards established by this building code law.

Even though the state has adopted minimum building codes, local governments can, if they choose, adopt more stringent standards for new construction in their jurisdictions. This can be an important tool in high-hazard communities to further reduce risk.

## Unreinforced Masonry Building Act

In 1986, the California legislature enacted the Unreinforced Masonry (URM) Building Act. This law requires that local governments identify every building that has unreinforced masonry located within a Seismic Zone 4. Once the buildings are identified, local governments must develop and submit to the state a plan for reducing URM loss during a seismic event. This plan should provide for retrofitting or removing URM buildings. California has forbidden the construction of URM buildings since 1933; however, there are still over 22,000 of these buildings in the state.

As of 2006, approximately 70 percent of all URM buildings in California had been retrofitted. In Los Angeles and Orange counties, the percentage is 87 percent and 89 percent, respectively. San Francisco has retrofitted 86 percent of all URM buildings.

## Capital Improvement Programs

Communities are far more than just land and buildings. Capital improvements, also called infrastructure or public works, play a critical role in the health of communities and include transportation, water, power, and sewage systems. These systems form the lifelines of communities; without functioning and efficient infrastructure, the communities would rapidly decline. Capital improvements must be maintained and modernized to continue to meet the needs and demands of the community.

Local jurisdictions typically maintain ongoing capital improvement programs. All capital improvement programs are required to be consistent with the general plan of the community. New development often requires construction of capital improvements. Examples include transportation improvements, such as parking and new roads, and expansion of water and sewer services. Local governments can require developers to build these improvements or levy fees on the development project that will help fund the improvements.

After a disaster, one of the critical functions for short-term recovery is to rebuild and restore critical infrastructure and key resources within the community. This can involve reconstruction of many, if not all, of the same systems that are included within capital improvement programs. Thus, one of the keys to community resilience is to ensure that the infrastructure is built to promote public safety after a disaster.

One example is requiring that new development have wider roads and multiple access points to facilitate evacuation and response operations.

### Land Acquisition

Local government can buy all or part of a property from a landowner to benefit the community. Examples include land acquired to allow road widening, construction of new roads and freeways, or sale to developers for redevelopment.

Land acquisitions have increasingly been used as tool for hazard mitigation, primarily because they are extremely effective at reducing risk within communities. In California, land acquisitions have been used for property susceptible to landslides and other geologic and seismic hazards.

Most buyouts occur after a disaster or after repeated events on the property. This is largely because land acquisition is the most expensive form of hazard mitigation, and sufficient funds are usually not available until after a disaster has been declared.

## 1.10. REDEVELOPMENT

Redevelopment, where the built environment is reshaped and rebuilt according to a new plan, occurs for a number of reasons and is common in older sections and neighborhoods of cities. Redevelopment can include demolition of existing structures and substantial new construction. The primary motivation behind redevelopment is economic growth in communities that are distressed or declining. Mot redevelopment is done by the private sector using market resources.

Until 2012, a formal public redevelopment system was in force in California. It authorized a complex process, guided by an extensive network of laws and state codes. It began with the county or city selecting a survey area and forming a redevelopment district. Consultants were then brought in to provide recommendations on which areas in the survey area are blighted. The redevelopment agency would then select a project area and create a redevelopment district and plan based on the recommendations.

Public redevelopment programs were financed by tax increment financing which earmarked the portion of local property taxes attributable to new development value added and returned that for exclusive use in the individual districts. This system has since been dismantled by recent legislation.

## 1.11. CONCLUSION

Community and land use planning is a complex system of processes and regulations that assist local governments in meeting challenges in their communities. These processes and regulations also include components that help protect communities from hazards. Among the most important of these components are the general plan law, the Subdivision Map Act, environmental review, and building codes. Knowledge of these tools can help emergency managers and planners understand how community planning can be used to create safer and more resilient communities.

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# ANNEX 2 - GUIDE TO CALIFORNIA HAZARD MITIGATION LAWS, POLICIES AND INSTITUTIONS

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## 2.1. INTRODUCTION

To understand state and local hazard mitigation, it is useful to examine primary laws and policies at each level of the federal system. This annex enlarges upon the summary of the federal, state and local disaster mitigation and emergency management laws provided in Chapter 3, providing more complete descriptions of federal, state, and local laws, policies, and institutions.

Development of disaster management systems in the U.S. has been piecemeal rather than systematic and comprehensive. Mitigation planning is conducted within a complex, fragmented and overlapping context of federal, state, and local laws, institutions, and policies, in turn intermingled with a variety of private sector risk reduction practices. The following are key elements of these systems.

## 2.2. FLOOD INSURANCE ACT

Public Law 90-448 of 1968, known as the National Flood Insurance Act, established the National Flood Insurance Program (NFIP) which provides for federal government backing of flood insurance sold by private companies. Supported by a national mapping system showing boundaries for 100- and 500-year floodplains, NFIP encourages local governments to direct development away from floodplain areas or elevate

construction to mitigate flood risks through local regulation. Through the Community Rating Service (CRS), the NFIP provides for financial incentives in the form of lower insurance rates for local communities encouraging mitigation of flood hazards in a manner parallel to rate incentives related to private fire insurance and enforced by the mortgage industry.

Additionally, the National Flood Insurance Act was modified in 1994 by Public Law 103-325, the National Flood Insurance Reform Act, to provide for flood hazard mitigation planning and project grants.

The Flood Mitigation Assistance (FMA) program assists states and local communities in implementing flood hazard mitigation measures before a major disaster occurs. The program targets NFIP communities with numerous repetitive losses. The program offers two types of grants to local communities: planning and project grants. A community must have a FEMA-approved Floodplain Management Plan (FMP) to be eligible for FMA grant funding. Under the FMA program, a community has two years from the time it is awarded a planning grant to develop an FMP. When awarded a project grant, the community has three years to complete the project with FMA grant funds. States also receive technical assistance with grants to administer the FMA program.

## 2.3. STAFFORD ACT

Public Law 93-288 of 1988, entitled the Robert T. Stafford Disaster Relief and Emergency Assistance Act (more commonly known as the Stafford Act), is the basic disaster relief law of the country. It authorizes three post-disaster programs implemented by the Federal Emergency Management Agency (FEMA), now part of the Department of Homeland Security (DHS):

1. Individual and Household Assistance, which provides limited post-disaster grants to assist displaced homeowners with mortgage payments and minor repairs

2. The Public Assistance Program, which provides grants to local governments and nonprofit groups for post-disaster repair of infrastructure and facilities

3. The Hazard Mitigation Grant Program (HMGP), which provides post-disaster grants to state and local governments to mitigate future damage

It should be noted that in addition to these three programs the Stafford Act includes preparedness and response authorities. Examples include the Fire Management Assistance Grant (FMAG) program, Part 204 of 44 CFR under the Stafford Act, along with other miscellaneous programs. Subpart F has unemployment assistance, legal aid, relocation, and crisis counseling. Subpart K has community disaster loans.

## 2.4. DISASTER MITIGATION ACT OF 2000

The most important federal hazard mitigation law is the Disaster Mitigation Act of 2000 (DMA 2000). It amended the Stafford Act and the Public Works Act to require preparation of hazard mitigation plans by local governments as a precondition for receipt of Hazard Mitigation Grant Program project funds. State governments were already required by the Stafford Act to prepare such plans. An initial deadline of November 2003 was extended to November 2004 and then to May 2005.

The general purpose of DMA 2000 was to reduce preventable, repetitive disaster losses by encouraging states and local jurisdictions to plan more wisely through mitigation of natural hazards, vulnerability, and risk. The basic reason for its passage was the growing volume and severity of preventable, repetitive losses from natural disasters aggravated by the widespread problem of poorly planned local development. Major disasters during the 1990s, including the 1993 mid-western floods along the Missouri and Mississippi rivers, and the Northridge Earthquake of 1994 together with an increase in wildland-urban interface fires, convinced Congress that more should be done locally to reduce the growing number of disaster losses.

### 2.4.1. LOCAL HAZARD MITIGATION PLANS

Preparation of a Local Hazard Mitigation Plan (LHMP) is a pre-condition for a local jurisdiction to receive HMGP project funds. Local jurisdictions include cities, counties, special districts, and Native American organizations. DMA 2000 requires all locally applicable hazards to be addressed in LHMPs, which can be prepared by a single jurisdiction or on a multi-agency regional basis. Whether the LHMPs singly or jointly prepared, FEMA requires direct participation, selection of mitigation strategies, and formal adoption by each jurisdiction. FEMA also has promoted open public involvement in the process, documented participation of stakeholders, and provided opportunity for public review and comment on the mitigation plan. Other key aspects of LHMP preparation encouraged by DMA 2000 include 1) pre-disaster planning, 2) integrated state and local planning, 3) use of all-hazards approaches, 4) risk assessment and risk reduction measures, and 5) community-based processes, including public/private partnerships.

A detailed discussion of FEMA-approved LHMPs in California is provided in Annex 4.

### 2.4.2. HAZARD MITIGATION GRANT PROGRAM

The HMGP program represents a disaster-based approach to allocating federal funds for use in mitigating hazards that might cause future disasters. HMGP funds are administered by states as sub-grants to local governments that have FEMA-approved LHMPs. Generally, HMGP allocations have represented from 7½ to 15 percent of post-disaster Stafford Act funding authorizations by Congress. Under H.R. 5441, the 2007 Department of Homeland Security Appropriations Act passed by Congress in October 2006, states with standard multi-hazard mitigation plans receive HMGP project funding based on varying proportions of a federally declared post-disaster Stafford Act funding authorization:

- 15 percent for amounts not more than $2 billion
- 10 percent for amounts more than $2 billion and not more than $10 billion
- 7½ percent for amounts more than $10 billion and not more than $35 billion

A more extensive discussion of the HMGP program is provided in Chapter 7.

### 2.4.3. PRE-DISASTER MITIGATION

DMA 2000 also provides for Pre-Disaster Mitigation (PDM) grants for hazard mitigation planning. PDM is administered in California by Cal EMA. It was created under DMA 2000 to provide a funding mechanism that was not dependent on a presidential disaster declaration. Of the $25 million appropriated in fiscal year 2002 nationwide, California received approximately $1 million or 4 percent. The majority of these funds were spent on the development of the 2004 SHMP. Starting in fiscal year 2003, the PDM program was split into two different grants: planning and competitive. A more detailed discussion of the PDM program is provided in Chapter 7.

## 2.5. OTHER FEDERAL DISASTER LAWS

Other federal laws authorize post-disaster funding to support restoration of highways, housing, and business. These include the Housing and Community Development Act, Federal-Aid Highways Act, Public Works Act, and Small Business Administration Act, which generally provide grants and loans for post-disaster recovery and reconstruction.

The Federal-Aid Highways Act, for example, authorizes emergency grants for freeways and highways on the federal network. The Housing and Community Development Act provides for several types of post-disaster assistance including:

1. Section 235 rental assistance

2. Section 8 rental vouchers
3. Community Development Block Grants (CDBG) for housing repair and commercial loans that are also used locally to help finance local hazard mitigation projects associated with rebuilding

The Small Business Administration Act authorizes emergency provision of business resumption loans for small businesses and loans to homeowners for damage restoration. Finally, the Public Works Act authorizes assistance to small businesses as well as assistance to local governments for economic development.

## 2.6. FEDERAL EMERGENCY MANAGEMENT DIRECTIVES

In addition to federal disaster management laws are a series of administrative directives regarding federal emergency management systems. These have been put in place over the past two decades by FEMA and, more recently, by the Department of Homeland Security, of which FEMA is now a part, in order to standardize disaster preparedness, response, and recovery practices nationwide.

The theory underlying the federal emergency management systems is a "bottom-up" concept that places priority in an emergency on local use of all locally available resources, including those supplied by mutual aid partners, before assistance is requested from the state government. In turn, it also emphasizes state use of all available state resources before assistance is requested of the federal government.

Thus, where local resources are overwhelmed in an emergency, assistance is requested from the state government. The Governor can declare a state of emergency and, if the emergency is so great as to overwhelm state resources, can request assistance from the federal government. Federal emergency response is provided after the President receives a request from a state and declares a federal emergency.

In return for federal emergency resources and post-disaster financial assistance, state and local governments are expected to follow specific federal regulations and guidelines associated with federal mitigation, preparedness, response, and recovery programs. This expectation forms the basis for the institutional arrangements and operations created at the state and local levels under federal administrative direction. Principal among these federal systems are the National Incident Management System (NIMS) and the National Response Framework (NRF).

### 2.6.1. NATIONAL INCIDENT MANAGEMENT SYSTEM (NIMS)

NIMS is a standardized incident command system (ICS) providing standardized terminology and procedures for common use in an emergency in any jurisdiction. NIMS uses standard incident command functions for managing an emergency (i.e., command, operations, planning and intelligence, logistics, and finance). NIMS is similar in many respects to a previously adopted system in California known as the Standardized Emergency Management System (SEMS).

NIMS is a major source of guidance for all state and local emergency management agencies in developing their own ICS protocols. Beginning in 2005, state and local governments wishing to receive federal financial assistance have been required by DHS to prepare emergency management plans that comply with NIMS. This is known as "NIMS compliance."

### 2.6.2. NATIONAL RESPONSE FRAMEWORK (NRF)

The National Response Framework (NRF), released by the Department of Homeland Security (DHS) in 2008, supersedes the National Response Plan. The NRF is a comprehensive guide for how the nation conducts incident response to all-hazards. Identified within the NRF are five key response principles: engaged partnerships; tiered response; scalable, flexible and adaptable operational capabilities; unity of effort through unified command; and the readiness to act. One of the most important functions of the NRF is defining the roles, responsibilities, and relationships of local, state, and federal government, the private

sector, and non-governmental organizations (NGOs) for responding to incidents. Within the NRF, there are 15 Emergency Support Functions (ESF) annexes. In addition, the NRF provides support annexes, incident annexes and partner guides. Annex Table 2.A lists the 15 ESFs along with the scope of each function.

**Annex Table 2.A: Emergency Support Functions and Scopes**

| Emergency Support Function | Scope |
|---|---|
| ESF #1-Transportation | Aviation/airspace management and control Transportation safety Restoration/recovery of transportation infrastructure Movement restrictions Damage and impact assessment |
| ESF #2-Communications | Coordination with telecommunications and information technology industries Restoration and repair of telecommunications infrastructure Protection, restoration, and sustainment of national cyber and information technology resources Oversight of communications within the federal incident management and response structures |
| ESF #3-Public Works and Engineering | Infrastructure protection and emergency repair Infrastructure restoration Engineering services and construction management Emergency contracting support for life-saving and life-sustaining services |
| ESF #4-Firefighting | Coordination of federal firefighting activities Support to wildland, rural, and urban firefighting operations |
| ESF #5-Emergency Management | Coordination of incident management and response efforts Issuance of mission assignments Resource and human capital Incident action planning Financial management |
| ESF #6-Mass Care, Emergency Assistance, Housing, and Human Services | Mass care Emergency assistance Disaster housing Human services |
| ESF #7-Logistics Management and Resource Support | Comprehensive, national incident logistics planning, management, and sustainment capability |
| Resource support (facility space, office equipment and supplies, contracting services, etc.) | |
| ESF #8-Health and Medical Services | Public health Medical Mental health services Mass fatality management |
| | |
| ESF #9- Search and Rescue | Life-saving assistance Search and rescue operations |
| ESF #10-Oil and Hazardous Materials Response | Oil and hazardous materials (chemical, biological, radiological, etc.) response Environmental short- and long-term cleanup |
| ESF #11-Agriculture and Natural Resources | Nutrition assistance Animal and plant disease and pest response Food safety and security Natural and cultural resources and historic properties protection and restoration Safety and well-being of household pets |
| ESF #12-Energy | Energy infrastructure assessment, repair, and restoration Energy industry utilities coordination Energy forecast |
| ESF #13-Public Safety and Security | Facility and resource security Security planning and technical resource assistance Public safety and security support Support to access, traffic, and crowd control General law enforcement |

| Emergency Support Function | Scope |
|---|---|
| ESF #14-Long-Term Community Recovery | Social and economic community impact assessment Long-term community recovery assistance to States, local governments, and the private sector Analysis and review of mitigation program implementation |
| ESF #15-External Affairs | Emergency public information and protective action guidance Media and community relations Congressional and international affairs Tribal and insular affairs |

*Source: U.S. Department of Homeland Security. National Response Framework, Emergency Support Function Annexes: Introduction.2008.*

### 2.6.3. NATIONAL PREPAREDNESS SYSTEM

A national initiative to integrate various prior and ongoing emergency management statutory and administrative directions from Congress and the President is embodied in Presidential Policy Directive (PPD) 8: National Preparedness, which was released in March 2011. Its goal is to strengthen the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to the security of the Nation. PPD-8 defines five mission areas—Prevention, Protection, Mitigation, Response, and Recovery—and mandates the development of a series of policy and planning documents to explain and guide the Nation's approach to ensuring and enhancing national preparedness.

### 2.6.4. THREAT AND HAZARD IDENTIFICATION AND RISK ASSESSMENT (THIRA)

The Threat and Hazard Identification and Risk Assessment (THIRA) is part of the overall National Preparedness System process derived from PPD-8, and builds on the National Preparedness Goal. THIRA is a tool that allows a jurisdiction to understand its threats and hazards and how the impacts may vary according to time of occurrence, season, location, and other community factors. This knowledge helps a jurisdiction establish informed and defensible capability targets. Each state must complete a THIRA each year as a condition of FEMA Homeland Security Grant Program funding. The ultimate outcome of the THIRA process is a set of capability targets.

The First Edition of the Threat and Hazard Identification Guide Comprehensive Preparedness Guide (CPG) 201 was published in April 2012. The annual State of California Threat and Hazard Identification and Risk Assessment is informed by the existing state emergency management plans and public and private stakeholders, and is conducted in accordance with Comprehensive Preparedness Guide (CPG) 201. This final THIRA document culminates in identifying preliminary State of California capability targets for the 31 core capabilities from the National Preparedness Goal. The entire Comprehensive Preparedness Guide (201) is available on FEMA's website: http://www.fema.gov/national-preparedness

### 2.6.5. NATIONAL MITIGATION FRAMEWORK

Also part of the National Preparedness System is the National Mitigation Framework (NMF), is which builds on the National Preparedness Goal. The National Mitigation Framework sets the strategy and doctrine for building, sustaining, and delivering the core capabilities for Mitigation identified in the National Preparedness Goal. This Framework considers the full spectrum of threats and hazards, including natural, technological/accidental, and adversarial/human-caused.

The Mission Areas for the National Mitigation Framework are consistent with those of THIRA: Prevention, Protection, Mitigation, Response and Recovery. The Framework provides the following definitions of the mission areas:

- Prevention: The capabilities necessary to avoid, prevent, or stop a threatened or actual act of terrorism. As defined by PPD-8, the term "prevention" refers to preventing imminent threats.

- Protection: The capabilities necessary to secure the homeland against acts of terrorism and manmade or natural disasters.
- Mitigation: The capabilities necessary to reduce loss of life and property by lessening the impact of disasters.
- Response: The capabilities necessary to save lives, protect property and the environment, and meet basic human needs after an incident has occurred.
- Recovery: The capabilities necessary to assist communities affected by an incident to recover effectively.

This Framework establishes a common platform and forum for coordinating and addressing how the Nation manages risk through mitigation capabilities. It describes mitigation roles across the whole community. The National Mitigation Framework was published May 2013 and is available on FEMA's website: http://www.fema.gov/national-preparedness .

PPD – 8 and the National Mitigation Framework provide an emerging institutional backdrop for the federal and state laws, policies, and strategies presented previously in Chapter 3 as well as the detailed hazard and risk assessments described in the following Chapters 5 and 6.

## 2.7. CALIFORNIA EMERGENCY SERVICES ACT

Among the more important laws, regulations, and administrative orders governing disaster management in California are the California Emergency Services Act, California Disaster Assistance Act, and Title 19 of the California Code of Regulations. The California Emergency Services Act provides the legal authority for emergency management and foundation for coordination of state and local emergency response, recovery, preparedness, and mitigation activities throughout California.

### 2.7.1. STATE EMERGENCY PLAN

The Governor's Executive Order W-9-91 requires the Director of the Office of Emergency Services (OES), now the Secretary of Cal EMA, to prepare the State of California's Emergency Plan and coordinate activities of all state agencies during the preparedness and response phases of emergencies. This Executive Order also directs state government organizations to submit agency emergency plans and procedures to the Director of OES, now Secretary of Cal EMA, for review and approval, provide personnel emergency training, define lines of succession, and ensure effective use of resources during response and recovery.

The State Emergency Plan describes the California Emergency Organization that provides the state and local agencies access to public and private resources during emergencies. The State Emergency Plan is revised periodically. Draft versions of revisions of the State Emergency Plan are posted on the Cal EMA website for review and comment by other governmental entities and the public. The most recent update was in June 2009.

#### State Emergency Plan Linkage with SHMP

The SHMP is an important supporting document to the California State Emergency Plan (SEP). The SEP defines and describes the fundamental systems, strategies, policies, assumptions, responsibilities and operational priorities that California uses to guide and support emergency management efforts. The SEP and the SHMP are closely interlinked; Section 8 of the SEP identifies mitigation as one of the four emergency management functions and references the role of the SHMP in describing and mitigating hazards, risks, and vulnerabilities, thereby reducing disaster losses. The SEP provides several examples of hazards, risks and vulnerabilities giving rise to emergencies in California. However, it formally acknowledges the SHMP as the overriding comprehensive hazard analysis document that it relies upon for detailed hazard, risk, and vulnerability analysis, and other hazard mitigation-related information and programs. Essential elements of the SEP include:

- A description of the emergency services that are provided by governmental agencies and how resources are mobilized
- An outline of the methods for carrying out emergency operations and the process for rendering mutual aid
- An overview of the system for providing public information
- Emphasis on the need for continuity planning to ensure uninterrupted government operations

## SEP Functional Annexes and Appendices

The SEP implements Emergency Function working groups, which develop functional annexes that follow an established format to describe discipline-specific goals, objectives, operational concepts, capabilities, organizational structures, and related policies and procedures. The functional annexes are developed separately from the basic plan and make reference to existing agency and department plans and procedures. Subsequent plans and procedures that are developed in support of the State Emergency Plan, such as mutual aid plans, the SHMP and other hazard-specific plans, catastrophic plans, and related procedures, are incorporated by reference and maintained separate from the SEP.

The State Emergency Plan (SEP) establishes the California Emergency Functions (CA-EFs) as a key component of California's system for all-hazards emergency management. The California Emergency Management Agency (Cal EMA) initiated the development of the CA-EFs in cooperation with California's emergency management community including federal, state, tribal, and local governments, public/private partners and other stakeholders to ensure effective collaboration during all phases of emergency management.

The development of the CA-EFs involves organization of the participating stakeholders and gradual development of emergency function components. This development also includes a process to maintain each of the CA-EFs as a permanent component of California's emergency management system. The 17 emergency functions identified in the California Emergency Function Guidance 2009 document are listed in Annex Table 2.B.

**Annex Table 2. B California Emergency Functions and Lead Agencies**

| Emergency Function | Lead Agency |
|---|---|
| Transportation | *Business Transportation and Housing Agency* |
| Communications | *State and Consumer Services Agency* |
| Construction and Engineering | *State and Consumer Services Agency* |
| Fire and Rescue | *Cal EMA* |
| Management | *Cal EMA* |
| Care and Shelter | *Health and Human Services Agency* |
| Resources | *State and Consumer Services Agency* |
| Public Health and Medical | *Health and Human Services Agency* |
| Search and Rescue | *Cal EMA* |
| Hazardous Materials | *California Environmental Protection Agency* |
| Food and Agriculture | *Department of Food and Agriculture* |
| Utilities | *Resources Agency* |
| Law Enforcement | *Cal EMA* |
| Long-Term Recovery | *State and Consumer Services Agency /Business, Transportation and Housing Agency* |
| Public Information | *Cal EMA* |
| Evacuation | *Business, Transportation, and Housing Agency* |
| Volunteer and Donations Management | *California Volunteers* |

*Source: California Emergency Function Guidance 2009*

The California Emergency Function Guidance 2009 document for the development of annexes and more information regarding CA-EFs is available on the Cal OES website:
http://www.calema.ca.gov/PlanningandPreparedness/Pages/Emergency-Functions.aspx

### SEP Revisions

The SEP is periodically revised. Draft versions of revisions of the State Emergency Plan are posted on the Cal EMA website for review and comment by other governmental entities and the public. The most recent update was in June 2009.

## 2.7.2. STANDARDIZED EMERGENCY MANAGEMENT SYSTEM (SEMS)

The Standardized Emergency Management System (SEMS) is the system required by Government Code Section 8607(a) for managing response to multi-agency and multi-jurisdiction emergencies in California.

There are five SEMS organization levels which, together with the private sector, comprise the California Emergency Organization. This virtual organization potentially represents all resources available within the state that may be applied in disaster response and recovery phases. The five levels are:

- *State* - Statewide resource coordination integrated with federal agencies
- *Regional* - Management and coordination of information and resources among operational areas
- *Operational Area* - Management and/or coordination of information, resources, and priorities among all local governments within the boundary of a county
- *Local* - County, city, or special districts
- *Field* - On-scene responders

SEMS operates from established Emergency Operations Centers (EOCs) at the state, regional, operational, and local levels, as well as in many businesses and industries. SEMS incorporates the use of the Incident Command System (ICS), the Master Mutual Aid Agreement, existing mutual aid systems, the operational area concept, and multi-agency or inter-agency coordination. A prime objective in emergency operations is to provide local jurisdictions with the resources to meet their disaster needs and maintain continuity of government. All state employees are Disaster Service Workers (DSW) under Governor's Executive Order W-9-91.

## 2.7.3. ROLE OF CAL OES AND SEMS

Cal EMA performs executive functions assigned by the Governor. The Secretary of Cal EMA coordinates the state's disaster preparedness and response activities, assisted by representatives of state agencies. SEMS helps unify all elements of California's emergency management organization into a single integrated system. Its use is required for state response agencies and local government agencies seeking eligibility for state funding of response-related personnel costs.

## 2.7.4. LOCAL GOVERNMENT COORDINATION

An important point of vertical and horizontal integration of emergency preparedness and response at the local level is the county operational area EOC. This EOC manages and/or coordinates information, resources, and priorities among all local governments within the boundary of a county. There are 58 operational areas within California, consistent with the number of counties. While each city within a county may have its own EOC, the county EOC has a special responsibility under SEMS to be the clearinghouse for

all other EOCs in that particular county. These fall within one or another of three Cal EMA Administrative Regions.

### 2.7.5. CAL OES ADMINISTRATIVE REGIONS

There are three Cal OES Administrative Regions (Inland, Coastal, and Southern) in California. Within these are six Mutual Aid Regions for fire and general mutual aid coordination. Law Enforcement and Coroners have seven Mutual Aid Regions. The Cal OES Administrative Regions manage and coordinate information and resources among operational areas within mutual aid regions and between operational areas and state agencies for support during emergency mitigation, preparedness, response, and recovery activities.

Annex Map 2.A on the following page identifies the 58 county operational areas within the three Cal OES Administrative Regions and six fire and general coordination Mutual Aid Regions. The Coastal Cal OES region extends from Monterey County on the south to Del Norte County on the north and is a single Mutual Aid Region. The Inland Cal OES region extends from Kern County on the south to Siskiyou and Modoc counties on the north and contains three Mutual Aid Regions. The Southern Cal OES region extends from San Diego County on the south to San Luis Obispo County on the north along the Pacific Coast and Mono County on the north along the California-Nevada border and contains two Mutual Aid Regions.

**Annex Map 2.A: Cal OES Administrative Regions**

## 2.8. RELATIONSHIP OF SHMP TO EMERGENCY MANAGEMENT

As discussed initially in Chapter 1 as well as later in the SHMP, the SHMP is a supporting document to the California State Emergency Plan (see Annex Chart 2.A). By referencing the SHMP, the State Emergency Plan acknowledges the potential risks associated with identified hazards.

The Standardized Emergency Management System (SEMS) is the system required by Government Code Section 8607(a) for managing responses to multi-agency emergencies in California. The State Emergency Plan supports the policies, concepts, and protocols specified in the SEMS Guidelines for the implementation of SEMS. The use of SEMS is required by law during multi-agency or multi-jurisdictional emergency response by state agencies. Local government must also use SEMS to be eligible for reimbursement of certain response-related personnel costs.

### 2.8.1. SPECIAL NOTE ON RELATIONSHIP OF MITIGATION AND EMERGENCY PLANS

The Disaster Mitigation Act of 2000 (DMA 2000) brought hazard mitigation to the forefront by requiring FEMA-approved state and local hazard mitigation plans in order for state agencies and local governments to remain eligible for reimbursement for permanent work under the federal Public Assistance Program and all federal hazard mitigation grant funding.

In addition, since 2005 state and local emergency management plans must be consistent with the National Incident Management System (NIMS) in order to be eligible to qualify for federal preparedness funds NIMS added prevention and protection to the emergency management cycle. In this way, the Department of Homeland Security merged under one roof the capability to anticipate, preempt, and deter threats to the homeland whenever possible and the ability to respond quickly when such threats do materialize.

The overall strategy of the revised emergency management cycle can be expressed very simply: what you cannot mitigate or prevent you must be prepared to respond to and recover from (see Annex Chart 2.B).

Other Cal OES plans and guidance documents referencing mitigation include the California Emergency Plan, Disaster Recovery and Mitigation Handbook, Electric Power Disruption, Emergency Planning Guidance for Local Government (revised 2007), Emergency Management in California (2003), Emergency Planning Guidance for Public and Private Water Utilities, Recovery Manual, Risk Communication Guide for State and Local Agencies, and Statewide Emergency Management Strategic Plan (2005-2010).

### 2.8.2. VITAL ROLE OF SHMP IN EMERGENCY MANAGEMENT

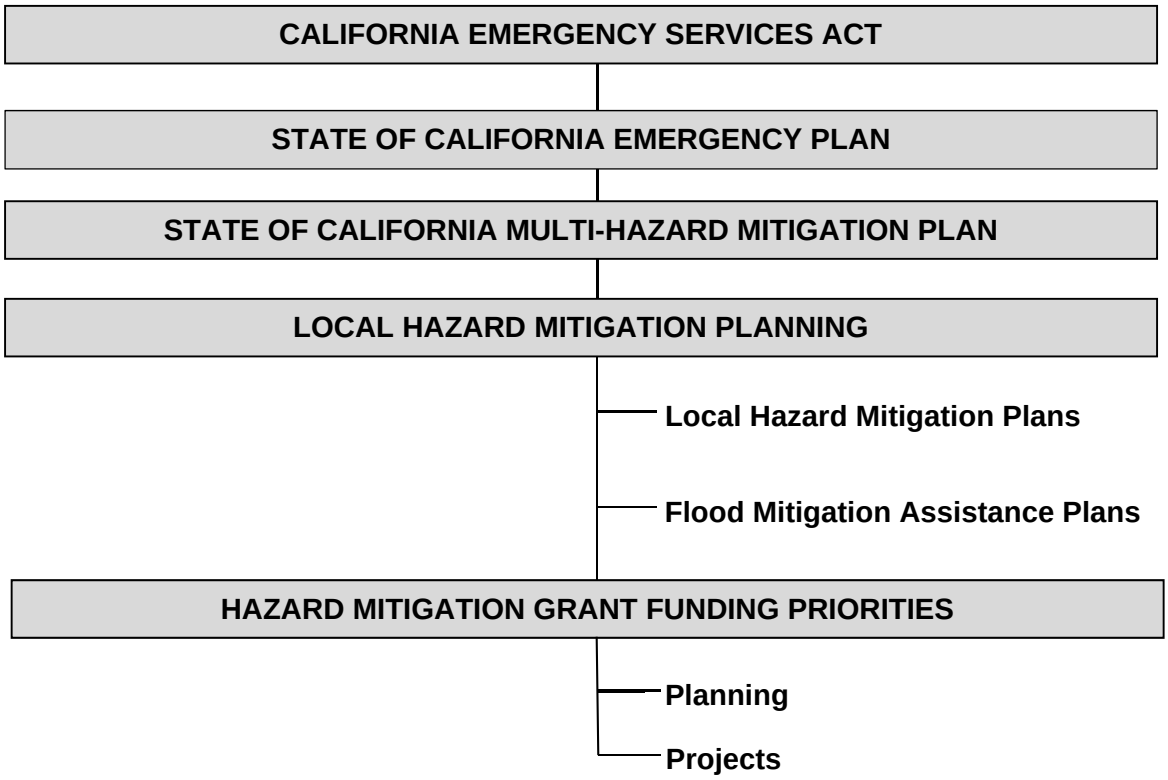
As pointed out in other chapters, the SHMP plays a fundamental role in comprehensive, integrated emergency management in California. Among other things, it identifies and analyzes the consequences of the risks associated with human-caused and natural hazards, together with vulnerabilities of people and property associated with such risks and mitigation programs devised to lessen their impact. Timely and effective hazard mitigation has multiple benefits, including the following:

- Minimizes deaths, injuries, and other negative disaster impacts on the public
- Reduces disaster losses to property, facilities, and infrastructure
- Minimizes negative impacts on the environment and economic condition of the state
- Lessens the work of emergency responders
- Assures greater continuity of government operations, including continued delivery of services
- Creates conditions by which recovery can happen more quickly and be less costly
- Heightens public confidence in the jurisdiction's governance

The 2010 SHMP identifies these benefits as an integral part of its various chapters, providing detailed evidence of the value of reducing specific hazards, risks, and vulnerabilities to achieve such benefits. Such

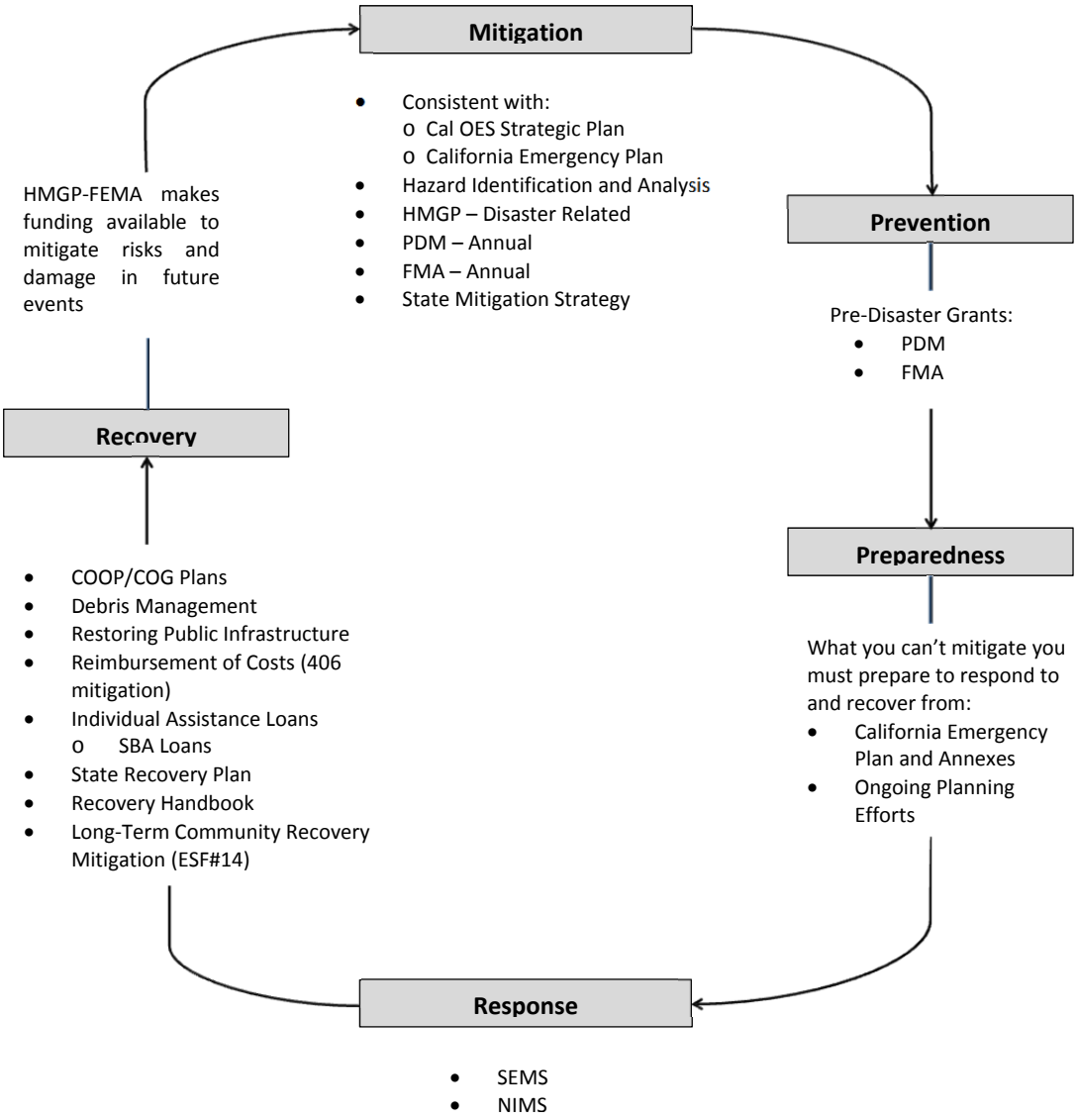
benefits are reflected in the SHMP goals in Chapter 2, strategies and actions in Chapter 3, risk assessment overview in Chapter 4, evaluation of primary and other hazards and their mitigation in Chapters 5 and 6, and the description of the California's comprehensive mitigation program management in Chapter 7.

**Annex Chart 2.A: Hierarchy of Hazard Mitigation Programs**




*Source: Cal OES*

**Annex Chart 2.B: Emergency Management Cycle after DMA 2000**




*Source: Cal OES*

## 2.9. STATE AGENCY RESPONSIBILITIES

The preceding laws are administered by more than 40 state agencies, departments, and divisions responsible for their implementation, many of which have been active in the State Hazard Mitigation Team (SHMT). Many of these agencies have key responsibilities for emergency management and hazard mitigation activities assigned by statute. Annex Table 2.B provides a list of state agencies involved in various disaster mitigation functions.

**Annex Table 2.C: State Agency Emergency Management and Mitigation Responsibilities**

| Agency | Emergency Management and Mitigation Role |
|---|---|
| **Business, Transportation and Housing Agency** | |
| California Highway Patrol | Protects state employees and property; supports evacuations and public safety in emergencies |
| Department of Housing & Community | |
| Development | Expands and preserves safe and affordable housing options; enforces seismic codes and standards for mobile homes/manufactured homes and special housing programs for vulnerable populations |
| Department of Transportation | Assures safety standards of California highway infrastructure; implements seismic strengthening of highway bridges and overpasses |
| **California Earthquake Authority** | Provides residential earthquake insurance; conducts mitigation pilot projects |
| **California Environmental Protection Agency** | |
| Air Resources Board | Regulates toxic air contaminants; oversees Climate Action Team; manages programs which reduce air pollution |
| Department of Pesticide Regulation | Regulates sale and use of pesticides; develops pest management systems |
| Department of Toxic Substances Control | Regulates transport, treatment, storage, and disposal of hazardous waste; monitors and cleans up waste sites |
| Integrated Waste Management Board | Manages generated waste; promotes reduction of waste; implements Disaster Debris Management Plan |
| Office of Environmental Health Hazard | |
| Assessment | Assesses exposure and risks to public health from toxic substances; supports green chemistry |
| State Water Resources Control Board | Administers National Pollutant Discharge Elimination System (NPDES) program and cleanup of underground storage tanks |
| **California Health & Human Services Agency** | |
| Department of Public Health | Monitors West Nile Virus, prepares for pandemic flu and bioterrorism incidents; monitors drinking water quality |
| Office of Statewide Health Planning and Development | Regulates the safety of acute care hospital design, construction and retrofits |
| California Public Utilities Commission | Participates in Energy Action Plan, reducing greenhouse gas emissions and encourages solar energy infrastructure in existing homes and businesses |
| California State Archives | Preserves historic records of state government |
| California State Military Reserve | Responds to natural and man-made threats to California |
| California State University (CSU) system | Regulates the safety of CSU campus facility design, construction and retrofits |
| California Volunteers | Coordinates volunteer activities through coordination with volunteer organizations, citizen corps programs, national service programs and |

| Agency | Emergency Management and Mitigation Role |
|---|---|
| | other non-governmental organizations |
| Department of Corrections and Rehabilitation | Provides labor for vegetation management and wildland firefighting |
| Department of Education | Identifies nonstructural earthquake hazards in public schools, assists with California Schools Integrated Pest Management Program; oversees school preparedness programs |
| Department of Food and Agriculture | Food safety oversight and inspection; responds to invasive animal and plant disease; oversees integrated pest control |
| Department of Insurance | Enforces compliance with residential earthquake insurance policy |
| Department of Social Services (Disaster Services Bureau) | Provide coordination, collaboration, and resource identification for mass care and shelter, to support the State of California's capabilities to minimize the humanitarian impact of disasters and other emergencies through all four phases of emergency management |
| Office of Historic Preservation | Oversees seismic upgrading issues in historical buildings |
| **Office of the Governor – State of California** | |
| California Governor's Office of Emergency Services (Cal OES) | Protects the public and the state from natural and man-made disasters through comprehensive emergency management programs; provides mitigation planning and technical assistance; administers hazard mitigation grant programs; gathers and disseminates information critical to protection of the state; oversees Critical Infrastructure Protection Plan |
| Governor's Office of Planning and Research (OPR) | OPR serves as staff for long-range planning and research, and constitutes the comprehensive state planning agency. It issues guidelines and advice for regarding city and county general plans, including safety elements, serves as the State Clearinghouse under the California Environmental Quality Act, and provides technical advice related to land use and environmental issues. |
| **Resources Agency** | |
| CAL FIRE | |
| (Department of Forestry and Fire | |
| Protection) | Protects and manages forest and vegetation resources, protects people and property from fires, responds to emergencies; develops fire hazard maps; develops fire safe standards; monitors forest pest infestations; conducts public education programs |
| Office of State Fire Marshal | Protects life and property from fires through education, enforcement and fire prevention engineering |
| California Coastal Commission | Administers California Coastal Act, manages |

| Agency | Emergency Management and Mitigation Role |
|---|---|
| | conservation and development of coastal resources |
| California Conservation Corps | Provides critical front-line and logistical support for natural and man-made hazards; assists with pre and post-disaster mitigation |
| California Energy Commission | Statewide energy policy and planning; implements Energy Emergency Response Plan and supports Green Building Initiatives |
| California State Lands Commission | Manages and protects important natural and cultural resources on public lands within state |
| Marine Invasive Species Program | Manages and protects important natural and cultural resources on public lands within the state |
| Oil Spill Prevention Program | Responsible for the prevention of oil spills at marine terminals; prevents or minimizes the introduction of NIS from commercial vessels |
| Delta Protection Commission | Implements the Land Use and Resource Management Plan for the Delta |
| Department of Boating and Waterways | Controls invasive species in Sacramento-San Joaquin Delta |
| Department of Conservation | Disseminates seismological and geological information regarding earthquakes, landslides and other geological hazards |
| California Geological Survey | Provides expert technical services and advice on seismic, volcanic, and tsunami hazards and earthquake engineering |
| Department of Fish and Wildlife | Maintains native fish, wildlife, plant species and natural communities for their ecological value; monitors invasive species and implements the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) |
| Office of Spill Prevention and Response | Spill prevention and response responsibilities |
| Department of Parks and Recreation | Has property jurisdiction for approximately 1.5 million acres, including over 300 miles of ocean coastline. Serves approximately 80 million or more visitors to state park facilities each year. Mission is to protect natural/cultural resources and the state's biodiversity and provide quality recreational experiences |
| Department of Water Resources | Provides dam safety and flood control services, water quality monitoring; monitors drought conditions; administers CALFED program; participates in Delta levee risk reduction; operates and maintains the State Water Project; administers the drought water bank |
| **State & Consumer Services Agency** | |
| California Building Standards Commission | Reviews, approves, and publishes building codes for new construction and alterations (including retrofits) proposed by state agencies |
| California Seismic Safety Commission | Provides decision-makers and the general public with cost-effective recommendations that reduce earthquake losses and expedite recovery |

| Agency | Emergency Management and Mitigation Role |
|---|---|
| Department of General Services | Manages state-owned or state-leased properties statewide |
| Division of the State Architect | Regulates the safety of design, construction, and retrofits for state-owned facilities, K-12 public schools, and essential services facilities |
| Office of Public School Construction | Adopts sound repair standards for state's public schools |
| Department of Technology Services | Recovers critical computer applications in event of disaster |
| The Reclamation Board | Designates floodways in Central Valley |
| University of California (UC) | Regulates the safety of UC campus facility design, construction, and retrofits |

A detailed chart showing state agency contact information, general functions, mitigation responsibilities, and corresponding enabling legislation, is provided in Appendix U.

## 2.10. STATE EMERGENCY MANAGEMENT AND MITIGATION LAWS

During the course of California's history as a state, the California legislature has adopted dozens of laws dealing with emergency management and hazard mitigation. The following is a representative list of such laws:

1. Air Pollution, Health and Safety Code Section 42320
2. Air Toxics Hot Spots, Health and Safety Code Section 44300
3. Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code Section 2621
4. California Building Code, CCR, Title 24
5. California Disaster Assistance Act, Government Code Section 8680
6. California Environmental Quality Act (CEQA), Public Resources Code Section 21000
7. California Fire Code, CCR, Title 24, Part 9
8. Dam Safety Act, Water Code Sections 6000-6501
9. Disaster Project Law, Health and Safety Code Section 34000
10. Disaster Recovery Reconstruction Act, Government Code Section 8877.1
11. Earthquake Hazards Reduction Act, Government Code Section 8871
12. Earthquake Fault Zoning Mapping Act, Public Resource Code Section 2621
13. Economic Disaster Act, Government Code Section 8695
14. Employees Safety Act, Labor Code Section 2801
15. Emergency Response Team for State Operations, Government Code Section 8549.10
16. Emergency Services Act, Government Code Section 8550
17. Essential Services Buildings Seismic Safety Act, Health and Safety Code Section 16000
18. Field Act for K-12 public school design and construction safety, Education Code Section 17280, Section 81130, Section 17365
19. FIRESCOPE Act, Health and Safety Section 13070
20. Flood Control Law, Water Code Section 8000
21. Flood Control Law of 1946, Water Code Section 12800
22. Flood Plain Management, Water Code Section 8400
23. Hazardous Substances Highway Spill Containment and Abatement Act, Vehicle Code Section 2450
24. Hazardous Materials Release Response Plans and Inventory, Health and Safety Code Section 25500
25. Alfred E. Alquist Hospital Facilities Seismic Safety Act, Health and Safety Code Section 129675
26. Integrated Waste Management Act, Resources Code Section 40050
27. Katz Act, Education Code Sections 35295-35297
28. (Requires schools to plan for earthquakes and other emergencies)

29. Natural Hazards Disclosure Act, Civil Code Section 1102
30. Oil Refinery and Chemical Plant Safety Preparedness Act, Government Code Section 51020
31. Oil Spill Prevention and Response Act, Government Code Section 8674.1
32. Planning and Zoning Law, Government Code Section 65000
33. Radiation Protection Act, Health and Safety Code Section 114650
34. Riley Act, Health and Safety Code Section 19100
35. Sabotage Prevention Act, Military and Veterans Code Section 1630
36. Seismic Hazards Mapping Act, Public Resources Code Section 2690
37. Alfred E. Alquist Seismic Safety Commission Act, Government Code Section 8870
38. Subdivision Map Act, Government Code Section 66410
39. Water Shortage Emergency Act, Water Code Section 350

For a more complete list and detailed descriptions of the content of such laws by hazard type, see Appendix T through Appendix W.

## 2.11. LOCAL EMERGENCY MANAGEMENT RESPONSIBILITIES

Cities and counties typically adopt ordinances establishing their local emergency organization, authorizing establishment of a local disaster council and adoption of an emergency plan, designating responsibilities for emergency management operations, and specifying officials authorized to declare a local emergency.
Most local jurisdictions have adopted the master mutual aid agreement to share critical skilled personnel and equipment and have conducted training for emergency response and taken advantage of training made available by a wide variety of agencies. During an immediate threat or in actual disaster conditions, local authorities immediately put emergency response plans into operation and take actions required to cope with disaster situations. As conditions require, all immediately available local, state, and federal resources are committed to protect lives, property, and the environment.

Traditionally, special districts also play an important role in emergency preparedness and response. Special districts are active participants in the operational area that is a focal point for all local emergency management information and the provision of mutual aid.

## 2.12. LOCAL HAZARD MITIGATION RESPONSIBILITIES

Local hazard mitigation is implemented by cities, counties, and special districts in California under certain of the laws listed previously. Each agency is responsible for mitigating hazards within its jurisdiction, as well as assuring health and safety conditions related to development constructed by the private sector and local government.

### 2.12.1. BUILDING AND FIRE CODES

In California, state laws and state-mandated professional building and fire codes adopted under the state's various safety planning laws have helped to create a solid foundation for mitigating impacts of floods, fire, earthquakes, and other natural hazards in new development. Such safety planning laws and codes have created a supportive policy framework for passage of laws dealing with retrofitting of existing potentially hazardous structures. A well-recognized example of such retrofit programs is the City of Los Angeles unreinforced masonry (URM) seismic retrofit program underway since the 1980s. According to the City of Los Angeles, 9,211 of its URM buildings had been retrofitted or demolished by 2006 under this program (CSSC 2006-04). Additional information on local URM programs can be found in Section 5.2.4.1.

### 2.12.2. PLANNING AND ZONING

Beyond facility safety are the mitigation practices improving safety from natural hazards having to do with the location and form of new development. These include local development planning and development

oversight responsibilities delegated to cities and counties. Principal among these are compliance with the Planning and Zoning Law (Government Code Section 63200), Subdivision Map Act (Government Code Section 66410), and California Environmental Quality Act (CEQA), (Public Resources Code Section 21000).

The Planning and Zoning Law requires all cities and counties to adopt a comprehensive general plan including land use, circulation, housing, safety, open space, conservation, and noise elements. It also mandates consistency among all general plan elements as well as consistency between the general plan and implementation measures such as zoning and subdivision review.

## General Plan Safety Element

California is one of approximately 10 states mandating that natural hazards be addressed as a required element of the local general plan. The general plan safety element establishes policies and programs to protect the community from risks associated with earthquakes, floods, wildfire, and other natural and human-caused hazards.

According to the general plan safety element guidelines of the Governor's Office of Planning and Research:

> The aim of the safety element is to reduce the potential risk of death, injuries, property damage, and economic and social dislocation resulting from fires, floods, earthquakes, landslides, and other hazards. Other locally relevant safety issues, such as airport land use, emergency response, hazardous materials spills, and crime reduction, may also be included. Some local jurisdictions have even chosen to incorporate their hazardous waste management plans into their safety elements.
>
> The safety element overlaps topics also mandated in the land use, conservation, and open-space elements. When preparing a new general plan or undertaking a comprehensive revision of an existing general plan, OPR suggests addressing these common topics in a single place rather than scattering them among four separate elements. The key concern should be to integrate effectively these common issues into the decision-making process.
>
> The safety element must identify hazards and hazard abatement provisions to guide local decisions related to zoning, subdivisions, and entitlement permits. The element should contain general hazard and risk reduction strategies and policies supporting hazard mitigation measures. Policies should address the identification of hazards and emergency response, as well as mitigation through avoidance of hazards by new projects and reduction of risk in developed areas.

As a required element of the general plan, the safety element provides the foundational information and policy direction regarding hazards, vulnerability, and risk upon which proactive mitigation strategies and actions can be based over time. All other general plan elements must be consistent with the safety element, and vice versa. Likewise, all zoning, subdivisions, and capital improvements must be consistent with the safety element.

## Subdivision Review

The Subdivision Map Act is clear regarding the requirement for consistency of subdivisions with the general plan. No tentative subdivision map can be approved unless the city or county finds that the subdivision, including its design and improvements, is consistent with the general plan. This requirement for direct implementation of the general plan through the specific implementation tool of subdivision review appears to be unusual when comparing California planning laws to those of other states.

### Environmental Review

The California Environmental Quality Act (CEQA) is also an important California law reinforcing hazard mitigation as discussed below. CEQA requires an environmental review of any "discretionary" project such as a general plan amendment, zone change, specific plan, subdivision, or development plan review. If significant impacts are found, an environmental impact report (EIR) must be prepared.

## 2.12.3. SEISMIC ZONATION

Complementing these laws are seismic zonation requirements of the Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code Section 2621), which prohibits buildings designed for continuing human occupancy from being constructed across an active fault, and Seismic Hazards Mapping Act (Public Resources Code Section 2690), which directs the California Geological Survey to provide maps showing areas susceptible to ground shaking, landslides, or liquefaction. Local governments must take such maps into account in their planning and development review.

## 2.12.4. STATE RESPONSIBILITY AREAS

Under the California Fire Plan, areas designated by CAL FIRE as State Responsibility Areas (SRAs), local governments must consult with the California Department of Forestry and Fire Protection on development review to assure safe development conditions.

## 2.12.5. HAZARD MITIGATION THROUGH LOCAL LAND USE PLANNING

To maximize the value of effective pre-disaster mitigation, many jurisdictions have written hazard mitigation provisions into local zoning, development subdivision, and environmental review ordinances and codes for reference in routine project review. Such ordinances are designed to address hazards identified in federal and state hazards mapping, such as Flood Insurance rate Maps (FIRM) for 100-year floodplains, as well as any identified in the general plan or a Local Hazard Mitigation Plan prepared by the locality under the Disaster Mitigation Act of 2000.

Ordinance language provides direction for further investigation where scientific evidence regarding hazard presence, return periods, or potential magnitude of impact is not clear. Such ordinances also identify standard hazard mitigation measures that can be attached to the project or subdivision as conditions to be met prior to subsequent stages of development.

Examples of commonly applied zoning and subdivision regulatory approaches to new developments in naturally hazardous areas include:

- Transfer of allowable density or intensity from hazardous parts of a site to safer areas during development plan review
- Restriction of allowable residential densities, thereby reducing the potential number of structures at risk
- Enforcement of suitable building setbacks from flood, landslide, and fault zones
- Adoption of slope-density formulas to limit the number of dwellings on hillsides
- Modification of proposed parcel boundaries and street locations to avoid hazardous areas
- Requirement of multiple ingress and egress points for emergency access and evacuation
- Provision of adequate street widths for two-directional movement in an emergency
- Assurance of sufficient water storage and pressure for adequate fire flows

Also commonly in use is an array of complementary techniques for avoiding private property development in hazard-prone areas. Examples include:

- Application of agricultural and conservation easements by private land trusts
- Establishment of open space easements or donation of property for tax relief purposes
- Acquisition of land or development rights using developer fees or public park bonds
- Limitations on infrastructure provision and extensions

Together, these regulations and practices represent a powerful combination of tools to strengthen natural hazard mitigation in the course of day-to-day development planning review.

Among these land use processes are three critical points at which communities make important risk reduction decisions related to new development in hazard-prone areas: 1) mandatory environmental review under CEQA, 2) general plan and zoning decisions, and 3) subdivision map approvals. Environmental review, general plan, zoning, and subdivision decisions all have far-reaching consequences in areas where natural hazards can create the potential for damage to development. If flooding, geological, and other hazards are not sufficiently recognized at these key decision points, a "multiplier" effect can be created in which the existing hazards are distributed among many new land parcels authorized under the decision. Environmental review provides an opportunity to identify and evaluate risk-reducing natural hazard mitigation measures as a prelude to the land use planning process. For more information, see Annex 1.

## 2.13. RELATIONSHIPS OF LOCAL PLANNING PROCESSES TO LHMPS

An important interest of FEMA in promoting compliance with the LHMP process as part of planning for hazard mitigation grants of various kinds is creation of an interface of mitigation planning with comprehensive planning (i.e., the local general plans, regional blueprint plans, and regional transportation plans).

Within this regional and local planning framework, key considerations identified by FEMA in evaluating mitigation planning strategies include considerations such as:

- Compatibility with community goals
- Legal authority
- Ability to implement and enforce mitigation actions
- Technical feasibility
- Financial capability
- Cost/benefit ratio of a proposed solution
- Priority level of the proposal project among the hazards addressed
- Completeness of the solution

Some benefits of integrating mitigation planning with comprehensive planning include reduction of vulnerability to disasters, stimulation of pre- and post-disaster decision-making, formation of partnerships between planners and emergency managers, expansion of external funding opportunities, and facilitation of the post-disaster return of the community to normalcy, as well as resolution of locally sensitive issues with community-based rather than externally-based solutions.

A recent California legislative action reinforcing these principles is Assembly Bill 2140, signed into law by the Governor in October 2006. This bill provides the following incentives for LHMP preparation: 1) authorizes cities and counties to adopt Local Hazard Mitigation Plans prepared under the terms of DMA 2000 as part of mandated general plan safety elements; 2) requires Cal OES to give preference for grant fund assistance in developing and adopting such a plan to local jurisdictions that have not adopted an LHMP; and, most importantly, 3) authorizes the legislature to provide to such cities or counties a state share of local costs exceeding 75 percent of total state-eligible post-disaster costs under the California Disaster Assistance Act. For information regarding the detailed provisions of AB 2140, see Appendix C.

## 2.14. UTILITIES

The California Utilities Emergency Association (CUEA) cooperates with Cal OES to coordinate public and private utility emergency-related issues in California. Largely supported by memberships from public and private utilities with jurisdiction or service territory in California, the CUEA operates and manages the Utilities Branch at Cal OES. Utilities membership in the CUEA includes gas, electric, telecommunications (including wireless), water, wastewater, and petroleum pipeline industries. During emergencies, the Utilities Operations Center (UOC) is activated to enhance the utilities' capability to respond to and recover from emergencies by providing a structure for cooperation and communication among utilities and government agencies.

Beyond involvement in emergency management, private utilities are continuously involved in ongoing investments increasing service capacities and replacing obsolete equipment and facilities. Many of these investments represent incremental improvements in the resilience against natural and human-caused hazards within their plants and facilities.

Additional discussion on private utility mitigation investment in hazard mitigation is provided within Annex 3.

## 2.15. BUSINESS, INDUSTRY AND COMMUNITY-BASED ORGANIZATIONS

Many business and industry organizations are recognizing that preparedness and mitigation can make a difference between a company surviving a disaster or going out of business. Risk managers and chief executive officers assess threats posed by disasters and, where risks are high, implement mitigation and preparedness measures. Employee injury and illness prevention programs and business resumption plans are helping to influence many businesses to develop or expand their emergency plans and move forward on hazard mitigation investments.

The American Red Cross (ARC) provides disaster relief to individuals and families and emergency mass care in coordination with government and private agencies. It receives its authority from a congressional charter that cannot be changed by state or local emergency plans and procedures. In providing their services, the ARC will not duplicate the programs of other public or private welfare agencies, nor will it assume financial responsibility for their actions.

Community-based volunteer agencies represent the most extensive source of response resources in an emergency. A multitude of volunteer organizations are able to provide caring and knowledgeable assistance in support of emergency response and recovery operations. Government recognizes the value and importance of community-based organizations which perform services and have resources that can augment the ARC and other traditional response and relief agencies.
Recognizing the critical need for coordination with the private sector, Governor Schwarzenegger signed Senate Bill (SB) 546 in September 2005 to help expand public/private partnerships and allow greater participation by the private sector in governmental emergency management efforts. SB 546 authorized OES (now Cal OES) to support partnership activities funded by the private sector.

California also has an extensive system of Fire Safe Councils, which are 501(c)3 nonprofit organizations involving thousands of citizens as well as over 50 corporate partners. Activities include community outreach and education, hazardous fuel assessment, community wildfire protection planning, and community chipping projects. Everyone is a volunteer. The California Volunteers connects volunteers with hundreds of community-based organizations. Following a disaster, volunteer agencies continue to provide services for their constituents as well as for the governmental agencies that might have need of their unique services.

Many of these organizations have already been identified through statewide information and referral networks and are trained in SEMS to maximize their efficiency and ability to become better integrated into

response and relief efforts. Many groups providing voluntary disaster services can be contacted through the National Voluntary Organizations Active in Disasters (VOAD).

# ANNEX 3 - LIFELINES INFRASTRUCTURE AND HAZARD MITIGATION PLANNING

ANNEX CONTENT

**3.1 Introduction**
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- 3.1.2 Cascading Lifeline Failures

**3.2 Lifeline Failure Case Examples**
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- 3.2.2 La Conchita Landslide – Impact on Transportation
- 3.2.3 Naples, Italy, Garbage Strike and San Francisco Combined Sewer Overflow
- 3.2.4 Chile Earthquake – Impact on Power, Water, Communication and Transportation
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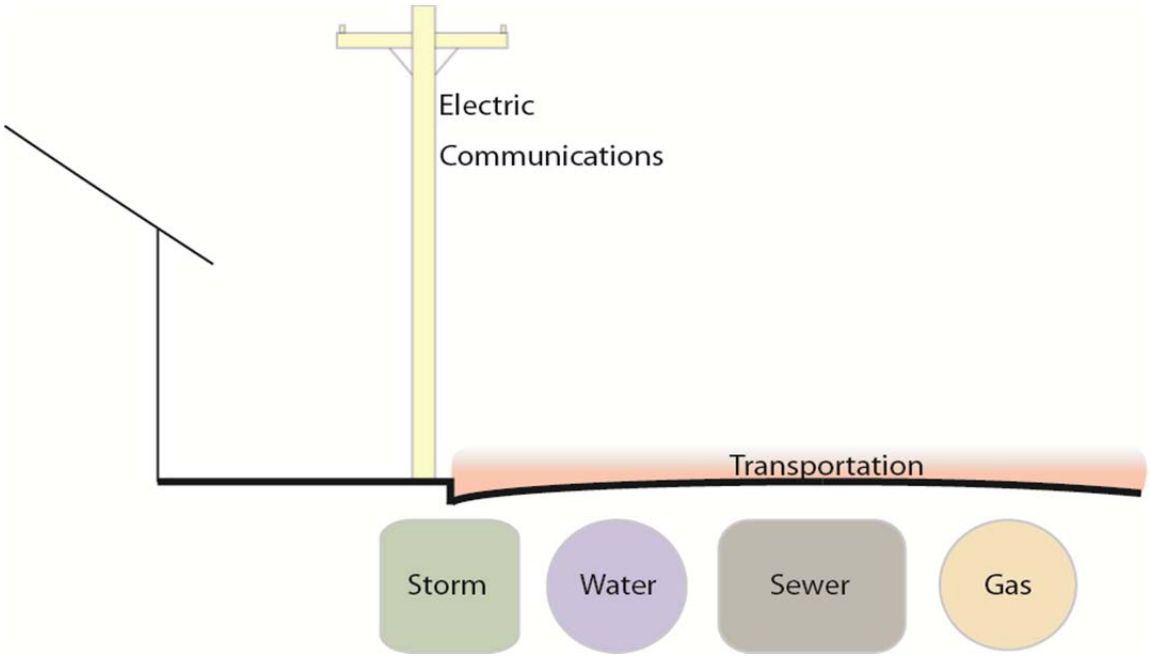
## 3.1. INTRODUCTION

A functioning society requires basic essentials (such as water, electricity, etc.) that are delivered through linear facilities often referred to as lifeline infrastructure. California has vast networks of vital lifeline infrastructure upon which normal daily human activities depend.

A lifeline is defined here as any spatially continuous engineered system that delivers essential services. The main categories of lifeline infrastructure systems can include transportation, communication, power, gas, water, and wastewater (see Annex Diagram 3.A below). Other separately situated services and facilities interact with lifelines; these include, for example, emergency responders (e.g., police, fire, ambulance), distribution services (e.g., food), collection services (e.g., solid waste), and emergency operations centers used to support disaster response.

These systems are often interdependent so that a service interruption in one may lead to failure of another. They are also interdependent with service sites and facilities such as city halls, schools, hospitals, and parks. While separate service sites are critically important, this discussion will focus on lifeline systems and the special considerations they require due to their system structure.

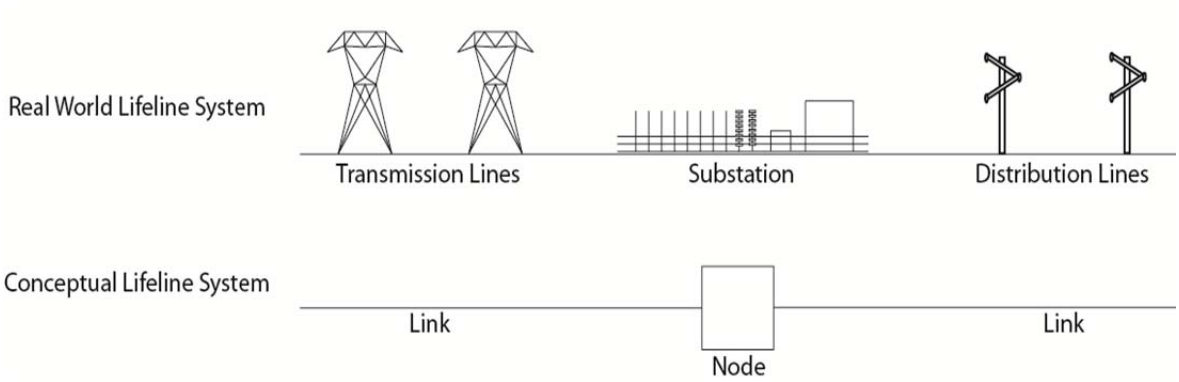
**Annex Diagram 3.A: Services Sometimes Included as Lifelines**




Lifeline systems are generally composed of links, such as pipelines, canals, roadways, and power lines, and nodes, such as pump stations, interchanges, switching hubs, and bridges (see Annex Diagram 3.B).

Lifeline systems provide the necessary services and resources for the day-to-day functioning of government, businesses, and society as a whole. Society relies heavily on lifelines without giving much consideration to their reliability until a disaster curtails or interrupts services. The failure of these systems can have a catastrophic impact on communities or regions. Lifeline failure can come about due to obvious system weaknesses, such as bridge failure due to poor design, as well as through interconnected or cascading failures for which the causes may not be obvious.

**Annex Diagram 3.B: Lifelines as Links and Nodes**

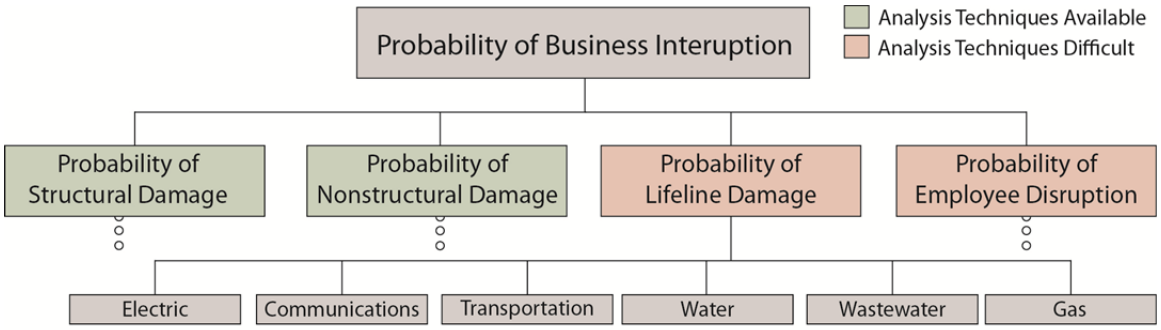



Hazard mitigation historically has focused on system components and facilities (i.e., lifeline nodes). However, lifelines are systems that require consideration of unique mitigation challenges. A single failed component may have a direct impact in the immediate vicinity and also in areas unaffected by the hazard that caused the failure. For example a bridge collapse due to a flood may cause traffic congestion not only in the immediate area but also in parts of the region unaffected by the flood. Lifelines must be seen as

systems where the failure of a single component affects the whole system, and lifeline mitigation must be measured by system performance. The goal is to minimize service interruption and ensure continuity or quick return of lifeline services to keep society functioning.

An agency's overall hazard risk is a combination of structural and nonstructural facility risk as well as the probability of damage to lifelines and the probability of disruption of the agency's personnel (see Annex Diagram 3.L). Many institutions have assessed their facility (or node) risks, but are unaware and unprepared for lifeline risk.

**Annex Diagram 3.C: Breakdown of Hazard Risks that Affect Organizations.**



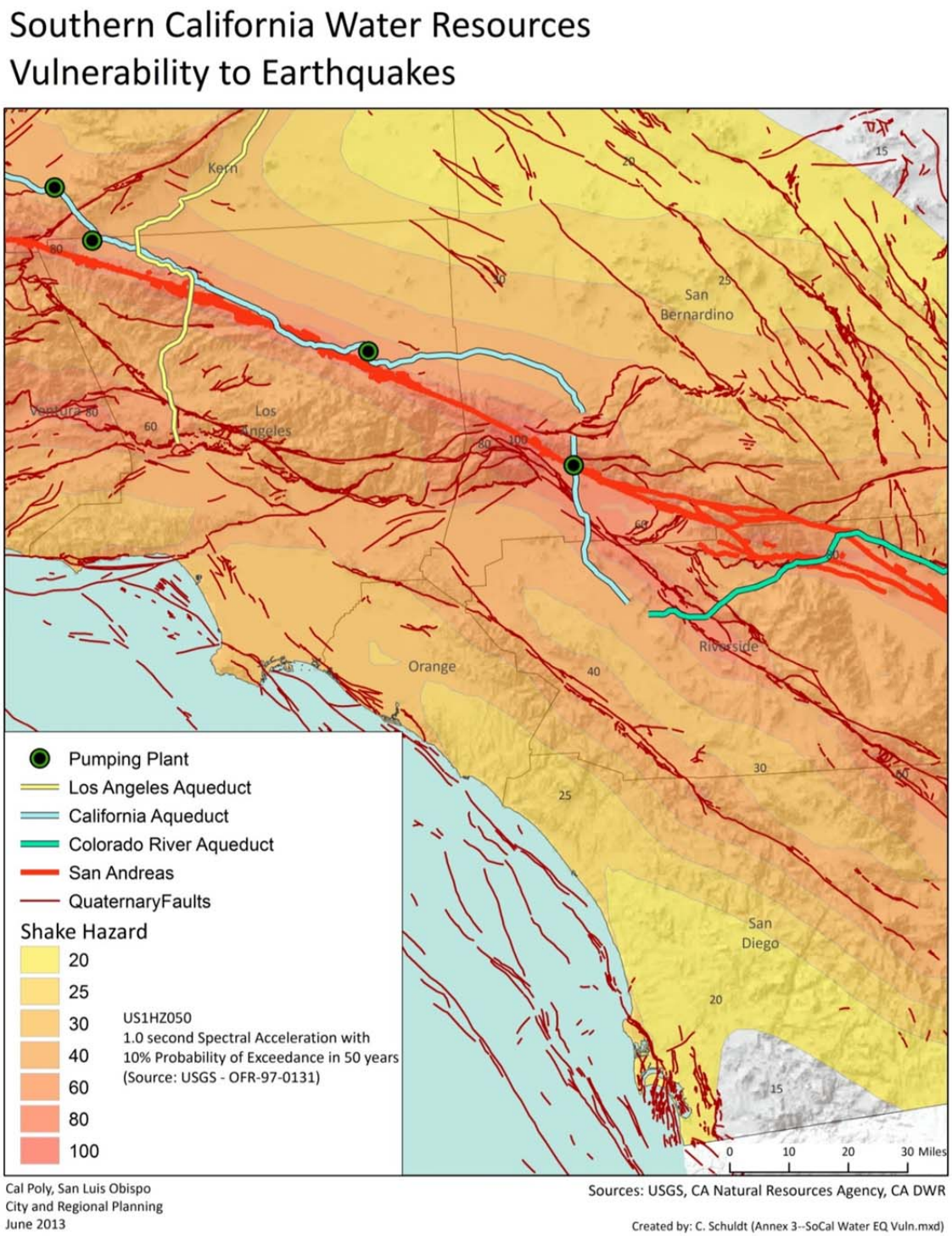

## 3.1.1. HAZARD MITIGATION AND CALIFORNIA LIFELINE SYSTEMS

In California, lifeline systems come into direct contact with multiple hazards. Lifeline systems cross faults, floodplains, and high fire hazard severity zones. In Southern California alone, for example, water aqueducts and canals cross the San Andreas Fault 32 times (EERI, 2011). Annex Map 3.A, Southern California Water Vulnerability, shows multiple crossings of the San Andreas Fault by the State Water Project (SWP), Los Angeles Aqueduct, and Colorado River Aqueduct, as well as location of a pumping plant on that fault.

This vulnerability only considers one fault and one type of lifeline system. When all faults and all hazards are considered the full extent of lifeline vulnerability is clear. When lifeline locations are overlaid on hazard zones, the potential for failure is evident. In contrast with hazard impacts on separately sited facilities like schools or fire stations, however, the potential for failure on a particular lifeline can affect service delivery of that system well beyond a failed bridge or other component in question. Individuals relying on lifeline systems can lose service even hundreds of miles from the point of failure.

In California it is common to find corridors that contain multiple lifeline systems. Topography is partially responsible, with mountains often forcing the routing of lifelines through narrow passes and corridors. In other cases development has constrained the rights-of-way potentially available for lifelines, thereby causing multiple lifelines to be located along the same path.

**Annex Map 3.A: Southern California Water Resources Vulnerability to Earthquakes**




## 3.1.2. CASCADING LIFELINE FAILURES

Lifeline infrastructure maps in Chapter 5 and Chapter 6 separately suggest some common corridors along which many lifelines are routed. Common routing can be either beneficial or hazardous depending upon the level of hazard mitigation. If multiple lifelines are placed together to avoid a hazardous area, they may

all benefit from appropriate mitigation measures. If lifelines are placed together through a hazardous area without appropriate mitigation, however, in many cases the failure of one lifeline can influence or precipitate failure of another. Damaged gas, water, wastewater, and electrical lines can become a secondary hazard resulting in damage to other lifelines. (For more information on related facilities see Section 5.2.4.2, Map 5.N – California Aqueducts, Canals and Hydrologic Regions, and also Map 5.P – Transportation Infrastructure; Section 6.4.5, Map. 6.K – California's Electric Transmission Grid; and Section 6.6.6, Map 6.T – California's Natural Gas Pipelines.)

Similarly, restoration of each lifeline following a disaster is largely interdependent with restoration of all other lifeline services. Communication systems and transportation networks are needed by repair crews to restore services. Those same lifelines often require electricity or other lifelines to operate.

## 3.2. LIFELINE FAILURE CASE EXAMPLES

The best way to describe typical lifeline failures is to explore brief case examples of lifelines disruption, highlighting the principles illustrated. Drawn from actual experiences, such examples highlight the important role of redundancy in the design of lifeline systems.

The discussion below describes case examples summarizes the concepts behind systems failure, and presents methods for improving the resilience of lifelines.

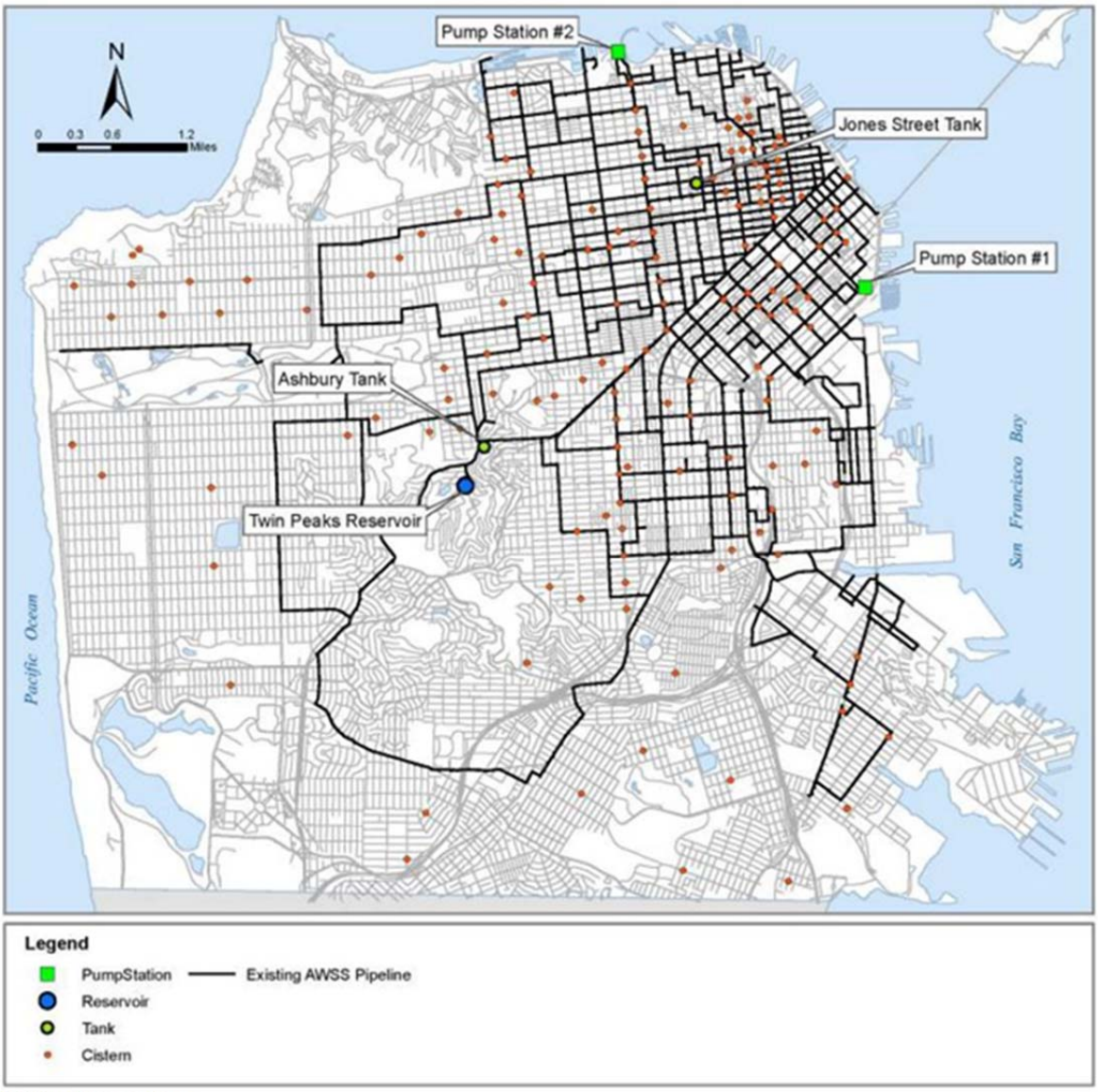
### 3.2.1. LOMA PRIETA EARTHQUAKE - IMPACT ON WATER AND TRANSPORTATION

The 1989 magnitude 6.9 Loma Prieta Earthquake was a large event, but the epicenter was located far enough away from the San Francisco Bay Area that the earthquake caused substantially less damage than if it were a direct hit. Nonetheless there were a number of failures from this event that warrant careful attention.

In the Loma Prieta Earthquake, ground shaking and liquefaction in the Marina District of San Francisco caused widespread damage to soft-story wood-frame residential structures. Soft-story structures are those with two or more stories built over a "soft" or "weak" story that typically consists of commercial space or parking. Gas mains into these structures ruptured, which sparked a fire that quickly spread. Fire crews arrived on the scene only to find that the water suppression system had failed and no water pressure was available to put out fires. The City and County of San Francisco has a 135-mile "seismically resistant" auxiliary water suppression system (AWSS) consisting of distributed large cisterns to provide scattered water sources across the city without relying on long stretches of pipeline (see Annex Map 3.B below). A 12-inch main of the AWSS failed and six fire hydrants were damaged by soil deformations in the area south of Market Street. It is estimated that this drained the 750,000-gallon Jones Street tank near the Marina District in about 20 minutes (Schiff, 1990). Air entered the nearest pumping station, further preventing water from reaching the fire.

Two fortunate events limited the potential damage due to fire: 1) calm winds, and 2) availability of the (soon to be decommissioned) fire boats. The San Francisco Fire Department was in the process of selling off the fire boats when the earthquake occurred, because there was full reliance on the "seismically resistant" water distribution system. The redundancy of the fire boats provided the independent backup system needed to suppress the fires.

**Annex Map 3.B: Auxiliary Water Suppression System in San Francisco**




Existing AWSS System

*Source: City and County of San Francisco, 2010*

The transportation systems in the greater Bay Area sustained over $1 billion in damage due to the earthquake. The most prominent failures were the collapse of the Bay Bridge deck and the collapse of the Cypress Viaduct freeway structure in Oakland. The Bay Bridge was closed for a full month, while the Cypress Viaduct was never rebuilt to its original form (Schiff, 1990). Before the earthquake, the heavily trafficked Bay Bridge corridor carried 240,000 vehicles and nearly 400,000 people across the bay on a daily basis (Deakin, 1991).

To offset the loss of this corridor, alternative corridors and alternative means of transportation provided the redundancy needed to maintain some functionality. A new ferry service transported 400 to 500 passengers a day. Bay Area Rapid Transit (BART) increased its ridership from 218,000 daily passengers to 357,000, a 64 percent increase (Schiff, 1990). Alternative bridges across the bay experienced traffic increases. The Golden Gate Bridge had the busiest day in its history 10 days after the earthquake.

*Principles Identified:*

- In both the emergency water system and the transportation system, the importance of redundancy is clearly demonstrated. To ensure lifeline redundancy the backup system should be independent and either not be subjected to or be resistant to the same disaster loading conditions.

### 3.2.2. LA CONCHITA LANDSLIDE – IMPACT ON TRANSPORTATION

During the wet winter of 2005 a landslide/debris flow occurred along the Central California coast at La Conchita, west of Ventura (Jibson, 2005). This landslide, in an area that is known for previous slides, resulted in a tragedy of life loss for 10 people living below the slope.

The landslide was accompanied by an associated mudflow that blocked Highway 101 and the Union Pacific rail line in a mountainous coastal area where there are no easy alternate transportation routes. The corridor was closed for five days. The alternate driving route from Santa Barbara to Ventura, nominally 35 miles on Highway 101, required a circuitous trip of 200 miles. The alternate rail line also required a substantial detour through the Central Valley. A ferry option was available, but at a cost of $35 one way (Pool, 2005). No substantial fix was put in place and the occurrence of future similar failures is just a matter of time and rainfall intensity.

*Principles Identified:*

- Some transportation corridors do not have simple alternate routes, particularly when dealing with difficult topography.
- The cost of armoring certain lifelines against closure should be weighed against the repeat costs of closure. If possible, **cost benefit analysis** of mitigation decisions should include not only life and property loss, but also lifeline repairs or lifeline outage consequences.

### 3.2.3. NAPLES, ITALY, GARBAGE STRIKE AND SAN FRANCISCO COMBINED SEWER OVERFLOW

These two case examples highlight reliance on lifeline systems that are often taken for granted. Rather than representing acute disasters, the examples demonstrate how substantial disruption may occur over extended periods.

In 2008 garbage pickup services in Naples, Italy, were suspended due to a labor strike and landfills that had reached capacity. While waste disposal is not often thought of as a lifeline, it also functions as a spatially distributed engineered system using city streets, and when this system is not functioning properly there can be a disruption of society. Waste disposal requires nodes (landfills) for long-term storage of the waste and recycle sites for material salvage and conversion, together with a distributed system of trucks and streets along which they can travel. For about seven months in Naples, the streets were full of accumulated garbage, which became a public health and sanitation issue, and day-to-day society functions were disrupted. At the peak of the strike there were over 200,000 tons of garbage in the streets (Economist, 2008), dampening the city's tourism, Naples' largest economic sector. Many businesses received half their normal business during this period and subsequently experienced a lag in return to business as usual.

Waste lifelines may also include combined storm/sewer systems that have the traditional link and node configuration. During intense rainfall these systems can overflow resulting in raw sewage being released into rivers, lakes, and the sea, as well as backing up and threatening municipal drinking water. The City and County of San Francisco's combined storm/sewer system can overflow at 39 separate locations when rainfall intensity exceeds 0.05 centimeters per hour, and has on average 80 overflows in a typical rainfall year (Hoffman and Meighan, 1984). The effects depend on the concentration of pollutants, the constituents in the pollutants, and the locations where the overflow is released.

*Principles Identified:*

- Sewer and storm water systems, along with household and solid waste systems, are essential for societal function and require lifelines consideration because of their spatially distributed nature.
- Combined storm/sewer systems can result in small but chronic failures that affect the health of the environment and citizens.
- Following many disasters (e.g., earthquake, tsunami, etc.) debris can block access to critical assets or prevent access for crews attempting to restore other lifelines (Yesler, 2011). Making access routes for emergency response the top priority, identifying corridors needed to restore essential services, and ranking other routes according to the need and timeliness for clearing debris will aid in more rapid recovery and rehabilitation.

### 3.2.4. CHILE EARTHQUAKE – IMPACT ON POWER, WATER, COMMUNICATION, AND TRANSPORTATION

The 2010 magnitude 8.8 Maule Earthquake affected a vast region of Central Chile (EERI, 2010a). Although the epicenter was 210 miles away from Santiago, the ground shaking had a large impact on the city. The electric grid went down throughout most of Central Chile including metropolitan Santiago, a region of 6.1 million people. The loss of power precipitated the loss of communication in the form of radio, television, telephone, cell phone, internet, and others. The loss of power halted Santiago's water distribution system which relies on electric pumps. This lack of services presented an inconvenience to some, a risk to other, more vulnerable populations, and a hindrance to disaster recovery, particularly because Santiago is the seat of power for the country. The interconnectedness of the power, communication, and water systems is an obvious concept but difficult to untangle for ensuring resiliency.

**Displacement and Closure of Highway Overpass Following Chile Earthquake**

*Source: EERI, 2010b*

Closer to the epicenter was the city of Concepcion, population 900,000. Here not only was power, water, and communication out, but all transportation access to the city was severed. The city was isolated and had no means of communicating with the rest of the country or receiving word that help was on the way. The lack of information compounded the lack of essential services and resulted in a break in the social

fabric of that community (American Red Cross, 2011). Once communication was restored, the civil unease dissipated and recovery and reconstruction began.

The main highway that runs north-south in Chile is Routa 5. Ground shaking and/or liquefaction resulted in damage to this transportation artery at multiple locations, slowing relief efforts, reconstruction, and regular commerce. The damage occurred generally due to two types of failures (GEER, 2010). The first was foundation soil failure at small water crossings. The major water crossings were engineered with well-designed bridges and abutments, but the lesser crossings were not addressed with the same engineering rigor and often failed, sometimes catastrophically, taking out large sections of the four lane highway. The second type of failure was small but ubiquitous deformations of the engineered abutments throughout the affected region. In this case a few centimeters of settlement of a bridge abutment in the approach to a bridge necessitated a slowing of traffic. This was observed at over 100 bridges. The failures were not catastrophic but nonetheless represented pervasive damage that was costly to fix because of the large number of bridges needing attention.

*Principles Identified:*

- The interconnectedness/interdependence of lifelines can result in cascading or multiple service failures.
- Communication is often the most critical service during a disaster. Without it society cannot function.
- Major transportation corridors, because they cover large spatial areas, are susceptible to a range of failures which all result in diminished capacity.

### 3.2.5. JAPAN EARTHQUAKE AND TSUNAMI - NUCLEAR DISASTER

The 2011 magnitude 9.0 Tohoku Earthquake resulted in widespread devastation, primarily due to the ensuing tsunami. The Fukushima Nuclear Power Plant was designed both for strong ground shaking due to an earthquake and for tsunami flooding, but the level of armoring against a tsunami was inadequate in several areas.

The Fukushima Nuclear Power Plant was a substantial node in Japan's power system. The safe operation and shut down of the power plant required a constant supply of electricity through the connection to the grid. This can be termed an active system requiring constant input to function, versus a passive system that does not need constant input. The tsunami disrupted the grid and severed the supply of incoming electricity to the power plant. In the event of such a disruption, electricity was to be supplied by backup generators located on the site. Due to poor planning and design these backup generators were inundated by the tsunami as well and were inoperable. With no viable redundancy in power supply, the power plant could not effect a safe cool down, and "meltdown" ensued.

*Principles Identified:*

- To have backup systems function as true redundant systems, the design must ensure that they are not subject to the same loading as the primary systems.
- Critical nodes that require active input are not reliable when that input is severed. A passive system, in this case a nuclear power plant that can cool down without being connected to the grid, presents a more reliable node.

### 3.2.6. HURRICANE SANDY - GAS SHORTAGE

In 2012, Hurricane Sandy battered the East Coast of the U.S. causing widespread flooding, wind damage, and related storm damage. Because of the widespread damage many lifelines systems were affected to a greater or lesser extent.

The electric grid went down mainly due to widely distributed damage to lines and substations. More than three weeks after the hurricane there remained a persistent gasoline shortage that hindered recovery efforts and contributed to a lingering delay in people resuming daily life operations (Sandalow, 2012). The dearth in gasoline was primarily due to an interconnected systems problem. Gasoline in the greater New York area is brought in mainly through the ports. These tankers were able to reach the ports quickly after the hurricane but could not unload the gasoline because there was no electricity to run the pumps. The lack of electricity hindered gasoline distribution at many levels along the supply chain.

*Principles Identified:*

- **Interdependence** of electricity and gasoline distribution was highlighted in this disaster. Simple redundant measures (e.g., manual pumps) could have alleviated some of the electricity-caused gasoline shortage.

## 3.3. LIFELINES AND SYSTEMS CONCEPTS

### 3.3.1. TYPES OF SYSTEMS

Most lifelines are arranged in what can be called series systems. If visualized as a chain, the lifeline fails when any single "link" in the chain fails (see Annex Diagram 3.C). This chain analogy represents a functional definition of a series or non-redundant system. Examples of series systems include:

- A transportation corridor where the failure of any bridge or highway section results in the closure of that corridor
- A gas main where a rupture anywhere along its length results in disruption of gas delivery
- A levee system where a single breach results in flooding on the protected side of the levee
- An electricity grid that is down because a substation component has failed
- A water canal where a fault has rupture through the canal section thereby ceasing all flow downstream

**Annex Diagram 3.D: A Series System When All Nodes and Links are Performing (Left) and When Failure of a Single Component Results in a System Wide Failure (Right)**

Within a series system there can be many components which are called **links** and **nodes**. These components can be interconnected or interrelated in various ways. This dependence between components is commonly termed **correlation**. Correlation can be seen in how multiple components resist adverse loading (e.g., the components all have a similar design or construction) and also in how the loading is applied across components (e.g., the loading consistently affects a large spatial area across numerous components). In a series system the higher the correlated resistance is across components the more reliable the system can be. On the other hand, the more components a series system has, the more likely the system is to fail.

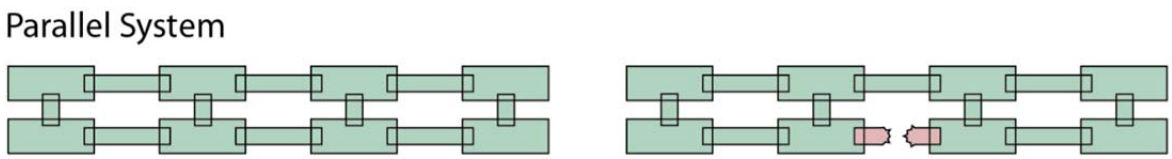
This discussion can be expanded to include **interdependent/interrelated** systems such as those highlighted in some of the case examples:

- A gasoline distribution system that is crimped by loss of electricity or transportation corridors
- A water distribution system that is down because of loss of electricity
- A communication system that is down due to severed land-lines and loss of electricity

- A water system that is non-operational because a failed levee system has compromised the flow of fresh water

One key to having serviceable and functioning lifelines during or after a disaster is to build redundancy into the system. Redundancy can be conceptualized as a parallel system where all components must fail to realize system failure (see Annex Diagram 3.D). But, as seen in the case histories, ensuring redundancy is often difficult, even when the adverse loading conditions can be anticipated. Analytical modeling of interconnected systems can be accomplished in some detail (e.g., Alexoudi, Kakderi, and Pitilakas, 2008) but often a qualitative assessment is sufficient to determine the relative risk. The key in analyzing interconnected systems, either quantitatively or qualitatively, is in properly assessing the interdependence and redundancy.

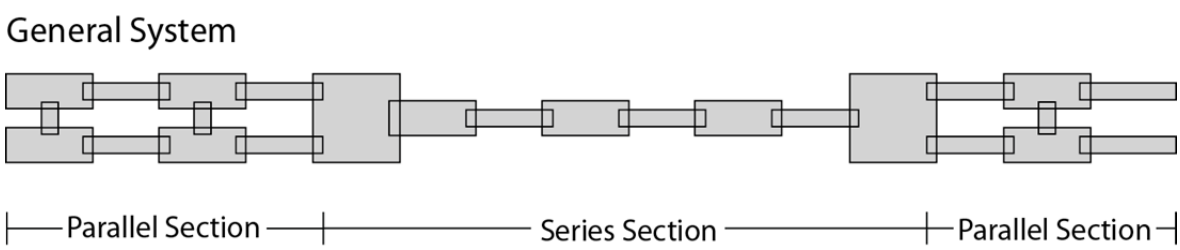
**Annex Diagram 3.E: A Parallel System That Has Two Components Performing the Same Function (Left), Allowing the System to Continue to Function Along the Redundant Component When a Single Component Fails (Right)**




Systems that have a combination of both series and parallel components are called general systems. General systems can be analytically modeled (e.g., Song and Der Kiureghian, 2010), but the difficulty in accurately mapping the complexity of general systems and, more importantly, the difficulty in properly accounting for the component correlation can make modeling difficult. Starting with the simplest model that captures the key components will provide a basis for understanding the system. The model complexity can be increased to provide a more refined risk assessment. If the risk does not change significantly with increased complexity then the simpler model accurately captures the key components.

It is important to note that at larger scales most lifelines have the attributes of a general system. Most lifeline systems are general systems that have portions that are series and portions that are parallel (see Annex Diagram 3.E).

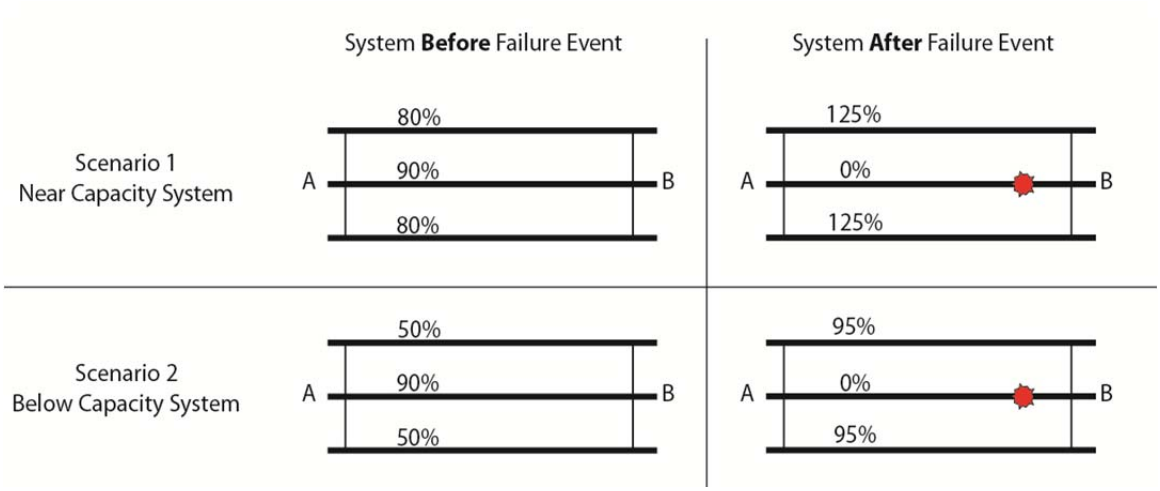
**Annex Diagram 3.F: A General System with a Series Section and Two Parallel Sections.**




The consequences of a system failure can be influenced by how near capacity the system is functioning on a day-to-day basis. Take for example a network of interconnected roads that provide access from point A to point B and other points. This system can be considered a general system as there may be roads that are parallel and there may be interchanges that are in series. If this system is performing at or near capacity prior to some adverse loading situation, even a failure of a redundant component can result in system failure such as gridlock (Lewis, Mackin, and Darken, 2011). If this system is running far below capacity,

however, there is inherent resilience in the system to absorb some component failure and continue to function (see Annex Diagram 3.F). This relationship of system capacity to consequences adds a layer of complexity to systems analysis, making proper assessment of risk and reliability tricky.

**Annex Diagram 3.G: Aerial View of Road System Operating Near and Below Capacity Before and After Failure Events**



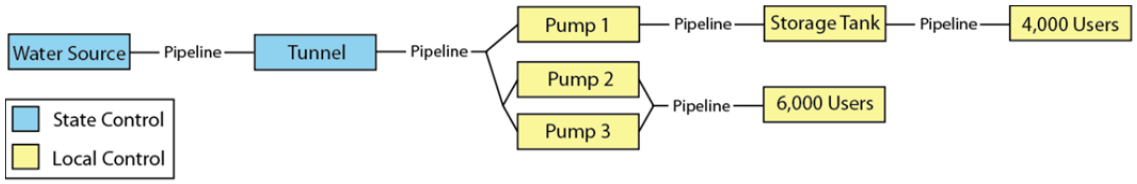

## 3.3.2. USING "FAULT TREES": A FICTIONAL EXAMPLE

An intuitive means of assessing system reliability is by using what is known as a "fault tree" to identify each failure scenario that exceeds a certain level of consequences. Each branch of the horizontal "tree" represents a separate scenario (see Annex Diagrams 3.G and 3.H). This allows for the capture of different scale systems failures, interconnected system failure, correlation of component resistance and load, and other unique characteristics of a system that can lead to failure.

The best means of describing a fault tree is by example, and the following example uses a water distribution system to illustrate: The fictional City Water Lifeline is controlled by a water distribution system at two scales: state and local. The city does not have direct control over the state delivery of water but must estimate the risk of the upstream water distribution problems at that scale. The probability of failure information at the state level could be based on a multi-hazard assessment produced by the state, while a local assessment could provide necessary information about locally controlled components.

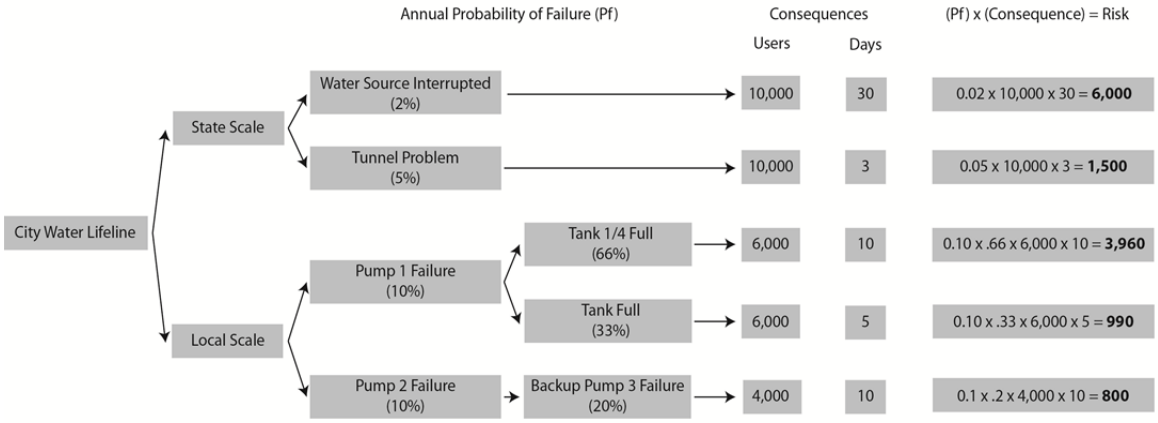
In this example the state controls the water source and a tunnel that provide water to the city. The city has direct control over the two primary pumps (Pumps 1 and 2), one backup pump (Pump 3) and a water tank. Pump 1 pushes water into a tank and the time users will be without water is a function of how full the tank is when the pump breaks. The city installed a redundant pump (Pump 3) to supplement Pump 2 because the water service to those users (hospital, etc) was deemed critical. The redundant pump may not be independent, however, and may be damaged in the same event as Pump 2.

**Annex Diagram 3.H: Conceptual Diagram of Fictional Water System**



Consequences are assessed as the disruption of water to the number of users in the city and the number of days those users would be without water. Risk is the product of the probability of failure and the consequences assumed, in this case the number of users and the days those users are without water. As shown in Annex Diagram 3.H, the resulting risk values (here the probability-weighted user days) are a metric for ranking the potential failure scenarios to aid in the decision process of which hazard to address first.

**Annex Diagram 3.I: Fault tree for fictional water system**




Based on the fictional example the biggest concern for the city is the water source reliability at the state scale, mainly because the time to repair and return service is so long and all residents would be affected. This would be the obvious choice of where to start mitigating hazards on the existing water system. The probability of failure of this particular link could be explored further to determine which hazard is driving the risk and how best to mitigate the risk, through redundancy, backup, or other means.

At the local level the most appropriate strategy may be to improve Pump 1 or the capacity of the tank. Mitigation could be as simple as installing a backup pump system for Pump 1, or increasing the tank capacity or likelihood of a full tank.

This simplistic fictional example provides a fault tree for deconstructing a complex system so that a rough risk assessment can be performed. The quality of the risk assessment is a function of the structure of the fault tree, the probability of failure analyses for each branch of the tree, and the estimates of the consequences. These can always be improved upon with increasingly finer detail. The most important aspect of the risk assessment is documenting the relative risk between branches of the fault tree to aid in the mitigation decision process.

## 3.4. PATH FORWARD FOR LIFELINE RESILIENCE

Often following a disaster event there is a gap between the time required to restore lifeline services, and the acceptable time for customers to be without service. The gap is dynamic. It is a function of the individual user resilience and the robustness of infrastructure.

For all users there is a critical point beyond which there will be unrecoverable consequences (e.g., permanent health problems, lost customers) or failure (e.g., death, bankruptcy). As shown graphically in Annex Diagram 3.I, if lifeline services are not restored before a critical point after a disaster, there may be permanent losses, but if restoration occurs before that critical point, permanent losses may be avoided or reduced. Each individual lifeline will likely have unique, nonlinear relationships between time without

service and losses. Knowledge of each party's resilience can guide mitigation and preparedness measures by both.

### 3.4.1. IDENTIFYING CRITICAL RESTORATION TIMELINES

While losses are expected after significant events, eliminating the gap between a user's critical point and restoration times can help minimize many losses. This can be accomplished by:

- Improving the user's ability to function without lifeline services;

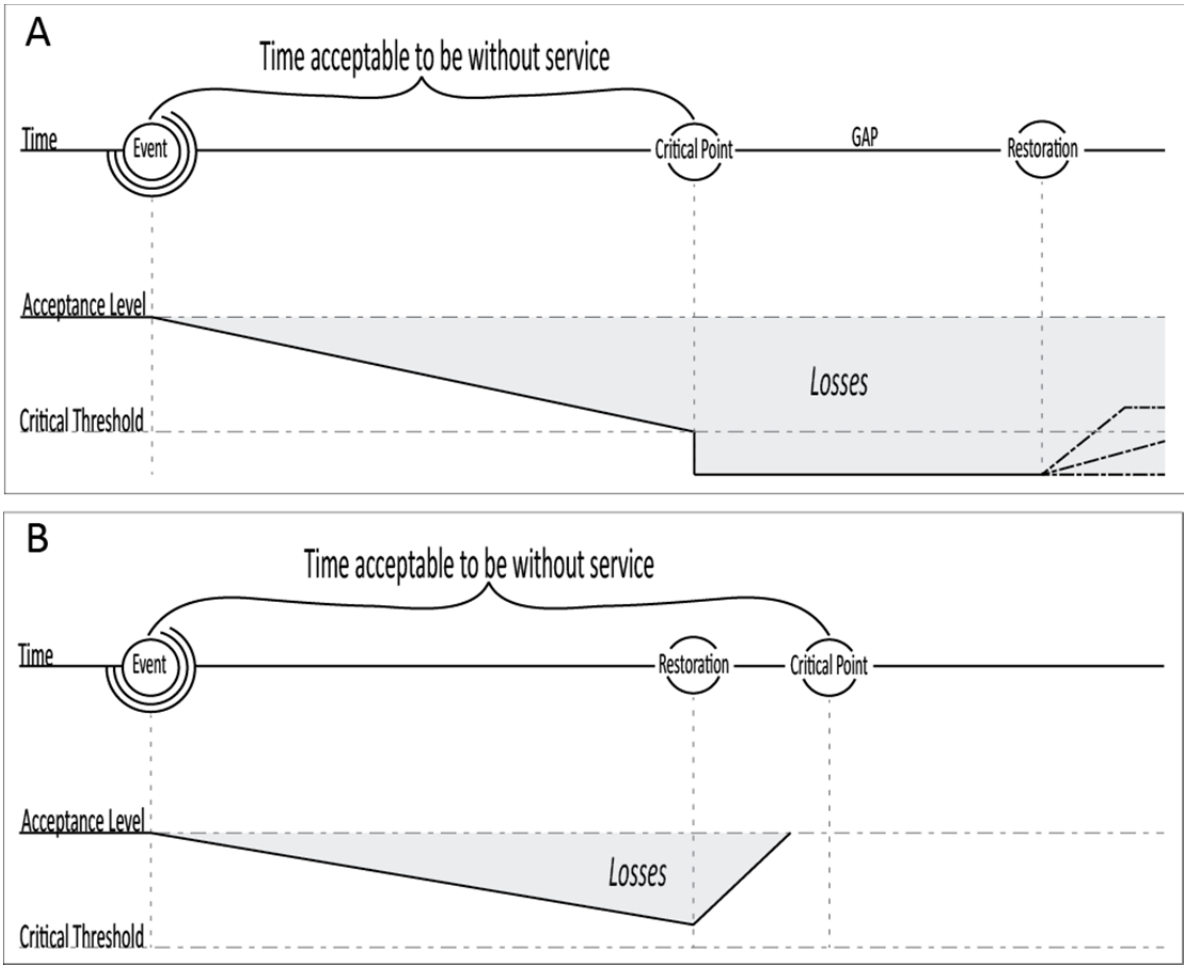
- Improving the lifeline provider's ability to restore services by making the system:
  1. Robust (retrofit and construct lifeline systems to a higher level to resist hazard forces, thereby decreasing the likelihood of failure), or
  2. Repairable (accept that damage may occur but have quick repair strategies or temporary elements to provide limited services quickly after a disaster);
     OR
- A combination of the two.

Lifeline service following a disaster should be measured on four scales that are often interdependent:

1. Outage time
2. Quantity of lifeline service
3. Quality of lifeline service
4. Distance to service

These four scales determine the severity of lifeline loss. As Kameda notes, "People can stand lifeline disruptions for some period immediately following [an event]. But as a reduced level of supply is sustained, their demand will increase and the individual users' acceptance curve decreases with time," (Kameda, 2000). Acceptance curves are the relationship between lifeline service and time. They are helpful in determining the design level of lifeline systems and the recovery strategies necessary to prevent serious losses.

**Annex Diagram 3.J: Losses When Lifeline Services Are Not Restored Before the Critical Point After a Disaster (A) vs. Losses When Lifeline Services Are Restored Before the Critical Point (B**




The relationship among the four scales can provide a metric to improve community capacity for coping with outages. San Francisco has developed plans for residents to shelter-in-place following a disaster, similar to the strategy used in Christchurch, New Zealand following the 2010-2011 earthquakes. Residents are encouraged to live at home without lifeline services rather than seek housing in temporary shelters. By preparing a shelter-in-place plan, San Francisco hopes to increase the time residents can cope without lifelines following a large magnitude earthquake.

In Christchurch portable toilets were placed on every block and portable showers were placed at community hubs while water and sewage systems damaged by liquefaction (due to earthquake shaking) were repaired. The recovery strategy was successful in bridging the gap between the event and the restoration of the lifeline system, allowing individuals to stay in their homes with acceptable level of service across all four scales. In large events where the main system will require weeks or months to repair, there should be consideration of acceptable quantity and quality of service within a reasonable distance. These relationships among time, quantity, quality, and space are important to consider when designing lifeline systems and recovery strategies.

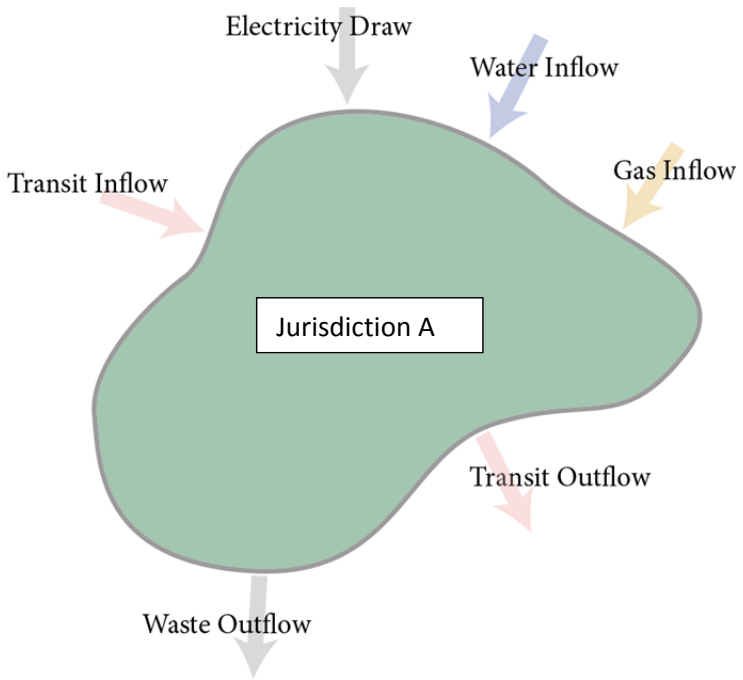
**Community Shower Stations That Helped People Stay in Minimally Damaged Homes In Neighborhoods Where Water Lines and Other Infrastructure Were Damaged by Earthquake in Christchurch, NZ**

*Source: EERI, 2011*

The multi-jurisdictional nature of lifelines and their many stakeholders can make them difficult to improve. Local jurisdictions often control distribution systems but rely on statewide systems (e.g., aqueducts, highways, transmission lines, etc) or private systems to provide utility resources. The probability of lifeline outages is a summation of failures both inside and outside their local jurisdictions. Single jurisdictions are typically unable to effectively mitigate risk as they do not have control over risk outside their boundaries (see Annex Diagram 3.J). Potential impacts should be viewed both internally (local/regional) and externally (regional/state/federal).

To assess the risk, local communities must determine the location of infrastructure, its current condition, and its susceptibility to hazards. For infrastructure that enters from outside the jurisdiction, it is critical to trace the infrastructure back to its source and determine the risks along the entirety of the infrastructure's path. Understanding the consequences of failures and outages will help to set mitigation priorities. Concepts identified in the prior section should be included in evaluations to assess the extent of lifeline vulnerability.

**Annex Diagram 3.K: Lifeline Failures for Single Jurisdictions: A Combination of Local Failures and Failures of Upstream Systems**



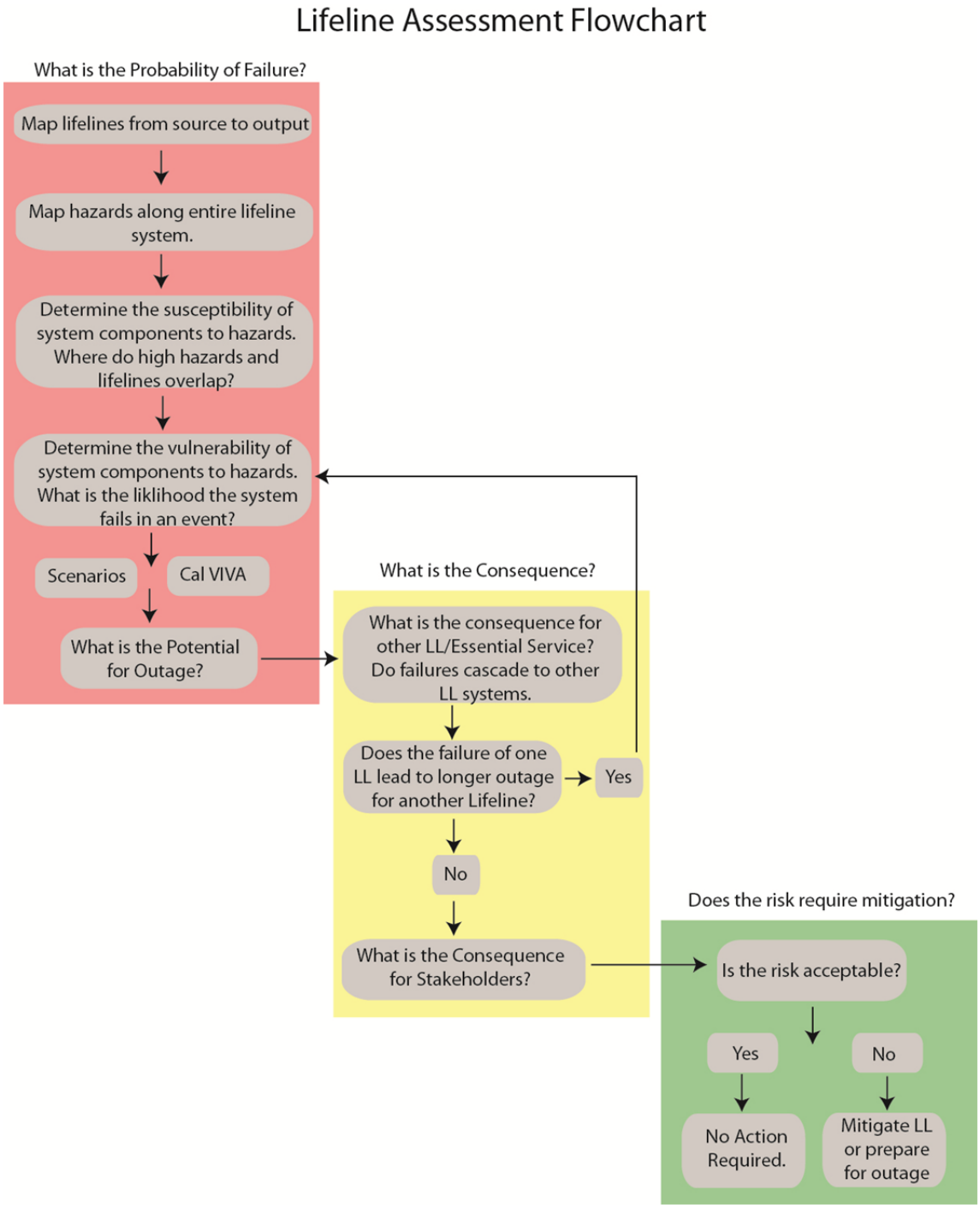

## 3.4.2. ASSESSING LIFELINE SYSTEM RISK

Annex Diagram 3.K illustrates a process for considering lifeline risk. The first step is to understand the probability of failure of the existing system. This requires information on the existing hazards that may interact with a lifeline system, and some knowledge of the fragility of the lifeline system.

There are a number of resources that provide mapping of hazards (e.g., MyPlan internet map service, United States Geological Survey, California Geological Survey) and lifeline service providers that have mapped their infrastructure systems (e.g., local utility providers, National Pipeline Mapping System, Antenna Search, Caltrans Office of GIS). Knowledge of the fragility of the infrastructure, or its susceptibility to failure due to adverse loading, may not be as readily available.

It is important to consider all lifelines at once, if possible, as they can influence one another through interconnectedness. The analysis listed in the first phase (shown in red) in the Annex Diagram 3.K flow chart will have to be completed for each lifeline system. Once the preliminary outage potential is realized, the consequence (in yellow) should be considered. The effect of one system outage on the other lifelines and vice versa should be considered. If there is an additional or extended outage caused by cascading failures across lifeline systems, the analysis should step back and consider if this outage will cascade further and cause additional disruptions.

**Annex Diagram 3.L: Lifeline Assessment Flowchart**




Once a complete understanding of outages is developed, the consequence to society should be considered. Case histories of similar outages in past disasters can provide an understanding of local dependency on lifelines. The last step (in green) in the Annex Diagram 3.K flow chart requires decision makers to assess if the risk is acceptable and if mitigation action is needed to improve the performance of lifeline systems. Mitigation is discussed in detail in the next section.

### 3.4.3. LIFELINE MITIGATION

Hazard mitigation is, to a considerable extent, a problem specific process. Important details include not only the actual physical hazard and lifelines at risk but also the time dependent political and social climate that exists around the hazard and risk. The following are selected examples that illustrate such specifics.

In 1994 more than 90 percent of East Bay Municipal Utility District (EBMUD)'s customers supported a $189 million Seismic Improvement Program to strengthen the water system against major earthquakes (ABAG, 1998). The communities reliant on EBMUD water experienced brief outages in the 1989 Loma Prieta earthquake, and were affected by the 1991 Oakland Hills Fire that killed 29 people and burned over 3,000 homes (Eidinger, 2004). Residents were receptive to rate increases to improve the performance of their water systems. Since that time, EBMUD has completed two projects to greatly improve system robustness. The first was a seismic strengthening of the Claremont Tunnel, which crosses the Hayward Fault underground. The $38 million tunnel is designed to function following a Hayward Fault earthquake despite a fault displacement upwards of 2.5 meters. EBMUD also constructed a parallel water transmission bypass that crosses the fault at another location. The southern loop pipeline adds redundancy to the water transmission system (EBMUD, 2012).

In 2000, the City of Berkeley spent $9.6 million to develop an aboveground water supply system. The City was concerned that its fire suppression system may have significant failures due to ground failures in a future earthquake. In the new aboveground water supply system, vehicles lay flexible hose from a water source to the fire. The system hooks up to either functioning water mains or portable pumps stationed at the wharf or a reservoir. The system reduces reliance on the underground system, which is vulnerable to liquefaction failures. While the main system may have serious failures, aboveground water supply system is designed to provide the Berkeley Fire Department with water to fight fires following an earthquake.

Devils Slide between Pacifica and Half Moon Bay is a geologically unstable section along State Route 1. Landslides and rockfalls have caused frequent road closures, resulting in large detours and economic losses for the communities north and south of Devils Slide. In 1995 the road was closed for five months for a $3 million in repairs. Again in 2006 the road was again closed for four months for $7 million in repairs. In March 2013, Caltrans completed two 4,200-feet long tunnels that bypass the unstable section of Devil's Slide. By rerouting a portion of Route 1 inward, one of the most vulnerable sections was mitigated, increasing the likelihood that the route between Half Moon bay and Pacifica will be open in future rainy seasons. (For more information about the Devil's Slide Tunnel Project see Best Practices Highlight 6.A in Section 6.2.)

## 3.5. SUMMARY

The preceding analysis has addressed the overall issue of lifeline vulnerability to natural hazards in California. Among other things, it has presented:

- Compelling evidence of lifeline failures in the form of previous failure case examples
- Simplified concepts of how lifeline organization and the unique properties of engineered systems

For society to function properly lifelines must be operational, particularly after the various disasters that are part and parcel of living in California. The primary goal of this annex is to steer the thinking about lifelines to encompass the concepts and tools of engineered systems. This includes:

- evaluating the multi-scale aspects of lifelines,
- Considering correlation among system components (nodes and links),
- Identifying interconnectedness/interdependence of different lifelines;
- Overlaying multiple hazards on lifelines,

- Identifying real versus perceived redundancy within a system, and
- Assessing existing system capacity prior to disaster.

To improve overall lifelines resilience the following scales present a sample metric for the severity of a disaster affecting a particular lifeline: 1) outage time, 2) quantity of lifeline service, 3) quality of lifeline service, and 4) distance to service.

## 3.6. RESOURCES

### 3.6.1. INFORMATION SOURCES

Antenna Search is a mapping system that has a large amount of antennas and communication towers mapped around any designated four mile radius. (http://www.antennasearch.com/)

California Department of Transportation has GIS layers for California highways and major roadways. (http://www.dot.ca.gov/hq/tsip/gis/datalibrary/gisdatalibrary.html)

California Geological Survey provides interactive California maps and other tools for identifying geologic hazards specific to the state. (http://www.conservation.ca.gov/CGS/)

Hazus has a database of infrastructure and hazard overlays that can be used for coarse first assessment of lifelines risk. The lifelines mapped in Hazus should be checked and verified before proceeding with analysis. (http://www.fema.gov/hazus)

Many local utility providers have their systems mapped in GIS and may be willing to share the information.

MyPlan has multiple hazard GIS layers that can be downloaded. The program also has population layers that may be helpful in understanding consequences. (http://myplan.calema.ca.gov/)

The National Pipeline Mapping System has GIS maps of gas and fuel transmission pipelines by county. (https://www.npms.phmsa.dot.gov/)

United States Geological Survey provides comprehensive maps and other tools for identifying all geologic hazards in the U.S. (http://www.usgs.gov/natural_hazards/)

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# ANNEX 4 - PUBLIC SECTOR FUNDING SOURCES

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## 4.1. INTRODUCTION

There is substantial public sector financial support available for hazard mitigation efforts in California. This annex is a reference point for agency and program funds. The annex is not inclusive, as funding changes annually, as do program requirements. Please use this annex as a starting point to identify funding sources.

Federal agencies include the Federal Emergency Management Agency (FEMA), National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA), Department of Housing and Urban Development (HUD), U.S. Bureau of Land Management (BLM), U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service and the U.S. Department of Agriculture (USDA). State funds are being spent for mitigation by various agencies including Cal OES, California Earthquake Authority, CAL FIRE, Department of Transportation, and the Department of Water Resources. Special districts, cities, and counties use bond funds, general funds, and sales tax funds to conduct “hard” projects that make the built environment more resilient as well as to take community emergency preparedness actions. Hundreds of millions of dollars are provided by government.

There are also important movements by the nonprofit and community-based organizational sectors to promote mitigation awareness and training at the community level. These include statewide, regional, and local multi-stakeholder coalitions, such as the Earthquake Country Alliance, as well as single-purpose local social service providers.

## 4.2. FEDERAL FUNDING SOURCES

Federal assistance for mitigation efforts is available through many programs and agencies. These include FEMA, EPA, NOAA, U.S. Army Corps of Engineers, HUD, Bureau of Land Management, U.S. Department of Agriculture, Department of Homeland Security, and various other health, economic, and research agencies. California uses many of these programs as part of its comprehensive mitigation efforts. The following discussion provides a brief description of federal mitigation funding sources and technical assistance programs that are currently available through each agency. For further contact information and projected expenditures, visit the website listed for the particular program of interest.

In addition, it is highly recommended that all funding sources listed in this section be evaluated in conjunction with those listed in The Catalog of Federal Domestic Assistance (CFDA) under the sub-category "Disaster Prevention and Relief.""

### 4.2.1. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

FEMA provides a multiplicity of funding opportunities for mitigation, disaster relief, education, and training. Primary federal FEMA funding sources include Pre-Disaster Mitigation (PDM) grants, Hazard Mitigation Grant Program (HMGP) grants, and Flood Mitigation Assistance (FMA) grants, as described in Chapter 2. Annex Table 3.A identifies the extent of each of these FEMA mitigation support programs from 2010 to 2012. The total amount obligated through these programs for this time period is $42,112,253.

**Annex Table 4.A: FEMA Mitigation Program Funds, 2007-2012[81]**

| Program | Obligated Funds |
|---|---|
| PDM | $6,839,713 |
| HMGP | $25,133,717 |
| FMA | $25,133,717 |
| SRL | $968,754 |
| Total | $42,112,253 |

Primary FEMA hazard mitigation programs are outlined in Annex Table 4.B and some eligibility criteria are identified in the "Notes" column. Additional eligibility information is available on the program website.

**Annex Table 4.B: Major FEMA Mitigation Funding Sources**

| Program | Details | Notes (Eligible Applicants) |
|---|---|---|
| Flood Mitigation Assistance (FMA) Program | Provides funding to implement measures that reduce or eliminate the long-term risk of flood damage http://www.fema.gov/flood-mitigation-assistance-program | States, localities, and tribal governments |

[81] *On July 6, 2012, President Obama signed the Biggert-Waters Flood Insurance Reform Act of 2012, which combined the SRL funding into the FMA program, and created a combined National Flood Mitigation Fund.*

| | | |
|---|---|---|
| Hazard Mitigation Grant Program (HGMP) | Provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. http://www.fema.gov/hazard-mitigation-grant-program | States, localities, tribal governments, and private non-profit organizations (PNPs) |
| National Flood Insurance Program (NFIP) | Enables property owners to purchase insurance as a protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages. http://www.fema.gov/national-flood-insurance-program | States, localities, and individuals |
| Pre-Disaster Mitigation (PDM) Program | Provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. http://www.fema.gov/pre-disaster-mitigation-grant-program | States, localities, tribal governments, and universities |
| Severe Repetitive Loss (SRL) | The Severe Repetitive Loss program provides grants for elevation and acquisition projects of severe repetitive loss structures insured under the Nation Flood Insurance Program (NFIP). *In 2013 it becomes part of the National Flood Mitigation Fund*. http://www.fema.gov/severe-repetitive-loss-program | Individual property owners identified on the FEMA validated SRL property list |

## 4.2.2. ENVIRONMENTAL PROTECTION AGENCY (EPA)

The EPA makes available funds for water management and wetlands protection programs that help mitigate against future costs associated with hazard damage (see Annex Table 4.C).

**Annex Table 4.C: EPA Mitigation Funding Sources**

| Program | Details | Notes (Eligible Applicants) |
|---|---|---|
| Clean Water Act Section 319 Grants | Supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source implementation projects. http://water.epa.gov/polwaste/nps/cwact.cfm | States, territories, and tribal governments |
| Clean Water State Revolving Funds | State grants to capitalize state loan funds. The states make loans to communities, individuals, and others for high-priority water-quality activities. http://water.epa.gov/grants_funding/cwsrf/cwsrf_index.cfm | States and Puerto Rico |
| Wetland Program Development Grants | Provides funding to projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. http://water.epa.gov/grants_funding/wetlands/grantguidelines/index.cfm | States, localities, tribal governments, national non-profits, NGO's. |

### 4.2.3. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

NOAA is the major source for mitigation funding related to coastal zone management and other coastal protection projects (see Annex Table 4.D).

**Annex Table 4.D: NOAA Mitigation Funding Sources**

| Program | Details | Notes |
|---|---|---|
| Coastal Services Center Grant Opportunities | Supports coastal communities that are environmentally and economically sustainable, and climate adaptation and mitigation. http://www.csc.noaa.gov/funding/ | Regional ocean partnerships, tribal governments and state, local, and territory governments, institutions of higher learning, and non-profit and for-profit organizations |
| Coastal Resilience Networks (Crest) | Provides funding to projects located along the regions of the Pacific Islands, Gulf of Mexico, and West Coast to become more resilient to the threats posed by coastal hazards, including storms, flooding, sea level rise, and climate change. http://www.csc.noaa.gov/psc/grants/crest.html | States, territories, local or county governments, nonprofit organizations, regional authorities, and institutions of higher education |
| Coastal Zone Management Program | To protect, restore, and responsibly develop coastal communities and resources. http://coastalmanagement.noaa.gov/funding/welcome.html#coastal | Funding to the nation's 34 state and territory coastal zone management programs |
| Coastal and Marine Habitat Restoration | Identifies and supports proactive restoration projects, which use a habitat-based approach to foster species recovery and increase fish production. http://www.habitat.noaa.gov/funding/coastalrestoration.html | Funding for institutions of higher education, non-profits, commercial (for profit) organizations, U.S. territories, and state, local and tribal governments |

### 4.2.4. U.S. ARMY CORPS OF ENGINEERS (USACE) AND U.S. FISH AND WILDLIFE SERVICE

USACE and the U.S. Fish and Wildlife Service offer funding and technical support for programs designed to protect floodplains, wetlands, and watersheds (see Annex Table 4.E).

**Annex Table 4.E: Funding and Technical Assistance for Wetlands and Floodplains**

| Agency | Program | Details | Notes (Eligibility Criteria) |
|---|---|---|---|
| USACE | Planning Assistance to States (PAS) | Funds studies dealing with water resource issues related to: Water supply and demand, water quality, environmental conservation/restoration, wetlands evaluation, dam safety/failure, flood damage reduction, flood plain management, coastal zone management/protection, and harbor/port. http://www.lre.usace.army.mil/planning/assist.html | 50 percent Federal-50 percent non-Federal basis |

| | | | |
|---|---|---|---|
| USACE | Flood Plain Management Services (FPMS) | Technical support for effective floodplain management. http://www.lre.usace.army.mil/planning/fpman.html | See website |
| USACE | USACE Environmental Laboratory | Guidance for implementing environmental programs such as ecosystem restoration and reuse of dredged materials. http://www.usace.army.mil/Missions/Environmental.aspx | See website |
| U.S. Fish and Wildlife Service | Coastal Wetlands Conservation Grant Program | Provides matching grants to states for acquisition, restoration, management or enhancement of coastal wetlands. http://www.fws.gov/coastal/CoastalGrants/index.html | Coastal States bordering the Atlantic, Gulf of Mexico (except Louisiana), Pacific, and Great Lakes. |
| U.S. Fish and Wildlife Service | Partners for Fish and Wildlife Program | Provides technical and financial assistance to private landowners and Tribes for restoring degraded wildlife habitat. http://www.fws.gov/partners/aboutus.html | Funding for volunteer-based programs |

## 4.2.5. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

Community Development Block Grants (CDBG) and other programs administered by HUD can be used to fund hazard mitigation projects (see Annex Table 4.F).

**Annex Table 4.F: HUD Mitigation Funding Sources**

| Program | Details | Notes (Eligibility Criteria) |
|---|---|---|
| Community Development Block Grants (CDBG) | Grants to develop viable communities, principally for low and moderate-income persons. CDBG funds available through the Disaster Recovery Initiative. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/drsi | Funding to states, local governments, tribal governments, and Insular areas designated by the President of the United States as disaster areas |
| Neighborhood Stabilization Program (NSP) | Stabilizing communities through the purchase and redevelopment of foreclosed and abandoned homes. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/neighborhoodspg | Funding to states, local governments, and non-profits |

### 4.2.7. BUREAU OF LAND MANAGEMENT

The Bureau of Land Management (BLM) has two technical assistance programs focused on fire mitigation strategies at the community level (see Annex Table 4.G).

**Annex Table 4.G: Bureau of Land Management Mitigation Funding Sources**

| Program | Details | Notes |
|---|---|---|
| Community Assistance and Protection Program | Focuses on mitigation/prevention, education, and outreach. National Fire Prevention and Education teams are sent to areas at risk for wildland fire. http://www.blm.gov/nifc/st/en/prog/fire/community_assistance.html. | See website |
| Firewise Communities Program | Encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks. http://www.firewise.org/ | See website |

### 4.2.8. U.S. DEPARTMENT OF AGRICULTURE (USDA)

There are multiple mitigation funding and technical assistance opportunities available from the USDA and its various sub-agencies: the Farm Service Agency, Forest Service, and Natural Resources Conservation Service (see Annex Table 4.H).

**Annex Table 4.H: USDA Mitigation Funding Sources**

| Agency | Program | Details | Notes (Eligible Applicants) |
|---|---|---|---|
| USDA | Smith-Lever Special Needs Funding | Grants to State Extension Services at 1862 Land-Grant Institutions to support education-based approaches to addressing emergency preparedness and disasters. http://www.csrees.usda.gov/funding/rfas/smith_lever.html | States, American Samoa, Guam, Micronesia, Northern Marianas, Puerto Rico, and the U.S. Virgin Islands |
| USDA | Community Facilities Direct and Guaranteed Loans Program | Funds may be used to construct, enlarge, or improve community facilities for health care, public safety, and public services. http://www.rurdev.usda.gov/HAD-CF_Loans.html | Localities (less than 20,000), special purpose districts, tribal governments, and non-profit corporations |
| USDA | Community Facilities Direct Grants | Grants used to assist in the development of essential community facilities. http://www.rurdev.usda.gov/HCF_CF.html | Localities (less than 20,000), special purpose districts, tribal governments, and non-profit corporations |
| USDA Farm Service Agency | Farm Service Agency Disaster Assistance Programs | Assistance for natural disaster losses, resulting from drought, flood, fire, freeze, tornadoes, pest infestation, and other calamities. http://www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=landing | Farmers and ranchers |

| | | | |
|---|---|---|---|
| USDA Forest Service | Community Wildfire Protection Plan (CWPP) | Provides communities with an opportunity to influence where and how federal agencies implement fuel reduction projects on federal lands and how additional federal funds may be distributed for projects on nonfederal lands. http://www.forestsandrangelands.gov/communities/cwpp.shtml | Prepare a Community Wildfire Protection Plan (CWPP) |
| USDA Forest Service | Wildland Fire Management (WFM) | Projects protecting communities from large, unnaturally severe fires and contribute to the restoration of fire-adapted ecosystems. http://www.fs.usda.gov/recovery | Federal lands and in cooperation with states, local governments, tribes, and owners of private lands |
| USDA Natural Resources Conservation Service | Emergency Watershed Protection Support Services | Funds for implementing emergency measures to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood, or any other natural occurrence is causing or has caused a sudden impairment of the watershed. http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ | See website |
| USDA Natural Resources Conservation Service | Watershed and Flood Prevention Operations (WFPO) Program | Provides technical and financial assistance for planning and installing watershed projects. http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ | See website |

## 4.2.10. HEALTH AND ECONOMIC AGENCIES

Alternative mitigation programs can be found through health and economic agencies that provide loans and grants aimed primarily at disaster relief (see Annex Table 4.I).

**Annex Table 4.I: Federal Loans and Grants for Disaster Relief**

| Agency | Program | Details | Notes (Eligibility Criteria) |
|---|---|---|---|
| Department of Health and Human Services | Disaster Assistance for State Units on Aging (SUAs) | Provide disaster relief funds to those SUAs and tribal organizations that are currently receiving a grant under Title VI of the Older Americans Act. http://www.aoa.gov/Grants/Funding/index.aspx | SUA and tribal organization areas declared as a federal disaster area by the President |
| Economic Development Administration | Disaster Relief Opportunity | Provide investments in regions experiencing severe economic distress as a result of natural disasters that were declared as major federal disasters. http://www.eda.gov/disasterrecovery.htm#1 | States, localities, tribal governments, ,institutions of higher education, and public or private non-profit organizations |
| U.S. Small Business Administration (SBA) | Disaster Loans | Loans for home and personal, physical small businesses, and economic injury in Presidential declared disaster areas http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans/loans | Individuals |

## 4.2.11. RESEARCH AGENCIES

The United States Geological Survey (USGS) and the National Science Foundation (NSF) provide grant money for hazard mitigation-related research efforts (see Annex Table 4.J).

**Annex Table 4.J: Hazard Mitigation Research Grants**

| Agency | Program | Details | Notes (Eligibility Criteria) |
|---|---|---|---|
| National Science Foundation (NSF) | Decision, Risk, and Management Sciences Program (DRMS) | Provides funding to support scientific research directed at increasing the understanding and effectiveness of decision making by individuals, groups, organizations, and society. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES | See website |
| United States Geological Survey (USGS) | Earthquake Hazards Program | Provides grants and cooperative agreements to support research in earthquake hazards, the physics of earthquakes, earthquake occurrence, and earthquake safety policy. http://earthquake.usgs.gov/research/external/ | See website |

### 4.2.12. U.S. DEPARTMENT OF HOMELAND SECURITY

The United States Department of Homeland Security provides grant money for disaster preparedness (see Annex Table 4.K).

**Annex Table 4.K: Department of Homeland Security Mitigation Funding Sources**

| Agency | Program | Details | Notes (Eligibility Criteria) |
|---|---|---|---|
| Department of Homeland Security | Homeland Security Grant Program (HSGP) | Provide a primary funding mechanism for building and sustaining national preparedness capabilities. http://www.fema.gov/preparedness-non-disaster-grants | See website |
| Department of Homeland Security | Emergency Management Performance Grants (EMPG) Program | Provide necessary direction, coordination, guidance, and assistance for a comprehensive emergency preparedness system for all hazards. http://www.fema.gov/preparedness-non-disaster-grants | States, localities, tribal governments, and territories |

## 4.3. STATE FUNDING SOURCES

California is fortunate that its legislature and citizens recognize the need for safer and more disaster-resilient communities. Projects that support the SHMP goals and objectives are embedded in the budgets and programs of many departments. A sizeable portion of funds are mitigation-directed or mitigation-related. The following is a brief summary of each of these programs sorted by primary hazard type.

### 4.3.1. EARTHQUAKE HAZARD MITIGATION FUNDING

Seismic mitigation is addressed by a series of state agencies and commissions. Some agencies focus on structural measures (such as Caltrans) while others focus on nonstructural measures (such as the Seismic Safety Commission).

#### California Department of Transportation (Caltrans) Programs

*Bridge Retrofit Funding*

The California Department of Transportation (Caltrans) operates and maintains more than 12,000 bridges statewide. When the 1971 San Fernando earthquake struck the Los Angeles area and damaged several bridges, Caltrans began operating a bridge seismic safety retrofit program focused on bridge expansion joints. After the 1989 Loma Prieta and 1994 Northridge earthquakes caused significant loss of life and closure of major routes, Caltrans established the Seismic Retrofit Programs Phase I and II. The current Seismic Retrofit Programs have focused on retrofitting existing bridges statewide. A total of 2,194 state bridges have been identified for seismic retrofit, and 2,191 have been retrofitted. In less than 20 years over 99% of the state's bridges are safer. The three remaining bridges are currently under construction and expected to be completed by 2017.

As of March 2013, Caltrans spent a total of $2.54 billion on the Seismic Retrofit Program (See Table 4.L). Caltrans budgeted and expended a total of $1.08 billion for their Phase I Seismic Retrofit Program from the State Highway Account (SHA) and federal gas tax programs (Federal Trust Fund). A total of $1.45 billion has been expended for Phase II, utilizing SHA/HBRR funds and the Proposition 192 Retrofit Bond Fund of 1996. The three remaining bridges under construction in Phase II have been allocated a remaining $287 million. Annex Table 4.L summarizes the Seismic Retrofit Programs Phase I and II.

**Annex Table 4.L: Seismic Retrofit Programs Funds**

| Program Funds | Phase I | Phase II | Total |
|---|---|---|---|
| Prop 192 | $0 | $1,210,000,000 | $1,210,000,000 |
| SHA/HBRR | $1,082,000,000 | $535,000,000 | $1,617,000,000 |
| Caltrans Expenditures | $1,082,000,000 | $1,458,000,000 | $2,540,000,000 |

*Toll Bridge Seismic Retrofit Program*

Privately owned toll bridges as well as city-and county-owned bridges are at earthquake damage risk. Although Caltrans is the lead agency, Senate Bills 60 and 226 established the Toll Bridge Program and provided initial funding. Assembly Bills 1171, 144 and 1175 established the funding levels. Eight bridges have been retrofitted, with one scheduled for completion in 2013.

The Toll Bridge Program funds are gathered from various programs including the Prop 192 Bond and SHA/HBRR programs. Miscellaneous funds account for $387 million which include the Motor Vehicle Account, Redirect Spillover, Public Transit Account Funds, and the Vincent Thomas and Coronado funds. The majority of these funds are generated through increased bridge tolls authorized by the state legislature. Privately owned toll bridges expenditures total $7.7 billion with a remaining of $1.6 billion allocated for the one bridge currently under construction. Annex Table 4.M summarizes the Toll Bridge Retrofit Program funding.

**Annex Table 4.M: Toll Bridge Seismic**

| Program Funds | Phase 1 | Phase II | Total |
|---|---|---|---|
| Prop 192 | $0 | $1,210,000,000 | $1,210,000,000 |
| SHA/HBRR | $1,082,000,000 | $535,000,000 | $1,617,000,000 |
| Cal Trans Expenditures | $1,082.000,000 | $1,458,000,000 | $2,540,000,000 |

## California Seismic Safety Commission Programs

The Alfred E. Alquist Seismic Safety Commission is funded by fees paid by insurance companies that sell policies in California. It has 20 volunteer commissioners and 6 staff members that manage programs for public education, preparedness, mitigation, and research to improve earthquake safety. The Commission's efforts are funded, in part, by an insurance claim settlement resulting from the Northridge Earthquake.

## California Earthquake Authority

The California Earthquake Authority (CEA), created in 1996 in response to the Northridge Earthquake, is a privately financed, publicly managed provider of earthquake insurance. Policyholders purchase coverage through the CEA as an add-on to their homeowners insurance. Insurance companies can join the CEA and issue seismic policies under its structure. The CEA currently collects about $600 million in gross premiums each year. The CEA's total claims-paying capacity now exceeds $10 billion. There were 821,000 policyholders as of December 31, 2011

The CEA's commitment to mitigation is reflected in its Strategic Plan, adopted by the CEA Governing Board in 2003. The plan includes the following mitigation strategy: "Educate residents about their earthquake risk and motivate them to protect themselves and their property."

The California Residential Mitigation Program ("CRMP") was created through a Joint Exercise of Powers Agreement between the California Emergency Management Agency ("Cal EMA") (now Cal OES) and the California Earthquake Authority ("CEA"). The CRMP is a public entity and is separate from Cal OES and the

CEA. The CRMP's goal is to provide incentives to California homeowners to seismically retrofit wood frame residential structures. The program will assure retrofitting compliance with the August 16, 2010, adoption by the California Building Standards Commission of Appendix A3 of the 2009 International Building Code – "Prescriptive Provisions for the Seismic Strengthening of Cripple Walls and Sill Plate Anchorage of Light Wood-Frame Residential Buildings" – with amendment of the 2007 and 2010 California Existing Building Code. The program will also include integration of contractor and building inspector training offered by other organizations as well as financial incentives for consumers. A pilot program is starting in 2013 in selected areas of Oakland and Los Angeles. A $3,000 per unit award is available to participating homes owners. This is funded by a 5% set-aside of the total investment income.

http://www.earthquakeauthority.com/UserFiles/File/Financial%20Statements/2011%20Audited%20Financial%20Statements.pdf

## 4.3.2. FLOOD HAZARD MITIGATION FUNDING

California makes significant and continued investments in mitigating flood risks. Funding for this comes from the state general fund and from large bond issues voted on by the citizens of the state.

### General Fund

In general, state flood management programs are funded from the general fund and voter-approved bonds. Since 2000, annual state funding for flood management has varied by year. In 2011-2012, $214 million was spent. In addition, local governments, including flood control districts and other public water agencies, operate their own flood management programs and projects. Funding for these local programs comes from various sources, including property assessments and state financial assistance.

### Proposition 1E

In addition to the general fund, bonds are an important source of state funding for flood hazard mitigation projects. Among the largest is the voter-approved $4.09 billion Proposition 1E (the Disaster Preparedness and Flood Prevention Bond Act of 2006) to fund flood management projects, including repairs and improvements to levees, weirs, bypasses, and other flood control facilities throughout the state. Proposition 1E allocates $3 billion to repair and improve state-federal facilities that are part of the State Plan of Flood Control for the Central Valley and to reduce the risks of levee failure in the Sacramento-San Joaquin Delta.

Of these funds, a minimum of $1 billion will be allocated to high-level flood protection for urban areas protected by state-federal project levees, $300 million to design flood level protection for non-urban areas protected by state-federal project levees, and a minimum of $500 million to reduce the risks of levee failure in the Sacramento-San Joaquin Delta. Also allocated are $500 million for State Flood Control Subventions and $300 million in storm water Flood Management Grants. Annex Table 4.N summarizes the purpose of allocated Proposition 1E dollars.

**Annex Table 4.N: Proposition 1E Uses of Bond Funds**

| Bond Project Allocation | Amount Allocated | Amount Committed | Balance |
|---|---|---|---|
| State Plan for Flood Control | $3,000,000,000 | $3,027,040,000 | -$27,040,000 |
| Flood Control and Flood Prevention | $500,000,000 | $266,415,000 | $233,585,000 |
| Flood Protection Corridors and Bypasses | $290,000,000 | $301,970,000 | -$11,970,000 |
| Storm Water Flood Management | $300,000,000 | $285,779,000 | $14,221,000 |
| Statewide Bond Cost | 0 | $143,150,000 | -$143,150,000 |
| *Total* | *$4,090,000,000* | *$4,024,354,000* | *$65,646,000* |

## Proposition 84

The voter-approved $5.4 billion Proposition 84 (the Safe Water Quality, Supply, Flood Control, River and Coastal Protection Act of 2006) will allocate about $1.2 billion in additional funding beyond Proposition 1E for flood control projects including the Delta Levee Program, State Flood Control Subventions Program, and floodplain evaluation and delineations (see Annex Table 4.O). Local agencies have already proposed mitigation and levee strengthening projects in the amount of $204 million related to funds from Propositions 1E and 84.

**Annex Table 4.O: Proposition 84 Uses of Bond Funds**

| Bond Project Allocation | Amount Allocated | Amount Committed | Balance |
|---|---|---|---|
| Safe Drinking Water and Water Quality Projects | $1,525,000,000 | $1,350,392,000 | $174,608,000 |
| Flood Control | $800,000,000 | $778,902,000 | $21,098,000 |
| Statewide Water Planning and Design | $65,000,000 | $63,407,000 | $1,593,000 |
| Protection of Rivers, Lakes and Streams | $928,000,000 | $805,828,000 | $122,172,000 |
| Forest and Wildlife Conservation | $450,000,000 | $443,198,000 | $6,802,000 |
| Protection of Beaches, Bays and Coastal Waters | $540,000,000 | $463,128,000 | $76,872,000 |
| Parks and Nature Education Facilities | $500,000,000 | $431,048,000 | $68,952,000 |
| Sustainable Communities and Climate Change Reduction | $580,000,000 | $556,358,000 | $23,642,000 |
| Statewide Bond Cost | $0 | $188,580,000 | ($188,580,000) |
| *Total* | *$5,388,000,000* | *$5,080,841,000* | *$307,159,000* |

## Proposition 40

The voter-approved $2.6 billion Proposition 40 (the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002) was passed to protect natural resources in California. Of the total, $1.5 billion was allocated to support the CALFED Bay-Delta Program, which protects coastal zones and funds flood mitigation efforts.

## Proposition 50

Proposition 50, also known as the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002, provided $825 million of bond funds for a variety of water projects including development of river parkways and improved security for state, local, and regional water systems. Eligible applicants have included local agencies, educational institutions, nonprofit organizations, and Native American tribal governments, together with state and federal agencies.

## California Water Resources Control Board Programs

The Water Resources Control Board has three programs for funding hazard mitigation projects:

1. *Watershed Protection Program*. This program provides grants to municipalities, local agencies, or nonprofit organizations to develop local watershed management plans and/or implement projects consistent with watershed plans. Sixty percent of the funds are allocated to projects in Los Angeles, Orange, Riverside, Ventura, San Bernardino, and San Diego counties. Forty percent of the funds are allocated to projects in the remaining counties. A total of $90 million is allocated for the program, $35 million of which is set aside for grants to small communities.

2. *Southern California Integrated Watershed Program*. This program provides local assistance to the Santa Ana Watershed Project Authority for projects in the Santa Ana watershed such as basin water banking; contaminant and salt removal; removal of non-native plants; the creation of wetlands; water conservation efficiency; storm water management; and planning and implementation of a flood control program to protect agricultural operations and adjacent property and to assist in abating the effects of waste discharges into the water supply. Provides $235 million in funding to localities through the Santa Ana Watershed Project Authority.

3. *Lake Elsinore and San Jacinto Watershed Program*. This program provides $15 million in local funding for watershed management and flood control projects consistent with the Lake Elsinore Management Plan that preserve agricultural land, protect wildlife habitat, protect and enhance recreation resources, and improve lake water quality.

## Department of Water Resources (DWR) Programs

DWR has five programs that provide funding for hazard mitigation projects:

1. *Urban Streams Restoration Program*. This competitive grant program promotes effective low-cost flood control projects, including stream clearance and flood mitigation and cleanup activities. Funds are available to public agencies, nonprofit organizations, and local community groups. All public agencies must have a partnership with a nonprofit citizens group to receive funding. Individual projects are limited to a $1 million maximum.

2. *Flood Protection Corridor Program*. This is a competitive grant program for flood protection projects, including the acquisition of real property and the acquisition of easements from willing sellers. Funds are available to public agencies, nonprofit organizations, and DWR.

3. *Infrastructure Rehabilitation Program*. DWR provides competitive grants for feasibility studies and cost-effective construction projects for the replacement of water distribution and storage infrastructure as well as construction grants to economically disadvantaged public agencies and mutual water companies. Applicants must demonstrate water losses or that the system is in imminent danger of failure. Funds from this program have been used to replace elevated water tanks that do not meet seismic standards.

4. *Flood Control Subventions Program*. The DWR Division of Flood Management provides financial assistance to local agencies cooperating in the construction of federal flood control projects. For more information, see: www.fcpsubventions.water.ca.gov

5. *Local Levee Assistance Program*. Provides funding for projects to immediately repair and improve critically damaged local levees, evaluate levee stability and levee seepage, and to perform design or alternatives analysis. http://www.water.ca.gov/floodmgmt/fpo/sgb/llap/

## 4.3.3. WILDFIRE HAZARD MITIGATION FUNDING

### CAL FIRE Programs

The goal of the Fuels Reduction Program within CAL FIRE is to reduce wildland fuel loadings that pose a threat to watershed resources and water quality. CAL FIRE is implementing the Fuels Reduction Program through the following existing mitigation programs:

1. *Vegetation Management Program*. The Vegetation Management Program (VMP) is a cost-sharing program that focuses on the use of prescribed fire, and mechanical means, for addressing wildland fire fuel hazards and other resource management issues on State Responsibility Area (SRA) lands. The use of prescribed fire mimics natural processes, restores fire to its historic role in wildland ecosystems, and provides significant fire hazard reduction benefits that enhance public and firefighter safety. VMP allows private landowners to enter into a contract with CAL FIRE to use prescribed fire to accomplish a combination of fire protection and resource management goals. The Vegetation Management Program has been in existence since 1982 and has benefitted an average of approximately 35,000 acres per year since its inception.

2. *California Forest Improvement Program*. Funding is available for fuels reduction projects conducted under the California Forest Improvement Program (CFIP). Eligible forestland owners can be reimbursed up to 90 percent of their expenses for fuels reduction projects conducted under CFIP. Landowners must own at least 20 acres of forestland but not more than 5,000 acres of forestland in California. CFIP may grant up to 75 percent of the cost of a project. (90% cost share rates are available on lands substantially damaged by fire, insects and disease within ten years prior to the execution of a contract; 90% cost share rates are available for all Cooperative Forest Management Plans for agreements signed from November 1, 2011 to April 30, 2014 or until special funds expire). http://www.fire.ca.gov/resource_mgt/downloads/2011-CFIP_UsersGuide.pdf

3. *Forest Stewardship Program*. This program combines funds from state and federal sources to assist communities with multiple-ownership watershed and community issues related to pre-fire fuels treatment, forest health, erosion control, and fisheries issues.

### California Fire Safe Councils Program

An additional fire mitigation program is operated through the California Fire Safe Council, a state-level nonprofit comprised of 150 local Fire Safe Councils. These local councils are made up of cross-sections of the community and can apply for grant funding from federal and private entities (such as PG&E) for fuel hazard reduction and education programs. Annex Table 4.P summarizes the total value of projects selected for federal funding through California Fire Safe grant programs by source from 2008 to 2013.

**Annex Table 4. P: Total Value of Mitigation Projects Funded by California Fire Safe Councils**

| Program | Total Value of Projects | | | |
|---|---|---|---|---|
| | 2008-2009 | 2010-2011 | 2012 | 2013 |
| Bureau of Land Management (BLM) Community Assistance | 2,593,292 | $689,176 | N/A | N/A |
| USDA Forest Service State Fire Assistance (SFA) | $3,214,400 | $9,825,324 | N/A | $4,582,621 |
| USDA Forest Service State Fire Assistance (SFA) 25% Cost Share | N/A | $4,100,000 | N/A | N/A |
| USDA Forest Service State Fire Assistance (SFA) 50% Cost Share | N/A | $2,870,000 | $4,105,000 | N/A |
| USDA Forest Service State Fire Assistance Cohesive Wildland Fire Management Strategy Focus (SFAX) | N/A | N/A | N/A | $1,169,593 |
| National Parks Service (NPS) Community Assistance | $207,150 | $253,500 | N/A | N/A |
| U.S. Fish and Wildlife Service Wildland Urban Interface | $368,727 | N/A | N/A | N/A |
| *Total* | *$6,383,569* | *$17,738,000* | *$4,105,000* | *$5,752,214* |

*Source: The Fire Safe Council*

### Air Pollution Control District Programs

The air pollution control districts can provide funds to support chipping projects that reduce air pollution and lower fuel levels. At times forest health is a factor in chipping, which is an alternative to controlled fires. In 2003, Proposition 40 provided funds to address the fire hazard related to bark beetle infestation in the mountain areas of San Bernardino and Riverside counties.

## 4.3.4. OTHER STATE HAZARD MITIGATION FUNDING

### Commerce and Economic Development Department Programs

The Commerce and Economic Development Department administers two programs that may provide funding for hazard mitigation projects:

1. *The Infrastructure State Revolving Fund (ISRF).* This program provides low-cost financing to public agencies for a wide variety of infrastructure projects. Loans are available in amounts ranging from $250,000 to $10,000,000 with loan terms of up to 30 years. Eligible applicants include any subdivision of a local government, including cities, counties, redevelopment agencies, special districts, assessment districts, joint powers authorities, and nonprofit corporations formed on behalf of a local government. Flood control is an eligible project type.

2. *The Rural Economic Development Infrastructure Program (REDIP).* This program provides loans to eligible public entities for water treatment and supply facilities and flood control projects. There is a limit of $1 million per project.

## Department of Housing and Community Development Programs

*Community Development Block Grant Program*

The Community Development Block Grant (CDBG) program, administered by the Department of Housing and Community Development (HCD) funds housing, economic development, public works, community facilities, and public service activities for lower-income people in small, typically rural communities. State regulations dictate the method of fund distribution to eligible jurisdictions, including ratings and rankings for most of the funds. State regulations allow the amendment of an existing grant to fund an otherwise CDBG-eligible replacement project or activity in an area proclaimed by the Governor as either a "state of emergency" or a "local emergency" as defined in Government Code Section 8558.

*Codes and Standards Program*

The purpose of HCD's Codes and Standards Program is to protect the public's health, safety, and general welfare in buildings and structures designed for human occupancy by the enforcement of the relevant provisions of the California Health and Safety Code, including the State Housing Law, Employee Housing Act, Mobile Home Parks Act, California Factory-Built Housing Law, and the Mobile Home-Manufactured Housing Act of 1980 as well as by enforcement of federal and state standards for the construction and safety of manufactured homes.

*Disaster Recovery Initiative*

In June 2009, HUD announced disaster aid to 11 states, including California, under its ongoing Disaster Recovery Initiative (DRI) program. At least $39.5 million has been made available for cities and counties affected by the 2008 wildfires (FEMA 3287-EM and FEMA 1810-DR) through the State of California Department of Housing and Community Development, using federal DRI funds, under the state Community Development Block Grant program. Between 2008 and 2012 $24,265,098 has been awarded, including $15 million allocated for forward-thinking land use planning. The remaining $5.235 million is awarded on an annual NOFA basis through the CA CBDG website.

The primary objectives of the 2008 DRI program are to:

1. Provide financial assistance to eligible jurisdictions (counties, cities, and tribes) for necessary expenses related to disaster relief, long-term recovery and restoration of infrastructure, housing and economic revitalization in areas affected by wildfire disasters occurring in 2008

2. Provide incentives to eligible jurisdictions for the incorporation of forward-thinking hazard mitigation planning activities in their recovery efforts (e.g., creation/updating of Local Hazard Mitigation Plans, or creation/updating of safety elements in general plans)

*Eligibility*

Eligible applicants include cities, counties, and federally recognized Native American tribes within counties for which major disasters were declared by the President in 2008. Eleven counties were listed in disaster declaration FEMA 3287-EM: Butte, Kern, Mariposa, Mendocino, Monterey, Plumas, Santa Barbara, Santa Clara, Santa Cruz, Shasta, and Trinity counties. Tribal organizations included the federally recognized Hoopa Valley Tribe and Yurok Tribe. Four counties were listed in major disaster declaration FEMA 1810-DR for 2008: Los Angeles, Orange, Riverside, and Santa Barbara counties.

Applicants within the eligible counties with no 2008 wildfire damage area may apply only for forward-thinking land use planning, such as general plan safety elements, LHMPs, and modern disaster codes (and associated administration costs). Under the 2008 DRI Notice of Funding Availability (NOFA), eligible applicants will be allowed to apply for grant amounts of up to $8.5 million, depending on the scope and number of eligible activities being applied for and the percentage of low- and moderate-income households that will be assisted.

### Strategic Growth Council Sustainable Planning Grant Funds

California is a national leader in its efforts to protect natural resources, reduce greenhouse gas emissions, and move toward sustainable communities. In 2010, the Strategic Growth Council (SGC), created through adoption of SB 732, The Council's mission is to help make California's communities more sustainable. The Council defines sustainability holistically through: reducing greenhouse gas emissions; improving air and water quality; improving protection of natural resources and agricultural lands; increasing the availability of affordable housing; improving public health, improve transportation; encouraging sustainable land use plans and greater infill development; and revitalizing urban and community centers in a sustainable manner. Using Proposition 84 funds the Urban Greening Program has awarded over $44 million through spring 2012, and the remaining $21.5 million is anticipated to be awarded in spring 2014.

The Sustainable Communities grants in rounds one and two totaled $50,673,260. The remaining $15,773,740 is to be awarded in the November 2013 request for proposals round. Hazard mitigation activities can be part of climate adaptation grant projects. Cal OES has previously urged inclusion by SGC of hazard mitigation planning as a specific grant-eligible activity.

For more information regarding the SGCs grant program, see: http://www.sgc.ca.gov/planning_grants.html

### California Natural Resources Agency

*River Parkways Grant Program*

California voters passed the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006. It added to the Public Resources Code, Section 75050, authorizing the Legislature to appropriate the sum of $62 million for the acquisition, restoration, protection and development of river parkways in accordance with the California River Parkways Act of 2004.

Grant Funds are awarded to Public Agencies and California Nonprofit Organizations to provide compatible recreational opportunities, including trails for strolling, hiking, bicycling and equestrian uses along rivers and streams; to protect, improve, or restore riverine or riparian habitat, including benefits to wildlife habitat and water quality; maintain or restore the open space character of lands along rivers and streams so that they are compatible with periodic flooding as part of a flood management plan or project; convert existing developed riverfront land into uses consistent with river parkways; and provide facilities to support or interpret river or stream restoration or other conservation activities. For more information see: http://resources.ca.gov/docs/FINAL_PROP_84_GUIDELINES.pdf

*Environmental Enhancement and Mitigation*

The Environmental Enhancement and Mitigation Program (EEMP), established in 1989, offers a total of $10 million each year for grants to local, state, and federal governmental agencies and to nonprofit organizations. Eligible projects must be directly or indirectly related to the environmental impact of the modification of an existing transportation facility or construction of a new transportation facility. Funding categories are: highway landscaping and urban forestry, resource lands projects, roadside recreation projects, and mitigation projects beyond the scope of the lead agency.

## 4.4. LOCAL FUNDING SOURCES

Local funding occurs in various forms. California's local governments and special districts have made considerable commitments to funding mitigation measures. Local governments must provide a local match of 25 percent for federal funds under HMGP, PDM, and FMA grant programs.

Many of California's local governments (cities, counties, and special districts spend their own funds for hazard mitigation efforts.

The following discussion provides examples of mitigation funding at the local level.

### 4.4.1. NAPA COUNTY FLOOD PROTECTION AND WATERSHED IMPROVEMENT EXPENDITURE PLAN

An example of local capacity is the Napa County Flood Protection and Watershed Improvement Expenditure Plan. Voted on and passed in 1998 by the citizens of Napa County, Measure A was enacted as the Napa County Flood Protection Sales Tax Ordinance (97-1) which established a 0.5-cent increase in the local sales tax for a 20-year period (1998-2018) to fund flood protection water supply reliability, and wastewater projects. This measure has enabled Napa County to collect over $70 million in local funds that are paired with financial help from the Napa County Flood Control and Water Conservation District (NCFCWCD) and the U.S. Army Corps of Engineers. This money is divided among the various cities in the county based on the percentage of sales tax that each city generates.

Annex Table 4.Q shows the percentage of funding that each city receives.

**Annex Table 4.Q: Percentage of Funding Received from Measure A**

| Percentage of Funding Received (2012) | |
|---|---|
| **City** | **Funding** |
| City of American Canyon | 11.1% |
| City of Calistoga | 1.1% |
| City of Napa | 40.2% |
| City of St. Helena | 4.9% |
| Town of Yountville | 3.0% |
| Napa County Unincorporated Areas | 14.8% |

*Source: Napa County*

In addition to funding flood mitigation measures, the plan has taken a restorative approach to flood protection by connecting the Napa River to its historic floodplain.

### 4.4.2. CITY OF ROSEVILLE FLOODPLAIN MANAGEMENT

Roseville is another city that is actively pursuing floodplain management on the local level by using a combination of local and federal funding. In addition to setting up an advanced flood warning system that alerts residents to current flood levels, the city prohibits building in the floodplain and has brought hundreds of homes out of the 100-year floodplain through the clearing and maintenance of streams. Roseville has become the first community in the nation to receive FEMA's Community Rating System highest rating of Class #1, entitling Roseville property owners to discounts of up to 45 percent on their flood insurance premiums.

### 4.4.3. SAN FRANCISCO PUBLIC UTILITIES COMMISSION WATER SYSTEM IMPROVEMENT PROGRAM (WSIP)

The Water System Improvement Project (WSIP) is a massive retrofitting project being undertaken by the San Francisco Public Utilities Commission (PUC). The purpose of the $4.6-billion initiative is to retrofit the city's water supply system in order for it to withstand a major earthquake, which experts predict has a 63-percent chance of happening over the next 30 years. In 2002, San Francisco voters passed legislation that nearly doubled their residential water rates (from $23 to $40 per month) in order to fund this initiative. One of the main projects being undertaken is a $347- million tunnel that will be constructed beneath San Francisco Bay. This tunnel will be five miles long, 14 feet high and as deep as 103 feet underground. A nine-foot pipe that brings water from the Hetch Hetchy reservoir to the Bay Area will run through the tunnel. The Bay Tunnel will have a 15-foot-excavated diameter with a final tunnel lining of 9-foot diameter welded

steel pipeline. Tunnel spoils will be used as part of the South Bay Salt Pond Restoration Project conversion of adjacent salt ponds to marshland. Compared with the current water supply system of aboveground piping, this system will be much less susceptible to a large earthquake on either the San Andreas or Hayward faults. The project broke ground in the spring of 2010 and is scheduled to be completed by 2015.

The Water System Improvement Program (WSIP) reached the peak of construction in 2012 with 18 projects valued at $2.6B in construction and all major projects launched. Currently, more than two-thirds of the 81 WSIP projects have completed construction between California's Central Valley and San Francisco. This past year, redundant seismically engineered conduits were installed where the Hetch Hetchy Regional Water System crosses three of the nation's most active earthquake faults to help establish a resilient supply system around the San Francisco Bay.

*Calaveras Dam Replacement*

The project consists of building a new-zoned earth and rock fill dam immediately downstream of the existing dam that will have a structural height of 220-feet high and is designed to accommodate a maximum credible earthquake on the Calaveras Fault. The total volume of the dam will be approximately 3.5 million cubic yards. The $575 million replacement dam project will restore the original reservoir capacity of 96,850 acre-feet, or 31 billion gallons of water. Expected completion date is November 2017.

### 4.4.4. CITY OF SANTA BARBARA LAND PURCHASE

Avoidance is an effective mitigation strategy. In an attempt to reduce vulnerability to landslides, the City of Santa Barbara purchased four high risk for landslide properties. The four properties cost a combined total of approximately $1 million and were purchased in 1998 using both federal and local funds (with 75 percent of the project funded through FEMA's pre-disaster mitigation grant program). The properties were left vacant in order to avoid any risk factors associated with landslides. In November 2008, when the Tea Fire swept through the area burning over 2,000 acres and destroying 210 homes, the project proved to mitigate risks associated with multiple hazards (wildfires and landslides). If the properties had not been purchased and vacated by the city, the 2008 combined value of the structures and possessions on the properties would have totaled over $1.8 million. Therefore, by preemptively buying the properties and negating any future losses, a minimum of $800,000 was saved. This figure does not factor in the price of fighting the fire, the cost of emergency shelter for the residents, or the potential loss of human life. Inclusion of these difficult-to-calculate factors would increase the estimated savings that resulted from the property.

The results of the mitigation efforts in the Tea Fire area show that the estimated overall benefit-cost ratio for this property acquisition mitigation project is 1.75:1.When property acquisitions are performed in an area threatened by multiple hazards, the mitigation becomes more beneficial than in an area threatened by a single hazard.

In order to be better able to calculate the benefits of preemptive measures such as the one taken by Santa Barbara, Cal OES is establishing the State Mitigation Assessment Review Team (SMART) system, a loss avoidance tracking system being implemented by the California Governor's Office of Emergency Services (Cal OES) with the help of the City and Regional Planning Department at Cal Poly. The program analyzes completed mitigation actions and establishes a record of the actual cost avoidance of the mitigation actions. The Santa Barbara Tea Fire was the first time that SMART analysis has been used on a multi-hazard mitigation project. For more information on SMART, see Section 7.4.1 in Chapter 7.

## 4.5. ALTERNATIVE FUNDING SOURCES

### 4.5.1. COMBINED FUNDING APPROACHES

Combining funding from one or more state agencies, state and local agencies, federal and state agencies, commonly occurs on projects in California. Partnerships have also been formed with nonprofit groups and utility companies. These approaches have been both informal and formal.

### 4.5.2. CALIFORNIA FINANCING COORDINATING COMMITTEE (CFCC)

The California Financing Coordinating Committee (CFCC), created in 1998, consists of state and federal agencies and departments that work together to offer coordinated and streamlined access to subsidized infrastructure financing for California's local communities. The CFCC members provide potential borrowers and grant recipients with an efficient and effective infrastructure funding mechanism. Funds for flood control projects are made available through the California Infrastructure and Economic Development Bank (I-Bank). http://www.cfcc.ca.gov

### 4.5.3. NONPROFIT GOVERNMENT PARTNERSHIPS

Land purchases in California have been carried out in cooperation with nonprofit agencies. The Trust for Public Land, The Nature Conservancy, and Conservation Fund are all helping communities throughout the country to develop local and regional plans for systems of open space. The California Council of Land Trusts (CCLT) is the statewide voice for more than 150 land trusts that conserve land and waters in local communities throughout California. http://www.calandtrust.org

### 4.5.4. UTILITY COMPANIES

California's public and private utilities play an essential role in keeping critical facilities up and running. Mitigation is an essential part of core infrastructure planning for them. The California Utilities Emergency Association (CUEA) is integrated into state's overall mitigation effort (http://www.cueainc.com). CUEA consists of 280 full members and 74 associate members, and provides training programs for both members and associate members in mitigation and response protocols. Its annual base budget of $340,000 is member-paid, and members also contribute equipment and staffing for response events in an average annual amount of $10 million per year.

CUEA major programmatic efforts are directed at building public/private partnerships in the areas of utilities and transportation, as called for under the Governor's Directive S-04-06. Joint training workshops are provided by Cal OES to CUEA members on a quarterly basis.

Major private utility companies, such as Pacific Gas and Electric (PG&E) and Southern California
Edison, as well as small local water companies, continuously program capital investments that provide strengthening of their companies' overall capacities to withstand various natural and human-caused disasters. Many of these investments represent incremental improvements in the resilience against natural and human-caused hazards within their plants and facilities.

## 4.6. OTHER FUNDING SOURCES

Additional examples of funding arrangements include the following:

### 4.6.1. BAYPREP

BayPrep, operated by San Francisco Community Agencies Responding to Disaster (SFCARD), was a separate program funded by the Hewlett, Haas, and San Francisco foundations, as well as other grant agencies. Begun in 2007, the program improved disaster preparedness in the San Francisco Bay Area by ensuring that

all communities are taken into account when planning for and responding to a disaster. The program focused on community and faith-based organizations and other nonprofit organizations that serve at-risk populations. These organizations can play crucial roles in initially responding to a disaster. BayPrep developed a standard for preparedness for NGO service providers and an implementation strategy. In 2010, the CalVolunteers "adopted" the standard and distributed it through training workshops. In late 2010 BayPrep become part of San Francisco Community Agencies Responding to Disaster (SFCARD), an agency that connects nonprofit, faith-based and private organizations with the network and knowledge they need to continue providing critical services after a disaster. The standard of preparedness continues, in 2013, to be taught as part of SFCARD training courses.

### 4.6.2. BART EARTHQUAKE SAFETY BOND

The Bay Area Rapid Transit District (BART) Earthquake Safety Bond, known as Measure AA, funds provide $980 million of the $1.2 billion project cost to retrofit BART facilities in Contra Costa, Alameda, and San Francisco counties. The bonds are repaid from proceeds of property tax estimated to average $7.04 annually per $100,000 of assessed value. The remainder of the project will be funded through additional BART passenger revenues ($50 million), funding from the Caltrans Local Seismic Retrofit Program ($134 million), and Regional Measure 2 ($143 million). The goal of the project is to strengthen the original BART system, protect public safety, and enable BART service to resume quickly in the event of a major earthquake. As of February 2013, work on seven Bart Stations and one Muni Station was complete. Work on the Transbay tube begins in 2014. All projects are scheduled for completion by 2018.

### 4.6.3. PORT OF LONG BEACH MITIGATION GRANT PROGRAM

The Port of Long Beach funds a mitigation grant program is designed to improve community health by lowering port related impacts on air pollution and greenhouse gas emissions. Grant support is given in three broad categories: (1) Air quality improvements and noise-reduction measures at schools and related sites; (2) Air quality improvements at hospitals, clinics, medical centers and senior facilities, as well as health education, outreach and screening; and (3) Greenhouse gas reductions through projects such as renewable power, energy efficiency, tree-planting, etc.
http://www.polb.com/environment/grants/default.asp

### 4.6.4. CONTRA COSTA COUNTY KELLER MITIGATION FUND

The Keller Canyon Landfill Fund supports mitigation projects that benefit residents living in the Bay Point, Pittsburgh, and other parts of Antioch and Concord, in Contra Costa County. Projects related to public safety, community beautification, and community services are considered.

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# ANNEX 5 - CALIFORNIA LOCAL HAZARD MITIGATION PLAN STATUS REPORT

ANNEX CONTENT

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## 5.1. INTRODUCTION

Cal OES undertakes a review of approved and adopted Local Hazard Mitigation Plans (LHMPs) for each update of the State of California Multi-Hazard Mitigation Plan (SHMP). LHMPs are required as a precondition for federal hazard mitigation grant eligibility. Federal law and guidelines require description of the relationship between LHMPs and the SHMP. The purpose of LHMP reviews by Cal OES is to foster partnerships, promote more resilient communities, and reduce the costs associated with disaster response and recovery by promoting hazard mitigation activities with SHMP goals and objectives.

Findings from the 2007 review were expanded in a December 2008 supplemental report titled "Local Hazard Mitigation Planning in California: A Report on the Implementation of LHMPs under DMA 2000". The report was prepared for the California Emergency Management Agency (now Cal OES) by the California Polytechnic State University San Luis Obispo Community Safety and Sustainability Group (CSSG).

The 2010 review supplemented the 2008 report and was documented in Annex 4 of the 2010 SHMP. This 2013 annex updates some of the data and analysis from the 2007 review, 2008 report, and 2010 Annex 4.

## 5.2. SUMMARY OF PREVIOUS LHMP FINDINGS

The 2007 SHMP documented the contents of most of the LHMPs that had been approved and adopted as of August 2007 and analyzed a survey completed by over half of the jurisdictions that had completed LHMPs. The 2010 SHMP contained a review of LHMPs approved by the Federal Emergency Management Agency (FEMA) and adopted by local jurisdictions between 2007 and December 2009. No new significant trends were revealed.

At the time of adoption of the 2010 SHMP, the original findings from the 2007 LHMP review and 2008 report were still considered valid. Local government participation in mitigation planning was thought to be significant and generally of good quality. Positive aspects found in most LHMPs, based on the content review and survey findings, were:

- Substantive citizen participation
- Identification of hazards and consistency with the state perspective in prioritization of those hazards
- Use of best available data on hazards from federal and state sources
- Adherence to "best practices" for vulnerability assessment (primarily FEMA "How-To" Guides)
- Adoption of mitigation measures that reflect the jurisdictions' hazard profile

- Satisfaction of local officials with state and federal technical support and the benefits of adopting an LHMP

However, the 2008 report had revealed several areas of concern. These included the following:

1. LHMPs prepared as part of multi-jurisdictional plans by which cities and counties collaborated in mitigation planning often showed minimal effort from participating jurisdictions in establishing unique vulnerability assessments and mitigation measures. Some multi-jurisdictional plans included analysis prepared by the lead agency for the region as a whole but did not provide detailed, jurisdiction-specific information.

2. Few LHMPs (only 17 percent) addressed future land use and development trends and their effect on hazard and risk assessment. Although local planning departments played an important role in preparation of most LHMPs, it appears that their special expertise in growth and development was not well used.

3. The integration of LHMPs and statutorily mandated general plan safety elements provides a powerful mechanism for ensuring that land use, infrastructure, transportation, and environmental decisions consider and include hazard reduction and mitigation. However, only 15 percent of jurisdictions surveyed chose to adopt their LHMPs as part of or together with their general plan safety elements; another 23 percent referenced their LHMPs in the safety element.

4. As a group, the LHMPs had a generic "catch-all" approach to establishing mitigation measures; resulting in extensive lists of unranked projects (i.e. no priorities were identified). Without a ranking, it is difficult to establish a method to fund, staff, or implement projects with the highest community mitigation benefit.

5. Non-mitigation activities (usually preparedness and response activities) dominated these plans, thus moving the focus away from the core mitigation. This is a major weakness needing correcting in the next round of LHMPs.

6. Most LHMPs had almost no linkage to statewide hazard mitigation efforts that have a need for local consistency. To achieve an integrated statewide approach, the variety of state agency plans that address hazard mitigation need to be considered.

7. Funding for projects was uncertain, with 47 percent of jurisdictions not knowing how they would fund the identified mitigation measures. Over 80 percent cited insufficient funds and staff as implementation constraints and 25 percent cited lack of technical expertise as a constraint.

8. There was an unevenness of documentation and concept definition within and among plans. This made plans difficult to follow and prevented comparison of plans by city size, county or other common categories. The latter concern makes statewide aggregation of local plan data difficult and inhibits integrated regional planning.

## 5.3. PROGRESS ON IMPROVING LHMPS

Since adoption of the 2007 SHMP, California has made significant progress in coordination of state and local hazard mitigation planning. Cal OES engages with federal agencies, state agencies and local jurisdictions to share information and provide guidance through the use of state resources, including, but not limited to, the My Hazards and My Plan databases. This information is provided to the local jurisdictions for use during the planning process when determining the jurisdictions' threats, vulnerabilities and priorities.

Additionally, through its LHMP Training Workshop Program, Cal OES provides technical assistance to assist local governments throughout their planning process. The workshops focus on the LHMP planning process, risk assessment and the development of mitigation strategies and objectives. The current LHMP training is based upon the FEMA Review Tool and associated requirements, as well as development of mitigation actions and strategies as outlined in FEMA's Mitigation Planning Handbook and FEMA's Mitigation Strategy Handbook. The additional assistance provided to local jurisdictions has improved the quality of new and updated LHMP currently underway and has increased consistency of state and federal planning requirements.

Throughout the next planning cycle, Cal OES will continue to provide LHMP technical assistance and training workshops to local governments, review LHMPs and assist with necessary additions and corrections with the jurisdictions prior to their submission for final FEMA Region IX approval. As part of the SHMP update process, these continual reviews also assist the state in identifying local planning trends and training needs and provide enhanced opportunity to assist local governments in creating the mitigation capabilities needed to promote and sustain resilient communities.

## 5.4. 2013 UPDATED DATA AND ANALYSIS

The following sections present data collected during preparation of the 2013 SHMP, together with updated analysis.

### 5.4.1. CALIFORNIA LHMP ADOPTION STATUS

As of May 2013, 194 cities, 32 counties, and 148 special districts had FEMA-approved, locally adopted LHMPs (either single- or multi-jurisdiction plans), for a total of 374 jurisdictions with plans (see Annex Table 5.A). This is a decrease from 2007 and 2009 (see Annex Tables 5.B and 5.C), which is not unexpected given that:

- LHMPs must be updated every five years
- While some jurisdictions have not previously adopted an LHMP, others have done so but have been slow to meet the update requirement (and thus their approvals have lapsed)
- A lag in LHMP revisions may have been created in recent years by the recession-induced state fiscal crisis.

For an additional 106 cities, 7 counties, and 153 special districts, LHMPs are either in the last phase of local adoption or are under FEMA review.

**Annex Table 5.A: LHMP Status as of May 2013**

| Jurisdiction Type | Number of California Jurisdictions | Number and Percent of Total Jurisdictions with Approved LHMPs | Population Covered (Percent of State Total)† |
|---|---|---|---|
| City | 482 | 194 (40%) | 17,106,211 (64%) |
| County (Unincorporated) | 58 | 32 (55%) | 4,699,884 (17%) |
| Special District/Other | 4,400 | 148 (3%) | (not available) |

| | | | |
|---|---|---|---|
| TOTAL | | 374 | 21,806,095 (57%) |

*† Based on 2013 Department of Finance population estimates (state population total = 37,966,000)*
*‡ Estimated from California State Government Guide to Government from the League of Women Voters of California, retrieved 6/6/13. www.guidetogov.org/ca/state/overview/districts.html*

**Annex Table 5.B: LHMP Status as of December 2009**

| Jurisdiction Type | Number of California Jurisdictions | Number and Percent of Total Jurisdictions with Approved LHMPs | Population Covered (Percent of State Total)† |
|---|---|---|---|
| City | 480 | 324 (68%) | 24,680,326 (64%) |
| County (Unincorporated) | 58 | 37 (64%) | 6,350,652 (17%) |
| Special District/Other | 4,400‡ | 388 (9%) | (not available) |
| TOTAL | | 749 | 31,030,978 (81%) |

*† Based on 2009 Department of Finance population estimates (state population total = 38,292,687)*
*‡ Estimated from California State Government Guide to Government from the League of Women Voters of California, retrieved 6/15/07. www.guidetogov.org/ca/state/overview/districts.html*

**Annex Table 5.C: LHMP Status as of August 2007**

| Jurisdiction Type | Number of California Jurisdictions | Number and Percent of Total Jurisdictions with Approved LHMPs | Population Covered (Percent of State Total)† |
|---|---|---|---|
| City | 478 | 241 (50%) | 21,435,195 (57%) |
| County (Unincorporated) | 58 | 30 (52%) | 5,047,592 (13%) |
| Special District/Other | 4,400‡ | 332 (8%) | (not available) |
| TOTAL | | 603 | 26,482,787 (71%) |

*†Based on 2006 Department of Finance population estimates (state population total = 37,444,385)*
*‡ Estimated from California State Government Guide to Government from the League of Women Voters of California, retrieved 6/15/07. www.guidetogov.org/ca/state/overview/districts.html*

**Annex Table 5.D: LHMP Adoption by County as of May 2013**

| County | County has Adopted LHMP? | Number of Cities | Number of Cities with LHMPs | Percent of Cities with LHMPs |
|---|---|---|---|---|
| Alameda | Yes | 14 | 10 | 71% |
| Alpine | No | 0 | 0 | 0% |
| Amador | No | 5 | 0 | 0% |
| Butte | No | 5 | 0 | 0% |
| Calaveras | Yes | 1 | 0 | 0% |
| Colusa | No | 2 | 0 | 0% |
| Contra Costa | Yes | 19 | 14 | 74% |
| Del Norte | Yes | 1 | 1 | 100% |
| El Dorado | Yes | 2 | 0 | 0% |
| Fresno | Yes | 15 | 8 | 53% |
| Glenn | No | 2 | 0 | 0% |
| Humboldt | No | 7 | 2 | 29% |
| Imperial | Yes | 7 | 7 | 100% |
| Inyo | No | 1 | 0 | 0% |

| County | County has Adopted LHMP? | Number of Cities | Number of Cities with LHMPs | Percent of Cities with LHMPs |
|---|---|---|---|---|
| Kern | No | 11 | 0 | 0% |
| Kings | Yes | 4 | 4 | 100% |
| Lake | Yes | 2 | 0 | 0% |
| Lassen | Yes | 1 | 1 | 100% |
| Los Angeles | No | 88 | 21 | 24% |
| Madera | Yes | 2 | 2 | 100% |
| Marin | No | 11 | 8 | 73% |
| Mariposa | Yes | 0 | 0 | 0% |
| Mendocino | No | 4 | 0 | 0% |
| Merced | No | 6 | 0 | 0% |
| Modoc | No | 1 | 0 | 0% |
| Mono | No | 1 | 0 | 0% |
| Monterey | No | 12 | 0 | 0% |
| Napa | No | 5 | 1 | 20% |
| Nevada | Yes | 3 | 0 | 0% |
| Orange | Yes | 34 | 5 | 15% |
| Placer | Yes | 6 | 6 | 100% |
| Plumas | No | 1 | 0 | 0% |
| Riverside | Yes | 28 | 1 | 4% |
| Sacramento | Yes | 7 | 1 | 14% |
| San Benito | No | 2 | 0 | 0% |
| San Bernardino | Yes | 24 | 16 | 67% |
| San Diego | Yes | 18 | 18 | 100% |
| San Francisco | Yes | 1 | 1 | 100% |
| San Joaquin | Yes | 7 | 0 | 0% |
| San Luis Obispo | Yes | 7 | 0 | 0% |
| San Mateo | Yes | 20 | 12 | 60% |
| Santa Barbara | Yes | 8 | 8 | 100% |
| Santa Clara | Yes | 15 | 10 | 67% |
| Santa Cruz | Yes | 4 | 0 | 0% |
| Shasta | Yes | 3 | 1 | 33% |
| Sierra | No | 1 | 0 | 0% |
| Siskiyou | Yes | 9 | 5 | 56% |
| Solano | No | 7 | 3 | 43% |
| Sonoma | Yes | 9 | 7 | 78% |
| Stanislaus | Yes | 9 | 5 | 56% |
| Sutter | No | 2 | 0 | 0% |
| Tehama | Yes | 3 | 1 | 33% |
| Trinity | No | 0 | 0 | 0% |
| Tulare | Yes | 8 | 8 | 100% |
| Tuolumne | No | 1 | 0 | 0% |
| Ventura | Yes | 10 | 7 | 70% |
| Yolo | No | 4 | 0 | 0% |
| Yuba | No | 2 | 0 | 0% |

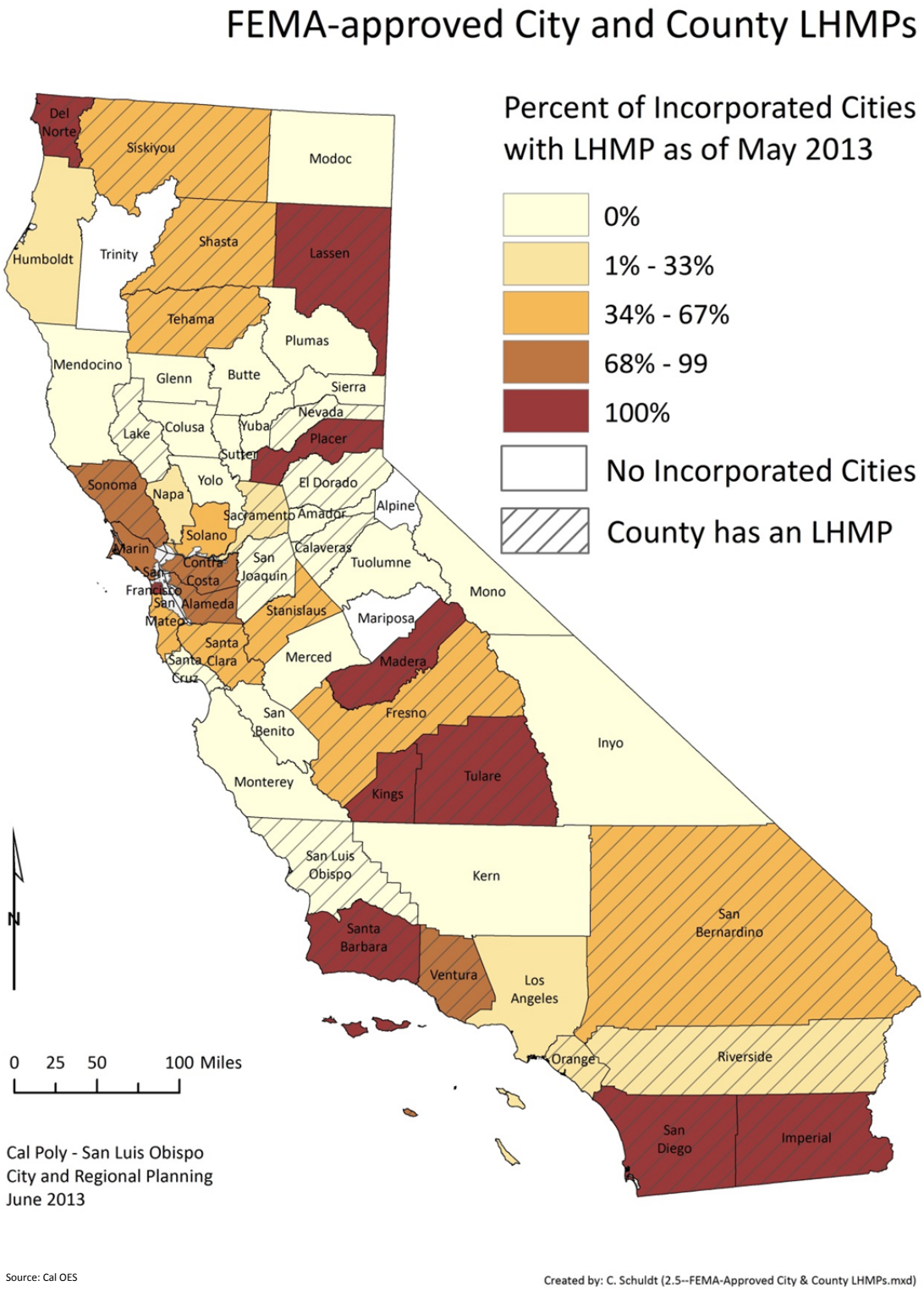
*Source: Cal OES LHMP Tracking Spreadsheet*

Annex Table 5.D provides LHMP status data by county, indicating counties having FEMA-approved and locally adopted LHMPs, the number of cities within each county, and the number and percent of cities by

county having FEMA-approved and locally adopted LHMPs. Not shown are regions and counties for which LHMPs are being prepared or revised on a multi-jurisdictional basis.

(Continued on next page)

**Annex Map 5.A: FEMA-Approved City and County LHMPs**




Annex Map 5.A shows the general status of LHMPs for cities and counties and indicates the geographic distribution of LHMP approvals based on data provided in Annex Table 5.D.

### 5.4.2. PREPARATION TRENDS

This section identifies trends related to the process used by local jurisdictions to prepare LHMPs. Notable trends include the following:

- Departments of emergency services (i.e., police, fire, emergency management) were the most common lead agencies for the planning process, (37 percent of the jurisdictions) with public safety departments a distant second (15 percent). Although this is decrease from 2010, it may be an artifact of how jurisdictions differentiate between emergency management divisions and public safety (police and fire) divisions.

- In 95 percent of jurisdictions, advisory bodies were established for preparation of the LHMPs, an 8 percent increase from 2010. In 26 percent of the jurisdictions with advisory bodies, members of the public (i.e., non-agency staff) were included.

- About 73 percent of jurisdictions that prepared LHMPs did so under the multi-jurisdictional option. This is very little change from 2010.

### 5.4.3. HAZARD AND RISK ASSESSMENT TRENDS

This section identifies trends related to hazard identification and ranking, risk assessment, and loss estimation. Notable trends include the following:

- The plans identified a total of 64 distinct hazards (see Annex table 5.E). Six new hazards—pipeline failure, solar storm, cyber-attack, hurricane, climate change, and sea level rise (SLR)--were identified since 2010, some apparently because of major incidents (e.g., the 2010 pipeline rupture in San Bruno) or because of increased attention by the state (climate change and sea level rise). Solar storms and cyber-attack were each identified as a hazard by a single jurisdiction, without explanation.

- The most commonly identified hazards are earthquake/seismic (96 percent of plans), flood (96 percent of plans), and wildfire (91 percent of plans). These are little changed from 2010. Annex Table 5.F shows the frequency of hazards cited in LHMPs; the table uses standardized hazard categories to account for the wide variety of approaches to classifying hazards found in the plans.

- Many of the LHMPs (an exact count was not possible due to the wide variety of ways it was addressed) identified climate change as exacerbating existing hazards rather than as a distinct hazard. This is a noticeable change from 2007 and 2010 when none of the plans addressed climate change.

- In 63 percent of the jurisdictions, human-caused hazards are identified despite the fact that the federal guidelines make this optional. This is up 13 percent from 2010. Many of these jurisdictions identified only single human caused hazard such as “dam failure,” however and did not identify other typical human-caused hazards.

- Increasingly cities and counties are conducting in-depth risk assessments that qualitatively describe hazards and their impacts, rather than producing a rank order of significance/importance. Most counties now are best characterized as “multi-hazard” as shown in Map 5.B.

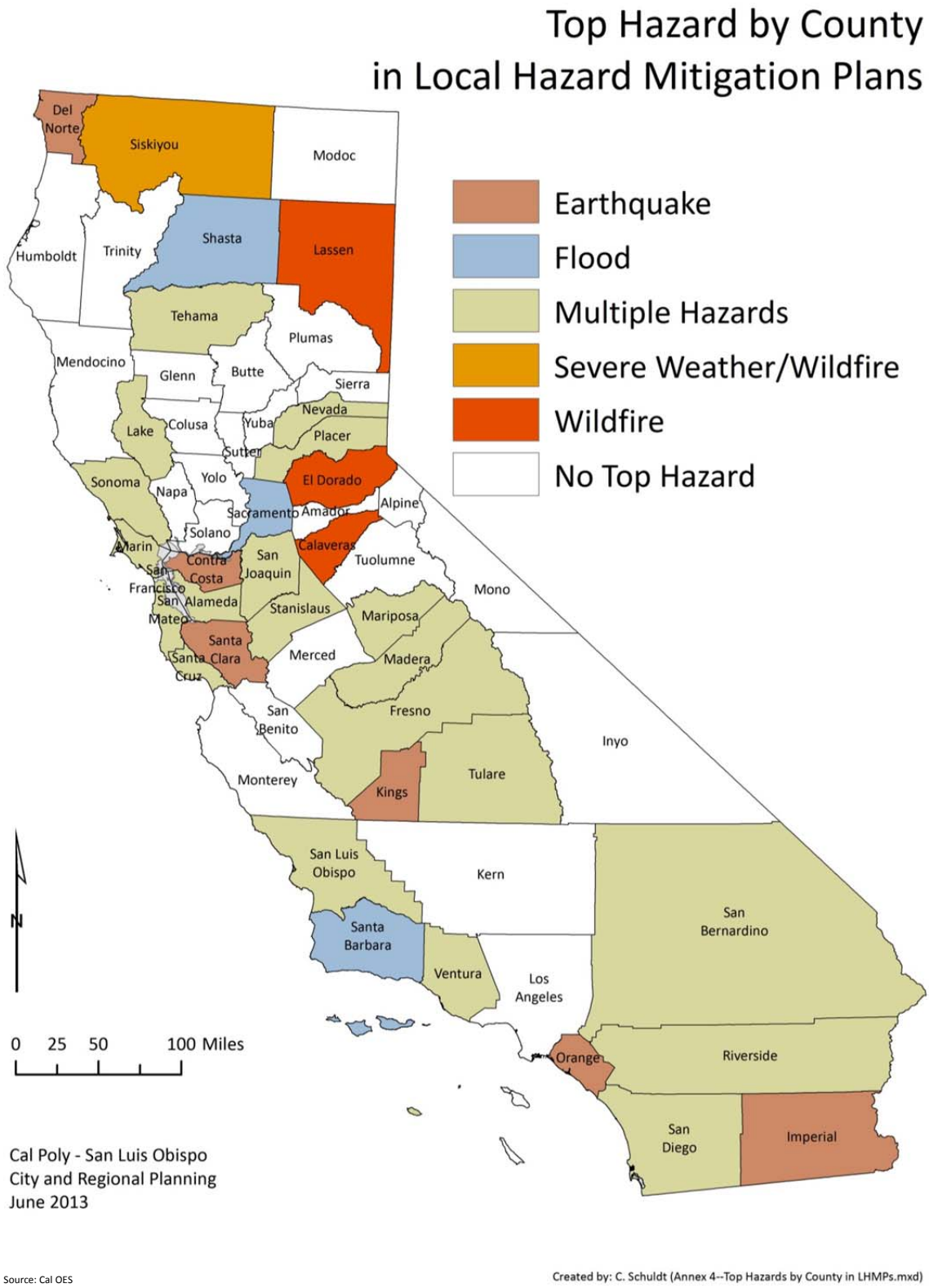
**Annex Table 5. E: Hazards Identified in LHMPs**

| LHMP Hazards | |
|---|---|
| Agriculture | Jail/Prison Events |
| Arson/Commercial Fire | Insect Hazards |
| Avalanche | Landslides |
| Biological/Health Emergency | Large Venue Fires |
| Blackout | Liquefaction |
| Civil Unrest | Mass Casualty |
| *Climate Change (as a distinct hazard) | Mine Safety |
| Coastal Erosion | Multi-Hazard |
| Coastal Storm | Nuclear Power Plant Accident |
| *Cyber Attack | *Pipeline Failures |
| Dam/Levee Failure | Propane Distribution Facilities |
| Data Telecommunications | Radiological Incident/Accident |
| Drought | *Sea Level Rise (SLR) |
| Earth Movement | Severe Weather |
| Earthquake | Sinkholes/Subsidence |
| Economic Disruption | Soil Hazards |
| Energy Emergency | Snow Storm |
| Explosions | *Solar Storm |
| Explosive Manufacturing and Storage | Special Events |
| Extreme Heat | Substations |
| Fire | Technological Failure |
| Fish Losses | Terrorism |
| Flooding | Tornados |
| Fuel Release | Toxic Pollution |
| Geologic Hazard | Transportation Incident |
| Ground Shaking | Tsunami |
| Groundwater Contamination | Unexploded Munitions |
| Hazardous Materials Release | Utility Loss |
| High/Straight Line Winds | Volcanoes |
| Human Caused | Water/Wastewater Disruption |
| *Hurricane | Wildfire |
| Infrastructure (Pipeline, Aqueduct) | Windstorms |

**New Since 2010*

Annex Map 5.B shows the "top" (most frequently identified) hazard cited by local jurisdictions with LHMPs. "No top hazard" indicates either that no jurisdiction in the county has an approved LHMP or that data from the LHMPs were insufficient to discern a primary hazard (no county reporting or fewer than 50 percent of cities reporting). The "top hazard by county" was determined by first assigning the ranking specified in a multi-jurisdiction plan for the county as a whole unless significant disagreement occurred among jurisdictions. In the latter case, the hazard ranked high by the plurality of jurisdictions was selected; this method was used for single-jurisdiction LHMP counties as well.

**Annex Map 5. B: Top Hazard by County**




Source: Cal OES

Created by: C. Schuldt (Annex 4--Top Hazards by County in LHMPs.mxd)

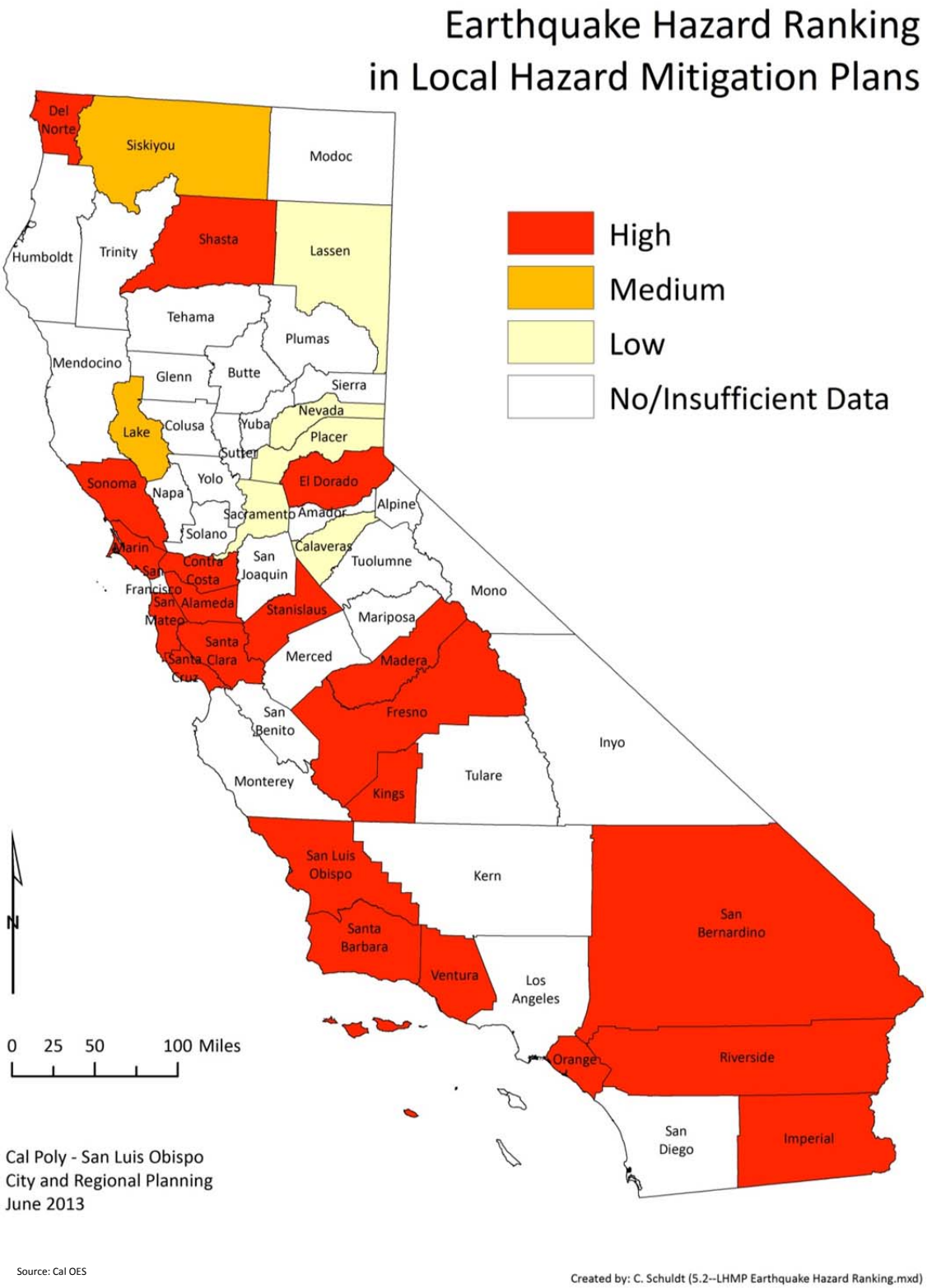
**Annex Table 5.F: Hazard Frequency in LHMPs**

| Standardized Hazard Category | Percent of Plans Identifying This Hazard |
|---|---|
| Earthquake | 96% |
| Flood | 96% |
| Wildfire | 91% |
| Landslide & Other Earth Movements | 70% |
| Dam Failure | 65% |
| Severe Weather and Storms | 55% |
| Drought | 43% |
| Other Human-Caused Hazard | 24% |
| Epidemic/Pandemic | 23% |
| Extreme Heat | 22% |
| Hazardous Material Release | 18% |
| Tsunami | 18% |
| Freeze | 14% |
| Terrorist Attack | 13% |
| Infestation/Disease | 12% |
| Volcano | 12% |
| Other Natural Hazard | 11% |
| Coastal Erosion | 9% |
| Energy Shortage | 7% |
| Avalanche | 4% |
| Coastal Storm and Flooding | 4% |
| Levee Failure | 2% |
| Climate Change/Sea Level Rise (SLR) (as a distinct hazard) | 2% |
| Hurricane | 0.5% |
| Radiological Accident | 0.5% |

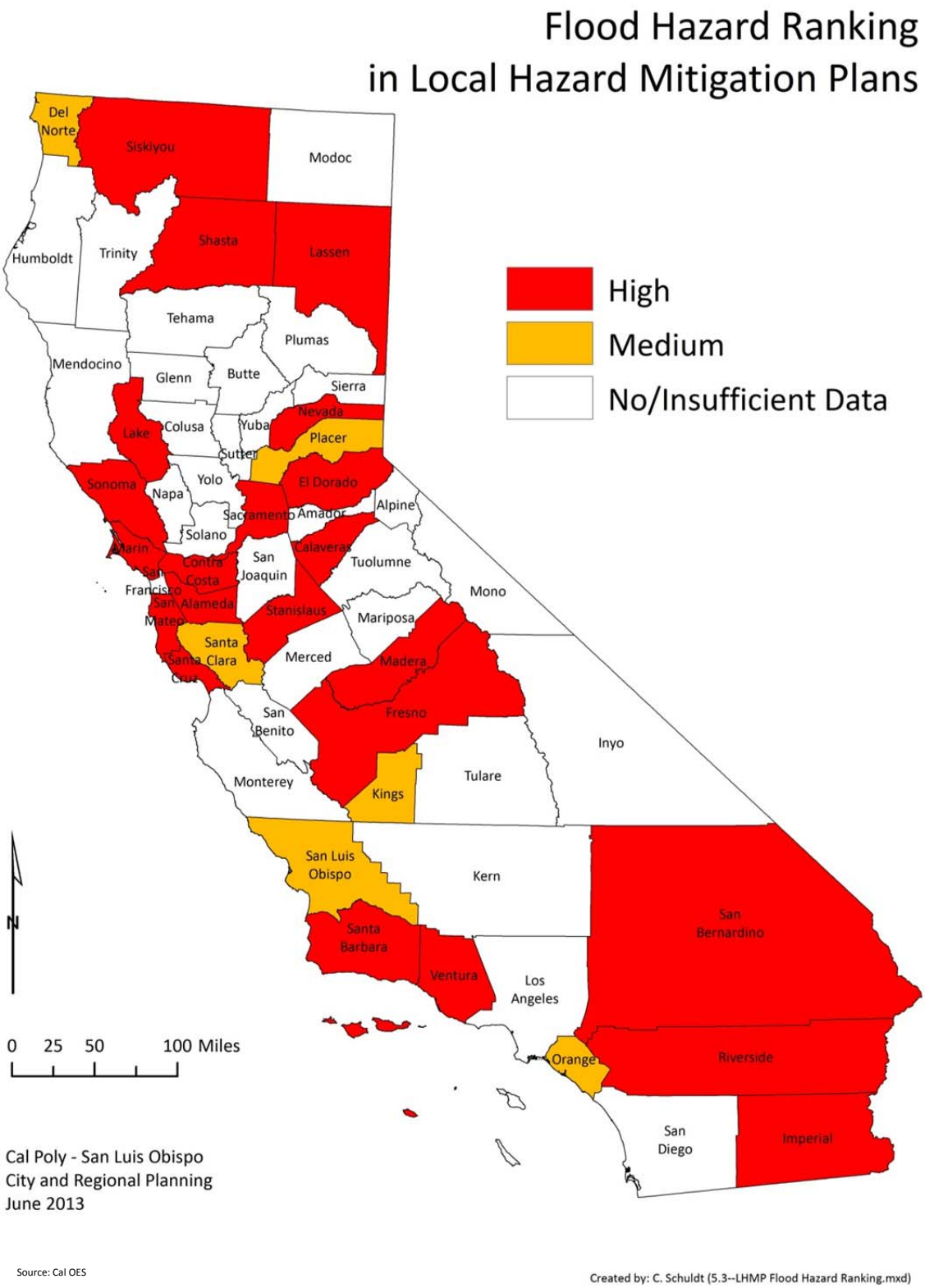
Annex Maps 5.C, 5.D, and 5.E show the relative rank of the three main hazards as derived from the LHMPs in 2013. Aggregation to the county level occurred by the same method used to determine the "top hazard" (explained above). The hazard ranking followed the following method:

- High: Majority hazard based on designation as high/significant ranking or ranked in the Top 3
- Medium: Majority hazard based on designation as moderately/less significant ranking or ranking below the "Top 3"
- Low: Majority hazard based on designation as low/insignificant ranking or no ranking

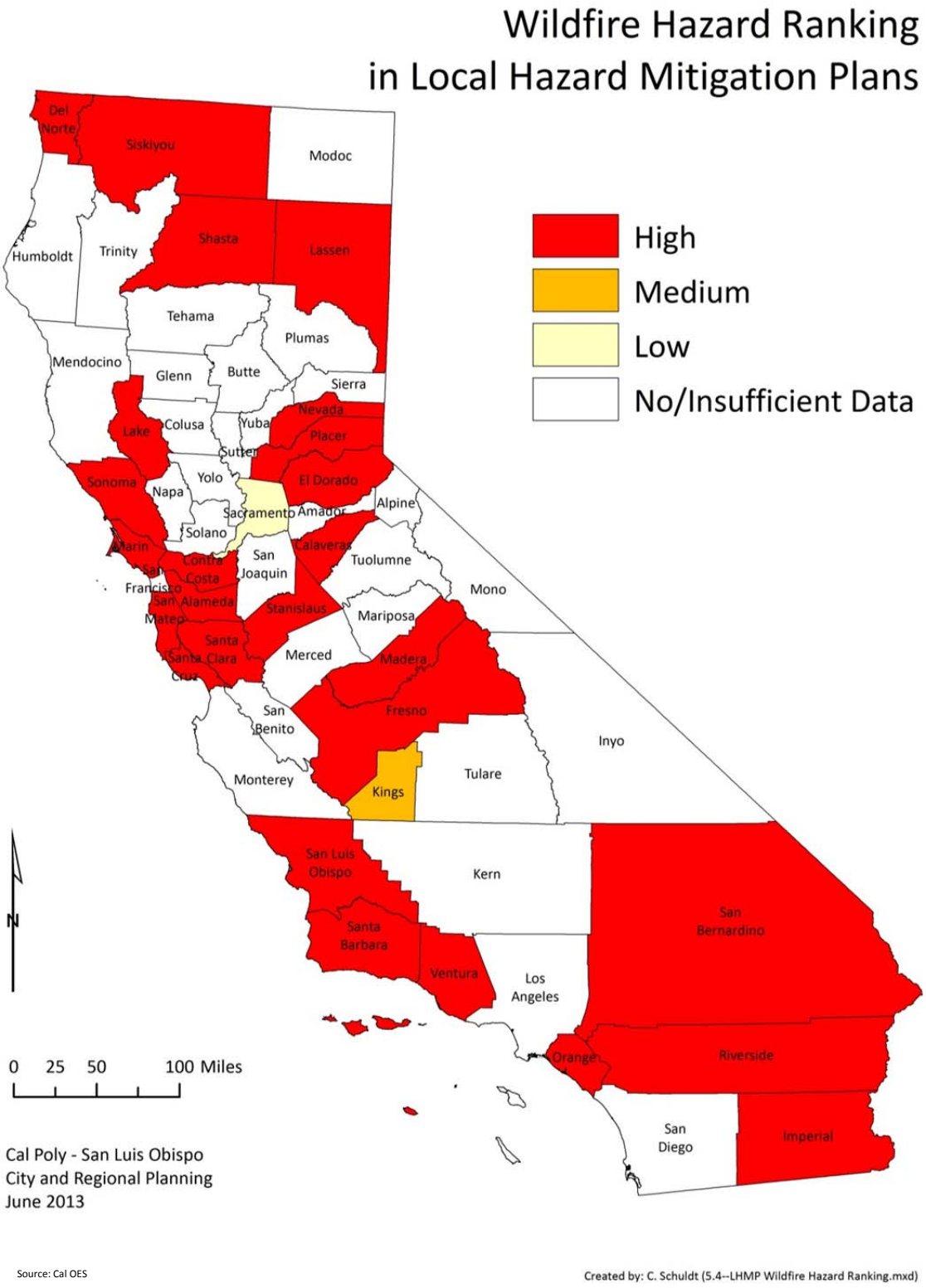
**Annex Map 5.C: Earthquake Hazard Ranking**



**Annex Map 5.D: Flood Hazard Ranking**



**Annex Map 5.E: Wildfire Hazard Ranking**



### 5.4.4. PLANNING AND MITIGATION TRENDS

This section identifies trends related to linkage to other planning efforts and the development of mitigation measures. Notable trends include the following:

- All jurisdictions identified mitigation measures per the federal requirement.

- To date a small percentage of jurisdictions have chosen to adopt an integrated LHMP and general plan safety element consistent with California Assembly Bill (AB) 2140. AB 2140 ("General Plans: Safety Element" signed on September 29, 2006), authorizes a city or county to adopt an LHMP with the safety element of its general plan and creates incentives for local governments to do so. Specifically, they would become eligible for additional financial assistance in the event of a federally declared disaster.

## 5.5. CONCLUSIONS

From this review of all approved and adopted LHMPs, the following conclusions can be made:

1. Few new significant trends were revealed. The original findings from the 2007 review, 2008 report, and 2010 report are generally valid.
2. LHMPs are now addressing climate change and sea level rise, although the level of detail and the way they are addressed varies considerably. Most LHMP's are treating climate change as a phenomenon that affects existing hazards such as wildfire, extreme heat, and coastal erosion rather than as a distinct hazard.
3. More counties can now be characterized as adopting a multi-hazard approach rather than a single-hazard focus when addressing risk and developing mitigation strategies.
4. Although there is a decrease from the 2009-2010 count of approved and adopted LHMPs in the state, this is not unexpected considering that some jurisdictions are late in updating their first LHMPs. The recent recession may also be slowing down LHMP preparation. It is assumed that the 2013 count will be similar to the 2010 count once LHMPs currently in the last phase of adoption or under FEMA review are completed.
5. Very few jurisdictions have chosen to adopt an integrated LHMP and general plan safety element consistent with AB 2140.

## 5.6. RECOMMENDATIONS

In light of the findings and conclusions of this annex, the following strategies are recommended:

- Before forwarding LHMPs to FEMA for final review and approval, Cal OES should check to ensure that they are integrated with state hazard mitigation requirements (e.g., AB 162, Senate Bill (SB) 5, SB 1241).

- Cal OES should pursue more rigorous LHMP submittal and accounting processes to enable better tracking of status.

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# ANNEX 6 - 2010 SHMP STAKEHOLDER SURVEY REPORT

ANNEX CONTENT

**6.1 Introduction**
**6.2 Purpose of the Stakeholder Surveys**
**6.3 Survey Development and Distribution Process**
6.3.1 Outreach Contracts
6.3.2 Survey Development
6.3.3 Survey Distribution Process and Schedule
**6.4 Survey Responses**
6.4.1 Perceived Concerns
6.4.2 Private Sector Concerns
6.4.3 Public Sector Implementation of Mitigation Actions
6.4.4 Private Sector Implementation of Mitigation Actions
6.4.5 Future Mitigation Actions
**6.5 Conclusions and Recommendations**
6.5.1 Recommendations for Future Outreach and Building Partnerships
6.5.2 Outreach Enhancements

*This annex presents a comprehensive analysis of the survey process and responses conducted by Cal EMA (now Cal OES) in preparation of the updated 2010 State of California Multi-Hazard Mitigation Plan (SHMP). It is included as part of the 2013 SHMP update to serve as a benchmark of comparison to future surveys and to provide guidance, through the 2010 recommendations (included at the end of this Annex), for ongoing outreach efforts related to hazard mitigation. The remainder of this Annex 6 is taken from the 2010 SHMP (numbered Annex 5 in the 2010 SHMP).*

## 6.1. INTRODUCTION

During the 2010 survey effort, Internet-hosted online surveys and email were the main tools used to solicit input from an expanded list of public and private stakeholders. The outreach efforts moved forward from those conducted in 2007, but there are still many opportunities to enhance outreach. Several recommendations for improving the outreach efforts are listed at the end of this annex.

Private sector respondents noted two primary concerns regarding hazard mitigation: 1) safety and welfare of employees, and 2) continuity of operations. Public sector respondents noted implementation of several mitigation actions including public outreach, more stringent building codes, floodplain management ordinances, and vegetation management in wildland-urban interface areas. The survey responses showed that both the public and private sectors recognize that taking action reduces the risk of casualties and property damage.

## 6.2. PURPOSE OF THE STAKEHOLDER SURVEYS

Cal EMA (now Cal OES) distributed two online surveys as one component of the overall Public Outreach Strategy described in Chapter 1, Section 1.3.3. The purpose for conducting these surveys was to gather information in a manner that helped achieve the following key objectives for the Public Outreach Strategy:

1. Make effective use of networks and technology to broadly include relevant agencies and businesses in the SHMP update process
2. Solicit informed comments and ideas on the draft 2010 SHMP

3. Establish relationships with key interested parties in both public and private sectors having the potential to become the foundation of ongoing interaction with the state in the area of hazard mitigation

## 6.3. SURVEY DEVELOPMENT AND DISTRIBUTION PROCESS

### 6.3.1. OUTREACH CONTACTS

With the goal of improving the outreach process from the 2007 update, Cal EMA (now Cal OES) reviewed three lists of contacts to begin development of an expanded outreach contact database. The Governor's Office of Planning and Research provided contact information (including email addresses) for the 538 city and county planning departments and 29 metropolitan planning organizations (MPOs) throughout California. Cal EMA (now Cal OES) expanded the 2007 contact list for statewide business, professional, nonprofit, and private sector organizations through internal research and recommendations by members of the State Hazard Mitigation Team (SHMT). Following the initial survey distribution, several email addresses were corrected and additional organizations (school districts, fire departments, etc.) were added to the contact lists.

The outreach contacts database reflects representation from both public and private sector organizations. Public sector organizations include 538 city and county planning departments and 29 MPOs, as well as representatives from over 80 agencies and organizations on the SHMT. Private sector representation includes 138 business, professional, nonprofit, and private sector organization contacts. The latter are typically umbrella associations representing a wide membership network.

Taking into account the diversity of memberships, this database encompasses a comprehensive and broad array of interests, creating the opportunity for the outreach effort to touch a greater number of individual agencies, nonprofits, and businesses. The outreach database is a "work in progress" and will continue to be expanded and updated during implementation of the 2010 SHMP.

Appendix J lists the MPOs, city and county planning organizations, and other associations contacted for the survey.

### 6.3.2. SURVEY DEVELOPMENT

Cal EMA (now Cal OES) used Survey Monkey (www.surveymonkey.com) as the online platform for distributing the survey. Initially, the 16-question stakeholder survey was distributed to the entire database of outreach contacts. This yielded 76 replies (an 11-percent response rate). Due to the limited responses from the private sector, Cal EMA (now Cal OES) developed an additional online survey of 12 questions targeted to the business, professional, nonprofit, and private sector contacts.

The content and intent of these two questionnaires are very similar. The first few questions in each questionnaire establish contact information and the type of organization the respondent represents. The fourth question asks the respondent to rate their organization's concern for each of the hazards identified in the SHMP. The final two questions in both questionnaires ask the respondent to suggest additional organizations or individuals that should be invited to participate in the survey and also added to the outreach contacts database for ongoing communication.

The main part of each questionnaire attempts to establish an understanding of each organization's awareness and progress for implementing hazard mitigation activities. Each questionnaire also inquires as to opportunities to improve statewide mitigation capabilities and form partnerships. Since mitigation actions in public sector (local government) agencies differ from those in business, professional, nonprofit,

and private sector organizations, the questions were written with differing approaches. Annex Table 6.A and Annex Table 6.B present the questions specific to each of the two separate surveys.

**Annex Table 6. A: Public Sector Survey Questions**

| Stakeholder Survey Questions (Public Sector) |
|---|
| 5. What is your organization doing to reduce risk of damage from natural and human-caused hazards? |
| 6. Please list three mitigation actions implemented by your organization over the past 5 years that you consider the most worthwhile. These should be actions or policies implemented to reduce the risk of being affected by a natural or human-caused hazard (if none, please skip to question #8). |
| 7. Please elaborate in what way these mitigation actions were beneficial to your organization (i.e., reduces risk of property damage, creates resiliency). |
| 8. Did your organization participate in the 2007 State of California Multi-Hazard Mitigation Plan? |
| 9. How helpful is the State of California Multi-Hazard Mitigation Plan to your organization in reducing the impact of hazards? |
| 10. Does your organization interact with Cal EMA or other state agencies regarding mitigation actions? (Mitigation actions include any activity intended to reduce the risk to damage/injury from hazards) |
| 11. Please select all of the mitigation activities for which your organization interacts with Cal EMA or other state agencies:<br>o Education<br>o Mapping<br>o Mitigation grants<br>o Technical advice<br>o Training<br>o Disaster preparedness<br>o Disaster response planning<br>o Disaster recovery planning<br>o Other (please specify): _____ |
| 12. What can your organization do to further reduce the risk of being affected by natural or human-caused hazards? |
| 13. What is the State of California doing to effectively reduce your organization's risk from natural or human-caused hazards? (please list any state laws, programs, policies, or regulations which help reduce your organization's vulnerability to hazards) |
| 14. What recommendations do you have for the State of California to improve identification, prioritization, and implementation of hazard mitigation actions (i.e., retrofit, infrastructure, upgrade building codes)? |

*Source: Dewberry & Davis*

**Annex Table 6. B: Private Sector Survey Questions**

| Private Sector Survey Questions |
|---|
| 5. What are your organization's primary concerns regarding natural hazards? (Concerns may include vulnerability of specific facilities, response capabilities, likelihood of specific hazard events, etc.) |
| 6. Regarding your organization's facilities, please select all that apply.<br>o My organization does not own facilities.<br>o My organization's facilities are currently designed to be resilient to earthquakes, flood, and wildfire as appropriate.<br>o My organization owns unreinforced masonry buildings that need to be structurally retrofitted.<br>o My organization owns facilities susceptible to flooding.<br>o My organization owns facilities within a wild land urban interface zone and/or is at risk to wildfire.<br>o My organization has experienced damages in the past due to earthquakes, flooding, or wildfire.<br>o My organization is in the process of structurally retrofitting some facilities to be safer and more resilient to natural hazards.<br>o My organization would like to structurally retrofit some facilities, but lacks funding. |
| 7. If your organization has taken or advocated actions to reduce risk to natural hazards, such as structurally strengthening facilities, providing educational outreach or incentives regarding mitigation, or actions that will allow you, your customers, clients, or members to continue business in the event of a disaster please share with us up to three successful projects. Examples of such projects might include relocating facilities outside of a floodplain, structural retrofits, vegetation management, repairing damage from past events to increase resiliency, incentivizing mitigation planning, etc. |
| 8. How can the state and local governments assist your organization in reducing risk and increasing resiliency? (What future mitigation actions would continue to reduce risk to natural hazards for your organization and/or its customers, clients, or members?) |
| 9. Is your organization interested in partnering with local communities to fund and implement future mitigation actions which increase disaster resiliency? |
| 10. Do you have additional comments regarding the structural safety of your organization's facilities and concern for damage from natural hazards? |

*Source; Dewberry & Davis*

For detailed survey questionnaire response choices, see Appendix J.

## 6.3.3. SURVEY DISTRIBUTION PROCESS AND SCHEDULE

The original three lists of contacts – (1) Planning Directors, (2) MPOs, and (3) business, professional, nonprofit, and private sector (in addition to the State Hazard Mitigation Team) –were chosen specifically as stakeholders in California who should be aware of the state's hazard mitigation planning process. The surveys were developed to capture informed comments on and ideas for the draft 2010 SHMP (Objective #2 of the Public Outreach Strategy), in addition to encouraging the stakeholder organizations to remain involved in hazard mitigation. By reaching out to a diverse base of stakeholders, Cal EMA (now Cal OES) raised awareness and identified opportunities for partnerships between organizations. Using the outreach contacts database and through communication with the State Hazard Mitigation Team, Cal EMA (now Cal OES) conducted the following outreach process:

### March 10, 2010

The original stakeholder survey was distributed via email accompanied by an official letter from Cal EMA.
April 5, 2010
Special correspondence was sent via email from Cal EMA to the Regional Administrators (emergency management community) to alleviate confusion regarding Cal EMA's direct correspondence with local planning directors.

## April 8, 2010

An email was distributed inviting stakeholders to join Cal EMA via conference call on April 14 in a question-and-answer session regarding the plan update process. This email provided an opportunity to submit questions in advance.

## April 14, 2010

Cal EMA hosted a Stakeholder Forum via conference call to provide those invited to participate in the surveys an opportunity to ask questions and discuss the SHMP update process (only one stakeholder took advantage of this opportunity).

## June 17, 2010

A second invitation to respond to the stakeholder survey was sent via email to the public agency contacts that had not yet responded.

## June 24, 2010

The private sector survey was distributed to the business, professional, nonprofit, and private sector contacts via email. A separate email was sent to business organizations that had previously responded to the stakeholder survey, inviting them to respond to the private sector survey as well. In both messages, the recipient was encouraged to disseminate the email as appropriate to local chapters or members of their organization.

## June 25, 2010

Cal EMA received correspondence that the Earthquake Engineering Research Institute (EERI) forwarded the survey request to EERI's California members.

## July 30, 2010

An article encouraging public comment on the draft SHMP and participation in the online surveys was published in the August 2010 BICEPP Bulletin and emailed to all of the Business and Industry Council for Emergency Planning and Preparedness (BICEPP) members in addition to being posted on the BICEPP website. This article was also forwarded to the following organizations:

- Association of Contingency Planners Orange County
- Association of Contingency Planners Los Angeles
- Association of Contingency Planners San Diego
- Business Recovery Managers Association
- California Resiliency Alliance
- Southern California first (SoCalfirst) - regional coalition of financial institutions and other critical infrastructure sectors addressing homeland security and emergency management issues in Southern California
- Bay Area Response Coalition first (BARCfirst) - one of the regional financial sector coalitions inspired by ChicagoFIRST
- Emergency Network of Los Angeles
- Greater Los Angeles Federal Executive Board

## August 2, 2010

An email blast was sent to the entire outreach contact database including State Hazard Mitigation Team members to notify all stakeholders that the public comment draft of the SHMP was available on Cal EMA's Hazard Mitigation Portal. This email also provided one final reminder and opportunity to participate in the online surveys.

### August 6, 2010

An article encouraging public comment on the draft SHMP was published in The CSAC Bulletin and emailed to all of the California State Association of Counties (CSAC) members in addition to being posted on the CSAC website.

### August 9-13, 2010

Cal EMA downloaded all of the survey responses and completed the analysis presented in this report.

### August 13, 2010

An article encouraging public comment on the draft SHMP was published in the City Advocate Weekly and emailed to subscribers through the League of California Cities.

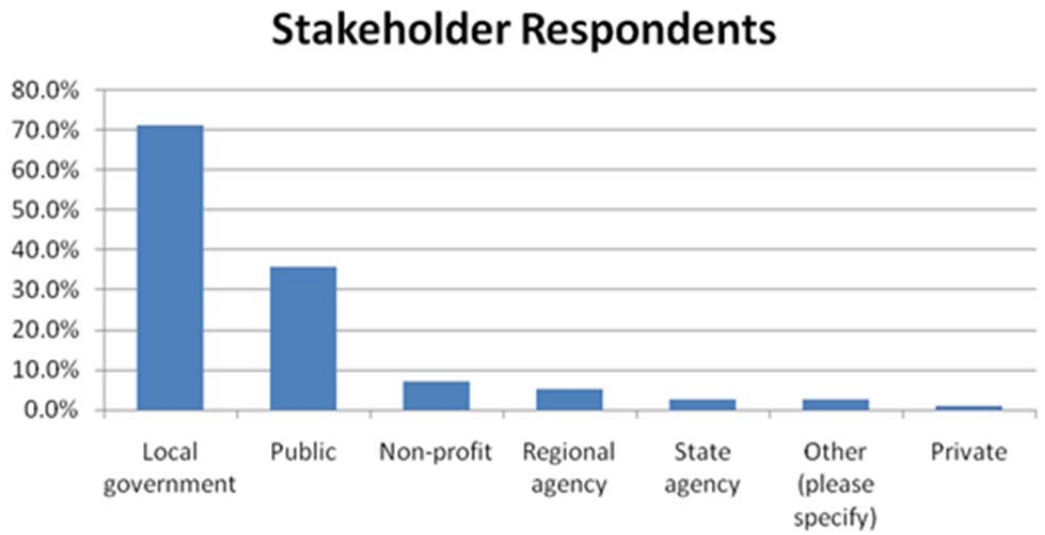
For details and copies of the key articles, see Appendix J.

## 6.4. SURVEY RESPONSES

As of August 6, 2010, Cal EMA received 116 responses to the stakeholder survey and 37 responses to the private sector survey. Survey responses primarily came from local government and the public (see Annex Chart 5.A) along with business organizations (see Annex Chart 6.B). More than half of the total responses were from local government representatives (82 of 153 total responses). Stakeholder categories included local government, public, nonprofit, regional agency, state agency, private and "other." The submitted "other" responses from the stakeholder survey included:

- The Southern California Earthquake Center (SCEC) and statewide coalitions, including the Earthquake Country Alliance
- Public safety and law enforcement
- Conservation groups

**Annex Chart 6.A: Stakeholder Respondents**



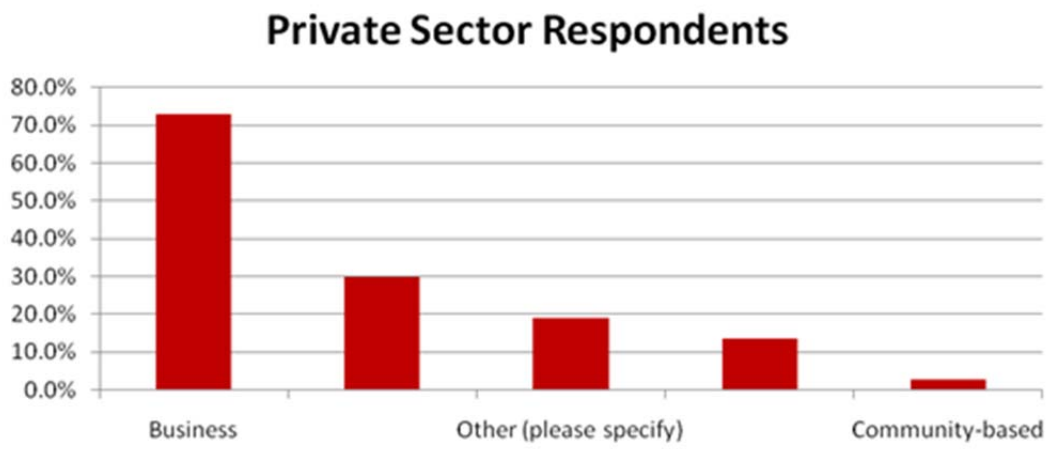

*Source: Dewberry & Davis*
*Note: Percentages add to more than 100% due to multiple responses.*

Annex Chart 6.B shows the distribution of private sector respondents. More than 70 percent were from business. Other categories represented include professional associations, nonprofit, community-based, and "other."

The submitted "other" responses from the private sector survey include:

- Investor-owned water utilities
- Special district for conservation of natural resources
- Educational institutions
- Certified licensed structural engineers and business continuity planners

**Annex Chart 6.B: Private Sector Respondents**




*Source: Dewberry & Davis*
*Note: Percentages add to more than 100% due to multiple responses.*

## 6.4.1. PERCEIVED CONCERNS

Survey respondents were asked to rank each of the hazards identified in the SHMP on a scale of 1 (no concern) to 3 (high concern) indicating the level of threat each presents to the operation of their organization. Annex Chart 5.C shows the average rating from both groups of respondents for each hazard. Overall ratings were somewhat similar for each hazard, although some interesting variations were noted.

As expected, earthquake was noted as the hazard of highest concern for both groups. On average, the private sector expressed a higher level of concern than the local governments for coastal storm and flooding, energy shortage, epidemic/pandemic, freeze, hurricane, levee failure, radiological accident, terrorist attack, and tsunami.

Annex Table 5.C shows exact numbers of responses for each hazard. Earthquake (77), wildfire (52), drought (30), and flood (29) received the most ratings of "high concern" from the public sector stakeholder respondents, while earthquake (25), energy shortage (13), and wildfire (12) received the most ratings of "high concern" from the private sector respondents.

The submitted responses for "additional" hazards from both surveys were as follows:

### *Stakeholder Survey:*

- Financial risk due to the local and state economies
- Reservoir tank failure in mountains upstream of development
- Rail and highway accidents

- Work-place violence, civil disturbance, or infrastructure disruption (highways, power, internet, gas, fuel)
- Transportation incident
- Aircraft-related or rail accidents
- Food security
- Mudslides
- High winds and tornadoes
- Prison riots
- Arsenic in water

*Private Sector Survey:*

- Internal situations: fire, bomb threat, public transportation
- Lack of definitive, published, and coordinated state, local, and federal emergency response plans.
- Information Technology (IT) hazards (e.g., electronic data or communication failure)
- Government ineptitude
- Civil unrest

Given the scale used in Annex Table 5.C, a rating of 1 indicates little concern for the hazard; thus, those with average ratings of 2 or greater indicate moderate to high concern among the majority of responders. For the public sector, these include earthquake, wildfire, and flood. The priority rating of these three hazards is consistent with the SHMP priorities.

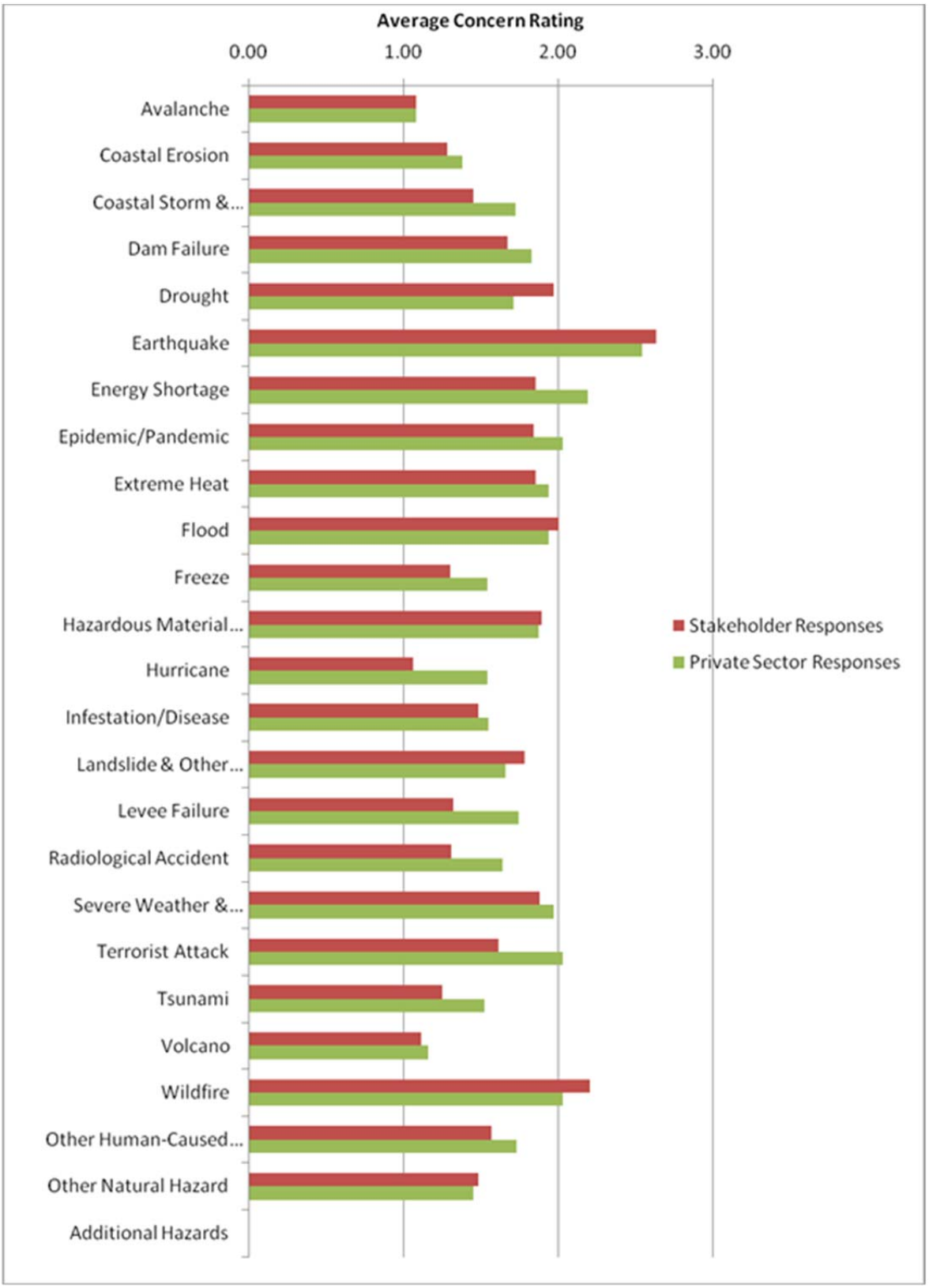
The private sector responses resulted in average ratings greater than 2 for earthquake and wildfire, but not flood. However, the private sector respondents also rated energy shortage, epidemic/pandemic, and terrorist attack with an average rating greater than 2. This may indicate a higher concern and potentially a higher level of awareness of the risk of human-caused hazards in the private sector than in the public sector.

The public sector responses acknowledge concern for human-caused hazards in the average ratings greater than 1.8 for energy shortage, epidemic/pandemic, and hazardous material release. The private sector responses show a similar level of concern for hazardous material release. In considering human-caused hazards, the two sectors differed most in their rating of terrorist attack. The majority of public sector respondents rated terrorist attack as a level 1 concern whereas the majority of private sector respondents rated it as a level 2 concern. The public sector average rating for terrorist attack (1.61) was substantially less than the average rating by the private sector (2.03).

The next greatest difference in ratings for a human-caused hazard was for energy shortage. While the majority of respondents in both groups rated energy shortage as a level 2 concern, the proportion of private sector respondents rating energy shortage as a level 3 concern was much higher. The public sector average rating for energy shortage (1.85) shows substantial concern, but is less than the private sector average rating of 2.19.

Several natural hazards received average ratings between 1.80 and 1.99 from the public sector showing substantial concern while still emphasizing the importance of earthquake, wildfire, and flood. These hazards of substantial concern to the public sector were drought, extreme heat, and severe weather and storms. The private sector respondents showed similar levels of concern for extreme heat and severe weather and storms, but somewhat less concern for drought. The private sector respondents indicate a greater level of concern for flood-related hazards such as dam failure, coastal storm and flooding, levee failure, and tsunami than the public sector.

**Annex Chart 6.C: Average Hazard Concern Rating**




*Source: Dewberry & Davis*

**Annex Table 6.C: Summary of Hazard Concern Responses**

| | Stakeholder (Public Sector) | | | | | Private Sector | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level of Concern | 1. Low | 2. Moderate | 3. High | Rating Average | Response Count | 1. Low | 2. Moderate | 3. High | Rating Average | Response Count |
| Avalanche | 78 | 5 | 1 | 1.08 | 84 | 24 | 2 | 0 | 1.08 | 26 |
| Coastal Erosion | 69 | 17 | 4 | 1.28 | 90 | 22 | 3 | 4 | 1.38 | 29 |
| Coastal Storm & Flooding | 61 | 21 | 10 | 1.45 | 92 | 14 | 9 | 6 | 1.72 | 29 |
| Dam Failure | 46 | 45 | 12 | 1.67 | 103 | 14 | 6 | 9 | 1.83 | 29 |
| Drought | 33 | 46 | 30 | 1.97 | 109 | 17 | 11 | 7 | 1.71 | 35 |
| Earthquake | 7 | 28 | 77 | 2.63 | 112 | 5 | 7 | 25 | 2.54 | 37 |
| Energy Shortage | 36 | 56 | 19 | 1.85 | 111 | 6 | 17 | 13 | 2.19 | 36 |
| Epidemic/Pandemic | 39 | 47 | 22 | 1.84 | 108 | 10 | 11 | 11 | 2.03 | 32 |
| Extreme Heat | 38 | 49 | 22 | 1.85 | 109 | 10 | 14 | 8 | 1.94 | 32 |
| Flood | 29 | 53 | 29 | 2.00 | 111 | 10 | 13 | 8 | 1.94 | 31 |
| Freeze | 70 | 28 | 1 | 1.30 | 99 | 17 | 7 | 4 | 1.54 | 28 |
| Hazardous Material Release | 37 | 48 | 25 | 1.89 | 110 | 8 | 18 | 4 | 1.87 | 30 |
| Hurricane | 78 | 5 | 0 | 1.06 | 83 | 18 | 5 | 5 | 1.54 | 28 |
| Infestation/Disease | 60 | 35 | 7 | 1.48 | 102 | 17 | 14 | 2 | 1.55 | 33 |
| Landslide & Other Earth Movements | 45 | 41 | 21 | 1.78 | 107 | 15 | 13 | 4 | 1.66 | 32 |
| Levee Failure | 73 | 17 | 7 | 1.32 | 97 | 15 | 4 | 8 | 1.74 | 27 |
| Radiological Accident | 73 | 26 | 3 | 1.31 | 102 | 15 | 15 | 3 | 1.64 | 33 |
| Severe Weather & Storms | 37 | 51 | 24 | 1.88 | 112 | 12 | 13 | 11 | 1.97 | 36 |
| Terrorist Attack | 56 | 34 | 15 | 1.61 | 105 | 6 | 22 | 7 | 2.03 | 35 |
| Tsunami | 72 | 17 | 3 | 1.25 | 92 | 19 | 8 | 4 | 1.52 | 31 |
| Volcano | 80 | 4 | 3 | 1.11 | 87 | 22 | 2 | 1 | 1.16 | 25 |
| Wildfire | 31 | 24 | 52 | 2.20 | 107 | 11 | 8 | 12 | 2.03 | 31 |
| Other Human-Caused Hazard | 46 | 38 | 7 | 1.57 | 91 | 10 | 18 | 2 | 1.73 | 30 |
| Other Natural Hazard | 47 | 23 | 7 | 1.48 | 77 | 12 | 10 | 0 | 1.45 | 22 |
| Additional Hazards | | | | | 19 | | | | | 6 |
| | | | | *answered question* | 114 | | | | *answered question* | 37 |
| | | | | *skipped question* | 2 | | | | *skipped question* | 0 |

*Source: Dewberry & Davis*

Note that because of the small sample size and self-selected survey responses, the rating for the individual hazards may not be fully representative.

## 6.4.2. PRIVATE SECTOR CONCERNS

Private sector respondents were given an opportunity to share their organization's primary concerns regarding natural hazards. The identified concerns are summarized in Annex Table 6.D. The primary concerns noted by private sector respondents were two-fold: 1) safety and welfare of employees, and 2) continuity of operations. The next priority concern was identified as vulnerability and structural stability of facilities, utilities, and infrastructure. Partnerships and communication between the local governments and the private sector could identify means for improving structural resiliency.

**Annex Table 6.D: Private Sector Primary Concerns**

| | Private Sector Primary Concerns | Response Count |
|---|---|---|
| 1 | Safety and welfare of employees | 9 |
| 2 | Maintaining operations so that we can serve our clients immediately after the disaster | 9 |
| 3 | Vulnerability and structural stability of facilities, utilities and infrastructure | 8 |
| 4 | Community preparedness and response capabilities | 3 |
| 5 | The speed of wildfire, especially this year with the prolonged wet season | 2 |
| 6 | Rapid deployment of employees to aid recovery – engineers and technical specialists and constructors | 2 |
| 7 | Identification of the likely natural hazards | 2 |
| 8 | Facilities within a flood plain and the probability of a dam/levee failure | 2 |
| 9 | Loss of business assets (e.g., buildings, computers and furniture) | 1 |
| 10 | Keeping traffic lanes open in order to vacate people safely | 1 |

*Source: Dewberry & Davis*

## 6.4.3. PUBLIC SECTOR IMPLEMENTATION OF MITIGATION ACTIONS

Public sector respondents were surveyed on the status of their organization's implementation of mitigation actions. The responses are summarized in Annex Table 6.E. More than 75 percent of local organizations responding to the survey have taken actions to prevent loss of life and prevent or minimize property damage. Seventy-three percent of organizations actively conduct outreach efforts to promote awareness of natural and human-caused hazards. More than half (57 percent) of the responding organizations have implemented policies to prevent development in hazardous areas.

**Annex Table 6.E: Public Sector Mitigation Implementation Status**

| Public Sector Implementation Status | Response Percent | Response Count |
|---|---|---|
| My organization is not doing anything to mitigate natural and human-caused hazards. | 6.30% | 7 |
| My organization has taken actions to prevent or minimize property damage. | 78.60% | 88 |
| My organization has taken actions to prevent loss of life. | 75.90% | 85 |
| My organization has developed a continuity of operation plan to prevent business interruption. | 49.10% | 55 |
| My organization conducts outreach activities to promote awareness of relevant natural and human-caused hazards. | 73.20% | 82 |
| My organization has implemented policies to prevent development in hazardous zones. | 57.10% | 64 |
| My organization has taken different action than listed here. | 19.60% | 22 |

*Source: Dewberry & Davis*

Respondents were asked to list three mitigation actions undertaken by their organizations within the past five years. The actions submitted are summarized in Annex Table 6.F.

Note that 37 organizations of the 116 respondents indicated "Implementation and maintenance of an Emergency Operation Plan (EOP)" as a mitigation action. While EOPs and other emergency response capabilities are not included in the definition of "mitigation" used for the purposes of the SHMP, these processes along with trained emergency managers are critical for the safety of local communities and valuable in informing the hazard mitigation planning process.

It should be noted that, while not the two most common responses, the following four items are proven mitigation strategies being implemented in many local governments: public outreach, more stringent building codes, floodplain management ordinances, and vegetation management in wildland-urban interface areas. These are the types of actions that help increase the entire state's resiliency as they are implemented locally.

Since the two most common responses for locally implemented mitigation actions are not within the definition of "mitigation," Cal OES notes this as an opportunity to extend additional outreach and education to local staff responsible for coordinating hazard mitigation. It is one of Cal OES's goals to ensure that the local staff developing the Local Hazard Mitigation Plans understands the difference between preparedness, response, recovery, and mitigation.

**Annex Table 6.F: Locally Implemented Mitigation Actions**

| | Locally Implemented Mitigation Actions | Response Count |
|---|---|---|
| 1 | Implementation and maintenance of Emergency Operation Plan | 37 |
| 2 | Local table top training and participation in regional emergency exercises | 25 |
| 3 | Numerous business and public outreach programs | 20 |
| 4 | Adoption/enforcement of more stringent building codes | 19 |
| 5 | Developed flood hazard mitigation programs and/or updated flood maps and ordinances | 16 |
| 6 | Identified wildland-urban interface areas, and regulated fire fuels in those areas or incorporated defensible space or implemented hazardous vegetation abatement program | 18 |
| 7 | Developed a Local Hazard Mitigation Plan (LHMP) | 8 |
| 8 | Involvement in Emergency Operations Center (EOC) with health facilities, police and fire departments | 7 |
| 9 | Implemented a reverse 9-1-1 public notification system | 5 |
| 10 | Developed a tsunami response plan | 4 |
| 11 | Developed an EOC with communication systems | 4 |
| 12 | Developed a continuity of operations plan | 4 |
| 13 | Engaged discussion with business community and created public forums for disaster preparedness | 4 |
| 14 | Adoption/enforcement of more stringent land-use planning (in flood zones) | 4 |
| 15 | Required fire protection plans in wild land-urban interface areas | 4 |
| 16 | Prepared an Emergency Preparedness Guide and distributed it to residents and businesses | 3 |
| 17 | Hired a full-time emergency preparedness coordinator | 3 |
| 18 | Implemented a system of Warning Sirens | 3 |
| 19 | Developed cooling centers | 3 |
| 20 | Pursued additional funding for mitigation initiatives | 3 |
| 21 | Infrastructure retrofitting (e.g. dams and bridges) | 3 |
| 22 | Rapid repair of key transportation infrastructure following a major event | 2 |
| 23 | Levee reinforcement/enhancement within the operational area | 2 |
| 24 | Implementation of a Geographic Information System (GIS) including hazards | 2 |
| 25 | Constructed a new fire station and/or increased number of trucks | 2 |
| 26 | Developed an Emergency Operations Center | 2 |
| 27 | Limited the use of hazardous material commercial and industrial areas | 2 |
| 28 | Adoption of a fire sprinkler ordinance | 2 |
| 29 | On-site storm water retention basins | 2 |

| | Locally Implemented Mitigation Actions | Response Count |
|---|---|---|
| 30 | Back-up electrical generator | 2 |
| 31 | Created food and equipment emergency bins | 2 |
| 32 | Upgraded 9-1-1 telephone system | 2 |
| 33 | Implementation of FEMA requirements | 1 |
| 34 | Development of Emergency Operations Center | 1 |
| 35 | Underground embankment stabilization for a development project | 1 |
| 36 | Implemented a required fire break for all new homes | 1 |
| 37 | Lake Isabella Dam evacuation plan | 1 |
| 38 | Have secured furniture and other contents to prevent damage and developed a post-earthquake communication response plan | 1 |
| 39 | Created Emergency Broadcast System | 1 |
| 40 | Supported the priorities of the City of Baldwin Park | 1 |
| 41 | Implemented voluntary and mandatory soft-story seismic upgrade legislation | 1 |
| 42 | Obtained additional hazmat outfitted equipment and training for our fire fighters | 1 |
| 43 | Designated a point of distribution site for pharmaceuticals for pandemic events | 1 |
| 44 | Public services contacted for placement onto priority list | 1 |
| 45 | Condemned unsafe buildings | 1 |
| 46 | Training of nonprofit agencies and staff in managing spontaneous volunteers | 1 |
| 47 | Implemented CERT program | 1 |
| 48 | Prepared an emergency recovery site | 1 |
| 49 | Participation in shakeout (earthquake simulation) activities | 1 |
| 50 | Security fence around reservoir | 1 |
| 51 | Required automatic gas shut off valves for earthquake hazard mitigation | 1 |
| 52 | Had fire department inspect for all resale properties | 1 |
| 53 | Inventoried climate change emissions in public and private sectors | 1 |
| 54 | Video cameras at all school sites | 1 |
| 55 | Implemented additional Fire Safe Councils | 1 |
| 56 | Compliance with Alquist-Priolo requirements | 1 |
| 57 | Xeriscape planting on hillsides | 1 |
| 58 | Erected a new pump station | 1 |
| 59 | Upgrade storm water system | 1 |
| 60 | Obtained HAM licenses | 1 |
| 61 | Developed a radiation detection system | 1 |
| 62 | Upgraded city well system to deal with arsenic | 1 |

*Source: Dewberry & Davis*

Respondents identified numerous benefits directly resulting from the implementation of these actions. These benefits are summarized in Annex Table 6.G. Most notably, the local government respondents recognize that taking action reduces the risk of casualties and property damage. It also allows emergency responders to be prepared for more effective response and recovery.

**Annex Table 6.G: Benefits of Locally Implemented Mitigation Actions**

| | Benefits of Locally Implemented Mitigation Actions | Response Count |
|---|---|---|
| 1 | Reduces the risk of casualties and property damage | 51 |
| 2 | Prepares training and early procedures and process to conduct emergency services | 42 |
| 3 | Refreshes awareness of procedures to both the public and local officials | 32 |
| 4 | Better access of information to the public for increased resiliency | 24 |
| 5 | Helps identify the hazards | 6 |
| 6 | Reduces risk of flooding | 5 |
| 7 | Decreases time of recovery and early business continuation | 4 |
| 8 | New technology can send targeted alerts and warning to at-risk residents; improved communication to citizens | 4 |
| 9 | Cross-discipline cooperation and coordination; Reduces communication gaps and misunderstandings; Now have a dependable/flexible communication system; Creating MOUs with local businesses establishes contacts and lines of communication that will become invaluable should the City require materials to help with a relief effort. | 4 |
| 10 | Protects the area from exposure to hazardous materials from spills, leaks, etc. | 3 |
| 11 | Increases power supply security | 2 |
| 12 | Increases security of water supply | 2 |
| 13 | Will spend minimal time recreating documents | 2 |
| 14 | Fuel reduction results in a lower threat; Provides increased fire protection | 2 |
| 15 | Avoidance of potential run-off from river bed to impact homes | 1 |
| 16 | Provides needed supplies for the public (e.g. basic provisions and food) | 1 |
| 17 | City Fire Department is more efficient and has increased coverage | 1 |
| 18 | Reduces risk of exposure to disease | 1 |
| 19 | Provides some ease of mind to residents for emergency alerting | 1 |
| 20 | Removed unsafe buildings | 1 |
| 21 | Was asked to participate in the Southern California Catastrophic Earthquake Response Plan development | 1 |
| 22 | Establishes professional relationships (teamwork) | 1 |
| 23 | Better equips local government for providing continuity of governance in an emergency event | 1 |
| 24 | Detailed GIS increases the accuracy and justification for land use restriction in areas of high risk | 1 |
| 25 | Clearing brush from urban interface properties reduces wildfires | 1 |
| 26 | Separation of debris, including motor oil, from storm water system | 1 |
| 27 | Creates buffer zones, clears roadsides of vegetation, and improves designated parking | 1 |
| 28 | Reduces economic losses | 1 |
| 29 | Faster notification to residents in case of emergency | 1 |
| 30 | Lowered fuel modification loads in what is normally a high fire danger area | 1 |
| 31 | Support CBO to reduce hazards in facilities | 1 |
| 32 | Protects public assets and infrastructure | 1 |
| 33 | Provides community input on local hazards and resources | 1 |
| 34 | Reduction of cliff erosion | 1 |

*Source: Dewberry & Davis*

### 6.4.4. PRIVATE SECTOR IMPLEMENTATION OF MITIGATION ACTIONS

Private sector respondents were surveyed on the status of their organization's implementation of mitigation actions. The majority of the private sector respondents occupy facilities that are currently designed to be resilient to earthquakes, floods, and wildfire (as appropriate). More than half of the responding organizations do not own any structural facilities. Therefore, the realm of potential mitigation actions for these organizations is limited to efforts involving their promotion and support. However, several organizations identified the need to retrofit their facilities for increased resiliency to earthquake, flood, and wildfire events. The responses to this question are summarized in Annex Table 6.H.

**Annex Table 6.H: Private Sector Mitigation Implementation Status**

| Private Sector Mitigation Implementation Status | Response Percent | Response Count |
|---|---|---|
| My organization does not own facilities. | 54.10% | 20 |
| My organization's facilities are currently designed to be resilient to earthquakes, floods, and wildfire as appropriate. | 59.50% | 22 |
| My organization owns unreinforced masonry buildings that need to be structurally retrofitted. | 13.50% | 5 |
| My organization owns facilities susceptible to flooding. | 13.50% | 5 |
| My organization owns facilities within a wildland-urban interface zone and/or is at risk to wildfire. | 18.90% | 7 |
| My organization has experienced damages in the past due to earthquakes, flooding, or wildfire. | 40.50% | 15 |
| My organization is in the process of structurally retrofitting some facilities to be safer and more resilient to natural hazards. | 21.60% | 8 |
| My organization would like to structurally retrofit some facilities, but lacks funding. | 10.80% | 4 |

*Source: Dewberry & Davis*

Private sector respondents were asked to share three successful mitigation actions undertaken by their organizations. The responses received are summarized in Annex Table 6.I. Many organizations have completed seismic evaluations and structural retrofits. Several organizations actively promote hazard risk information to their members and the public.

**Annex Table 6.I: Private Sector Implemented Mitigation Actions**

| | Private Sector Implemented Mitigation Actions | Response Count |
|---|---|---|
| 1 | Various seismic evaluations and structural retrofits | 14 |
| 2 | Training and outreach efforts with the public | 10 |
| 3 | Advocate new Building Codes | 3 |
| 4 | Equipped facilities with emergency standby power | 2 |
| 5 | Development of emergency planning procedures | 2 |
| 6 | Developed seismic studies and business strategy projects | 2 |
| 7 | Added vaccine clinics for pandemic planning | 1 |
| 8 | Upgrades HAZUS including local structure types | 1 |
| 9 | Introduced numerous FEMA projects | 1 |
| 10 | Added flooding mitigation measures | 1 |
| 11 | Construction of new facility for emergencies | 1 |
| 12 | Started vegetation management and fuel reduction activities | 1 |
| 13 | Subscribe to disaster recovery vendors for IT, IVR, voice, workspace and print/mail services | 1 |

| | | |
|---|---|---|
| 14 | Updated floodplain maps | 1 |
| 15 | Improved drainage with green roofs | 1 |
| 16 | Developed an annual review of critical infrastructure at risk | 1 |
| 17 | Relocated data center away from flood plain and high density transportation corridors | 1 |
| 18 | Installed a new HAM antenna | 1 |

*Source: Dewberry & Davis*

Private sector respondents included the following additional comments regarding the structural safety of their organization's facilities and concern for damage from natural hazards:

- Implement additional training exercises with engineers and consultants
- Fortify the underground distribution system
- Better management of electronic documents, particularly with a backup in an off-site location

These comments suggest further support for the private sector's desire to coordinate training exercises and increase response capabilities.

### 6.4.5. FUTURE MITIGATION ACTIONS

Public sector respondents identified several mitigation actions that may be implemented in the future – most notably, preparation of a Local Hazard Mitigation Plan and public outreach regarding hazard risk. The respondents indicated interest in acquiring additional funding for completing mitigation projects and conducting emergency management training exercises.

**Annex Table 6.J: Capabilities Identified by Public Sector**

| | Locally Mitigation Actions | Response Count |
|---|---|---|
| 1 | Prepare/update a hazard mitigation plan (HMP) | 23 |
| 2 | Public outreach through educational and awareness programs | 21 |
| 3 | Acquire further funding for mitigation projects | 8 |
| 4 | Further training exercises with first respondents | 7 |
| 5 | Continue participation in the EOC | 6 |
| 6 | Adoption of new, more stringent building codes | 5 |
| 7 | Share information and resources to further reduce hazard mitigation | 5 |
| 8 | Update the Business Continuity Plan | 2 |
| 9 | Update land use policies that prevent development in hazardous zones | 2 |
| 10 | Fuel reduction projects | 2 |
| 11 | Plan documents and GIS mapping for hazard/risk identification | 2 |
| 12 | Acquire a grade-separated train crossing on at least one major roadway | 2 |
| 13 | Operationalize preparedness and response into the staffing structure | 1 |
| 14 | Continue work on stream and creek maintenance to prevent widening pavement flooding | 1 |
| 15 | Continue to work closely with state and federal officials | 1 |
| 16 | Promote education/awareness efforts in English and Spanish | 1 |
| 17 | Assess and evaluate other organizations, as well as our own for systemic planning and preparation | 1 |
| 18 | Further secure objects within the building | 1 |
| 19 | Continue efforts in keeping open lines of communication emergency services | 1 |
| 20 | Improve on levee system | 1 |

*Source: Dewberry & Davis*

As local governments work through the process of hazard mitigation planning, it is expected that they will identify the most pertinent mitigation projects for their communities. A summary of the identified mitigation actions is presented in Annex Table 6.J.

Private sector respondents identified several ways that the state and local governments could assist their organizations in reducing risk and increasing resiliency. The suggestions are summarized in Annex Table 6.K. The private sector would like to partner with the public sector on public outreach efforts and develop incentives for implementing resiliency measures. Working together will provide the most effective means of increasing resiliency and educating the residents of California about relevant risks.

**Annex Table 6.K: Mitigation Actions Suggested by Private Sector**

| | Suggested Mitigation Actions | Response Count |
|---|---|---|
| 1 | Assistance to help educate citizens and businesses about risk and resiliency | 7 |
| 2 | Develop easily understood incentives to encourage risk resiliency | 5 |
| 3 | Include engineers in federal/state/local training exercises | 4 |
| 4 | Assistance to the private utility companies (e.g. California Water) | 2 |
| 5 | Implement fuel reduction programs (e.g. cutting/chopping trees) | 2 |
| 6 | Continue to retro-fit highways, electrical grids, waterways and/or critical infrastructure | 2 |
| 7 | Assistance for the private sector in order to reach out the public and local businesses | 1 |
| 8 | Agreements between the local government and water utility companies to increase resiliency | 1 |
| 9 | The design of a common all-hazards design/building code | 1 |
| 10 | Implement fuel breaks to increase protection and minimize catastrophic fires | 1 |
| 11 | Be well prepared | 1 |
| 12 | Compile community-specific/resiliency issues and attributes from state or natural hazard assessments | 1 |
| 13 | Create subsidies for conducting risk evaluation | 1 |
| 14 | Establish minimum seismic requirement standards for all Transmission and Distribution electrical power systems and components | 1 |
| 15 | Increase communication between health and emergency response teams | 1 |

*Source: Dewberry & Davis*

Of the 37 private sector respondents, 30 indicated they were interested in partnering with local communities to fund and implement future mitigation actions that increase disaster resiliency.

Cal EMA recognizes the opportunity to communicate with these organizations to help coordinate appropriate partnerships with the public sector. The organizations were as follows (with some organizations having multiple respondents):

- Delta Dental of CA
- Automobile Club of Southern California
- American Institute of Architects California Council
- Telesis Engineers
- Stanford University
- Degenkolb Engineers
- SCE - Apparatus Engineering
- Lake Tahoe Humane Society and S.P.C.A.
- Association of Contingency Planners
- Nabih Youssef Associates
- UC Irvine
- COPE Preparedness
- HDR Engineering
- Psomas
- AECOM
- Caltrans
- Golden State Water Company

- California American Water
- Black Rock
- California Fire Safe Council
- CYS Structural Engineers, Inc.
- California Water Service Co.
- URS Corp
- Western Shasta Resource Conservation District

In addition to building public/private partnerships, California will become more resilient through collaboration between the local and state governments. Seventy-eight of the 116 public sector respondents (67.2 percent) indicated that their organization interacts with Cal EMA or other state agencies regarding mitigation activities. Local government respondents were asked to indicate the activities in which they interact with Cal EMA and other state agencies. The summary of responses is shown in Annex Table 6.L. Only 38 percent of the respondents interact with Cal EMA or other state agencies for mitigation grants.

**Annex Table 6.L: Local Government Interaction with State Agencies**

| Interaction with State Agencies | Response Percent | Response Count |
|---|---|---|
| Education | 62.50% | 55 |
| Mapping | 39.80% | 35 |
| Mitigation grants | 38.60% | 34 |
| Technical advice | 40.90% | 36 |
| Training | 65.90% | 58 |
| Disaster preparedness | 71.60% | 63 |
| Disaster response planning | 67.00% | 59 |

*Source: Dewberry & Davis*

Only 43 of the 116 public sector respondents indicated that their organization participated in the preparation of the 2007 SHMP. These responses suggest an opportunity for Cal EMA to involve more local governments in the state's hazard mitigation planning process. Doing so is expected to increase linkage between the Local Hazard Mitigation Plans and awareness of state resources available to assist the local hazard mitigation planning process. A summary of the public sector responses to their level of participation in the 2007 SHMP is shown in Annex Table 6.M.

**Annex Table 6.M: Local Government Participation in 2007 SHMP**

| SHMP Participation Status | Response Percent | Response Count |
|---|---|---|
| Yes, my organization participated | 40.20% | 43 |
| Yes, my organization provided comments | 26.20% | 28 |
| No, my organization did not participate | 38.30% | 41 |
| No, my organization did not provide comments | 25.20% | 27 |

*Source: Dewberry & Davis*

Overall, the local governments indicated that the SHMP is helpful for their organization's efforts in reducing the impact of hazard events. Annex Table 6.N further suggests the opportunity for Cal EMA to involve more local governments in the state's hazard mitigation planning process. One-third of the respondents were unable to indicate whether or not the SHMP is helpful. Another third indicated that it was only "somewhat helpful." Cal EMA strives to develop a SHMP that is "very helpful" to most local governments and the private sector in implementing mitigation actions.

**Annex Table 6.N: Local Government rating of Helpfulness of SHMP**

| Helpfulness of SHMP | Response Percent | Response Count |
|---|---|---|
| Very helpful | 16.80% | 19 |
| Moderately helpful | 18.60% | 21 |
| Somewhat helpful | 27.40% | 31 |
| Not at all | 5.30% | 6 |
| Don't know | 31.90% | 36 |

*Source: Dewberry & Davis*

Public sector respondents identified effective programs that the state implements for assisting with local hazard mitigation as well as several suggestions of ways the state government could assist their organizations in reducing risk and increasing resiliency. The effective programs are summarized in Annex Table 6.O. In addition to appreciating the funding provided by the state, local governments look for resources and support such as building code standards that they may implement locally to increase resiliency.

**Annex Table 6.O: State Capabilities Identified by Local Governments**

| | State Capabilities | Response Count |
|---|---|---|
| 1 | Updating their hazard mitigation plan (HMP) | 11 |
| 2 | Additional funding for mitigation activities | 9 |
| 3 | More stringent building and fire codes | 6 |
| 4 | Educational and awareness efforts to the public | 5 |
| 5 | Continual training efforts with first responders | 4 |
| 6 | Periodic communication with Cal EMA | 3 |
| 7 | Assistance with recovery and affected infrastructure (e.g., roads) | 2 |
| 8 | Development of GIS-based resources for local jurisdictions | 2 |
| 9 | State wildland fire prevention laws | 2 |
| 10 | Development of the Southern California Earthquake Response Plan | 1 |
| 11 | Adoption of the Alquist-Priolo Act | 1 |
| 12 | Provider of information to local jurisdictions on hazards and risks | 1 |
| 13 | Assistance with hazardous materials | 1 |
| 14 | Creation of the first State Secretary of Service and Volunteering | 1 |
| 15 | Help with tsunami mapping | 1 |
| 16 | Enactment of the California Environmental Quality Act (CEQA) | 1 |

*Source: Dewberry & Davis*

Annex Table 6.P summarizes state mitigation actions recommended by local governments. Several of the capabilities identified in Annex Table 6.O are also noted as recommendations. This confirms that local governments are primarily interested in receiving state funding to continue hazard mitigation efforts. Other common suggestions included state-provided consultants for guidance through the local hazard mitigation planning process and development of more stringent building codes. Local respondents suggested that the state continue its efforts for structurally retrofitting government buildings and/or infrastructure vulnerable to natural hazards.

**Annex Table 6.P: Suggested State Mitigation Actions Identified by Local Governments**

| | Recommendations for State Mitigation Planning | Response Count |
|---|---|---|
| 1 | Provide funding for local jurisdictions | 15 |
| 2 | Provide consultants for guidance throughout the HMP process | 8 |
| 3 | Development of more stringent building codes | 8 |
| 4 | Retrofit government buildings and/or infrastructure | 6 |
| 5 | Prepare a hazard mitigation plan and/or be ready to assist | 4 |
| 6 | Increase public awareness of hazards | 2 |
| 7 | Promote resiliency in transportation infrastructure | 1 |
| 8 | Better coordination among emergency organizations (e.g., FEMA, Cal EMA, UASI) | 1 |
| 9 | Increase the number of training exercises | 1 |
| 10 | Disseminate information to the local jurisdictions | 1 |
| 11 | Provide subsidies for building upgrades (e.g., tax reductions) | 1 |
| 12 | Update on GIS risk maps | 1 |
| 13 | Expand slope instability studies | 1 |
| 14 | Identify activities that are most cost-effective | 1 |
| 15 | Develop a new program where communities can op" into a program for transportation assistance | 1 |
| 16 | Legislation to minimize groundwater overdraft | 1 |

*Source: Dewberry & Davis*

## 6.5. CONCLUSIONS AND RECOMMENDATIONS

More than half of the total survey responses were from local government representatives. Earthquake was noted as a "high concern" by the majority of responders from both the public sector and private sector. In addition to the expected natural hazards of wildfire, flood, and drought, human-made hazards, including hazardous material release and terrorist attacks, received notable numbers of "high concern" ratings.

The primary concerns noted by private sector respondents were two-fold: 1) safety and welfare of employees, and 2) continuity of operations. Partnerships and communication between the local governments and the private sector could identify means for improving structural resiliency.

Many local governments are implementing public outreach, more stringent building codes, floodplain management ordinances, and vegetation management in wildland-urban interface areas. These are the types of actions that, when implemented locally, contribute to increasing resiliency throughout the entire state of California.

Both the public and private sector responses recognize that taking action reduces the risk of casualties and property damage. The majority of the private sector respondents occupy facilities that are currently designed to be resilient to earthquakes, floods, and wildfire (as appropriate). More than half of the responding organizations do not own any structural facilities. Therefore, the realm of potential mitigation actions for these organizations is limited to efforts involving their promotion and support. Many private sector organizations have completed seismic evaluations and structural retrofits. However, several organizations identified the need to retrofit their facilities for increased resiliency to earthquake, flood, and wildfire events. Several private sector organizations actively promote hazard risk information to their members and the public.

Local governments are primarily interested in receiving state funding to continue hazard mitigation efforts. Public sector respondents identified several mitigation actions that may be implemented in the future – most notably, preparation of a Local Hazard Mitigation Plan and public outreach of hazard risk. As local governments work through the process of hazard mitigation planning, it is expected that they will identify

the most pertinent mitigation projects for their communities. In addition to appreciating the funding provided by the state, local governments also look to the state for resources and support such as assistance with the local mitigation planning process and development of more stringent building code standards. Local respondents suggested that the state continue its efforts for structurally retrofitting government buildings and/or infrastructure vulnerable to natural hazards.

The private sector respondents would like to partner with the public sector on public outreach efforts and develop incentives for implementing resiliency measures. Working together will provide the most effective means of increasing resiliency and educating the residents of California about relevant risks. Cal EMA recognizes the opportunity to communicate with the organizations that expressed interest in building partnerships with the public sector.

In addition to building public/private partnerships, California will become more resilient through collaboration between local and state governments. Overall, the local governments indicated that the SHMP is helpful for their organization's efforts in reducing the impact of hazard events. Cal EMA recognizes the opportunity for integrating local governments in both mitigation planning and implementation of mitigation actions. This is expected to increase linkage between the Local Hazard Mitigation Plans and awareness of state resources available to assist the local hazard mitigation planning process.

### 6.5.1. RECOMMENDATIONS FOR FUTURE OUTREACH AND BUILDING PARTNERSHIPS

The following recommendations for future action were derived from the preceding analysis:

1. Contact the private sector organizations that expressed interest in establishing partnerships with local governments to implement mitigation actions. These organizations may be valuable members to the Cross-Sector Communications and Knowledge-Sharing Strategic Work Group.

2. Conduct targeted outreach to local hazard mitigation planners within the community development, planning, and emergency management departments to clarify the differences between preparedness, response, recovery, and mitigation. As shown in Annex Table 5.F, local government respondents tend to view typical emergency management preparedness activities as mitigation progress. While these are critical to the safety of a community, they do not necessarily reduce risk or increase resiliency, which are the goals of mitigation actions. Outreach and education provided to local governments through conferences and specific training sessions regarding the state's mitigation strategy and how it may be applied locally can be an effective means to increasing resiliency.

3. Include a link to the survey(s) on the Cal EMA Hazard Mitigation Portal when conducting future online surveys. Directing individuals to the portal will raise awareness of the useful mitigation materials available to all agencies. This will also enable the general public to find the survey and participate, if they wish.

4. In future online surveys, incorporate questions regarding how the SHMP can better help local organizations reduce the impact of hazard events. These questions may need to be specific in order to determine how local governments are currently using the SHMP and/or how local governments are currently implementing their mitigation strategies.

5. Distribute future online surveys to suggested respondents (see Appendix J) and explore possibilities of these individuals participating on the State Hazard Mitigation Team and/or the four work groups as appropriate.

6. Determine the extent to which state-provide materials are used in local outreach efforts. Seventy-three percent of the responding local governments actively conduct outreach efforts to promote

awareness of natural and human-caused hazards. Cal EMA should inquire as to whether state-provided materials are currently used in these efforts or if additional materials could assist with ongoing local outreach efforts.

### 6.5.2. OUTREACH ENHANCEMENTS

The public outreach conducted for the 2010 SHMP was substantially expanded from the efforts conducted in 2007. Notably, the outreach contact database has grown to include a more diverse representation of the private sector. Through distribution of the online surveys, Cal EMA was able to reach more organizations and identify potential partnerships for implementing hazard mitigation on a statewide basis. Many of the recommendations identified above are objectives of the Cross-Sector Communications and Knowledge-Sharing Strategic Work Group. Cal EMA anticipates that this work group will continue implementing and expanding the outreach strategy with the goals of building awareness of the state's mitigation strategy and identifying mitigation progress throughout the state.