Natural Hazard Mitigation Plan
For The City of La Verne, CA

ACKNOWLEDGEMENTS

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We also availed ourselves of data, reports and plans from a variety of cities, counties and states from across the country as part of the research in preparing this plan. Thank you to all those agencies who are so generous to their colleagues in the emergency management profession. The work of many of these agencies is cited in Section 1.

Special Thanks & Acknowledgment

Citizens and Business Leaders Who Have contributed to the formation of this Plan.

RESOLUTION NO. 12-09

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LA VERNE, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA ADOPTING THE CITY OF LA VERNE NATURAL HAZARD MITIGATION PLAN

WHEREAS, on October 30, 2000, the Disaster Mitigation Act of 2000 (the "DMA") was enacted, amending provisions of the Robert T. Stafford Disaster Relief Act of 1988, and requiring cities to prepare and submit Natural Hazard Mitigation Plans in order to qualify for pre and post-disaster mitigation funds; and

WHEREAS, the DMA reinforces the importance of pre-disaster mitigation planning to reduce human and economic losses from natural disasters nationwide; and

WHEREAS, Natural hazard mitigation planning is essential to the sustainability of the City of La Verne in that it increases the City's disaster resiliency; and

WHEREAS, the DMA requires local agencies such as the City of La Verne to develop a natural hazard mitigation plan that includes a detailed City profile; identifies specific threats and vulnerabilities within the City; and sets forth specific mitigating measures to address such threats and vulnerabilities; and

WHEREAS, the La Verne City Council adopted the original Natural Hazard Mitigation Plan November 1, 2004;and

WHEREAS, the Plan Maintenance section of the original Natural Hazard Mitigation Plan requires the City to update the plan every five years; and

WHEREAS, public meetings regarding disaster preparedness and hazard mitigation were conducted by the Community Services Department and the Community Development Department; and

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF LA VERNE DOES HEREBY RESOLVE AS FOLLOWS:

Section 1. Environmental Determination. The City Council HEREBY FINDS and DETERMINES that this project and the Disaster Mitigation Act 2000 (DMA2K) are not subject to the provisions of the California Environmental Quality Act (CEQA) and the La Verne Environmental Guidelines.

Section 2. The Natural Hazard Mitigation Plan and its update meets the program criteria of the Stafford Act as amended (Disaster Mitigation Act of 2000) in order that the City of La Verne will be eligible for future pre-disaster and post-disaster mitigation funds.

Section 3. The Natural Hazard Mitigation Plan shall be a collection of analyses, policies and actions to guide future development and infrastructure in order to achieve disaster resiliency in the City of La Verne.

Section 4. The City Council of the City of La Verne hereby adopts the City of La Verne Natural Hazard Mitigation Plan (2012) and authorizes the submission of the Plan to the State Office of Emergency Services and the Federal Emergency Management Agency with the understanding the Plan is still undergoing review with the possibility of minor revisions in the near future.

Section 5. That the Mayor shall sign and the City Clerk shall attest to the passage and adoption of this Resolution.

PASSED, APPROVED AND ADOPTED this 21st day of February, 2012 by the following vote:

AYES:
NOES: ABSENT: ABSTAIN:
ATTEST:

List of Maps

City of La Verne Natural Hazard Mitigation Plan

Table of Contents

Part I: Mitigation Action Plan

Executive Summary

What is the Natural Hazard Mitigation Plan?

The Natural Hazard Mitigation Plan is a requirement from the Federal Emergency Management Agency. The Plan is an attempt to develop pre-disaster mitigation strategies in order to prevent human and economic loss in the event of a natural disaster such as an earthquake, landslide, or wildfire. All cities and jurisdictions are required to prepare this plan in order to qualify for FEMA pre-disaster and post-disaster mitigation funding.

The City of La Verne Natural Hazard Mitigation Plan includes resources and information to assist City residents, public and private sector organizations, and others interested in participating in planning for natural disasters. The Mitigation Plan provides a list of activities that may assist the City of La Verne in reducing risk and preventing loss from future natural hazard events. The action items address multi-hazard issues, as well as activities for earthquakes, earth movement, flooding, wildfires and windstorms.

What is the Mission of the Plan?

The mission of the City of La Verne Natural Hazards Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, and private property, from natural hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the City towards building a safer, more sustainable community.

What are the Plan Goals?

The plan goals describe the steps that City of La Verne agencies, organizations, and citizens can take to work toward mitigating risk from natural hazards. The goals are stepping-stones between the broad direction of the mission statement and the specific recommendations outlined in the action items. The plan goals listed below are not entirely unique to La Verne and are based on suggested goals provided by the Office of Disaster Management.

Protect Life and Property

- *Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from natural hazards.*
- *Reduce losses and repetitive damages from chronic hazard events while promoting insurance coverage for catastrophic hazards.*
- *Improve hazard assessment information to make recommendations for discouraging new development in high hazard areas and encouraging preventative measures for existing development in areas vulnerable to natural hazards.*

Public Awareness

- *Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.*
- *Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.*

Natural Systems

- *Balance natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.*
- *Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.*

Partnerships and Implementation

- *Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.*
- *Encourage leadership within public and private sector organizations to prioritize and implement local and regional hazard mitigation activities.*

Emergency Services

- *Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.*
- *Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.*
- *Coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures.*

How is the Plan Organized?

The Mitigation Plan contains a five-year action plan matrix, background on the purpose and methodology used to develop the mitigation plan, a profile of the City of La Verne, sections on *five* natural hazards that occur within the City, and a number of appendices. All of the sections are described in detail in Section 1, the plan introduction.

How are the Action Items Organized?

The action items are a listing of activities in which City agencies and citizens can be engaged to reduce community risk. Each action item includes an estimate of the time line for implementation. Short-term action items are activities that City agencies may implement with existing resources and authorities within one or two years. Long-term action items may require new or additional resources or authorities, and may take between one and five years (or more) to implement.

The action items are organized within the matrix that follows this executive summary, which lists all of the multi-hazard and hazard-specific action items included in the mitigation plan. Data collection and research and the public participation process resulted in the development of these action items (see Appendix B). The matrix includes the following information for each action item:

Coordinating Organization. The coordinating organization is the public agency with regulatory responsibility to address natural hazards or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

Timeline. Action items include both short and long-term activities. Each action item includes an estimate of the time line for implementation. Short-term action items are activities which City agencies are capable of implementing with existing resources and authorities within one to two years. Long-term action items may require new or additional resources or authorities, and may take between one and five years (or more) to implement.

Ideas for Implementation. Each action item includes ideas for implementation and potential resources, which may include grant programs or human resources. The matrix includes the page number within the mitigation plan where this information can be found.

Plan Goals Addressed. The plan goals addressed by each action item are included as a way to monitor and evaluate how well the mitigation plan is achieving its goals once implementation begins. The plan goals are organized into the following five areas:

1. Protect Life and Property
2. Increase Public Awareness About Hazard Mitigation
3. Protect Natural Systems
4. Create Partnerships For Implementation
5. Improve Emergency Services
6. Encourage Public Participation in Hazard Mitigation Planning

Partner Organizations. The Partner organizations are not listed with the individual action items or in the plan matrix. Partner organizations are listed in Appendix A of this plan and are agencies or public/private sector organizations that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization. The partner organizations listed in the Resource Directory of the City of La Verne Natural Hazard Mitigation Plan (NHMP) are potential partners recommended by the project planning committee, but were not necessarily contacted during the development of the Mitigation Plan. Partner organizations should be contacted by the coordinating organization to establish commitment of time and resources to action items.

Constraints. Constraints may apply to some of the action items. These constraints may be a lack of city staff, lack of funds, or vested property rights which might expose the City to legal action as a result of adverse impacts on private property.

How Will the Plan be Implemented, Monitored, and Evaluated?

The Plan Maintenance Section of this document details the formal process that will ensure that the City of La Verne NHMP remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the City will integrate public participation throughout the plan maintenance process. Finally, this section includes an explanation of how the City of La Verne government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the City's General Plan, Capital Improvement Plans, and Building & Safety Codes.

Plan Adoption

Adoption of the NHMP by the local jurisdiction's governing body is one of the prime requirements for approval of the plan. The initial completed plan was adopted by the City Council on November 1, 2004. The updated plan was adopted by the La Verne City Council in February 2012. The local agency governing body has the responsibility and authority to promote sound public policy regarding natural hazards. The City Council will periodically need to re-adopt the plan as it is revised to meet changes in the natural hazard risks and exposures in the community. The approved NHMP will be significant in the future growth and development of the community as it will provide an additional resource to help determine the type or development and/or redevelopment that will take place in different areas of the City.

Coordinating Body

A City of La Verne Hazard Mitigation Planning Committee will be responsible for coordinating implementation of Plan action items and undertaking the formal review process. The City Manager will assign representatives from City agencies, including, but not limited to, the current Hazard Mitigation Advisory Committee members.

Convener

The City Council will be asked to adopt the City of La Verne Natural Hazard Mitigation Plan, and the Hazard Mitigation Advisory Committee will take responsibility for plan implementation. The City Manager will serve as a convener to facilitate the Hazard Mitigation Advisory Committee meetings, and will assign tasks such as updating and presenting the Plan to the members of the committee. Plan implementation and evaluation will be a shared responsibility among all of the Natural Hazard Advisory Committee Members.

Implementation through Existing Programs

The City of La Verne addresses statewide planning goals and legislative requirements through its General Plan, Zoning Ordinance, Capital Improvement Plans, and City Building & Safety Codes. The Natural Hazard Mitigation Plan provides a series of recommendations that are closely related to the goals and objectives of these existing planning programs. The City of La Verne will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

Economic Analysis of Mitigation Projects

The Federal Emergency Management Agency's approaches to identify costs and benefits associated with natural hazard mitigation strategies or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards can provide decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. (Also see "Method of Prioritizing Mitigation Action Items" on Page 41.)

Formal Review Process

The City of La Verne Natural Hazard Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The evaluation process includes a firm schedule and time line, and identifies the local agencies and organizations participating in plan evaluation. The convener will be responsible for contacting the Hazard Mitigation Advisory Committee members and organizing the annual meeting. Committee members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan.

Continued Public Involvement

The City of La Verne is dedicated to involving the public directly in the continual review and updates of the Natural Hazard Mitigation Plan. Copies of the plan will be catalogued and made available at City Hall and the La Verne branch of the Los Angeles County Public Library. The existence and location of these copies will be publicized in City newsletters and on the City website. The plan also includes the address and the phone number of the City of La Verne Community Development Department, responsible for keeping track of public comments on the Plan. In addition, copies of the plan and any proposed changes will be posted on the City website. This site will also contain an email address and phone number to which people can direct their comments and concerns.

Who Participated in Developing the Plan?

The City of La Verne Natural Hazards Mitigation Plan is the result of a collaborative effort between City of La Verne citizens, public agencies, non-profit organizations, the private sector, and regional and state organizations. Public participation played a key role in development of goals and action items. Interviews were conducted with stakeholders across the City, and eight public workshops were held to include City of La Verne residents in plan development. A project planning committee guided the process of developing the plan.

The Planning Committee was comprised of representatives from:

City of La Verne Administration
City of La Verne Building and Safety
City of La Verne Community Development
City of La Verne Public Works Department
City of La Verne Fire Department
City of La Verne Community Services

2012 Update Process

According to the NHMP as adopted in 2004, there should be an update to the plan every five years. A shortage of resources, including financial and personnel, have resulted in a delay past this original goal. However, the current update process again brings the City of La Verne into compliance with the Disaster Mitigation Act of 2000 as well as with associated amendments that have taken place since the law's passage. The update of the plan can be divided into three phases. The first was a review conducted by eight interested residents. During this review, each section was examined by one resident for areas of concern that might have not been addressed in the original document as well as issues with the plan such as trying to catch errors or discrepancies. The result of this first phase was that the residents completing the review had no feedback or requested improvements to the existing plan.

The second phase of the process consisted of public opportunities to participate in updating the plan. This included sending written requests for participation to local stakeholders as well as inviting all La Verne residents via the City's web site and two separate publications that are mailed to each residential and business address. There was only one response to these requests.

The final phase was a thorough review by the advisory committee. This included a page by page analysis of the 2004 NHMP as well as utilization of the Local Mitigation Plan Review Crosswalk to ensure compliance with several changes that have occurred to the plan requirements since its original adoption. Each member of the advisory committee reviewed the plan in its entirety as well as specific sections being assigned to those specializing in those fields such as the fire chief reviewing the wildfire section, the public works director reviewing the windstorm section, and the city engineer reviewing the earthquakes, earth movement, and flood sections.

Each section of the plan received some minimal revisions during the update process. Many of these were grammatical in nature. The most significant changes came from the updated public process highlighted in Appendix B and the inclusion of National Flood Insurance Program requirements that are included in the Flood Section of the plan.

Below is a summary of the short and long term mitigation action items.

Summary Table of Short and Long Term Mitigation Action Items

Natural Hazard	Short Term	Page	Long Term	Page
Earthquake	Minimize Personal and Property Damage for New Developments.	6-22		

Earthquake	Continue to implement the Unreinforced Masonry Program in Lordsburg. Complete all inventory of all unreinforced masonry structures in the City of La Verne. Require structural reinforcement of all unreinforced masonry structures when renovated. The cost of reinforcement shall not be an adequate justification for demolition of a structure determined to be historical within the City of La Verne.	6-22		
			Develop a debris management program in compliance with AB939, including short term transfer stations.	6-23
			Request that the Los Angeles County Flood Control District assess all dams in the La Verne area for earthquake soundness.	6-23
			Prepare our Community for the Event of an Earthquake.	6-23
Earthquake	Enforce current regulations that require that water heaters be double strapped to the wall in all new residential construction. Encourage owners of existing homes to bolt water heaters to the wall and encourage the use of tankless water heaters	6-23		
Earth Movement/Landslide	Improve knowledge of landslide hazard and debris flow areas and understanding of vulnerability and risk to life and property in hazard-prone areas. Develop public handout with map showing area susceptible to landslides and debris flows.	7-15		
Earth Movement/landslide	Encourage construction and subdivision design that can be applied to steep slopes to reduce the potential adverse impacts from development. Amend hillside development overlay zone ordinance if necessary.	7-15		

Earth Movement/landslide	Identify safe evacuation routes in high-risk debris flow and landslide areas.	7-17		
Earth Movement/landslide			Limit activities in identified potential and historical landslide and flood plain areas which cannot be mitigated through regulation.	7-16
Floods	Pursue Federal or other funding sources to mitigate the single repetitive flood property in the City of La Verne. (West Marshall Canyon	8-23		
Floods	Recommend revisions to requirements for development within the West Marshall Canyon floodplain.	8-23		
Floods	Revisit the data and mapping for West Marshall Canyon floodplain information, and identify and map flood-prone areas outside the previously designated floodplains.	8-23		
Floods	Encourage development of acquisition and management strategies to preserve open space for flood mitigation.	8-24		
Natural Hazard	Short Term	Page	Long Term	Page
Wildfire	Enhance emergency services to increase the efficiency of wildfire response and recovery activities.	9-17		
Wildfire	Educate agency personnel on federal cost-share and grant programs, Fire Protection Agreements and other related federal programs so the full array of assistance available to local agencies is understood.	9-17		
Wildfire	Encourage development and dissemination of maps relating to the fire hazard to help educate and assist builders and homeowners in being engaged in wildfire mitigation activities and to help guide emergency services during response.	9-17		
Wildfire	Develop a comprehensive vegetation management plan for Mountain Springs Estates.	9-18		

Wildfire			Build a fire station within close proximity to the wildland interface area in La Verne in partnership with the USFS and jointly staff the facility.	9-18
Wildfire			Enhance outreach and education programs aimed at mitigating wildfire hazards and reducing or preventing the exposure of citizens, public agencies, private property owners and businesses to natural hazards.	9-18
Wildfire			Increase communication, coordination and collaboration between wildland/urban interface property owners, local and county planners and fire prevention crews and officials to address risks, existing mitigation measures and federal assistance programs.	9-19
Wildfire			Encourage implementation of wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability.	9-19
Natural Hazard	Short Term	Page	Long Term	Page
Windstorms			Since fall and early winter tend to be the likely most common time when events occur, establish a Public Awareness Campaign to run annually starting in September. Campaign will focus on providing public education materials to City of La Verne residents and all school district staff, parents and age-appropriate students with mitigation materials pertaining to the protection of life and property before, during, and after a windstorm.	10-17
Windstorms			Evaluate existing high risk areas to determine whether species identified as susceptible to falling should be replaced.	10-17

Section One: Introduction

City of La Verne Natural Hazard Mitigation Plan

Section One

Introduction

Throughout history, the residents of what is now the City of La Verne have faced various natural hazards. Photos, journal entries, and newspapers from the 1800's show that the residents of the area dealt with earthquakes, earth movement (landslides and debris flow), flooding, wildfires, and wind storms.

Although there were fewer people in the area, the natural hazards adversely affected the lives of those who depended on the land and climate conditions for food and welfare. As the population of the City continues to increase, the exposure to natural hazards creates an even higher risk than previously experienced.

The City of La Verne is the 55th most populous of 88 cities in Los Angeles County, and offers the benefits that come from living in a Mediterranean type of climate. The City is characterized by the unique and attractive landscape that makes the area so popular. However, the impacts of natural hazards associated with the terrain make the environment and population potentially vulnerable to natural disaster situations.

The City is subject to earthquakes, earth movements, flooding, wildfires and windstorms. It is not always possible to predict when these disasters will occur, or the extent to which they will affect the City. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from these natural disasters.

The City of La Verne most recently opened the Emergency Operations Center in response to the Williams Fire in 2002 and the Grand Prix/Padua Fire in 2003. Suppression costs for the Padua portion of the 2003 fire amounted to 1.2 million.

There was no damage to La Verne businesses, residences, and infrastructure as a result of the Williams and Grand Prix Fires. The La Verne Fire Department estimated that the Williams Fire required the evacuation of approximately 100 of the City's 32,512 residents. Most of the residents affected lived in the Mountains Springs Estates neighborhood of northern La Verne. The Grand Prix/Padua Fire required the evacuation of approximately 400 La Verne residents. There was significant loss of property in other cities such as Claremont as a result of the fire. However, no structures in La Verne were destroyed.

Why Develop and Maintain a Mitigation Plan?

The Natural Hazard Mitigation Plan is a requirement from the Federal Emergency Management Agency. The Plan is an attempt to develop pre-disaster mitigation strategies in order to prevent human and economic loss in the event of a natural disaster such as an earthquake, landslide, or wildfire. All cities and jurisdictions are required to prepare this plan in order to qualify for FEMA pre-disaster and post-disaster mitigation funding.

As the costs of damage from natural disasters continue to increase, the community also realizes the importance of identifying effective ways to reduce vulnerability to disasters. Natural hazard mitigation plans assist communities in reducing risk from natural hazards by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the City.

The plan provides a set of action items to reduce risk from natural hazards through education and outreach programs to foster the development of partnerships. Additionally, the plan provides implementation of preventative activities such as land use programs that restrict and control development in areas subject to damage from natural hazards.

The resources and information within the Mitigation Plan:

(1) Establish a basis for coordination and collaboration among agencies and the public in the City of La Verne;
(2) Identify and prioritize future mitigation projects; and
(3) Assist in meeting the requirements of federal assistance programs.

The mitigation plan works in conjunction with other City plans, including the City General Plan and Emergency Operations Plans such as the Multi-Function Hazard Plan.

Whom Does the Mitigation Plan Affect?

The City of La Verne Natural Hazards Mitigation Plan affects the entire city. Map 1 shows major roads in the City of La Verne. This plan provides a framework for planning for natural hazards. The resources and background information in the plan is applicable City-wide, and the goals and recommendations can lay groundwork for local mitigation plans and partnerships.

Natural Hazard Land Use Policy in California

Planning for natural hazards should be an integral element of any city's land use planning program. All California cities and counties are required to have General Plans and the implementing ordinances that are required to comply with the statewide planning regulations.

The continuing challenge faced by local officials and state government is to keep the network of local plans effective in responding to the changing conditions and needs of California's diverse communities, particularly in light of the very active seismic region in which we live. This is especially true in the case of planning for natural hazards where communities must balance development pressures with detailed information on the nature and extent of hazards.

Planning for natural hazards, calls for local plans to include inventories, policies, and ordinances to guide development in hazard areas. These inventories should include the compendium of hazards facing the community, the built environment at risk, the personal property that may be damaged by hazard events, and most of all, the people who may be threatened by these hazards.

Support for Natural Hazard Mitigation

All mitigation is local, and the primary responsibility for development and implementation of risk reduction strategies and policies lie with local jurisdictions. Local jurisdictions, however, are not alone. Partners and resources exist at the regional, state, and federal levels. Numerous California state agencies have a role in natural hazards and natural hazard mitigation. Some of the key agencies include:

- The Governor's Office of Emergency Services (OES) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration.

- The Southern California Earthquake Center (SCEC) gathers information about earthquakes, integrates information on earthquake phenomena, and communicates to end-users and the general public to increase earthquake awareness, reduce economic losses, and save lives.

- The California Division of Forestry (CDF) is responsible for all aspects of wild land fire protection on private and state land and administers forest practices regulations, including landslide mitigation, on non-federal lands.

- The California Division of Mines and Geology (DMG) is responsible for geologic hazard characterization, public education, the development of partnerships aimed at reducing risk, and exceptions (on science-based refinement of tsunami inundation zone delineation) to state mandated tsunami zone restrictions.

- The California Division of Water Resources (DWR) plans, designs, constructs, operates, and maintains the State Water Project; regulates dams; provides flood protection and assists in emergency management. It also educates the public and serves local water needs by providing technical assistance.

Plan Methodology

Information in the Natural Hazard Mitigation Plan is based on research from a variety of sources. Staff from both the Public Works Department and Community Development Department of the City of La Verne conducted data research and analysis, facilitated planning committee meetings and public workshops, and developed the final mitigation plan. The research methods and various contributions to the plan include:

<u>Input from the Hazard Mitigation Plan committee:</u>

Between January 2009 and January 2012, members of the Hazard Mitigation Planning Committee convened approximately ten times to guide development of the Mitigation Plan. The committee played an integral role in developing the mission, goals, and action items for the mitigation plan. The committee consisted of City of La Verne department heads as well as other representatives of various City Departments, including:

City of La Verne Building and Safety
City of La Verne Fire Department
City of La Verne Community Development Department
City of La Verne Public Works Department
City of La Verne Parks and Community Services

Stakeholder Interviews:

As part of the original adoption of the NHMP, City staff conducted 25 interviews with individuals and specialists from organizations interested in natural hazards planning. The interviews identified common concerns related to natural hazards and identified key long and short-term activities to reduce risk from natural hazards. Stakeholders interviewed for the plan included representatives from:

Water Providers – Three Valleys, MWD, City of La Verne, Golden State Water
Los Angeles County Fire Department
Los Angeles County Public Works Department
Los Angeles County Office of Emergency Management
Utility Providers – Edison, SoCal Gas
Local Businesses
City of La Verne Chamber of Commerce

Additionally, the City sent out written requests asking for participation with the NHMP to a number of stakeholders during the 2012 update process. Letters were sent to:

- The La Verne Chamber of Commerce
- The University of La Verne
- Hillcrest Brethren Homes
- Los Angeles County Dept. of Public Works
- Los Angeles County Flood Control
- The Los Angeles County Sanitation District
- Verizon
- The Gas Company
- Southern California Edison
- The Metropolitan Water District of Southern California
- The Golden State Water Company
- The Three Valleys Municipal Water District

There were no public comments received with the exception of a short correspondence received from Edison that is included in the appendices section.

State and federal guidelines and requirements for mitigation plans:

Following are the Federal requirements for approval of a Natural Hazard Mitigation Plan:

- Open public involvement, with public meetings that introduce the process and project requirements.
- The public must be afforded opportunities for involvement in: identifying and assessing risk, drafting a plan, and public involvement in approval stages of the plan.
- Community cooperation, with opportunity for other local government agencies, the business community, educational institutions, and non-profits to participate in the process.
- Incorporation of local documents, including the local General Plan, the Zoning Ordinance, the Building Codes, and other pertinent documents.

The following components must be part of the planning process:

- Complete documentation of the planning process
- A detailed risk assessment on hazard exposures in the community
- A comprehensive mitigation strategy, which describes the goals & objectives, including proposed strategies, programs & actions to avoid long-term vulnerabilities.
- A plan maintenance process, which describes the method and schedule of monitoring, evaluating and updating the plan, and integration of the Hazard Mitigation Plan into other planning mechanisms.
- Formal adoption by the City Council.
- Plan Review by both State OES and FEMA

These requirements are spelled out in greater detail in the following plan sections and supporting documentation.

The City of La Verne staff examined existing mitigation plans from around the country, current FEMA hazard mitigation planning standards (386 series), and the State of California Natural Hazards Mitigation Plan Guidance.

Other reference materials consisted of county and city mitigation plans, including:

Clackamas County (Oregon) Natural Hazards Mitigation Plan
Six County (Utah) Association of Governments
Upper Arkansas Area Risk Assessment and Hazard Mitigation Plan
Urbandale-Polk County, Iowa Plan
Hamilton County, Ohio Plan
Natural Hazard Planning Guidebook from Butler County, Ohio

Hazard specific research: City of La Verne staff collected data and compiled research on five hazards: earthquakes, earth movements, flooding, wildfires and wind storms. Research materials came from state agencies including OES, and CDF. The City of La Verne staff conducted research by referencing historical local newspapers, interviewing long time residents, long time City of La Verne employees, and locating City of La Verne information in historical documents. The City of La Verne staff identified current mitigation activities, resources and programs, and potential action items from research materials and stakeholder interviews.

Public Workshops

During the original plan creation process, the City of La Verne staff facilitated five public workshops to gather comments and ideas from City residents about updating mitigation planning and priorities for mitigation plan goals. The first input session was held at the Planning Commission meeting on March 10, 2004. On June 8, 2004, a second session was held and facilitated by the Parks and Community Services Department. There were approximately 24 local residents and representatives from various local businesses and institutions. The following week, on June 15, 2004, an additional public input session was conducted with individuals who had expressed interest in further participation at the June 8 meeting. There were six residents in attendance.

As part of the 2012 update to the City's Hazard Mitigation Plan, there were three public workshops. The first was held on January 6, 2009, and a second on June 2, 2009 in coordination with the annual Disaster Preparedness Meeting held in the La Verne Community Center. At these meetings eight citizens volunteered to participate in the update to the Hazard Mitigation Plan. After the meeting the participants were given the Plan to review. It was split up into eight different sections for each of them to review. After they were given a few months to review the document, feedback from the members was negligible with nothing additional to add to the plan. The second workshop was held on December 14th, 2011 in conjunction with the City's Planning Commission meeting and was advertised in the local City paper, on the City's website, and was noticed in the regional newspaper (Inland Valley Daily Bulletin). Unfortunately there wasn't any attendance or comments received at this meeting. There will also be a fourth and final opportunity for any public input at the time the City Council considers adoption.

Additional opportunities were made available on the City's website as well as at public counters of City Hall. These efforts also provided no comments from the public.

In spite of a lack of public comment on the update of the plan, the resources and information cited in the mitigation plan provide a strong local perspective and help identify strategies and activities to make the City of La Verne more disaster resilient. This is due to the efforts of the original plan as well as the strong presence of La Verne residents on the Plan Committee.

How Is the Plan Used?

Each section of the mitigation plan provides information and resources to assist people in understanding the City and the hazard-related issues facing citizens, businesses, and the environment. Combined, the sections of the plan work together to create a document that guides the mission to reduce risk and prevent loss from future natural hazard events.

The structure of the plan enables people to use a section of interest to them. It also allows City government to review and update sections when new data becomes available. The ability to update individual sections of the mitigation plan places less of a financial burden on the City. Decision-makers can allocate funding and staff resources to selected pieces in need of review, thereby avoiding a full update, which can be costly and time-consuming. New data can be easily incorporated, resulting in a natural hazards mitigation plan that remains current and relevant to the City of La Verne.

The mitigation plan is organized in three volumes. Volume I contains an executive summary, introduction, City profile, multi-hazard risk assessment, and plan maintenance. Volume II contains the six natural hazard sections and Volume III includes the appendices. Each section of the plan is described below.

Part I: Mitigation Action Plan

Executive Summary: Five-Year Action Plan

The Five-Year Action Plan provides an overview of the mitigation plan mission, goals, and action items. The plan action items are included in this section, and address multi-hazard issues, as well as hazard-specific activities that can be implemented to reduce risk and prevent loss from future natural hazard events.

Section 1: Introduction

The Introduction describes the background and purpose of developing the mitigation plan for the City of La Verne.

Section 2: Community Profile

This section presents the history, geography, demographics, and socioeconomics of the City of La Verne. It serves as a tool to provide a historical perspective of natural hazards in the City.

Section 3: Risk Assessment

This section provides information on hazard identification, vulnerability and risk associated with natural hazards in the City of La Verne.

Section 4: Multi-Hazard Goals and Action Items

This section provides information on the process used to develop goals and action items that address the five natural hazards addressed in the mitigation plan.

Section 5: Plan Maintenance

This section provides information on plan implementation, monitoring, and evaluation.

Part II: Hazard Specific Information

Hazard-Specific Information on the five chronic hazards are addressed in this plan. Chronic hazards occur with some regularity and may be predicted through historic evidence and scientific methods. The chronic hazards addressed in the plan include:

Section 6: Earthquake
Section 7: Earth Movement (Landslide / Debris Flow)
Section 8: Flooding
Section 9: Wildfire
Section 10: Windstorm

Catastrophic hazards do not occur with the frequency of chronic hazards, but can have devastating impacts on life, property, and the environment. In Southern California, because of the geology and terrain, earthquake, earth movement, flooding, and wildfire also have the potential to be catastrophic as well as chronic hazards.

Each of the hazard-specific sections include information on the history, hazard causes and characteristics, hazard assessment, goals and action items, and local, state, and national resources.

Part III: Resources

The plan appendices are designed to provide users of the City of La Verne NHMP with additional information to assist them in understanding the contents of the mitigation plan, and potential resources to assist them with implementation.

Appendix A: Plan Resource Directory

The resource directory includes City, regional, state, and national resources and programs that may be of technical and/or financial assistance to the City of La Verne during plan implementation.

Appendix B: Public Participation Process

This appendix includes specific information on the various public processes used during development of the plan. I.e., notes, goals set, conclusions, locations and times.

Appendix C: Benefit Cost Analysis

This section describes FEMA's requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities.

Appendix D: List of Acronyms

This section provides a list of acronyms for City, regional, state, and federal agencies and organizations that may be referred to within the City of La Verne NHMP.

Appendix E: Glossary

This section provides a glossary of terms used throughout the plan.

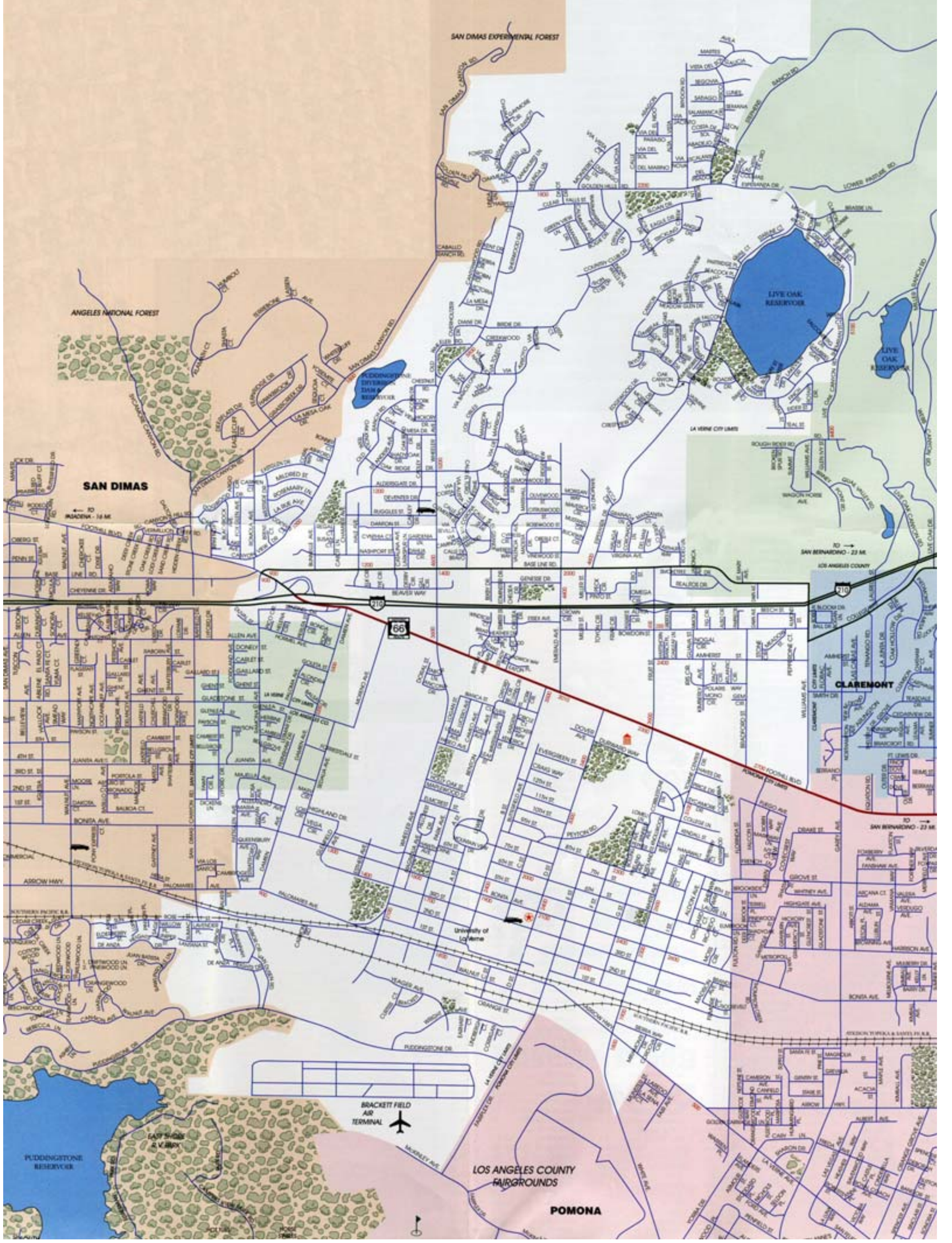
Appendix F: Local Agency Hazard Mitigation Strategies

This section includes submittals from local agencies on their hazard mitigation strategies and activities.

Appendix G: City of La Verne Community Wildfire Protection Plan

This section provides more details and information on the City’s wildfire protection activities.

Section Two: Community Profile



CITY OF LA VERNE – BASE MAP

Section Two

Why Plan for Natural Hazards in the City of La Verne?

Natural hazards impact citizens, property, the environment, and the economy of the City of La Verne. Earthquakes, earth movements, flooding, wildfires, and wind storms have exposed La Verne's residents and businesses to the financial and emotional costs of recovering after natural disasters. The risk associated with natural hazards increases as more people move to areas affected by natural hazards.

Even in those communities that are essentially "built-out" i.e., have little or no vacant land remaining for development; population density continues to increase when low density housing is replaced with medium and high density development projects.

The inevitability of natural hazards, and the growing population and activity within the City create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future natural hazard events. Identifying the risks posed by natural hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the City to create a natural hazards mitigation plan that addresses the potential impacts of hazard events.

Geography and the Environment

The City of La Verne has an area of 9.09 square miles and is located in eastern Los Angeles County.

Elevations in the City range from a high of 1,700 feet to a low of 1,000 feet. The terrain of the city is a combination of relatively flat land in the mid and southern portions and hills primarily in the northern half of the City.

Community Profile

The area comprising the City was first settled in 1887 and the City was incorporated in 1906. The City is served by the 210 (Foothill) Freeway, and the major arterial highways are Foothill Boulevard and Arrow Highway, both of which run east to west. The Burlington Northern Santa Fe railroad serves the city with tracks along Arrow Highway. Passenger transportation is provided by Foothill Transit, and Metrolink commuter rail with a stop in northwest Pomona near the City's eastern border. A Metro Gold Line station in the southern section of the City is proposed along Arrow Highway. **(See Base Map on Page 26)**

Major Rivers

The nearest major river is the San Gabriel River. Normally this river channel is relatively dry and only carries a significant water flow during a major rain storm. The San Gabriel River does not have any potential impact on the City of La Verne due to its distance from the City.

Climate

Average temperatures in the City of La Verne range from 55 degrees Fahrenheit in the winter months to 72 degrees Fahrenheit in the summer months. However the temperatures can vary over a wide range, particularly when the Santa Ana winds blow, bringing higher temperatures and very low humidity. Temperatures rarely exceed 110 degrees Fahrenheit in the summer months (June - September), and rarely drop below 30 degrees Fahrenheit in the winter months (November-March).

Rainfall in the city averages 14.8 inches of rain per year. However the term “average rainfall” is misleading because over the recorded history of rain fall in the City of La Verne, rainfall amounts have ranged from no rain at all in some years to 20 inches of rain or more in very wet years.

Furthermore, actual rainfall in Southern California tends to fall in large amounts during sporadic and often heavy storms rather than consistently at somewhat regular intervals. Rain fall in Southern California might be characterized as feast or famine within a single year. Because the metropolitan basin is becoming largely built out, water originating in higher elevation communities can have a sudden impact on adjoining communities that have a lower elevation.

Minerals and Soils

The characteristics of the minerals and soils present in the City of La Verne indicate the potential types of hazards that may occur. Rock hardness and soil characteristics can determine whether or not an area will be prone to geologic hazards such as earthquakes, liquefaction and landslides.

The surface material includes artificial fill, unconsolidated, fine-grained deposits of silt, sand, gravel, and recent flood plain deposits, Glendora volcanics, andestite, dacites, rhyolite, and volcanic conglomerates. Torrential flood events can introduce large deposits of sand and gravel. Sandy silt and silt containing clay are moderately dense and firm, and are primarily considered to be prone to liquefaction, an earthquake related hazard. Basaltic lava consists mainly of weathered and non-weathered, dense, fine-grained basalt. Though the characteristics of this lava may offer solid foundation support, landslides are common in many of these areas where weathered residual soil overlies the basalt. Understanding the geologic characteristics of the City of La Verne is an important step in hazard mitigation and avoiding at-risk development.

Other Significant Geologic Features

The City of La Verne, like most of the Los Angeles Basin, lies over the area of one or more known earthquake faults, and potentially many more unknown faults, particularly so-called lateral or blind thrust faults. The major faults that have the potential to affect the greater Los Angeles Basin, and therefore the City of La Verne are:

- San Andreas
- San Jacinto
- Newport Inglewood
- Palos Verdes
- Whittier
- Santa Monica
- Sierra Madre

Chino

The Los Angeles Basin has a history of powerful and relatively frequent earthquakes; the most recent very powerful earthquake was the 8.0+ San Andreas earthquake of 1857, which did substantial damage to the relatively few buildings that existed at the time. Paleoseismological research indicates that large (8.0+) earthquakes occur on the San Andreas fault at intervals between 45 and 332 years with an average interval of 140 years[1]. Other lesser faults have also caused very damaging earthquakes since 1857. Notable earthquakes include the Long Beach Earthquake of 1933, the San Fernando Earthquake of 1971, the 1987 Whittier Earthquake and the 1994 Northridge Earthquake.

In addition, many areas in the Los Angeles Basin have sandy soils that are subject to liquefaction. The City of La Verne has liquefaction zones as shown on Figure EH-3 Page 11 of Section 6.

The City of La Verne also has areas with land movement (landslide and debris flow) potential. These areas are primarily in the northern foothills of the city. See Map EM-1 Page 8 of Section 7.

Population and Demographics

The City of La Verne has a population of about 31,063 per the 2010 Census in an area of 9.09 square miles. The population of La Verne had steadily increased from the late 1800's through 2000, and increased 8% from 1990 to 2000 according to the 2000 Census. Growth has currently leveled off during the last several years.

The City of La Verne has nearly reached the point of being "built out." The relatively recent increase in the number of people living in the northern foothills of the City creates more community exposure to wildfire and earth movement hazards and changes how agencies prepare for and respond to natural hazards. For example, more people living on the urban fringe can increase risk of fire. Wildfire has an increased chance of starting due to human activities in the urban/rural interface, and has the potential to injure more people and cause more property (Urban fire plan from chief) damage. But an Urban/wildland fire is not the only threat to the City of La Verne. In the 1987 publication, Fire Following Earthquake issued by the All Industry Research Advisory Council, Charles Scawthorn explains how a post-earthquake urban conflagration would develop. The conflagration would be started by fires resulting from earthquake damage, but made much worse by the loss of pressure in the fire mains, caused by either lack of electricity to power water pumps, and /or loss of water pressure resulting from broken fire mains.

Natural hazards do not discriminate, but the impacts in terms of vulnerability and the ability to recover vary greatly among the population. According to Peggy Stahl of the Federal Emergency Management Agency (FEMA) Preparedness, Training, and Exercise Directorate, 80% of the disaster burden falls on the public, and within that number, a disproportionate burden is placed upon special needs groups: women, children, minorities, and the poor.[2]

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[1] Peacock, Simon M., http: aamc.geo.lsa.umich.edu eduQuakes EQpredLab EQprediction.peacock.html

[2] www.fema.gov

Total population	**100.0**	**31,063**
One race	95.5	29,651
White	74.2	24,157
Black or African American	3.4	1,065
American Indian and Alaska Native	0.9	265
Asian	7.7	2,381
Native Hawaiian and Other Pacific Islander	0.2	61
Native Hawaiian	0.1	27
Guamanian or Chamorro	-	14
Samoan	-	6
Other Pacific Islander [2]	0.1	14
Some other race	9.1	2,822
Two or more races	4.5	1,412
Hispanic or Latino (of any race)	31	9,635
Mexican	24.6	7,627
Puerto Rican	0.6	180
Cuban	0.6	182
Other Hispanic or Latino	5.3	1,646
Not Hispanic or Latino	69	21,428
White alone	55.4	17,197

Census data from 2010 indicates that although the percentage of poverty in La Verne (4.7%) is about one third that of the state's (14.2%), 27% of the people living in poverty in City of La Verne are under 18 years old, and 4.1% are over 65. Vulnerable populations, such as those living in poverty, may be disproportionately impacted by natural hazards.

Examining the reach of hazard mitigation policies to special needs populations may assist in increasing access to services and programs. FEMA's Office of Equal Rights addresses this need by suggesting that agencies and organizations planning for natural disasters identify special needs populations, make recovery centers more accessible, and review practices and procedures to remedy any discrimination in relief application or assistance.

The cost of natural hazards recovery can place an unequal financial responsibility on the general population when only a small proportion may benefit from governmental funds used to rebuild private structures. Discussions about natural hazards that include local citizen groups, insurance companies, and other public and private sector organizations can help ensure that all members of the population are a part of the decision-making processes.

Land and Development

Development in Southern California from the earliest days was a cycle of boom and bust. However, the Second World War dramatically changed that cycle. Military personnel and defense workers came to Southern California to fill the logistical needs created by the war effort. The available housing was rapidly exhausted and existing commercial centers proved inadequate for the influx of people. Immediately after the war, construction began on the freeway system, and the face of Southern California was forever changed. Home developments and shopping centers sprung up everywhere and within a few decades the central basin of Los Angeles County was nearly built out. This pushed new development further and further away from the urban center.

The City of La Verne General Plan addresses the use and development of private land, including residential and commercial areas. This plan is one of the City's most important tools in addressing environmental challenges including transportation and air quality, growth management, conservation of natural resources, clean water, and open spaces.

The environment of most Los Angeles County cities is nearly identical with that of their immediate neighbors and the transition from one incorporated municipality to another is seamless to most people. Seamless too are the exposures to the natural hazards that affect all of Southern California.

Housing and Community Development

The demand for housing outstrips the available supply in much of California and the recent low interest rates have further fueled a pent up demand. There are approximately 11,286 housing units in the City of La Verne. Owner occupied units number 8,582 while there are 2,488 renter occupied units. As in most areas of Southern California demand for low to medium priced homes continues to be strong. The median price for a single family home in the City of La Verne for 2005-2007 is $525,800, a 12% increase since 2004. The median price for condominium homes in the City of La Verne is $264,000, which is a 29.6% increase in the median compared to 2003.

The City participates in the Community Development Block Grant (CDBG) program. One of the resources available to address community development needs is the CDBG program. The City of La Verne’s CDBG allocation for the year 2010-2011 is $166,427.

There is an increased concentration of resources and capital in La Verne. The best indicator of this fact is the increasing per capita personal income in the region since the 1970's. Per capita income is an estimate of total personal income divided by the total population.

This estimate can be used to compare economic areas as a whole, but it does not reflect how income is distributed among residents of the area being examined. The City's per capita personal income is also increasing relative to California’s and the United State's average per capita incomes, resulting in a more affluent community than the average population.

Subtle but very measurable changes occur constantly in communities that increase the potential loss that will occur in a major disaster. There are a number of factors that contribute to this increasing loss potential. First, populations tend to continue to increase, putting more people at risk within a defined geographic space. Second, inflation constantly increases the value of real property and permanent improvements. Third, the amount of property owned per capita increases over time. Information from the U.S. Census Bureau shows gains in average housing standards.

Amount of Property per person	1975	1998
Average size of new homes	1645 sq. ft.	2190 sq. ft.
of homes with 4 bedrooms	21	33
of homes with 2 or more baths	20	52
Source: U.S. Department of Census		

If we look at the largest recorded earthquakes in American history, and compare the level of population and development today with that which existed at the time of the event, the scale of potential damage is staggering.

1886 Charleston EQ M7.3 in Charleston, SC
Estimated insured damage if happened today 10 Billion

1906 San Francisco EQ M8.3 Significant fire following damage
Estimated insured damage if happened today 36 Billion

1811-12 New Madrid EQ 1811-12, series of 4 EQs over 7 weeks
Estimated insured damage if happened today 88 Billion

Source: Risk Management Solutions

A pro-business attitude, shared community vision, and a dedication to reinvestment in retail/commercial businesses through the City Redevelopment Agency have all played key roles in La Verne's dynamic growth and success over the last ten to fifteen years in attracting new business, expanding job opportunities, and increasing residential, commercial, and industrial property values. Recent figures indicate that general sales tax revenues in La Verne have increased from $1,924,699 in 1994 to $3,005,736 in 2003.

Mitigation activities are needed at the business level to ensure the safety and welfare of workers and limit damage to industrial infrastructure. Employees are highly mobile, commuting from surrounding areas to industrial and business centers. This creates a greater dependency on roads, communications, accessibility and emergency plans to reunite people with their families. Before a natural hazard event, large and small businesses can develop strategies to prepare for natural hazards, respond efficiently, and prevent loss of life and property.

Transportation and Commuting Patterns

La Verne is the 55th largest city of the 88 cities in Los Angeles County. Over the past decade, Los Angeles County has experienced significant growth in employment and population. Increases in population and business activity generates an increase in vehicle licensing transactions as well as in vehicle miles traveled in the City of La Verne. Furthermore, close to 47 percent of La Verne's working population commutes to work outside of the City.

Private automobiles are the dominant means of transportation in Southern California and in the City of La Verne. However, La Verne meets its public transportation needs through a mixture of a regional transit system (Metrolink), and bus service through Foothill Transit. MTA will operate a proposed light rail service to the City of La Verne and to the Los Angeles County metropolitan area. In addition to this service, the City promotes alternative transportation activities.

La Verne has shown its support for alternative transportation modes through its bike/walk/carpool incentive program which provides direct cash for employees who avoid solo driving to work. Incentives are based on mode and distance, with the highest dollar value going to commuters using "human powered" methods for long distances and the lowest dollar to carpoolers commuting short distances. Employees track their trips and "earn" their awards annually.

The City's Community Services Department provides subsidized Metrolink passes for residents and provides transit information, and the City has helped support paratransit for the University of La Verne and the Pomona Valley Transportation Authority, which provides transportation for seniors and disabled persons.

In addition to its own 97 mile road system, the City of La Verne is served by the 210 Freeway connecting the city to adjoining parts of Los Angeles and San Bernardino Counties. As daily traffic rises, there is an increased risk that a natural hazard event will disrupt the travel plans of residents across the region, as well as local, regional, and national commercial traffic.

Localized flooding can render roads unusable. A severe winter storm has the potential to disrupt the daily driving routine of hundreds of thousands of people. Natural hazards can disrupt automobile traffic and shut down local and regional transit systems.

Section Three: Risk Assessment

Section Three

What is a Risk Assessment?

Conducting a risk assessment can provide information on: the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment that may result from natural hazard events. Specifically, the three levels of a risk assessment are as follows:

1) Hazard Identification

This is the description of the geographic extent, potential intensity and the probability of occurrence of a given hazard. Maps are frequently used to display hazard identification data. The City of La Verne identified five major hazards that affect this geographic area. These hazards - earthquakes, earth movements, flooding, wildfires, and wind storms - were identified through an extensive process that utilized input from the Hazard Mitigation Advisory Committee The geographic extent of each of the identified hazards are addressed in more detail in the specific sections of this plan. In general, earthquakes and wind storms are possible in every part of the City while earth movements and wildfires are more concentrated to areas north of the 210 Freeway. A disaster such as flooding has been identified as a possibility but it is an issue that is more thoroughly addressed in the flooding section and is specific to certain conditions. Below is table 3-1 representing the process the advisory committee used to select hazards to be addressed by the NHMP.

Potential Hazard	***Notes***
Earthquakes	Inclusion in plan is warranted. Earthquakes are frequent in the area.
Earth Movement	Inclusion in plan is warranted. History has shown that earth movement is a possibility in La Verne and the types of soil on the alluvium continues to be an issue of concern under certain conditions ie after wildfires.
Floods	Inclusion in plan is warranted.
Wildfires	Inclusion in plan is warranted. The City boundaries meet the foothills of the national forest where wildfires occur periodically.
Wind Storm	Inclusion in plan is warranted. La Verne is along the San Gabriel Mountains where Santa Ana winds annually produce strong winds.
Volcanic Eruption	According to the USGS, there is no active or potentially active volcanic activity currently known to be threatening La Verne. This type of hazard is not warranted to include in the plan.
Cyclone Type Storm	According to the NOAA, cyclonic type storms, such as a hurricane or typhoon are not a threat to La Verne. They are unlikely to Southern California in general due to the colder ocean water found off the coast. There have only been 4 hurricanes recorded to reach Southern California and the resulting weakened storms impacts even in the most extreme scenario are already accounted for in other sections of this plan such as wind and floods. Inclusion in the plan is not warranted.

2) Profiling Hazard Events

This process describes the causes and characteristics of each hazard, how it has affected the City of La Verne in the past, and what part of the City of La Verne's population, infrastructure, and environment has historically been vulnerable to each specific hazard. A profile of each hazard discussed in this plan is provided in each hazard section. For a full description of the history of hazard specific events, please see the appropriate hazard chapter.

3) Vulnerability Assessment/Inventorying Assets

This is a combination of hazard identification with an inventory of the existing (or planned) property development(s) and population(s) exposed to a hazard. Critical facilities are of particular concern because these entities provide essential products and services to the general public that are necessary to preserve the welfare and quality of life in the City and fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities have been identified, mapped, and are illustrated in Map 3 at the end of this section. A description of the critical facilities in the City is also provided in this section. In addition, this plan includes a community issues summary in each hazard section to identify the most vulnerable and problematic areas in the City, including critical facilities, and other public and private property.

4) Risk Analysis

Estimating potential losses involves assessing the damage, injuries, and financial costs likely to be sustained in a geographic area over a given period of time. This level of analysis involves using mathematical models. The two measurable components of risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Describing vulnerability in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets. For each hazard where data was available, quantitative estimates for potential losses are included in the hazard assessment.

5) Assessing Vulnerability/ Analyzing Development Trends

This step provides a general description of land uses and development trends within the community so that mitigation options can be considered in land use planning and future land use decisions. This plan provides a comprehensive description of the character of the City of La Verne in the Community Profile. This description includes the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns. Analyzing these components of the City of La Verne can help in identifying potential problem areas and can serve as a guide for incorporating the goals and ideas contained in this mitigation plan into other community development plans.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Each hazard-specific section of the plan includes a section on hazard identification using data and information from City, County, or State agency sources.

Regardless of the data available for hazard assessments, there are numerous strategies the City can take to reduce risk. These strategies are described in the action items detailed in each hazard section of this Plan. Mitigation strategies can further reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure. Action items throughout the hazard sections provide recommendations to collect further data to map hazard locations and conduct hazard assessments.

Federal Requirements for Risk Assessment

Recent federal regulations for hazard mitigation plans outlined in 44 CFR Part 201 include a requirement for risk assessment. This risk assessment requirement is intended to provide information that will help communities to identify and prioritize mitigation activities that will reduce losses from the identified hazards. There are five hazards profiled in the mitigation plan, including earthquakes, earth movements, flooding, wildfires, and wind storms. The Federal criterion for risk assessment and further information on how the City of La Verne NHMP meets those specific requirements are outlined in Table 3-2 below.

Table 3-2. Federal Criteria for Risk Assessment

Section 322 Plan Requirement	How is this addressed?
Identifying Hazards	Each hazard section includes an inventory of the best available data sources that identify hazard areas. Then, the City developed maps identifying the location of the hazard in the City. The Executive Summary and the Risk Assessment sections of the plan include a list of the hazard maps.
Profiling Hazard Events	Each hazard section includes documentation of the history, causes, and characteristics of the hazard in the City.
Assessing Vulnerability: Identifying Assets	Where data is available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of all publicly owned land within hazardous areas. Each hazard section provides information on vulnerable areas in the City in the Community Issues section. Each hazard section also identifies potential mitigation strategies.
Assessing Vulnerability: Estimating Potential Losses:	The Risk Assessment Section of this mitigation plan identifies key critical facilities and lifelines in the City and includes a map of these facilities. Vulnerability assessments have been completed for the hazards addressed in the plan, and quantitative estimates were made for each hazard where data was available.
Assessing Vulnerability: Analyzing Development Trends	The City of La Verne Profile Section of this plan provides a description of the development trends in the City, including the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns.

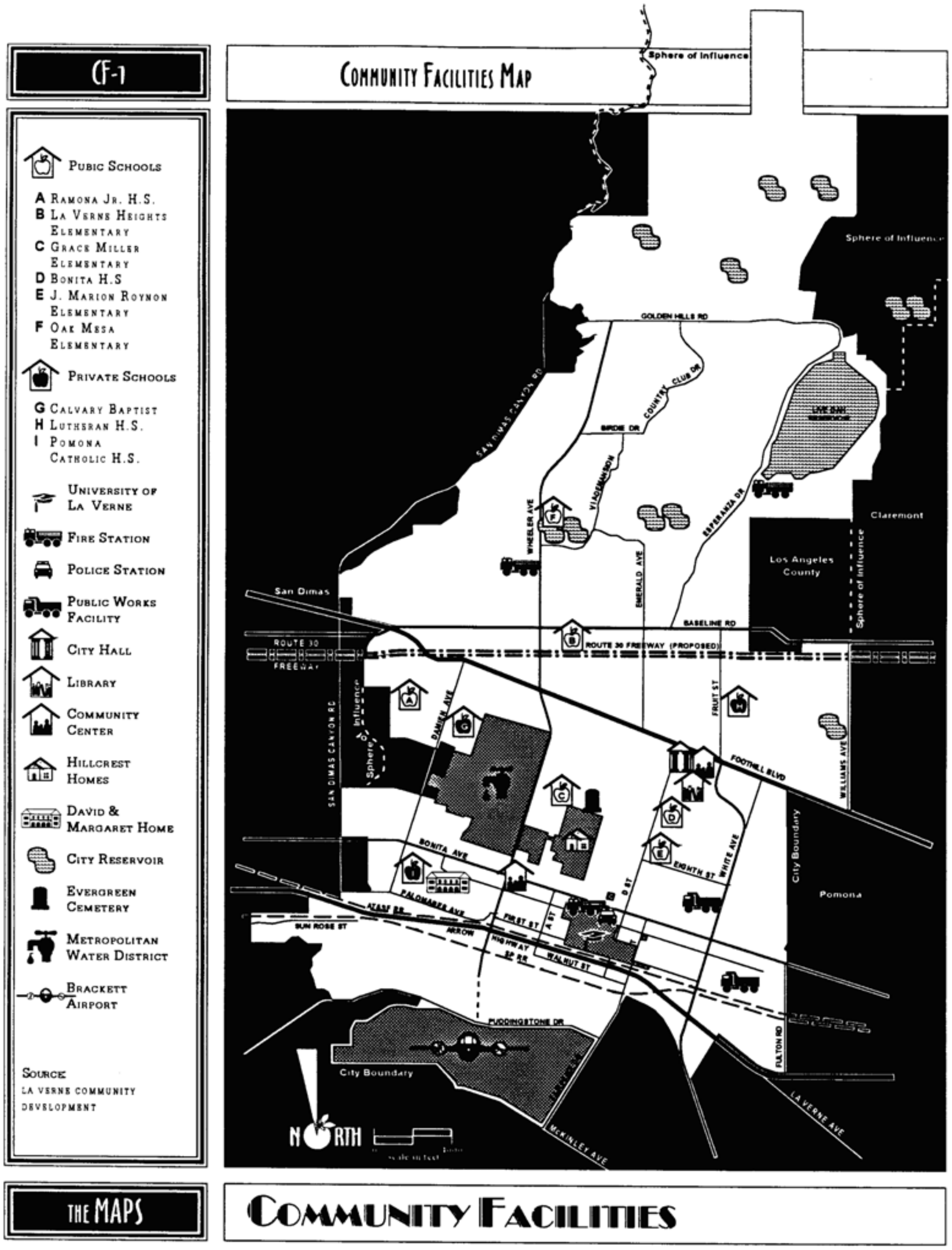
Critical Facilities and Infrastructure

Facilities critical to government response and recovery activities (i.e., life safety and property and environmental protection) include: 911 centers, emergency operations centers, police and fire stations, public works facilities, communications centers, sewer and water facilities, hospitals, bridges and roads, shelters; facilities that, if damaged, could cause serious secondary impacts may also be considered "critical." A hazardous material facility is one example of this type of critical facility.

Critical and essential facilities are those facilities that are vital to the continued delivery of key government services or that may significantly impact the public's ability to recover from the emergency. These facilities may include: buildings such as the jail, law enforcement center, public services building, community corrections center, the courthouse, and juvenile services building and other public facilities such as schools. The map on the following page illustrates the critical facilities, essential facilities, and public infrastructure within the City of La Verne.

Summary

Natural hazard mitigation strategies can reduce the impacts concentrated at large employment and industrial centers, public infrastructure, and critical facilities. Natural hazard mitigation for industries and employers may include developing relationships with emergency management services and their employees before disaster strikes, and establishing mitigation strategies together. Collaboration among the public and private sector to create mitigation plans and actions can reduce the impacts of natural hazards.


CF-1
Community Facilities Map
Pubic Schools
A Ramona Jr. H.S.
B La Verne Heights Elementary
C Grace Miller Elementary
D Bonita H.S
E J. Marion Roynon Elementary
F Oak Mesa Elementary
Private Schools
G Calvary Baptist
H Lutheran H.S.
I Pomona Catholic H.S.
University of La Verne
Fire Station
Police Station
Public Works Facility
City Hall
Library
Community Center
Hillcrest Homes
David & Margaret Home
City Reservoir
Evergreen Cemetery
Metropolitan Water District
Brackett Airport
Source: La Verne Community Development
Sphere of Influence
Golden Hills Rd
San Dimas Canyon Rd
Country Club Dr
Birdie Dr
Wheeler Ave
Esperanza Dr
Emerald Ave
Claremont
Los Angeles County
San Dimas
Baseline Rd
Route 30
Freeway
Route 30 Freeway (Proposed)
Fruit St
Damien Ave
Foothill Blvd
Williams Ave
Bonita Ave
White Ave
Eighth St
City Boundary
Pomona
Arrow
Highway
First St
Walnut St
Puddingstone Dr
Fulton Rd
La Verne Ave
McKinley Ave
North
THE MAPS
COMMUNITY FACILITIES

Section Four: Multi-Hazard Goals and Action Items

City of La Verne Natural Hazard Mitigation Plan

Section Four

Multi-Hazard Goals and Action Items

This section provides information on the process used to develop goals and action items that pertain to the five natural hazards addressed in the mitigation plan. It also describes the framework that focuses the plan on developing successful mitigation strategies. The framework is made up of three parts: the Mission, Goals, and Action Items.

<u>Mission</u>

The mission of the City of La Verne NHMP is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, and private property from natural hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to help guide the City toward building a safer, more sustainable community.

<u>Goals</u>

The plan goals describe the overall direction that City of La Verne agencies, organizations, and citizens can take to minimize the impacts of natural hazards. The goals are stepping-stones between the broad direction of the mission statement and the specific recommendations that are outlined in the action items.

<u>Action Items</u>

The action items are a listing of activities in which City agencies and citizens can be engaged to reduce risk. Each action item includes an estimate of the time line for implementation. Short-term action items are activities that City agencies may implement with existing resources and authorities within one to two years. Long-term action items may require new or additional resources or authorities, and may take between one and five years (or more) to implement.

Mitigation Plan Goals and Public Participation

The Natural Hazard Mitigation Plan goals help to guide direction of future activities aimed at reducing risk and preventing loss from natural hazards. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

<u>Protect Life and Property</u>

> *Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural hazards.*
>
> *Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.*
>
> *Improve hazard assessment information to make recommendations for discouraging*

new development and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

Public Awareness

Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.

Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

Natural Systems

Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.

Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.

Partnerships and Implementation

Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.

Encourage leadership within public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

Emergency Services

Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.

Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.

Coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

Public Participation

Public input during development of the mitigation plan assisted in creating plan goals. Meetings with the project planning committee, stakeholder interviews, and public input sessions served as methods to obtain input and identify priorities in developing goals for reducing risk and preventing loss from natural hazards in the City of La Verne.

On January 6, 2009, the plan organizers attended a meeting concerning disaster preparedness at the City of La Verne Community Center. Plan organizers utilized this as a public workshop to gather ideas from City of La Verne residents and business owners regarding the goals for the City of La Verne Natural Hazards Mitigation Plan.

The second public workshop was held June 2, 2009 and was incorporated into the previously scheduled bi-annual disaster preparedness meeting that the City of La Verne Community Services Department provides for local business people, institutions, and residents. This meeting has since been changed to an annual meeting instead of bi-annual. At this meeting eight citizens volunteered to participate in the update to the Hazard Mitigation Plan. After the meeting, participants were given a copy of the NHMP to review. It was split up into eight different sections for each of them to review. After they were given a few months to review the document, they all had no feedback.

The third public workshop, held on December 14, 2011 was in conjunction with a regular Planning Commission meeting held the second Wednesday of each month. It was noticed on the City's web site, in a local newsletter, and in the local newspaper as well as posted throughout City Hall. The workshop focused on reviewing the NHMP as adopted in 2004 and receiving any questions, concerns, and or feedback from interested parties. Plan organizers detailed the history of the NHMP and the need to update it. It was also presented that there were extensive efforts in involving the public in the update process, including:

- Reaching out to the Disaster Preparedness group
- Sending letters to the Chamber of Commerce, the University of La Verne, Hillcrest Brethren Homes, Los Angeles County Dept. of Public Works, Los Angeles County Flood Control, the Los Angeles County Sanitation District, various utility companies (Verizon, Gas Co, Edison, Metropolitan Water District, Golden State Water Co, and Three Valleys Municipal Water Dist.) There was no public comment received from the audience at the meeting. Planning Commissioners asked limited questions with one specifically involving a previous land slide area. The question was addressed and the workshop closed with the Planning Commissioners thanking the plan organizers for their work on the project.

The fourth public workshop was held on February 21, 2012 in conjunction with a regular City Council meeting and was a Public Hearing. It was noticed on the City's web site and in the local newspaper as well as posted throughout City Hall. The workshop focused on reviewing the updated NHMP and what changes were incorporated. These changes included incorporation of the National Flood Insurance Program requirements as well as the public outreach efforts that have taken place for the updated plan. After a brief presentation by the plan organizer the Public Hearing was opened to receive comments, questions, concerns, and or feedback from interested parties. There were no comments offered by public at this hearing.

Natural Hazard Mitigation Plan Action Items

The mitigation plan identifies short and long-term action items developed through data collection and research, and the public participation process. Mitigation plan activities may be considered for funding through Federal and State grant programs, and when other funds are made available through the city. Action items address multi-hazard (MH) and hazard specific issues. To help ensure activity implementation, each action item includes information on the time line and coordinating organizations. Upon implementation, the coordinating organizations may look to partner organizations for resources and technical assistance. A description of the partner organizations is provided in Appendix A, the resource directory of this plan.

Coordinating Organization

The coordinating organization is the organization that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, city, or regional agencies that are capable of or responsible for implementing activities and programs.

Time line

Action items include both short and long-term activities. Each action item includes an estimate of the time line for implementation. Short-term action items are activities that city agencies may implement with existing resources and authorities within one to two years. Long-term action items may require new or additional resources or authorities, and may take between one and five years (or more) to implement.

Ideas for Implementation

Each action item includes ideas for implementation and potential resources, which may include grant programs or human resources.

Plan Goals Addressed

The plan goals addressed by each action item are included as a way to monitor and evaluate how well the mitigation plan is achieving its goals once implementation begins.

Constraints

Constraints may apply to some of the action items. These constraints may be a lack of city staff, lack of funds, or vested property rights which might expose the City to legal action as a result of adverse impacts on private property.

Project Evaluation Worksheets:

Each jurisdiction will have some limitations on the number and cost of mitigation activities that can be completed within a given period of time. There are likely to be multiple ideas to mitigate the effects of a given hazard. Therefore it will be necessary for the committee to select the most cost effective mitigation projects and to further prioritize them. To assist the committee in the Benefit Cost Analysis (BCA) a Project Evaluation Worksheet is included at the end of Section 4. The data on these worksheets will help the committee determine the most cost effective mitigation solutions for the community. Some projects may need more detailed BCA, but this worksheet will provide a first screening methodology.

Method for Prioritizing Mitigation Action Items

The Multi Hazard Action Items listed immediately after this section were prioritized based on a simple examination of economic feasibility as well as technical feasibility and administrative capabilities. Those mitigation action items that met the greatest number of the ranking criteria were given priority ranking. The short term and long term mitigation actions items for each specific hazard were prioritized similarly. The justification for the ranking order of the action items for each particular hazard is in table form and precedes the list of action items for that hazard. There may be instances in which a particular action item is ranked higher than its ranking seems to require. In these cases it was indicated by a member of the Hazard Mitigation planning committee that despite practical or economic constraints a particular item should take priority over other. The tables can be found on the following pages:

Earthquakes: Page 6-22, 6-23
Earth Movement: Page 7-14, 7-15
Floods: Page 8-23, 8-24
Wildfires: Page 9-17, 9-18
Windstorms: Page 10-17, 10-18

Economic evaluation: The prioritization of action items was based in part on the estimate that the anticipated benefits of the action items outweighed the costs associated with mitigation. These criteria also consider availability of funds.

Technical feasibility:

Administrative capabilities: This criterion assesses the ability of the city to dedicate existing personnel to implement a particular action item. It also addresses whether or not new personnel would be required as a means of administering an action item.

Multi-Hazard Action Items

Multi-hazard action items are those activities that pertain to two or more of the five hazards in the mitigation plan: earthquake, landslide, wildfire, flood, and windstorm. There are six short-term and three long-term multi-hazard action items described below.

Short Term Multi-Hazard Action Items

SHORT TERM ACTIVITY - MULTI HAZARD #l: Integrate the goals and action items from the City of La Verne Natural Hazard Mitigation Plan into existing regulatory documents and programs, where appropriate.

Ideas for Implementation:

> Use the mitigation plan to help the City's General Plan institutionalize guidelines for sustainable development in all new construction and development projects according to the hazards that impact the City of La Verne.

Integrate the city's mitigation plan into current capital improvement plans to ensure that development does not encroach on known hazard areas: and

Partner with other organizations and agencies with similar goals to promote Building & Safety Codes that are more disaster resistant at the state level.

Coordinating Organization: Hazard Mitigation Planning Committee
Time line: Ongoing
Plan Goals Addressed: Partnerships and Implementation
Constraints: None

SHORT TERM ACTIVITY - MULTI HAZARD #2: Identify and pursue funding opportunities to develop and implement local and city mitigation activities.

Ideas for Implementation:

Develop incentives for local governments, citizens, and businesses to pursue hazard mitigation projects:

Allocate city resources and assistance to mitigation projects when possible: and

Partner with other organizations and agencies in the City of La Verne to identify grant programs and foundations that may support mitigation activities.

Coordinating Organization: Community Development Department
Time line: Ongoing
Plan Goals Addressed: Partnerships and Implementation
Constraints: Staff, Funding

SHORT TERM ACTIVITY - MULTI HAZARD #3: Establish a formal role for the City of La Verne Natural Hazards Mitigation Committee to develop a sustainable process for implementing, monitoring, and evaluating citywide mitigation activities.

Ideas for Implementation:

Establish clear roles for participants, meeting regularly to pursue and evaluate implementation of mitigation strategies.

Oversee implementation of the mitigation plan.

Establish measurable standards to evaluate mitigation policies and programs and provide a mechanism to update and revise the mitigation plan.

Monitor hazard mitigation implementation by jurisdictions and participating organizations through surveys and other reporting methods.

Develop updates for the Natural Hazard Mitigation Action Plan based on new information.

Conduct a full review of the Natural Hazards Mitigation Action Plan every 5 years by evaluating mitigation successes, failures, and areas that were not addressed.

Provide training for Committee members to remain current on developing issues in the natural hazard loss reduction field.

Coordinating Organization: Hazard Mitigation Planning Committee
Time line: Ongoing
Plan Goals Addressed: Partnerships and Implementation
Constraints: None

SHORT TERM ACTIVITY - MULTI HAZARD #4: Identify, improve, and sustain collaborative programs focusing on the real estate and insurance industries, public and private sector organizations, and individuals to avoid activity that increases risk to natural hazards.

Ideas for Implementation:

Distribute information about flood, fire, earthquake, and other forms of natural hazards insurance to property owners in areas identified to be at risk through hazard mapping.

Develop a one-page handout on types of insurance and deliver through city utility or service agencies.

Educate individuals and businesses on the benefit of engaging in mitigation activities such as developing impact analyses.

Pinpoint areas of high risk and transfer the cost of risk to property owners through insurance (rather than to the public).

Encourage the development of unifying organizations to ensure communication and dissemination of natural hazard mitigation information.

Multi hazard Action Items

Identify activities for private sector and citizen involvement such as nonstructural seismic daycare retrofits.

Coordinating Organization: Community Development Department
Time line: Ongoing
Plan Goals Addressed: Protect Life and Property, Public Awareness, Partnerships and Implementation
Constraints: Staff

SHORT TERM ACTIVITY - MULTI HAZARD #5: Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration in the City of La Verne.

Ideas for Implementation:

Work with local organizations to develop local Natural Hazard Mitigation Plans that are consistent with the goals and framework of the City plan.

Identify all organizations within the City of La Verne that have programs or interests in natural hazards mitigation.

Involve private businesses throughout the City in mitigation planning.

Improve communication between Cal Trans and City road departments, and work together to prioritize and identify strategies to deal with road problems.

Establish protocol for communication with electricity providers and the Department of

Transportation and Development to assure rapid restoration of transportation capabilities.

Coordinating Organization:	Community Development Department
Time line:	Ongoing
Plan Goals Addressed:	Partnerships and Implementation
Constraints:	Staff

SHORT TERM ACTIVITY - MULTI HAZARD #6: Develop inventories of at-risk buildings and infrastructure and prioritize mitigation projects.

Ideas for Implementation:

Identify critical facilities at risk from natural hazards events.

Develop strategies to mitigate risk to these facilities, or to utilize alternative facilities should natural hazards events cause damages to the facilities in question.

Incorporate the building inventory developed by the Department of Geology and Mineral Industries (Dec. 2002) into the hazard assessment.

Identify bridges at risk from flood or earthquake hazards, identify enhancements, and implement projects needed to reduce the risks.

Coordinating Organization:	Community Development Department
Time line:	1-2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships and Implementation
Constraints:	Staff, Funds

SHORT TERM ACTIVITY - MULTI HAZARD #7: Strengthen emergency services preparedness and response by linking emergency services with natural hazard mitigation programs, and enhancing public education on a regional scale.

Ideas for Implementation:

Educate private property owners on limitations of bridges and dangers associated with them.

Develop a process to encourage private property owners to upgrade their bridges to support weight of fire trucks and emergency vehicles.

Encourage individual and family preparedness through public education projects such as safety fairs.

Coordinate the maintenance of emergency transportation routes though communication among the City Streets Department, neighboring jurisdictions, and the California Department of Transportation.

Identify opportunities for partnering with citizens, private contractors, and other jurisdictions to increase availability of equipment and manpower for efficiency of response efforts.

Work with Community Planning Organizations (CPO's) and other neighborhood groups to establish community response teams.

Familiarize public officials of requirements regarding public assistance for disaster response.

Coordinating Organization: La Verne Fire Department
Time line: Ongoing
Plan Goals Addressed: Emergency Services
Constraints: Staff, Funds

Long Term Multi-Hazard Action Items

LONG TERM ACTIVITY - MULTI HAZARD-MH #1: Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing the risk to citizens, public agencies, private property owners, businesses, and schools.

Ideas for Implementation:

Multi hazard Action Items

Make the City of La Verne Natural Hazard Mitigation Plan available to the public by publishing the plan electronically on the City and emergency management websites.

Enhance C-map capabilities by creating a website that includes information specific to the City of La Verne residents, including site-specific hazards information, Building & Safety Codes information, insurance companies that provide earthquake insurance for city residents, and educational information on damage prevention.

Develop a web page to facilitate Internet discussions and information sharing.

Develop and complete a baseline survey to gather perceptions of private citizens and the business community regarding natural hazard risks and identify mitigation needs. Repeat the survey in five years to monitor successes and failures of natural hazard mitigation programs.

Develop outreach programs to business organizations that must prepare for flooding events.

Develop adult and child educational programs to be used by local radio and cable stations.

Use local radio and cable stations as a conduit for advertising public forums.

Education: Develop curriculum for school programs and adult education on reducing risk and preventing loss from natural hazards.

Conduct natural hazards awareness programs in schools and community centers.

Conduct workshops for public and private sector organizations to raise awareness of mitigation activities and programs.

Develop outreach materials for mitigation, preparedness, response, and recovery.

Coordinating Organization: La Verne Fire Department, Community Development Department, Department of Parks and Community Services, La Verne Information Systems Administrator
Time line: Ongoing
Plan Goals Addressed: Public Awareness, Protect Life and Property
Constraints: Staff, Funds

LONG TERM ACTIVITY - MULTI HAZARD #2: Use technical knowledge of natural ecosystems and events to link natural resource management and land use organizations to mitigation activities and technical assistance.

Ideas for Implementation:

> Review ordinances that protect natural systems and resources to mitigate for natural hazards for possible enhancements.
>
> Pursue vegetation and restoration practices that assist in enhancing and restoring the natural and beneficial functions of the watershed.
>
> Develop education and outreach programs that focus on protecting natural systems as a mitigation activity.

Coordinating Organization:	City Planning Department
Time line:	Ongoing
Plan Goals Addressed:	Natural Systems
Constraints:	Funds

Section Five: Plan Maintenance

City of La Verne Natural Hazard Mitigation Plan

Section Five

Plan Maintenance

The plan maintenance section of this document details the formal process that will ensure that the City of La Verne Natural Hazard Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the city will integrate public participation throughout the plan maintenance process. Finally, this section includes an explanation of how the City of La Verne government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the City General Plan, Capital Improvement Plans, and Building and Safety Codes.

Monitoring and Implementing the Plan

<u>Plan Adoption</u>

The City Council is responsible for adopting the City of La Verne Natural Hazard Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazards. Once the plan has been adopted and or updated, the Community Development Department will be responsible for submitting it to the State Hazard Mitigation Officer at The Governor's Office of Emergency Services. The Governor's Office of Emergency Services will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the City of La Verne will gain eligibility for Hazard Mitigation Grant Program funds.

<u>Coordinating Body</u>

A City of La Verne Hazard Mitigation Committee will be responsible for coordinating implementation of plan action items and undertaking the formal review process. The City Council (or other authority) will assign representatives from city agencies, including, but not limited to, the current Hazard Mitigation Advisory Committee members. The City has formed a Hazard Mitigation Committee that consists of members from local agencies, organizations, and citizens, and includes the following:

City of La Verne Administration
City of La Verne Community Development Department
City of La Verne Public Works Department
City of La Verne Building and Safety Department (Division of Community Development)

City of La Verne Fire Department
City of La Verne Community Services

In order to make this committee as broad and useful as possible, the City Manager will engage other relevant organizations and agencies in hazard mitigation. The recommendations for adding to the Hazard Mitigation Advisory Committee include:

An elected official
A representative from the Chamber of Commerce
An insurance company representative
Representation from professional organizations such as the Home Builders Association
A representative from the Southern California Association of Governments

The Hazard Mitigation Advisory Committee will meet no less than once yearly. Meeting dates will be scheduled once the final Hazard Mitigation Advisory Committee has been established. These meetings will provide an opportunity to discuss the progress of the action items and maintain the partnerships that are essential for the sustainability of the mitigation plan.

Convener

The City Council will adopt the City of La Verne Natural Hazard Mitigation Plan, and the Hazard Mitigation Advisory Committee will take responsibility for plan implementation. The City Manager/Administrator will serve as a convener to facilitate the Hazard Mitigation Advisory Committee meetings, and will assign tasks such as updating and presenting the Plan to the members of the committee. Plan implementation and evaluation will be a shared responsibility among all of the Natural Hazard Advisory Committee Members.

Implementation through Existing Programs

The City of La Verne addresses statewide planning goals and legislative requirements through its General Plan, Capital Improvement Plans, and City Building and Safety Codes. The Natural Hazard Mitigation Plan provides a series of recommendations - many of which are closely related to the goals and objectives of existing planning programs. The City of La Verne will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

Particularly, the City utilizes fourteen specific plans to enhance protection from natural hazards such as wildfires, earthquakes, and landslides. These plans include zoning standards that regulate what and where development can occur as well as precautionary and or additional measures that must be evaluated or completed before certain land uses can take place. These specific plans include:

- Walnut

- Puddingstone
- Live Oak
- Sierra La Verne
- Arrow Corridor
- Rancho Esperanza
- La Verne Heights
- Foothill Boulevard
- Marshall Canyon
- Emerald Ridge
- Lordsburg
- 900 Bonita
- Rancho La Verne
- Hillside Development Overlay

Additionally, there are master plans that are related to larger self contained developments such as the University of La Verne, Hillcrest Brethren Homes, and the Metropolitan Water District of Southern California. These specific plans, master plans, the General Plan, Urban Water Management Plan, and Housing Element, have all been reviewed as a part of the creation of the NHMP. After an evaluation process with members of the advisory committee there is no need to modify current practices or standard operating procedures further as any additional measures would be redundant. Components of each plan have been incorporated and are interchangeable as appropriate already.

The City of La Verne Building Department is responsible for administering the Building & Safety Codes. In addition, the Hazard Advisory Committee will work with other agencies at the state level to review, develop, and ensure Building & Safety Codes that are adequate to mitigate or present damage by natural hazards. This is to ensure that life-safety criteria are met for new construction.

The goals and action items in the mitigation plan may be achieved through activities recommended in the city's Capital Improvement Plans (CIP). Various city departments develop CIP plans, and review them on an annual basis. Upon annual review of the CIPs, the Hazard Mitigation Advisory Committee will work with City departments to identify areas that the hazard mitigation plan action items are consistent with CIP planning goals and integrate them where appropriate.

Within six months of formal adoption of the mitigation plan, the recommendations listed above will be incorporated into the process of existing planning mechanisms at the City level. The meetings of the Hazard Mitigation Advisory Committee will provide an opportunity for committee members to report back on the progress made on the integration of mitigation planning elements into city planning documents and procedures.

Economic Analysis of Mitigation Projects

FEMA's approaches to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis.

Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later.

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards can provide decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Given federal funding, the Hazard Mitigation Advisory Committee will use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action items. For other projects and funding sources, the Hazard Mitigation Advisory Committee will use other approaches to understand the costs and benefits of each action item and develop a prioritized list. For more information regarding economic analysis of mitigation action items, please see Appendix C of the Plan.

Evaluating and Updating the Plan

<u>Formal Review Process</u>

The City of La Verne Natural Hazard Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The evaluation process includes a firm schedule and time line, and identifies the local agencies and organizations participating in plan evaluation. The convener or designee will be responsible for contacting the Hazard Mitigation Advisory Committee members and organizing the annual meeting. Committee members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan. The committee will review the goals and action items to determine their relevance to changing situations in the city, as well as changes in State or Federal policy, and to ensure they are addressing current and expected conditions. The committee will also review the risk assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised.

The convener will assign the duty of updating the plan to one or more of the committee members. The designated committee members will have three months to make appropriate changes to the Plan before submitting it to the Hazard Committee members, and presenting it to the City Council (or other authority). The Hazard Mitigation Advisory Committee will also notify all holders of the city plan when changes have been made. Every five years the updated plan will be submitted to the State Hazard Mitigation Officer and the Federal Emergency Management Agency for review.

Continued Public Involvement

The City of La Verne is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. The Hazard Mitigation Committee members are responsible for the annual review and update of the plan.

The public will also have the opportunity to provide feedback about the Plan. Copies of the Plan will be catalogued and kept at all of the appropriate agencies in the city. The existence and location of these copies will be publicized in the Inland Valley Daily Bulletin as well as the La Verne Community Newspaper. The plan also includes the address and the phone number of the Community Development Department which is responsible for keeping track of public comments on the Plan.

In addition, copies of the plan and any proposed changes will be posted on the City website. This site will also contain an email address and phone number to which people can direct their comments and concerns.

A public meeting will also be held after each annual evaluation or when deemed necessary by the Hazard Mitigation Advisory Committee. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan. The Community Development Department will be responsible for using City resources to publicize the annual public meetings and maintain public involvement through the public access channel, web page, and newspapers.

Part II: Specific Natural Hazards

Section Six: Earthquakes

City of La Verne Natural Hazard Mitigation Plan

Section Six: Earthquakes

Table of Contents

Why Are Earthquakes a Threat to the City of La Verne?

While the City of La Verne has not been at the epicenter of a significant earthquake, Southern California is a relative hotbed of earthquake activity. The experiences of other Southern California cities would be similar to what could happen in La Verne if a localized earthquake did occur.

The most recent significant earthquake event affecting Southern California was the January 17, 1994, Northridge Earthquake. At 4:31 A.M. on Monday, January 17, a moderate but very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures.

Fifty-seven people were killed and more than 1,500 people seriously injured. For days afterward, thousands of homes and businesses were without electricity; tens of thousands had no gas; and nearly 50,000 had little or no water. Approximately 15,000 structures were moderately to severely damaged, which left thousands of people temporarily homeless. 66,500 buildings were inspected. Nearly 4,000 were severely damaged and over 11,000 were moderately damaged. Several collapsed bridges and overpasses created commuter havoc on the freeway system. Extensive damage was caused by ground shaking, but earthquake triggered liquefaction and dozens of fires also caused additional severe damage. This extremely strong ground motion in large portions of Los Angeles County resulted in record economic losses.

However, the earthquake occurred early in the morning on a holiday. This circumstance considerably reduced the potential effects. Many collapsed buildings were unoccupied, and most businesses were not yet open. The direct and indirect economic losses ran into the 10's of billions of dollars. In La Verne, there was no reportable damage of significance.

Historical and geological records show that California has a long history of seismic events. Southern California is probably best known for the San Andreas Fault, a 400-mile long fault running from the Mexican border to a point offshore, west of San Francisco. "Geologic studies show that over the past 1,400 to 1,500 years large earthquakes have occurred at about 130 year intervals on the southern San Andreas Fault. As the last large earthquake on the southern San Andreas occurred in 1857, that section of the fault is considered a likely location for an earthquake within the next few decades."[1]

The San Andreas is only one of dozens of known earthquake faults that criss-cross Southern California. Some of the better known faults include the Newport-Inglewood, Whittier, Chatsworth, Elsinore, Hollywood, Los Alamitos, and Palos Verdes faults. Beyond the known faults, there are a potentially large number of "blind" faults that underlie the surface of Southern California. One such blind fault was involved in the Whittier Narrows earthquake in October 1987.

Although the most famous of the faults, the San Andreas, is capable of producing an earthquake with a magnitude of 8+ on the Richter scale, some of the "lesser" faults have the potential to inflict greater damage on the urban core of the Los Angeles Basin. Seismologists believe that a 6.0 earthquake on the Newport-Inglewood would result in far more death and destruction than a “great” quake on the San Andreas, because the San Andreas is relatively remote from the urban centers of Southern California. The majority of La Verne is residential with homes being wood framed. Damage from earthquakes, short of a massive 8+, would likely be limited to issues with downed utilities (water, gas, and power), as well as possible fires from ruptured gas lines and power lines.

For decades, partnerships have flourished between the USGS, Cal Tech, the California Geological Survey and universities to share research and educational efforts with Californians. Tremendous earthquake mapping and mitigation efforts have been made in California in the past two decades, and public awareness has risen remarkably during this time. Major federal, state, and local government agencies and private organizations support earthquake risk reduction, and have made significant contributions in reducing the adverse impacts of earthquakes. Despite the progress, the majority of California communities remain unprepared because there is a general lack of understanding regarding earthquake hazards among Californians.

Table of Earthquake Events In the Southern California Region

Southern California Region Earthquakes with a Magnitude 5.0 or Greater			
1769	Los Angeles Basin	1916	Tejon Pass Region
1800	San Diego Region	1918	San Jacinto
1812	Wrightwood	1923	San Bernardino Region
1812	Santa Barbara Channel	1925	Santa Barbara
1827	Los Angeles Region	1933	Long Beach
1855	Los Angeles Region	1941	Carpenteria
1857	Great Fort Tejon Earthquake	1952	Kern County
1858	San Bernardino Region	1954	W. of Wheeler Ridge
1862	San Diego Region	1971	San Fernando
1892	San Jacinto or Elsinore Fault	1973	Point Mugu
1893	Pico Canyon	1986	North Palm Springs
1894	Lytle Creek Region	1987	Whittier Narrows
1894	E. of San Diego	1992	Landers
1899	Lytle Creek Region	1992	Big Bear
1899	San Jacinto and Hemet	1994	Northridge
1907	San Bernardino Region	1999	Hector Mine
1910	Glen Ivy Hot Springs		

Source:
http://geology.about.com/gi/dynamic/offsite.htm?site=http%3A%2F%2Fpasadena.wr.usgs.gov%2Finfo%2Fcahist_eqs.html

Table EQ-1

To better understand the earthquake hazard, the scientific community has looked at historical records and accelerated research on those faults that are the sources of the earthquakes occurring in the Southern California region. Historical earthquake records can generally be divided into records of the pre-instrumental period and the instrumental period. In the absence of instrumentation, the detection of earthquakes is based on observations and felt reports, and are dependent upon population density and distribution. Since California was sparsely populated in the 1800s, the detection of pre-instrumental earthquakes is relatively difficult. However, two very large earthquakes, the Fort Tejon in 1857 (7.9) and the Owens Valley in 1872 (7.6) are evidence of the tremendously damaging potential of earthquakes in Southern California. More recently, two 7.3 earthquakes struck Southern California, in Kern County (1952) and Landers (1992).

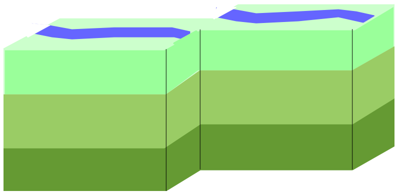
The damage from these four large earthquakes was limited because they occurred in areas that were sparsely populated at the time they happened. The seismic risk is much more severe today than in the past because the population at risk is in the millions, rather than a few hundred or a few thousand persons.

History of Earthquake Events in Southern California

Since seismologists started recording and measuring earthquakes, there have been tens of thousands of recorded earthquakes in Southern California, most with a magnitude below three. No community in Southern California is beyond the reach of a damaging earthquake.

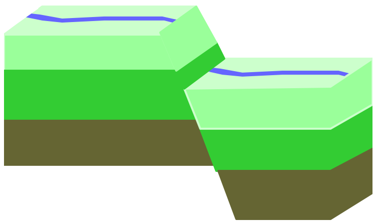
Causes and Characteristics of Earthquakes in Southern California

<u>Earthquake Faults</u>



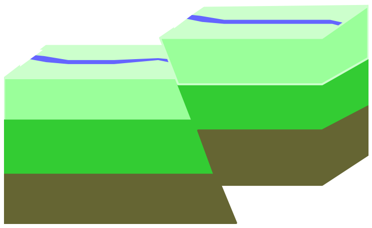
A fault is a fracture along and between blocks of the earth's crust where either side moves relative to the other along a parallel plane to the fracture.

<u>Strike-slip</u>



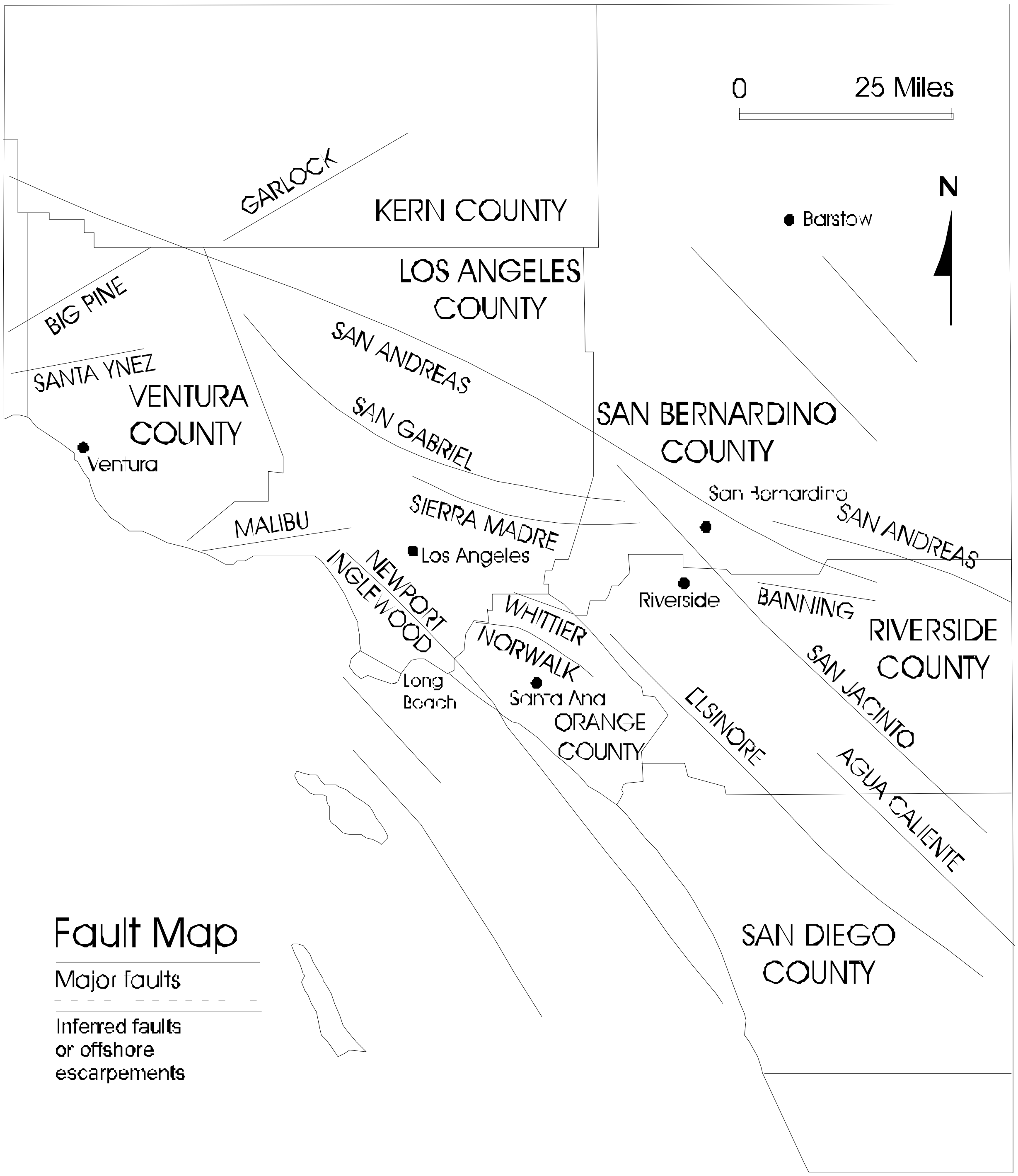
Strike-slip faults are vertical or almost vertical rifts where the earth's plates move mostly horizontally. From the observers perspective, if the opposite block looking across the fault moves to the right, the slip style is called a right lateral fault; if the block moves left, the shift is called a left lateral fault.

<u>Dip-slip</u>



Dip-slip faults are slanted fractures where the blocks mostly shift vertically. If the earth above an inclined fault moves down, the fault is called a normal fault, but when the rock above the fault moves up, the fault is called a reverse fault. Thrust faults have a reverse fault with a dip of 45 ° or less.

Southern California Earthquake Fault Map



MAP EQ-1

Dr. Kerry Sieh of Cal Tech has investigated the San Andreas Fault at Pallett Creek. “The record at Pallett Creek shows that rupture has recurred about every 130 years, on average, over the past 1500 years. But actual intervals have varied greatly, from less than 50 years to more than 300. The physical cause of such irregular recurrence remains unknown.” [2] Damage from a great quake on the San Andreas would be widespread throughout Southern California.

Earthquake Related Hazards

Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

Ground Shaking

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and distance from the epicenter (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

Earthquake Induced Landslides

Earthquake induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake. Many communities in Southern California have a high likelihood of encountering such risks, especially in areas with steep slopes.

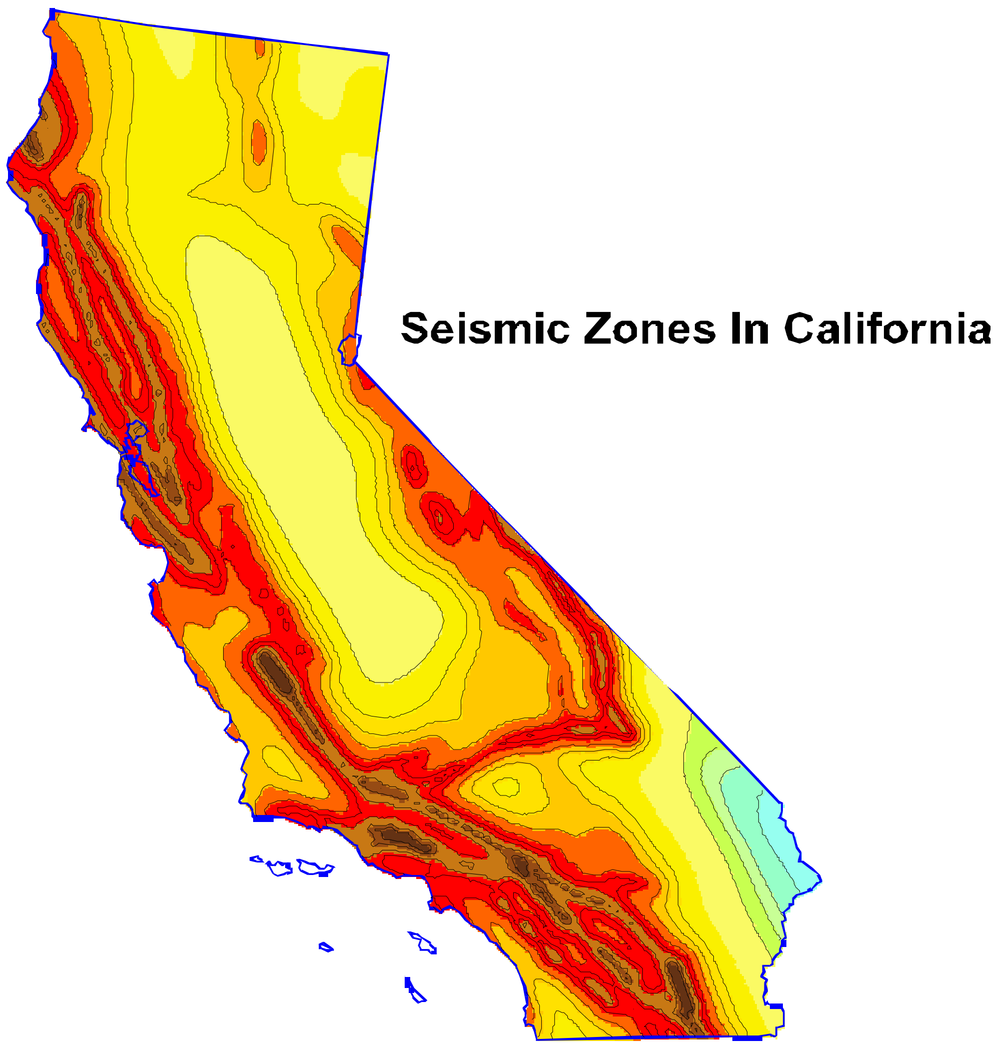
Liquefaction

Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures. Many communities in Southern California, such as La Verne, are built on ancient river bottoms and have sandy soil. In some cases, this ground may be subject to liquefaction, depending on the depth of the water table.

Amplification

Soils and soft sedimentary rocks near the earth's surface can modify ground shaking caused by earthquakes. One of these modifications is amplification. Amplification increases the magnitude of the seismic waves generated by the earthquake. The amount of amplification is influenced by the thickness of geologic materials and their physical properties. Buildings and structures built on soft and unconsolidated soils can face greater risk.[3] Amplification can also occur in areas with deep sediment filled basins and on ridge tops.

MAP EQ-2: SEISMIC ZONES IN CALIFORNIA



Darker Shaded Areas indicate Greater Potential Shaking

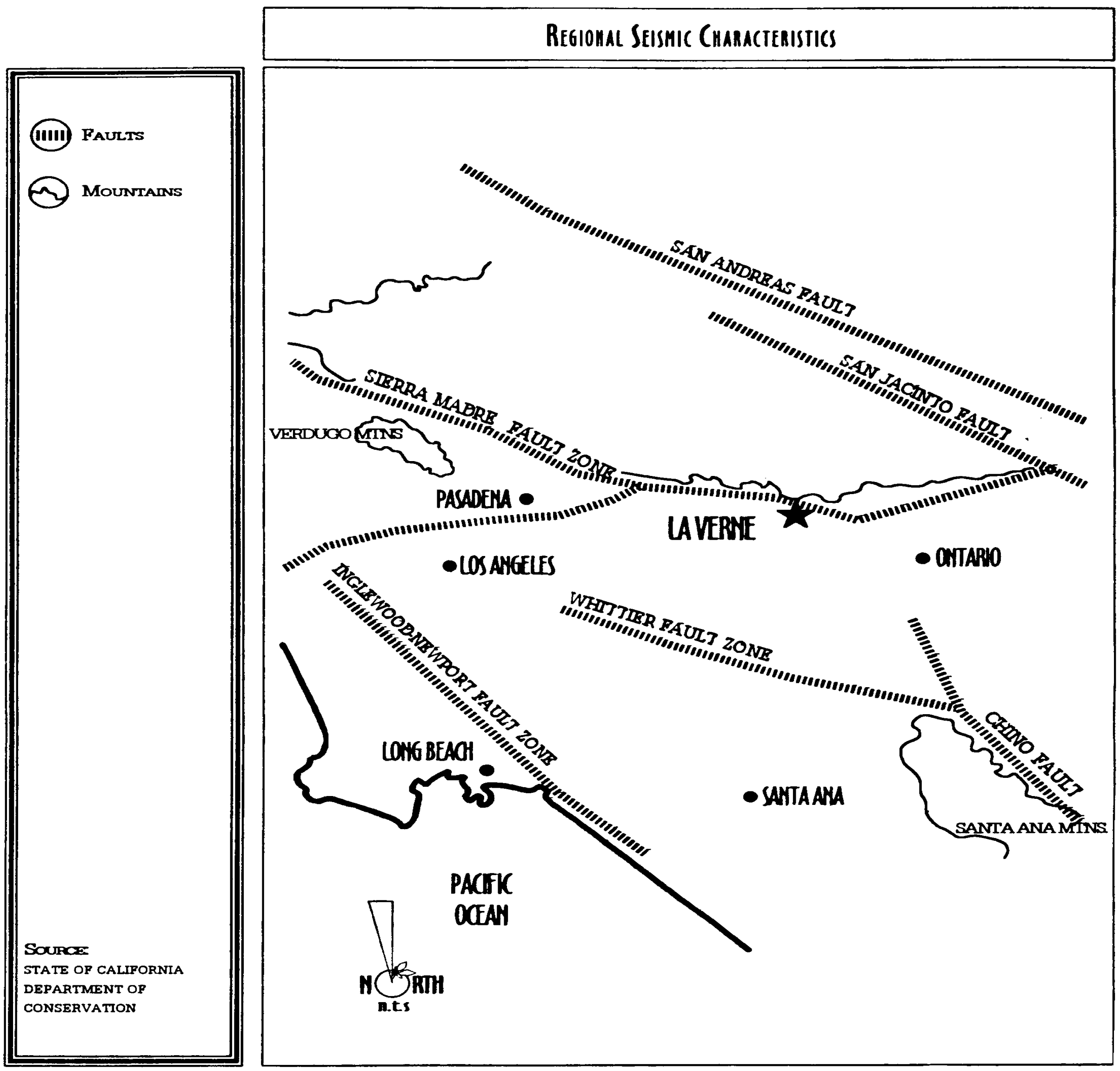
Source: USGS Website

Earthquake Hazard Assessment

Hazard Identification

In California, many agencies are focused on seismic safety issues: the State's Seismic Safety Commission, the Applied Technology Council, Governor's Office of Emergency Services, United States Geological Survey, the California Technical Institute, the California Geological Survey as well as a number of universities and private foundations.

These organizations, in partnership with other state and federal agencies, have undertaken a rigorous program in California to identify seismic hazards and risks including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides. Seismic hazard maps have been published and are available for many communities in California through the State Division of Mines and Geology. Map EH-1 illustrates the known earthquake faults in Southern California.



MAP EQ-3, Source: City of La Verne General Plan

Numerous major faults have been mapped within the Southern California region, several of which are within the City or within 20 miles of La Verne. The most significant of these faults are described and shown in the above Figure EQ-2, Regional Seismic Characteristics.

Sierra Madre Fault: As part of the San Gabriel Mountain frontal fault system, this fault zone has been responsible for uplift of mountains by reverse faulting in response to north-south compression. Approximately seven feet of uplift occurred along the San Fernando and Tujunga Faults (westward extensions of the Sierra Madre Fault Zone) during the 1971 San Fernando earthquake. The recurrence interval for large (7.5 Richter Scale or greater magnitude) earthquakes is estimated at 100 to 5,000 years.

The Sierra Madre Fault Zone encompasses essentially all major faults within the foothill area, including major surface traces in bedrock as well as sub parallel faults in alluvial areas immediately to the south.

Cucamonga Fault: This is an easterly extension of the Sierra Madre zone It is considered active and has been mapped from Lytle Creek area to at least the mouth of San Antonio Canyon, a distance of 10 miles. Geologically, recent movement has occurred just east of Glendora where granite basement rocks have been thrust over alluvial formation, and in the vicinity of San Antonio, Deer, and Day Canyons to the east where relative uplift on the northern side has produced scarps approximately 200 feet high in recent alluvium.

San Andreas Fault: This fault is widely recognized as the longest and most active fault in the state. It has been mapped from Cape Mendocino in northern California to an area near the Mexican border, approximately 500 miles. The fault is known to be active from historic earthquakes, including ones which caused extensive surface rupture, and from abundant evidence from displacement of recent sediments. Recent work indicates that large earthquakes have occurred along the fault at widely varying intervals, but averaging 160 years. A maximum probable earthquake of M8.3 (magnitude of 8.3 on the Richter Scale) has been assigned to the San Andreas in Southern California.

San Jacinto Fault: This active fault is similar to the San Andreas in that it is a large strike-slip fault that has been active for several million years. It has been the principal focus of historical release of strain in Southern California between the North American continental plate and Pacific Ocean plate. Surface rupture has been associated with several historic earthquakes on the fault. A maximum probable earthquake for the San Jacinto of M7.2 is based upon historic seismicity and rupture length.

Whittier-Elsinore Fault: This active fault parallels the San Jacinto Fault and is approximately 15 miles southwest of the City. In 1987, a M5.9 earthquake occurred along a previously unknown thrust fault attached to this system. A maximum probable of M6.7 is assigned to the combined Whitter-Elsinore Fault.

Indian Hill Fault: This fault is located beneath alluvium in the southern part of the city. The existence of the fault is based on the uplift of Indian Hill in the Claremont area and ground water barriers in the older alluvial aquifers. Because of the suggested displacement of older alluvial deposits, the fault may be geologically young and potentially active; however, the lack of surface evidence for recent faulting precludes a more definitive interpretation of this activity.

In California, each earthquake is followed by revisions and improvements in the Building Codes. The 1933 Long Beach resulted in the Field Act, affecting school construction. The 1971 Sylmar earthquake brought another set of increased structural standards. Similar re-evaluations occurred after the 1989 Loma Prieta and 1994 Northridge earthquakes. These code changes have resulted in stronger and more earthquake resistant structures.

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. This state law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. Surface rupture is the most easily avoided seismic hazard.[4]

The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.[5] The State Department of Conservation operates the Seismic Mapping Program for California. Extensive information is available at their website: http://gmw.consrv.ca.gov/shmp/index.htm.

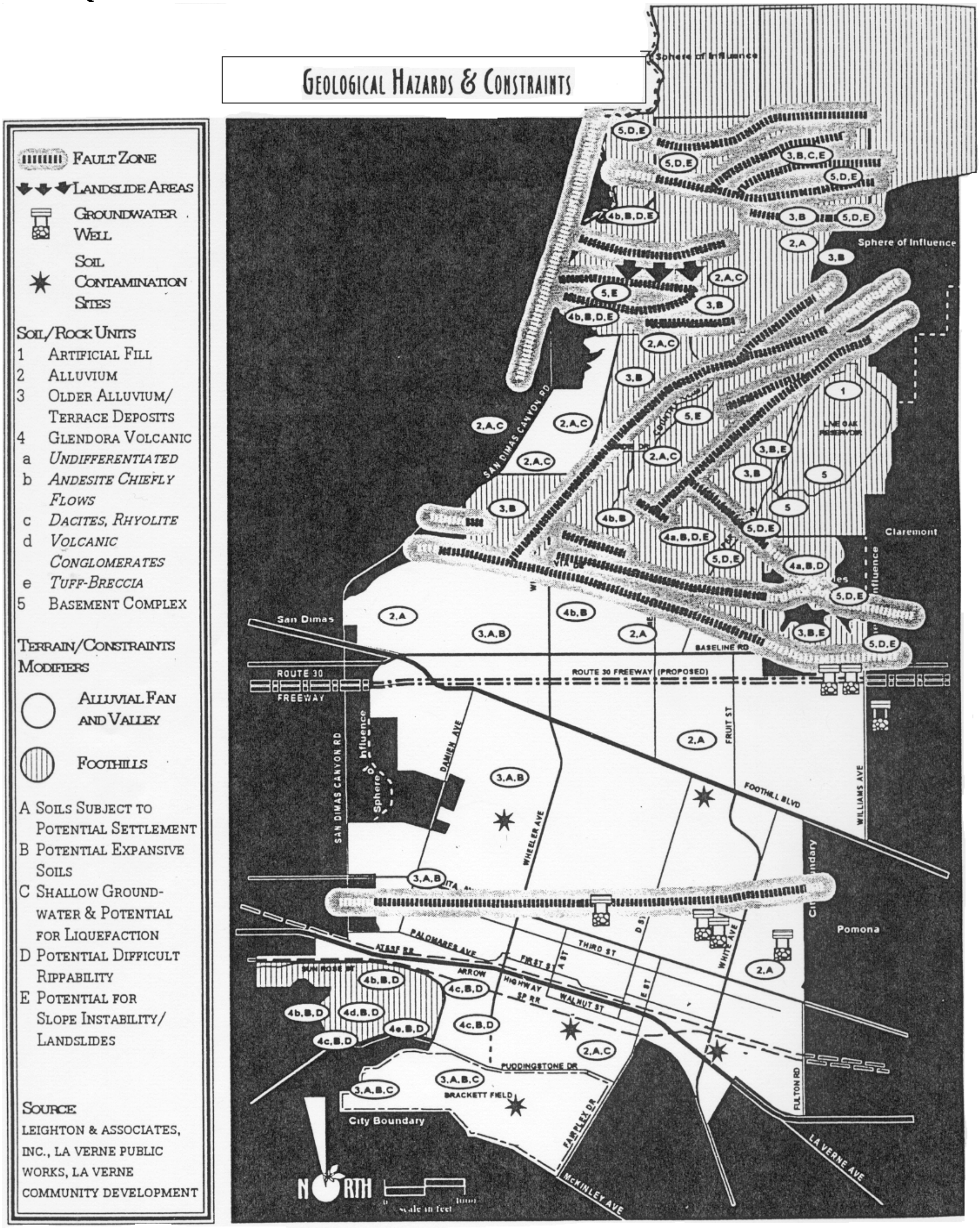
Vulnerability Assessment

The effects of earthquakes span a large area, and large earthquakes occurring in many parts of Southern California would probably be felt throughout the region. However, the degree to which the earthquakes are felt, and the damages associated with them may vary. At risk from earthquake damage are large stocks of old buildings and bridges: many high tech and hazardous materials facilities: extensive sewer, water, and natural gas pipelines; earth dams; petroleum pipelines; and other critical facilities and private property located in the county. The relative or secondary earthquake hazards, which are liquefaction, ground shaking, amplification, and earthquake-induced landslides, can be just as devastating as the earthquake.

The California Geological Survey has identified areas most vulnerable to liquefaction. Liquefaction occurs when ground shaking causes wet, granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures. Map EQ-4, identifies the areas in the City of La Verne that have soils vulnerable to liquefaction.

Southern California has many active landslide areas, and a large earthquake could trigger accelerated movement in these slide areas, in addition to jarring loose other unknown areas of landslide risk. Map EQ-4 identified areas of potential landslides. La Verne does not have any chronic landslide areas but has many slopes with potential of landslides under certain conditions.

MAP EQ-4



Source: City of La Verne General Plan

Risk Analysis

Risk analysis is the third phase of a hazard assessment. Risk analysis involves estimating the damage and costs likely to be experienced in a geographic area over a period of time[6] . Factors included in assessing earthquake risk include population and property distribution in the hazard area, the frequency of earthquake events, landslide susceptibility, buildings, infrastructure, and disaster preparedness of the region. This type of analysis can generate estimates of the damages to the disaster event in a specific location. These estimations, however have limitations and are difficult to calculate due to a multitude of validity issues in such estimations. There are many factors of what could happen in a specific disaster as all disasters are not the same.

For greater Southern California there are multiple worst-case scenarios, depending on which fault might rupture, and which communities are in proximity to the fault. But damage will not necessarily be limited to immediately adjoining communities. Depending on the hypocenter of the earthquake, seismic waves may be transmitted through the ground to unsuspecting communities. In the 1994 Northridge earthquake, Santa Monica suffered extensive damage, even though there was a range of mountains between it and the origin of the earthquake.

Damages for a large earthquake almost anywhere in Southern California are likely to run into the billions of dollars. Although California building codes are some of the most stringent in the world, ten's of thousands of older existing buildings were built under much less rigid codes. California has laws affecting unreinforced masonry buildings (URM's) and although many building owners have retrofitted their buildings, hundreds of pre-1933 buildings still have not been brought up to current standards. The City of La Verne has one (1) un-reinforced masonry building that has not been seismically retrofitted (2336 "D" St.). Since the original adoption of this plan, four buildings have been seismically retrofitted through either a change of ownership or the change of business in the location.

Non-structural bracing of equipment and contents is often the most cost-effective type of seismic mitigation. Inexpensive bracing and anchoring may be the most cost effective way to protect expensive equipment. Non-structural bracing of equipment and furnishings will also reduce the chance of injury for the occupants of a building.

Estimations of damages in this plan were calculated using the number of residential units affected by a specific hazard. These financial damages were estimated by utilizing mathematical formulas and information about building stock, local geology, location, economic data, and other information such as housing values.

Community Earthquake Issues

<u>What is Susceptible to Earthquakes?</u>

Earthquake damage occurs because humans have built structures that cannot withstand severe shaking. Buildings, airports, schools, and lifelines (highways and utility lines) suffer damage in earthquakes and can cause death or injury to humans. The welfare of homes, major businesses, and public infrastructure is very important. Addressing the reliability of buildings, critical facilities, and infrastructure, and understanding the potential costs to government, businesses, and individuals as a result of an earthquake, are challenges faced by the city.

Ground Shaking Assessment

Approximately 8,000 residential units in La Verne will be affected by ground shaking in and around the fault zones identified in Figure EQ-3. The ground shaking potential within the City of La Verne is similar to that expected from areas surrounding the Sierra Madre-Cucamonga Fault Zone. It is an important factor in the design of mid-rise structures, medium to heavy industrial structures, and critical facilities. More typical structures, such as one- and two-story, wood-frame residences typically perform quite well when constructed in accordance with the latest building codes. Considerable ground shaking could occur in proximity to the Sierra Madre-Cucamonga Fault Zone during a maximum probable event. The probability of considerable ground shaking emphasizes the importance of seismic considerations in the design of critical structures. More stringent design criteria apply to dams, nuclear reactors, and hospitals.

Ground Surface Rupture Assessment

Ground surface ruptures could damage approximately 4,000 residential units in northern La Verne and total $460 million of estimated improvement value. Faults in the northern portion of the City of La Verne and the Indian Hill Fault are components of the active Sierra Madre-Cucamonga Fault Zone. The City should establish a 1/8 mile wide Geologic Hazard Special Studies Zone along theses faults. The faults with recommended zones for special study are shown on EQ-4. Study of geologic data within these zones, subsurface trenching across the entire width of such a zone within any property, will serve two purposes: the studies will provide accurate fault locations and they will provide information on the occurrence of movement and/or recurrence interval of movement along them. The information is important to properly determine the hazard of surface rupture for proposed developments.

Where clear evidence of fault activity is absent, or where accurate fault location data is obtained by trenching or other means, such requirements should be left to the discretion of the Registered Geologist (R.G.) or Certified Engineering Geologist (C.E.G.) of record, or to the discretion of a City appointed R.G. or C.E.G.

Risk Assessment – Surface Rupture

There are many clusters of fault zones in north La Verne (north of Baseline Road) and approximately nineteen separate fault lines within these clusters in the northern portion of the City. In this portion of the City there are approximately 3,600 residential units with an estimated improvement value of $460 million.

The southern portion of the City (south of Foothill Boulevard and north of Arrow Highway) contains only one notable fault zone which transects the entire width of the City according to map EQ-3. There are approximately 2,848 residential units in this fault zone area with an estimated improvement value of $305,497,048.

The estimated improvement values were reached by dividing north La Verne into several different neighborhoods. The number of residential units in each zone was counted. A random sampling of residential units was done using the Los Angeles County Assessor's information from win2data. Then the median estimated improvement value of the sample for each neighborhood was multiplied by the number of residential units in that neighborhood. The total estimated improvement values of each neighborhood were then added to find the total estimated improvement value of the portions of La Verne that could potentially be affected by surface ruptures.

Liquefaction and Related Ground Failure Phenomena

Secondary earthquake hazards, such as liquefaction, flow landsliding, and seismically induced dynamic settlement are generally associated with relatively high intensities of shaking, shallow ground water conditions and the presence of loose, sandy soils or alluvial deposits. Because the City of La Verne is likely to be subject to moderate to strong seismic shaking, the potential for liquefaction will be a function of the presence of shallow ground water in conjunction with loose sandy deposits. This set of conditions is most likely to occur locally in canyon bottom areas and in the flatter, southerly portion of the City of La Verne. An earthquake event along the Sierra-Madre Cucamonga Fault Zone might produce localized effects of this type. The general areas expected to be impacted by liquefaction potential are shown on Figure EQ-4 with the "S" hazard/constraint modifier symbol.

Within alluvial and older alluvial areas with shallow ground water, an analysis of liquefaction potential, based on site specific soils, seismic, and ground water conditions are necessary to adequately evaluate the potential for such effects to occur.

There are approximately 324 of homes in areas of the city that have the potential for liquefaction. (See Figure EQ – 4) The estimated total improvement value for homes in areas that have potential for liquefaction is $64,111,512.

Dams

There are a total of 103 dams in Los Angeles County, owned by 23 agencies or organizations, ranging from the Federal government to Home Owner Associations.[7] These dams hold billions of gallons of water in reservoirs. Releases of water from the major reservoirs are designed to protect Southern California from floodwaters and to store domestic water. Seismic activity can compromise the dam structures, and result in catastrophic flooding. Following the 1971 Sylmar earthquake, the Lower Van Norman Dam showed signs of structural compromise, and tens of thousands of persons had to be evacuated until the dam could be drained. The dam has never been refilled. Within the City of La Verne, there are thirteen (13) city owned reservoirs, one (1) Metropolitan Water District (MWD) reservoir, and an MWD water treatment plant. Following is a list of these facilities:

TABLE EQ-2 *Millions of gallons except where noted

Reservoir	Owner	Capacity*	Type of Construction
Amherst	City	2.5	Concrete
Wheeler #1	City	3.0	Concrete

Wheeler #2	City	3.0	Concrete
Emerald #1	City	3.0	Concrete
Emerald #2	City	1.5	Concrete
Zone III	City	2.5	Concrete
Plateau #1	City	2.5	Concrete
Plateau #2	City	5.0	Concrete
Mt. Springs	City	1.0	Concrete
Dewenter	City	.5	Concrete
Marshall Canyon	City	2.5	Concrete
Lincoln Forebay	City	.16	Concrete
Leroys Forebay	City	.2	Concrete
Live Oak	MWD	250.0 AF	Open/Concrete Lined
Treatment Plant	MWD	2.0 AF	Concrete

Buildings

The built environment is susceptible to damage from earthquakes. Buildings that collapse can trap and bury people. Lives are at risk and the costs to clean up the damages are great. In many California communities, including the City of La Verne, many buildings were built before 1933 when building codes were not as strict. In addition, retrofitting is not required except under certain conditions and can be expensive. Therefore, the number of buildings at risk remains high. The California Seismic Safety Commission makes annual reports on the progress of the retrofitting of unreinforced masonry buildings.

Infrastructure and Communication

Residents in the City of La Verne commute frequently by automobiles and public transportation such as buses and by rail. An earthquake can greatly damage bridges and roads, hampering emergency response efforts and the normal movement of people and goods. Damaged infrastructure strongly affects the economy of the community because it disconnects people from work, school, food, and leisure, and separates businesses from their customers and suppliers. Plan organizers requested summaries of mitigation activities for all utilities that operate with in La Verne. Appendix F is a representation of what and which utilities submitted. These summaries provide information on activities implemented to mitigate the effects to infrastructure and communication during disasters.

Bridge Damage

Even modern bridges can sustain damage during earthquakes, leaving them unsafe for use. Some bridges have failed completely due to strong ground motion. Bridges are a vital transportation link - with even minor damages making some areas inaccessible. Because bridges vary in size, materials, location and design, any given earthquake will affect them differently. Bridges built before the mid-1970' s have a significantly higher risk of suffering structural damage during a moderate to large earthquake compared with those built after 1980 when design improvements were made.

Much of the interstate highway system was built in the mid to late 1960's. The bridges in the City of La Verne are state owned and built in 2002/03. Statewide, Cal Trans has retrofitted most bridges on the freeway systems, however there are still some county maintained bridges that are not retrofitted, none of which are in the City of La Verne. The FHWA requires that bridges on the National Bridge Inventory be inspected every 2 years. CalTrans checks when the bridges are inspected because they administer the Federal funds for bridge projects.

Damage to Lifelines

Lifelines are the connections between communities and outside services. They include water and gas lines, transportation systems, electricity and communication networks. Ground shaking and amplification can cause pipes to break open, power lines to fall, roads and railways to crack or move, and radio and telephone communication to cease. Disruption to transportation makes it especially difficult to bring in supplies or services. Lifelines need to be usable after an earthquake to allow for rescue, recovery, and rebuilding efforts and to relay important information.

Disruption of Critical Services

Critical facilities include police stations, fire stations, hospitals, shelters, and other facilities that provide important services to the community. These facilities and their services need to be functional after an earthquake event. Most critical facilities are housed in buildings built years ago and are not up to current seismic codes. The City of La Verne critical facilities currently meet seismic codes and are located in strategic areas in which to better serve citizens, including during natural hazards. These efforts should minimize the effect of a significant event to the extent practicable and no additional critical facilities are currently planned for development.

Businesses

Seismic activity can cause great loss to businesses, both large-scale corporations and small retail shops. When a company is forced to stop production for just a day, the economic loss can be tremendous, especially when its market is at a national or global level. Seismic activity can create economic loss that presents a burden to large and small shop owners who may have difficulty recovering from their losses.

Forty percent of businesses do not reopen after a major disaster and another twenty-five percent fail within one year according to the Federal Emergency Management Agency (FEMA). Similar statistics from the United States Small Business Administration indicate that over ninety percent of businesses fail within two years after being struck by a disaster.[8] Emergency personnel, businesses, and the City work closely together to not only prepare for natural hazards but to also educate the community of potential dangers associated with such hazards.

Individual Preparedness

Because the potential for earthquake occurrences and earthquake related property damage is relatively high in the City of La Verne, increasing individual preparedness is a significant need. Strapping down heavy furniture, water heaters, and expensive personal property, and anchoring buildings to foundations are just a few steps individuals can take to prepare for an earthquake. Public outreach is a main concern of the City of La Verne and a tool that will help in the event of a natural hazard. The City of La Verne in association with the American Red Cross and the California Office of Emergency Services puts on an annual Disaster Preparedness Workshop for local business owners and all City residents. These workshops are held during June of each year and educate participants about ways to prepare for various disasters.

Death and Injury

Death and injury can occur both inside and outside of buildings due to collapsed buildings, falling equipment, furniture, debris, and structural materials. Downed power lines and broken water and gas lines can also endanger human life. Education efforts such as the Disaster Preparedness Workshop and the availability of informational pamphlets are helpful tools in preventing death and injury during hazard events.

Fire

Downed power lines or broken gas mains can trigger fires. When fire stations suffer building or lifeline damage, quick response to extinguish fires is less likely. Furthermore, major incidents will demand a larger share of resources, and initially smaller fires and problems will receive little or insufficient resources in the initial hours after a major earthquake event. Loss of electricity may cause a loss of water pressure in some water zones in the City of La Verne, further hampering fire fighting ability. Initial damage surveys will help to aide local fire officials to prioritize their services to the most immediate needs.

Debris

After damage to a variety of structures, much time is spent cleaning up brick, glass, wood, steel, or concrete building elements, office and home contents, and other materials. Developing a strong debris management strategy is essential in post-disaster recovery. Occurrence of a disaster does not exempt the City of La Verne from compliance with AB 939 regulations. (AB 939 established an integrated waste management hierarchy in the following order of importance: 1. Source reduction, 2. Recycling and composting, 3. Environmentally safe transformation and land disposal of solid wastes).

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by county, regional, state, or federal agencies or organizations.

City of La Verne Codes

Implementation of earthquake mitigation policy most often takes place at the local government level. The City of La Verne Department of Building and Safety enforces building codes pertaining to earthquake hazards. Currently, the City of La Verne has adopted the Los Angeles County 2011 Building Code (2010 California Building Code.)

The City of La Verne Planning Department enforces the zoning and land use regulations relating to earthquake hazards. The Public Safety Section of the 1998 General Plan and Section 4.3 of the Environmental Impact Report for the 1998 General Plan, addresses geology and seismicity and regulates development, i.e. mitigate the impacts of an earthquake.

Generally, these codes seek to discourage development in areas that could be prone to flooding, landslide, wildfire, and/or seismic hazards; and where development is permitted, that the applicable construction standards are met. Developers in hazard-prone areas may be required to retain a qualified professional engineer to evaluate level of risk on the site and recommend appropriate mitigation measures.

Coordination Among Building Officials.

The City of La Verne Building Code (2011 Los Angeles County Building Code) sets the minimum design and construction standards for new buildings. The City of La Verne has adopted the most recent seismic standards in its building code, which requires that new buildings be built at a higher seismic standard. Since 1998 the City of La Verne also requires that site-specific seismic hazard investigations be performed for new essential facilities, major structures, hazardous facilities, and special occupancy structures such as schools, hospitals, and emergency response facilities.

Businesses/Private Sector

Natural hazards have a devastating impact on businesses. In fact, of all businesses which close following a disaster, more than forty-three percent never reopen, and an additional twenty-nine percent close for good within the next two years.[9] The Institute of Business and Home Safety has developed “Open for Business”, which is a disaster planning toolkit to help guide businesses in preparing for and dealing with the adverse effects of natural hazards. The kit integrates protection from natural disasters into the company's risk reduction measures to safeguard employees, customers, and the investment itself. The guide helps businesses secure human and physical resources during disasters, and helps to develop strategies to maintain business continuity before, during, and after a disaster occurs.

Hospitals

“The Alfred E. Alquist Hospital Seismic Safety Act (“Hospital Act”) was enacted in 1973 in response to the moderate Magnitude 6.6 Sylmar Earthquake in 1971 when four major hospital campuses were severely damaged and evacuated. Two hospital buildings collapsed killing forty seven people. Three others were killed in another hospital that nearly collapsed. There are no hospital facilities located in La Verne. In approving the Act, the Legislature noted that hospitals that house patients who have less than the capacity of normally healthy persons to protect themselves and that must be reasonably capable of providing services to the public after a disaster shall be designed and constructed to resist, insofar as practical, the forces generated by earthquakes, gravity, and winds. (Health and Safety Code Section 129680)

When the Hospital Act was passed in 1973, the State anticipated that, based on the regular and timely replacement of aging hospital facilities, the majority of hospital buildings would be in compliance with the Act’s standards within 25 years. However, hospital buildings were not, and are not, being replaced at that anticipated rate. In fact, the great majority of the State's urgent care facilities are now more than 40 years old. The moderate Magnitude 6.7 Northridge Earthquake in 1994 caused $3 billion in hospital-related damage and evacuations. Twelve hospital buildings constructed before the Act were cited (red tagged) as unsafe for occupancy after the earthquake. Those hospitals that had been built in accordance with the 1973 Hospital Act were very successful in resisting structural damage. However, nonstructural damage (for example, plumbing and ceiling systems) was still extensive in those post-1973 buildings.

Senate Bill 1953 ("SB 1953"), enacted in 1994 after the Northridge Earthquake, expanded the scope of the 1973 Hospital Act. Under SB 1953, all hospitals are required, as of January 1, 2008, to survive earthquakes without collapsing or posing the threat of significant loss of life.

The 1994 Act further mandates that all existing hospitals be seismically evaluated, and retrofitted, if needed, by 2030, so that they are in substantial compliance with the Act (which requires that the hospital buildings be reasonably capable of providing services to the public after disasters). SB 1953 applies to all urgent care facilities (including those built prior to the 1973 Hospital Act) and affects approximately 2,500 buildings on 475 campuses.

SB 1953 directed the Office of Statewide Health Planning and Development ("OSHPD"), in consultation with the Hospital Building Safety Board, to develop emergency regulations including "…earthquake performance categories with subgradations for risk to life, structural soundness, building contents, and nonstructural systems that are critical to providing basic services to hospital inpatients and the public after a disaster." (Health and Safety Code Section 130005)

<u>The Seismic Safety Commission Evaluation of the State's Hospital Seismic Safety Policies</u>

In 2001, recognizing the continuing need to assess the adequacy of policies, and the application of advances in technical knowledge and understanding, the California Seismic Safety Commission created an Ad Hoc Committee to re-examine the compliance with the Alquist Hospital Seismic Safety Act. The formation of the Committee was also prompted by the recent evaluations of hospital buildings reported to OSHPD that revealed that a large percentage (40%) of California's operating hospitals are in the highest category of collapse risk."[10] Currently, there are no hospital facilities located in the City of La Verne.

California Earthquake Mitigation Legislation

California is painfully aware of the threats it faces from earthquakes. Dating back to the 19th century, Californians have been killed, injured, and lost property as a result of earthquakes. As the State's population continues to grow, and urban areas become even more densely built up, the risk will continue to increase. For decades the Legislature has passed laws to strengthen the built environment and protect the citizens. Table EQ-3 provides a sampling of some of the 200 plus laws in the State's codes.

Table EQ-3 Partial List of the Over 200 California Laws on Earthquake Safety

Government Code Section 8870-8870.95	Creates Seismic Safety Commission.
Government Code Section 8876.1-8876.10	Established the California Center for Earthquake Engineering Research.
Public Resources Code Section 2800-2804.6	Authorized a prototype earthquake prediction system along the cental San Andreas fault near the City of Parkfield.
Public Resources Code Section 2810-2815	Continued the Southern California Earthquake Preparedness Project and the Bay Area Regional Earthquake Preparedness Project.
Health and Safety Code Section 16100-16110	The Seismic Safety Commission and State Architect, will develop a state policy on acceptable levels of earthquake risk for new and existing state-owned buildings.
Government Code Section 8871-8871.5	Established the California Earthquake Hazards Reduction Act of 1986.
Health and Safety Code Section 130000-130025	Defined earthquake performance standards for hospitals.
Public Resources Code Section 2805-2808	Established the California Earthquake Education Project.
Government Code Section 8899.10-8899.16	Established the Earthquake Research Evaluation Conference.
Public Resources Code Section 2621-2630 2621.	Established the Alquist-Priolo Earthquake Fault Zoning Act.
Government Code Section 8878.50-8878.52 8878.50.	Created the Earthquake Safety and Public Buildings Rehabilitation Bond Act of 1990.
Education Code Section 35295-35297 35295.	Established emergency procedure systems in kindergarten through grade 12 in all the public or private schools.
Health and Safety Code Section 19160-19169	Established standards for seismic retrofitting of unreinforced masonry buildings.
Health and Safety Code Section 1596.80-1596.879	Required all child day care facilities to include an Earthquake Preparedness Checklist as an attachment to their disaster plan.
Source: http://www.leginfo.ca.gov/calaw.html	

Earthquake Education

Earthquake research and education activities are conducted at several major universities in the Southern California region, including Cal Tech, USC, UCLA, UCSB. and UCI. The local clearinghouse for earthquake information is the Southern California Earthquake Center located at the University of Southern California, Los Angeles, CA 90089, Telephone: (213) 740-5843, Fax: (213) 740-0011, Email: SCEinfo@usc.edu, Website: http://www.scec.org. The Southern California Earthquake Center (SCEC) is a community of scientists and specialists who actively coordinate research on earthquake hazards at nine core institutions, and communicate earthquake information to the public. SCEC is a National Science Foundation (NSF) Science and Technology Center and is co-funded by the United States Geological Survey (USGS).

In addition, Los Angeles County along with other Southern California counties, sponsors the Emergency Survival Program (ESP), an educational program for learning how to prepare for earthquakes and other disasters. Many school districts have very active emergency preparedness programs that include earthquake drills and periodic disaster response team exercises. Please see Appendix E to view the Bonita Unified School District mitigation summary for more information on specific earthquake preparation and education in local schools.

Prioritization of Earthquake Hazard Mitigation Action Items

The Mitigation Action Items listed below were prioritized based on a simple examination of economic feasibility as well as technical feasibility and administrative capabilities. Those mitigation action items that met the greatest number of the ranking criteria were given priority ranking. The justification for the ranking order of the action items for each particular hazard is in table form and precedes the list of action items for that hazard.

Short Term Mitigation Items	Economic evaluation	Technical feasibility	Administrative capability	Priority Ranking
Geologic studies required of developers.	No financial impact on city, cost borne by developers	City engineer able to review proposed geologic studies	No administrative effort required beyond including the studies as a condition of approval for development projects	1
Enforce regulations that require earthquake straps for water heaters.	Printing costs for flyers inserted in water bills. Minimal costs to housing rehab program through requirement of water heater strapping as part of each grant.	No technical advising or review required of city staff	Good opportunity for implementation with current staff – housing rehab grant program	2
Implementation of unreinforced masonry program	No money currently available for grants but progress is made when ownership or changes in business occur.	The feasibility of seismic reinforcement and buildings in need of reinforcement have already been determined.	Current staff has addressed the problem in the past and could handle the program easily if money were made available.	3

Long Term Mitigation Items	Economic evaluation	Technical feasibility	Administrative capability	Priority ranking
Community earthquake preparedness.	Programs are existing and ongoing so would not result in an increase in costs	There are no apparent technical impediments to the existing earthquake preparedness programs	Programs exist and are administered by public safety and community services employees of the city.	1
Assess soundness of all dams in La Verne.	No immediate costs, but costs could be significant if retrofit is required.	Request assessment be performed by LA County	Could require a five year study as no assessments currently exist.	2
Develop a debris management program to comply with AB939.	The price of land is currently a constraint.	require the acquisition of a site for short and long term storage of debris, availability of land is limited	Administration could be handled by Public Works Department	3

Earthquake Mitigation Action Items

The following earthquake mitigation action items will provide guidance on specific activities that the City of La Verne and agencies, organizations, and residents in the City of La Verne can undertake to reduce risk and prevent loss from earthquake events. Each action item is followed by ideas for implementation, which can be used by the City in pursuing earthquake hazard strategies (EQ-ST) for implementation. The action items are listed in order of priority.

Short Term Mitigation Activity for Earthquakes #1: Minimize Personal and Property Damage for New Developments with special geologic studies.

Ideas for Implementation:

- Monitor the special studies zones, which extend 350 feet on both sides of known and suspected faults.
- Require a study by a registered geologist or certified engineering geologist to determine exact location and nature of the fault and the probability and probable extent of earthquake damage prior to the development in any such zone.
- Require all development in a geologic specials studies zone to be set back 50 feet from each side of a mapped active fault trace.
- Require special site-specific studies in areas potentially subject to liquefaction to determine the nature and extent of possible liquefaction and to identify engineering and development siting measures to permit development to occur.

Timeline: Immediate
Constraints: No financial impact to City. Studies required of developer.
Status: Implemented beginning in 2010

Short Term Mitigation Activity for Earthquakes #2: Enforce current regulations that require that water heaters be double strapped to the wall in all new residential construction. Encourage owners of existing homes to bolt water heaters to the wall and encourage the use of tankless water heaters.

Ideas for Implementation:

- Continue with the requirement that hot water heaters be secured per current regulations for homes involved in the City's Housing Rehabilitation Program.
- Include articles in local newspaper publications on current regulations relating to securing hot water heaters.

Timeline: Immediate to 1 year
Constraints: Appropriate staff time to create articles.
Status: This program is in progress but has not fully been implemented due to a lack in staffing resources. Flyers have been created and will begin being used within year one after adoption.

Short Term Mitigation Activity for Earthquakes #3: Continue to implement the Unreinforced Masonry Program in Lordsburg. Complete an inventory of all unreinforced masonry structures in the City of La Verne. Require structural reinforcement of all unreinforced masonry structures when renovated. The cost of reinforcement shall not be an adequate justification for demolition of a structure determined to be historical within the City of La Verne.

Ideas for Implementation:

- Provide rehabilitation grants for the retrofitting of the remaining unreinforced masonry buildings in downtown La Verne.

Timeline: 2-5 years

Constraints: City/Agency funds are not available at this time for grants.

Status: All but one of these buildings have been retrofitted through the renovation requirements as part of the City's Municipal code. Funds are not currently available to retrofit the remaining building.

Long Term Mitigation Activity for Earthquakes #3: Prepare our Community for the Event of an Earthquake

Implementation Measures:

- Include earthquake preparedness in all regular fire safety inspections by the fire department.
- Take an active role in the earthquake preparedness planning and drills for all city schools conducted by the Fire Department.
- Review earthquake emergency planning periodically for all major contingents in the city to promote effective interaction in the event of an emergency. Review to be conducted by the Fire Department.
- Provide periodic earthquake drills involving all major contingents in the city to coordinate emergency activity in the event of an earthquake. Drills to be conducted by the Fire Department.

Timeline: Currently all measures are ongoing.

Constraints: None.

Status: This is ongoing but the City has implemented a community wide disaster preparedness program that takes place at least once annually. In addition the City has also hosted a special Disaster Preparedness Expo event with the theme "the first 72 (hours) are on you." This outreach targeted residents to become prepared for disasters and to rely without possible services for up to three days.

Long Term Mitigation Activity for Earthquakes #2: Request that the Los Angeles County Flood Control District assess all dams in the La Verne area for earthquake soundness.

Ideas for Implementation:

- Believe reports may already exist.

Timeline: 6 months to receive report if it currently exists. Up to 5 years if study has not been completed.

Constraints: None to the City. Significant when retrofit, if necessary, to Los Angeles County.

Status: Program is implemented by the operators of the dams.

Long Term Mitigation Activity for Earthquakes #3: Develop a debris management program in compliance with AB939, including short term transfer stations.

Ideas for Implementation:

- Secure sites in the City where a significant volume of debris can safely be stored.

- Secure agreements with demolition contractors to be on call in the event that an earthquake causes damage requiring debris removal.

Timeline: 2-3 years

Constraints: Cost of sites.

Environmental hazards of debris removal and storage without air and water quality agencies approval.

Status: No specific plan has been created due to a lack of staffing resources. This program is ongoing.

Earthquake Resource Directory

Local and Regional Resources

Los Angeles County Public Works Department
900 S. Fremont Ave.
Alhambra, CA 91803
Ph: 626-458-5100
http://ladpw.org
Notes: The Los Angeles County Department of Public Works protects property and promotes public safety through Flood Control, Water Conservation, Road Maintenance, Bridges, Buses and Bicycle Trails, Building and Safety, Land Development, Waterworks, Sewers, Engineering, Capital Projects and Airports

Southern California Earthquake Center (SCEC)
3651 Trousdale Parkway, Suite 169
Los Angeles, CA 90089-0742
Ph: 213-740-5843 - Fx: 213/740-0011
www.scec.org
Notes: The Southern California Earthquake Center (SCEC) gathers new information about earthquakes in Southern California, integrates this information into a comprehensive and predictive understanding of earthquake phenomena, and communicates this understanding to end-users and the general public in order to increase earthquake awareness, reduce economic losses, and save lives.

State Resources

California Department of Transportation (CalTrans)
120 S. Spring Street
Los Angeles, CA 90012
Ph: 213-897-3656
http://www.dot.ca.gov/
Notes: CalTrans is responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries. Alone and in partnership with Amtrak, CalTrans is also involved in the support of intercity passenger rail service in California

California Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814
Ph: 916-653-5656
http://resources.ca.gov/
Notes: The California Resources Agency restores, protects and manages the state's natural, historical and cultural resources for current and future generations using solutions based on science, collaboration and respect for all the communities and interests involved.

California Division of Mines and Geology (DMG)
801 K Street, MS 12-30
Sacramento, CA 95814
Ph: 916-445-1825 - Fx: 916-445-5718
Notes: The California Geological Survey develops and disseminates technical information and advice on California's geology, geologic hazards, and mineral resources.

California Department of Conservation: Southern California Regional Office
655 S. Hope Street, #700
Los Angeles, CA 90017-2321
Ph: 213-239-0878 - Fx: 213-239-0984
Notes: The Department of Conservation provides services and information that promote environmental health, economic vitality, informed land-use decisions and sound management of our state's natural resources.

Governor's Office of Emergency Services (OES)
P.O. Box 419047
Rancho Cordova, CA 95741-9047
Ph: 916 845- 8911 - Fx: 916 845- 8910
Notes: The Governor's Office of Emergency Services coordinates overall state agency response to major disasters in support of local government. The office is responsible for assuring the state's readiness to respond to and recover from natural, manmade, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response and recovery efforts.

Federal and National Resources

Building Seismic Safety Council (BSSC)
1090 Vermont Ave., NW, Suite 700
Washington, DC 20005
Ph: 202-289-7800 - Fx: 202-289-109
www.bssconline.org
Notes: The Building Seismic Safety Council (BSSC) develops and promotes building earthquake risk mitigation regulatory provisions for the nation.

Federal Emergency Management Agency, Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607
Ph: 510-627-7100 - Fx: 510-627-7112
www.fema.gov
Notes: The Federal Emergency Management Agency is tasked with responding to, planning for, recovering from and mitigating against disasters.

Federal Emergency Management Agency, Mitigation Division
500 C Street, S.W.
Washington, D.C. 20472
Ph: 202-566-1600

www.fema.gov/fima/planhowto.shtm
Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has a number of programs and activities which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country.

United States Geological Survey
345 Middlefield Road
Menlo Park, CA 94025
Ph: 650-853-8300
http://www.usgs.gov/
Notes: The USGS provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

Western States Seismic Policy Council (WSSPC)
125 California Avenue, Suite D201, #1
Palo Alto, CA 94306
Ph: 650-330-1101 - Fx: 650-326-1769
Notes: WSSPC is a regional earthquake consortium funded mainly by FEMA. Its website is a great resource, with information clearly categorized - from policy to engineering to education.

Institute for Business & Home Safety
4775 E. Fowler Avenue
Tampa, FL 33617
Ph: 813-286-3400 - Fx: 813-286-9960
http://www.ibhs.org/
The Institute for Business & Home Safety (IBHS) is a nonprofit association that engages in communication, education, engineering and research. The Institute works to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters.

Publications

"Land Use Planning for Earthquake Hazard Mitigation: Handbook for Planners"
Wolfe, Myer R. et. aI., (1986) University of Colorado, Institute of Behavioral Science, National Science Foundation. - This handbook provides techniques that planners and others can utilize to help mitigate for seismic hazards, It provides information on the effects of earthquakes, sources on risk assessment, and effects of earthquakes on the built environment. The handbook also gives examples on application and implementation of planning techniques to be used by local communities.
Contact: Natural Hazards Research and Applications Information Center
Address: University of Colorado, 482 UCB,
Boulder, CO 80309-0482
Phone: (303) 492-6818
Fax: (303) 492-2151
Website: http://www,colorado.edu/UCB/Research/IBS/hazards

“Public Assistance Debris Management Guide”, FEMA (July 2000).
The Debris Management Guide was developed to assist local officials in planning, mobilizing, organizing. and controlling large-scale debris clearance, removal, and disposal operations, Debris management is generally associated with post-disaster recovery. While it should be compliant with local and county emergency operations plans, developing strategies to ensure strong debris management is a way to integrate debris management within mitigation activities. The “Public Assistance Debris Management Guide” is available in hard copy or on the FEMA website.

Earthquake End Notes

[1] http://pubs.usgs.gov/gip/earthq3/when.html

[2] http://www.gps.caltech.edu/~sieh/home.html

[3] Planning for Natural Hazards: The California Technical Resource Guide, Department of Land Conservation and Development (July 2000)

[4] http://www.consrv.ca.gov/CGS/rghm/ap/

[5] Ibid

[6] Burby, R. (Ed.) Cooperating with Nature: Confronting Natural Hazards with Land Use Planning for Sustainable Communities (1998), Washington D.C., Joseph Henry Press.

[7] Source: Los Angeles County Public Works Department, March 2004

[8] http://www.chamber101.com/programs_committee/natural_disasters/DisasterPreparedness/Forty.htm

[9] Institute for Business and Home Safety Resources (April 2001),

[10] http://www.seismic.ca.gov/pub/CSSC_2001-04_Hospital.pdf

Section Seven: Earth Movement (Landslide Debris Flow)

City of La Verne Natural Hazard Mitigation Plan

Section Seven: Earth Movement (Landslides/Debris Flow)

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Why are Landslides a Threat to the City of La Verne?

Landslides are a serious geologic hazard in almost every state in America. Nationally, landslides cause 25 to 50 deaths each year.[1] The best estimate of direct and indirect costs of landslide damage in the United States range between $1 and $2 billion annually.[2] As a seismically active region, California has had a significant number of locations impacted by landslides. Some landslides result in private property damage, while other landslides impact transportation corridors, fuel and energy conduits, and communication facilities. They can also pose a serious threat to human life.

Landslides can be broken down into two categories: (1) rapidly moving (generally known as debris flows), and (2) slow moving. Rapidly moving landslides or debris flows present the greatest risk to human life, and people living in or traveling through areas prone to rapidly moving landslides are at increased risk of serious injury. Slow moving landslides can cause significant property damage, but are less likely to result in serious human injuries.

The City of La Verne does have limited liquefaction zones generally located south of Arrow Highway indicated on Map # EM-1. Since the settlement of the City in the 1800's, there has not been any recorded instances of liquefaction associated with seismic activity or recorded landslides of major significance. Instead, the City hopes to gain information and experience from other events that have happened in Southern California communities.

Historic Southern California Landslides

1928 St. Francis Dam failure
Los Angeles County, California. The dam gave way on March 12, and its waters swept through the Santa Clara Valley toward the Pacific Ocean, about 54 miles away. Sixty-five miles of valley was devastated, and over 500 people were killed. Damages were estimated at $672.1 million (year 2000 dollars).[3]

1956 Portuguese Bend, California
Cost, $14.6 million (2000 dollars) California Highway 14, Palos Verdes Hills. Land use on the Palos Verdes Peninsula consists mostly of single-family homes built on large lots, many of which have panoramic ocean views. All of the houses were constructed with individual septic systems, generally consisting of septic tanks and seepage pits. Landslides have been active here for thousands of years, but recent landslide activity has been attributed in part to human activity. The Portuguese Bend landslide began its modern movement in August 1956, when displacement was noticed at its northeast margin. Movement gradually extended downslope so that the entire eastern edge of the slide mass was moving within 6 weeks. By the summer of 1957, the entire slide mass was sliding towards the sea.[4]

1958-1971 Pacific Palisades, California
Cost, $29.1 million (2000 dollars) California Highway 1 and house damaged.[5]

1961 Mulholland Cut, California
Cost, $41.5 million (2000 dollars) On Interstate 405, 11 miles north of Santa Monica, Los Angeles County.[6]

1963 Baldwin Hills Dam Failure.
On December 14, the 650 foot long by 155 foot high earth fill dam gave way and sent 360 million gallons of water in a fifty foot high wall cascading onto the community below, killing five persons, and causing $50 million (1963 dollars) in property damage.

1969 Glendora, California
Cost, $26.9 million (2000 dollars) Los Angeles County, 175 houses damaged, mainly by debris flows.[7]

1969 Seventh Ave., Los Angeles County, California
Cost, $14.6 million (2000 dollars) California Highway 60.[8]

1970 Princess Park, California
Cost, $29.1 million (2000 dollars) California Highway 14, 10 miles north of Newhall, near Saugus, northern Los Angeles County.[9]

1971 Upper and Lower Van Norman Dams, San Fernando, California
Earthquake-induced landslides Cost, $302.4 million (2000 dollars). Damage due to the February 9, 1971, magnitude 7.5 San Fernando, California, earthquake. The earthquake of February 9 severely damaged the Upper and Lower Van Norman Dams.[10]

1971 Juvenile Hall, San Fernando, California
Landslides caused by the February 9, 1971, San Fernando, California, earthquake Cost, $266.6 million (2000 dollars). In addition to damaging the San Fernando Juvenile Hall, this 1.2 km-long slide damaged trunk lines of the Southern Pacific Railroad, San Fernando Boulevard, Interstate Highway 5, the Sylmar, California, electrical converter station, and several pipelines and canals.[11]

1977-1980 Monterey Park, Repetto Hills, Los Angeles County, California
Cost, $14.6 million (2000 dollars) 100 houses damaged in 1980 due to debris flows.[12]

1978 Bluebird Canyon Orange County
California October 2, cost, $52.7 million (2000 dollars) 60 houses destroyed or damaged. Unusually heavy rains in March of 1978 may have contributed to initiation of the landslide. Although the 1978 slide area was approximately 3.5 acres, it is suspected to be a portion of a larger, ancient landslide.[13]

1978-1979, 1980 San Diego County, California
Experienced major damage from storms in 1978, 1979, and 1979-80, as did neighboring areas of Los Angeles and Orange County, California. One hundred and twenty landslides were reported to have occurred in San Diego County during these 2 years. Rainfall for the rainy seasons of 78-79 and 79-80 was 14.82 and 15.61 inches (37.6 and 39.6 cm) respectively, compared to a 125-year average (1850-1975) of 9.71 inches (24.7 cm). Significant landslides occurred in the Friars Formation, a unit that was noted as slide-prone in the Seismic Safety Study for the City of San Diego. Of the nine landslides that caused damage in excess of $1 million, seven occurred in the Friars Formation, and two in the Santiago Formation in the northern part of San Diego County.[14]

1979 Big Rock, California, Los Angeles County
Cost, approximately $1.08 billion (2000 dollars), California Highway 1 rockslide.[15]

1980 Southern California slides
$1.1 billion in damage (2000 dollars) Heavy winter rainfall in 1979-90 caused damage in six Southern California counties. In 1980, the rainstorm started on February 8. A sequence of 5 days of continuous rain and 7 inches of precipitation had occurred by February 14. Slope failures were beginning to develop by February 15 and then very high-intensity rainfall occurred on February 16. As much as 8 inches of rain fell in a 6 hour period in many locations. Records and personal observations in the field on February 16 and 17 showed that the mountains and slopes literally fell apart on those 2 days.[16]

1983 San Clemente, California, Orange County
Cost, $65 million (2000 dollars), California Highway 1. Litigation at that time involved approximately $43.7 million (2000 dollars).[17]

1983 Big Rock Mesa, California
Cost, $706 million (2000 dollars) in legal claims condemnation of 13 houses, and 300 more threatened rockslide caused by rainfall.[18]

1994 Northridge, California earthquake landslides
As a result of the magnitude 6.7 Northridge, California, earthquake, more than 11,000 landslides occurred over an area of 10,000 km². Most were in the Santa Susana Mountains and in mountains north of the Santa Clara River Valley. Destroyed dozens of homes, blocked roads, and damaged oil-field infrastructure. Caused deaths from Coccidioidomycosis (valley fever) the spore of which was released from the soil and blown toward the coastal populated areas. The spore was released from the soil by the landslide activity.[19]

March 1995 Los Angeles and Ventura Counties, Southern California
Above normal rainfall triggered damaging debris flows, deep-seated landslides, and flooding. Several deep-seated landslides were triggered by the storms, the most notable was the La Conchita landslide, which in combination with a local debris flow, destroyed or badly damaged 11 to 12 homes in the small town of La Conchita, about 20 km west of Ventura. There also was widespread debris-flow and flood damage to homes, commercial buildings, and roads and

highways in areas along the Malibu coast that had been devastated by wildfire 2 years before.[20]

Landslide Characteristics

What is a landslide?

A landslide is defined as, the movement of a mass of rock, debris, or earth, down a slope. Landslides are a type of "mass wasting" which denotes any down slope movement of soil and rock under the direct influence of gravity. The term "landslide" encompasses events such as rock falls, topples, slides, spreads, and flows. Landslides can be initiated by rainfall, earthquakes, volcanic activity, changes in groundwater, disturbance and change of a slope by man-made construction activities, or any combination of these factors. Landslides can also occur underwater, causing tidal waves and damage to coastal areas. These landslides are called submarine landslides.[21]

The size of a landslide usually depends on the geology and the initial cause of the landslide. Landslides vary greatly in their volume of rock and soil, the length, width, and depth of the area affected, frequency of occurrence, and speed of movement. Some characteristics that determine the type of landslide are slope of the hillside, moisture content, and the nature of the underlying materials. Landslides are given different names, depending on the type of failure and their composition and characteristics.

Slides move in contact with the underlying surface. These movements include rotational slides where sliding material moves along a curved surface and translational slides where movement occurs along a flat surface. These slides are generally slow moving and can be deep. Slumps are small rotational slides that are generally shallow. Slow-moving landslides can occur on relatively gentle slopes and can cause significant property damage, but are far less likely to result in serious injuries than rapidly moving landslides.[22]

"Failure of a slope occurs when the force that is pulling the slope downward (gravity) exceeds the strength of the earth materials that compose the slope. They can move slowly, (millimeters per year) or can move quickly and disastrously, as is the case with debris-flows. Debris-flows can travel down a hillside at speeds up to 200 miles per hour (more commonly, 30 – 50 miles per hour), depending on the slope angle, water content, and type of earth and debris in the flow. These flows are initiated by heavy, usually sustained, periods of rainfall but sometimes can happen as a result of short bursts of concentrated rainfall in susceptible areas. Burned areas charred by wildfires are particularly susceptible to debris flows, given certain soil characteristics and slope conditions."[23]

What is a Debris Flow ?

A debris or mudflow is a river of rock, earth, and other materials, including vegetation, that is saturated with water. This high percentage of water gives the debris flow a very rapid rate of movement down a slope. Debris flows with speeds greater than 20 miles per hour, and can often move much faster than 20 miles per hour.[24] This high rate of speed makes debris flows extremely dangerous to people and property in its path.

Landslide Events and Impacts

Landslides are a common hazard in California although they have fortunately not been an issue in La Verne. However, it is important to note they are possible under certain conditions within the City. Weathering and the decomposition of geologic materials produces conditions conducive to landslides and human activity further exacerbates many landslide problems. Many landslides are difficult to mitigate, particularly in areas of large historic movement with weak underlying geologic materials. As communities continue to modify the terrain and influence natural processes, it is important to be aware of the physical properties of the underlying soils as they, along with climate, create landslide hazards. Even with proper planning, landslides will continue to threaten the safety of people, property, and infrastructure, but without proper planning, landslide hazards will be even more common and more destructive.

The increasing scarcity of buildable land, particularly in urban areas, increases the tendency to build on geologically marginal land. Additionally, hillside housing developments in Southern California are prized for the view lots that they provide.

Rock falls occur when blocks of material come loose on steep slopes. Weathering, erosion, or excavations, such as those along highways, can cause falls where the road has been cut through bedrock. They are fast moving with the materials free falling or bouncing down the slope. In falls, material is detached from a steep slope or cliff. The volume of material involved is generally small, but large boulders or blocks of rock can cause significant damage.

Earth flows are plastic or liquid movements in which land mass (e.g. soil and rock) breaks up and flows during movement. Earthquakes often trigger flows.[25] Debris flows normally occur when a landslide moves downslope as a semi-fluid mass scouring, or partially scouring soils from the slope along its path. Flows are typically rapidly moving and also tend to increase in volume as they scour out the channel.[26] Flows often occur during heavy rainfall, can occur on gentle slopes, and can move rapidly for large distances.

Landslide Conditions

Landslides are often triggered by periods of heavy rainfall. Earthquakes, subterranean water flow and excavations may also trigger landslides. Certain geologic formations are more susceptible to landslides than others. Human activities, including locating development near steep slopes, can increase susceptibility to landslide events. Landslides on steep slopes are more dangerous because movements can be rapid.

Although landslides are a natural geologic process, the incidence of landslides and their impacts on people can be exacerbated by human activities. Grading for road construction and development can increase slope steepness. Grading and construction can decrease the stability of a hill slope by adding weight to the top of the slope, removing support at the base of the slope, and increasing water content. Other human activities affecting landslides include: excavation, drainage and groundwater alterations, and changes in vegetation.[27]

Wildland fires in hills covered with chaparral are often a precursor to debris flows in burned out canyons. Such is the case in La Verne. The extreme heat of a wildfire can create a soil condition in which the earth becomes impervious to water by creating a waxy-like layer just below the ground surface. Since the water cannot be absorbed into the soil, it rapidly accumulates on slopes, often gathering loose particles of soil in to a sheet of mud and debris. Debris flows can often originate miles away from unsuspecting persons, and approach them at a high rate of speed with little warning.

Natural Conditions

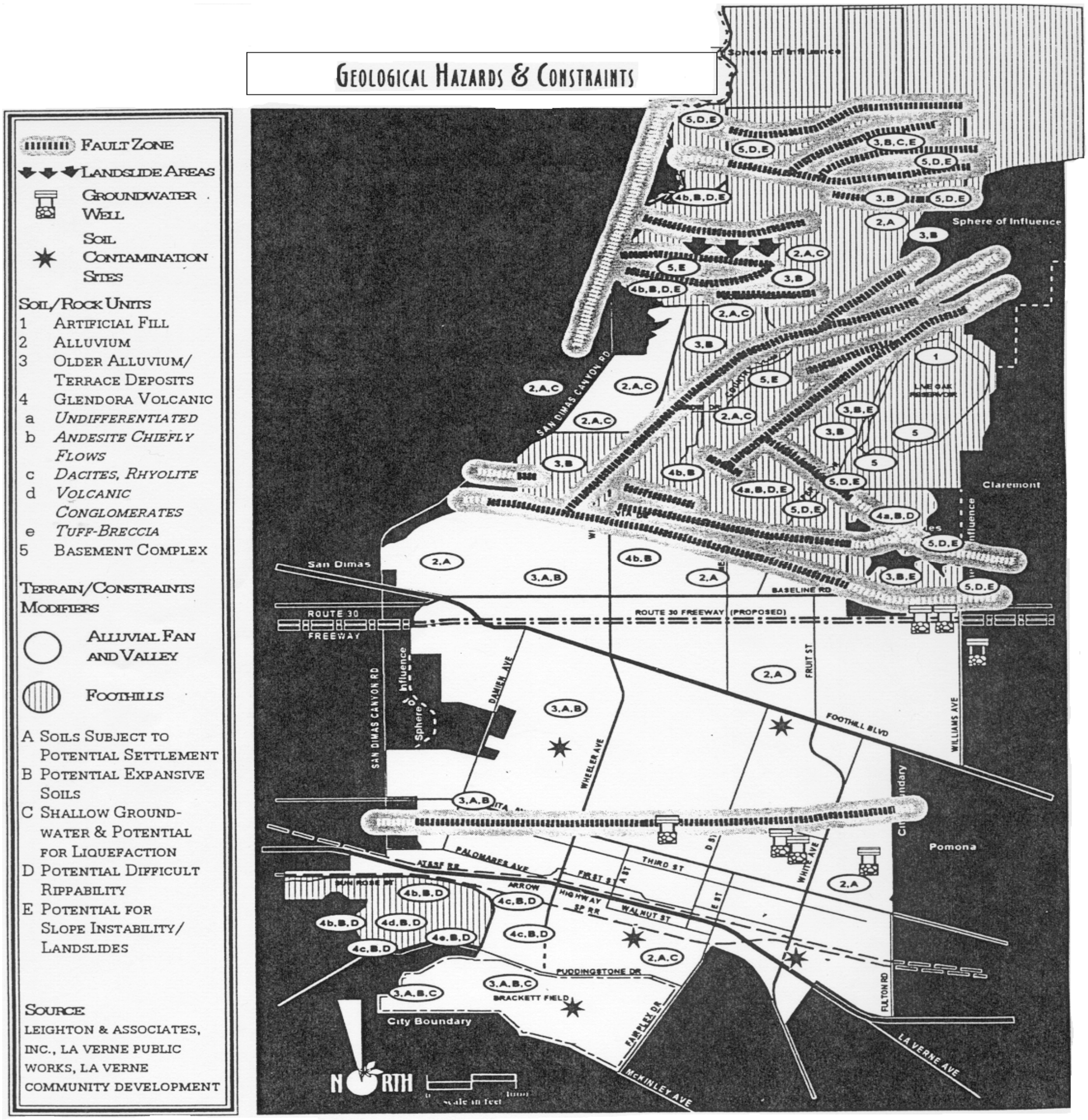
Natural processes can cause landslides or re-activate historical landslide sites. The removal or undercutting of shoreline-supporting material along bodies of water by currents and waves produces countless small slides each year. Seismic tremors can trigger landslides on slopes historically known to have landslide movement. Earthquakes can also cause additional failure (lateral spreading) that can occur on gentle slopes above steep streams and riverbanks.

Particularly Hazardous Landslide Areas

Locations at risk from landslides or debris flows include areas with one or more of the following conditions:

1. On or close to steep hills;
2. Steep road-cuts or excavations;
3. Existing landslides or places of known historic landslides (such sites often have tilted power lines, trees tilted in various directions, cracks in the ground, and irregular-surfaced ground);
4. Steep areas where surface runoff is channeled, such as below culverts, V -shaped valleys, canyon bottoms, and steep stream channels;
5. Fan-shaped areas of sediment and boulder accumulation at the outlets of canyons; and
6. Canyon areas below hillside and mountains that have recently (within 1-6 years) been subjected to a wildland fire.

Map EM-1 shows the location of areas subject to landslides including the north foothills of the City subject to wildfires.



MAP EM-1

Source: City of La Verne 1998 General Plan

Impacts of Development

Although landslides are a natural occurrence, human impacts can substantially affect the potential for landslide failures in the City of La Verne. Proper planning, such as setbacks from potential landslides slopes and bluffs, and geotechnical engineering can be exercised to reduce the threat of safety to people, property, and infrastructure.

Excavation and Grading

Slope excavation is common in the development of home sites or roads on sloping terrain. Grading these slopes can result in some slopes that are steeper than the pre-existing natural slopes. Since slope steepness is a major factor in landslides, these steeper slopes can be at an increased risk for landslides. The added weight of fill placed on slopes can also result in an increased landslide hazard. Small landslides can be fairly common along roads, in either the road cut or the road fill. Landslides occurring below new construction sites are indicators of the potential impacts stemming from excavation.

Drainage and Groundwater Alterations

Water flowing through or above ground is often the trigger for landslides. Any activity that increases the amount of water flowing into landslide-prone slopes can increase landslide hazards. Broken or leaking water or sewer lines can be especially problematic, as can water retention facilities that direct water onto slopes. However, even lawn irrigation in landslide prone locations can result in damaging landslides. Ineffective storm water management and excess runoff can also cause erosion and increase the risk of landslide hazards. Drainage can be affected naturally by the geology and topography of an area; development that results in an increase in impervious surface impairs the ability of the land to absorb water and may redirect water to other areas. Channels, streams, ponding, and erosion on slopes all indicate potential slope problems.

Road and driveway drains, gutters, downspouts, and other constructed drainage facilities can concentrate and accelerate flow. Ground saturation and concentrated velocity flow are major causes of slope problems and may trigger landslides.[28]

Changes in Vegetation

Whether the result from a wildfire or by land clearing for development, removing vegetation from very steep slopes can increase landslide hazards. Re-vegetation of these slopes is critical to reduce the potential for landslides. Certain types of ground cover have a much greater need for constant watering to remain green, thus, increasing the possibility of landslides.

Landslide Hazard Assessment

The “L” hazard/constraint modifier symbol used on Map EM-1 indicates hillside with expected slope constraints. This includes most of the foothill areas except for the flatter, terrace areas such as that surrounding the Live Oak Canyon Reservoir. In these designated foothill areas, there is a high potential for hazard from shallow failures, mud and debris flows, as well as moderate to high potential for landsliding.

Any development proposal concept within the hillside terrain of the City would have to consider the site-specific potential for landsliding. In some areas, this constraint is severe enough to affect the feasibility of developing the property. Careful site-specific evaluation, based on geotechnical investigations is one of the chief means to mitigate this hazard. The effects of onsite sewage effluent on slope stability must be addressed prior to development. The stability of areas up-slope from development must also be addressed both in terms of gross stability and mud and debris flows. Slope stability should be evaluated early in the developmental feasibility process.

Technical review for adequacy of all such reports should be accomplished in accordance with current practice. Review agencies have found that adherence to Chapter 70 of the Uniform Building Code, regulating earthwork and grading, is important in the mitigation of slope instability during the actual grading phase of development. Reducing erosion potential can also be achieved by minimizing the amount of land distributed through planning (for example clustering of dwelling units), limiting acreage of bare soils exposed at any one time, restricting grading to the dry season and requiring immediate revegetation.

Hazard Identification

Identifying hazardous locations is an essential step towards implementing more informed mitigation activities. The City's "Safety Element" of the General Plan contains a map (included as Map EM-1) which identified, among other hazards, fault zones, liquefaction areas and areas of potential slope instability. All projects submitted for development are compared to this map to determine the extent of geological review required. Those projects subject to any geologic hazard identified by this map are required to a full site-specific study to determine the extent of the hazard and the mitigation required, including the effect of the development on surrounding areas.

Vulnerability and Risk

Vulnerability assessment for landslides will assist in predicting how different types of property and population groups will be affected by a hazard.[29] Data that includes specific landslide-prone and debris flow locations in the city can be used to assess the population and total value of property at risk from future landslide occurrences.

The City of La Verne Community Development Department uses percent slope as an indicator of hill slope stability. The city uses a 25% or greater threshold to identify potentially unstable hill slopes. Exhibit 18.68.010 of the City of La Verne Municipal Code shows the hillside development overlay zone, which includes the area of the City having slopes over 25%.

While a quantitative vulnerability assessment (an assessment that describes number of lives or amount of property exposed to the hazard) has not yet been conducted for City of La Verne landslide events, there are some qualitative factors that point to potential vulnerability. Landslides can impact transportation arteries, blocking residents from essential services and businesses. Past landslide events have caused only minor property damage, i.e. less than $100,000 total combined. The City of La Verne has also experienced relatively minor debris flows in the past 20 years. Property damage has been limited to less than $80,000, with the majority of debris cleanup being limited to flood plain areas. Please reference the Flood Hazards Section for additional details on the impact and vulnerability on debris flows along flood plains. The City is continuing to map any potential City landslide and debris flow areas to help prevent future losses.

Factors included in assessing landslide risk include population and property distribution in the hazard area, including those areas subject to debris caused by fire, the frequency of landslide or debris flow occurrences, slope steepness, soil characteristics, and precipitation intensity. This type of analysis could generate estimates of the potential damages to the City due to a specific landslide or debris flow event. At the time of publication of this plan, data was insufficient to perform a complete risk analysis.

Community Landslide Issues - What is Susceptible to Landslides?

Landslides can affect utility services, transportation systems, and critical lifelines. Communities may suffer immediate damages and loss of service. Disruption of infrastructure, roads, and critical facilities may also have a long-term effect on the economy. Utilities, including potable water, water reservoirs, wastewater, telecommunications, natural gas, and electric power are all essential to service community needs. Loss of electricity has the most widespread impact on other utilities and on the whole community. Natural gas pipes may also be at risk of breakage from landslide movements. For information on such utilities and their specific mitigation activities please see Appendix F.

<u>Roads and Bridges</u>

Losses incurred from landslide hazards in the City of La Verne have been associated with damage to roads and bluffs. The City of La Verne Public Works Department is responsible for responding to slides that inhibit the flow of traffic or are damaging to road drainage facilities including culvert crossings. The Public Works Department communicates with residents and emergency service providers (i.e. fire & police) impacted by landslides, but can usually only repair the road itself, as well as the areas adjacent to the slide where the City has the right of way. Landslides occurring on private property are the responsibility of private land owners.

In the past 20 years, there have only been two landslide occurrences. The most significant landslide was caused by a debris "plugged" storm drain pipe located adjacent to a road. The water thus bypassed the storm drain inlet and flowed over the slope, causing slope damage. Located below the slope was a debris basin, so no down slope damage occurred. The storm drain and slope were reconstructed. Since the storm drain pipe size was increased, the potential for a future occurrence is minimal. A second location sustainable to landslides is a roadway at Esperanza Drive. Two minor slides, less than $20,000 of cleanup, have occurred since the road was constructed in 1984. An annual assessment district is in place to maintain the slope. Neither of the landslide events caused the roadway to be closed and the future potential for a major slide is minimal.

It is not possible to mitigate all slides because of limited funds and the fact that some historical slides are likely to become active again even with mitigation measures. The City's Public Works Department alleviates problem areas by grading slides, and by installing new drainage systems on the slopes to divert water from the landslides and is continuing to work toward the construction of a debris basin in the northern portion of La Verne to intercept mud flows caused by fires burning off vegetation.

Lifelines and Critical Facilities

Lifelines and critical facilities should remain accessible, if possible, during a natural hazard event. The impact of closed transportation arteries may be increased if the closed road or washed out culvert crossing is critical for access to public facilities and other emergency facilities. Therefore, inspection and repair of critical transportation facilities and routes is essential and should receive high priority. Losses of power and phone service are also potential consequences of landslide events. Due to heavy rains, soil erosion in hillside areas can be accelerated, resulting in loss of soil support beneath high voltage transmission towers in hillsides and remote areas. Flood events can also cause landslides, which can have serious impacts on utility lines that are located in vulnerable areas.

Landslide Mitigation Activities

Landslide Building/Zoning Codes

The City of La Verne Municipal Code addresses development on steep slopes in Chapter 18.68. This chapter outlines standards for steep slope hazard areas on slopes of 25% or more. Generally, the ordinance requires a geotechnical study for developments within an area where slopes in excess of 25% exists and prohibits development, including grading, on slopes of 25% or greater. More detailed surface and subsurface investigations shall be warranted if indicated by preliminary engineering and geologic studies. This may include soils, vegetation, geologic formations, and drainage patterns. Site evaluations may also occur where stability might be lessened by proposed grading/filling or land clearing.

In liquefaction areas, no special codes have been developed by the City of La Verne. The City uses the Los Angles County Grading Code, which requires a geologic study and recommendation by a geologist as to foundation design. Secondary earthquake hazards, such as liquefaction, flow landsliding, and seismically induced dynamic settlement are generally associated with relatively high intensities of shaking, shallow ground water conditions, and the presence of loose, sandy soils or alluvial deposits. Because the City is likely to be subject to moderate to strong seismic shaking, the potential for liquefaction will be a function of the presence of shallow ground water in conjunction with loose, sandy deposits. This set of conditions is most likely to occur locally in canyon bottom areas and in the flatter, southerly portion of the City. An earthquake event along the Sierra Madre-Cucamonga Fault Zone might produce localized effects of this type. The general areas expected to be impacted by liquefaction potential are shown on Map EM-1 with the S” hazard/constraint modifier symbol.

Within alluvial and older alluvial areas with shallow ground water, an analysis of liquefaction potential, based on site-specific soils, seismic, and ground water conditions are required by the City to adequately evaluate the potential for such effects to occur.

Community Issues Summary

Landslides can be a problem in the City of La Verne, and can impact the city’s infrastructure as well as private property. The public safety element of the General Plan lists the known landslide hazard area(s). Since slide activity has been superficial in nature, no specific mapping and cost analysis has been developed. The City’s vulnerability from the impact of landslides is minor as long as the grading codes in effect are followed.

Prioritization of Earth Movement Hazard Mitigation Action Items

The Mitigation Action Items listed below were prioritized based on a simple examination of economic feasibility as well as technical feasibility and administrative capabilities. Those mitigation action items that met the greatest number of the ranking criteria were given priority ranking. The justification for the ranking order of the action items for each particular hazard is in table form and precedes the list of action items for that hazard.

Short Term Mitigation Items	Economic evaluation	Technical feasibility	Administrative capability	Priority ranking
Identify safe evacuation routes in high-risk debris flow and landslide areas.	Minimal new costs.	Mapping routes can be done using existing city maps and aerial photos.	Coordination between Public Works, public safety, and Planning staff.	1
Discourage construction and subdivision design that can be applied to steep slopes to reduce the potential adverse impacts from development.	Reduction of impacts from land slide and debris flow lowers public safety costs and minimizes potential loss. The costs of implementing these action items are limited.	City Engineer can provide technical consulting for any necessary amendments to Hillside Development Overlay Zone.	Development in hillsides zones is Community Development. This would require increased coordination between Community Development and Public Works Departments.	2
Develop public handout with map	Cost to develop flood plain mapping may	Able to make use of existing	Collaboration between Public	3

showing area susceptible to landslides and debris flows.	exceed $30,000.	city maps and aerial photos.	Works and Building and Safety (Engineer).	
Long Term Mitigation Items	**Economic evaluation**	**Technical feasibility**	**Administrative capability**	**Priority Ranking**
Limit activities in identified potential and historical landslide and flood plain areas which cannot be mitigated through regulation.	Costs borne by applicants for development.	Development applications will require constraints analyses.	A matter of approving or not approving proposed developments in landslide or flood plain areas.	1

Landslide Mitigation Action Items

The landslide mitigation action items provide direction on specific activities that the city, organizations, and residents in City of La Verne can undertake to reduce risk and prevent loss from landslide events. Each action item is followed by ideas for implementation, which can be used by the steering committee and local decision makers in pursuing strategies for implementation. Both short-term and long-term mitigation activities are listed in priority of importance.

Short Term Mitigation Activity for Landslide #1: Identify safe evacuation routes in high-risk debris flow and landslide areas.

- Identify potential debris removal resources;
- Increase participation in regional committee planning for emergency transportation routes; and
- Identify and publicize information regarding emergency transportation routes.

Timeline: 1 year
Constraints: None.
Status: Staff reviewed possible evacuation routes for affected residents. These would be limited to the only two routes available from these areas. Public Works and Public Safety personnel would be responsible for directing which route should be taken depending on what area is affected by the incident and to what severity. It is not likely for both areas to be affected at the same time.

Short Term Mitigation Activity for Landslide #2: Discourage construction and subdivision design that can be applied to steep slopes to reduce the potential adverse impacts from development. Amend hillside development overlay zone ordinance if necessary.

Ideas for Implementation

- Increase communication and coordination between the City's Public Works and

Community Development Departments.
- Amend hillside development overlay zone ordinance to increase design standards around landslide and flood plain areas to facilitate soil & debris removal.

Timeline: 1 year
Constraints: None.
Status: Current development processes meet this mitigation activity's requirements.

<u>Short Term Mitigation Activity for Landslides and Debris Flows #3</u>: Improve knowledge of landslide hazard and debris flow areas and understanding of vulnerability and risk to life and property in hazard-prone areas. Develop public handout with map showing area susceptible to landslides and debris flows.

Ideas for Implementation:
- Review a landslide hazard mapping study in the City of La Verne.
- Conduct a flood plain mapping study in the City of La Verne.
- Develop public information to emphasize economic risk when building on or near potential or historical landslide and flood plain areas.

Timeline: 2 years
Constraints: Cost to develop flood plain mapping may exceed $30,000.
Status: Not completed as a result of the cost constraints.

<u>Long Term Mitigation Activity for Landslide #1:</u> Limit activities in identified potential and historical landslide and flood plain areas which cannot be mitigated through regulation.

Ideas for Implementation:
- Analyze existing regulations regarding development in landslide and flood prone areas and amend regulations if necessary.
- Study methods to fund the construction of debris basins to control debris flows in the West Marshall Canyon (reference Section 8, Flooding Hazards).
- Reconstruct previously failed slope (discussed in subsection "Road and Bridges") to a 2:1 slope.

Timeline: 2 years
Constraints: Cost to construct the West Marshall Canyon debris basin will exceed $1.5 million.
(First priority)
Cost to reconstruct slope will be approximately $350,000.
(Second priority)
Status: Not completed as a result of cost constraints. Efforts to receive funding continues and is ongoing.

Landslide Resource Directory

County Resources

- Los Angeles County Department of Public Works

State Resources

- Department of Conservation Headquarters
- California Geological Survey Headquarters/Office of the State Geologist
- California Division of Forestry
- Department of Water Resources
- Governor's Office of Emergency Services
- California Department of Transportation (Cal Trans)

Federal Resources and Programs

- Federal Emergency Management Agency (FEMA)
- Natural Resource Conservation Service (NRCS)
- US Geological Survey, National Landslide Information Center

Publications

Olshansky, Robert B., Planning for Hillside Development (1996) American Planning Association. - This document describes the history, purpose, and functions of hillside development and regulation and the role of planning, and provides excerpts from hillside plans, ordinances, and guidelines from communities throughout the US.

Olshansky, Robert B. & Rogers, J. David, Unstable Ground: Landslide Policy in the United States (1987) Ecology Law Quarterly.
This is about the history and policy of landslide mitigation in the US.

Public Assistance Debris Management Guide (July 2000) Federal Emergency Management Agency. - The Debris Management Guide was developed to assist local officials in planning, mobilizing, organizing, and controlling large-scale debris clearance, removal, and disposal operations. Debris management is generally associated with post-disaster recovery. While it should be compliant with local and city emergency operations plans, developing strategies to ensure strong debris management is a way to integrate debris management within mitigation activities. The Guide is available in hard copy or on the FEMA website.

USGS Landslide Program Brochure. National Landslide Information Center (NLIC), United States Geologic Survey. - The brochure provides good, general information in simple terminology on the importance of landslide studies and a list of databases, outreach, and exhibits maintained by the NLLC. The brochure also includes information on the types and causes of landslides, rock falls, and earth flows.

Landslide Endnotes

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2. Brabb, E.E., and B.L Harrod. (Eds) *Landslides: Extent and Economic Significance. Proceedings of the 28th International Geological Congress Symposium on Landslides.* (1989) Washington D.C., Rotterdam: Balkema.

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13. Ibid.

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18. Ibid.

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22. Interagency Hazard Mitigation Team, *State Hazard Mitigation Plan* (2000) Oregon Emergency Management

23. Ibid.

24. Barrows, Alan and Smith, Ted, DMG Note 13, http://www.consrv.ca.gov/cgs/information/publications/cgs_notes/note_33/

25. Robert Olson Associates, *Metro Regional Hazard Mitigation and Planning Guide* (June 1999) Metro

26. Ibid.

27. Planning For Natural Hazards: *The Oregon Technical Resource Guide,* Department of Land Conservation and Development (2000), Ch 5.

28. *Homeowners Guide for Landslide Control, Hillside Flooding, Debris Flows, Soil Erosion,* (March 1997)

29. Burby, R. (Ed.) *Cooperating With Nature* (1998) Washington, D.C.: Joseph Henry Press.

Section Eight: Floods

City of La Verne Natural Hazard Mitigation Plan

Section Eight: Floods

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Why are Floods a Threat to the City of La Verne?

La Verne is situated in an alluvial fan that gently slopes in a westward direction towards San Dimas. The alluvial fan is bordered on the north by the San Gabriel Mountains and on the south by the San Jose Hills. The alluvial materials were deposited by the many intermittent streams that drain the southern slopes of the San Gabriel Mountains. Four major streams drain from the San Gabriel Mountains and flow into La Verne. These include the San Dimas Creek, Marshall Canyon Creeks, Live Oak Creek, and Thompson Creek.

The San Dimas Creek system, most of which is in the City of San Dimas to the west, is the largest in terms of drainage and watershed area. Smaller secondary drainage systems that flow into San Dimas Creek include: Sycamore Canyon, Ham Canyon, Lodi Canyon, West Fork, East Fork, and Wolfskill Canyon, most of which are not located in the City of La Verne. At the base of the mountains, San Dimas Creek flows in a westerly direction in the City of San Dimas.

The Marshall Canyon Creeks and Live Oak Creek drainage system include two separate streams that drain Marshall Canyon. These streams flow in a southwesterly direction as they enter La Verne. Several smaller intermittent streams provide local drainage in the hills between the two larger streams, which eventually empty into Emerald Wash (see Figure FH-1, Hydrology/Flood Control Map).

Thompson Creek drains the hills north of the City of Claremont, a community adjacent to and east of the City of La Verne, and flows in a southwesterly direction towards urbanized areas of Claremont, Pomona, and La Verne. A channelized section of Thompson Creek forms a portion of La Verne's easternmost border with the City of Pomona. A fifth unconsolidated drainage system is located in the San Jose Hills in the southern portion of the City of La Verne. This runoff flows into the low-lying areas of La Verne where Puddingstone Reservoir and Brackett Airport are now located.

The natural drainage of the City of La Verne and the surrounding areas have been significantly altered as La Verne has become increasingly urbanized. Natural drainage courses in both the City and region have been altered with construction of dams, retention basins, and channels. Also, as development has occurred, local runoff has increased due to the extensive use of impervious materials.

On September 23, 2002, the "Williams Fire" began and burned a total of 37,240 ± acres of which 180 ± acres was watershed within the 380 acres of the West Marshall Canyon. The U.S. Department of Agriculture Natural Resources Conservation Service identified the fire as having "reduced the hydrologic conditions thus posing as a serious hazard for debris flow." Remedial measures were taken with the placement of K-rails and sand bags adjacent to the tributary watercourse and homes. During the winter rainstorms of 2002/03, debris flows were generally contained by the K-rail system. The only damage sustained being that of mud and debris on a downstream private golf course built in the flood plain, within the public street right-of-way, and the rear yards of two homes. Immediately after the Williams Fire and prior to the rain storms, the United States Department of Agriculture completed, with the help of the city, an Inventory and Evaluation form and a Rationale of Social/Economic Defensibility form which identified 16 homes that could potentially sustain damage from uncontrolled debris flows. Eight of the most impacted homes could possibly sustain an estimated $971,000 in damage based upon the depth of damage factor provided by the HUD curves. An additional eight homes, were added to the list "to be protected" after the 2002/03 rainstorms, in which water flows deviated from its usual water course and impacted homes thought to be out of the flood plain.

History of Flooding in the City of La Verne

There is no history of any significant flooding or damage caused by any of the main creeks in the City of La Verne. Creeks flow through the City in canyons, then into debris basins, which outlet into concrete channels and from there into a reservoir/lake with a controlled outlet structure. A secondary creek in the West Marshall Canyon, has experienced some flooding and debris flows. To date, damages have been minor and are generally confined to 2 to 3 rear yards, public street right-of-way, and a private golf course built in the flood plain.

Historic Flooding in Los Angeles County

There are a number of rivers in the Southern California region, but the river with the best recorded history is the Los Angeles River. The flood history of the Los Angeles River is generally indicative of the flood history of much of Southern California.

Records show that since 1811, the Los Angeles River has flooded 30 times, on average once every 6.1 years. But averages are deceiving, for the Los Angeles basin goes through periods of drought and then periods of above average rainfall. Between 1889 and 1891 the river flooded every year, and from 1941 to 1945, the river flooded 5 times. Conversely, from 1896 to 1914, a period of 18 years, and again from 1944 to 1969, a period of 25 years, the river did not have serious floods.[1] (See Table FH-1)

The City of La Verne is 20 miles east of Los Angeles, which is far enough away as to not be affected by the heavy rains that brought flooding to the Los Angeles River system. While the towering mountains give the Los Angeles region its spectacular views, they also wring a great deal of rain out of the storm clouds that pass through. Because the mountains are so steep, the rainwater moves rapidly down the slopes and across the coastal plains on its way to the ocean. In the City of La Verne, the contributory drainage areas are small enough and the channel systems are adequate enough to reduce the flooding hazards.

TABLE FH-1

Major Floods of the Los Angeles River	
1811	Flooding
1815	Flooding
1825	L.A. River changed its course back from the Ballona wetlands to San Pedro
1832	Heavy flooding
1861-62	Heavy flooding. Fifty inches of rain falls during December and January.
1867	Floods create a large, temporary lake out to Ballona Creek.
1876	The Novician Deluge
1884	Heavy flooding causes the river to change course again, turning east to Vernon and then southward to San Pedro.
1888-1891	Annual floods
1914	Heavy flooding. Great damage to the harbor.
1921	Flooding
1927	Moderate flood
1934	Moderate flood starting January 1. Forty dead in La Canada.
1938	Great County-wide flood with 4 days of rain. Most rain on day 4.
1941-44	L.A. River floods five times.
1952	Moderate flooding
1969	One heavy flood after 9 day storm. One moderate flood.
1978	Two moderate floods
1979	Los Angeles experiences severe flooding and mudslides.
1980	Flood tops banks of river in Long Beach. Sepulveda Basin spillway almost opened.
1983	Flooding kills six people.
1992	15 year flood. Motorists trapped in Sepulveda basin. Six people dead.
1994	Heavy flooding
Sources: http: www.lalc.k12.ca.us target units river tour hist.html and (http: www.losangelesalmanac.com topics History hi01i.htm)	

The Santa Monica, Santa Susana and Verdugo mountains, which surround three sides of the Los Angeles valley seldom reach heights above three thousand feet. The western San Gabriel Mountains, in contrast, have elevations of more than seven thousand feet. These higher ridges often trap eastern-moving winter storms. Although downtown Los Angeles averages just fifteen inches of rain a year, some mountain peaks in the San Gabriels receive more than forty inches of precipitation annually. Naturally, this rainfall moves rapidly down stream, often with severe consequences for anything in its path. In extreme cases, flood-generated debris flows will roar down a canyon at speeds near 40 miles per hour with a wall of mud, debris and water tens of feet high. In Southern California, stories of floods, debris flows, persons buried alive under tons of mud and rock and persons swept away to their death in a river flowing at thirty-five miles an hour are without end. No catalog of chaos could contain all the losses suffered by man and his possessions from the region's rivers and streams.

What Factors Create Flood Risk?

Flooding occurs when climate, geology, and hydrology combine to create conditions where water flows outside of its usual course. In the City of La Verne, geography and climate combine to create chronic seasonal flooding conditions, but with the exception of the West Marshall Canyon Creek, flood control improvements have reduced the flooding risk to acceptable standards.

<u>Winter Rainfall</u>

Over the last 125 years, the average annual rainfall in Los Angeles is 14.9 inches. But the term "average" means very little as the annual rainfall during this time period has ranged from only 4.35 inches in 2001-2002 to 38.2 inches in 1883-1884. In fact, in only fifteen of the past 125 years, has the annual rainfall been within plus or minus 10% of the 14.9-inch average. And in only 38 years has the annual rainfall been within plus or minus 20% of the 14.9-inch average. This makes the Los Angeles basin a land of extremes in terms of annual precipitation. The average annual rainfall in the City of La Verne is 15 inches, which is barely above the average "Los Angeles" rainfall of 14.9 inches.

<u>Monsoons</u>

Another relatively regular source for heavy rainfall, particularly in the mountains and adjoining cities is from summer tropical storms. Table FH-2 lists tropical storms that have had significant rainfall in the past century, and the general areas affected by these storms. These tropical storms usually coincide with El Niño years.

TABLE FH-2

Tropical cyclones that have affected Southern California during the 20th Century			
Month-Year	**Date(s)**	**Area(s) Affected**	**Rainfall**
July 1902	20th 21st	Deserts Southern Mountains	up to 2"
Aug. 1906	18th 19th	Deserts Southern Mountains	up to 5"
Sept. 1910	15th	Mountains of Santa Barbara County	2"
Aug. 1921	20th 21st	Deserts Southern Mountains	up to 2"
Sept. 1921	30th	Deserts	up to 4"
Sept. 1929	18th	Southern Mountains Deserts	up to 4"
Sept. 1932	28th - Oct 1st	Mountains Deserts, 15 Fatalities	up to 7
Aug. 1935	25th	Southern Valleys, Mountains Deserts	up to 2"
Sept. 1939	4th - 7th	Southern Mountains, Southern Eastern Deserts	up to 7
	11th 12th	Deserts, Central Southern Mountains	up to 4"
	19th - 21st	Deserts, Central Southern Mountains	up to 3"
	25th	Long Beach, W Sustained Winds of 50 Mph	5"
		Surrounding Mountains	6 to 12"
Sept. 1945	9th 10th	Central Southern Mountains	up to 2
Sept. 1946	30th - Oct 1st	Southern Mountains	up to 4"
Aug. 1951	27th - 29th	Southern Mountains Deserts	2 to 5"
Sept. 1952	19th - 21st	Central Southern Mountains	up to 2"
July 1954	17th - 19th	Deserts Southern Mountains	up to 2"
July 1958	28th 29th	Deserts Southern Mountains	up to 2"
Sept. 1960	9th 10th	Julian	3.40"
Sept. 1963	17th - 19th	Central Southern Mountains	up to 7"
Sept. 1967	1st - 3rd	Southern Mountains Deserts	2"
Oct. 1972	6th	Southeast Deserts	up to 2"
Sept. 1976	10th 11th	Central Southern Mountains. Ocotillo, CA was Destroyed 3 Fatalities	6 to 12"
Aug. 1977	n a	Los Angeles	2"
		Mountains	up to 8"
Oct. 1977	6th 7th	Southern Mountains Deserts	up to 2
Sept. 1978	5th 6th	Mountains	3"
Sept. 1982	24th - 26th	Mountains	up to 4"
Sept. 1983	20th 21st	Southern Mountains Deserts	up to 3"
http: www.fema.gov nwz97 eln scal.shtm			

Geography and Geology

The greater Los Angeles Basin is the product of rainstorms and erosion for millennia. "Most of the mountains that ring the valleys and coastal plain are deeply fractured faults and, as they (the mountains) grew taller, their brittle slopes were continually eroded. Rivers and streams carried boulders, rocks, gravel, sand, and silt down these slopes to the valleys and coastal plain. In some locations these sediments are as much as twenty thousand feet thick"[2]

Much of the coastal plain rests on the ancient rock debris and sediment washed down from the mountains. This sediment can act as a sponge, absorbing vast quantities of rain in those years when heavy rains follow a dry period. But like a sponge that is near saturation, the same soil fills up rapidly when a heavy rain follows a period of relatively wet weather. So even in some years of heavy rain, flooding is minimal because the ground is relatively dry. The same amount of rain following a wet period of time can cause extensive flooding.

The greater Los Angeles basin is for all intents and purposes built out, especially the non-hillsides of the City of La Verne. This leaves precious little open land to absorb rainfall. This lack of open ground forces water to remain on the surface and rapidly accumulate. If it were not for the massive flood control system with its concrete lined river and stream beds, flooding would be a much more common occurrence. The tendency is towards even less and less open land. In-fill building is becoming a much more common practice in many areas. Developers tear down an older home, which typically covers up to 40% of the lot size, and replace it with three or four town homes or apartments that may cover 90-95% of the lot.

Another potential source of flooding is "asphalt creep." The street space between the curbs of a street is a part of the flood control system. Water leaves property and accumulates in the streets, where it is directed towards the underground portion of the flood control system. The carrying capacity of the street is determined by the width of the street and the height of the curbs along the street. Often, when streets are being resurfaced, a one to two inch layer of asphalt is laid down over the existing asphalt. This added layer of asphalt subtracts from the rated capacity of the street to carry water. Thus the original engineered capacity of the entire storm drain system is marginally reduced over time. Subsequent re-paving of the street will further reduce the engineered capacity even more.

Flood Terminology

Floodplain

A floodplain is a land area adjacent to a river, stream, lake, estuary, or other water body that is subject to flooding. This area, if left undisturbed, acts to store excess flood water. The floodplain is made up of two sections: the floodway and the flood fringe.

100-Year Flood

The 100-year flooding event is the flood having a one percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years. The 100-year floodplain is the area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood.

Floodway

The floodway is one of two main sections that make up the floodplain. Floodways are defined for regulatory purposes. Unlike floodplains, floodways do not reflect a recognizable geologic feature. For NFIP purposes, floodways are defined as the channel of a river or stream, and the overbank areas adjacent to the channel. The floodway carries the bulk of the floodwater downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties.

The City of La Verne regulations prohibit development in the floodway. The NFIP floodway definition is "the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot. Floodways are not mapped for all rivers and streams but are generally mapped in developed areas.

Flood Fringe

The flood fringe refers to the outer portions of the floodplain, beginning at the edge of the floodway and continuing outward.

Development

For floodplain ordinance purposes, development is broadly defined to mean "any manmade change to improved or unimproved real estate, including but not limited to, habitual structures, mining, dredging, filling, grading, paving, excavation, or drilling operations located within the area of special flood hazard which impact the flow of water or debris." The definition of development for floodplain purposes is generally broader and includes more activities than the definition of development used in other sections of local land use ordinances.

Base Flood Elevation (BFE)

The term "Base Flood Elevation" refers to the elevation (normally measured in feet above sea level) that the base flood is expected to reach. Base flood elevations can be set at levels other than the 100-year flood. Some communities choose to use higher frequency flood events as their base flood elevation for certain activities, while using lower frequency events for others. For example, for the purpose of storm water management, a 25-year flood event might serve as the base flood elevation; while the 500-year flood event may serve as base flood elevation for the tie down of mobile homes. The regulations of the NFIP focus on development in the 100-year floodplain.

Characteristics of Flooding

Two types of flooding primarily affect the City of La Verne riverine flooding and urban flooding (see descriptions below). In addition, any low-lying area has the potential to flood. The flooding of developed areas may occur when the amount of water generated from rainfall and runoff exceeds a storm water system's capability to remove it.

Riverine Flooding

Riverine flooding is the overbank flooding streams in the City of La Verne. There are no rivers in the City. The natural processes of riverine flooding add sediment and nutrients to fertile floodplain areas. Flooding in large river systems typically results from large-scale weather systems that generate prolonged rainfall over a wide geographic area, causing flooding in hundreds of smaller streams, which then drain into the major rivers, which is not a factor in the City of La Verne.

Shallow area flooding is a special type of riverine flooding. FEMA defines shallow flood hazards as areas that are inundated by the 100-year flood with flood depths of only one to three feet. These areas are generally flooded by low velocity sheet flows of water. This is the case of the west Marshall Canyon in the City of La Verne.

Urban Flooding

As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization of a watershed changes the hydrologic systems of the basin. Heavy rainfall collects and flows faster on impervious concrete and asphalt surfaces. The water moves from the clouds, to the ground, and into streams at a much faster rate in urban areas. Adding these elements to the hydrological systems can result in floodwaters that rise very rapidly and peak with violent force.

Almost 40% percent of the area in the City of La Verne has a high concentration of impermeable surfaces that either collect water, or concentrate the flow of water in unnatural channels. During periods of urban flooding, streets can become swift moving rivers. Storm drains can back up with debris causing additional, localized flooding. The City has the storm drains inspected and cleaned annually before the storm season (November – April).

Dam Failure Flooding

Loss of life and damage to structures, roads, and utilities may result from a dam failure. Economic losses can also result from a lowered tax base and lack of utility profits. These effects would certainly accompany the failure of the Metropolitan Water District's (MWD) Raw Water Reservoir in the City of La Verne. This reservoir holds 250 acre feet of fresh water. Because dam failure can have severe consequences, FEMA requires that all dam owners develop Emergency Action Plans (EAP) for warning, evacuation, and post-flood actions. Although there may be coordination with county officials in the development of the EAP, the responsibility for developing potential flood inundation maps and facilitation of emergency response is the responsibility of the dam owner. For more detailed information regarding dam failure flooding, and potential flood inundation zones for a particular dam in the county, refer to the MWD's Emergency Action Plan.

One other dam failure that could possibly affect a small portion of La Verne would be the San Dimas Canyon Dam. This dam is located outside of La Verne but its failure could impact the "Fox Glen" neighborhood on the City's western border. This neighborhood includes approximately 300 units and while it could be impacted, mitigation measures are outside of the City's immediate control. The Los Angeles County Flood Control District has implemented several measures in recent years to improve the flood plain area located outside of the City.

There have been a total of 45 dam failures in California, since the 19th century. The significant dam failures in Southern California are listed in Table FH-3.

TABLE FH-3

Dam Failures in Southern California			
Sheffield	Santa Barbara	1925	Earthquake slide
Puddingstone	Pomona	1926	Overtopping during construction
Lake Hemet	Palm Springs	1927	Overtopping
Saint Francis	San Francisquito Canyon	1928	Sudden failure at full capacity through foundation, 426 deaths
Cogswell	Monrovia	1934	Breaching of concrete cover
Baldwin Hills	Los Angeles	1963	Leak through embankment turned into washout, 3 deaths
http: cee.engr.ucdavis.edu faculty lund dams Dam History Page Failures.htm			

The two most significant dam failures are the St. Francis Dam in 1928 and the Baldwin Hills Dam in 1963.

> "The failure of the St. Francis Dam, and the resulting loss of over 500 lives in the path of a roaring wall of water, was a scandal that resulted in the almost complete destruction of the reputation of its builder, William Mulholland.
>
> Mulholland was an immigrant from Ireland who rose up through the ranks of the

city's water department to the position of chief engineer. It was he who proposed, designed, and supervised the construction of the Los Angeles Aqueduct, which brought water from the Owens Valley to the city. The St. Francis Dam, built in 1926, was 180 feet high and 600 feet long; it was located near Saugus in the San Francisquito Canyon.

The dam gave way on March 12, 1928, three minutes before midnight. Its waters swept through the Santa Clara Valley toward the Pacific Ocean, about 54 miles away. 65 miles of valley was devastated before the water finally made its way into the ocean between Oxnard and Ventura. At its peak the wall of water was said to be 78 feet high; by the time it hit Santa Paula, 42 miles south of the dam, the water was estimated to be 25 feet deep. Almost everything in its path was destroyed: livestock, structures, railways, bridges, and orchards. By the time it was over, parts of Ventura County lay under 70 feet of mud and debris. Over 500 people were killed and damage estimates topped $20 million."[3]

The Baldwin Hills dam failed during the daylight hours, and was one of the first disaster events documented a live helicopter broadcast.

"The Baldwin Hills Dam collapsed with the fury of a thousand cloudbursts, sending a 50-foot wall of water down Cloverdale Avenue and slamming into homes and cars on Dec. 14, 1963.

Five people were killed. Sixty-five hillside houses were ripped apart, and 210 homes and apartments were damaged. The flood swept northward in a V-shaped path roughly bounded by La Brea Avenue and Jefferson and La Cienega boulevards.

The earthen dam that created a 19-acre reservoir to supply drinking water for West Los Angeles residents ruptured at 3:38 p.m. As a pencil-thin crack widened to a 75-foot gash, 292 million gallons surged out. It took 77 minutes for the lake to empty. But it took a generation for the neighborhood below to recover. And two decades passed before the Baldwin Hills ridge top was reborn.

The cascade caused an unexpected ripple effect that is still being felt in Los Angeles and beyond. It foreshadowed the end of urban-area earthen dams as a major element of the Department of Water and Power's water storage system. It prompted a tightening of Division of Safety of Dams control over reservoirs throughout the state.

the break in the dam.

<u>Debris Flows</u>

Another flood related hazard that can affect certain parts of the Southern California region are debris flows. Most typically debris flows occur in mountain canyons and the foothills against the San Gabriel Mountains. However, any hilly or mountainous area with intense rainfall and the proper geologic conditions may experience one of these very sudden and devastating events.

> “Debris flows, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, are common types of fast-moving landslides. These flows generally occur during periods of intense rainfall or rapid snow melt. They usually start on steep hillsides as shallow landslides that liquefy and accelerate to speeds that are typically about 10 miles per hour, but can exceed 35 miles per hour. The consistency of debris flows ranges from watery mud to thick, rocky mud that can carry large items such as boulders, trees, and cars. Debris flows from many different sources can combine in channels, and their destructive power may be

> greatly increased. They continue flowing down hills and through channels, growing in volume with the addition of water, sand, mud, boulders, trees, and other materials. When the flows reach flatter ground, the debris spreads over a broad area, sometimes accumulating in thick deposits that can wreak havoc in developed areas."[4]

<u>Coastal Flooding</u>

Low-lying coastal communities of Southern California have one other source of flooding, coastal flooding. This occurs most often during storms which bring higher than normal tides. Storms, the time of year and the tidal cycle can sometimes work to bring much higher than normal tides which cause flooding in low lying coastal areas. This hazard however is limited to those areas.

What is the Effect of Development on Floods?

When structures or fill are placed in the floodway or floodplain water is displaced. Development raises the river levels by forcing the river to compensate for the flow space obstructed by the inserted structures and/or fill. When structures or materials are added to the floodway or floodplain and no fill is removed to compensate, serious problems can arise. Floodwaters may be forced away from historic floodplain areas. As a result, other existing floodplain areas may experience floodwaters that rise above historic levels. The City of La Verne, like other California communities, requires engineer certification to ensure that proposed developments will not adversely affect the flood carrying capacity of the Special Flood Hazard Area (SFHA). Displacement of only a few inches of water can mean the difference between no structural damage occurring in a given flood event, and the inundation of many homes, businesses, and other facilities. Careful attention should be given to development that occurs within the floodway to ensure that structures are prepared to withstand base flood events. In highly urbanized areas, increased paving can lead to an increase in volume and velocity of runoff after a rainfall event, exacerbating the potential flood hazards. Care should be taken in the development and implementation of storm water management systems to ensure that these runoff waters are dealt with effectively.

How are Flood-Prone Areas Identified?

Flood maps and Flood Insurance Studies (FIS) are often used to identify flood-prone areas. The NFIP was established in 1968 as a means of providing low-cost flood insurance to the nation's flood-prone communities. The NFIP also reduces flood losses through regulations that focus on building codes and sound floodplain management. In the City of La Verne, the NFIP and related building code regulations went into effect on March 1, 1978. NFIP regulations (44 Code of Federal Regulations (CFR) Chapter 1, Section 60, 3) require that all new construction in floodplains must be elevated at or above base flood level.

Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS) Floodplain maps are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements. A Flood Insurance Rate Map (FIRM) is the official map produced by FEMA which delineates SFHA in communities where NFIP regulations apply. FIRMs are also used by insurance agents and mortgage lenders to determine if flood insurance is required and what insurance rates should apply.

Water surface elevations are combined with topographic data to develop FIRMs. FIRMs illustrate areas that would be inundated during a 100-year flood, floodway areas, and elevations marking the 100-year-flood level. In some cases they also include base flood elevations (BFEs) and areas located within the 500-year floodplain. Flood Insurance Studies and FIRMs produced for the NFIP provide assessments of the probability of flooding at a given location. FEMA conducted many Flood Insurance Studies in the late 1970s and early 1980s. These studies and maps represent flood risk at the point in time when FEMA completed the studies.

Flood Mapping Methods and Techniques

All of the flood-related damage from past floods/debris flows in the City of La Verne are located outside the boundaries of the FEMA's FIRMs.

Communities find it particularly useful to overlay flood hazard areas on tax assessment parcel maps. This allows a community to evaluate the flood hazard risk for a specific parcel during review of a development request. Coordination between FEMA and local planning jurisdictions is the key to making a strong connection with GIS technology for the purpose of flood hazard mapping.

FEMA and the Environmental Systems Research Institute (ESRI), a private company, have formed a partnership to provide multi-hazard maps and information to the public via the Internet. ESRI produces GIS software, including ArcViewC9 and ArcInfoC9 . The ESRI web site has information on GIS technology and downloadable maps. The hazards maps provided on the ESRI site are intended to assist communities in evaluating geographic information about natural hazards. Flood information for most communities is available on the ESRI web site. Visit www.esri.com for more information.

Hazard Assessment

Hazard Identification

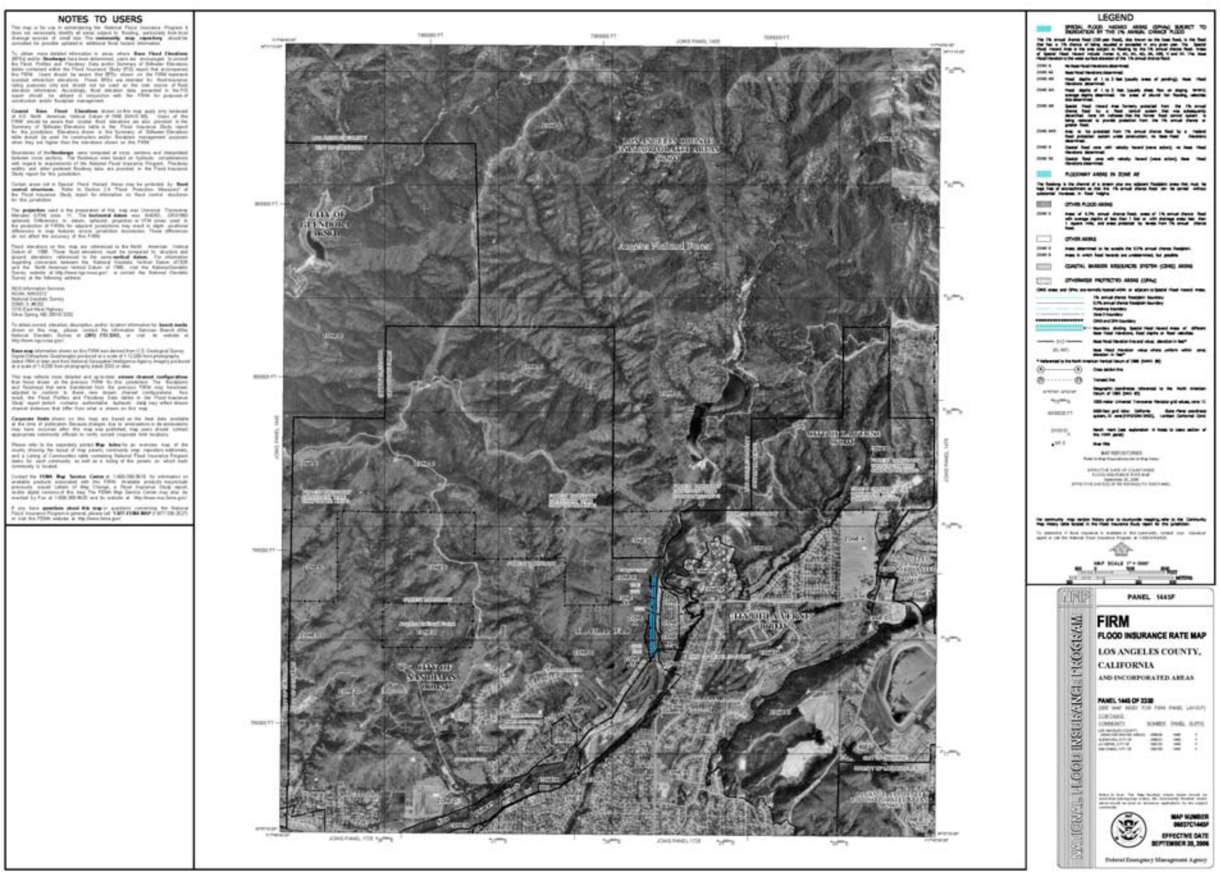
Hazard identification is the first phase of flood-hazard assessment. Identification is the process of estimating: (1) the geographic extent of the floodplain (i.e., the area at risk from flooding); (2) the intensity of the flooding that can be expected in specific areas of the floodplain; and (3) the probability of occurrence of flood events. This process usually results in the creation of a floodplain map. Floodplain maps provide detailed information that can assist jurisdictions in making policies and land-use decisions.

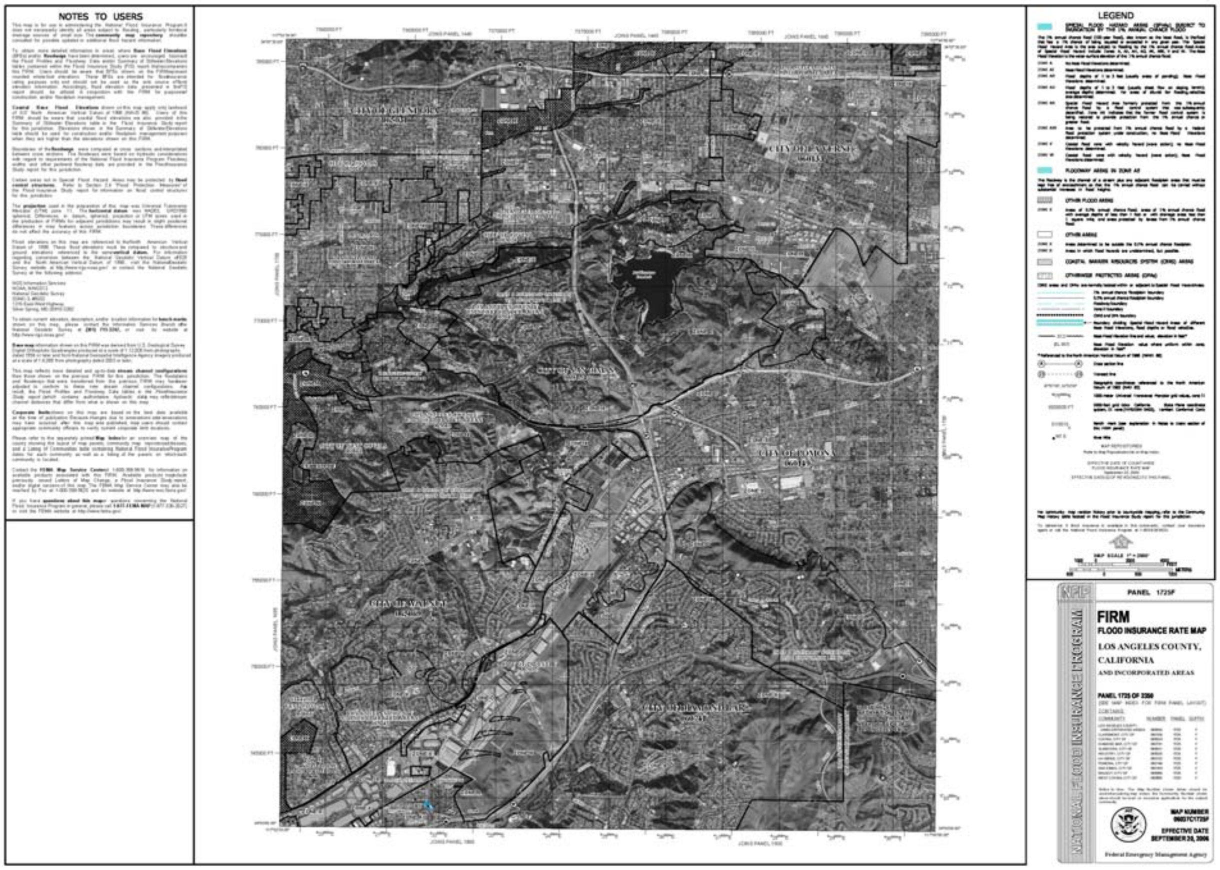
The City of La Verne has five areas designated Zone D including Puddingstone Hill, Marshall

Canyon Creek, La Verne Heights, Live Oak, a portion of Rancho Esperanza, and the north east portion of Marshall Canyon Estates. Zone D are areas in which flood hazards are undetermined, but possible. Assessor Parcel Number 8665-012-911 is the only area in La Verne located in Zone AE, meaning base flood elevations were determined. Approximately 95% of the City of La Verne is Zone X, meaning areas of 0.2% annual chance of flood; areas of 1% annual chance floor with average depths of less than one foot or with drainage areas less than one square mile; and areas protected by levees from 1% annual chance flood.

Data Sources

FEMA mapped the 100 -year and 500-year floodplains through the Flood Insurance Study (FIS) in conjunction with the United States Army Corps of Engineers (USACE) in August of 1987. There were previous studies done, including a Housing and Urban Development (HUD) study, which mapped the floodplain in March of 1978. The county has updated portions of the USACE and FEMA maps through smaller drainage studies in the county since that time. Flood Insurance Rate Map by the National Flood Insurance Program Panel 1445F and 1725F, Map Numbers 06037C1725F and 06037C1445F created and made effective September 20, 2006. These maps are shown below as FH-1 and FH-2.





Vulnerability Assessment

Vulnerability assessment is the second step of flood-hazard assessment. It combines the floodplain boundary, generated through hazard identification, with an inventory of the property within the floodplain. Understanding the population and property exposed to natural hazards will assist in reducing risk and preventing loss from future events. Because site-specific inventory data and inundation levels given for a particular flood event (10-year, 25-year, 50-year, 100-year, 500-year) are not readily available, calculating a community's vulnerability to flood events is not straightforward. The amount of property in the floodplain, as well as the type and value of structures on those properties, should be calculated to provide a working estimate for potential flood losses.

Table FH-4 below lists the properties, the value of property and the potential of damage (2002 dollars) within the City of La Verne 's 100-year floodplain which is not in existing flood channels or retention basins.

Table FH-4 Flood Hazard Vulnerability Assessment

Properties	Value ($)	Depth Damage Factor*	Damage ($)	Probability Factor**	Near Term Damage ($)
2011 Golden Hills	367,000	.3615	132,670	1.0	132,670
2019 Golden Hills	255,000	.3615	60,218	1.0	60,218
1977 Golden Hills	600,000	.257	154,200	1.0	154,200
7124 Melinda Lane	360,000	.3615	130,140	1.0	130,140
7136 Melinda Lane	610,000	.257	156,770	1.0	156,770
7158 Melinda Lane	327,000	.257	84,039	1.0	84,039
1867 Golden Hills	350,000	.3615	126,525	1.0	126,525
1883 Golden Hills	350,000	.3615	126,525	1.0	126,525

Source: U.S. Department of Agriculture, 2002 Social/Economic Defensibility Study

The following properties (Table FH-5) have been added to the list after the 2002/03 winter storms, in which the creek historic alignment changed causing a realignment of the flood plain. Cleanup of debris over the past five years is estimated to be $50,000.

TABLE FH-5

7227 Monterey Street, La Verne
7235 Monterey Street, La Verne
7251 Monterey Street, La Verne

Risk Analysis

Risk analysis is the third and most advanced phase of a hazard assessment. It builds upon the hazard identification and vulnerability assessment. A flood risk analysis for the City of La Verne should include two components: (1) the life and value of property that may incur losses from a flood event (defined through the vulnerability assessment); and (2) the number and type of flood events expected to occur over time. Within the broad components of a risk analysis, it is possible to predict the severity of damage from a range of events. After the September 2002 "Williams Fire" which burned 180 ± acres of the 380 acre West Marshall Canyon Watershed, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) completed a study of the flood plain area and identified 16 homes which could potentially sustain damage from uncontrolled debris flows. Eight of the most impacted homes (see Table FH-4) could sustain an estimated $971,000 in damages based upon the depth damage factor provided by the HUD curves. An additional study by the NRCS verified that a debris basin(s) located in the flood plain could reduce the debris flow risk to near zero. The City made a FEMA grant application for funding of this project in April of 2004.

Community Flood Issues

What is Susceptible to Damage During a Flood Event?

The largest impact on communities from flood events is the loss of life and property. During certain years, property losses resulting from flood damages can be extensive. The limited development in the floodplains of the City of La Verne will continue to be at risk from flooding because flood damage occurs on a regular basis throughout the county. Property loss from floods strikes both private and public property. Losses in the City of La Verne over the past 25 years have totaled approximately $100,000.

Property Loss Resulting from Flooding Events

The type of property damage caused by flood events depends on the depth and velocity of the floodwaters. Faster moving floodwaters can wash buildings off their foundations and sweep cars downstream. Pipelines, bridges, and other infrastructure can be damaged when high waters combine with flood debris. Extensive damage can be caused by basement flooding and landslide damage related to soil saturation from flood events. Most flood damage is caused by water saturating materials susceptible to loss (i.e., wood, insulation, wallboard, fabric, furnishings, floor coverings, and appliances). In many cases, flood damage to homes renders them unlivable.

Business/Industry

Flood events impact businesses by damaging property and by interrupting business. Flood events can cut off customer access to a business as well as close a business for repairs. A quick response to the needs of businesses affected by flood events can help a community maintain economic vitality in the face of flood damage. Responses to business damages can include funding to assist owners in elevating or relocating flood-prone business structures.

Public Infrastructure

Publicly owned facilities are a key component of daily life for all citizens of the county. Damage to public water and sewer systems, transportation networks, flood control facilities, emergency facilities, and offices can hinder the ability of the government to deliver services. Government can take action to reduce risk to public infrastructure from flood events, as well as craft public policy that reduces risk to private property from flood events.

Roads

During natural hazard events, or any type of emergency or disaster, dependable road connections are critical for providing emergency services. Roads systems in the City of La Verne are maintained by multiple jurisdictions. State, county, and city governments all have a stake in protecting roads from flood damage. While major roadway networks in the City don't traverse floodplains or unprotected floodway areas, some local streets are susceptible to debris flow and landslides. Transportation agencies responsible for road maintenance are typically aware of roads at risk from flooding and take precautionary measures such as flow diversion to prevent interruptions of accessible roadways.

Bridges

Bridges are key points of concern during flood events because they are important links in road networks, river crossings, and they can be obstructions in watercourses, inhibiting the flow of water during flood events. The bridges in the City of La Verne are state, county, and City owned. A state-designated inspector must inspect all state bridges every two years. The inspections are rigorous, looking at everything from seismic capability to erosion and scour.

The highest priority bridges in the City of La Verne are state-owned and were constructed with the 210 Freeway in 2002.

Storm Water Systems

Local drainage problems are not common in the City of La Verne. The City has a drainage master plan identifying all of the catch basins and storm drains and the ownership of the systems. The City of La Verne and County of Los Angeles public works staffs that maintain the drainage systems are aware of local drainage threats and take the necessary maintenance steps to reduce flood hazards.

Water/Wastewater Treatment Facilities

There is one sanitary district in the City of La Verne, which is operated by the Los Angeles County Sanitation District, but no sewage treatment facilities are located within the City. There are also two water service companies in the City. The City of La Verne provides water to 98 percent of the residents as part of city services. The second water service provider, Golden State Water Company, is privately owned.

Water Quality

Environmental quality problems include bacteria, toxins, and pollution. Floodwaters can expedite the introduction of pollutants into the environment by overloading sewer systems or rapidly washing materials away and into larger water bodies such as reservoirs and the ocean. Floodwaters can also damage facilities that contain pollutants such as gas stations but such facilities are not located in identified La Verne flood zones.

Existing Flood Mitigation Activities

<u>The City of La Verne Codes</u>

The City of La Verne uses building codes, zoning codes, and various planning strategies to address the goals which aim at restricting development in areas of known hazards, and applying the appropriate safeguards. The Public Safety Section of the City's 1998 General Plan & Environmental Impact Report (E.I.R.) supporting the General Plan identify the flood hazard zones which should not be built in, but assign a low risk to 100-year flooding (Table PS-1, Public Safety Element of the General Plan, designated as FH-2 in this report). The City of La Verne by policy has adopted the 1991 Los Angeles County Department policy on levels of flood protection. This policy contains the Federal Flood Insurance Agency (FIA) protection standard that require the finish floor elevation of proposed new dwellings be a minimum of 1 foot above the water surface elevation of a 100-year flood.

<u>Mitigation Requirements</u>

Per Federal guidelines and the National Flood Insurance Program, the City does not allow the expansion of dwelling units that are not at least 1 foot above the 100-year flood level.

<u>Acquisition and Protection of Open Space in the Floodplain</u>

Current efforts to increase public open space in the City of La Verne have been paired with the need to restore and preserve natural systems that provide wildlife habitat and help to mitigate flood events. Public parks and publicly owned open spaces can provide a buffer between flood hazards and private property. The La Verne Land Conservancy (LVLC) was formed in 2002 to acquire private land to protect developable properties and open space.

<u>Riparian Areas</u>

Riparian areas are important transitional areas that link water and land ecosystems. Vegetation in riparian areas is dependent on stream processes, such as flooding, and often is composed of plants that require large amounts of water, such as willows and cottonwood trees. Healthy vegetation in riparian buffers can reduce streamside erosion. During flood events, high water can cause significant erosion. Population growth and development have strained the land and water resources, and the community has responded by supporting zoning ordinances which do not allow encroachment into riparian and highly vegetated areas.

Wastewater Management

The City of La Verne does not allow any surface drainage water to connect directly or infiltrate into the wastewater systems. Manholes located in natural areas are set at a height above surrounding flood levels.

Wetlands

Many floodplain and stream-associated wetlands absorb and store storm water flows, which reduces flood velocities and stream bank erosion. Preserving these wetlands reduces flood damage and the need for expensive flood control devices such as levees. When the storms are over, many wetlands augment summer stream flows by slowly releasing the stored water back to the stream system. Wetlands are highly effective at removing nitrogen, phosphorous, heavy metals, and other pollutants from water. For this reason, artificial wetlands are often constructed for cleaning storm water runoff and for tertiary treatment (polishing) of wastewater. In the City of La Verne these only exist from development streams, which are protected.

Storm Water Systems

There are a variety of surface water management providers in the county that manage water quality and stormwater runoff from new development. La Verne's storm drain system was designed to prevent flooding by transporting excess rainwater from City streets. Since the storm drain system contains no filter, untreated storm water is released into various water bodies. Storm Water pollution occurs when untreated contaminated water (urban runoff) drains from City streets into the rivers and oceans. The largest source of storm water pollution is residents. Through the conduct of daily activities, the general public releases various pollutants into the storm drain. Urban runoff is the largest source of unregulated pollution to the waterways and coastal areas of the United States. The most common pollutants released into storm drains are fuel and motor oil leaking from cars, household cleaning products, improperly disposed paint and paint thinners, paper, cups and other litter, yard waste and fertilizers, and animal waste left from household pets.

These pollutants are transported into the city's storm drain system by various sources such as rain, hoses and sprinklers, which drain from streets, parking lots, and lawns to enter various catch basins, that leads to rivers and oceans. Storm water pollution destroys the natural beauty of our beaches and waterways in addition to harming both marine wildlife and plant life. It can also lead to unsafe swimming conditions in our beaches and lakes. The City of La Verne maintains an NPDES program that targets ways to educate residents on how to prevent these types of pollutants from entering the storm drain system and the watershed as a whole.

Flood Management Projects

Flood management structures can assist in regulating flood levels by adjusting water flows upstream of flood-prone areas. Since there are no dams in the City of La Verne, systems are designed to carry 100-year flood levels. Debris basins, with the exception of the West Marshall Canyon, have been constructed to remove debris from the natural drainage courses.

The City of La Verne has identified one major flood control deficiency in the City. The West Marshall Canyon watershed is comprised of five small, yet steep canyons totaling 380 ± acres. These canyons converge and drain into a single watercourse. The area has been subject to flooding during heavy storm events. The watershed and watercourse were densely vegetated prior to the "Williams Fire" of 2002 that denuded the hillsides. This vegetation aided in stabilizing soils and reducing flow velocities. The fire directly resulted in increased debris flows from the watershed and flow velocities. The increase in flow velocities altered the alignment of the watercourse, placing additional structures and residents at risk over those initially believed. The City has thus identified the need for a debris basin (s) to be constructed in the West Marshall Canyon. The City has made application to the Federal government for a grant to help finance the $1.5 million cost to design and construct this facility.

Community Issues Summary

The City of La Verne works to mitigate problems regarding flood issues when they arise. However, funding, time, and manpower are often unavailable, causing the one significant problem to go unresolved, i.e. the construction of the West Marshall Canyon debris basin. The City of La Verne has documented the problem area in the community, and is attempting to fund the construction of the required facilities.

Prioritization of Earth Movement Hazard Mitigation Action Items

The Mitigation Action Items listed below were prioritized based on a simple examination of economic feasibility as well as technical feasibility and administrative capabilities. Those mitigation action items that met the greatest number of the ranking criteria were given priority ranking. The justification for the ranking order of the action items for each particular hazard is in table form and precedes the list of action items for that hazard.

Short Term Mitigation Items	**Economic evaluation**	**Technical feasibility**	**Administrative capability**	**Priority Ranking**
Pursue federal or other funding sources to mitigate the single repetitive flood property. (West Marshall Canyon)	Debris basin construction costs $1.5M. Cost to acquire property unknown.	The construction of the debris basin has already been determined to be technically feasible and ultimately necessary.	Potential to partner with La Verne Conservancy and local property owners to work on land acquisition and mitigation.	1
Identify and map any flood-prone areas outside the	Costs associated with mapping would be offset	City Engineer and Department of Public works	Provision of maps and other flood plain information	2

previously designated floodplains.	by benefits of multiple uses for the maps – planning, risk analysis, and emergency analysis.	are able to determine any expansion of an existing flood plain.	can be maintained and administered by the Department of Public Works.	
Encourage development of acquisition and management strategies to preserve open space for flood mitigation.	Cost to acquire property unknown. Explore funding from grant sources.	Technical knowledge for development of strategies present in several departments.	Development of acquisition and management strategies would be coordinated by multiple department heads.	3
Revise development standards for West Marshall Canyon flood plain.	Changes in flood plain delineation may constitute a "taking" of property by the City. Legal fees and land acquisition costs.	Revision of standards would include simple changes such as raising the base elevation requirement for new residential construction	Collaboration is possible between, Planning, Building and Safety (City Engineer), Public Works.	4

Long Term Mitigation Items	Economic evaluation	Technical feasibility	Administrative capability	Priority ranking
N/A	N/A	N/A	N/A	N/A

Flood Mitigation Action Items

The flood mitigation action items provide direction on specific activities that organizations and residents in the City of La Verne can undertake to reduce risk and prevent loss from flood events. Each action item, listed in order of priority, is followed by ideas for implementation, which can be used by local decision makers in pursuing strategies for implementation.

Short Term Mitigation Activity For Flood Hazards #l: Pursue Federal or other funding sources to mitigate the single repetitive flood property in the City of La Verne. (West Marshall Canyon)

Ideas for Implementation:

- Identify appropriate and feasible funding sources; and
- Contact repetitive loss property owners to discuss mitigation opportunities, and determine interest should future project opportunities arise; and
- Explore options for incentives to encourage property owners within the flood plain to engage in mitigation.

Timeline: Ongoing
Plan Goals Addressed: Protect Life and Existing Developed Property
Constraints: Debris basin construction estimated at $1.5 million. Cost to acquire property to construct debris basin and maintain unknown.
Status: This is ongoing and has not been completed due to cost restraints.

<u>Short Term Mitigation Activity For Flood Hazards #2</u>: Recommend revisions to requirements for development within the West Marshall Canyon floodplain.
Ideas for Implementation:

- Evaluate elevation requirements for new residential structures in the floodplain area;
- Explore raising the base elevation requirement for new residential construction to two or three feet above base flood elevation, or greater. An increased elevation standard is one activity the county can engage in to receive credit from the NFIP Community Rating System Program;
- Upgrade the City's General Plan Hazard Map to show West Marshall Canyon area;
- Identify alternatives to reduce development in the floodplain.

Timeline: 1 year
Plan Goals Addressed: Protect Life and Property
Constraints: Changes in flood plain delineation may constitute a "taking" of property in the City.
Status: This has not been completed due to the difficulty of the measures and the lack of staff resources.

<u>Short Term Mitigation Activity For Flood Hazards #3</u>: Revisit the data and mapping for West Marshall Canyon floodplain information, and identify and map flood-prone areas outside the previously designated floodplains.
Ideas for Implementation:

- Revise the existing flood plain map based on 2003/04 storms, in which the stream altered its traditional course and widened the flood plain. Show the new subject to inundation. The maps can be used for planning, risk analysis, and emergency management.

Timeline: 1 year
Plan Goals Addressed: Protect Life and Property
Constraints: None
Status: New flood plain maps have been developed through the National Flood Insurance Program and are included with the 2012 NHMP update.

<u>Short Term Mitigation Activity for Flood Hazards #4</u>: Encourage development of acquisition and management strategies to preserve open space for flood mitigation.
Ideas for Implementation:

- Develop a comprehensive strategy for acquiring and managing this floodplain as open space;
- Explore funding for property acquisition from federal (e.g. FEMA Hazard Mitigation Grant Program), state, regional, and local governments, as well as private and non-profit organizations, trails programs, fish programs as well as options for special appropriations;
- Develop a regional partnership between flood mitigation, fish habitat, and water quality enhancement organizations/programs to improve educational programs;
- Identify existing watershed education programs and determine which programs would support a flood education component.

Timeline: 3 years
Plan Goals Addressed: Natural Systems, Protect Life and Property
Constraints: Cost to acquire property.
Status: Ongoing. The City has acquired open space in the past and continues to look for opportunities to do so to not only preserve its beauty but to protect its residents from possible disasters associated with living in these areas.

Flood Resource Directory

The following resource directory lists the resources and programs that can assist county communities and organizations. The resource directory will provide contact information for local, county, regional state and federal programs that deal with natural hazards.

County Resources

Los Angeles County Public Works Department
900 S. Fremont Ave.
Alhambra, CA 91803
Ph: 626-458-5100

Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90607
Ph: 562-699-7411 x2301

State Resources

Governor's Office of Emergency Services (OES)
P.O. Box 419047
Rancho Cordova, CA 95741-9047
Ph: 916 845- 8911
Fx: 916 845- 8910

California Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814
Ph: 916-653-5656

California Department of Water Resources (DWR)
1416 9th Street
Sacramento, CA 95814
Ph: 916-653-6192

California Department of Conservation: Southern California Regional Office
655 S. Hope Street, #700
Los Angeles, CA 90017-2321
Ph: 213-239-0878
Fx: 213-239-0984

Federal Resources and Programs

Federal Emergency Management Agency (FEMA)
FEMA provides maps of flood hazard areas, various publications related to flood mitigation, funding for flood mitigation projects, and technical assistance, FEMA also operates the National Flood Insurance Program. FEMA' s mission is to reduce loss of life and property and protect the nation’s critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery.

Federal Emergency Management Agency, Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607
Ph: 510-627-7100
Fx: 510-627-7112

Federal Emergency Management Agency, Mitigation Division
500 C Street, S.W.
Washington, D.C. 20472
Ph: 202-566-1600

FEMA' s List of Flood Related Websites -This site contains a long list of flood related Internet sites from “American Heritage Rivers" to "The Weather Channel" and is a good starting point for flood information on the Internet.
Contact: Federal Emergency Management Agency, Phone: (800) 480-2520
Website: http://www.fema.gov/nfip/related.htm

National Flood Insurance Program (NFIP)- In Southern California many cities lie within flood zones as defined in FEMA Flood Maps. The City of La Verne is (or is not) a community within a designated flood zone. Flood insurance is available to citizens in communities that adopt and implement NFIP building standards. The standards are applied to development that occurs within a delineated floodplain, a drainage hazard area, and properties' within 250 feet of a floodplain boundary. These areas are depicted on federal Flood Insurance Rate Maps available through the county.

National Floodplain Insurance Program (NFIP)
500 C Street, S.W.
Washington, D.C. 20472
Ph: 202-566-1600

The Floodplain Management Association - The Floodplain Management website was established by the Floodplain Management Association (FMA) to serve the entire floodplain management community. It includes full-text articles, a calendar of upcoming events, a list of positions available, an index of publications available free or at nominal cost, a list of associations, a list of firms and consultants in floodplain management, an index of newsletters dealing with flood issues (with hypertext links if available), a section on the basics of floodplain management, a list of frequently asked questions (FAQs) about the Website, and a catalog of Web links.

Floodplain Management Association
P.O. Box 50891
Sparks, NV 89435-0891
Ph: 775-626-6389
Fx: 775-626-6389

The Association of State Floodplain Managers - The Association of State Floodplain Managers is an organization of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning, and recovery. ASFPM fosters communication among those responsible for flood hazard activities, provides technical advice to governments and other entities about proposed actions or policies that will affect flood hazards, and encourages flood hazard research, education, and training. The ASFPM Web site includes information on how to become a member, the organization's constitution and bylaws, directories of officers and committees, a publications list, information on upcoming conferences, a history of the association, and other useful information and Internet links.
Contact: The Association of State Floodplain Managers
Address: 2809 Fish Hatchery Road, Madison, WI 53713 Phone: (608) 274-0123
Website: http://www.floods,org

National Weather Service - The National Weather Service provides flood watches, warnings, and informational statements for rivers in the City of La Verne.
National Weather Service
520 North Elevar Street
Oxnard, CA 93030

Ph: 805-988- 6615

Office of Hydrology, National Weather Service - The National Weather Service s Office of Hydrology (OH) and its Hydrological Information Center offer information on floods and other aquatic disasters, This site offers current and historical data including an archive of past flood summaries, information on current hydrologic conditions, water supply outlooks, an Automated Local Flood Warning Systems Handbook, Natural Disaster Survey Reports, and other scientific publications on hydrology and flooding.

National Weather Service, Office of Hydrologic Development
1325 East West Highway, SSMC2
Silver Spring, MD 20910
Ph: 301-713-1658
Fx: 301-713-0963

National Resources Conservation Service (NRCS), US Department of Agriculture - NRCS provides a suite of federal programs designed to assist state and local governments and landowners in mitigating the impacts of flood events. The Watershed Surveys and Planning Program and the Small Watershed Program provide technical and financial assistance to help participants solve natural resource and related economic problems on a watershed basis. The Wetlands Reserve Program and the Flood Risk Reduction Program provide financial incentives to landowners to put aside land that is either a wetland resource, or that experiences frequent flooding. The Emergency Watershed Protection Program (EWP) provides technical and financial assistance to clear debris from clogged waterways, restore vegetation, and stabilizing riverbanks. The measures taken under EWP must be environmentally and economically sound and generally benefit more that one property.

National Resources Conservation Service
14th and Independence Ave., SW, Room 5105-A
Washington, DC 20250
Ph: 202-720-7246
Fx: 202-720-7690

USGS Water Resources - This web page offers current US water news; extensive current (including real-time) and historical water data; numerous fact sheets and other publications; various technical resources; descriptions of ongoing water survey programs; local water information; and connections to other sources of water information.

USGS Water Resources
6000 J Street Placer Hall
Sacramento, CA 95819-6129
Ph: 916-278-3000
Fx: 916-278-3070

Bureau of Reclamation - The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. The Bureau provides leadership and technical expertise in water resources development and in the efficient use of water through initiatives including conservation, reuse, and research. It protects the public and the environment through the adequate maintenance and appropriate operation of Reclamation's facilities and manages Reclamation's facilities to fulfill water user contracts and protect and/or enhance conditions for fish, wildlife, land, and cultural resources.

Mid Pacific Regional Office
Federal Office Building
2800 Cottage Way
Sacramento CA 95825-1898
Ph: 916- 978-5000
Fax 916- 978-5599
http://www.usbr.gov/

Army Corps of Engineers - The Corps of Engineers administers a permit program to ensure that the nation's waterways are used in the public interest. Any person, firm, or agency planning to work in waters of the United States must first obtain a permit from the Army Corps of Engineers. The Corps is responsible for the protection and development of the nation's water resources, including navigation, flood control, energy production through hydropower management, water supply storage and recreation.

US Army Corps of Engineers
P.O. Box 532711
Los Angeles CA 90053- 2325
Ph: 213-452- 3921

Other National Resources

American Public Works Association
2345 Grand Boulevard, Suite 500
Kansas City, MO 64108-2641
Ph: 816-472-6100
Fx: 816-472-1610

Publications

NFlP Community Rating System Coordinator's Manual
Indianapolis, IN. - This informative brochure explains how the Community Rating System works and what the benefits are to communities. It explains in detail the CRS point system, and what activities communities can pursue to earn points. These points then add up to the "rating" for the community, and flood insurance premium discounts are calculated based upon that "rating " The

brochure also provides a table on the percent discount realized for each rating (1-10). Instructions on how to apply to be a CRS community are also included.
Contact: NFIP Community Rating System
Phone: (800) 480-2520 or (317) 848-2898
Website: http://www.fema.gov/nfip/crs

Floodplain Management: A Local Floodplain Administrator's Guide to the NFIP - This document discusses floodplain processes and terminology. It contains floodplain management and mitigation strategies, as well as information on the NFIP, CRS, Community Assistance Visits, and floodplain development standards.
Contact: National Flood Insurance Program Phone: (800) 480-2520
Website: http://www.fema,gov/nfip/

Flood Hazard Mitigation Planning: A Community Guide, (June 1997). Massachusetts Department of Environmental Management. - This informative guide offers a 10-step process for successful flood hazard mitigation. Steps include: map hazards, determine potential damage areas, take an inventory of facilities in the flood zone, determine what is or is not being done about flooding, identify gaps in protection, brainstorm alternatives and actions, determine feasible actions, coordinate with others, prioritize actions, develop strategies for implementation, and adopt and monitor the plan.
Contact: Massachusetts Flood Hazard Management Program Phone: (617) 626-1250
Website: http://www.magnetstate.ma.us/dem/programs/mitigate

Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials, (February 1987), FEMA-116. - This guidebook offers a table on actions that communities can take to reduce flood losses. It also offers a table with sources for floodplain mapping assistance for the various types of flooding hazards, There is information on various types of flood hazards with regard to existing mitigation efforts and options for action (policy and programs, mapping, regulatory, non-regulatory). Types of flooding which are covered include alluvial fan, areas behind levees, areas below unsafe dams, coastal flooding, flash floods, fluctuating lake level floods, ground failure triggered by earthquakes, ice jam flooding, and mudslides.
Contact: Federal Emergency Management Agency Phone: (800) 480-2520
Website: http://www.fema,gov

Flood Endnotes

1. http://www.lalc.k12.ca.us/target/units/river/tour/hist.html
2. Ibid
3. http://www.usc.edu/isd/archives/la/scandals/st_francis_dam.html
4. http://www.fema.gov/rrr/talkdiz/landslide.shtm#what

Section Nine: Wildfires

Section Nine: Wildfire

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Why are Wildfires a Threat to Southern California?

For thousands of years, fires have been a natural part of the ecosystem in Southern California. However, wildfires present a substantial hazard to life and property in communities built within or adjacent to hillsides and mountainous areas. There is a huge potential for losses due to wildland/urban interface fires in Southern California. According to the California Division of Forestry (CDF), there were over seven thousand reportable fires in California in 2003, with over one million acres burned.[1] According to CDF statistics, in the October, 2003 Firestorms, over 4,800 homes were destroyed and 22 lives were lost.[2]

The fall of 2003 marked one of the most destructive wildfire seasons in California history. In a ten day period, 12 separate fires raged across Southern California in Los Angeles, Riverside, San Bernardino, San Diego, and Ventura counties. The massive "Cedar" fire in San Diego County alone consumed of 2,800 homes and burned over a quarter of a million acres. (See Table WF-1)

Table WF-1. October 2003 Firestorm Statistics

County	Fire Name	Date Began	Acres Burned	Homes Lost	Homes Damaged	Lives Lost
Riverside	Pass	10 21 03	2,397	3	7	0
Los Angeles	Padua	10 21 03	10,446	59	0	0
San Bernardino	Grand Prix	10 21 03	69,894	136	71	0
San Diego	Roblar 2	10 21 03	8,592	0	0	0
Ventura	Piru	10 23 03	63,991	8	0	0
Los Angeles	Verdale	10 24 03	8,650	1	0	0
Ventura	Simi	10 25 03	108,204	300	11	0
San Diego	Cedar	10 25 03	273,246	2,820	63	14
San Bernardino	Old	10 25 03	91,281	1,003	7	6
San Diego	Otay Mine	10 26 03	46,000	6	11	0
Riverside	Mountain	10 26 03	10,000	61	0	0
San Diego	Paradise	10 26 03	56,700	415	15	2
Total Losses			749,401	4,812	185	22

Source: http: www.fire.ca.gov php fire er content downloads 2003LargeFires.pdf

Historic Wildfires in Southern California

Large fires have been part of the Southern California landscape for millennia. "Written documents reveal that during the 19th century human settlement of southern California altered the fire regime of coastal California by increasing the fire frequency. This was an era of very limited fire suppression, and yet like today, large crown fires covering tens of thousands of acres were not uncommon. One of the largest fires in Los Angeles County

(60,000 acres) occurred in 1878, and the largest fire in Orange County's history, in 1889, was over half a million acres."

Historic Wildfires in La Verne

In the past 20 years, La Verne has been impacted by three major wildfires. Those fires were all started outside city limits and spread toward La Verne. Those fires include: LeRoy's Fire in 1988, Williams Fire in 2002, and the Padua Fire of 2003. Each of those fires was driven by the hot, dry Santa Ana winds. In each instance, the City's Emergency Operations Center (EOC) was activated. Structural damage as a result of these fires was minimal or non-existent. (See WF-2) Several hundred acres of natural vegetation in La Verne was burned during the Williams fire, resulting in mudflow during the winter.

Table WF-2. Large Historic Fires in California 1961-2003
20 Largest California Wildland Fires (Structures Destroyed) **(Southern California fires are shown in bold)**

	Fire Name	Date	County	Acres	Structures	Deaths
1	Tunnel	October 1991	Alameda	1,600	2,900	25
2	Cedar	October 2003	San Diego	273,246	2,820	14
3	Old	October 2003	San Bernardino	91,281	1,003	6
4	Jones	October 1999	Shasta	26,200	954	1
5	Paint	June 1990	Santa Barbara	4,900	641	1
6	Fountain	August 1992	Shasta	63,960	636	0
7	City of Berkeley	September 1923	Alameda	130	584	0
8	Bel Air	November 1961	Los Angeles	6,090	484	0
9	Laguna Fire	October 1993	Orange	14,437	441	0
10	Paradise	October 2003	San Diego	56,700	415	2
11	Laguna	September 1970	San Diego	175,425	382	5
12	Panorama	November 1980	San Bernardino	23,600	325	4
13	Topanga	November 1993	Los Angeles	18,000	323	3
14	49er	September 1988	Nevada	33,700	312	0
15	Simi	October 2003	Ventura	108,204	300	0
16	Sycamore	July 1977	Santa Barbara	805	234	0
17	Canyon	September 1999	Shasta	2,580	230	0
18	Kannan	October 1978	Los Angeles	25,385	224	0
19	Kinneloa	October 1993	Los Angeles	5,485	196	1
19	Grand Prix	October 2003	San Bernardino	59,448	196	0
20	Old Gulch	August 1992	Calaveras	17,386	170	0

http: www.fire.ca.gov FireEmergencyResponse HistoricalStatistics PDF 20LSTRUCTURES.pdf

During the 2002 fire season, more than 6.9 million acres of public and private lands burned in the US, resulting in loss of property, damage to resources and disruption of community services.[3] Taxpayers spent more than $1.6 billion[4] to combat more than 88,400 fires nationwide. Many of these fires burned in wildland/urban interface areas and exceeded the fire suppression capabilities of those areas. Table WF-3 (Below) illustrates fire suppression costs for state, private and federal lands.

Table WF-3. National Fire Suppression Costs			
Year	Suppression Costs	Acres Burned	Structures Burned
2000	1.3 billion	8,422,237	861
2001	0.5 billion	3,570,911	731
2002	1.6 billion	6,937,584	815
http: research.yale.edu gisf assets pdf ppf wildfire report.pdf			

Wildfire Characteristics

There are three categories of interface fire:[5] the classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas; the mixed wildland/urban interface is characterized by isolated homes, subdivisions, and small communities situated predominantly in wildland settings; and the occluded wildland/urban interface exists where islands of wildland vegetation occur inside a largely urbanized area. Certain conditions must be present for significant interface fires to occur. The most common conditions include: hot, dry, and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started, several conditions influence its behavior, including fuel, topography, weather, drought, and development.

Southern California has two distinct areas of risk for wildland fire. The foothills and lower mountain areas are most often covered with scrub brush or chaparral. The higher elevations of mountains also have heavily forested terrain. The lower elevations covered with chaparral create one type of exposure.

> ““Past fire suppression is not to blame for causing large shrubland wildfires, nor has it proven effective in halting them.”” said Dr. Jon Keeley, a USGS fire researcher who studies both southern California shrublands and Sierra Nevada forests. ““Under Santa Ana conditions, fires carry through all chaparral regardless of age class. Therefore, prescribed burning programs over large areas to remove old stands and maintain young growth as bands of firebreaks resistant to ignition are futile at stopping these wildfires.””[6]

The higher elevations of Southern California’s mountains are typically heavily forested. The magnitude of the 2003 fires is the result of three primary factors: (1) severe drought, accompanied by a series of storms that produce thousands of lightning strikes and windy conditions; (2) an infestation of bark beetles that has killed thousands of mature trees; and (3) the effects of wildfire suppression over the past century that has led to buildup of brush and small diameter trees in the forests.

> “When Lewis and Clark explored the Northwest, the forests were relatively open, with 20 to 25 mature trees per acre. Periodically, lightning would start fires that would clear out underbrush and small trees, renewing the forests.”
>
> “Today's forests are completely different, with as many as 400 trees crowded onto each acre, along with thick undergrowth. This density of growth makes forests susceptible to disease, drought and severe wildfires. Instead of restoring forests, these wildfires destroy them and it can take decades to recover. This radical change in our forests is the result of nearly a century of well-intentioned but misguided management.”[7]

The Interface

One challenge Southern California faces regarding the wildfire hazard is from the increasing number of houses being built on the urban/wildland interface. Every year the growing population has expanded further and further into the hills and mountains, including forestlands. The increased "interface" between urban/suburban areas and the open spaces created by this expansion has produced a significant increase in threats to life and property from fires and has pushed existing fire protection systems beyond original or current design and capability. Property owners in the interface are not aware of the problems and threats they face. Therefore, many owners have done very little to manage or offset fire hazards or risks on their own property. Furthermore, human activities increase the incidence of fire ignition and potential damage.

Fuel

Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is classified by volume and by type. Volume is described in terms of "fuel loading," or the amount of available vegetative fuel.

The type of fuel also influences wildfire. Chaparral is a primary fuel of Southern California wildfires. Chaparral habitat ranges in elevation from near sea level to over 5,000' in Southern California. Chaparral communities experience long dry summers and receive most of their annual precipitation from winter rains. Although chaparral is often considered as a single species, there are two distinct types; hard chaparral and soft chaparral. Within these two types are dozens of different plants, each with its own particular characteristics.

“Fire has been important in the life cycle of chaparral communities for over 2 million years; however, the true nature of the "fire cycle" has been subject to interpretation. In a period of 750 years, it generally thought that fire occurs once every 65 years in coastal drainages and once every 30 to 35 years inland.”[8]

> “The vegetation of chaparral communities has evolved to a point it requires fire to spawn regeneration. Many species invite fire through the production of plant materials with large surface-to-volume ratios, volatile oils and through periodic die-back of vegetation. These species have further adapted to possess special reproductive mechanisms following fire. Several species produce vast quantities of seeds which lie dormant until fire triggers germination the parent plant which

> produces these seeds defends itself from fire by a thick layer of bark which allows enough of the plant to survive so that the plant can crown sprout following the blaze. In general, chaparral community plants have adapted to fire through the following methods; a) fire induced flowering; b) bud production and sprouting subsequent to fire; c) in-soil seed storage and fire stimulated germination; and d) on plant seed storage and fire stimulated dispersal."[9]

An important element in understanding the danger of wildfire is the availability of diverse fuels in the landscape, such as natural vegetation, manmade structures, and combustible materials. A house surrounded by brushy growth rather than cleared space allows for greater continuity of fuel and increases the fire's ability to spread. After decades of fire suppression "dog-hair" thickets have accumulated, which enable high intensity fires to flare and spread rapidly.

Topography

Topography influences the movement of air, thereby directing a fire course. For example, if the percentage of uphill slope doubles, the rate of spread in wildfire will likely double. Gulches and canyons can funnel air and act as chimneys, which intensify fire behavior and cause the fire to spread faster. Solar heating of dry, south-facing slopes produces up slope drafts that can complicate fire behavior. Unfortunately, hillsides with hazardous topographic characteristics are also desirable residential areas in many communities. This underscores the need for wildfire hazard mitigation and increased education and outreach to homeowners living in interface areas.

Weather

Weather patterns combined with certain geographic locations can create a favorable climate for wildfire activity. Areas where annual precipitation is less than 30 inches per year are extremely fire susceptible.[10] High-risk areas in Southern California share a hot, dry season in late summer and early fall when high temperatures and low humidity favor fire activity. The so-called "Santa Ana" winds, which are heated by compression as they flow down to Southern California from Utah create a particularly high risk, as they can rapidly spread what might otherwise be a small fire.

Drought

Recent concerns about the effects of climate change, particularly drought, are contributing to concerns about wildfire vulnerability. The term drought is applied to a period in which an unusual scarcity of rain causes a serious hydrological imbalance. Unusually dry winters, or significantly less rainfall than normal, can lead to relatively drier conditions and leave reservoirs and water tables lower. Drought leads to problems with irrigation and may contribute to additional fires, or additional difficulties in fighting fires.

Development

Growth and development in scrubland and forested areas is increasing the number of human-made structures in Southern California interface areas. Wildfire has an effect on development, yet development can also influence wildfire. Owners often prefer homes that are private, have scenic views, are nestled in vegetation and use natural materials. A private setting may be far from public roads, or hidden behind a narrow, curving driveway. These conditions, however, make evacuation and fire fighting difficult. The scenic views found along mountain ridges can also mean areas of dangerous topography. Natural vegetation contributes to scenic beauty, but it may also provide a ready trail of fuel leading a fire directly to the combustible fuels of the home itself.

Wildfire Hazard Identification

Wildfire hazard areas are commonly identified in regions of the wildland/urban interface. Ranges of the wildfire hazard are further determined by the ease of fire ignition due to natural or human conditions and the difficulty of fire suppression. The wildfire hazard is also magnified by several factors related to fire suppression/control such as the surrounding fuel load, weather, topography, and property characteristics. Generally, hazard identification rating systems are based on weighted factors of fuels, weather, and topography.

Table WF-4 Illustrates a rating system to identify wildfire hazard risk (with a score of 3 equaling the most danger and a score of 1 equaling the least danger.)

Table WF-4. Sample Hazard Identification Rating System

Category	Indicator	Rating
Roads and Signage	Steep; narrow; poorly signed	3
	One or two of the above	2
	Meets all requirements	1
Water Supply	None, except domestic	3
	Hydrant, tank, or pool over 500 feet away	2
	Hydrant, tank, or pool within 500 feet	1
Location of the Structure	Top of steep slope with brush grass below	3
	Mid-slope with clearance	2
	Level with lawn, or watered groundcover	1
Exterior Construction	Combustible roofing, open eaves, Combustible siding	3
	One or two of the above	2
	Non-combustible roof, boxed eaves, non-combustible siding	1

In order to determine the "base hazard factor" of specific wildfire hazard sites and interface regions, several factors must be taken into account. Categories used to assess the base hazard factor include:

Topographic location, characteristics and fuels;
Site/building construction and design;
Site/region fuel profile (landscaping);
Defensible space;
Accessibility;
Fire protection response; and
Water availability.

The use of Geographic Information System (GIS) technology in recent years has been a great asset to fire hazard assessment, allowing further integration of fuels, weather and topography data for such ends as fire behavior prediction, watershed evaluation, mitigation strategies, and hazard mapping.

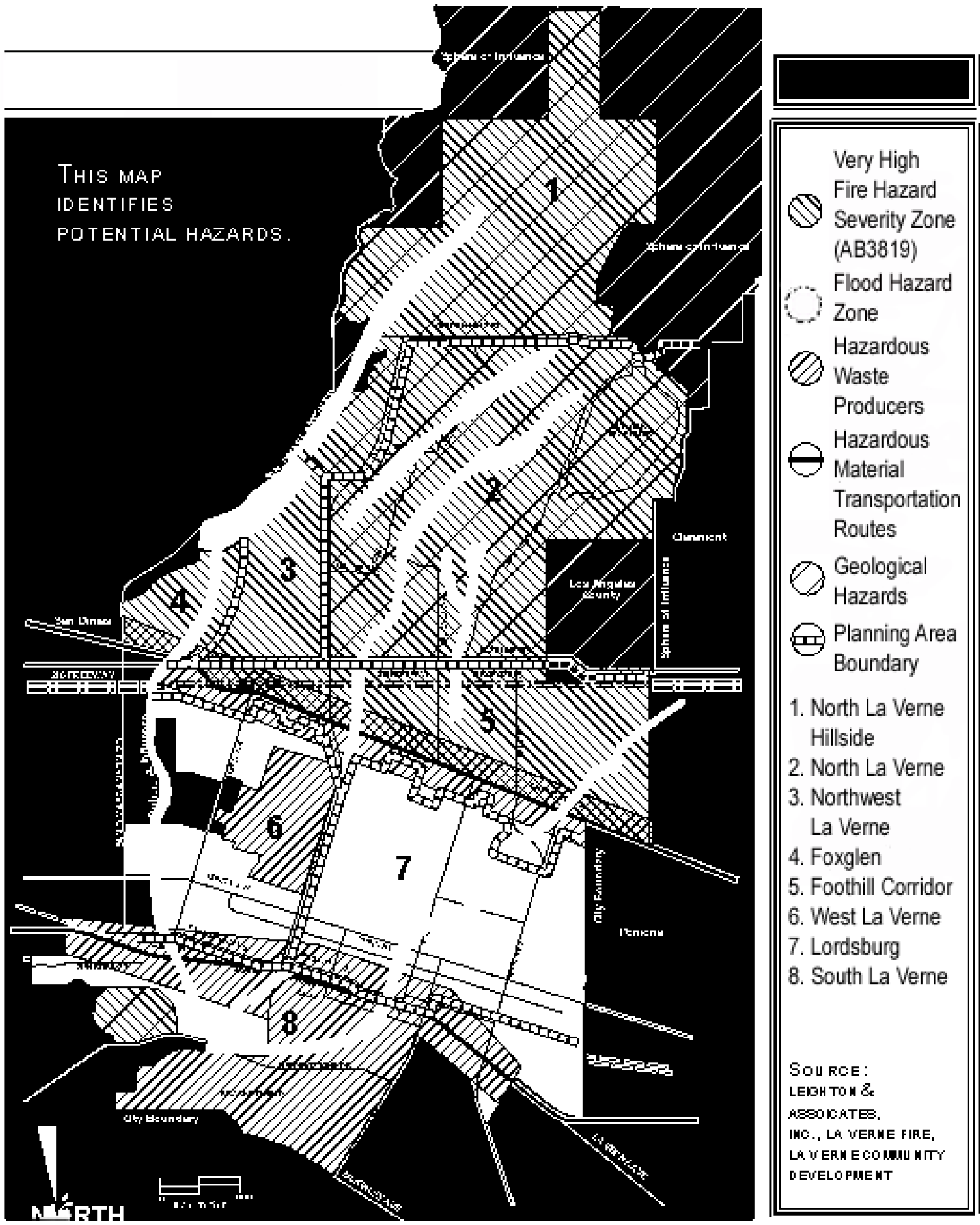
Vulnerability and Risk

Southern California residents are served by a variety of local fire departments as well as county, state, and federal fire resources. Data that includes the location of interface areas in the county can be used to assess the population and total value of property at risk from wildfire and direct these fire agencies in fire prevention and response.

Key factors used in assessing wildfire risk include ignition sources, building materials and design, community design, structural density, slope, vegetative fuel, fire occurrence and weather, as well as occurrences of drought. According to the City of La Verne's General Plan, the entire northern half of the City is at risk of wildfire. However, areas most at risk to wildfire in La Verne are the Wildland/Urban Interface along the City's northern borders. As a result of this risk, the City of La Verne's Fire Department initiated a Community Wildfire Protection Plan included as part of the NHMP as Appendix G. The purpose of this CWPP is to provide a more specific assessment of the mitigation measures needed to protect the community from wildfires. Wildfire professionals, employed by La Verne Fire Department, reviewed the Natural Hazards mitigation Plan and identified several areas that could be more specifically addressed. These areas became major components of the CWPP.

The CWPP provides information on how to fight wildland fires. It examines the fiscal liabilities the City should anticipate to fight wildland fires burning within its corporate boundaries. In addition, the CWPP includes further analysis and recommendations detailing management of hazardous fuels and reduction of structure ignitability. Finally, it offers the City specific recommendations for the application and acquisition of federal grant monies.

Damages caused by wildfire along the City's northern borders could immediately affect 1,875 residential units totaling $546 million in estimated improvement value. All but one of these zones has implemented mitigation measures such as preventative building design and fuel modification that will help to alleviate fire danger. On the other hand, the northwest corner of the City was built before such mitigation efforts were used and is at the highest risk for damages during wildfires. There are currently two homes in this area of the City (Mountain Springs Estates) that have wood shake roofs. There are 80 residential units in this corner and damages could reach an estimated $80 million in estimated improvement value. (See WF-1 Page 129)



Map WF-1

The National Wildland/Urban Fire Protection Program has developed the Wildland/Urban Fire Hazard Assessment Methodology tool for communities to assess their risk to wildfire. For more information on wildfire hazard assessment refer to http://www.Firewise.org.

Community Wildfire Issues

Each summer, the City of La Verne is reminded of the likely potential for wildfires when the Santa Ana winds blow through town. Like many foothill communities, more than half of our city is located within the Very High Fire Hazard Severity Zone designated by the State of California (see appendix A). Hillside properties north of Baseline are especially vulnerable to the threat of wildfires. Located within the City's Hillside Overlay Zone, they are required to undertake additional development precautions to aid in the suppression of and prevention of wildfires.

Several hillside neighborhoods are within the extreme fire hazard severity zones identified by forestry and fire officials. In particular, North La Verne and North La Verne Hillside (neighborhoods 1 and 2 on attachment A) are exposed to considerable wildfire hazard. Terrain, fuel loading, climate, water pressure, and limited access combine to make this an extremely difficult area in which to control wildfires.

Those developments that were built after the identification of the Hillside Overlay Zone were required to provide additional precautions as described above to aid in the suppression and prevention of wildfires. However, those developments that were built prior to identification of the Hillside Overlay Zone lack the additional precautions required today. In particular, is the Mountain Springs Estates area, located in the northeast area of the City. Mountain Springs Estates has many similarities to both Bradbury and Padua.

Mountain Springs Estates, which began developing in 1957, consists of approximately 80 homes within approximately 135 acres. The development was later annexed by the city in 1959. The value of these homes range from a low end of $500 thousand to a high of over $3 million. It was developed under Los Angeles County guidelines. The northern section of this community backs up to the Angeles National Forest. The growth surrounding the development consists of heavy fuels that have not burned for 40-60 years. Several homes have limited access due to slope, topography or inadequate roadways and driveways. Limited access compromises defensible space necessary for fire suppression efforts. Additionally, most of the homes have natural and planned landscaping that is 40-50 years old with dense overgrowth of flammable vegetation. Many of the large pine, juniper, and eucalyptus trees are overgrown with tall canopies.

What is Susceptible to Wildfire?

<u>Growth and Development in the Interface</u>

The hills and mountainous areas of Southern California are considered to be interface areas. The development of homes and other structures is encroaching onto the wild lands and is expanding the wild land/urban interface. The interface neighborhoods are characterized by a diverse mixture of varying housing structures, development patterns, ornamental and natural vegetation, and natural fuels.

In the event of a wildfire, vegetation, structures, and other flammables can merge into unwieldy and unpredictable events. Factors important to the fighting of such fires include access, firebreaks, proximity of water sources, distance from a fire station and available firefighting personnel and equipment. Reviewing past wildland/urban interface fires shows that many structures are destroyed or damaged for one or more of the following reasons:

Combustible roofing material;
Wood construction;
Structures with no defensible space;
Fire department with poor access to structures;
Subdivisions located in heavy natural fuel types;
Structures located on steep slopes covered with flammable vegetation;
Limited water supply; and
Winds over 30 miles per hour.

<u>Road Access</u>

Road access is a major issue for all emergency service providers. As development encroaches into the rural areas of the county, the number of houses without adequate turn-around space is increasing. In many areas, there is not adequate space for emergency vehicle turnarounds in single-family residential neighborhoods, causing emergency workers to have difficulty doing their jobs because they cannot access houses. As fire trucks are large, firefighters are challenged by narrow roads and limited access. When there is inadequate turn around space, the fire fighters can only work to remove the occupants, but cannot safely remain to save the threatened structures.

Water Supply

Fire fighters in remote and rural areas are faced by limited water supply and lack of hydrant taps. Rural areas are characteristically outfitted with small diameter pipe water systems, inadequate for providing sustained fire fighting flows.

Interface Fire Education Programs and Enforcement

Fire protection in urban/wildland interface areas may rely more heavily on the landowner's personal initiative to take measures to protect his or her own property. Therefore, public education and awareness may play a greater role in interface areas. In those areas with strict fire codes, property owners who resist maintaining the minimum brush clearances may be cited for failure to clear brush.

The Need for Mitigation Programs

Continued development into the interface areas will have growing impacts on the wildland/urban interface. Periodically, the historical losses from wildfires in Southern California have been catastrophic, with deadly and expensive fires going back decades. The continued growth and development increases the public need for natural hazards mitigation planning in Southern California.

Wildfire Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by county, regional, state, or federal agencies or organizations.

Local Programs

In Southern California there are dozens of independent local fire departments as well as large county wide consolidated fire districts. Although each district or department is responsible for fire related issues in specific geographic areas, they work together to keep Southern California residents safe from fire. Although fire agencies work together to fight urban/wildland interface fires, each separate agency may have a somewhat different set of codes to enforce for mitigation activities.

The fire departments and districts provide essential public services in the communities they serve and their duties far surpass extinguishing fires. Most of the districts and departments provide other services to their jurisdictions, including Emergency Medical Services who can begin treatment and stabilize sick and injured patients in emergency situations. All of the fire service providers in the county are dedicated to fire prevention and use their resources to educate the public to reduce the threat of the fire hazard, especially in the wildland/urban interface. Fire prevention professionals throughout the county have taken the lead in providing many useful and educational services to Southern California residents, such as:

Home fire safety inspection;
Assistance developing home fire escape plans;
Business Inspections;
Citizen Emergency Response Team (CERT) training;
Fire cause determination;
Counseling for juvenile fire-setters;
Teaching fire prevention in schools;
Coordinating educational programs with other agencies, hospitals, and schools; and
Answering citizens' questions regarding fire hazards.

The Threat of Urban Conflagration

Although communities without an urban/wildland interface are much less likely to experience a catastrophic fire, in Southern California there is a scenario where any community might be exposed to an urban conflagration similar to the fires that occurred following the 1906 San Francisco earthquake.

> "Large fires following an earthquake in an urban region are a relatively rare phenomena, but have occasionally been of catastrophic proportions. The two largest peace-time urban fires in history, 1906 San Francisco and 1923 Tokyo, were both caused by earthquakes.
>
> The fact that fire following earthquakes has been little researched or considered in the United States is particularly surprising when one realizes that the conflagration in San Francisco after the 1906 earthquake was the single largest urban fire, and the single largest earthquake loss, in U.S. history. The loss over three days of more than 28,000 buildings within an area of 12 km^2 was staggering: $250 million in 1906 dollars, or about $5 billion at today's prices.
>
> The 1989 Loma Prieta Earthquake, the 1991 Oakland hills fire, and Japan''s recent Hokkaido Nansei-oki Earthquake all demonstrate the current, real possibility of a large fire, such as a fire following an earthquake, developing into a conflagration. In the United States, all the elements that would hamper fire-fighting capabilities are present: density of wooden structures, limited personnel and equipment to address multiple fires, debris blocking the access of fire-fighting equipment, and a limited water supply."[11]

In Southern California, this scenario highlights the need for fire mitigation activity in all sectors of the region, wildland/urban interface or not.

Local Fire Codes

The City of La Verne Fire Prevention Bureau uses the 2000 Urban-Wildland Interface Code as a general guideline. However, pursuant to the City of La Verne's Hillside Overlay Zone, all new construction is required to have fire resistant building materials for structures, boxed-in eaves, fuel modification zones ranging from 100-300 feet from structures, and residential fire sprinklers. In addition, all new construction requires approval of the Fire Prevention Bureau. Fuel modification zones are enforced annually by the Fire Prevention Bureau.

County Fire Codes

Fire codes in the City of La Verne are more restrictive than codes adopted by Los Angeles County.

State

Fire codes in the City of La Verne are more restrictive than those codes adopted by the State of California.

Federal Programs

The role of the federal land managing agencies in the wildland /urban interface is reducing fuel hazards on the lands they administer; cooperating in prevention and education programs; providing technical and financial assistance; and developing agreements, partnerships and relationships with property owners, local protection agencies, states and other stakeholders in wildland/urban interface areas. These relationships focus on activities before a fire occurs, which render structures and communities safer and better able to survive a fire occurrence.

Federal Emergency Management Agency (FEMA) Programs FEMA is directly responsible for providing fire suppression assistance grants and, in certain cases, major disaster assistance and hazard mitigation grants in response to fires. The role of FEMA in the wildland /urban interface is to encourage comprehensive disaster preparedness plans and programs, increase the capability of state and local governments, and provide for a greater understanding of FEMA programs at the federal, state, and local levels.[12]

Fire Suppression Assistance Grants

Fire Suppression Assistance Grants may be provided to a state with an approved hazard mitigation plan for the suppression of a forest or grassland fire that threatens to become a major disaster on public or private lands. These grants are provided to protect life and improved property and encourage the development and implementation of viable multi-hazard mitigation measures and provide training to clarify FEMA's programs. The grant may include funds for equipment, supplies, and personnel. A Fire Suppression Assistance Grant is the form of assistance most often provided by FEMA to a state for a fire. The grants are cost-shared with states. FEMA’s US Fire Administration (USFA) provides public education materials addressing wildland/urban interface issues and the USFA's National Fire Academy provides training programs.

Hazard Mitigation Grant Program

Following a major disaster declaration, the FEMA Hazard Mitigation Grant Program provides funding for long-term hazard mitigation projects and activities to reduce the possibility of damages from all future fire hazards and to reduce the costs to the nation for responding to and recovering from the disaster. The City of La Verne received HMGP funding for both the Williams and Padua Fires.

National Wildland/Urban Interface Fire Protection Program

Federal agencies can use the National Wildland/Urban Interface Fire Protection Program to focus on wildland/urban interface fire protection issues and actions. The Western Governors' Association (WGA) can act as a catalyst to involve state agencies, as well as local and private stakeholders, with the objective of developing an implementation plan to achieve a uniform, integrated national approach to hazard and risk assessment and fire prevention and protection in the wildland/urban interface. The program helps states develop viable and comprehensive wildland fire mitigation plans and performance-based partnerships.

U.S. Forest Service

The U. S. Forest Service (USFS) is involved in a fuel-loading program implemented to assess fuels and reduce hazardous buildup on forestlands. The USFS is a cooperating agency and, while it has little to no jurisdiction in the lower valleys, it has an interest in preventing fires in the interface, as fires often burn up the hills and into the higher elevation US forest lands.

Other Mitigation Programs and Activities

Some areas of the country are facing wildland/urban issues collaboratively. These are model programs that include local solutions. Summit County, Colorado, has developed a hazard and risk assessment process that mitigates hazards through zoning requirements. In California, the Los Angeles County Fire Department has retrofitted more than 100 fire engines with fire retardant foam capability and Orange County is evaluating a pilot insurance grading and rating schedule specific to the wildland/urban interface. All are examples of successful programs that demonstrate the value of pre-suppression and prevention efforts when combined with property owner support to mitigate hazards within the wildland/urban interface.

Prescribed Burning

The health and condition of a forest will determine the magnitude of wildfire. If fuels - dry or dead vegetation, fallen limbs and branches - are allowed to accumulate over long periods of time without being methodically cleared, fire can move more quickly and destroy everything in its path. The results are more catastrophic than if the fuels are periodically eliminated. Prescribed burning is the most efficient method to get rid of these fuels. In California during 2003, various fire agencies conducted over 200 prescribed fires and burned over 33,000 acres to reduce the wildland fire hazard.[13]

Firewise

Firewise is a program developed within the National Wildland/ Urban Interface Fire Protection Program and it is the primary federal program addressing interface fire. It is administered through the National Wildfire Coordinating Group whose extensive list of participants includes a wide range of federal agencies. The program is intended to empower planners and decision makers at the local level. Through conferences and information dissemination, Firewise increases support for interface wildfire mitigation by educating professionals and the general public about hazard evaluation and policy implementation techniques. Firewise offers online wildfire protection information and checklists, as well as listings of other publications, videos and conferences. The interactive home page allows users to ask fire protection experts questions and to register for new information as it becomes available.

<u>FireFree Program</u>

FireFree is a unique private/public program for interface wildfire mitigation involving partnerships between an insurance company and local government agencies. It is an example of an effective non-regulatory approach to hazard mitigation. Originating in Bend, Oregon, the program was developed in response to the city's "Skeleton Fire" of 1996, which burned over 17,000 acres and damaged or destroyed 30 homes and structures. Bend sought to create a new kind of public education initiative that emphasized local involvement. SAFECO Insurance Corporation was a willing collaborator in this effort. Bend's pilot program included:

1. A short video production featuring local citizens as actors, made available at local video stores, libraries and fire stations;
2. Two city-wide yard debris removal events;
3. A 30-minute program on a model FireFree home, aired on a local cable television station; and
4. Distribution of brochures, featuring a property owner evaluation checklist and a listing of fire-resistant indigenous plants.

Prioritization of Wildfire Hazard Mitigation Action Items

The Mitigation Action Items listed below were prioritized based on a simple examination of economic feasibility as well as technical feasibility and administrative capabilities. Those mitigation action items that met the greatest number of the ranking criteria were given priority ranking. The justification for the ranking order of the action items for each particular hazard is in table form and precedes the list of action items for that hazard.

Short Term Mitigation Items	Economic evaluation	Technical feasibility	Administrative capability	Priority Ranking
Educate agency personnel on federal cost-share and grant programs, Fire Protection Agreements and other related federal programs.	Minimal costs to educate staff.	Information readily available for staff adaptation.	Internal Fire Department staff development required.	1
Develop a comprehensive vegetation management plan for Mountain Springs Estates.	Some financial resources constraints.	Individual property assessment and development of a	Staff available to work with residents and perform property by property assessment.	2

		vegetation management plan do not pose any significant tech challenge.		
Encourage development and dissemination of maps relating to the fire hazard to help educate and assist builders/homeowners and to help guide emergency services during response.	Funding constraints	Technically feasible, but constrained by other factors.	Personnel constraints	3
Enhance emergency services to increase the efficiency of wildfire response and recovery activities.	Purchase of a fire engine with compressed air foam capabilities.	Completed June of 2002	Completed June 2002	4

Long Term Mitigation Items	Economic evaluation	Technical feasibility	Administrative capability	Priority ranking
Build a fire station within close proximity to the wildland interface area.	Fire Station completed 2006	Fire Station completed 2006	Joint partnership between USFS and City of La Verne.	1
Increase communication, coordination and collaboration between all parties to address risks, existing mitigation measures and federal assistance programs.	No immediately obvious economic constraints or impacts.	Requires cooperation from effected parties. Ensuring participation could be problematic.	Fire Safety personnel would manage these efforts.	2
Encourage implementation of wildfire mitigation activities consistent with the sustainable ecological management and community stability goals.	Costs associated with personnel.	Controlled burning and mechanical clearing of vegetation are technically feasible through the use of existing	Fire Safety personnel would conduct these mitigation activities.	3

		staff and equipment.		
Enhance outreach and education programs aimed at mitigating wildfire hazards and reducing or preventing the exposure of citizens to natural hazards.	Personnel costs could be a minor constraint, but are not necessarily cost prohibitive.	Requires existing staff knowledge of existing fire safety and mitigation activities and could be as simple as neighborhood "drive-though" activities.	Staffing constraint. Requires hiring fire prevention and educational personnel.	4

Wildfire Mitigation Action Items

> As stated in the Federal Wildland Fire Policy, **"The problem is not one of finding new solutions to an old problem but of implementing known solutions.** Deferred decision-making is as much a problem as the fires themselves. If history is to serve us in the resolution of the wildland/urban interface problem, we must take action on these issues now. To do anything less is to guarantee another review process in the aftermath of future catastrophic fires."[14]

The wildfire mitigation action items provide direction on specific activities that organizations and residents in Southern California can undertake to reduce risk and prevent loss from wildfire events. Each action item is followed by ideas for implementation, which can be used by the steering committee and local decision makers in pursuing strategies for implementation.

Short Term Mitigation Activity for Wildfires #1: Educate agency personnel on federal cost-share and grant programs, Fire Protection Agreements and other related federal programs so the full array of assistance available to local agencies is understood.

Ideas for Implementation:

1. Investigate potential funding opportunities for individual mitigation projects.

Coordinating Organization: La Verne Fire Department

Timeline: Ongoing

Plan Goals Addressed: Protect Life and Property, Public Awareness

Constraints: Staffing and Financial Resources

Status: This activity is ongoing.

Short Term Mitigation Activity for Wildfires #2: Develop a comprehensive vegetation management plan for Mountain Springs Estates.

Ideas for implementation:

1. Meet with homeowners in the area to develop input.
2. Provide homeowners with residential fire inspection by appointment.
3. Secure a grant to provide funding.
4. Coordinate grant distribution amongst homeowners/landowners.

Coordinating organization: La Verne Fire Department

Timeline: 3-5 years
Plan Goals Addressed: Protect Life and Property, Public Awareness, Emergency Services, Partnerships and Implementation.
Constraints: Financial Resources
Status:

<u>Short Term Mitigation Activity for Wildfires # 3</u>: Encourage development and dissemination of maps relating to the fire hazard to help educate and assist builders and homeowners in being engaged in wildfire mitigation activities and to help guide emergency services during response.
Ideas for Implementation:

1. Update wildland/urban interface maps.
2. Conduct risk analysis incorporating data and the created hazard maps using GIS technology to identify risk sites and further assist in prioritizing mitigation activities; and
3. Encourage coordination between fire jurisdictions and sanitary districts to make sure that the most accurate elevation maps are being used.

Coordinating Organization: Planning Department
Timeline: Ongoing
Plan Goals Addressed: Protect Life and Property
Constraints: Funding, personnel
Status: Activity is ongoing but has not been implemented due to financial and staffing constraints.

<u>Short Term Mitigation Activity for Wildfires # 4</u>: Enhance emergency services to increase the efficiency of wildfire response and recovery activities.
Ideas for Implementation:

1. Provide firefighters with a minimum of 20 hours of wildland firefighting related training annually.
2. Purchase a Type II or III fire engine with compressed air foam capabilities.
3. Secure an Automatic Aid Agreement/MOU with the USFS that includes reciprocal services.
4. Secure an Automatic Aid Agreement/MOU with Los Angeles County Fire Department that includes reciprocal services.

Coordinating Organization: La Verne Fire Department, USFS, LA County Fire Department
Timeline: 2 years
Plan Goals Addressed: Emergency Services
Status: Completed June of 2002

<u>*Long Term Mitigation Activity for Wildfires # 1</u>: Build a fire station within close proximity to the wildland interface area in La Verne in partnership with the USFS and jointly staff the facility.
Ideas for Implementation:

1. Secure a written commitment from USFS representatives.
2. Secure funding for the project.
3. Secure land for the fire station.
4. Involve the neighborhood in the planning phase.

Coordinating Organization: City of La Verne, USFS
Timeline: 2-5 years
Plan Goals Addressed: Protect Life and Property, Partnerships

Constraints: Funding, USFS interest
Status: Construction of this station was completed in 2006

Long Term Mitigation Activity for Wildfires #2: Increase communication, coordination and collaboration between wildland/urban interface property owners, local and county planners and fire prevention crews and officials to address risks, existing mitigation measures and federal assistance programs.
Ideas for Implementation:
1. Encourage single-family residences to have fire plans and practice evacuation routes;
2. Encourage fire inspections in residential homes by fire departments to increase awareness among homeowners and potential fire responders;
3. Encourage a standard for the State Fire Marshall to evaluate fire plans and emergency plans;
4. Require fire department notification of new business applications to ensure that appropriate fire plans have been developed;
5. Encourage local zoning and planning entities to work closely with landowners and/or developers who choose to build in the wildland/urban interface to identify and mitigate conditions that aggravate wildland/urban interface wildfire hazards, including:
    - Limited access for emergency equipment due to width and grade of roadways;
    - Inadequate water supplies and the spacing, consistency and species of vegetation around structures;
    - Inadequate fuel breaks, or lack of defensible space;
    - Highly flammable construction materials;
    - Building lots and subdivisions that are not in compliance with state and local land use and fire protection regulations;
    - and Inadequate entry/escape routes.
6. Encourage all new homes and major remodels involving roofs additions that are located in the interface to have fire resistant roofs and residential sprinkler systems; and
7. Encourage the public to evaluate access routes to rural homes for fire-fighting vehicles and to develop passable routes if they do not exist.

Coordinating Organization: La Verne Fire Department with Planning, Building & Safety
Timeline: Ongoing
Plan Goals Addressed: Protect Life and Property, Public Awareness, Emergency Services, Partnerships and Implementation
Constraints:
Status:

LongTerm Mitigation Activity for Wildfires #3: Encourage implementation of wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability.
Ideas for Implementation:
1. Employ mechanical thinning and prescribed burning to abate the risk of catastrophic fire and restore the more natural regime of high frequency, low-intensity burns. Prescribed burning can provide benefit to ecosystems by thinning hazardous vegetation and restoring ecological diversity to areas homogenized by invasive plants; and
2. Clear trimmings, trees, brush and other debris completely from sites when performing routine maintenance and landscaping to reduce fire risk.

Coordinating Organization: Local Agency Fire Department
Timeline: Ongoing

Plan Goals Addressed: Natural Systems
Constraints:
Status:

<u>Long Term Mitigation Activity for Wildfires #4</u>: Enhance outreach and education programs aimed at mitigating wildfire hazards and reducing or preventing the exposure of citizens, public agencies, private property owners and businesses to natural hazards.
Ideas for Implementation:
1. Encourage the hiring of fire prevention and education personnel to oversee education programs;
2. Visit urban interface neighborhoods and rural areas and conduct education and outreach activities;
3. Conduct specific community-based demonstration projects of fire prevention and mitigation in the urban interface;
4. Establish neighborhood "drive-through" activities that pinpoint site-specific mitigation activities. Fire crews can give property owners personal suggestions and assistance; and
5. Perform public outreach annually during “Open House” in October.

Coordinating Organization: La Verne Fire Department
Timeline: Ongoing
Plan Goals Addressed: Protect Life and Property, Public Awareness
Constraints: personnel
Status:

Wildfire Resource Directory

Local Resources
La Verne Fire Department
2061 Third Street
La Verne, CA 91750
(909) 596-5991

Los Angeles County Resources
Los Angeles County Fire Department
1320 N. Eastern Ave.
Los Angeles, CA., 90063
Telephone: 323.881.2411
http://www.lacofd.org/default.htm

State Resources
California Division of Forestry & Fire Protection
1416 9th Street
PO Box 944246
Sacramento California 94244-2460
(916)653-5123
http://www.fire.ca.gov/php/index.php

Office of the State Fire Marshal (OSFM)
1131 "S" Street
Sacramento, CA 95814
PO Box 944246
Sacramento, CA 94244-2460
Tel. (916) 445-8200
Fax. (916) 445-8509

Federal Resources and Programs
US Forest Service (Department of Agriculture)
110 N. Wabash Ave.
Glendora, CA 91741
(626) 335-1251

Federal Wildland Fire Policy, Wildland/Urban Interface Protection - This is a report describing federal policy and interface fire. Areas of needed improvement are identified and addressed through recommended goals and actions. http://www.fs.fed.us/land/wdfire7c.htm

National Fire Protection Association (NFPA) - This is the principal federal agency involved in the National Wildland/Urban Interface Fire Protection Initiative. NFPA has information on the Initiatives programs and documents.
Public Fire Protection Division
1 Battery March Park.
P.O. Box 9101
Quincy, MA 02269-9101
Phone: (617) 770-3000

National Interagency Fire Center (NIFC) - The NIFC in Boise, Idaho is the nation's support center for wildland firefighting. Seven federal agencies work together to coordinate and support wildland fire and disaster operations. These agencies include the Bureau of Indian Affairs, Bureau of Land Management, Forest Service, Fish and Wildlife Service, National Park Service, National Weather Service and Office of Aircraft
National Interagency Fire Center
3833 S. Development Ave.
Boise, Idaho 83705
208-387-5512
http://www.nifc,gov/

United States Fire Administration (USFA) of the Federal Emergency Management Agency (FEMA) - As an entity of the Federal Emergency Management Agency, the mission of the USFA is to reduce life and economic losses due to fire and related emergencies through leadership, advocacy, coordination and support.
USFA, Planning Branch, Mitigation Directorate
16825 S. Seton Ave.
Emmitsburg, MD 21727
(301) 447-1000
http://www.fema.gov/hazards/fires/wildfires.shtm - Wildfire Mitigation
http://www.usfa.fema.gov/index.htm - U.S. Fire Administration

Additional Resources
Firewise - The National Wildland/Urban Interface Fire program - Firewise maintains a Website designed for people who live in wildfire prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos and conferences.
Firewise
1 Battery March Park.
P.O. Box 9101
Quincy, MA 02269-9101
Phone: (617) 770-3000
http://www.firewise.org/

Publications
National Fire Protection Association Standard 299: Protection of Life and Property from Wildfire, National Wildland/Urban Interface Fire Protection Program, (1991), National Fire Protection Association, Washington, D. - This document, developed by the NFPA Forest and Rural Fire Protection Committee, provides criteria for fire agencies, land use planners, architects, developers and local governments to use in the development of areas that may be threatened by wildfire. To obtain this resource:
National Fire Protection Association Publications
(800) 344-3555
http://www.nfpa.org or http://www.firewise.org

(Information Report NOR- 344). Hirsch, K., Pinedo, M., & Greenlee, J. (1996). Edmonton, Alberta: Canadian Forest Service. - This is a comprehensive bibliography of interface wildfire materials. Over 2,000 resources are included, grouped under the categories of general and technical reports, newspaper articles and public education materials. The citation format allows the reader to obtain most items through a library or directly from the publisher. The bibliography is available in hard copy or diskette at no cost. It is also available in downloadable PDF form.
Canadian Forest Service, Northern Forestry Centre, I-Zone Series
Phone: (780) 435-7210
http://www.prefire.ucfpl.ucop.edu/uwibib.htm

Wildland/Urban Interface Fire Hazard Assessment Methodology.
National Wildland/Urban Interface Fire Protection Program, (1998).
NFPA, Washington, D.C.
Firewise (NFPA Public Fire Protection Division)
Phone: (617) 984-7486
http://www.firewise.org

Fire Protection in the Wildland/Urban Interface: Everyone's Responsibility.
National Wildland/Urban Interface Fire Protection Program, (1998). Washington, D.
Firewise (NFPA Public Fire Protection Division)
Phone: (617) 984-7486
http://www.firewise, org

Wildfire Endnotes

[1] http://www.fire.ca.gov/php/2003fireseasonstats_v2.asp

[2] http://www.fire.ca.gov/php/fire_er_content/downloads/2003LargeFires.pdf

[3] http://www.nifc.gov/stats/wildlandfirestats.html

[4] http://research.yale.edu/gisf/assets/pdf/ppf/wildfire_report.pdf

[5] Planning for Natural Hazards: The Oregon Technical Resource Guide, (July 2000) Department of Land Conservation and Development

[6] http://www.usgs.gov/public/press/public_affairs/press_releases/pr1805m.html

[7] Overgrown Forests Require Preventive Measures, By Gale A. Norton (Secretary of the Interior), USA Today Editorial, August 21, 2002

[8] http://www.coastal.ca.gov/fire/ucsbfire.html

[9] Ibid

[10] Planning for Natural Hazards: The Oregon Technical Resource Guide, (July 2000), Department of Land Conservation and Development

[11] http://www.eqe.com/publications/revf93/firefoll.htm

[12] Source: National Interagency Fire Center, Boise ID and California Division of Forestry, Riverside Fire Lab.

[13] http://nifc.gov/fire_policy/docs/chp1.pdf

[14] http://www..fs..fed.us/land/wdfire7c.htm

Section Ten: Windstorms

City of La Verne Natural Hazard Mitigation Plan

Section Ten: Windstorms

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Windstorms:

Map WS-1, Map from NASA s Observatorium

Why are Severe Windstorms a Threat to the City of La Verne? Severe wind storms pose a significant risk to life and property in the region by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. High winds can and do occasionally cause tornado-like damage to local homes and businesses. Severe windstorms can present a very destabilizing effect on the dry brush that covers local hillsides and urban wildland interface areas. High winds can have destructive impacts, especially to trees, power lines, and utility services.

Windstorm Characteristics in Southern California

<u>Santa Ana Winds and Tornado-Like Wind Activity</u>

Based on local history, most incidents of high wind in the City of La Verne are the result of the Santa Ana wind conditions. While high impact wind incidents are not frequent in the area, significant Santa Ana Wind events and sporadic tornado activity have been known to negatively impact the local community.

<u>What are Santa Ana Winds?</u>

“Santa Ana winds are generally defined as warm, dry winds that blow from the east or northeast (offshore). These winds occur below the passes and canyons of the coastal ranges of Southern California and in the Los Angeles basin. Santa Ana winds often blow with exceptional speed in the Santa Ana Canyon (the canyon from which it derives its name). Forecasters at the National Weather Service offices in Oxnard and San Diego usually place speed minimums on these winds and reserve the use of "Santa Ana" for winds greater than 25 knots.”[1] (Twenty-five knots is equal to 28.8 miles per hour.) These winds accelerate to speeds of 35 knots (40.3 MPH) as they move through canyons and passes, with gusts to 50 or even 60 knots. (57.6 – 69.1 MPH)

“The complex topography of Southern California combined with various atmospheric conditions creates numerous scenarios that may cause widespread or isolated Santa Ana events. Commonly, Santa Ana winds develop when a region of high pressure builds over the Great Basin (the high plateau east of the Sierra Mountains and west of the Rocky Mountains including most of Nevada and Utah). Clockwise circulation around the center of this high-pressure area forces air down slope from the high plateau. The air warms as it descends toward the California coast at the rate of 5 degrees F per 1000 feet due to compressional heating. Thus, compressional heating provides the primary source of warming. The air is dry since it originated in the desert, and it dries out even more as it is heated."[2]

These regional winds typically occur from October to March and, according to most accounts, are named either for the Santa Ana River Valley where they originate or for the Santa Ana Canyon, southeast of Los Angeles, where they pick up speed.

What are Tornados?

Tornadoes are spawned when there is warm, moist air near the ground, cool air aloft, and winds that speed up and change direction. An obstruction, such as a house, in the path of the wind causes it to change direction. This change increases pressure on parts of the house, and the combination of increased pressures and fluctuating wind speeds creates stresses that frequently cause structural failures.

In order to measure the intensity and wind strength of a tornado, Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale. This scale compares the estimated wind velocity with the corresponding amount of suspected damage. The scale measures six classifications of tornadoes with increasing magnitude from an "F0" tornado to a "F6+" tornado. The chart below depicts the Fujita Tornado Damage Scale:

Scale	Wind Estimate (mph)	Typical Damage
F0	73	**Light damage.** Some damage to chimneys and TV antennas; breaks twigs off trees; pushes over shallow-rooted trees.
F1	73-112	**Moderate damage.** Peels surface off roofs; windows broken; light trailer houses pushed or overturned; some trees uprooted or snapped; moving automobiles pushed off the road. 74 mph is the beginning of hurricane wind speed.
F2	113-157	**Considerable damage.** Roofs torn off frame houses leaving strong upright walls; weak buildings in rural areas demolished; trailer houses destroyed; large trees snapped or uprooted; railroad boxcars pushed over; light object missiles generated; cars blown off highway.
F3	158-206	**Severe damage.** Roofs and some walls torn off frame houses; some rural buildings completely demolished; trains overturned; steel-framed hangar-warehouse-type structures torn; cars lifted off the ground; most trees in a forest uprooted snapped, or leveled.
F4	207-260	**Devastating damage.** Whole frame houses leveled, leaving piles of debris; steel structures badly damaged; trees debarked by small flying debris; cars and trains thrown some distances or rolled considerable distances; large missiles generated.
F5	261-318	**Incredible damage.** Whole frame houses tossed off foundations; steel-

		reinforced concrete structures badly damaged; automobile-sized missiles generated; trees debarked; incredible phenomena can occur.
F6-F12	319 to sonic	**Inconceivable damage.** Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.
Source: http: weather.latimes.com tornadoFAQ.asp		

Table WS-1

Microbursts

Unlike tornados, microbursts, are strong, damaging winds which strike the ground and often give the impression a tornado has struck. They frequently occur during intense thunderstorms. The origin of a microburst is downward moving air from a thunderstorm's core. But unlike a tornado, they affect only a rather small area.

University of Chicago storm researcher Dr. Ted Fujita first coined the term "downburst" to describe strong, downdraft winds flowing out of a thunderstorm cell that he believed were responsible for the crash of Eastern Airlines Flight 66 in June of 1975.[3] A downburst is a straight-direction surface wind in excess of 39 mph caused by a small-scale, strong downdraft from the base of convective thundershowers and thunderstorms. In later investigations into the phenomena he defined two sub-categories of downbursts: the larger macrobursts and small microbursts.[4]

Macrobursts are downbursts with winds up to 117 mph which spread across a path greater than 2.5 miles wide at the surface and which last from 5 to 30 minutes. The microburst, on the other hand is confined to an even smaller area, less than 2.5 miles in diameter from the initial point of downdraft impact. An intense microburst can result in damaging winds near 270 km/hr (170 mph) and often last for less than five minutes.[5]

> "Downbursts of all sizes descend from the upper regions of severe thunderstorms when the air accelerates downward through either exceptionally strong evaporative cooling or by very heavy rain which drags dry air down with it. When the rapidly descending air strikes the ground, it spreads outward in all directions, like a fast-running faucet stream hitting the sink bottom.
>
> When the microburst wind hits an object on the ground such as a house, garage or tree, it can flatten the buildings and strip limbs and branches from the tree. After striking the ground, the powerful outward running gust can wreak further havoc along its path. Damage associated with a microburst is often mistaken for the work of a tornado, particularly directly under the microburst. However, damage patterns away from the impact area are characteristic of straight-line winds rather than the twisted pattern of tornado damage."[6]

Tornados, like those that occur every year in the Midwest and Southeast parts of the United States, are a rare phenomenon in most of California, with most tornado-like activity coming from microbursts.

Local History of Windstorm Events

While the effects of Santa Ana Winds are often overlooked, it should be noted that in 2003, two deaths in Southern California were directly related to the fierce condition. A falling tree struck one woman in San Diego.[7] The second death occurred when a passenger in a vehicle was hit by a flying pickup truck cover launched by the Santa Ana Winds.[8]

The following Santa Ana wind events were featured in news resources during development of the La Verne Natural Hazard Mitigation Plan and its Update:	
January 6, 2003 OC Register	One of the strongest Santa Ana windstorms in a decade toppled 26 power poles in Orange early today, blew over a mobile derrick in Placentia, crushing two vehicles, and delayed Metrolink rail service. This windstorm also knocked out power to thousands of people in northeastern Orange County.
January 8, 2003 CBSNEWS.com	Santa Ana s roared into Southern California late Sunday, blowing over trees, trucks and power poles. Thousands of people lost power.
March 16, 2003 dailybulletin.com	Fire Officials Brace for Santa Ana Winds - - The forest is now so dry and so many trees have died that fires, during relatively calm conditions, are running as fast and as far as they might during Santa Ana Winds. Now the Santa Ana season is here. Combine the literally tinder dry conditions with humidity in the single digits and 60-80 mph winds, and fire officials shudder.
Dec. 2, 2012 usatoday.com	California Can Expect for Fierce Blasting From Santa Ana s - - There could be damaging wind gusts of 80 mph or higher through the Los Angeles and Ventura County mountains. Gusts could reach 60 mph across the wind-prone nearby valleys and coastal areas. Wind gusts this strong will be able to topple trees and power lines," weather service meteorologist James Thomas said.
January 8, 2012 dailybulletin.com	Strong Winds Blow through Valley - - A tractor trailer lies on its side on the eastbound 10 Freeway transition lane from the southbound 15 Freeway on Sunday in Ontario. A high-wind warning was in effect until late Sunday afternoon with northeast winds of 20-35 mph and gusts up to 65 mph below canyons and passes, according to the National Weather Service.

Table WS-2

Major Windstorms / Santa Ana Wind Events
Southern California Area from 1961- 2012

Date	Location and Damage
February 10-11, 1973	Strong storm winds:. 57 mph at Riverside, 46 Newport Beach. Some 200 trees uprooted in Pacific Beach alone
December 24, 1993	Santa Ana winds: gusts up to 75 mph in Ontario.
January 6-7, 1997	Santa Ana winds in excess of 70 mph caused the uprooting of over 200 trees in La Verne and resulted in over 400,000 of loss citywide
October 14, 1997	Santa Ana winds: gusts 87 mph in central Orange County. Large fire in Orange County
December 10-12, 1997	Santa Ana winds: gusts up to 87 mph in Upland.
December 29, 1997	Gusts 60 mph at Santa Ana
March 28-29, 1998	Strong storm winds in Orange County: sustained 30-40 mph. Gust 70 mph at Newport Beach, gust 60 Huntington Beach. Trees down, power out, and damage across Orange and San Diego Counties. 1 illegal immigrant dead in Jamul.
September 2, 1998	Strong winds from thunderstorms in Orange County with gusts to 40mph. Large fires in Orange County
December 6, 1998	Thunderstorm in Los Alamitos and Garden Grove: gust 50-60 mph called almost a tornado
December 21-22, 1999	Santa Ana winds: gust 68 mph at Campo, 53 Huntington Beach, 44 Orange. House and tree damage in Hemet.
January 5-6, 2000	Santa Ana winds: gusts up to 60 mph in Ontario, 58 mph Devore. Interstate-15 closed.
March 5-6, 2000	Strong thunderstorm winds at the coast: gust 60 mph at Huntington Beach Property damage and trees downed along the coast
December 25-26, 2000	Santa Ana winds: gust 87 mph at Fremont Canyon. Damage and injuries in Mira Loma, Orange and Riverside Counties
February 13, 2001	Thunderstorm gust to 89 mph in east Orange
October 26, 2003	Fire in the Foothills coupled with Santa Ana winds created a firestorm that resulted in the destruction of numerous homes throughout the foothill communities.
December 2, 2011	Strong Santa Ana Winds with gusts up to 90 mph. Hundreds of trees down as well as several power lines down. Parts of La Verne experienced close to 24 hours without power.

Table WS-3

Major Tornado-like Events in the Orange County Area 1958-2012	
Date	***Location and Damage***
March 16, 1977	*Tornado skipped from Fullerton to Brea Damage to 80 homes and injured four people*
January 31, 1979	*Tornado Santa Ana Numerous power outages*
January 13, 1984	*Tornado: Huntington Beach. Property damage*
January 18, 1988	*Tornadoes: Mission Viejo and San Clemente. Property damage*
December 7, 1992	*Tornadoes: Anaheim and Westminster Property damage*
January 18, 1993	*Tornado: Orange County Property damage*
February 8, 1993	*Tornado: Brea. Property damage*
February 7, 1994	*Tornado from Newport Beach to Tustin. Roof and window damage. Trees were also knocked down*
December 13, 1994	*Two waterspouts about 0.5 mile off Newport Beach*
December 13, 1995	*Funnel cloud near Fullerton Airport*
November 10-11, 1997	*Waterspout came ashore at Newport Pier on the 10th and dissipated over western Costa Mesa. Tornadoes in Irvine on the 11th and a funnel cloud developed. 10th: Winds estimated at 60-70 mph. 11th: Minor power outages occurred with little property damage. A fisherman was blown from one end of Newport Pier to the other. Property and vehicle damage in Irvine from flying debris. Ten cars were thrown a few feet.*
December 21, 1997	*Waterspout and tornado in Huntington Beach. Damage to boats, houses, and city property*
February 24, 1998	*Tornado in Huntington Beach. Property damage with a power outage, roof flew ¼ mile*
March 31-April 1, 1998	*Numerous funnel clouds reported off Orange County coastline, two of which became waterspouts off Orange County. One waterspout briefly hit the coast off the Huntington Beach pier.*
February 21, 2000	*Tornado: Anaheim Hills. Property damage*
January 10, 2001	*Funnel cloud at Orange County airport and Newport Beach*
February 24, 2001	*Tornado in Orange. Damage to warehouse, 6 structures, fences, and telephone wires.*
Source: http: www.wrh.noaa.gov sandiego research Guide weatherhistory.pdf	

Table WS - 4

Windstorm Hazard Assessment

Hazard Identification

While the frequencies of events that have directly impacted La Verne are minimal, the greater challenge exists due to the inability to predict the occurrence of these events. Although, seasonal in nature there are no telltale signs as to when an episode of destructive nature may strike the City of La Verne. Therefore, mitigation measures such as adherence to a reoccurring tree trimming schedule are essential. Map WS-2 details areas of the community with high concentrations of mature trees, as well as areas where impacts of a Santa Ana windstorm could be substantial.

A windstorm event in the region can range from short term microburst activity lasting only minutes to a long duration Santa Ana wind condition that can last for several days as in the case of the January 2003 Santa Ana wind event. Windstorms in the City of La Verne area can cause extensive damage including heavy tree stands, road and highway infrastructure, and critical utility facilities. The proximity of the University of La Verne to the downtown area where many mature trees exist creates an added risk for injury while the University is in session.

Figure 1 shows clearly the direction of the Santa Ana winds as they travel from the stable, high-pressure weather system called the Great Basin High through the canyons and towards the low-pressure system off the Pacific. Clearly the area of the City of La Verne is in the direct path of the ocean-bound Santa Ana winds.

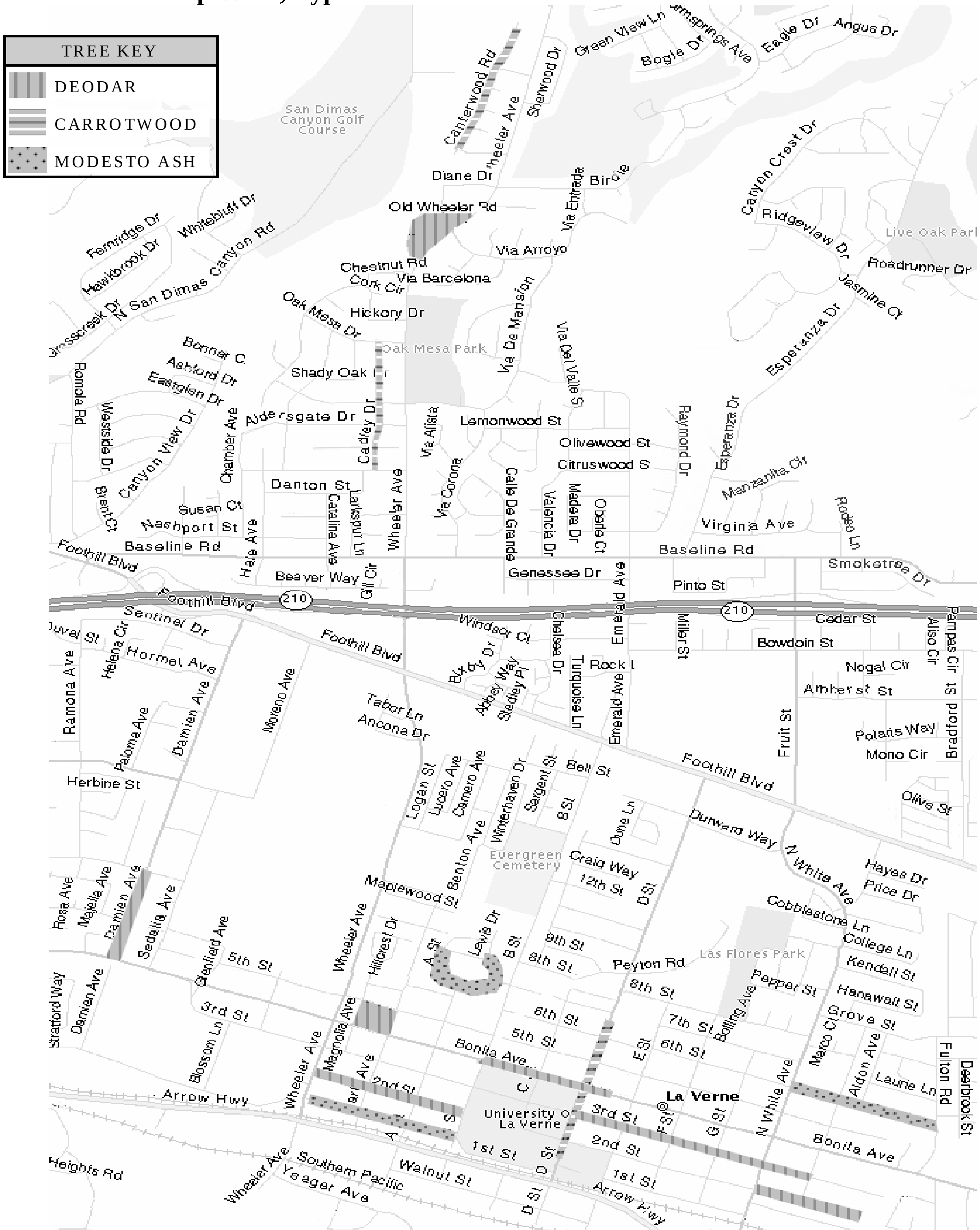
Vulnerability and Risk

Several factors went into evaluating which areas of the community have the greatest risk of damage. The older parts of the community (all of La Verne, south of Foothill Boulevard and Emerald Avenue to the north) have more mature trees that have grown to heights that will result in substantial damage if they were to fall.

Accessibility to sensitive populations in the community, were a key consideration during this aspect of the evaluation. Through this process, the following locations were identified:

Hillcrest Homes - located north of Bonita Avenue and west of D Street.
Casitas La Verne - 3945 Bradford St.
Foothill Terrace - 4095 Fruit St.
The Fountains - 3530 Damien Ave.
LV Mobile C. C. - 3620 Moreno Ave.
Twin Oaks MHP - 3800 Bradford St.
Vintage Grove - 3625 Williams Ave.
Seasons - 2500 Damien Ave.
Canyon Terrace 2400 San Dimas Canyon Rd.

Map WS-2, Types and Concentrations of Problematic Trees



Considering access to these locations was not in jeopardy based on their proximity to susceptible areas, (see Map WS-2 for detail) it was concluded that special consideration is not necessary at this time.

Additionally, from past experience it has been noted that certain species of trees are more susceptible to uprooting and toppling whole than those that will lose their branches or snap at the trunk. This being the case, areas with high concentrations of Deodars, Ash, and Carrot wood trees were identified as being parts of the community to be closely watched during a windstorm. Of additional concern in the older parts of the community is the existence of overhead utilities.

Based on these considerations and depending on the intensity and pervasiveness of the wind gusts, it is estimated that within the areas detailed below, damage to property could be in the millions of dollars.

With an analysis of the high wind and tornado events depicted in the "Local History" section, the common windstorm impact areas including impacts on life, property, utilities, infrastructure, and transportation. Additionally, if a windstorm disrupts power to local residential communities, the American Red Cross and City resources might be called upon for care and shelter duties. Displacing residents and utilizing City resources for shelter staffing and disaster cleanup can cause an economic hardship on the community.

Community Windstorm Issues - What is Susceptible to Windstorms?

<u>Life and Property</u>

Based on the history of the region, windstorm events can be expected annually, across widespread areas of the region, which can be adversely impacted during a windstorm event. This can result in the involvement of City emergency response personnel during a wide-ranging windstorm or microburst tornado activity. Both residential and commercial structures with weak reinforcement are susceptible to damage. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift suction forces that pull building components and surfaces outward. With extreme wind forces, the roof or entire building can fail causing considerable damage. Such damage to property occurred on January 6, 1996 when a tree in La Verne fell on a home as the result of severe wind gusts.

Debris carried along by extreme winds can directly contribute to loss of life and indirectly to the failure of protective building envelopes, siding, or walls. When severe windstorms strike a community, downed trees, power lines, and damaged property can be major hindrances to emergency response and disaster recovery.

The Beaufort Scale below, coined and developed by Sir Francis Beaufort in 1805, illustrates the effect that varying wind speed can have on sea swells and structures:

BEAUFORT SCALE		
Beaufort Force	Speed (mph)	Wind Description - State of Sea - Effects on Land
0	Less 1	Calm - Mirror-like - Smoke rises vertically
1	1-3	Light - Air Ripples look like scales; No crests of foam - Smoke drift shows direction of wind, but wind vanes do not
2	4-7	Light Breeze - Small but pronounced wavelets; Crests do not break - Wind vanes move; Leaves rustle; You can feel wind on the face
3	8-12	Gentle Breeze - Large Wavelets; Crests break; Glassy foam; A few whitecaps - Leaves and small twigs move constantly; Small, light flags are extended
4	13-18	Moderate Breeze - Longer waves; Whitecaps - Wind lifts dust and loose paper; Small branches move
5	19-24	Fresh Breeze - Moderate, long waves; Many whitecaps; Some spray - Small trees with leaves begin to move
6	25-31	Strong Breeze - Some large waves; Crests of white foam; Spray - Large branches move; Telegraph wires whistle; Hard to hold umbrellas
7	32-38	Near Gale - White foam from breaking waves blows in streaks with the wind - Whole trees move; Resistance felt walking into wind
8	39-46	Gale - Waves high and moderately long; Crests break into spin drift, blowing foam in well marked streaks - Twigs and small branches break off trees; Difficult to walk
9	47-54	Strong Gale - High waves with wave crests that tumble; Dense streaks of foam in wind; Poor visibility from spray - Slight structural damage
10	55-63	Storm - Very high waves with long, curling crests; Sea surface appears white from blowing foam; Heavy tumbling of sea; Poor visibility - Trees broken or uprooted; Considerable structural damage
11	64-73	Violent Storm - Waves high enough to hide small and medium sized ships; Sea covered with patches of white foam; Edges of wave crests blown into froth; Poor visibility - Seldom experienced inland; Considerable structural damage
12	74	Hurricane - Sea white with spray. Foam and spray render visibility almost non-existent - Widespread damage. Very rarely experienced on land.
Source: http: www.compuweather.com decoder-charts.html		

Table WS-5

Utilities

Historically, falling trees have been the major cause of power outages in the region. Windstorms such as strong microbursts and Santa Ana Wind conditions can cause flying debris and downed utility lines. For example, tree limbs breaking in winds of only 45 mph can be thrown over 75 feet. As such, overhead power lines can be damaged even in relatively minor windstorm events. Falling trees can bring electric power lines down to the pavement, creating the possibility of lethal electric shock. Rising population growth and new infrastructure in the region creates a higher probability for damage to occur from windstorms as more life and property are exposed to risk.

Infrastructure

Windstorms can damage buildings, power lines, and other property and infrastructure due to falling trees and branches. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds.

Windstorms can result in collapsed or damaged buildings or blocked roads and bridges, damaged traffic signals, streetlights, and parks, among others. Roads blocked by fallen trees during a windstorm may have severe consequences to people who need access to emergency services. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric services and from extended road closures. They can also sustain direct losses to buildings, personnel, and other vital equipment. There are direct consequences to the local economy resulting from windstorms related to both physical damages and interrupted services.

Increased Fire Threat

Perhaps the greatest danger from windstorm activity in Southern California comes from the combination of the Santa Ana winds with the major fires that occur every few years in the urban/wildland interface. With the Santa Ana winds driving the flames, the speed and reach of the flames is even greater than in times of calm wind conditions. The higher fire hazard raised by a Santa Ana wind condition requires that even more care and attention be paid to proper brush clearances on property in the wildland/urban interface areas.

Transportation

Windstorm activity can have an impact on local transportation in addition to the problems caused by downed trees and electrical wires blocking streets and highways. During periods of extremely strong Santa Ana winds, major highways can be temporarily closed to truck and recreational vehicle traffic. However, typically these disruptions are not long lasting, nor do they carry a severe long term economic impact on the region.

Trees

It is not uncommon for parkway trees to be damaged by Santa Ana Winds. In the past, some of these trees have been mature, tall trees. There are some that have a history of being susceptible to loss during windstorms. This could be due to the direction of the prevailing winds or that certain species have a propensity to lose limbs during the storm. Listed below are trees that are most likely to suffer wind damage during a storm. They are as follows:

Tree Species	Count	Percent of tree population.
Liquidambar	1,421	10.71
Deodar cedar	538	05.75
Modesto Ash	236	02.99
Carrotwood	301	02.64
Calif. Sycamore	155	00.95

Location of Deodar cedar trees
2200 to 2600 Block of Bonita Ave.
2200 to 3500 Block of Damien Ave.
Kuns Park
Mills Park
Second Street
Third Street

Location of Carrotwood
2000 to 2100 Block of Second Street
2000 to 2100 Block of Third Street
2000 to 2700 Block Bonita Ave.
2600 Block Bowdoin
2300 Block C Street
4800 Block Cadley
6300 to 6900 Canterwood

Location of Modesto Ash Trees
1500 to 1800 Block of First Street
1700 Block of Second Street
1900 to 2700 Block of Sixth Street
2600 to 2700 Block of A Street

Location of Liquidambar trees
Throughout the City in various locations

Sycamore trees
2400 Block on Amherst

Cost to replace trees in the City of La Verne

The City loses an average of 50 trees a year. There are several reasons the trees are removed, such as **being damaged, diseased, or causing a hardship for adjacent property owners.** The trees could be removed by City staff or contracted out **to a certified arborist**. If the work were contracted out, staff would use the services of West Coast Arborist. The charge is $14.00 per inch on stump removal and tree removal. The average size of the trees removed is 24 inches. The following is a breakdown of cost:

Estimate Cost for Replacement of City trees by West Coast Arborist	
Average costs to remove trees and stumps @ $14.00 per inch.	$336.00
Average cost to plant 15 gallon size tree	$100.00
Average amount of trees removed each year (50 trees)	
Total Cost to contract the remove and plant 50 trees	$21,800

Existing Windstorm Mitigation Activities

As stated, one of the most common problems associated with windstorms is power outages. High winds commonly occur during winter storms, and can cause trees to bend, sag, or fail (tree limbs or entire trees), coming into contact with nearby distribution power lines. Fallen trees can cause short-circuiting and conductor overloading. Wind-induced damage to the power system causes power outages to customers, incurs cost to make repairs, and in some cases can lead to ignitions that start wild land fires. One of the strongest and most widespread existing mitigation strategies pertains to tree clearance. Currently, California State Law requires utility companies to maintain specific clearances (depending on the type of voltage running through the line) between electric power lines and all vegetation. However, it has been noted that it is not good maintenance practices to top certain tree species as this will remove the central leader and adversely affect the tree. As a result, removal may be a better alternative.

Local Efforts

In established areas, the City has instituted its own maintenance efforts regarding city owned trees along the parkways and medians. The City of La Verne has inventoried each city owned tree and abides by a tree trimming schedule consistent with International Society of Horticulture Class II standards. Class II constitutes Standard Pruning and is defined as aesthetic considerations being secondary to structural integrity and tree health concerns. Standard pruning shall consist of removal of dead, dying, diseased, decaying, interfering, objectionable, obstructing, and weak branches, as well as selective thinning to lessen wind resistance. Through this effort the City eliminates most of the heavy branches that will increase a tree’s chances of falling.

In areas where there is new development or re-landscaping, the City also considers species that are known to genetically have a better root system to minimize uprooting (See Table WS-6). Also, when determining landscaping for new developments or medians consideration is given to the "growing area" and the characteristics of the tree as well as avoiding planting of trees where above ground utilities are present.

Enforcement of the following California Public Resource Code Sections provides guidance on tree pruning regulations:[9]

4293: Power Line Clearance Required
4292: Power Line Hazard Reduction
4291: Reduction of Fire Hazards Around buildings
4171: Public Nuisances

The following pertain to tree pruning regulations and are taken from the California Code of Regulations:

Title 14: Minimum Clearance Provisions
Sections 1250-1258
General Industry Safety Orders
Title 8: Group 3: Articles 12, 13, 36, 37, 38
California Penal Code Section 385

Finally, the following California Public Utilities Commission section has additional guidance:

California Public Utilities Commission
General Order 95: Rule 35

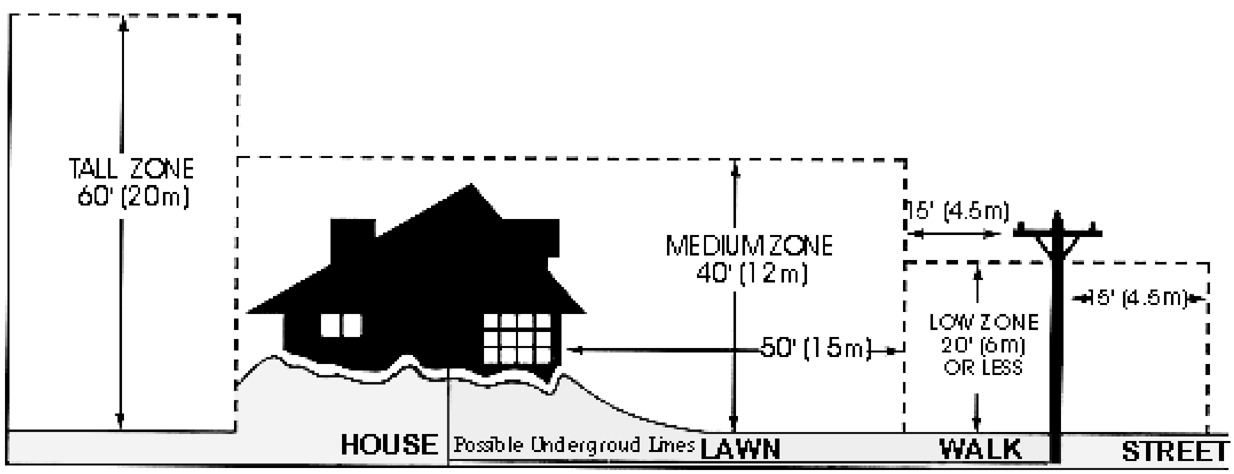


Figure WS-3

Homeowner Liability

Failure to allow a utility company to comply with the law can result in liability to the homeowner for damages or injuries resulting from a vegetation hazard. Many insurance companies do not cover these types of damages if the policy owner has refused to allow the hazard to be eliminated.

The power companies, in compliance with the above regulations, collect data about tree failures and their impact on power lines. This mitigation strategy assists the power company in preventing future tree failure. From the collection of this data, the power company can advise residents as to the most appropriate vegetative planting and pruning procedures. The following chart depicts some of the tree failure data collected by Southern California Edison in this comprehensive mitigation strategy:

Prioritization of Windstorm Hazard Mitigation Action Items

The Mitigation Action Items listed below were prioritized based on a simple examination of economic feasibility as well as technical feasibility and administrative capabilities. Those mitigation action items that met the greatest number of the ranking criteria were given priority ranking. The justification for the ranking order of the action items for each particular hazard is in table form and precedes the list of action items for that hazard.

Short Term Mitigation Items	Economic evaluation	Technical feasibility	Administrative capability	Priority ranking
N/A	N/A	N/A	N/A	N/A

Long Term Mitigation Items	Economic evaluation	Technical feasibility	Administrative capability	Priority Ranking
Establish an annual Public Awareness Campaign focusing on providing public education materials pertaining to the	Cost of printing brochures with no funding currently available.	Making brochures could be accomplished with existing resources from the Public Works Department.	Staffing could be a constraint.	1

protection of life and property.				
Evaluate existing high-risk areas to determine whether species identified as susceptible to falling should be replaced.	Cost of replacement.	Through the City's tree inventory suitable replacement species could be found.	Staffing considerations	2

Windstorm Mitigation Action Items

The windstorm mitigation action items provide direction on specific activities that organizations and residents in the City of La Verne can undertake to reduce risk and prevent loss from windstorm events. Each action item is followed by ideas for implementation, which can be used by the Hazard Mitigation Planning Committee and local decision makers in pursuing strategies for implementation.

City of La Verne Mitigation Strategy Recommendations

Long Term Mitigation Activity for Windstorms #1: Since fall and early winter tend to be the likely most common time when events occur, establish a Public Awareness Campaign to run annually starting in September. Campaign will focus on providing public education materials to City of La Verne residents and all school district staff, parents and age-appropriate students with mitigation materials pertaining to the protection of life and property before, during, and after a windstorm.

Ideas for Implementation:
1. Compile mitigation brochures from the following organizations: FEMA; California Public Utilities Commission; County of Los Angeles Public Works; Southern California Edison; Tree Line Connection
2. Distribute these materials to residents and school district members. Materials can be distributed at City Council Meetings, Commission Meetings, City Hall, Parks and Recreation Centers, Fire Departments, Police Departments, Chamber of Commerce Meetings, School Administration Offices and other appropriate venues. Excerpts can be placed on LVTV 3, City Website, and in the Recreation Newsletter
3. Create community PowerPoint seminar to be given at CERT/RACES joint hazard training event. Utilize presentation at future City Council Meetings or other public events as appropriate.

Coordinating Organization: Public Works Department and City Manager's Office
Timeline: Ongoing
Plan Goals Addressed: Public Awareness, Protection of Life and Property
Constraints: Funding, Staffing, Homeowner buy in.
Status: Work on this mitigation activity continues. There was a transitional period in 2010/2011 when the Public Works Department took over the maintenance duties of the Parks and Community Services Department.

Long Term Mitigation Activity for Windstorms #2: Evaluate existing high risk areas to determine whether species identified as susceptible to falling should be replaced.
Ideas for Implementation:

1. From City's tree inventory gather information of all trees in susceptible areas
2. Determine a suitable replacement species
3. Replace tree

Coordinating Organization: Public Works Department
Timeline: Ongoing
Plan Goals Addressed: Reduce potential for damage created by loss of mature trees.
Constraints:

1. Cost for replacement
2. Mature established trees provide character to many of the older areas. Their removal could meet with public pressure.
3. The choice of tree species that does the least amount of damage is not always the most aesthetically pleasing tree.

Status: This activity is ongoing with the same constraints listed above.

Windstorm Resource Directory

State Resources
California Division of Forestry & Fire Protection
1416 9th Street
PO Box 944246
Sacramento California 94244-2460
916-653-5123
http://www.fire.ca.gov/php/index.php

Federal Resources and Programs
National Weather Service
Los Angeles/Oxnard Weather Forecast Office
520 North Elevar Street
Oxnard, CA 93030
Forecast and weather info: 805-988-6610
Administrative issues: 805-988-6615
E-mail: Webmaster.LOX@noaa.gov
http://weather.noaa.gov/

Additional Resources

International Society of Arboriculture.
P.O. Box 3129
Champaign, IL 61826-3129
Phone: 217.355.9411
Fax: 217.355.9516
Web: www.isa-arbor.com
E-mail: isa@isa-arbor.com

Publications
<u>WINDSTORMS: Protect Your Family and Property from the Hazards of Violent Windstorms</u>
http://emd.wa.gov/5-prep/trng/pubed/Windstrm.pdf

<u>Preparing Your Home for Severe Windstorms</u> is available from
http://www.chubb.com/personal/html/helpful_tips_home_windstorm.html

Windstorms End Notes:

1http://nimbo.wrh.noaa.gov/Sandiego/snawind.html

2Ibid

3Keith C. Heidorn at http://www.suite101.com/article.cfm/13646/100918, June 1, 2003

4Ibid

5Ibid

6Ibid

7www.cbsnews.com, January 8, 2003

8www.cbsnews.com/stories/2003/01/06/national/

9www.cpuc.ca.gov/js.asp

Appendices

Appendix A: Resources

City of La Verne Natural Hazard Mitigation Plan

Master Resource Directory

The Resource Directory provides contact information for local, regional, state, and federal programs that are currently involved in hazard mitigation activities. The Hazard Mitigation Advisory Committee may look to the organizations on the following pages for resources and technical assistance. The Resource Directory provides a foundation for potential partners in action item implementation.

The Hazard Mitigation Advisory Committee will continue to add contact information for organizations currently engaged in hazard mitigation activities. This section may also be used by various community members interested in hazard mitigation information and projects.

American Public Works Association			
Level: National	Hazard: Multi	http://www.apwa.net	
2345 Grand Boulevard		Suite 500	
Kansas City, MO 64108-2641		Ph: 816-472-6100	Fx: 816-472-1610
Notes: The American Public Works Association is an international educational and professional association of public agencies, private sector companies, and individuals dedicated to providing high quality public works goods and services.			
Association of State Floodplain Managers			
Level: Federal	Hazard: Flood	www.floods.org	
2809 Fish Hatchery Road			
Madison, WI 53713		Ph: 608-274-0123	Fx:
Notes: The Association of State Floodplain Managers is an organization of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning and recovery			
Building Seismic Safety Council (BSSC)			
Level: National	Hazard: Earthquake	www.bssconline.org	
1090 Vermont Ave., NW		Suite 700	
Washington, DC 20005		Ph: 202-289-7800	Fx: 202-289-109
Notes: The Building Seismic Safety Council (BSSC) develops and promotes building earthquake risk mitigation regulatory provisions for the nation.			

California Department of Transportation (CalTrans)			
Level: State	Hazard: Multi	http://www.dot.ca.gov/	
120 S. Spring Street			
Los Angeles, CA 90012		Ph: 213-897-3656	Fx:
Notes: CalTrans is responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries. Alone and in partnership with Amtrak, Caltrans is also involved in the support of intercity passenger rail service in California.			

California Resources Agency			
Level: State	Hazard: Multi	http://resources.ca.gov/	
1416 Ninth Street		Suite 1311	
Sacramento, CA 95814		Ph: 916-653-5656	Fx:
Notes: The California Resources Agency restores, protects and manages the state's natural, historical and cultural resources for current and future generations using solutions based on science, collaboration and respect for all the communities and interests involved.			

California Division of Forestry (CDF)			
Level: State	Hazard: Multi	http://www.fire.ca.gov/php/index.php	
210 W. San Jacinto			
Perris CA 92570		Ph: 909-940-6900	Fx:
Notes: The California Department of Forestry and Fire Protection protects over 31 million acres of California's privately-owned wildlands. CDF emphasizes the management and protection of California's natural resources.			

California Division of Mines and Geology (DMG)			
Level: State	Hazard: Multi	www.consrv.ca.gov/cgs/index.htm	
801 K Street		MS 12-30	
Sacramento, CA 95814		Ph: 916-445-1825	Fx: 916-445-5718
Notes: The California Geological Survey develops and disseminates technical information and advice on California’’s geology, geologic hazards, and mineral resources.			

California Environmental Resources Evaluation System (CERES)			
Level: State	Hazard: Multi	http://ceres.ca.gov/	
900 N St.		Suite 250	
Sacramento, Ca. 95814		Ph: 916-653-2238	Fx:
Notes: CERES is an excellent website for access to environmental information and websites.			

California Department of Water Resources (DWR)			
Level: State	Hazard: Flood	http://wwwdwr.water.ca.gov	
1416 9th Street			
Sacramento, CA 95814		Ph: 916-653-6192	Fx:
Notes: The Department of Water Resources manages the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments.			

California Department of Conservation: Southern California Regional Office			
Level: State	Hazard: Multi	www.consrv.ca.gov	
655 S. Hope Street		#700	
Los Angeles, CA 90017-2321		Ph: 213-239-0878	Fx: 213-239-0984
Notes: The Department of Conservation provides services and information that promote environmental health, economic vitality, informed land-use decisions and sound management of our state's natural resources.			

California Planing Information Network			
Level: State	Hazard: Multi	www.calpin.ca.gov	
		Ph:	Fx:
Notes: The Governor's Office of Planning and Research (OPR) publishes basic information on local planning agencies, known as the California Planners' Book of Lists. This local planning information is available on-line with new search capabilities and up-to-the- minute updates.			

EPA, Region 9			
Level: Regional	Hazard: Multi	http://www.epa.gov/region09	
75 Hawthorne Street			
San Francisco, CA 94105		Ph: 415-947-8000	Fx: 415-947-3553
Notes: The mission of the U.S. Environmental Protection Agency is to protect human health and to safeguard the natural environment through the themes of air and global climate change, water, land, communities and ecosystems, and compliance and environmental stewardship.			
Federal Emergency Management Agency, Region IX			
Level: Federal	Hazard: Multi	www.fema.gov	
1111 Broadway		Suite 1200	
Oakland, CA 94607		Ph: 510-627-7100	Fx: 510-627-7112
Notes: The Federal Emergency Management Agency is tasked with responding to, planning for, recovering from and mitigating against disasters.			
Federal Emergency Management Agency, Mitigation Division			
Level: Federal	Hazard: Multi	www.fema.gov/fima/planhowto.shtm	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country.			
Floodplain Management Association			
Level: Federal	Hazard: Flood	www.floodplain.org	
P.O. Box 50891			
Sparks, NV 89435-0891		Ph: 775-626-6389	Fx: 775-626-6389
Notes: The Floodplain Management Association is a nonprofit educational association. It was established in 1990 to promote the reduction of flood losses and to encourage the protection and enhancement of natural floodplain values. Members include representatives of federal, state and local government agencies as well as private firms.			

Gateway Cities Partnership			
Level: Regional	Hazard: Multi	www.gatewaycities.org	
7300 Alondra Boulevard		Suite 202	
Paramount, CA 90723		Ph: 562-817-0820	Fx:
Notes: Gateway Cities Partnership is a 501 C 3 non-profit Community Development Corporation for the Gateway Cities region of southeast LA County. The region comprises 27 cities that roughly speaking extends from Montebello on the north to Long Beach on the South, the Alameda Corridor on the west to the Orange County line on the east.			

Governor's Office of Emergency Services (OES)			
Level: State	Hazard: Multi	www.oes.ca.gov	
P.O. Box 419047			
Rancho Cordova, CA 95741-9047		Ph: 916 845- 8911	Fx: 916 845- 8910
Notes: The Governor's Office of Emergency Services coordinates overall state agency response to major disasters in support of local government. The office is responsible for assuring the state's readiness to respond to and recover from natural, manmade, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response and recovery efforts.			

Greater Antelope Valley Economic Alliance			
Level: Regional	Hazard: Multi		
42060 N. Tenth Street West			
Lancaster, CA 93534		Ph: 661-945-2741	Fx: 661-945-7711
Notes: The Greater Antelope Valley Economic Alliance, (GA VEA) is a 501 (c)(6) nonprofit organization with a 501(c)(3) affiliated organization the Antelope Valley Economic Research and Education Foundation. GA VEA is a public-private partnership of business, local governments, education, non-profit organizations and health care organizations that was founded in 1999 with the goal of attracting good paying jobs to the Antelope Valley in order to build a sustainable economy.			

Landslide Hazards Program, USGS			
Level: Federal	Hazard: Landslide	http://landslides.usgs.gov/index.html	
12201 Sunrise Valley Drive		MS 906	
Reston, VA 20192		Ph: 703-648- 4000	Fx:
Notes: The NLIC website provides good information on the programs and resources regarding landslides. The page includes information on the National Landslide Hazards Program Information Center, a bibliography, publications, and current projects. USGS scientists are working to reduce long-term losses and casualties from landslide hazards through better understanding of the causes and mechanisms of ground failure both nationally and worldwide.			
Los Angeles County Economic Development Corporation			
Level: Regional	Hazard: Multi	www.laedc.org	
444 S. Flower Street		34th Floor	
Los Angeles, CA 90071		Ph: 213-236-4813	Fx: 213- 623-0281
Notes: The LAEDC is a private, non-profit 501 (c) 3 organization established in 1981 with the mission to attract, retain and grow businesses and jobs in the Los Angeles region. The LAEDC is widely relied upon for its Southern California Economic Forecasts and Industry Trend Reports. Lead by the renowned Jack Kyser (Sr. Vice President, Chief Economist) his team of researchers produces numerous publications to help business, media and government navigate the LA region's diverse economy.			
Los Angeles County Public Works Department			
Level: County	Hazard: Multi	http://ladpw.org	
900 S. Fremont Ave.			
Alhambra, CA 91803		Ph: 626-458-5100	Fx:
Notes: The Los Angeles County Department of Public Works protects property and promotes public safety through Flood Control, Water Conservation, Road Maintenance, Bridges, Buses and Bicycle Trails, Building and Safety, Land Development, Waterworks, Sewers, Engineering, Capital Projects and Airports			

National Wildland/Urban Interface Fire Program			
Level: Federal	Hazard: Wildfire	www.firewise.org/	
1 Batterymarch Park			
Quincy, MA 02169-7471		Ph: 617-770-3000	Fx: 617 770-0700
Notes: Firewise maintains a Website designed for people who live in wildfire- prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.			

National Resources Conservation Service			
Level: Federal	Hazard: Multi	http://www.nrcs.usda.gov/	
14th and Independence Ave., SW		Room 5105-A	
Washington, DC 20250		Ph: 202-720-7246	Fx: 202-720-7690
Notes: NRCS assists owners of America's private land with conserving their soil, water, and other natural resources, by delivering technical assistance based on sound science and suited to a customer's specific needs. Cost shares and financial incentives are available in some cases.			

National Interagency Fire Center (NIFC)			
Level: Federal	Hazard: Wildfire	www.nifc.gov	
3833 S. Development Ave.			
Boise, Idaho 83705-5354		Ph: 208-387- 5512	Fx:
Notes: The NIFC in Boise, Idaho is the nation's support center for wildland firefighting. Seven federal agencies work together to coordinate and support wildland fire and disaster operations.			

National Fire Protection Association (NFPA)			
Level: National	Hazard: Wildfire	http://www.nfpa.org/catalog/home/index.asp	
1 Batterymarch Park			
Quincy, MA 02169-7471		Ph: 617-770-3000	Fx: 617 770-0700
Notes: The mission of the international nonprofit NFPA is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically-based consensus codes and standards, research, training and education			

National Floodplain Insurance Program (NFIP)			
Level: Federal	Hazard: Flood	www.fema.gov/nfip/	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country.			
National Oceanic /Atmospheric Administration			
Level: Federal	Hazard: Multi	www.noaa.gov	
14th Street & Constitution Ave NW		Rm 6013	
Washington, DC 20230		Ph: 202-482-6090	Fx: 202-482-3154
Notes: NOAA's historical role has been to predict environmental changes, protect life and property, provide decision makers with reliable scientific information, and foster global environmental stewardship.			
National Weather Service, Office of Hydrologic Development			
Level: Federal	Hazard: Flood	http://www.nws.noaa.gov/	
1325 East West Highway		SSMC2	
Silver Spring, MD 20910		Ph: 301-713-1658	Fx: 301-713-0963
Notes: The Office of Hydrologic Development (OHD) enhances National Weather Service products by: infusing new hydrologic science, developing hydrologic techniques for operational use, managing hydrologic development by NWS field office, providing advanced hydrologic products to meet needs identified by NWS customers			
National Weather Service			
Level: Federal	Hazard: Multi	http://www.nws.noaa.gov/	
520 North Elevar Street			
Oxnard, CA 93030		Ph: 805-988- 6615	Fx:
Notes: The National Weather Service is responsible for providing weather service to the nation. It is charged with the responsibility of observing and reporting the weather and with issuing forecasts and warnings of weather and floods in the interest of national safety and economy. Briefly, the priorities for service to the nation are: 1. protection of life, 2. protection of property, and 3. promotion of the nation's welfare and economy.			

San Gabriel Valley Economic Partnership			
Level: Regional	Hazard: Multi	www.valleynet.org	
4900 Rivergrade Road		Suite A310	
Irwindale, CA 91706		Ph: 626-856-3400	Fx: 626-856-5115
Notes: The San Gabriel Valley Economic Partnership is a non-profit corporation representing both public and private sectors. The Partnership is the exclusive source for San Gabriel Valley-specific information, expertise, consulting, products, services, and events. It is the single organization in the Valley with the mission to sustain and build the regional economy for the mutual benefit of all thirty cities, chambers of commerce, academic institutions, businesses and residents.			
Sanitation Districts of Los Angeles County			
Level: County	Hazard: Flood	http://www.lacsd.ora/	
1955 Workman Mill Road			
Whittier, CA 90607		Ph:562-699-7411 x2301	Fx:
Notes: The Sanitation Districts provide wastewater and solid waste management for over half the population of Los Angeles County and turn waste products into resources such as reclaimed water, energy, and recyclable materials.			
Santa Monica Mountains Conservancy			
Level: Regional	Hazard: Multi	http://smmc.ca.gov/	
570 West Avenue Twenty-Six		Suite 100	
Los Angeles, CA 90065		Ph: 323-221-8900	Fx:
Notes: The Santa Monica Mountains Conservancy helps to preserve over 55,000 acres of parkland in both wilderness and urban settings, and has improved more than 114 public recreational facilities throughout Southern California.			
South Bay Economic Development Partnership			
Level: Regional	Hazard: Multi	www.southbaypartnership.com	
3858 Carson Street		Suite 110	
Torrance, CA 90503		Ph: 310-792-0323	Fx: 310-543-9886
Notes: The South Bay Economic Development Partnership is a collaboration of business, labor, education and government. Its primary goal is to plan an implement an economic development and marketing strategy designed to retain and create jobs and stimulate economic growth in the South Bay of Los Angeles County.			

South Coast Air Quality Management District (AQMD)			
Level: Regional	Hazard: Multi	www.aqmd.gov	
21865 E. Copley Drive			
Diamond Bar, CA 91765		Ph: 800-CUT-SMOG	Fx:
Notes: AQMD is a regional government agency that seeks to achieve and maintain healthful air quality through a comprehensive program of research, regulations, enforcement, and communication. The AQMD covers Los Angeles and Orange Counties and parts of Riverside and San Bernardino Counties.			
Southern California Earthquake Center (SCEC)			
Level: Regional	Hazard: Earthquake	www.scec.org	
3651 Trousdale Parkway		Suite 169	
Los Angeles, CA 90089-0742		Ph: 213-740-5843	Fx: 213/740-0011
Notes: The Southern California Earthquake Center (SCEC) gathers new information about earthquakes in Southern California, integrates this information into a comprehensive and predictive understanding of earthquake phenomena, and communicates this understanding to end-users and the general public in order to increase earthquake awareness, reduce economic losses, and save lives.			
Southern California Association of Governments (SCAG)			
Level: Regional	Hazard: Multi	www.scag.ca.gov	
818 W. Seventh Street		12th Floor	
Los Angeles, CA 90017		Ph: 213-236-1800	Fx: 213-236-1825
Notes: The Southern California Association of Governments functions as the Metropolitan Planning Organization for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura and Imperial. As the designated Metropolitan Planning Organization, the Association of Governments is mandated by the federal government to research and draw up plans for transportation, growth management, hazardous waste management, and air quality.			

State Fire Marshal (SFM)			
Level: State	Hazard: Wildfire	http://osfm.fire.ca.gov	
1131 "S" Street			
Sacramento, CA 95814		Ph: 916-445-8200	Fx: 916-445-8509
Notes: The Office of the State Fire Marshal (SFM) supports the mission of the California Department of Forestry and Fire Protection (CDF) by focusing on fire prevention. SFM regulates buildings in which people live, controls substances which may, cause injuries, death and destruction by fire; provides statewide direction for fire prevention within wildland areas; regulates hazardous liquid pipelines; reviews regulations and building standards; and trains and educates in fire protection methods and responsibilities.			
The Community Rating System (CRS)			
Level: Federal	Hazard: Flood	http://www.fema.gov/nfip/crs.shtm	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Community Rating System (CRS) recognizes community floodplain management efforts that go beyond the minimum requirements of the NFIP. Property owners within the County would receive reduced NFIP flood insurance premiums if the County implements floodplain management practices that qualify it for a CRS rating. For further information on the CRS, visit FEMA's website.			
United States Geological Survey			
Level: Federal	Hazard: Multi	http://www.usgs.gov/	
345 Middlefield Road			
Menlo Park, CA 94025		Ph: 650-853-8300	Fx:
Notes: The USGS provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.			
US Army Corps of Engineers			
Level: Federal	Hazard: Multi	http://www.usace.army.mil	
P.O. Box 532711			
Los Angeles CA 90053- 2325		Ph: 213-452- 3921	Fx:
Notes: The United States Army Corps of Engineers work in engineering and environmental matters. A workforce of biologists, engineers, geologists, hydrologists, natural resource managers and other professionals provide engineering services to the nation including planning, designing, building and operating water resources and other civil works projects.			

USDA Forest Service			
Level: Federal	Hazard: Wildfire	http://www.fs.fed.us	
1400 Independence Ave. SW			
Washington, D.C. 20250-0002		Ph: 202-205-8333	Fx:
Notes: The Forest Service is an agency of the U.S. Department of Agriculture. The Forest Service manages public lands in national forests and grasslands.			
USGS Water Resources			
Level: Federal	Hazard: Multi	www.water.usgs.gov	
6000 J Street		Placer Hall	
Sacramento, CA 95819-6129		Ph: 916-278-3000	Fx: 916-278-3070
Notes: The USGS Water Resources mission is to provide water information that benefits the Nation's citizens: publications, data, maps, and applications software.			
Western States Seismic Policy Council (WSSPC)			
Level: Regional	Hazard: Earthquake	www.wsspc.org/home.html	
125 California Avenue		Suite D201, #1	
Palo Alto, CA 94306		Ph: 650-330-1101	Fx: 650-326-1769
Notes: WSSPC is a regional earthquake consortium funded mainly by FEMA. Its website is a great resource, with information clearly categorized - from policy to engineering to education.			
Westside Economic Collaborative C/O Pacific Western Bank			
Level: Regional	Hazard: Multi	http://www.westside-Ia.or	
120 Wilshire Boulevard			
Santa Monica, CA 90401		Ph: 310-458-1521	Fx: 310-458-6479
Notes: The Westside Economic Development Collaborative is the first Westside regional economic development corporation. The Westside EDC functions as an information gatherer and resource center, as well as a forum, through bringing business, government, and residents together to address issues affecting the region: Economic Diversity, Transportation, Housing, Workforce Training and Retraining, Lifelong Learning, Tourism, and Embracing Diversity.			

Appendix B: The Public Process

City of La Verne Natural Hazard Mitigation Plan

The Public Participation Process

Public participation is a key component to strategic planning processes. Citizen participation offers citizens the chance to voice their ideas, interests, and opinions. The City of La Verne's Natural Hazards Mitigation Plan integrates a cross-section of citizen input opportunities throughout the planning process to accomplish a collection of citizen ideas, ideals and interpretation of natural hazard dangers and possible mitigation in their community.

The City of La Verne developed many different opportunities for all citizens and interested parties to participate. These opportunities include the ability to submit web site comments, public workshops and public hearings. In addition draft plans were also available at the office of the City Clerk for review and comment. The Hazard Mitigation Advisory Committee, which included La Verne citizens, also utilized its members for knowledge in their developed professional expertise. Finally, all agencies that operate in the City of La Verne, such as the County of Los Angeles and Verizon were solicited for input, cooperation, and summaries on disaster mitigation activities. These public participation components helped to identify common concerns and ideas regarding hazard mitigation and to discuss specific goals and actions of the mitigation plan.

Integrating public participation during the development of the City of La Verne Natural Hazards Mitigation Plan (LVNHMP) has ultimately resulted in increased public awareness. Through citizen involvement, the mitigation plan reflects community issues, concerns, and new ideas and perspectives on mitigation opportunities and plan action items.

During the re-adoption process there was an extended effort to solicit additional public outreach. The Advisory Committee facilitated the review of the LVNHMP

Advisory Committee

Hazard mitigation in the City of La Verne is overseen by the Hazard Mitigation Advisory Committee, which consists of representatives from various city departments and local professionals whom service the public. Advisory committee members have an understanding of how the community is structured and how residents, businesses, and the environment may be affected by natural hazard events. The advisory committee guided the development of the plan and assisted in developing plan goals, action items, identifying stakeholders, and sharing local expertise to create a more comprehensive plan.

Table B.1 lists the various people that participated on the City of La Verne Natural Hazard Mitigation Steering Committee.

Table B.1. 2012 Updated Hazard Mitigation Planning Committee

Project Steering Committee:
- Bob Russi, City Manager – City of La Verne

- John Breaux, Fire Chief - City of La Verne
- Hal Fredericksen, Community Development Director - City of La Verne
- Daniel W. Keesey, Director of Public Works – City of La Verne
- Dominic Milano, City Engineer - City of La Verne
- Bill Aguirre, Director of Community Services - City of La Verne
- J.R. Ranells, Sr. Management Analyst - City of La Verne
- Candice Moffit, Associate Planner - City of La Verne

2004 Original Adoption:
Meeting #1: February 10, 2004
The Director of Public Works convened the meeting and provided an overview to the plan organizers about the Disaster Mitigation Act of 2000 and the planning process that was about to be undertaken.

The City of La Verne Local Hazard Mitigation Plan (LHMP) organizers introduced the advisory committee. Each committee member described the department or organization that they represented and their role in addressing hazard mitigation. There was a discussion of past and current mitigation activities undertaken in the City to provide the committee members with knowledge of historic community disaster issues.

Meeting #2 February 17, 2004
At this meeting the advisory committee members organized responsibilities for each section of the plan. Each committee member described the department or organization that they represented and their role in addressing hazard mitigation. There was a discussion of past and current mitigation activities undertaken in the city to provide the committee members with knowledge of historic community disaster issues. The City Manager designated Patrick Prescott, Associate Planner and J.R. Ranells, Administrative Analyst to serve as the city's LHMP organizers.

The plan organizers presented the project methodology and the draft framework for the LHMP. Committee members discussed how to set-up the document, responsibilities of each member, coordination tools, overall timeline and deadlines, organization of plan, and finally there was a discussion about what problems the committee faced in completing the plan. Advisory committee members were asked to provide input on key stakeholders to be included in the planning process. A brainstorming process was then conducted to develop the goals for the Plan. The advisory committee was asked to identify goals for risk reduction, and potential outcomes for how the plan could be used in the future. Table B-2 lists the resulting goals and ideas.

Table B.2. Goal Areas and Ideas

Goal Area	Idea
Property Protection	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance coverage for catastrophic hazards. Focus resources on activities involving property owners and that assist in protecting homes, structures, or property from natural hazards.
Natural Systems	Evaluate and make recommendations for city guidelines, codes, and permitting processes in addressing natural hazard mitigation and development in vulnerable areas. Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities to protect vital habitat and water quality. Preserve and rehabilitate natural systems to serve natural hazard mitigation functions.
Public Awareness	Develop and implement education programs that will increase property owners and developers awareness of natural hazards. Develop and conduct outreach programs to increase the number of local, county, and regional activities implemented by public and private sector organizations.
Partnerships	Strengthen communication and coordinate participation in and between public agencies, citizens, non-profit organizations, business, and industry. Document the process and resources that will reduce the administrative burden on the requestors/recipients of grant funds. Provoke congressional attention by identifying mitigation priorities.
Emergency Services	Establish policy to encourage mitigation for critical facilities, services, and infrastructure. Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.
Implementation	Promote leadership within public agencies to implement natural hazard mitigation activities. Attain participation and funding to implement mitigation activities by creating a dynamic document, which is continually updated and revised.
Guide Development and Use of Vulnerable Areas	Identify a clear process by which planners can identify and illustrate to potential developers the natural hazards that are present, the threat they pose, and how their development will be mitigated, regulated, and possibly limited. Improve hazard identification, assessment and summarize hazards data and possible mitigation strategies to address those hazards in a palatable format

Meeting #3: March 2, 2004
The advisory committee used this meeting as a work session to revise and finalize the goals identified in previous committee meetings. The committee worked through the structure of the plan, and agreed on the final organizational framework.

The committee also discussed strategies for the agenda, the roles of committee members, and advertising the upcoming public workshop to be held on June 8, 2004. There was a presentation on what resources the committee had available (template, existing city plans, professional expertise and experience), and what additional resources where needed (La Verne specific information, maps, at risk inventory of buildings/infrastructure/ population/…etc, and public input session). There was also a discussion on final assembly and review of the proposed plan.

Meeting #4: April 13, 2004
The plan organizers explained the structure of the upcoming workshop to be held at the La Verne Community Center on June 8th, and the role of the committee, which included helping to facilitate the brainstorming sessions and providing information to citizens. This meeting also sought to evaluate the status of the LHMP. During this meeting there was a discussion of the checklist form that was provided by OES and how many of the items have been satisfactorily completed.

The Community Development Director suggested that aside from names, that title's be added to show validity of the professional representation that is in attendance in the committee. It was also discussed that assistance would be needed for research of historical documents by an intern. Mr. Russi advised staff to provide specific information that would be needed and he would assign the Administration Intern to complete the research.

Meeting #5: May 20, 2004
This regional meeting with Area D professionals gave committee members the opportunity to discuss different aspects of the LHMP and share information on problems with sections and the various troubleshooting options that are available. Also, information that must be included in the plan were reviewed with helpful examples.

Meeting #6: June 15, 2004
At this meeting the committee discussed various plan section development status and what some highlights of each section are. Specifically, mitigation activities were given to discuss during public workshop. Reminders of due dates were given to members and each section writer was asked if any further assistance was needed. The first major deadline on the calendar is the first draft due date of July 8, 2004. Also, a plan requirement reminder to add a prioritization of Mitigation Action Items in each section was given. This will then be used to prioritize all action items into one individual section.

Public Meetings
The City of La Verne coordinated two public workshops in the City to gather public ideas and opinions about the mitigation plan goals and activities.

First Public Workshop: Wednesday, March 10, 2004
The first public workshop provided information on the mitigation plan to Planning Commission officials and citizens and garnered input on issues related to natural hazards in the community. The meeting was successful with all Commission members offering beneficial input and suggestions. There was limited public attendance and input however, but is not unlike many other meetings of this type in La Verne.

Invitation Process
In order to advertise the first public input session, the City of La Verne published public notices in the Inland Valley Daily Bulletin. This is the local paper that serves La Verne and other surrounding communities. The public notice was also posted throughout City Hall and on the City's web site.

Results
A steering committee member began the presentation by providing an overview of the Disaster Mitigation Act and how it affected La Verne. There was also a presentation of the Natural Hazard Mitigation Plan requirements and some proposed goals provided by the steering committee. After the presentation each Commissioner commented on various aspects of the mitigation plan, how it would affect La Verne, and what resources would be required to complete an inclusive plan. Public input was limited but beneficial examples of how the City could further notify the public were given as well as pertinent concerns about natural hazards.

After all comments and suggestions were heard the Planning Commission voted to support the steering committee and its proposed goals in completing a timely and conclusive Local Hazard Mitigation Plan.

Second Public Workshop: June 8, 2004
The City of La Verne held it's second public workshop in cooperation with the City's bi-annual Disaster Preparedness Workshop. The bi-annual workshop is held in January and June of each year and has been held since 2000. During these workshops emergency representatives from Area D, the Red Cross, and City Fire Departments discuss ways to be prepared in case of emergencies and how to best protect oneself and family in the instance of a disaster.

Invitation Process
City staff posted notices of this workshop in the City's recreation guide, posted notices on all water utility bills, advertised on the City's web site, advertised on the local cable channel, and directly sent out over 90 letters of invitation. These letters were addressed to local businesses, churches, apartment complexes, schools and institutions, volunteer groups, mobile home parks, Homeowner Associations, and medical facilities.

Results
A steering committee member began the presentation by providing an overview of the Disaster Mitigation Act and how it affected La Verne. There was also a presentation of the Natural Hazard Mitigation Plan requirements, what role community members played in hazard mitigation planning, and some proposed goals provided by the steering committee. Following the presentation there was a question and answer session between audience members and City representatives.

The workshop concluded with a detailed presentation on earthquake preparedness from the Area D Coordinator and a demonstration on how to create an emergency package by a representative of the local American Red Cross. There were approximately 25 members of the community and other stakeholders present at this workshop.

Third Public Workshop: Tuesday, June 15, 2004
This workshop was a follow up to the Disaster Preparedness Workshop and was held for any of attendees that had expressed further specialized interest in the Local Hazard Mitigation Planning process.

Invitation Process
All persons whom attended the Disaster Preparedness workshop that expressed interest in further participation in LHMP were invited by either direct phone calls or by email.

Results
During this workshop, interested parties received a detailed presentation on each section of the LHMP and how the City was addressing these issues. This workshop also was used for information gathering on how the City might better address and improve any strategies currently utilized. Various valuable questions and feedback were given from the five community members that attended.

Fourth Public Workshop: Wednesday, September 8, 2004
(Planning Commission Public Hearing)
Invitation Process
All persons whom attended the Disaster Preparedness workshop that expressed interest in further participation in LHMP were invited by either direct phone calls or by email. Additionally, the hearing was properly noticed to the public in the local news paper as well as posted in the designated spaces throughout City Hall.

Results
During the Public Hearing, there were no comments from the public. Planning Commissioners asked minimal questions and recommended approval by the City Council.

Fifth Public Workshop: Monday, September 20, 2004
(Final Draft Plan submitted to City Council)

Invitation Process
All persons whom attended the Disaster Preparedness workshop that expressed interest in further participation in LHMP were invited by either direct phone calls or by email. Additionally, the hearing was properly noticed to the public in the Inland Valley Daily Bulletin as well as posted in the designated spaces throughout City Hall.

Results
During the Public Hearing, there were no comments from the public. There were minimal questions from the City Council and the La Verne NHMP was approved unanimously by the City Council.

2012 Update:

Meeting #1 & 2: November 7, 2006 & November 6, 2007
The advisory committee received an update from plan organizer JR Ranells reviewing the City's adopted NHMP and the requirements of the plan maintenance section to review the plan annually. This was not done in 2005 or 2006. The advisory committee reviewed the past year's events and discussed if there was a need for any updates or changes to La Verne's NHMP. Plan organizer JR Ranells reported that after his review there was not a need to modify the plan. The plan was then scheduled to be reviewed again next November.

Meeting #3: November 4, 2008
The advisory committee reviewed the past year as it applied to hazard mitigation planning and found that there was no need for modifying or updating the current NHMP. Plan organizer JR Ranells noted to the group that per the Plan Maintenance section of the plan, there was a need to update the plan in 2010. It was directed to the plan organizer to coordinate with the Disaster Preparedness Group which meets each January to discuss the NHMP update. The Disaster Preparedness Group meets at least annually (June) and is made up of representatives from local businesses, institutions, utilities, and residents. These meetings are utilized to coordinate disaster preparedness for the general public, businesses, and at risk groups such as seniors with in the City. As these same types of interested parties would likely be those wanting to be involved in hazard mitigation planning, there was a high level of compatibility for the review of the City's NHMP. Close to 100 invitations are sent out each meeting inviting participants.

Public Workshop #1: January 6, 2009
Invitation Process
100 invitations to the bi-annual Disaster Preparedness meeting were sent directly to businesses, utilities, institutions, and residents. It is also advertised in the City's Recreation Guide.

Results
Plan organizers attended this meeting because of its correlation to disaster preparedness at the City of La Verne Community Center. Plan organizers utilized this as a public workshop to gather ideas from City of La Verne residents and business owners regarding the goals for the

City of La Verne Natural Hazards Mitigation Plan.

Public Workshop #2: June 2, 2009
Invitation Process
100 invitations to the annual Disaster Preparedness meeting (this meeting used to be held bi-annually) were sent directly to businesses, utilities, institutions, and residents. It is also advertised in the City's Recreation Guide.

Results
At this meeting eight citizens volunteered to participate in the update to the Hazard Mitigation Plan. After the meeting, participants were given a copy of the NHMP to review. It was split up into eight different sections for each of them to review. After they were given a few months to review the document, they all had no feedback.

Meeting #4: November 3, 2009
Members of the advisory committee discussed the results of the June public workshop. Also discussed was a tentative timeline and steps necessary for updating the NHMP. Members of the Committee tasked JR Ranells, Sr. Management Analyst and Candice Bowcock to be the plan organizers for the NHMP update. The original timeline focused on a December 2010 adoption by the City Council.

Meeting #5: June 7, 2011
Members of the advisory committee met to discuss the status on the update of the NHMP. Due to a lack of staffing, resources, and other prevalent projects needing attention, no progress on updating the NHMP had been made to date. The plan organizers set a goal of bringing the updated plan to the City Council for adoption in early 2012.

Public Workshop #3: December 14, 2011
Invitation Process
This public workshop was in conjunction with a regular Planning Commission meeting held the second Wednesday of each month. It was noticed on the City's web site, in a local newsletter, and in the local newspaper as well as posted throughout City Hall. The workshop focused on reviewing the NHMP as adopted in 2004 and receiving any questions, concerns, and or feedback from interested parties.

Result
Plan organizers detailed the history of the NHMP and the need to update it. It was also presented that there were extensive efforts in involving the public in the update process, including:

- Reaching out to the Disaster Preparedness group
- Sending letters to the Chamber of Commerce, the University of La Verne, Hillcrest Brethren Homes, Los Angeles County Dept. of Public Works, Los Angeles County Flood Control, the Los Angeles County Sanitation District, various utility companies (Verizon, Gas Co, Edison, Metropolitan Water District, Golden State Water Co, and

Three Valleys Municipal Water Dist.) There was no public comment received from the audience at the meeting. Planning Commissioners asked limited questions with one specifically involving a previous land slide area. The question was addressed and the workshop closed with the Planning Commissioners thanking the plan organizers for their work on the project.

Meeting #6: January 3, 2012
Members of the advisory committee met to discuss the status of the update to the NHMP. The plan organizer detailed the results of the recent public workshop and other efforts to include public participation including letters that were directly sent to key stakeholders (see result of second public workshop above). There has been no response with the exception of an update by Edison to what was submitted in 2004.

Meeting #7: January 17, 2012
Members of the advisory committee met and discussed the status of the update to the NHMP. The plan organizer is currently utilizing the Local Mitigation Plan Review Crosswalk in order to ensure that the City's plan includes information required for compliance. The goal is to still have a completed plan ready for City Council adoption in February. There are no additional public workshops scheduled other than the public hearing associated with adoption as previous attempts have not been successful. The draft plan will be posted on the City's web site as soon as it is completed.

Meeting #8: January 30, 2012
Members of the advisory committee met to discuss the status of the update to the NHMP. The plan organizer is still making necessary changes to the plan in order to be in compliance.

Meeting #9: February 7, 2012
Members of the advisory committee received an update from the plan organizer. The initial review has been completed and advisory committee members will receive a copy of the plan to review. Special emphasis was placed on the review of the mitigation actions as well as the goals for each hazard. Additionally, sections were assigned to members of the advisory committee that specialize in specific areas (ie Wildfire section to the Fire Chief, Earth Movement and Flood to the Engineer, and Windstorms to the Public Works Director).

Public Workshop #4: February 21, 2012
Invitation Process
This public workshop was in conjunction with a regular City Council meeting and was held as a Public Hearing. It was noticed on the City's web site and in the local newspaper as well as posted throughout City Hall. The workshop focused on reviewing the updated NHMP and what changes were incorporated. These changes included incorporation of the National Flood Insurance Program requirements as well as the public outreach efforts that have taken place for the updated plan. After a brief presentation by the plan organizer the Public Hearing was opened to receive comments, questions, concerns, and or feedback from interested parties.

Result

Yet to be determined.

Appendix C:
Cost Analysis

City of La Verne Natural Hazard Mitigation Plan

Economic Analysis of Natural Hazard Mitigation Projects

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Services (OES), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

This appendix outlines several approaches for conducting economic analysis of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, State Hazard Mitigation Plan, (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation.

This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred.

Evaluating natural hazard mitigation provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools.

Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster’s social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are Some Economic Analysis Approaches for Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. The distinction between the two methods is the way in which the relative costs and benefits are measured. Additionally, there are varying approaches to assessing the value of mitigation for public sector and private sector activities.

Benefit/Cost Analysis

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in public sector mitigation activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions that involve a diverse set of beneficiaries and nonmarket benefits.

Investing in private sector mitigation activities

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;

3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

Estimating the costs and benefits of a hazard mitigation strategy can be a complex process. Employing the services of a specialist can assist in this process.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

How can an Economic Analysis be Conducted?
Benefit/cost analysis and cost-effectiveness analysis are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating alternative mitigation activities is outlined below:

1. Identify the Alternatives: Alternatives for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits: Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate alternative. Potential economic criteria to evaluate alternatives include:

- Determine the project cost. This may include initial project development costs, and repair and operating costs of maintaining projects over time.

- Estimate the benefits. Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- Consider costs and benefits to society and the environment. These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.

- Determine the correct discount rate. Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Alternatives: Once costs and benefits have been quantified, economic analysis tools can rank the alternatives. Two methods for determining the best alternative given varying costs and benefits include net present value and internal rate of return.

- Net present value. Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.

- Internal Rate of Return. Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project.

Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk; project effectiveness; and economic, environmental, and social returns in choosing the appropriate project for implementation.

How are Benefits of Mitigation Calculated?

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owner as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural

disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities. Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

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Appendix D: Acronyms

City of La Verne Natural Hazard Mitigation Plan

Acronyms

Federal Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ATC	Applied Technology Council
b/ca	benefit/cost analysis
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BSSC	Building Seismic Safety Council
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CRS	Community Rating System
EDA	Economic Development Administration
EPA	Environmental Protection Agency
ER	Emergency Relief
EWP	Emergency Watershed Protection (NRCS Program)
FAS	Federal Aid System
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance (FEMA Program)
FTE	Full Time Equivalent
GIS	Geographic Information System
GNS	Institute of Geological and Nuclear Sciences (International)
GSA	General Services Administration
HAZUS	Hazards U.S.
HMGP	Hazard Mitigation Grant Program
HMST	Hazard Mitigation Survey Team
HUD	Housing and Urban Development (United States, Department of)
IBHS	Institute for Business and Home Safety
ICC	Increased Cost of Compliance
IHMT	Interagency Hazard Mitigation Team
NCDC	National Climate Data Center
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHMP	Natural Hazard Mitigation Plan (also known as "409 Plan")
NIBS	National Institute of Building Sciences
NIFC	National Interagency Fire Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
SBA	Small Business Administration

SEAO	Structural Engineers Association of Oregon
SHMO	State Hazard Mitigation Officer
TOR	Transfer of Development Rights
UGB	Urban Growth Boundary
URM	Unreinforced Masonry
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFA	United States Fire Administration
USFS	United States Forest Service
USGS	United States Geological Survey
WSSPC	Western States Seismic Policy Council

California Acronyms

A&W	Alert and Warning
AA	Administering Areas
AAR	After Action Report
ARC	American Red Cross
ARP	Accidental Risk Prevention
ATC20	Applied Technology Council20
ATC21	Applied Technology Council21
BCP	Budget Change Proposal
BSA	California Bureau of State Audits
CAER	Community Awareness & Emergency Response
CalARP	California Accidental Release Prevention
CalBO	California Building Officials
CalEPA	California Environmental Protection Agency
CalREP	California Radiological Emergency Plan
CALSTARS	California State Accounting Reporting System
CalTRANS	California Department of Transportation
CBO	Community Based Organization
CD	Civil Defense
CDF	California Department of Forestry and Fire Protection
CDMG	California Division of Mines and Geology
CEC	California Energy Commission
CEPEC	California Earthquake Prediction Evaluation Council
CESRS	California Emergency Services Radio System
CHIP	California Hazardous Identification Program
CHMIRS	California Hazardous Materials Incident Reporting System
CHP	California Highway Patrol
CLETS	California Law Enforcement Telecommunications System
CSTI	California Specialized Training Institute
CUEA	California Utilities Emergency Association

CUPA	Certified Unified Program Agency
DAD	Disaster Assistance Division (of the state Office of Emergency Svcs)
DFO	Disaster Field Office
DGS	California Department of General Services
DHSRHB	California Department of Health Services, Radiological Health Branch
DO	Duty Officer
DOC	Department Operations Center
DOE	Department of Energy (U.S.)
DOF	California Department of Finance
DOJ	California Department of Justice
DPA	California Department of Personnel Administration
DPIG	Disaster Preparedness Improvement Grant
DR	Disaster Response
DSA	Division of the State Architect
DSR	Damage Survey Report
DSW	Disaster Service Worker
DWR	California Department of Water Resources
EAS	Emergency Alerting System
EDIS	Emergency Digital Information System
EERI	Earthquake Engineering Research Institute
EMA	Emergency Management Assistance
EMI	Emergency Management Institute
EMMA	Emergency Managers Mutual Aid
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency (U.S.)
EPEDAT	Early Post Earthquake Damage Assessment Tool
EPI	Emergency Public Information
EPIC	Emergency Public Information Council
ESC	Emergency Services Coordinator
FAY	Federal Award Year
FDAA	Federal Disaster Assistance Administration
FEAT	Governor's Flood Emergency Action Team
FEMA	Federal Emergency Management Agency
FFY	Federal Fiscal Year
FIR	Final Inspection Reports
FIRESCOPE	Firefighting Resources of So. Calif Organized for Potential Emergencies
FMA	Flood Management Assistance
FSR	Feasibility Study Report
FY	Fiscal Year
GIS	Geographical Information System
HAZMAT	Hazardous Materials
HAZMIT	Hazardous Mitigation

HAZUS	Hazards United States (an earthquake damage assessment prediction tool)
HAD	Housing and Community Development
HEICS	Hospital Emergency Incident Command System
HEPG	Hospital Emergency Planning Guidance
HIA	Hazard Identification and Analysis Unit
HMEP	Hazardous Materials Emergency Preparedness
HMGP	Hazard Mitigation Grant Program
IDE	Initial Damage Estimate
IA	Individual Assistance
IFG	Individual & Family Grant (program)
IRG	Incident Response Geographic Information System
IPA	Information and Public Affairs (of state Office of Emergency Services)
LAN	Local Area Network
LEMMA	Law Enforcement Master Mutual Aid
LEPC	Local Emergency Planning Committee
MARAC	Mutual Aid Regional Advisory Council
MHID	Multihazard Identification
MOU	Memorandum of Understanding
NBC	Nuclear, Biological, Chemical
NEMA	National Emergency Management Agency
NEMIS	National Emergency Management Information System
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Association
NPP	Nuclear Power Plant
NSF	National Science Foundation
NWS	National Weather Service
OA	Operational Area
OASIS	Operational Area Satellite Information System
OCC	Operations Coordination Center
OCD	Office of Civil Defense
OEP	Office of Emergency Planning
OES	California Governor's Office of Emergency Services
OSHPD	Office of Statewide Health Planning and Development
OSPR	Oil Spill Prevention and Response
PA	Public Assistance
PC	Personal Computer
PDA	Preliminary Damage Assessment
PIO	Public Information Office
POST	Police Officer Standards and Training
PPA/CA	Performance Partnership Agreement/Cooperative Agreement (FEMA)
PSA	Public Service Announcement
PTAB	Planning and Technological Assistance Branch
PTR	Project Time Report
RA	Regional Administrator (OES)

RADEF	Radiological Defense (program)
RAMP	Regional Assessment of Mitigation Priorities
RAPID	Railroad Accident Prevention & Immediate Deployment
RDO	Radiological Defense Officer
RDMHC	Regional Disaster Medical Health Coordinator
REOC	Regional Emergency Operations Center
REPI	Reserve Emergency Public Information
RES	Regional Emergency Staff
RIMS	Response Information Management System
RMP	Risk Management Plan
RPU	Radiological Preparedness Unit (OES)
RRT	Regional Response Team
SAM	State Administrative Manual
SARA	Superfund Amendments & Reauthorization Act
SAVP	Safety Assessment Volunteer Program
SBA	Small Business Administration
SCO	California State Controller's Office
SEMS	Standardized Emergency Management System
SEPIC	State Emergency Public Information Committee
SLA	State and Local Assistance
SONGS	San Onofre Nuclear Generating Station
SOP	Standard Operating Procedure
SWEPC	Statewide Emergency Planning Committee
TEC	Travel Expense Claim
TRU	Transuranic
TTT	Train the Trainer
UPA	Unified Program Account
UPS	Uninterrupted Power Source
USAR	Urban Search and Rescue
USGS	United States Geological Survey
WC	California State Warning Center
WAN	Wide Area Network
WIPP	Waste Isolation Pilot Project

Appendix E: Glossary

City of La Verne Natural Hazard Mitigation Plan

Glossary

Acceleration	The rate of change of velocity with respect to time. Acceleration due to gravity at the earth's surface is 9.8 meters per second squared. That means that every second that something falls toward the surface of earth its velocity increases by 9.8 meters per second.
Asset	Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.
Base Flood	Flood that has a 1 percent probability of being equaled or exceeded in any given year. Also known as the 100-year flood.
Base Flood Elevation (BFE)	Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood Insurance Program.
Bedrock	The solid rock that underlies loose material, such as soil, sand, clay, or gravel.
Building	A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.
Coastal High Hazard Area	Area, usually along an open coast, bay, or inlet, that is subject to inundation by storm surge and, in some instances, wave action caused by storms or seismic sources.
Coastal Zones	The area along the shore where the ocean meets the land as the surface of the land rises above the ocean. This land/water interface includes barrier islands, estuaries, beaches, coastal wetlands, and land areas having direct drainage to the ocean.
Community Rating System (CRS)	An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.
Computer-Aided Design And Drafting (CADD)	A computerized system enabling quick and accurate electronic 2-D and 3-D drawings, topographic mapping, site plans, and profile/cross-section drawings.
Contour	A line of equal ground elevation on a topographic (contour) map.

Critical Facility	Facilities that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.
Debris	The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.
Digitize	To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates) for use in computer applications.
Displacement Time	The average time (in days) which the building's occupants typically must operate from a temporary location while repairs are made to the original building due to damages resulting from a hazard event.
Duration	How long a hazard event lasts.
Earthquake	A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.
Erosion	Wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.
Erosion Hazard Area	Area anticipated to be lost to shoreline retreat over a given period of time. The projected inland extent of the area is measured by multiplying the average annual long-term recession rate by the number of years desired.
Essential Facility	Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.
Extent	The size of an area affected by a hazard or hazard event.
Extratropical Cyclone	Cyclonic storm events like Nor'easters and severe winter low-pressure systems. Both West and East coasts can experience these non-tropical storms that produce gale-force winds and precipitation in the form of heavy rain or snow. These cyclonic storms, commonly called Nor'easters on the East Coast because of the direction of the storm winds, can last for several days and can be very large – 1,000-mile wide storms are not uncommon.

Fault	A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.
Federal Emergency Management Agency (FEMA)	Independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery.
Fire Potential Index (FPI)	Developed by USGS and USFS to assess and map fire hazard potential over broad areas. Based on such geographic information, national policy makers and on-the-ground fire managers established priorities for prevention activities in the defined area to reduce the risk of managed and wildfire ignition and spread. Prediction of fire hazard shortens the time between fire ignition and initial attack by enabling fire managers to pre-allocate and stage suppression forces to high fire risk areas.
Flash Flood	A flood event occurring with little or no warning where water levels rise at an extremely fast rate.
Flood	A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.
Flood Depth	Height of the flood water surface above the ground surface.
Flood Elevation	Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.
Flood Hazard Area	The area shown to be inundated by a flood of a given magnitude on a map.
Flood Insurance Rate Map (FIRM)	Map of a community, prepared by the Federal Emergency Management Agency, that shows both the special flood hazard areas and the risk premium zones applicable to the community.
Flood Insurance Study (FIS)	A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.
Floodplain	Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.

Frequency	A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.
Fujita Scale of Tornado Intensity	Rates tornadoes with numeric values from F0 to F5 based on tornado windspeed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while and F5 indicated severe damage sustained.
Functional Downtime	The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event.
Geographic Area Impacted	The physical area in which the effects of the hazard are experienced.
Geographic Information Systems (GIS)	A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.
Ground Motion	The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions
Hazard	A source of potential danger or adverse condition. Hazards in this how to series will include naturally occurring events such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.
Hazard Event	A specific occurrence of a particular type of hazard.
Hazard Identification	The process of identifying hazards that threaten an area.
Hazard Mitigation	Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.
Hazard Profile	A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

HAZUS (Hazards U.S.)	A GIS-based nationally standardized earthquake loss estimation tool developed by FEMA.
Hurricane	An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74-miles-per-hour or more and blow in a large spiral around a relatively calm center or "eye." Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160°E longitude. Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
Hydrology	The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.
Infrastructure	Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area's transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, drydocks, piers and regional dams.
Intensity	A measure of the effects of a hazard event at a particular place.
Landslide	Downward movement of a slope and materials under the force of gravity.
Lateral Spreads	Develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies in a seismic event. The phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.
Liquefaction	Results when the soil supporting structures liquefies. This can cause structures to tip and topple.
Lowest Floor	Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.
Magnitude	A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.

Mitigation Plan	A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the state and includes a description of actions to minimize future vulnerability to hazards.
National Flood Insurance Program (NFIP)	Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.
National Geodetic Vertical Datum of 1929 (NGVD)	Datum established in 1929 and used in the NFIP as a basis for measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or Mean Sea Level. The Base Flood Elevations shown on most of the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency are referenced to NGVD.
National Weather Service (NWS)	Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state entities in preparing weather and flood warning plans.
Nor'easter	An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain.
Outflow	Follows water inundation creating strong currents that rip at structures and pound them with debris, and erode beaches and coastal structures.
Planimetric	Describes maps that indicate only man-made features like buildings.
Planning	The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.
Probability	A statistical measure of the likelihood that a hazard event will occur.
Recurrence Interval	The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.
Repetitive Loss Property	A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978.
Replacement Value	The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type and quality.
Richter Scale	A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.

Risk	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.
Riverine	Of or produced by a river.
Scale	A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.
Scarp	A steep slope.
Scour	Removal of soil or fill material by the flow of flood waters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence.
Seismicity	Describes the likelihood of an area being subject to earthquakes.
Special Flood Hazard Area (SFHA)	An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V.
Stafford Act	The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.
State Hazard Mitigation Officer (SHMO)	The representative of state government who is the primary point of contact with FEMA, other state and Federal agencies, and local units of government in the planning and implementation of pre- and postdisaster mitigation activities.
Storm Surge	Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.
Structure	Something constructed. (See also Building)

Substantial Damage	Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.
Super Typhoon	A typhoon with maximum sustained winds of 150 mph or more.
Surface Faulting	The differential movement of two sides of a fracture – in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.
Tectonic Plate	Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.
Topographic	Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include manmade features.
Tornado	A violently rotating column of air extending from a thunderstorm to the ground.
Tropical Cyclone	A generic term for a cyclonic, low-pressure system over tropical or subtropical waters.
Tropical Depression	A tropical cyclone with maximum sustained winds of less than 39 mph.
Tropical Storm	A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.
Tsunami	Great sea wave produced by submarine earth movement or volcanic eruption.
Typhoon	A special category of tropical cyclone peculiar to the western North Pacific Basin, frequently affecting areas in the vicinity of Guam and the North Mariana Islands. Typhoons whose maximum sustained winds attain or exceed 150 mph are called super typhoons.
Vulnerability	Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment	The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.
Water Displacement	When a large mass of earth on the ocean bottom sinks or uplifts, the column of water directly above it is displaced, forming the tsunami wave. The rate of displacement, motion of the ocean floor at the epicenter, the amount of displacement of the rupture zone, and the depth of water above the rupture zone all contribute to the intensity of the tsunami.
Watershed	A watershed or water basin is the region of land that drains into a specified body of water, such as a river, lake, sea, or ocean. Rain that falls anywhere within a given body of water's watershed will eventually drain into that body of water. The term "watershed" can also mean the topographical dividing line between water basins: watersheds usually run along mountain ridges.
Wave Runup	The height that the wave extends up to on steep shorelines, measured above a reference level (the normal height of the sea, corrected to the state of the tide at the time of wave arrival).
Wildfire	An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.
Zone	A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

Appendix F: Local Agency Hazard Mitigation Summaries

In order to include hazard mitigation activities for all agencies operating facilities or critical infrastructure within the City of La Verne, the City requested a "Natural Hazard Mitigation Activities Summary." Please see the list below for agencies that were contacted and asked to submit such a summary.

- **University of La Verne**
- **Bonita Unified School District**
- **Metropolitan Water District**
- **Three Valleys Municipal Water District**
- **The Gas Company**
- **Verizon**
- **Three Valleys Municipal Water District**
- **Southern California Edison**
- **Southern California Water Co.**
- **Los Angeles County Department of Public Works**
- **Los Angeles County Flood Control District**
- **Los Angeles County Sanitation District**

These agencies were first contacted by letter and asked to submit a summary of hazard mitigation activities no later than July 23, 2004. During the 2012 update process, the same agencies were contacted and given until December 8, 2011. Agencies not submitting summaries were then directly contacted by phone and again asked for summaries. Some agencies expressed concern of submitting such documentation for security reasons and other agencies were not responsive. The following summaries are a representation of responses that were received.

Appendix F.1: Three Valleys MWD Hazard Activities Summary

City of La Verne Natural Hazard Mitigation Plan

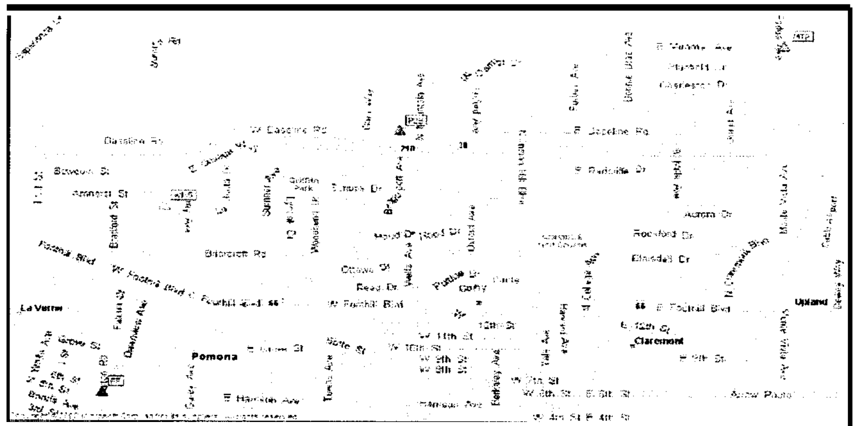
THREE

VALLEYS

MUNICIPAL

WATER

01STPICT



All Facilities Overview Map

Y RESPONSE PLAN

. ACTIVATE NEEDED EMERGENCY SERVICES AND 2. ASSESS THE SITUATION

COMPANY PERSONNEL

Local Law Enforcement

Pomona Police Department	911, Non-Emr.: **909 620-2155**
Claremont Police Department	**911,** Non-Emr.: **9091399-5411**
La Verne Police Department	911, Non-Emr.: **909 596-1913**
Upland Police Department	911, Non-Emr.: **909 946-7624**

Local Fire Stations

Los Angeles County Fire Department	**911,** Non-Emr.: **909 626-5096**
Pomona Fire Department	**911,** Non-Emr.: **909 620-2211**
La Verne Fire Department	**911,** Non-Emr.: **909 596-5991**
Upland Fire Department	**911,** Non-Emr.: **909 982-1352**

Local Medical Facilities

Pomona Valley Community Hospital	**911,** Non-Emr.: **909 865-9600**
San Dimas Community Hospital	**911,** Non-Emr.: **909 599-6811**
San Antonio Community Hospital	**911,** Non-Emr.: **909 985-2811**

Agencies

California Office of Emergency Services	**911,** Non-Emr.: **800 852-7550**
Water Quality Control	**909 782-4130**
National Response Center	**800 424-8802**
Environmental Protection Agency	**800 424-8802**
Los Angeles Dept. of Health Services	**2131580-5723**

Where is the emergency incident located ?

Are there are any injuries ?

Is there a fire ?

Is there a chemical release ?

Is a Security Breach involved ?

Are vehicles involved ?

Are emergency vehicles at the scene ?

3. PLAN YOUR RESPONSE

Refer to the pre-planned responses

Assist TVMWD personnel.

4. SECURE THE FACILITY AND PIPELINES

5. REPORT ON CONDITIONS

	Office	Cellular	Home
Richard W. Hansen - General Manager	909 621-5568	909 241-1725	626 335-6298
Carl Workman - Operations Superintendent	909 621-5568	909 241-2945	626 963-5891
Michael K. Holmes - Assistant General Manager	909 621-5568	909 675-7442	626 852-1984
James A. Palm - Administrative Service Officer	909 621-5568	909 217-7522	909 626-0771 (UL)
Jim Johns - Operations Manager	909 621-5568	909 238-4885	909 985-2711

Miramar Treatment Plant
1021 Miramar Avenue
Claremont, CA 91711
909 621-5568

Fulton Facility
2930 Fulton Road
Pomona, CA 91767
909 593-8114

Williams Hydroelectric Station
3949 Williams Avenue
La Verne, CA 91750
909 596-2374

Plant 2 Booster
888 West Baseline Road
Claremont, CA 91711

INTRODUCTION

EMERGENCY RESPONSE OVERVIEW

TABLE OF CONTENTS

I. PURPOSE OF THE EMERGENCY RESPONSE PLAN

The purpose of this Emergency Response Plan (ERP) is to:

- Protect the health of employees and the public
- Limit the impact of a crisis on services and resources
- Ensure a quick recovery following an emergency

and to provide guidelines for personnel who might respond to abnormal events at Three Valleys Municipal Water District (TVMWD) Facilities, including:

- Miramar Treatment Plant (MTP)
- Fulton Facility (FF)
- Williams Hydroelectric Station (WHS)
- Plant 2 Booster (P2B)

This ERP provides a reference for employees and contractors and for Municipal Emergency Response organizations such as the Los Angeles County Fire Department (LACFD), the La Verne Fire Department, the Pomona Fire Department, the Upland Fire Department, the Pomona Police Department (PPD), the La Verne PD, the Claremont PD, and the Upland PD. This ERP was also written with the intent of satisfying the emergency response plan requirements of:

- US EPA Security Vulnerability Assessment Initiative
- Process Safety Management (PSM) - compliance with 29 CFR 1910.119 (Process Safety Management of Highly Hazardous Chemicals)
- 40 CFR Part 68 - "Risk Management Programs for Chemical Accidental Release Prevention"
- CA H S Code, Title 19, Division 2, Chapter 4, Sections 2735-2785 - "California Accidental Release Prevention Program (CalARP)"

Other emergency response resources, that will be maintained as separate documents, but are accessible, and potentially useful, to emergency responders are:

- Emergency Handbook for Three Valleys Municipal Water District, revised January 2000.

II. EMERGENCY RESPONSE OBJECTIVES

The overall emergency response objectives of the TVMWD are to:

- Maintain, restore, or establish water services to meet requirements of emergency services and the essential needs of the community.
- Coordinate the pooling of utility personnel, equipment, and materials, when necessary.
- Provide an inventory of potable water sources during emergency conditions.

Policies and Procedures

Policies governing the operation of the TVMWD function during peacetime emergencies are provided below:

- All personnel, equipment, supplies, and transportation facilities of the TVMWD will be reserved primarily for TVMWD operations and restoration.
- Under major disaster conditions affecting a widespread area, TVMWD personnel stranded, or unable to report to work because of loss of transportation network, etc., should make every attempt to find alternate transportation routes and services.
- Information regarding the demand and availability, etc. of water will be furnished to government officials for use in informing the public regarding the conservation of the services.
- When required, personnel assistance and supplemental equipment and supplies will be requested through the TVMWD Emergency Operations Center (EOC). TVMWD may utilize pre-arranged Mutual Aid resources.
- Engineering equipment and supplies not available from TVMWD, inventory, warehouse, or normal suppliers will be requested through the EOC.

The major duties to be accomplished by the TVMWD during an emergency are:

- Provide essential water services.
- Manage repair crews.
- Meet city, county, and state established priorities.

Coordinate service from outside water departments.

- Provide and maintain an inventory of potable water resources.
- Develop priorities.

General Water System Response Activities (Extracted from "Emergency Handbook for Water Supply Managers")

- Act to protect life
- Preserve water in storage
  - Where water levels are high enough to threaten liquefaction, pump and store water in surface facilities.
  - Consider what can be saved and what can be sacrificed.
  - Lower water level in dams to reduce possibility of structural failure, if damage is apparent.
  - Assess damage to sewer system because it could contaminate water supply.
- Isolate areas that will take longest to restore service and arrange for emergency water distribution:
  - Establish collection points and ration water.
  - Spot plastic bottles at locations to serve immediate needs.
  - Get trucks with water tanks.
  - Start reserve pumping facilities.
- Identify areas that can be served with minimum of repair and list repairs.
- Set priorities on repair work.
  - Plan to restore service area-by-area.
  - Prepare and keep current a plan to restore service.
  - Get input from Emergency Operation Center on essential uses -Take into account the condition of feeder lines.
  - Keep in mind the need for fire protection.
  - Determine if imported water is available.
  - When work exceeds capabilities ensure that the EOC is notified.

III. PHASES OF EMERGENCY MANAGEMENT

The four phases of emergency management employed before, during, and after an incident are identified as Preparedness, Response, Recovery, and Mitigation (as illustrated below).

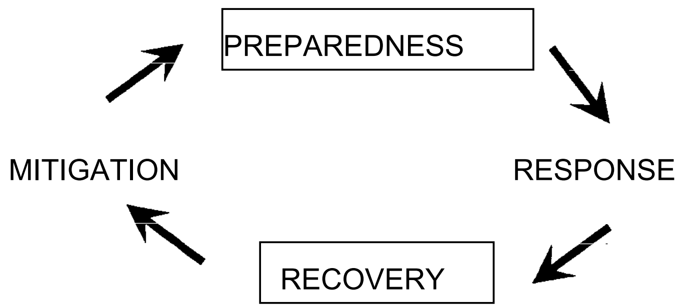


Figure III-1: Four Phases of Emergency Management

NOTE: In emergency management and as used in this Emergency Response Plan, the term "mitigation" refers to the process of eliminating or reducing the effects of future emergencies and disasters. It is a phase within the overall concept of operations. However, within the hazardous materials discipline, the term "mitigation" is used within the response phase to mean the stopping or elimination of the cause of a release, or a reduction of the serious health and safety or environmental risks it poses; and within the recovery phase to refer to the process of cleaning up or restoring the environment to a safe or original (pre-release) state. (Source: California Hazardous Materials Incident Contingency Plan, draft August 1999)

Preparedness

The preparedness phase consists of conducting hazard or risk analysis; identification of agency roles and responsibilities; developing emergency response plans and procedures; mutual aid or assistance agreements; response resources; and conducting training, drills, and exercises to test the plans, procedures, and training. It also includes a medical surveillance program to protect the health and safety of responders. Lastly, preparedness includes the development of inspection and enforcement programs.

Response

The response to a hazardous materials emergency includes measures such as the implementation of emergency plans; activation of emergency operations centers; mobilization of resources; issuance of health and safety warnings and directions; provision of medical and social services assistance; enforcement of laws and regulations; and declaration of emergencies as enabled by appropriate legislation. This phase is designed to eliminate or control the immediate, acute threat to public health and the environment. A successful response may or may not completely eliminate the threat to human health and the environment.

Recovery

The recovery phase restores communities and or the environment to a safe or pre-emergency condition, and includes measures such as investigation and cleanup of remaining hazardous substances contamination, physical restoration and reconstruction of damaged facilities and the environment, counseling of victims, performing economic impact studies and implementing financial assistance programs, providing temporary housing or permanently relocating victims, and providing health and safety information. As the recovery phase is the transition from the response phase to a pre-emergency condition, post incident critique and follow-up are considered part of the recovery phase, as well, and are conducted as soon after the incident as possible.

Mitigation

The mitigation phase is the ongoing effort to prevent or reduce the impact that an incident will have on people, property, and the environment. It is preventative by definition and should not be confused with "site mitigation programs" designed to investigate and cleanup hazardous substances contamination. Mitigation processes include laws and regulations mandating prevention, inspection, and enforcement programs; development of zoning and land use management plans; education; and tax and insurance incentives.

IV. EVALUATION

Based on information provided by the TVMWD observer at the emergency site, the General Manager will make an evaluation prior to activation of the plan. When calling with notification of an emergency or imminent danger the following minimum information is required:

- Nature and type of emergency that has occurred.
- Location of emergency.
- Initial abatement and mitigation actions required.
- Safety equipment needed immediately for employee safety and public health protection.

The evaluation shall enable Management and other TVMWD personnel to plan and implement immediate and longer-term mitigation steps to the affected area.

<u>Emergency Classification System</u>

1. Routine Problem Areas

TVMWD personnel can occasionally be involved in emergencies which, although serious, are controlled by standard procedures and do not require notification of Civil authorities to control.

Some of these emergencies include:

- Pipeline breaks

  Blowouts of water lines

  Minor chlorine leaks

  Minor ammonia leaks
- Minor chemical spills

  Single total coliform violations of drinking water

  Minor accidents requiring first-aid

  Short duration power failures

  Variations in water quality such as high turbidity

  Intermittent low pressure in isolated areas

These types of problems are addressed in the "Incidents" subsection of Section 2 Response.

2. Classification of Emergencies

Simply stated, a disaster is an event, natural or manmade, which causes a community or a specific area to suffer danger or disruption of normal functions.

An emergency situation as defined in this plan is a failure of a TVMWD facility, a natural phenomenon, or a man-made event, which causes immediate destruction of property or threat to human life. An emergency situation requires an immediate decision by the area Supervisor Operator, and action by TVMWD employees assigned to the area.

3. Examples of emergencies discussed in this plan are:

a. Disasters: Level 2 or 3

- Earthquakes
- Major fire
- Drowning or other deaths
- Rupture of Cl_2, NH_3 or acute-hazardous-material-containing equipment
- Explosion
- Civil disorders, sabotage, or bomb threat
- Nuclear attack, Act of War, or Terrorist attack
- Major power outages critical to TVMWD facilities and or systems.

b. Local Emergencies: Level 1 or 2

- Drinking water emergencies:
  1) Failures in one fecal coliform or multiple total coliform tests
  2) Oil spills
  3) Toxic chemicals
  4) Radioactive fallout
  5) High coliform content
  6) Major failure to water delivery systems

4. Effects on TVMWD Operations

The above incidents may cause any of the following problems to TVMWD Operations:

- Curtailment of services
- Contamination of water supplies
- Rationing of water
- Personnel contamination
- Large-scale loss of water
- Loss of power with coincident disruption of service
- Failure of pumping facilities, treatment, and or storage
- Disruption of communications
- Interruption of maintenance and repair operations

Abnormal events include both Incidents and Emergencies. An Incident is an abnormal event that can be safely and effectively controlled by employees at the facility, whereas an Emergency is an abnormal event that requires the immediate assistance of outside agencies. Although this ERP contains pre-planned action guides to address incidents, the main focus of the document is to provide structure and guidance to employees to effectively respond and mitigate emergencies.

According to adopted State, Federal, and other governmental agencies' policies, an emergency can be classified into one of three levels of severity: Minor (Level I), Major (Level II), Catastrophic (Level III). This rating system provides a universal standard for determining how and when to initiate an emergency response. These response levels can be utilized for all types of emergencies in addition to earthquakes, for which they were originally designed.

In the case of earthquakes, the Richter and Modified Mercalli Intensity Scales will be utilized to further define the various levels of an emergency. Exhibit 2.2.6.A (in Section 2.2.6) provides a comparison of the two scales. For other emergencies, the level of severity will be determined in a subjective manner.

- LEVEL 1 - MINOR EMERGENCY: A minor to moderate incident wherein local resources are adequate and available - Examples:
  - local flooding
  - short-term power or communications failure over portions of TVMWD service area
  - minor earthquakes (See Section 2.2.5 for additional details) Note:

  These events may result in TVMWD Incident Command activation.
- LEVEL II - MAJOR EMERGENCY: A moderate to severe emergency wherein local resources are not adequate and mutual aid may be required on a regional or state-wide basis - Examples:
  - regional flooding
  - dam failure
  - power or communications failure throughout the District's service area
  - strong to very strong earthquakes

  Note: These events may require either TVMWD or External Incident Command.
- LEVEL III - CATASTROPHIC EMERGENCY: A major disaster wherein resources in or near the impacted area are overwhelmed and extensive state and or federal resources are required - Examples:
  - catastrophic earthquakes
  - major hurricanes Note: These events are likely to require External

  Incident Command.

V. RESPONSE LEVELS

TVMWD's primary objective and initial response to an emergency will be to determine the level of mobilization necessary to save lives, maintain personnel and public safety, and to protect the environment and property. Initially, preliminary inspection of TVMWD's facilities after an emergency will dictate the level of mobilization that is required.

Mobilization levels have been defined in Table V-1, "TVMWD Levels of Alert and Emergency Response Activation".

Table V-1: TVMWD LEVELS OF ALERT AND **EMERGENCY RESPONSE** ACTIVATION

EVENT/SITUATION	**LEVEL of ALERT**	NOTIFICATIONS AND STAFFING
Normal Daily Operations: ■ Typical problems and occurrences such as small localized power failures ■ No immediate threat to public or employee safety	**ONE**	Standard on duty staffing levels ■ Personnel response to problems and incidents around the clock
Moderate: Earthquake (3.5 - 5.0) - within the District's service area ■ Severe storm likely to impact the area Likelihood of major flooding ■ Power outage of significance with multiple facilities involved and or member agencies impacted ■ Destructive winds ■ Wildfire impacting operations ■ Hazardous material spill or release ■ Water quality or regulatory concern ■ Pending situation with serious consequences ■ Water demands likely to exceed available supply or capacity	TWO 2	**Working Hours:** ■ The General Manager and all department heads are to be notified by Operations Superintendent of Alert Status 2 and informed of the District's situation ■ EOC may be activated and staffed by available personnel as listed in Appendix "A" After **Hours:** ■ The General Manager and all department heads are to be notified by Operations Superintendent of Alert Status 2 via the District's emergency radios (channel 1) ■ Additional staff are called to respond as needed EOC may be activated and staffed by available personnel as listed in Appendix "A"
Significant: Earthquake (5.0) within or close to the District's service area Multiple Severe storm related problems Flooding with significant operations impact ■ Major power outage of unknown duration ■ Substantial water system incidents involving numerous outages, facility damage, regulatory and or public health and safety concerns	**THREE** **3**	**Working Hours:** ■ Operations section of the EOC is to be activated ■ The General Manager and all department heads are to be notified by Operations Superintendent of Alert Status 3 and informed of the District's situation The entire EOC may be activated and staffed by available personnel as listed in Appendix "A" After **Hours:** ■ Operations section of the EOC is to be activated. ■ The General Manager and all department heads are to be notified by Operations Superintendent of Alert Status 3 via the District's emergency radios (channel 1) Additional staff are called to respond as needed ■ The entire EOC may be activated and staffed by available personnel as listed in Appendix "A"
Major Catastrophic: ■ Large Earthquake (5.5) within or close to the District's service area Severe flooding ■ Long-term power outage	**FOUR** **4**	**Working Hours:** EOC is to be fully activated After **Hours:** EOC is to be fully activated. All personnel are to report to duty after securing their family situation. Employees should anticipate remaining at the District for an extended period of time.

VI. RESPONSE PHASES

Phase I — **Initial Inspection:** Rapid inspections are conducted to determine injuries and any damage that might affect the distribution system.

Phase II — **Report Back and Follow-up Inspection:** Emergency communication flow is initiated.

Phase III — **Repair:** Field personnel are coordinated to conduct repair of damaged facilities.

Phase IV — **Management Activation:** General Manager, department heads and other designated management report to the EOC to assume and coordinate emergency responsibilities.

Phase V — **Full Mobilization:** All available employees are mobilized, and outside assistance may be requested.

<u>All Other Emergency and Non-Emergency Personnel</u>

All personnel not required to automatically respond to an emergency while off-duty will report to their regular work location at their regularly scheduled times.

<u>Treatment Plant Inspection</u>

On-duty treatment plant personnel will evaluate the operating condition of the plant, including the primary and emergency power equipment, influent-effluent water flow, reservoirs, chemical feed systems, and treatment system. A quick inspection of the entire plant for any significant damage shall be completed as soon as possible.

Operators will immediately inspect and analyze all necessary checklists and charts, if any, to identify any process disturbances and critical areas that require attention.

Plant operators will immediately read all instruments to determine changes in flow rates. If significant changes are found, immediately notify the appropriate personnel.

<u>Operational Changes</u>

During an emergency, the distribution system will be managed by the Treatment Plant Operators. Water shall be routed to maintain service, as deemed necessary, by the IC, or General Manager. **No operational changes in the distribution system are to be initiated without the consent of the IC or General Manager or Treatment Plant Operator, unless an immediate danger to life or property exists.**

VII. REPORTING REQUIREMENTS

The 1994 Uniform Fire Code, Article 13, Section 1302.2, ("Reporting Emergencies"), states: "In the event a fire occurs or the discovery of a fire, smoke or unauthorized release of flammable or hazardous materials on any property occurs, the owner or occupant shall without delay report such condition to the fire department." This is one of the bases for notifying 911 Municipal Emergency Services as one of the first emergency response actions. This notification may also be one mechanism for ensuring that other parties are informed if the response to an incipient stage event can not be readily controlled.

This is also reinforced by CCR Title 19, Chapter 4, Article 2 ("Reporting Requirements"). Section 2703 ("Immediate Reporting of a Release or a Threatened Release") states:

(a) "A person shall provide an immediate, verbal report of any release or threatened release of a hazardous material to the administering agency and the Office of Emergency Services as soon as:

(1) a person has knowledge of the release or threatened release;

(2) notification can be provided without immediate control of the release or threatened release;

(3) notification can be provided without impeding immediate emergency medical measures."

The above regulatory requirements use terms such as "immediate reporting" and "without delay report". From a practical perspective, site events such as releases can fall into one of three general categories:

1) a clear potential for imminent on-site or off-site health or environmental impacts
2) potential on-site or off-site health or environmental impacts
3) very remote potential for on-site or off-site health or environmental impacts

It is clear that Category 1 requires immediate assistance and an immediate 911 call. Category 2 may require rapid size-up to characterize the likelihood of on-site or off-site health or environmental impacts. Category 3 may utilize a reporting mechanism authorized by the administering agency. When in doubt, there should be no hesitancy in summoning the appropriate emergency response agencies by using 911.

The following is offered as a practical protocol and is not intended to represent an agreement by any agency to contradict reporting requirements as defined by the Uniform Fire Code or the CCR. It should be noted that this is simply intended to be a reflection of an operational understanding between the TVMWD and the appropriate municipal response authority.

Use 911 for immediate notification, as described above, unless all available information immediately identifies the release fire to be small enough or sufficiently contained as to not present any credible potential for off-site consequences or on-site injury. Note that 911 may also be used to immediately report and describe events that may be limited or under control, and not require a Code 3 response by the agency.

Use 911 for immediate notification:

- if injuries requiring medical attention have occurred or are suspected,
- if TVMWD has had to evacuate any individuals from any of its facilities, or
- if there is any potential for an incipient stage event propagating to a potential for requiring assistance

Discovery of Reportable Incident

When discovering an unusual incident, the first priority of the observing personnel is to determine whether the situation is immediately life threatening. If any circumstance poses an immediate danger to human health or safety, the discovering personnel shall proceed to:

1) Call **"911"** (outside line) or other known telephone numbers for emergency services in the area;
2) Report the situation to your supervisor; and
3) Notify the Administrative Services Officer to mobilize the proper response.

Assessment of Reportable Incident

The **Administrative Services Officer** or his on-duty designee will size-up the incident and evaluate the severity of the situation and determine if the situation constitutes an emergency or reportable incident. The **Administrative Services Officer** or his designee will proceed to direct the appropriate response to management and the appropriate Emergency Response Team personnel, and maintain communication with the Incident Commander to provide appropriate progress updated.

In the event of **a potential hazardous materials emergency incident** at a field location; the Miramar Treatment Plant (MTP) will be immediately notified of the situation by the appropriate field personnel. The **Administrative Services Officer** or his designee will then proceed to make arrangements to contact, as necessary, the members of the Emergency Response Team.

Following evaluation of the situation, the **Administrative Services Officer** or his designee will decide whether or not the situation is to be declared a reportable incident, and will discuss any findings with management. If deemed appropriate, the emergency response plan will be activated and a command center will be established.

Response to Reportable Incident

If an emergency or reportable incident is declared, the **Administrative Services Officer** or his designee will notify the **General Manager** whom will assume the role of IC. Through communication with management, the IC will activate the Emergency Response Team members and other appropriate emergency personnel. It should be noted that, at any time, the IC may delegate some of his responsibilities, as appropriate.

During the emergency response, the IC will manage and direct all activities from the EOC. Responding outside agency personnel will be requested and directed to check in at the command post before being directed to the site of the incident.

Throughout the response, the IC will be responsible for maintaining the flow of communications to management. The **Administrative Services Officer** or his alternate will be responsible for establishing communications with the management. The IC will oversee the activities of the Emergency Response Team members.

External Reporting Procedures

In addition to their internal responsibilities, the Emergency Response Team (ERT) members will coordinate the required immediate verbal and written notifications to all the required federal, state, and local agencies. Dangers from release, fire, or explosion, which could immediately threaten human health or the environment, will be immediately reported to local authorities by the IC. The IC shall:

a. Determine if the evacuation of local areas may be advisable. The IC shall immediately have appropriate local authorities notified, and shall be available to assist appropriate officials in determining whether local areas should be evacuated;

b. Immediately direct the appropriate individual to notify all required federal, state, and local agencies. The report shall include:

- Name and telephone number of reporter;
- Name and address of facility;
- Time and type of incident (e.g. release fire);
- Name and quantity of material(s) involved, to the extent known;

- The extent of injuries, if any; and
- The possible hazards to human health or the environment outside the facility.

c. Ensure that a written record of each required notification is made that includes the following:

- The agency called;
- The name of the person making the notification;
- The name of the agency employee to whom notification was made;
- The date and time of the call;
- An identifying incident or report number, if available; and
- Any comments, or instructions, received from the agency.

d. Maintain all notification records at the EOC during the incident and forward them to the **Administrative Services Officer** at the incident's conclusion.

VIII. COMMAND STRUCTURE

TVMWD's response operations will be managed and directed by TVMWD personnel using the Incident Command System (ICS) which is used by most public agencies, including fire departments, police departments, etc. During the course of an incident or an emergency, the first responder will initially act as the Incident Commander (IC), and the level of response, as noted above, may be escalated based on the judgment of the IC at the time. The first responder, subsequent line managers, and TVMWD Emergency Response Team (ERT) personnel are expected, and fully empowered, to act as the IC and direct all response activities until termination of the emergency or until relieved by a person of higher authority. TVMWD endorses the principle of "over responding," and employees should not hesitate to engage **whatever resources they may feel are necessary** to effectively mitigate an emergency.

TVMWD's overall response to an emergency which poses a potential for widespread impact on its water system will be directed by the **General Manager** who assumes the role of Incident Commander (IC). The IC will manage TVMWD's wide response from the District's Emergency Operations Center (EOC), along with the **Administrative Services Officer,** which is located at the Miramar Treatment Plant at 1021 Miramar Avenue.

During the assessment period, emergency response, and recovery phase, all appropriate staff will be under the direction of the IC. This transfer of responsibilities is critical in order to ensure that all actions will be properly organized and coordinated. Key IC responsibilities include:

- evaluating the risk potential;
- determining source and possible effect;
- delegating responsibility and authority;
- assessing priorities in terms of manpower, materials, and equipment;
- mobilizing and managing proper response effort, both internal and external; and
- establishing communications with management.

The IC will be assisted by members of the **Emergency Response Team.** The primary objectives of the Emergency Response Team include assisting in the decision-making process prior to declaration of an emergency, providing exert assistance to the IC during an emergency, and interfacing with other outside agencies and parties during an emergency response.

Unified Command

Note: Consistent with the 1994 Uniform Fire Code, Section 104.1, "Authority at Fires and Other Emergencies," municipal authorities have sole authority over the abatement of fires, acute hazardous conditions, and related emergencies, both on-site and off-site.

The municipal authority does not have the latitude to relinquish its authority and or responsibility for emergency response and abatement within its jurisdictional boundaries.

One of the key reasons for using a standardized ICS approach is the ability to adapt the emergency response to the particular event. Standardized ICS provides an organized platform for readily and rapidly integrating other emergency response organizations that also use a standardized ICS, e.g.: municipal emergency response organizations and industrial mutual aid companies.

Following the arrival of Municipal Emergency Services, and at the discretion of the Municipal Emergency Services Incident Commander, a Unified Command ICS structure may be established. For a Unified Command structure, key like-positions of both emergency support teams are paired and decisions are typically made jointly; however, the Municipal Emergency Services Incident Commander retains ultimate authority. These authorities apply to command and control issues, as well as location of the Incident Command Post. If a Unified Command is established, Incident Commanders should be co-located to facilitate Unified Command communication.

IX. GENERAL STRATEGIES

This ERP for the Three Valleys Municipal Water District (TVMWD) is not meant to replace common sense or other more appropriate actions that may not be mentioned in the plan. Responders during an abnormal event should continually evaluate the effectiveness of the actions recommended in this ERP and make the appropriate adjustments to the response based on past experience and training.

Although this plan provides a framework for emergency response, it does not attempt to identify and discuss every potential situation or problem which may result during an emergency. A situation may develop which warrants quick operational changes in order to prevent serious danger of life and/or extensive property damage. In most cases, such time-sensitive decisions shall be made by personnel initially encountering the potentially dangerous situation. Actions which could have a significant effect on other portions of the distribution system, or which are considered major, should only be taken if they are absolutely necessary in the judgment of personnel that initiate such actions.

X. STANDARDIZED EMERGENCY MANAGEMENT SYSTEM (SEMS)

Legal Basis

The legal basis for the implementation of SEMS in the TVMWD Emergency Response Plan is through Senate Bill (SB) 1841, which was passed by the State Legislature and became effective January 1, 1993. The law was in response to emergency coordination problems encountered during the 1991 East Bay Hills Fire in Oakland, and is found in Section 8607 of the California Government Code. The intent of the law is to improve the coordination of State and Local Emergency Response to disasters in California.

The TVMWD has adopted the Standardized Emergency Management System (SEMS) as described and required by Government Code Section 8607(a) for managing response to multi-agency and multi-jurisdiction emergencies in California. SEMS is an integrated management system, which provides for five (5) emergency response levels, including:

1) Field (On-scene Responders)
2) Local Government (City EOCs)
3) Operational Area (County-wide Level)
4) Region (Multiple Operational Areas)
5) State (OES)

The Standardized Emergency Management System (SEMS) and the Incident Command System (ICS) will be used in all TVMWD emergency response operations. It provides effective Emergency Response Management, proper span of control, and assigns response functions into the various sections based upon commonalties, relationships, and agency assignments.

Key functions performed within SEMS

1) **Command Management** is responsible for overall emergency policy and coordination through the joint efforts of governmental agencies and private organizations. This function is called Command in the field and Management in the EOC. Multi-jurisdiction incidents will involve a Unified Command element, which will bring together jurisdictional Incident Commanders to develop a coordinated Action Plan to make the best use of all available resources.

2) **Operations** is responsible for coordinating all jurisdictional operations in support of the response to the emergency through implementation of the organizational level's action plan. An Operations Chief, who is responsible for the management of all incident tactical activities, heads the Operations Section. On multi-disciplinary incidents, the Operations Section Chief may have deputies. The Operations Section can be subdivided into Operational Groups (Fire OPS 1, Law 2, etc.) Branches,

Groups, and Units. Staging areas for resources are also under the management of the Operations Section.

3) **Planning Intelligence** is responsible for collecting, evaluating, and disseminating information, developing the organizational level's action plan in coordination with the other functions, and maintaining documentation. The Planning Intelligence Section is headed by a Planning Section Chief and is divided into several smaller units, depending upon the needs of the incident. Situation Status, Resources Status, and Damage Assessment are examples of the kinds of units that may be formed within this Section. The Planning Section collects and analyzes all data regarding incident operations, develops alternatives for tactical action plans, conducts planning meetings, and prepares the Incident Action Plan for incidents, which will require extended operational periods.

4) **Logistics** is responsible for providing facilities, services, personnel, equipment, and materials. The Logistics Section is headed by the Logistics Section Chief, and is responsible for meeting the logistical needs of the Operations Section. The Logistics Section can be divided into Branches and Units, as the situation requires.

5) **Finance Administration** is responsible for financial activities and administrative aspects not assigned to other functions. The Finance Administration Section will be activated when required for purposes of maintaining records on personnel and equipment time; for providing payments to vendors for supplies and equipment usage; and for determining the cost considerations or various alternative strategies associated with incident planning.

6) **Recovery** (a sixth function added as a result of lessons-learned from response to the 1994 Northridge Earthquake) is responsible for coordinating the financial, short-and long-term, recovery efforts of both private and public sector entities involved in a disaster. The Recovery Section will be activated at the initial stages of a disaster response and will start the process of collecting the required documentation for future OES and FEMA reimbursement filing.

Appendix B contains a detailed checklist of responsibilities and response actions for each ICS unit.

SEMS also incorporates the use of five (5) key concepts:

1) Incident Command System (ICS)
2) Multi-Agency Coordination System (MACS)
3) Master Mutual Aid Agreement (Mutual Aid)

4) Operational Area (OA)

5) Operational Area Satellite Information System (OASIS) **The following is a description of the individual components of SEMS**

- **The Incident Command Systems (ICS)** was developed initially as part of the FIRESCOPE program during the 1970's by an inter-agency working group representing Local, State, and Federal Fire Services in California. The ICS was adopted by the Fire Services in California as their standard response system for all hazards. The ICS was also adopted by the federal land management agencies as the standard for response to all wildland fires nationally. A national, generic version of ICS is now in place.
- **The Multi-Agency Coordination System (MACS),** as it applies to SEMS, is actually inter-agency coordination, and means the participation of agencies and disciplines involved at any level of the SEMS organization. These agencies work together in a coordinated effort to facilitate decisions for overall emergency response, sharing critical resources, and prioritizing incidents.
- **The Master Mutual Aid Agreement** was initially signed in California in 1950 and was an agreement among cities, counties, and the State to join together in a comprehensive program to voluntarily provide services, personnel, and facilities when local resources were inadequate to handle an emergency. The Master Mutual Aid Agreement now contains discipline-specific Mutual Aid Systems that function on a statewide basis.
- **Operational Areas (OA's)** consist of counties, and all political subdivisions within a county area. The governing bodies of each county, and the political subdivisions within each county, have organized and structured their individual Operational Areas.
- **The LA County Operational Area (LACOA)** is responsible for the coordination of resources and information, and acts as a link in the system of communications and coordination between the State's Regional EOC (REOC), the LA County EOC, and the EOC's of individual LA County jurisdictions. The specific Coordinators of the LACOA are determined based on the type of emergency the County will be responding to.

Law Enforcement	**Public Works**
Earthquake	Dam Failure
Civil Disturbance	Flood
Nuclear Power Plant Emergency	Storm
Terrorism	
Act of War	

Fire and Rescue	**Health Care**
Fire Oil Spills Hazardous Material Release Mass Casualty	Threat of Declared Epidemic

Any emergency, not specifically indicated above, would be assigned to a Mutual Aid Coordinator, as defined by the type of emergency and applicable State or Federal laws. Coordination of resources under Fire, Law Enforcement, and other systems with formal adopted Mutual Aid plans, will follow their respective systems, protocols, and procedures.

Operational Area Satellite Information System (OASIS) is a satellite-based communications system with a high frequency radio backup. OASIS provides the capability to rapidly transfer a wide variety of information between agencies using the system. In SEMS, OASIS can be viewed as both a communications network and an information dissemination system, linking (3) three of the (5) five emergency response levels (State, Region, and Operation Area).

The informational processing component of OASIS contains fifteen (15) forms that provide a rapid and accurate means of transferring information between locations on the OASIS network.

As required by law under SEMS, the following elements have been incorporated into the TVMWD Emergency Response Plan:

- Use of SEMS in all future emergencies.
- Use of the SEMS functions (Management, Operations, Planning Intelligence, Logistics, Finance Administration, and Recovery).
- Management by objectives, action planning, modular organization, organizational unity and hierarchy of management, span of control, personal accountability, common terminology, resource management, and integrated communications.
- Use of ICS at the field level by all responding units, and personnel.
- Arrangements for the provision of direction and control, including internal personnel notification recall rosters and implementation methods. This should include a communication system to implement call-back of personnel assigned to the EOC, and other response teams.
- Specific emergency authorities that may be assumed by a designated successor during emergency situations and circumstances under which emergency authorities would be terminated.

- Designation and establishment of communication systems and dispatch centers to manage TVMWD resources and response personnel, and maintain contact with the EOC during emergencies.
- Designation of a representative to report to the EOC, during an emergency, to advise the Policy Group and coordinate the TVMWD's response efforts with other responding entities.
- Reporting appropriate information as to damage sustained, casualties, evacuation status, radiation levels, chemical exposure, etc, to the EOC Staff during an emergency.
- Provide for support of clean-up and recovery operations during and after emergencies.
- Training of assigned response staff and volunteers to augment emergency function performance.

Four Phases of Emergency Management

The four phases of emergency management include preparedness, response, recovery, and mitigation. For additional information, see Section III - "Phases of Emergency Management".

XI. TVMWD EMERGENCY OPERATIONS CENTER (EOC) ACTIVATION PROCEDURE

- Check-in prior to assuming assignment
- Respond aggressively to the emergency, but always consider safety in all actions taken
- Initiate all action based on current and expected situation
- Recognize current weather conditions and obtain forecasts
- Ensure instructions are given and understood
- Obtain current information on emergency status
- Remain in communication with crew members, your supervisor, and adjoining forces
- Determine safety zones and escape routes
- Establish lookouts in potentially hazardous situations
- Retain control at all times
- Stay alert, keep calm, think clearly, act decisively
- Document all actions taken, listing personnel, vehicles, and materials involved
- Demobilization upon completion of Operation

For additional information see Section V - "Response Levels", Table V-1 - "TVMWD Levels of Alert and Emergency Response Activation".

XII. ADDITIONAL INFORMATION

The following individual may be contacted for further information regarding this emergency response plan:

Mr. James A. Palm - 909 621-5568 - TVMWD Administrative Services Officer

The Administrative Services Officer is responsible for periodically reviewing and ensuring necessary changes and revisions to this plan are completed, coordinated, published, and distributed. The annual review of this plan (and other documents that provide the legal basis for emergency planning) ensures compliance with SEMS and other applicable state-mandated emergency management programs.

XIII. ACKNOWLEDGMENT

The following acknowledges the participation and contribution of the following individuals for the Three Valleys Municipal Water District Emergency Response Plan:

Emergency Response Plan, Revision 0 - September 2003

Three Valleys Municipal Water District (TVMWD)

- James A. Palm

Risk Management Professionals, Inc.:

- Don J. Julitz
- Steven T. Maher, PE CSP
- Maria G. Monge
- Kristin D. Swihart

Emergency Response Plan, Revision 1 - December 2003

Three Valleys Municipal Water District (TVMWD)

- James A. Palm

Risk Management Professionals, Inc.:

- Steven T. Maher, PE CSP
- Maria G. Monge

Please direct any questions or comments to the TVMWD Administrative Services Officer, or Risk Management Professionals Staff at 949/347-8622

Appendix F.2: Metropolitan Water District of Southern California

City of La Verne Natural Hazard Mitigation Plan

Hazard Mitigation

This document describes the process the Metropolitan Water District (Metropolitan) uses for hazard mitigation and planning. The purpose of this document is to affirm that Metropolitan actively engages in threat mitigation and to identify highlights of this process that may assist cities and counties in their own mitigation planning within Metropolitan's service area.

The Metropolitan Water District of Southern California is a cooperative of 26 cities and water districts that provides drinking water to nearly 18 million people in parts of Los Angeles, Orange, San Diego, Riverside, San Bernardino and Ventura counties. The mission of the Metropolitan Water District of Southern California is to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way. Metropolitan currently delivers an average of 1.7 billion gallons of water per day to a 5,200-square-mile service area.

Metropolitan operates a mature emergency management program to plan for and mitigate the impacts of emergencies before they become disasters. We use the Standardized Emergency Management System (SEMS) in our preparedness and response efforts. As a water wholesaler, we have a primary obligation to sustain communications and support for our 26 member agencies which, in turn, are directly accountable to the public in the areas they serve. We follow an all-hazards approach in planning for emergencies. We also consider a broad array of natural disasters and induced catastrophes in conducting exercises for our responders. We have assessed the vulnerability of our infrastructure to a variety of hazards and taken steps to address identified vulnerabilities. We have also supplied detailed information from our vulnerability assessment to the federally designated lead agency for our part of the critical infrastructure, the Environmental Protection Agency (EPA). [Note: Two presidential directives, PDD-63 and HSPD-7 have designated and redesignated EPA in this role for the water infrastructure.] Additionally, we have followed federal mandates in safeguarding details of our vulnerability assessment and operations in order to avoid inadvertently supplying a potential adversary with details to exploit in targeting the water supply.

Planning

Since the Sylmar Earthquake of 1971, Metropolitan has maintained an emergency management program that ensures readiness for a variety of major emergencies. We continually update response plans and contact lists, and one in every six employees is a member of a trained, multi-disciplinary emergency team that dispatches to all reaches of Metropolitan’s service area to assess and respond to the specific needs of each event. When field assessment is needed, team members on pre-established patrols report status information to regional command centers, which in turn report to the main Emergency Operations Center (EOC), to facilitate a quick and comprehensive assessment of impact and needs. Metropolitan employs extensive and regionally distributed pipeline teams, and combines them with the unique capabilities of a full-service fabrication shop, engineering teams, and specialty construction services teams to enable the manufacture and installation of most kinds of repairs using in-house resources. In addition, Metropolitan has access to several mutual aid and contract mutual assistance resources, which augment in-house capabilities.

Testing the Plans

To ensure Metropolitan's ability to respond effectively to an emergency, we schedule and conduct monthly briefings, orientations, or disaster exercises as part of an ongoing training program for employees tasked with emergency response actions. We develop realistic scenarios for each exercise, covering both natural disasters and induced catastrophes, such as terrorist threats. Exercises vary from tabletop discussions to those involving large numbers of employees at multiple locations.

Metropolitan further strengthens field response capabilities by responding to the special requirements of shutdowns where we shut off a pipeline for a brief period in order to perform scheduled maintenance or emergency repairs. These activities involve the same kind of intense, round-the-clock deployments of crews and resources that we use under emergency conditions, as there is always great sensitivity about turning off any portion of the water supply, even when we have redundant water distribution lines in operation. This hands-on experience provides the opportunity throughout the year to use and improve emergency repair skills.

In addition, we conduct annual high-rise fire safety training for employees assigned to Metropolitan's headquarters and annual evacuation drills at all facilities, to fulfill both federal and state fire safety code requirements.

Mutual Assistance/Mutual Aid

Metropolitan participates in several mutual assistance and mutual aid agreements. The purpose of the agreements is to provide support when a disaster exceeds a single utility's capacity for recovery. Pure mutual aid comes free of charge, as there is no reimbursement by the requestor for costs of resources, such as personnel, materials, or equipment. Mutual assistance, on the other hand, provides for reimbursement by the requestor for services and resources used. Metropolitan has access to a number of vehicles for obtaining help in an emergency, including MARS, WARN, the State Master Mutual Aid Agreement, and the CUEA, as described below.

Our unique Member Agency Response System (MARS) is a mutual aid agreement among Metropolitan's member agencies. It is also a radio system for emergency communications in a disaster. Metropolitan and its member agencies conduct regular monthly MARS radio tests, and we have used the MARS radio for checking status after earthquakes. The MARS agreement is useful for localized emergencies where requestors are likely to be able to get aid from other agencies within the service area. MARS is also a forum for sharing information and training.

Water and Wastewater Agency Response Network (WARN) is a statewide mutual assistance agreement that includes public and private utilities. The WARN agreement includes language that provides for reimbursement to the lending agency. A major advantage of WARN is that if there is a large disaster, an agency in one part of the state can request assistance from another part of the state that might not have any damage. Having a legal agreement in place ahead of time can save delays in getting crews and equipment on the road. Metropolitan is the WARN administrator for Southern California.

The State Master Mutual Aid Agreement is the umbrella for all public agencies and political subdivisions in California. Governor Earl Warren signed it into law in 1950. The agreement specifies that there is no reimbursement to the lending agency unless otherwise expressly provided by the participating agencies. An agency or political subdivision is not obligated to provide assistance or aid if doing so will unreasonably deplete its own resources.

The California Utilities Emergency Association (CUEA) is a voluntary statewide association of dues-paying utilities of all types, including telecommunications, electricity, natural gas, water, and wastewater, both public and private. In a disaster, CUEA fills the utilities chair in the State Operations Center (SOC), and it is responsible for helping to coordinate mutual aid and mutual assistance. Metropolitan holds a seat on CUEA's board of directors.

External Coordination

As a regionally active, State-chartered special district, Metropolitan maintains working relationships with the political subdivisions in the areas we serve. Through our EOC we operate a 24-hour capability to respond to emergencies affecting our infrastructure, service area, and member agencies. The vast expanse of our service area crosses so many jurisdictional lines that it would take several times our employee population to assign representatives to each political subdivision where we provide service or operate infrastructure components. So, while we are not able to provide liaison for its own sake, we do work closely and meet regularly with local and regional authorities on a recurring and issue-specific basis. This routine, operational involvement includes

- REOC, the Regional Emergency Operations Center for the Governor's Office of Emergency Services at Los Alamitos.

- TEW, the Terrorism Early Warning Group created in Los Angeles County and now extending to other jurisdictions throughout the nation.

- CUEA, the California Utilities Emergency Association, which coordinates mutual aid and mutual assistance during emergencies.

- WARN, the Water/Wastewater Agency Response Network, a system of mutual assistance which expedites availability of resources throughout California to water utilities in need from sister utilities that are not in the geographical area that was affected by a given disaster.

- MARS, our Member Agency Response System, a program for providing mutual aid to our member agencies affected by a disaster and also a forum for sharing emergency planning and mitigation lessons.

- EPA's WSWG, or Water Security Working Group, a subset of the National Drinking Water Advisory Council, where we hold the only position within California as a representative to the EPA body tasked with identifying best practices in the arena of protection of the water supply.

Mitigation

Metropolitan employs several mitigation strategies to reduce potential damage from various hazard exposures:

1. Redundancy. Metropolitan's system was designed with a high degree of redundancy in mind, so flow options are available to isolate damage for repairs. In addition to pipeline redundancy, other design strategies have been employed to mitigate the effects of outages, including a six-month water supply stored in reservoirs, multiple aqueduct supply source options, interconnections with other water supply systems, and redundant treatment options.

2. Seismic design. New facilities are constructed to high seismic standards, and Metropolitan's teams of in-house engineers, seismologists and dam safety staff ensure ongoing monitoring, retrofitting and safety of water structures.

3. Quick assessment and response capability. Through the use of ground patrols, company airplanes, and automated sensing and monitoring equipment, Metropolitan can quickly assess its condition after an incident, providing for a concerted and organized response effort for affected facilities. Coupled with the capabilities mentioned in "Planning" above, Metropolitan can mitigate impacts to the area directly affected by the damage as well as the area which the facility serves.

4. Business continuity program. Metropolitan recognizes the importance of business systems critical to maintaining a robust response capability. The business continuity program ensures that identified critical business systems survive, or can be restored within pre-identified recovery time objectives, to ensure essential support to emergency response efforts.

Appendix F.3: Southern California Edison

City of La Verne Natural Hazard Mitigation Plan

Hazard Mitigation Planning

The Federal Emergency Management Agency's Hazard Mitigation Planning Program encourages integrated planning between utilities and the cities and counties they serve.

In order to meet the hazard mitigation planning needs of communities we serve, we have developed this document to provide an overview of our own hazard mitigation and planning process. You may use this document within your local planning process to affirm that we at Southern California Edison (SCE) have taken the necessary pre-disaster steps to mitigate threats to our electric system.

SCE is committed to providing reliable electric service to our customers. We have an emergency preparedness program in place to address pre- and post-disaster planning needs. Additionally, we have developed the necessary plans to allow SCE to communicate post-disaster with the jurisdictions we serve and, as necessary, to integrate our response activities with theirs. Finally, we have assessed the vulnerability of our equipment to hazards and have taken steps to mitigate that vulnerability.

Planning

The California Public Utilities Commission (PUC), which regulates SCE, has devoted considerable attention to disaster preparedness and system response. SCE has undertaken an all-hazards approach to planning for an emergency event. The plans are updated annually and employees are trained on these plans. Plan contents are specified by the PUC's General Order No. 166, Standards for Operations, Reliability, and Safety during Emergencies and Disasters. A summary of General Order No. 166 is attached.

SCE's Emergency Response & Recovery Plan provides a framework for coordinating and integrating the response and recovery for all of SCE's business units and departments during emergency situations, in order to meet our goal of providing safe and reliable electric service. As an event begins to develop and increase in magnitude, SCE takes the appropriate actions to increase its readiness. Actions taken during normal operations are elevated to respond to a more serious situation. These increased actions may include:

- Activation of Emergency Response & Recovery Plans
- Activation of the Emergency Information Coordination Center, Emergency Operation Center, or Mobile Command Center
- Mobilization of resources such as manpower and equipment
- Escalation of the amount of material and equipment on hand
- Communication of emergency and safety information to the public

Testing the Plans

SCE tests its plans annually through a corporate emergency preparedness exercise. Hundreds of employees from organizations across the company participate in these exercises. In addition to this annual exercise, the company also conducts "tabletop" exercises that provide an opportunity to discuss and walk through our plans for response to specific emergency events. Two examples of recent exercise scenarios are the introduction of a computer virus to our system and response to an emergency declared by the California Independent System Operator that resulted in rotating electric service outages. We conduct other drills of a smaller scale throughout the company to test and train on specific emergency response procedures.

SCE also conducts an annual test of our Outage Notification Communication (ONC) system which is used to notify cities and counties of rotating outages.

SCE is committed to the safety and welfare of our employees. We train our employees through an annual Drop, Cover, & Hold Drill combined with an Evacuation Drill. These drills allow us to test our processes. Conducted at every company facility, these drills ensure that we reach the maximum number of employees possible. As part of the drill, selected employees from our engineering and facilities staff are organized and trained to provide building damage assessment immediately after major emergency events. Employee volunteers from throughout the company are organized and trained in light urban search and rescue.

Mutual Assistance

If an outage is of such proportions that customers are projected to be without service for an extended period of time and additional resources will significantly reduce that restoration time, SCE may request mutual assistance from other utilities to supplement Southern California Edison (SCE) crews. To assist in service restoration, SCE has entered into agreements with neighboring utilities through the California Utilities Emergency Association's Mutual Assistance Agreement. During such emergencies, SCE management may request to have crews of qualified electrical workers from these utilities sent to supplement SCE crews. SCE will also utilize the resources of organizations whose primary business is to supplement the workforce of electrical utilities with contract labor.

External Coordination

SCE has a long-standing relationship with the counties we serve. We meet regularly to keep local officials informed of ongoing issues related to the electric industry within California. Should it be necessary, direct contact information has been provided to appropriate county agencies. During an actual emergency, designated SCE representatives will be stationed at the affected county's Emergency Operations Center.

SCE is an active member of several operational area Terrorism Early Warning Groups, the Police Officer's Association of Los Angeles County, and the Chief Special Agents, along with a host of other state and federal organizations whose purpose is to share intelligence information. We are an active member of the California Utilities Emergency Association, providing coordinated utility response to major events. We are a leader in the Business and Industry Council for Emergency Planning and Preparedness, an organization devoted to enhancing emergency preparedness and contingency planning. We are supportive of the Emergency Preparedness Commission for the County and Cities of Los Angeles. We are active members of the state and many local Fire Safe Councils and other organizations devoted to enhancing the response capabilities of fire agencies. We are also active in numerous other organizations at the state and federal level and supporting the activities of the counties we serve.

SCE also provides educational brochures to its customers and contacts regarding electrical safety, generator safety, power outages, and many programs the company offers. Samples of some of these brochures are included in this package.

Mitigation
SCE's service territory is an area of high seismic activity. The company has specifically acted to mitigate the impacts of a seismic event on our electrical system. Recognizing that the location, time and magnitude of an earthquake cannot be precisely predicted, we forecast the maximum magnitudes and approximate boundaries of earthquakes on a probability basis by reviewing:

- Geological data and studies of earthquake records
- Depth, direction, geologic formation, location and proximity of faults that can induce earthquakes
- Accumulation of energy on a specific fault since its last major eruption

Some of the activities we have undertaken to mitigate potential damage include:

Reinforcement of existing equipment / structures

- Shock absorbing capability was added at base of transformer bushings.
- Anchorages were reinforced at base of transformers.
- Braces were added at bottom of transformer radiators.

Changes in equipment layouts to reduce interactions among substation equipment

- Surge arrestors were relocated away from transformers to independent supports.
- Extra length of conductors (cables) was provided between equipment.

Adoption of seismic-safe models and new material

- Live tank circuit breakers were replaced with dead tank circuit breakers at every opportunity to lower the center of gravity and reduce internal seismic loads.
- Conventional porcelain insulators were replaced with polymer / silicon rubber insulators in selective applications to reduce seismic loads.
- High-strength insulators are used more generously throughout the system.

Continuous upgrades to engineering design criteria based on the latest industrial progress, geotechnical findings, and Code revisions. For instance, Dynamic Shake Table Tests were recently made mandatory for certain equipment in addition to analytical design.

It is not economical, if even possible, to build an electric system which is impervious to earthquake damage. Instead, SCE focuses its efforts on mitigating earthquake damage within reasonable costs in order to minimize the loss of electric service when earthquake damage occurs. One such effort is an SCE program to utilize information related to equipment and locations of vulnerability in the electric system to make resources available to minimize the time needed to bring the system back to service.

We work closely with other utilities, organizations, research institutes, and manufacturers on earthquake-related tasks. Some of these activities are:

- Tri-Net earthquake monitoring system of the California Institute of Technology provides updated earthquake data and information electronically. We are then able to use this data to determine probable areas of damaged facilities.
- PEER (Pacific Earthquake Engineering Research), a joint effort of electric utilities on the west coast of the United States and Canada. This provides SCE:
  - Channels to exchange technical information and experiences among utilities.
  - Opportunities to influence the seismic design criteria used by substation equipment manufacturers through joint purchase power.
- As a member of IEEE (Institute of Electrical & Electronics Engineers) Subcommittee 693, SCE contributes to the development of IEEE's Recommendations and Standards of Substation Equipment Seismic Design.

Summary of General Order No. 166

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Standards for Operation, Reliability, and Safety
During Emergencies and Disasters

Adopted July 23, 1998. Effective July 23, 1998.
(D.98-07-097 in R.96-11-004)
Revised May 4, 2000 Effective May 4, 2000
(D.00-05-022 in R.96-11-004)

Applicability: This General Order applies to all electric utilities subject to the jurisdiction of the CPUC with regard to matters relating to electric service reliability and/or safety.

Purpose: The purpose of these standards is to insure that jurisdictional electric utilities are prepared for emergencies and disasters in order to minimize damage and inconvenience to the public which may occur as a result of electric system failures, major outages, or hazards posed by damage to electric distribution facilities. The standards will facilitate the Commission's investigations into the reasonableness of the utility's response to emergencies and major outages. Such investigations will be conducted following every major outage, pursuant to and consistent with Public Utilities Code Section 364(c) and Commission policy.

Summary: The following rules require each jurisdictional electric utility to:

- Prepare an emergency response plan and update the plan annually. Standard 1.
- Enter into mutual assistance agreements with other utilities. Standard 2.
- Conduct annual emergency training and exercises using the utilities emergency response plan. Standard 3.
- Develop a strategy for informing the public and relevant agencies of a major outage. Standard 4.
- Coordinate internal activities during a major outage in a timely manner. Standard 5.
- Notify relevant individuals and agencies of an emergency or major outage in a timely manner. Standard 6.
- Evaluate the need for mutual assistance during a major outage. Standard 7.
- Inform the public and relevant public safety agencies of the estimated time for restoring power during a major outage. Standard 8.
- Train additional personnel to assist with emergency activities. Standard 9.
- Coordinate emergency plans with state and local public safety agencies. Standard 10.
- File an annual report describing compliance with these standards. Standard 11.
- Be subject to a restoration performance benchmark for major outages. Standard 12.
- Be subject to a call center performance benchmark for major outages. Standard 13.

Appendix F.4: County Sanitation Districts of Los Angeles County

WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

September 21, 2004

JR Ranells
City of La Verne
3660 "D" Street
La Verne, CA 91750

Dear Mr. Ranells:

Natural Hazard Mitigation Activities Summary
Request for Information

The Sanitation Districts are in receipt of your request dated June 29, 2004 for a summary of hazard mitigation activities used by our organization. Your request is intended to facilitate your compliance with the Disaster Mitigation Act of 2000 requirement to develop a City-wide Natural Hazard Mitigation Plan (NHMP).

The Sanitation Districts have previously made extensive plans and preparations for disasters at our many operating sites. A brief summary of activities is enclosed. The Sanitation Districts intends to formalize these efforts and provide a guide for future efforts to reduce the effects of natural hazards through our own formal Hazard Mitigation Plan.

We are currently participating in Los Angeles County's Hazard Mitigation Advisory Committee which has been assigned to develop the Countywide Hazard Mitigation Plan. We are working cooperatively with the County to develop our own plan. When the Sanitation Districts complete a draft Hazard Mitigation Plan, we are prepared to provide local governments such as yours a chance for comment before finalizing our Plan.

If you have any questions regarding this transmittal, please do not hesitate to contact me at the above-listed telephone number, extension 1330.

Very truly yours,

James F. Stahl

Michael M. Shatynski
Senior Engineer
Human Resources Department

MMS:erj
9-14-04 City of La Verne Request for HMA Summary (7-29-04).doc
Enclosure

County Sanitation Districts of Los Angeles County
Hazard Mitigation Planning

The Disaster Mitigation Act of 2000 (DMA 2000) reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As a result, the Federal Emergency Management Agency (FEMA) established the planning requirements for local governments including development of a Hazard Mitigation Plan. To be most effective, the planning process should include the opportunity to involve other local governments, agencies and groups in the process.

In order to meeting the hazard mitigation planning needs of communities we serve, The Sanitation Districts have developed this document to provide an overview of our own hazard mitigation and planning process. You may use this document within your own planning process to affirm that the Sanitation Districts have taken the necessary pre-disaster steps to mitigate threats to our sewerage and solid waste systems.

The Sanitation Districts are committed to providing safe, reliable, and cost-effective service to our communities. We have an emergency preparedness program in place to address both pre- and post-disaster planning needs. The Sanitation Districts have made extensive plans and preparations for disasters at our many operating sites. We have assessed the vulnerability of our facilities and equipment to hazards and have taken steps to mitigate those vulnerabilities. Site-specific emergency response plans have been developed for each of the Sanitation Districts' facilities. We have developed an overarching Emergency Operations Plan with Standard Operating Procedures. Additionally, we have developed the necessary plans to allow the Sanitation Districts to communicate post-disaster with the local governments and agencies in our areas and, as necessary, to integrate our response activities with theirs.

We intend to formalize these mitigation efforts and provide a guide for future efforts to reduce the effects of natural hazards through a formal Hazard Mitigation Plan. We are currently participating in Los Angeles County's Hazard Mitigation Advisory Committee which has been assigned to develop the Countywide Hazard Mitigation Plan. We are working cooperatively with the County to develop our own plan. When the Sanitation Districts complete a draft disaster mitigation plan, we intend to contact local community groups such as yours for comment before finalizing our Hazard Mitigation Plan.

Planning

The State of California's Office of Emergency Services (OES) and the County of Los Angeles Office of Emergency Management (OEM) have devoted considerable attention to disaster preparedness and system response. In accordance with California Code of Regulations (CCR), guidance for planning, training, exercises, and performance is provided through the State's Standardized Emergency Management System (SEMS). Under the oversight of OES and OEM, the Sanitation Districts has undertaken an all-hazards approach to planning for an emergency event. The Sanitation Districts' plan is updated as needed and employees are trained on these plans. Plan contents are specified in SEMS guidelines.

The Sanitation Districts' Emergency Operations Plan provides a framework for coordinating and integrating the response and recovery for all the Sanitation Districts' facilities during emergency situation, in order to meet our goal of providing safe and reliable sewerage and solid waste management services. As an event begins to develop and increase in magnitude, the Sanitation Districts takes the appropriate action to increase its readiness. Actions taken during normal operations are elevated to respond to a more serious situation. These increased actions may include:

- Activation of Emergency Operations Plan
- Activation of Emergency Operations Centers
- Mobilization of resources such as manpower and equipment
- Escalation of the amount of material and equipment on hand
- Communication of emergency and safety information to other agencies and the public

Testing the Plan

The Sanitation Districts test its plans annually by participating in the Los Angeles County Operational Area Disaster Exercise. Hundreds of employees from organizations across the Sanitation Districts participate in these exercises. Scenarios for recent County-wide exercises include: earthquake, flooding, computer mishap, and terrorism events. In addition to this annual exercise, the Sanitation Districts also conduct "tabletop" exercises that provide an opportunity to discuss and walk through our plans for response to specific emergency events. Two examples of recent tabletop exercise scenarios are a fire in heavy equipment on a landfill and an earthquake in a water reclamation plant. We conduct other drills on a smaller scale throughout the Districts to test and train on specific emergency response procedures.

The Sanitation Districts is committed to the safety and welfare of our employees. We train all our employees on disaster preparedness using paycheck flyers and periodic classroom training. The Sanitation Districts conducts an annual evacuation drill to test our processes. As part of the emergency plan, selected employees are organized and trained to provide an orderly evacuation and pre-planned response immediately after a major emergency event including damage assessment and light urban search and rescue.

Mutual Assistance

The Sanitation Districts is striving to be self-sufficient in almost any foreseeable emergency situation affecting sewerage or solid waste management services. If an emergency is of such proportion that service areas are projected to be services for an extended period of time and additional resources will significantly reduce the restoration time, the Sanitation Districts may request mutual assistance from other local governments or agencies to supplement Sanitation Districts' crews. To accomplish this, the Sanitation

Districts is covered under the State of California's Master Mutual Aid Plan. Cities, counties, special districts, and the State use the mutual aid system to provide services, resources and facilities when faced with an overwhelming emergency. Mutual aid uses a neighbor helping neighbor concept. It was initially used by fire and law enforcement but was expanded to include medical, public works, and others. If Sanitation Districts' equipment and staff are unable to recover and repair damaged facilities, resolutions by the Board of Directors have been put in place to contract for repairs to facilities.

External Coordination

The Sanitation Districts has a long-standing relationship with the cities in our service area and the County. The State of California's government code states the each county is designated as an "Operational Area" that serves as the lead for communicating for information exchange and coordinating activities during an emergency within the county area. The County of Los Angeles serves as the Operational Area to coordinate local governments including Sanitation Districts during emergency response and interacts with the State's OES on behalf of local governments. Sanitation Districts' emergency response staff meets regularly with the County's OEM and other emergency response participants. The Districts is routinely in contact with organizations with similar functions such as the County's and local cities' Departments of Public Works. During an actual emergency, Sanitation Districts' representatives will operate an Emergency Operations Center to ensure communication and coordination with the County and other local governments and agencies. The Sanitation Districts has designated representatives to be stationed at the County Emergency Operations Center (CEOC).

The Sanitation Districts is an active member of numerous organizations to better prepare for and respond to a disaster. These include local, State, and national organizations such as the County's Terrorism Early Warning Group, South Bay Community Awareness & Emergency Response (CAER), and the Water Environment Federation's Water Information Sharing and Analysis Center (ISAC). Each Sanitation Districts' facility actively interacts with local fire, medical, and police agencies to ensure that responders are prepared to support our facilities.

The Sanitation Districts is currently a member of the Los Angeles County's Hazard Mitigation Advisory Committee (HMAC) which has been assigned to develop the Countywide Hazard Mitigation Plan in accordance with the Federal government's Disaster Mitigation Act of 2000. The Sanitation Districts have made extensive plans and preparations for disasters at our many operating sites. We intend to formalize these efforts and provide a guide for future efforts to reduce the effects of natural hazards through a formal Hazard Mitigation Plan.

Mitigation

The Sanitation Districts service area is an area of high threat for seismic activity. The Sanitation Districts has specifically acted to mitigate the impacts of seismic events on our sewerage and solid waste management systems. Recognizing that location, time, and magnitude of an earthquake cannot be precisely predicted, we reviewed forecasts of the maximum magnitudes and approximate boundaries of earthquakes on a probability basis that were developed by reviewing:

- Geological data and studies of earthquake records
- Depth, direction, and geologic formation, location, and proximity of faults that can induce earthquakes
- Accumulation of energy on a specific fault since its last major eruption

Some activities that we have undertaken to mitigate potential damage include:

- Reinforcement of existing equipment and structures
- Changes in equipment layouts to reduce interactions among facility equipment
- Adoption of seismic-safe models and new material
- Continuous upgrade to engineering design criteria based on latest industry standards, geotechnical findings, and Code revisions

It is not economically feasible, if even possible, to build sewerage and solid waste management systems that are impervious to earthquake damage. Instead, the Sanitation Districts focuses its efforts on mitigating earthquake damage within reasonable costs in order to minimize the loss of service when earthquake damage occurs. Similar consideration has been given to other hazards faced at Sanitation Districts' facilities including major floods and fires.

Since 1967, the Sanitation Districts has worked closely with other public works agencies to publish the Standard Specifications for Public Works Construction, popularly know as the "Green Book". This book is updated and republished every 3 years. The book is designed to provide uniform plans and specifications that reflect the constantly changing technology and advanced thinking of the construction industry as it applies to public works projects.

The Sanitation Districts is an active member of various national and state-level organizations that provide industry guidelines and standards for equipment, processes, and procedures for emergency mitigation, preparedness, response, and recovery in the sewerage and solid waste management industries including:

- Water Environment Federation (WEF)
- Association of Metropolitan Sewerage Agencies (AMSA)
- Solid Waste Association of North America (SWANA)

Figure 1. La Verne Wildland Urban Interface

City of La Verne
Community Wildfire Protection Plan

COMMUNITY WILDFIRE PROTECTION PLAN
La Verne California

I. Introduction

Founded in 1887 and incorporated in 1906, La Verne is nestled in the foothills below the San Gabriel Mountains. La Verne is situated approximately 35 miles east of Los Angeles and has a population of over 33,000. La Verne is listed in the Federal Register as one of 1,297 communities at risk from wildfire in the state of California. Furthermore, the northern portion of La Verne is classified as Very High Fire Hazard Severity Wildland Urban Interface by the State of California.

Substantial Wildland Urban Interface (WUI) exists in the northern portion of La Verne. The Williams Fire of 2002 resulted in a significant threat to the northwestern portion of the City as the fire spread from the Angeles National Forest into the City. In 2003, the Padua Fire resulted in a significant threat to the northeastern portion of the City as the fire spread from Los Angeles County Fire Department jurisdiction to the eastern boundary of the City. Both of these fires burned very actively until the winds died down. This was very fortuitous for La Verne, resulting in only a few hundred acres burned within the City. It is highly likely that a future fire will burn through the thousands of acres of wildlands and the WUI within the City of La Verne.

Shortly after the fires of 2003, the City of La Verne completed a comprehensive Natural Hazards Mitigation Plan. Section 9 of that document discusses the wildfire threat in detail. This Community Wildfire Protection Plan (CWPP) serves as an addendum to Section 9 of the Natural Hazards Mitigation Plan.

The purpose of this CWPP is to provide a more specific assessment of the mitigation measures needed to protect the community from wildfires. Wildfire professionals, employed by La Verne Fire Department, reviewed the Natural Hazards mitigation Plan and identified several areas that could be more specifically addressed. These areas became major components of the CWPP.

The CWPP provides information on how to fight wildland fires. It examines the fiscal liabilities the City should anticipate to fight wildland fires burning within its corporate boundaries. In addition, the CWPP includes further analysis and recommendations detailing management of hazardous fuels and reduction of structure ignitability. Finally, it offers the City specific recommendations for the application and acquisition of federal grant monies.

The La Verne Fire Department was the lead agency for the Plan. Adjoining jurisdictions such as the Angeles National Forest and the Los Angeles County Fire Department collaborated during the planning process to insure joint project planning wherever possible. (See Appendix A for a letter from the Angeles National Forest in support of the CWPP and joint projects.) The Police Department, Community Development Department and the Parks and Community Services Department of the City of La Verne participated in the development of the CWPP. Representatives of several Homeowner Associations (HOAs) consulted in developing the CWPP.

II. Wildfire Management Issues

Wildfire Emergency Response and Financial Responsibility

Historically, the City of La Verne s fiscal exposure for wildland fire suppression has been minimal. However, an examination of the Wildland Urban Interface reveals a substantial potential for wildland fire activity within the City. Nearly the entire portion of the City north of the 210 Freeway is located within a state-designated Very High Fire Hazard Severity Zone. Several wildfire scenarios were identified and assessed with the intent of providing the City Council with notice of the potential scope and cost of wildfires within the City s limits. (See Appendix B for planning assumptions and data. Fire suppression costs are in 2009 dollars.

Scenario 1: A fire starts in brush near a house north of Golden Hills Road on a typical summer day. The fire begins to head upslope into the foothills of the San Gabriel Mountains. Under the command of the La Verne Fire Department, local engine companies respond along with cooperating engines, handcrews, and helicopters from Los Angeles County Fire Department and the Angeles National Forest.

With Cooperative Agreements in place, a total of twelve engines respond to the fire with four water tenders in support. Four hand crews and four helicopters also respond to the incident. In a period of two hours, the fire is contained at 20 acres in size. A portion of the suppression cost of this fire would be subsumed by agreement and not charged to the City. Los Angeles County Fire Department provides 12 hours of support free of charge as does the U.S. Forest Service for some of its resources.

While most engine companies are not billed to the City of La Verne during the free period of 12 hours, other resources including water tenders, hand crews, and aircraft are reimbursable from the start of an incident. Consequently, the estimated cost to the City of La Verne for this one day of initial attack followed by a day of mop-up and patrol is 131,491. This scenario would be typical of relatively moderate weather conditions. The potential for fires of this size exists 70 days each year, on average, based on historic fire and weather data. (See Appendix C for outputs from a nationally recognized software program used for determining historical fire occurrence and climate.)

Scenario 2: A brush fire is ignited in a canyon behind the north end of Alta Vista Street. The same resources as in Scenario 1 respond to this fire. However, due to the remote location of the fire and hotter and drier weather conditions, engines are not able to respond to the fire s point of origin. As a result, the fire expands north to the top of the front ridge of the San Gabriel Mountains. The fire is not contained until the second day and covers approximately 480 acres of land. This fire is typical of slope-driven fires that burn under hot and dry conditions without strong wind conditions.

The eastern flank of the fire is in Los Angeles County jurisdiction, the western and southern flanks are within City of La Verne jurisdiction, and the northern flank is shared between La Verne and the Angeles National Forest. The fire line placement for this fire is based on field review by experienced Incident Commanders from the La Verne Fire Department. Substantial cost to the City is associated with the western flank of the fire. Approximately 50 of the northern flank would be changed to the City. The full range of fire suppression resources are utilized in each area. City of La Verne s potential liability is 175,005. The possibility for fires of this size exists 42 days each year, on average. (See Appendix C for historic fire and weather data.)

Scenario 3: A vehicle fire on Mt. Baldy Road quickly spreads into the brush under a strong Santa Ana wind condition. The fire spreads rapidly westward towards the communities of Claremont and La Verne. The fire is spreading towards a portion of La Verne s eastern edge and its entire northern perimeter. A significant compliment of fire engines and other suppression resources are immediately ordered to assist La Verne resources in protecting life and property in the City. The La Verne portion of the fire suppression cost is estimated to be 890,950 plus 67,200 in logistical support costs associated with a firefighter base camp. The potential for fires of this size exists seven (7) days each year, on average. (See Appendix C for historic fire and weather data.)

Other possible fire scenarios exist; however, these three complex scenarios test both the suppression and financial capability of the City. While the third scenario encompasses only seven days a year, it poses the greatest risk to the City of La Verne. This worst case scenario was developed by a nationally recognized risk management program which verified the possibility of its occurrence as described in Scenario 3.

The third scenario model is significant in that it is based on the beginning of a wind event that actually occurred in 2008 rather than the Padua Fire which burned into the City during the tail end of a Santa Ana wind episode in 2003. If a fire occurs at the same time of year as the Padua Fire, as modeled in Scenario 3, it would easily spread throughout the WUI over a two-day period.

Structural Ignitability

Structure loss may occur due to wildfires, even in those neighborhoods which were built under modern fire resistant building codes. A study of the 2007 fires in San Diego County indicated that 13 of the homes within the fire perimeters were lost to the fires. Homes built under building codes enacted in 2001 had a loss rate of 4 ; while homes built under codes modified in 2004 had a loss rate of only 2 (approximately 20 residences). Enactment of more stringent building codes can reduce the loss of residential structures.

While much of the northern portion of the City has been built to modern fire resistant standards, there are factors other than wood roofs that could result in the loss of residential structures in the City. Fire Department personnel visited each neighborhood within the Very High Fire Hazard Severity Zone and identified the following areas of concern;

1. There are wood exposures attached to homes after construction. Examples include wood fences, wooden decks, and wood patio covers.
2. Additional wood exposures appeared to be hazardous. They included gazebos installed in back yards, weathered eaves, fascia board, and wood siding.
3. There are homes in the very high fire hazard severity zone that do not have boxed in eaves.
4. Many homes have ineffective attic screens. They will not prevent burning embers from entering and causing ignitions in attics during wind-driven fires.
5. There are residences where residents have unknowingly planted hazardous vegetation such as junipers or pine trees, thus creating additional fire hazards if not properly maintained.
6. Even in those neighborhoods that have been built to the most recent codes, there are numerous cases where leaf and litter buildup occurs in rain gutters, thus providing an ignition source for fires to destroy or damage structures.
7. In the southern portion of the City there is potential for structure loss outside of the Very High Fire Hazard Severity Zone. Because burning embers can carry in the wind for a number of miles, older homes with tall trees around them are at risk due to leaf build up on the roofs and in the rain gutters.
8. There are still a few wood shake roofs on residences within the City. Until the roofs are replaced with non-combustible Class A roofs, these homes are at great risk even though their locations are to one mile from the nearest combustible vegetation. (See Appendix D for a listing of those residences with shake roofs.)

Fire Prevention

Fire prevention involves education, enforcement and engineering. While several major fires have started outside the City and then threatened portions of the City, several other fires have started within the City. The causes of these fires must be examined to perform an assessment of the current fire prevention program.

Arson fires set along San Dimas Canyon Road are of great historical concern. With Peacock Hill, a very hazardous area of the City lies adjacent to this road and to Mountain Springs Estates. The City has implemented the application of fire retardant along portions of San Dimas Canyon and Golden Hills Roads to prevent roadside ignitions in this portion of the City. This is the only fire-prevention engineering project currently implemented by the fire department each year.

Additionally, the Department of Community Development performs a significant role in fire prevention. The Department conducts extensive plan checks prior to the issuance of building permits within the City.

Fire prevention education is sporadic in nature. It is based primarily on citizen requests for inspections of their properties. In some cases, HOA s have requested assessments of their safety from wildfires and recommendations for property improvements to prevent or limit the spread of wildfires to their property.

Enforcement is a major component of the fire prevention program. Until the early 1980 s, the City allowed for the sale and use of fireworks within the City. After numerous structural and wildland fires occurred due to the use of fireworks, the City banned the sale and use of fireworks. Wildland fires have declined dramatically due to aggressive enforcement work. The La Verne Police and Fire Departments are actively involved in arson investigations and exchange of information with neighboring jurisdictions.

Fire Suppression Infrastructure

A review of the fire fighting capability within the City indicates La Verne has an excellent firefighting infrastructure related to the three fire stations, countless fire hydrants throughout the City and an excellent water system. Two improvement items are noted. These include the need for a fire hydrant at the large water tank above the Emerald Debris Basin and the need to maintain a water cistern located within the City of La Verne along the Sunset Peak Motorway at the extreme northern corporate boundary near the Angeles National Forest.

III. Evacuation

The City of La Verne has several evacuation routes that allow residents to quickly depart the northern portion of the City in the event that a brush fire forces such evacuations. The Police Department implements and is responsible for evacuation. The Fire Department works closely with the Police Department to ensure that wildfire evacuations are timely and necessary.

During a serious fire scenario such as the wind driven fire described in Part II, Fire Management Issues, both the Fire and Police Chief would likely be located at the Emergency Operations Center at the Public Safety Building that houses both the Police and Fire Department Headquarters. The Police Chief would likely appoint a Police Department Captain to be the Law Enforcement Branch Director in the field working with the Incident Commander from the Fire Department. These two officials would manage the evacuation situation with the Incident Commander providing the Law Enforcement Branch Director with a much notice as possible on the need to evacuate and the Law Enforcement Branch Director managing the actual evacuations.

The installation of the approved Reverse 911 system will facilitate evacuations within the City. This major improvement will allow the City to notify citizens of the need to evacuate in a timely manner. The official evacuation map for the City of La Verne is the same fire district map the dispatchers use for day to day fire and medical aid dispatching. This map divides the City into 36 districts (See Appendix F). With many of the districts being composed of structures built about the same time, these maps are ideal for evacuation decisions recommended by the Incident Commander and implemented by the Branch Director for Evacuations. All the phone numbers for each district can be reached automatically with the push of a single button with the new Reverse 911 system.

The ease of public notification helps insure a safe and orderly evacuation of residents to protect human life and to keep the streets passable both for the evacuees and the law enforcement and fire personnel dealing with the fire emergency. As a general rule, Wheeler Avenue will serve as the primary evacuation route as residents can quickly move south towards the 210 Freeway on a four lane street with few controlled intersections.

IV. Fuels Management

Hazardous fuels were examined throughout the corporate boundary of the City of La Verne. These include approximately 1000 acres of chaparral and coastal sage scrub north of the developed portion of the City, the Marshall Canyon area, and the wildlands along the boundary with the City of Claremont along the eastern edge of the City. In addition, every neighborhood north of Baseline Road was examined for ornamental vegetation associated with flammability. Lastly, each development in the northern portion of the City was surveyed for defensible space and vegetation management needs.

Numerous days of field review were completed. The following projects are important to manage vegetation and to improve community protection;

1. Remove dead and flammable fuels within 300 feet of residences in the La Verne Heights area (181 residential structures).

2. Remove dead and flammable fuels within 300 feet of residences in the Live Oak La Verne development. There are 210 residential structures that would be more defendable and less ignitable should this be accomplished.

3. Complete a 300 foot wide fuelbreak on City of La Verne s privately-owned lands that would reduce the probability of a large fire in the northwestern portion of the City. This plan would create a fire control ridge running southerly off the Sunset Peak Motorway from the boundary with the Angeles National Forest through La Verne property to the edge of the Wildland Urban Interface near Golden Hills Road.

4. Implement a pilot project to remove and ban Blue Gum Eucalyptus trees to reduce long range spot fire potential along the Wildland Urban Interface north of Baseline Road and west of the boundary with the City of Claremont, with their input. There is a minimum of 600 homes that would be significantly less vulnerable if these hazardous fuels were removed from four locations as part of a pilot project to educate the public of the fire hazard associated with this tree species.

5. There is a small amount of work needed in the fuel modification zone adjoining the Marshall Canyon Estates where there are 328 residential structures.

6. Remove dead and flammable fuels within 300 feet of residences in the Mountain Springs Estates. There is a lack of consistency in defense zone width in this area. This is the only specific fuels management need identified in the La Verne Natural Hazards Mitigation Plan.

Figure 2. Heavy brush near structures in the Live Oak/La Verne development.

V. Recommendations

1. The numerous groves of Blue Gum Eucalyptus trees in the wildland urban interface will pose a major threat to hundreds of residences and commercial structures in the City during a wind driven fire event. It would require over 2,000,000 in total cost to remove all the Blue Gum Eucalyptus groves City wide as there is a minimum of 5,000 homes and businesses threatened by the ember flow associated with fires burning in groves of these trees. Establish a ban on these trees as well as replacing them with less hazardous species could be the major focus of a citizen education program. Planting less hazardous trees such as Oaks, Sycamores and Deodar Cedar is recommended.

2. The City can increase structural survivability through increasing defensible space and reducing hazardous fuels adjoining a number of developments described in part IV, Fuels Management. Federal grants may be available to help support hazardous fuels projects 1-4 and 6. Project number 4 is a pilot project regarding Eucalyptus tree removal related to the recommendation above.

3. Work with the Marshall Canyon Estates HOA to complete Hazardous Fuels Project 5.

4. The City needs a specific set of standards related to fuel modification zones throughout the northern portion of the City. Some developments required mitigation of up to 300 feet of fuel modifications while those built prior to the hillside ordinance have far fewer requirements. In a few cases, fuel modification zones have become very flammable and some of the vegetation should be removed.

5. Some of the recommended hazardous fuels reduction work identified will require legal agreements with private landowners before any action can be taken to abate identified hazards.

6. There are fire resistant neighborhoods that may be candidates for the shelter in place concept versus the traditional practice of evacuations during wildfires. An example is the recently developed Marshall Canyon Estates where there are swimming pools in the backyard of nearly every residence. Armed with fire pumps and fire hose, homeowners may be in a position to help protect their own homes while firefighters deal with the more hazardous situations elsewhere in the City during a serious wildfire scenario.

7. The City should foster the development of a city-wide Fire Safe Council (FSC) consisting of representatives of Homeowner Associations (HOAs), elected officials, City employees, and citizens at large. The FSC could then play an important role in informing and influencing citizens and government regarding wildfire issues.

8. The City should implement the recommendations of the La Verne Natural Hazards Mitigation Plan related to the education of and collaboration with homeowners regarding the wildfire threat. This would be an excellent approach to reducing the level of threat associated with the structural ignitability issues noted in Part II, Wildfire Management Issues. This would include providing some sort of incentive for the few remaining homeowners with wood roofs to replace those roofs with non-combustible Class A roofs.

9. Two minor fire suppression infrastructure projects were identified during field reviews that would improve future fire suppression operations. First, a hydrant could be installed next to the water reservoirs above the Emerald Debris Basin. This would resolve the issue where there is no way for firefighters to directly tap that water source at this time. Second, there is a water cistern along the Sunset Peak Motorway that is located on City of La Verne property that will provide a strategic water supply in the northern portion of the City. Regardless of which government agency originally built this water storage facility, it is recommended the La Verne Department of Public Works maintain this cistern for future brush fire suppression needs.

10. Several of the HOA s within the City might be better off to discontinue irrigation within fuel modification zones in favor of increased expenditures for hazardous fuels reduction.

11. With substantial City ownership of watershed lands, and substantial privately owned watershed lands within the City, substantial wildfire suppression costs can be expected in the future, not as an annual cost to the City, but as an occasional spike in cost to the City. It is recommended that City government be made fully aware of potential future wildfire suppression expenses.

Prepared by:

Don Garwood
Deputy Emergency Operations Chief, City of La Verne

Prepared by:

Richard Hawkins
Deputy Emergency Operations Chief, City of La Verne

Recommended by:

John Breaux
Fire Chief, City of La Verne

Approved by:

Don Kendrick
Mayor, City of La Verne

Approved by:

Assistant Chief, Los Angeles County Fire Department

APPENDIX A

USDA United States Department of Agriculture | Forest Service | San Gabriel River Ranger District | 110 N. Wabash Ave.
Glendora, CA 91741
626-335-1251 Voice
626-447-8992 TTY

File Code: 3170
Date: February 6, 2009

Chief John Breaux
La Verne Fire Department
2061 Third Street
La Verne, CA 91750

Dear Chief Breaux:

The San Gabriel River Ranger District of the Angeles National Forest is proposing a fuels reduction project to enhance indirect community protection along the front country of the San Gabriel Mountains. This Forest Service project will occur within the next two to five years and involves applying a variety of treatments along a 900-acre fuel break in the vicinity of Marshall Canyon. The project will benefit by being connected to the work you propose in the City of La Verne.

The Forest Service encourages collaborative efforts with local municipalities to champion community protection projects.

The Leadership and Land Management staffs of the San Gabriel River Ranger District are committed to the protection and enhancement of the resources and communities within the San Gabriel River Watershed.

Sincerely,

L'TANGA WATSON
District Ranger

Appendix B
Planning Assumptions and Data

In the third scenario, a large fire driven by Santa Ana winds enters the City from the east. There are no other large fires burning in southern California at the time, so resource availability is excellent.

To combat that portion of the fire entering La Verne (LVN), a Chief Officer is assigned to the Unified Command function with Los Angeles County Fire Department (LAC) and the Angeles National Forest (ANF). In the interest of the City, an additional Chief Officer assumes command of the La Verne branch, which encompasses the entire city.

The fire front enters Marshall Canyon and burns across the northern perimeter of the City simultaneously.

Substantial firefighting resources are assigned to neighborhoods adjacent to the fire to protect structures. Engines are the primary fire protection resource to be employed in the city as other types of resources such as aircraft and handcrews are of limited value during periods of high wind. Type 3 engines may be used in place of Type 1 engines if available. The following resources are assigned for direct structure protection under three Group Supervisors.

Resource	District Assigned	Resource	District Assigned
ST Type 1 Engine	257	ST Type 1 Engine	253 255
ST Type 1 Engine	251	ST Type 1 Engine	243 245
ST Type 1 Engine	247	ST Type 1 Engine	237 239
ST Type 1 Engine	241 243 245	ST Type 1 Engine	231 233
ST Type 1 Engine	227 225		

Group Supervisor A	241 243 245 247 237 239
Group Supervisor V	231 233 225 227
Group Supervisor W	221,223,211,212,214,226,228,236,238,246
Group Supervisor X	213,216,215,218,232,217,222,234,242,244
Group Supervisor B	251 253 255 257

1 Type 4 Engine for each Group Supervisor to provide for recon and patrol to find new starts and prevent rekindles.

Two additional Group Supervisors are activated to provide supervision for any suppression operations that occur in the southern portion of the city due to burning embers being carried well away from the fire perimeter by the wind. In addition, two staging areas are set up at Oak Mesa School and Church of the Latter Day Saints. The following resources are assigned to staging to provide for support of any of the five Structure Protection Group Supervisors

Oak Mesa Staging
Oak Mesa School Staging Area Mgr
Two Type 1 or 2 Handcrews
Two ST Type 1 Engines

Church of Later Day Saints (LDS) Staging
LDS Staging Area Manager
Two Type 1 or 2 Handcrews
Two ST Type 1 Engines

The major threat to the jurisdiction of the City of La Verne would pass after the first 12 hours since the fire first entered the city. On the second day of the fire 45 of the 65 engines would be released to substantially reduce cost. Three of the five Group Supervisors could also be released at that time. The four hand crews, the five Type 4 Engines and 20 Type 1 Engines would remain for mop-up and patrol on Day 2. On Day 3 of the fire, the suppression force would be further reduced to 10 Type 1 Engines and two hand crews. On Day 4 of the fire, two La Verne engines would be the only resources assigned as the threat to City would be virtually eliminated.

LVN would be responsible for 25 of the Base Camp cost of a camp that would be in place for three days at the Bonelli Regional Park at Puddingstone Dam.

Appendix B Supplement

Scenario Summary   Numbers of Resources and Cost Summary

Day 1 **Resource Count**

Fire Fighting Equipment		Scenario 1	Scenario2	Scenario 3
ENG3	LVN	1	1	0
ENG3	FS	5	2.5	0
ENG1	LVN LG	1	1	65
ENG1	LAC	5	4	15
ENG4	FS	0	1	5
HCT1	LAC	2	1	4
HCT1	FS	2	2	0
HCT2	FS	0	0	0
HEL1	FS	2	1	0
HEL1	LAC	0	1	0
HEL2	LAC	1	2	0
HEL2	FS	1	2	0
AT1	FS	0	1	0
AT2	CAL	0	1	0
DOZ2	LAC	0	1.5	0
DOZ2	FS	0	0.5	0
WT2	FS	2	0.5	0
WT2	LAC	2	0	7
OH		2	2.5	7
Base Camp				31,950.00

Day 2 **Resource Count**

Fire Fighting Equipment		Scenario 1	Scenario2	Scenario 3
ENG3	LVN	1	0	0
ENG3	FS	1	3.5	0
ENG1	LVN LG	0	1	25
ENG1	LAC	0	1	0
ENG4	FS	0	0	5
HCT1	LAC	0	0.5	4
HCT1	FS	0	0	0
HCT2	FS	2	1	0
HEL1	FS	0	0.5	0
HEL1	LAC	0	0	0
HEL2	LAC	0	0	0
HEL2	FS	0	0	0
AT1	FS	0	0	0
AT2	CAL	0	0	0
DOZ2	LAC	0	0	0
DOZ2	FS	0	0	0
WT2	FS	0	0.5	0
WT2	LAC	2	0	0
OH		0	1.5	3
Base Camp				30,745.00

Day 3 **Resource Count**

Fire Fighting Equipment		Scenario 1	Scenario2	Scenario 3
ENG3	LVN		1	0
ENG3	FS		0.5	0
ENG1	LVN LG		0	10
ENG1	LAC		0	0
ENG4	FS		2	0
HCT1	LAC		1	2
HCT1	FS		0.5	0
HCT2	FS		0	0
HEL1	FS		0	0
HEL1	LAC		0	0
HEL2	LAC		0	0
HEL2	FS		0	0
AT1	FS		0	0
AT2	CAL		0	0
DOZ2	LAC		0	0
DOZ2	FS		0	0
WT2	FS		1	0
WT2	LAC		0	0
OH			0	2
Base Camp				4,504.00

Day 4 **Resource Count**

Fire Fighting Equipment		Scenario 1	Scenario2	Scenario 3
ENG3	LVN			1
ENG3	FS			0
ENG1	LVN			1
ENG1	LAC			0
ENG4	FS			0
HCT1	LAC			0
HCT1	FS			0
HCT2	FS			0
HEL1	FS			0
HEL1	LAC			0
HEL2	LAC			0
HEL2	FS			0
AT1	FS			0
AT2	CAL			0
DOZ2	LAC			0
DOZ2	FS			0
WT2	FS			0
WT2	LAC			0
OH				0

Cost of Scenario	131,491	174,847	958,149

The resource count is the total used to calculate the cost not covered by local agreements with Los Angeles County Fire Department and the US Forest Service.

Individual Resource Costs	Measure	Amount	ID
Federal Type 2 Crew	Day	6,563	HCT2
Federal Type 1 Crew	Day	10,500	HCT1
State County Type 1 Crew	Day	11,000	HCT1
Federal Type 1 Helicopter	Hourly Flight Rate	3,723	
Federal Type 1 Helicopter	Daily Crew Salary	3,290	HEL1
Federal Type 2 Helicopter	Hourly Flight Rate	1,710	
Federal Type 2 Helicopter	10 person crew per day	5,444	HEL2
State County Type 2 Helicopter	Hourly Flight Rate	3,326	
State County Type 2 Helicopter	7 person crew per day	7,000	HEL2
Fed Med. Dozer	Day	2,415	DOZ2
State County Dozer	Day	1,620	DOZ2
Federal State Type 3 Engine	Day	2,900	ENG3
County Type 1 Engine	Day	7,014	ENG1
County Type 2 Engine	Day	3,150	ENG2
Federal Type 4 Engine	Day	1,640	ENG4
Federal Type 2 Water Tender	Day	1,300	WT2
Contract Type 1 Water Tender	Day	1,575	WT1
Average Overhead	Day	750	OH

Air Tanker Fed T1	Hourly Flight Rate	5,829	AT1
Air Tanker State T2	Hourly Flight Rate	2,649	AT2
Air Tanker Fed T1	Drop	2,776	
Air Tanker State T2	Drop	1,667	

These costs were gathered from Federal Fire Planners and Local Gov. Financial Analyst.

Appendix C

Summary

	Scenario 1	Scenario 2	Scenario 3
Days	11543	11543	11543
Total days fires occurred	2130	2130	2130
Days fires fit scenario	414	248	42
Fraction of year scenario fits	0.194	0.116	0.020
Number of days that fit	70.9	42.5	7.2
Acre Floor	5	20	500

FireFamily Plus v4.0 Results worksheet attached. This summary is a display of actual fires exceeding the Acre Floor which is the minimum size each scenario represents. The Fraction is the ratio of the Total days fires occurred and the Days fires fit scenario which gives the fraction of the planning period that each scenario did occur. The Number of days that fit each scenario is the product of a year in days and the Fraction of the year scenario fits

Appendix C

FireFamily Plus Decision Points
SIG - LA Verne
Variable: ERC
Time Frame: 1/1 - 12/31
Data Years: 1972 - 2008
Cause = All

Scenario 1
Large Fire Day = 5 acres
Multiple Fire Day = 1 fires
Stations in SIG - LA Verne:
045421 - TANBARK Model: 7B3AE2 Weight: 0.60
045443 - CLAREMONT Model: 7B2AE2 Weight: 0.40
Percentages Based On Current Class Definitions | Model Probabilities (%)
Cls Index All-Days Fire-Days Large Fire-Days Multi-Fire-Days | Fire Large Multi
Range # % # %FD %AD # %LFD %FD %AD # %MFD %FD %AD | Day F-Day F-Day
-----------------------*----------*--------------*-----------------*---------- ------------------------
1 0- 17 3634 31 303 14 8 31 7 10 1 303 14 100 8 12- 15 14- 16 50- 50
2 18- 35 3404 29 708 33 21 127 31 18 4 708 33 100 21 15- 18 16- 18 50- 50
3 36- 71 3295 29 810 38 25 188 45 23 6 810 38 100 25 18- 27 18- 23 50- 50
4 72- 93 852 7 210 10 25 48 12 23 6 210 10 100 25 28- 34 23- 27 50- 50
5 94-131 358 3 99 5 28 20 5 20 6 99 5 100 28 34- 47 27- 34 50- 50
-----------------------*----------*--------------*-----------------*---------- ------------------------
11543 2130 414 2130
Values in columns denoted by an * are displayed in the bar charts.

Scenario 2
Large Fire Day = 20 acres
Multiple Fire Day = 1 fires
Stations in SIG - LA Verne:
045421 - TANBARK Model: 7B3AE2 Weight: 0.60
045443 - CLAREMONT Model: 7B2AE2 Weight: 0.40
Percentages Based On Current Class Definitions | Model Probabilities (%)
Cls Index All-Days Fire-Days Large Fire-Days Multi-Fire-Days | Fire Large Multi
Range # % # %FD %AD # %LFD %FD %AD # %MFD %FD %AD | Day F-Day F-Day
-----------------------*----------*--------------*-----------------*---------- ------------------------
1 0- 17 3634 31 303 14 8 13 5 4 0 303 14 100 8 12- 15 7- 9 50- 50
2 18- 35 3404 29 708 33 21 71 29 10 2 708 33 100 21 15- 18 9- 10 50- 50
3 36- 71 3295 29 810 38 25 121 49 15 4 810 38 100 25 18- 27 11- 15 50- 50
4 72- 93 852 7 210 10 25 27 11 13 3 210 10 100 25 28- 34 15- 19 50- 50
5 94-131 358 3 99 5 28 16 6 16 4 99 5 100 28 34- 47 19- 27 50- 50
-----------------------*----------*--------------*-----------------*---------- ------------------------

11543 2130 248 2130
Values in columns denoted by an * are displayed in the bar charts.
Scenario 3
Large Fire Day = 500 acres
Multiple Fire Day = 2 fires
Stations in SIG - LA Verne:
045421 - TANBARK Model: 7B3AE2 Weight: 0.60
045443 - CLAREMONT Model: 7B2AE2 Weight: 0.40
Percentages Based On Current Class Definitions | Model Probabilities (%)
Cls Index All-Days Fire-Days Large Fire-Days Multi-Fire-Days | Fire Large Multi
Range # % # %FD %AD # %LFD %FD %AD # %MFD %FD %AD | Day F-Day F-Day
-----------------------*----------*--------------*------------------*---------- ------------------------
1 0- 17 3634 31 303 14 8 1 2 0 0 48 10 16 1 12- 15 1- 1 20- 21
2 18- 35 3404 29 708 33 21 7 17 1 0 160 33 23 5 15- 18 1- 1 21- 22
3 36- 71 3295 29 810 38 25 23 55 3 1 195 41 24 6 18- 27 1- 3 22- 25
4 72- 93 852 7 210 10 25 7 17 3 1 50 10 24 6 28- 34 3- 5 25- 26
5 94-131 358 3 99 5 28 4 10 4 1 25 5 25 7 34- 47 5- 11 26- 29
-----------------------*----------*--------------*------------------*---------- ------------------------
11543 2130 42 478
Values in columns denoted by an * are displayed in the bar charts.

Appendix D

City of La Verne Wood Shake Shingle Roof Inventory

District	Address
211	4775 Beaver Way
215	4327 Fruit Street
217	2512 Polaris Way
223	4773 4845 Hale Avenue
225	1119 Baseline Road
241	6392 6612 Wheeler Avenue
241	6930 Sherwood Drive