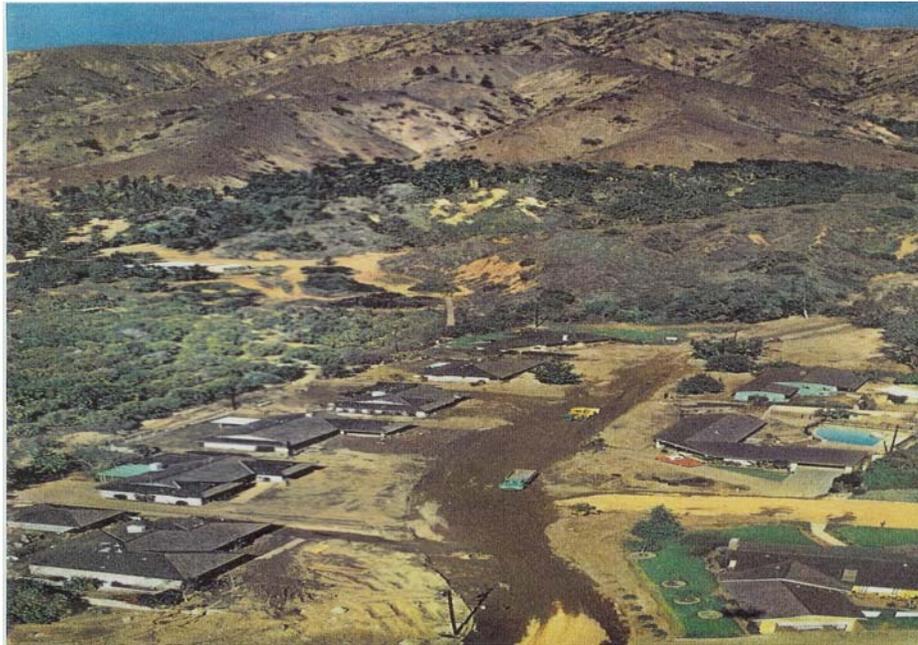


City of Glendora

Natural Hazard Mitigation Plan



"Pride of the Foothills"



Adopted by City Council October 12, 2004

RESOLUTION NO. 04-58

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF GLENDORA
ADOPTING A DISASTER MITIGATION PLAN PURSUANT TO
REQUIREMENTS OF THE DISASTER MITIGATION ACT OF 2000

WHEREAS, the City of Glendora wishes to be eligible to receive disaster recovery funding from Federal and State agencies after a declared disaster; and

WHEREAS, the City of Glendora believes it is prudent to make emergency plans addressing disaster preparedness, mitigation, response and recovery; and

WHEREAS, Public Law 106-390, known as the Disaster Mitigation Act of 2000, amended the Stafford Act by requiring that local governments update Disaster Mitigation Plans to remain eligible for disaster recovery funding; and

WHEREAS, the City Council of the City of Glendora has conducted three public hearings to gather information and citizen input to formulate required update of its Disaster Mitigation Plan; and

WHEREAS, the updated Disaster Mitigation Plans require approval and adoption by the governing body of the local agency; and

WHEREAS, adopted Disaster Mitigation Plans must be submitted to the State and Federal Governments by November 1, 2004.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF GLENDORA HEREBY RESOLVES AS FOLLOWS:

SECTION 1. That the City of Glendora Disaster Mitigation Plan attached as Exhibit A hereto is hereby approved and adopted; and

SECTION 2. This resolution shall take effect immediately upon its adoption by the City Council and the City Clerk shall certify the vote adopting this resolution.

PASSED, APPROVED AND ADOPTED at a regular meeting of the City Council of the City of Glendora thereof held this 12th day of October, 2004.

CITY OF GLENDORA

By: /s/ CLIFFORD A. HAMLOW
Clifford A. Hamlow, Mayor

ATTEST:

/S/ JO ANN SHARP
Jo Ann Sharp, City Clerk

APPROVED AS TO FORM AND EFFECT:

/S/ D. WAYNE LEECH
D. Wavne Leech. Citv Attornev

State of California)
County of Los Angeles) ss.
City of Glendora)

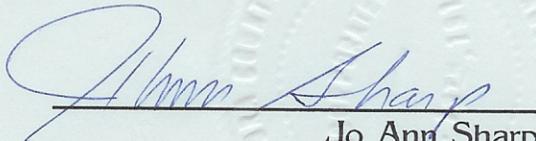
I, Jo Ann Sharp, City Clerk of the City of Glendora, California, do hereby certify that the foregoing resolution, being Resolution No. 04-58 was duly passed, approved and adopted by the City Council of the City of Glendora, approved and signed by the Mayor, and attested by the City Clerk, all at a Regular Meeting of said City Council held on the 12th day of October 2004, and that the same was passed and adopted by the following vote, to wit:

AYES: Hamlow, Clifford, Conway, Herman, Tessitor

NOES: None

ABSENT: None

DATE: 10-15-04



Jo Ann Sharp
City Clerk
City of Glendora

Special Thanks & Acknowledgments

Project Steering Committee:

- City of Glendora Building and Safety
- City of Glendora Economic Development
- City of Glendora Emergency Services Coordinator
- City of Glendora Planning
- City of Glendora Community Development
- City of Glendora Public Information
- City of Glendora Public Works Department
- City of Glendora Community Services
- Office of Disaster Management, Area D: Brenda Hunemiller, Coordinator
- Office of Disaster Management, Area E: Fan Abel, Coordinator
- Office of Disaster Management, Area G: Mike Martinet, Executive Director
- Los Angeles County Office of Emergency Management: Constance Perett, Manager

Project Manager: John Schmidt, City of Glendora Police Department

Citizen Assistance: Glendora Historical Society

Citizens: Dan Stevenson
Kathy Stevenson
Gordon Rowley
Culver Heaton
Richard Young

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City of Glendora Natural Hazard Mitigation Plan

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Executive Summary:

Five -Year Action Plan Matrix

The City of Glendora Natural Hazards Mitigation Action Plan includes resources and information to assist City residents, public and private sector organizations, and others interested in participating in planning for natural hazards. The mitigation plan provides a list of activities that may assist City of Glendora 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 movements, flooding, wildfires and windstorms.

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 City of Glendora, sections on six 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.

Who Participated in Developing the Plan?

The City of Glendora Natural Hazards Mitigation Action Plan is the result of a collaborative effort between City of Glendora 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 two public workshops were held to include City of Glendora residents in plan development. A project Steering Committee guided the process of developing the plan.

The Steering Committee was comprised of representatives from:

City of Glendora Building and Safety	<i>maps and information</i>
City of Glendora Economic Development	<i>information</i>
City of Glendora Emergency Services Coordinator	<i>project chairman</i>
City of Glendora Finance	<i>provided financial information</i>
City of Glendora Police Department	<i>provided data and maps</i>
City of Glendora Planning	<i>provided data and maps</i>
City of Glendora Community Development	<i>provided information</i>
City of Glendora Public Works Department	<i>provided historical data and maps</i>
City of Glendora Community Services	<i>provided data</i>
Citrus Community College	<i>provided data</i>
Glendora Unified school District	<i>provided data, information and maps</i>
Office of Disaster Management, Area G	<i>provided maps and data</i>

What is the Plan Mission?

The mission of the City of Glendora Natural Hazards Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment 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 overall direction that City of Glendora 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.

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 for 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 are the Action Items Organized?

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.

The action items are organized within the following matrix, 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.

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 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:

- Protect Life and Property
- Public Awareness
- Natural Systems
- Partnerships and Implementation
- Emergency Services

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 Glendora Natural Hazards Mitigation Plan are potential partners recommended by the project steering 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 Glendora Natural Hazards 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 City of Glendora 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. The City Manager will be responsible for implementation and maintenance.

Plan Adoption

Adoption of the Natural Hazard Mitigation Plan by the local jurisdiction's governing body is one of the prime requirements for approval of the plan. Once the plan is completed, the City Council will be responsible for adopting the City of Glendora Natural Hazards Mitigation Plan. 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 Natural Hazard Mitigation Plan will be significant in the future growth and development of the community. Plan was adopted on October 12, 2004.

Coordinating Body

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

Convener

The City Council will adopt the City of Glendora 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

City of Glendora addresses statewide planning goals and legislative requirements through its General Plan, 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. City of Glendora 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.

Formal Review Process

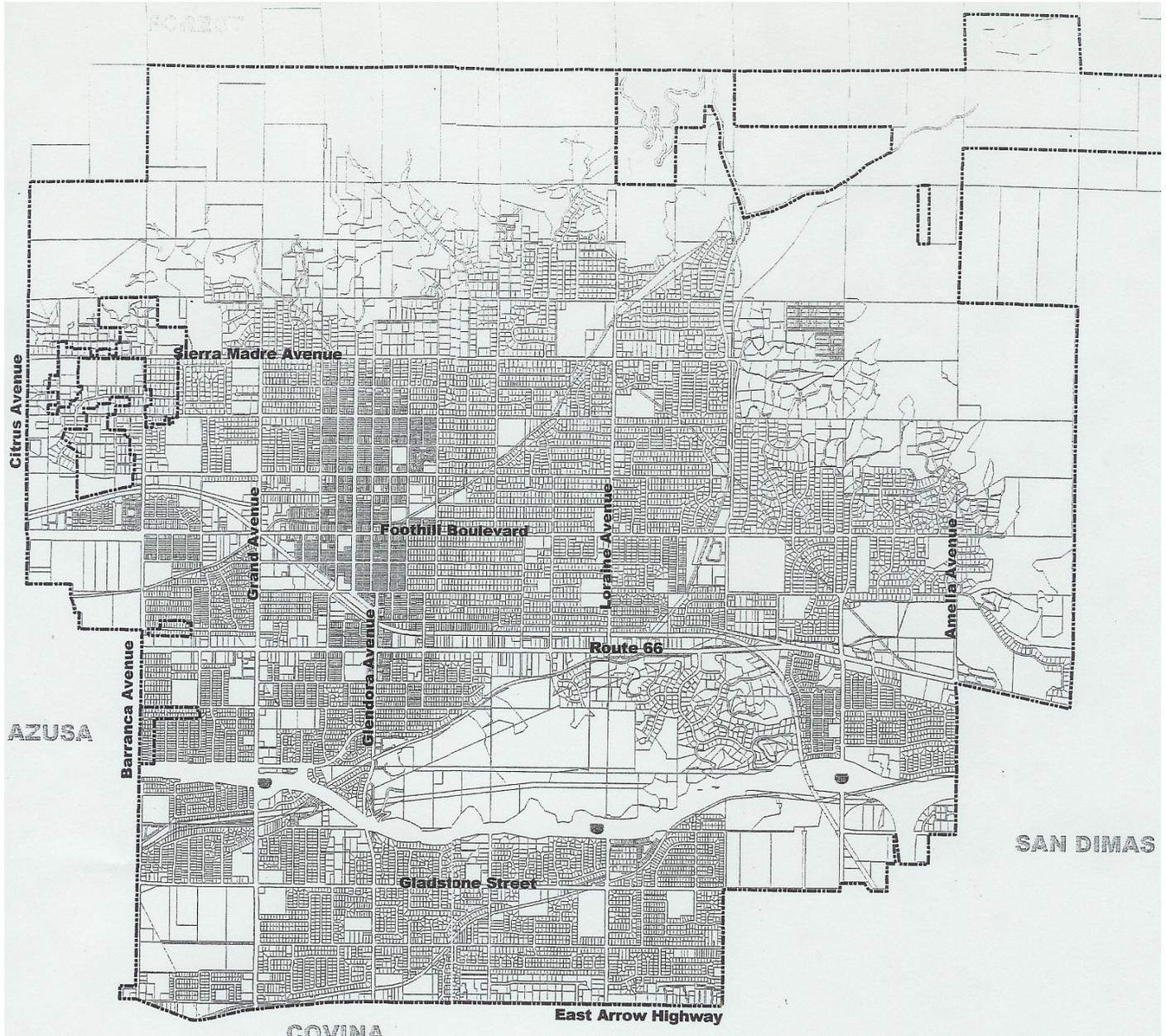
The City of Glendora Natural Hazards Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The evaluation process includes a firm schedule and time line, and identifies 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

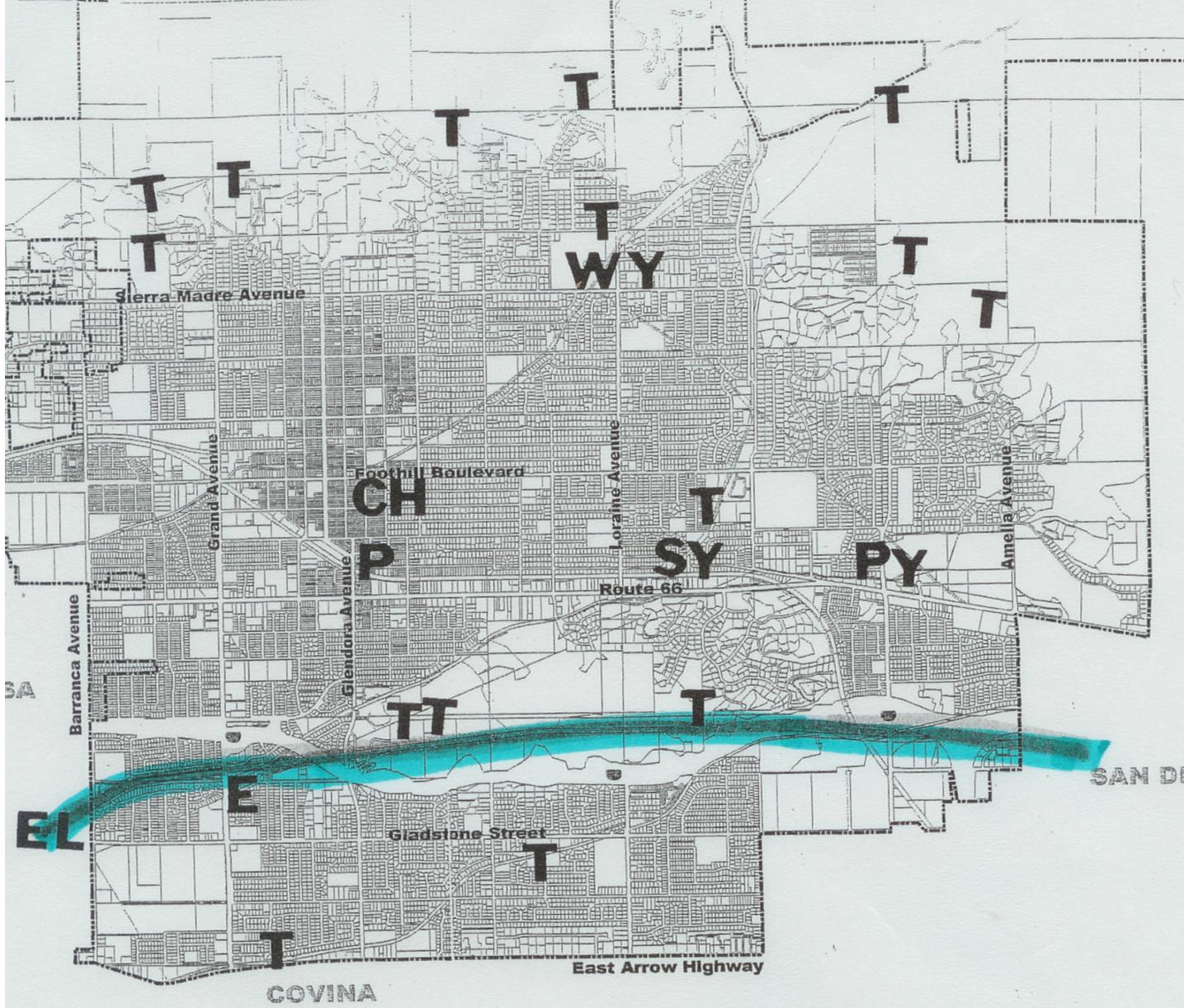
City of Glendora is dedicated to involving the public directly in the continual review and updates of the Hazard Mitigation Plan. Copies of the plan will be catalogued and made available at city hall and at all City operated public libraries. The existence and location of these copies will be publicized in City newsletters. The plan also includes the address and the phone number of the City Planning Division, 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.

CITY OF GLENDORA CALIFORNIA



ESSENTIAL FACILITIES



E EDISON SUBSTATION

EL EDISON LINES

SY STREET YARD

PY PARKS YARD

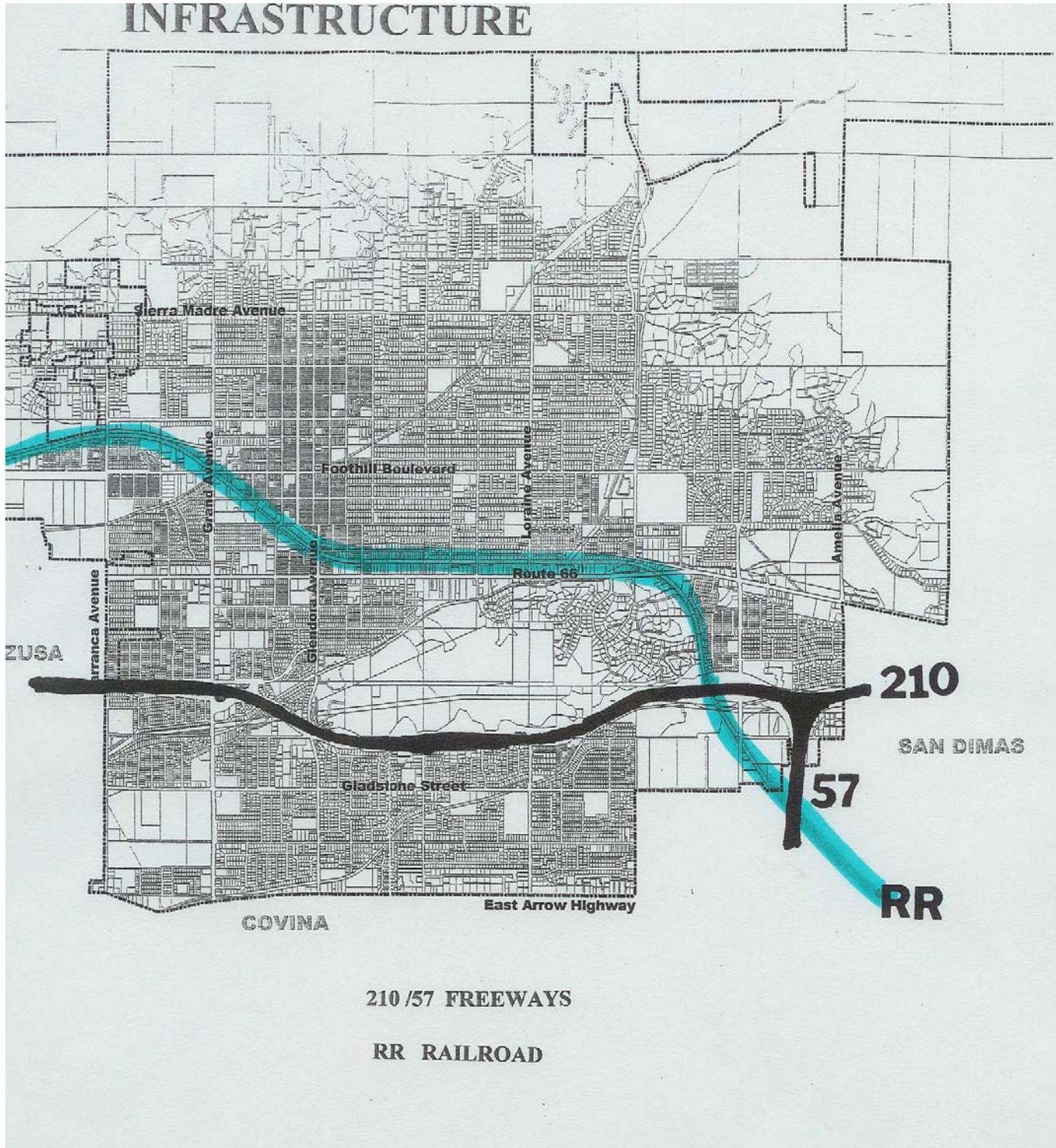
CH CITY HALL

T WATER TANKS

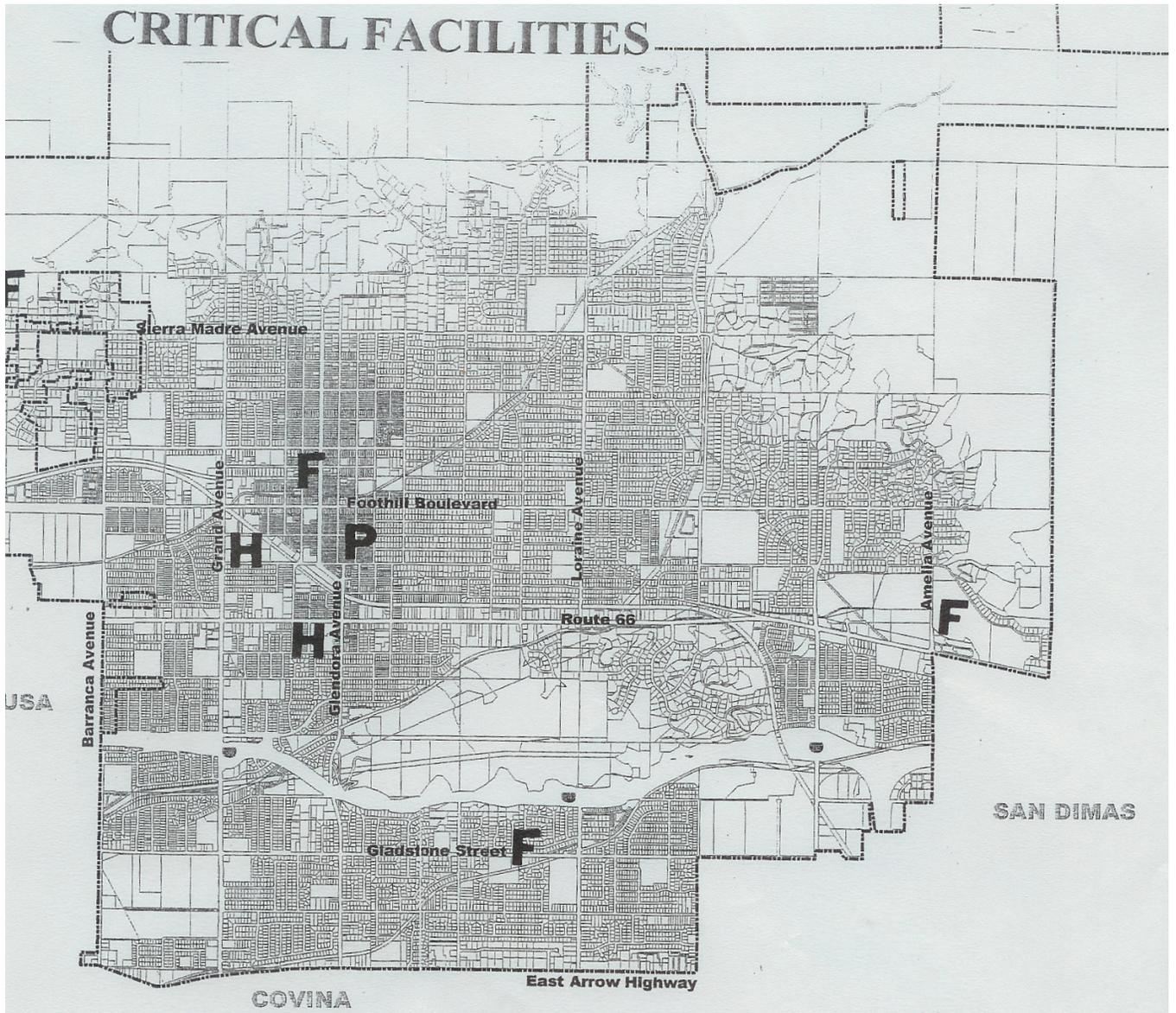
P PHONE SWITCH

WY WATER YARD

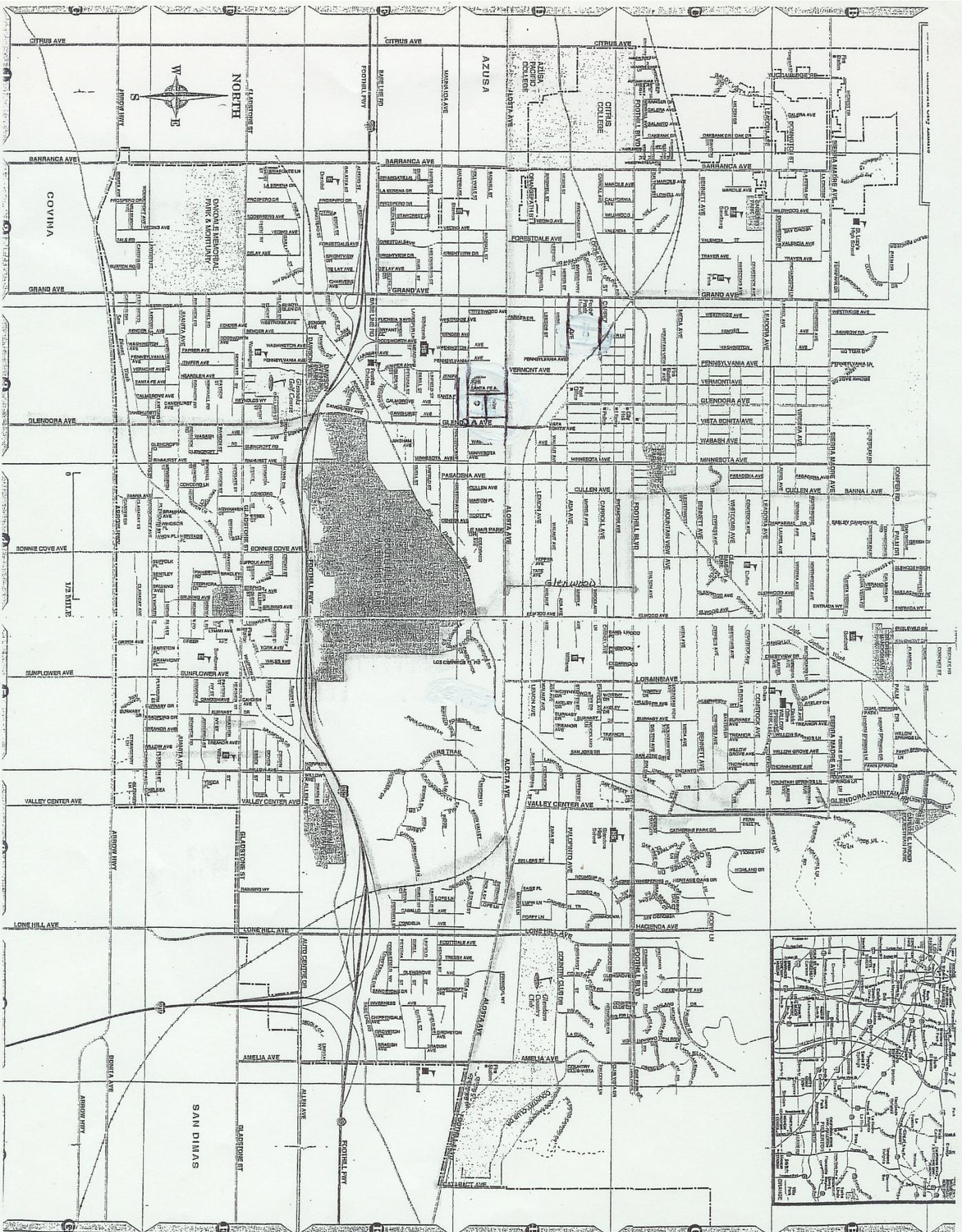
INFRASTRUCTURE



CRITICAL FACILITIES

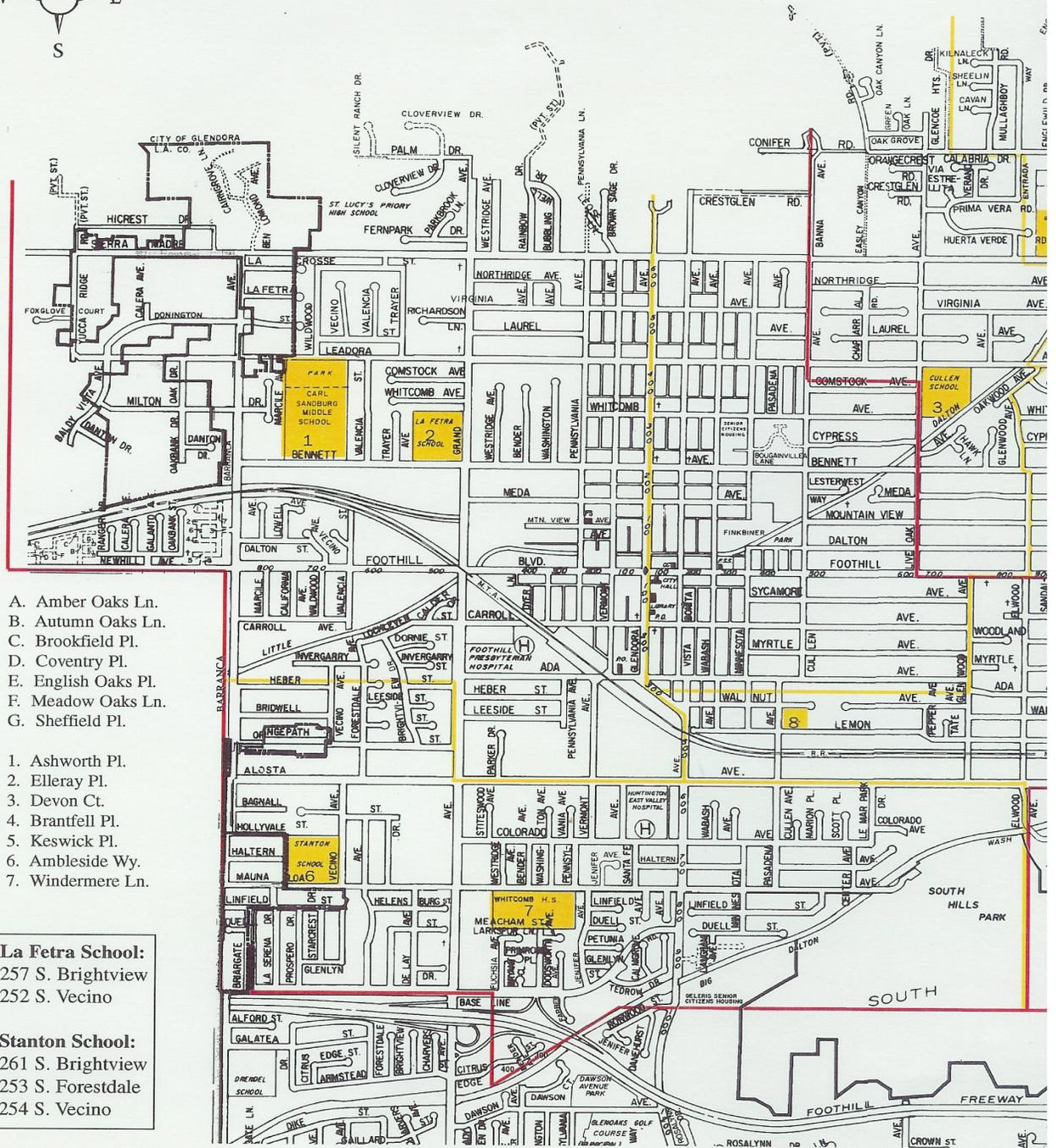
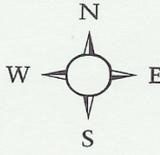


- H** HOSPITAL WITH EMERGENCY ROOM
- F** FIRE STATION
- P** POLICE STATION/EOC



MAP OF GLENDORA UT

500 LORAIN AVENUE • GLE



- A. Amber Oaks Ln.
- B. Autumn Oaks Ln.
- C. Brookfield Pl.
- D. Coventry Pl.
- E. English Oaks Pl.
- F. Meadow Oaks Ln.
- G. Sheffield Pl.

- 1. Ashworth Pl.
- 2. Ellery Pl.
- 3. Devon Ct.
- 4. Brantfell Pl.
- 5. Keswick Pl.
- 6. Ambleside Wy.
- 7. Windermere Ln.

La Fetra School:
257 S. Brightview
252 S. Vecino

Stanton School:
261 S. Brightview
253 S. Forestdale
254 S. Vecino

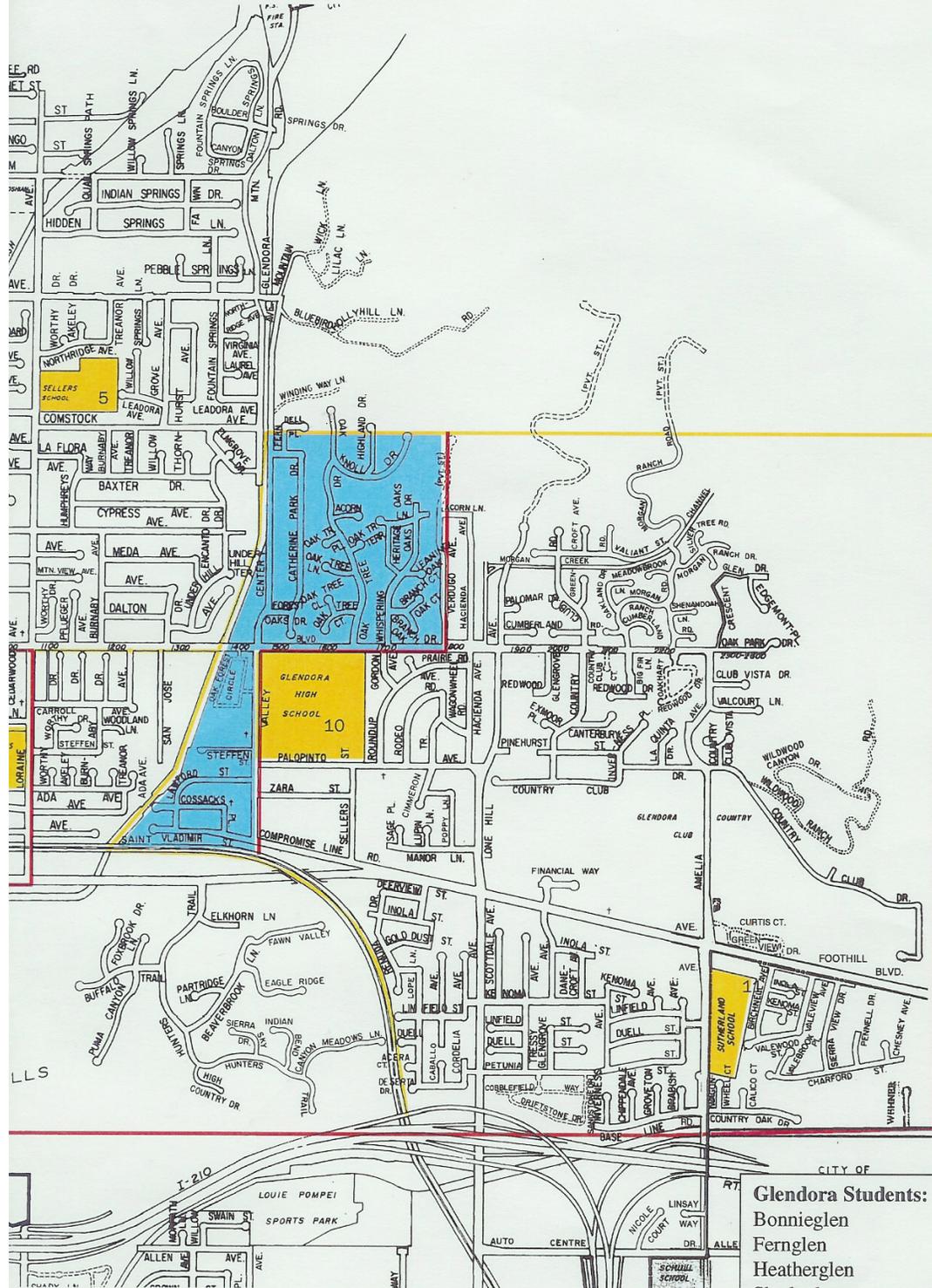
Middle School Dividing Line
Other School Dividing Line
Sellers or Williams Optional Area

Citrus Edge Street 300 and 400
Blocks are in GUSD.

- 1 Sandburg Middle School
- 2 La Fetra
- 3 Cullen
- 4 Goddard Middle School
- 5 Sellers / I
- 6 Stanton
- 7 Whitcom
- 8 Maintens

Glendora School District

Glendora, California • (626) 963-1611



on Center
 School
 rehouse

9 Williams
 10 Glendora High School
 11 Sutherland

All odd numbers beginning with 301
 West Baseline, San Dimas, belong to
 Glendora School District. Even
 numbers belong to Bonita.

Glendora Students:
 Bonnienglen
 Fernglen
 Heatherglen
 Shadyglen
 Terryglen
 Willowglen
 Woodglen 305 & up

San Dimas Students:
 Forestglen
 Hollyglen
 Meadowglen
 Whisparglen
 Woodglen 305 & below

Items listed by priority

Natural Hazard	SHORT TERM ACTIVITY - MULTI HAZARD # 1		
Action Item	Integrate the goals and action items from the City of Glendora Natural Hazard Mitigation Plan into existing regulatory documents and programs, where appropriate		
Coordinating Organization	Hazard Mitigation Advisory Committee		
Ideas for Implementation	Use the mitigation plan to help the city's General Plan meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through planning strategies that restrict development in areas of known hazards: 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.		
Time line	Ongoing		
Constraints	funding		
Plan Goals Addressed			Protect Life and Property
	Public Awareness		Natural Systems
X	Partnerships and Implementation		Emergency Services

Natural Hazard	SHORT TERM ACTIVITY - MULTI HAZARD # 2:		
Action Item	Identify and pursue funding opportunities to develop and implement local and city mitigation activities.		
Coordinating Organization	Planning Department		
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 City of ???? to identify grant programs and foundations that may support mitigation activities		
Time line	Ongoing		
Constraints	funding		
Plan Goals Addressed			Protect Life and Property
	Public Awareness		Natural Systems
X	Partnerships and Implementation		Emergency Services

Natural Hazard	SHORT TERM ACTIVITY - MULTI HAZARD #3		
Action Item	Establish a formal role for the City of Glendora Natural Hazards Mitigation Committee to develop a sustainable process for implementing, monitoring, and evaluating citywide mitigation activities		
Coordinating Organization	Hazard Mitigation Advisory Committee		
Ideas for Implementation	<p>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 Hazards 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.</p>		
Time line	Ongoing		
Constraints	funding		
Plan Goals Addressed			Protect Life and Property
	Public Awareness		Natural Systems
X	Partnerships and Implementation		Emergency Services

Natural Hazard			
Action Item			
Coordinating Organization			
Ideas for Implementation			
Time line			
Constraints			
Plan Goals Addressed			Protect Life and Property
	Public Awareness		Natural Systems
X	Partnerships and Implementation		Emergency Services

Section 1

Introduction

Throughout history, the residents of City of Glendora have dealt with the various natural hazards affecting the area. Photos, journal entries, and newspapers from the 1900's show that the residents of the area dealt with earthquakes, earth movements, 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.

City of Glendora is the 38th most populous City in the Los Angeles County, and offers the benefits of 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 potential impacts of natural hazards associated with the terrain make the environment and population vulnerable to natural disaster situations.

The City is subject to earthquakes, earth movements, flooding, wildfires and wind storms. It is impossible to predict exactly 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 most recent declared disaster in Glendora was the September firestorms of 2002. The City lost no property due to the valiant efforts of the fire service. Our neighbors to the north and east were not so lucky.

In 1969 the City of Glendora was hit by a flood and series of mudslide that caused over 1 million dollars and damage and received a Presidential declaration. The disaster was carried by the national media and was a article in the October 1969 National Geographic Magazine. A copy of the article is included in this plan.

Why Develop a Mitigation Plan?

As the cost of damage from natural disasters continues to increase, the community 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 and to foster the development of partnerships, and 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 City of Glendora;
- (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.

Whom Does the Mitigation Plan Affect?

The City of Glendora Natural Hazards Mitigation Plan affects entire city. Map 1 on page 10 shows major roads in the City of Glendora. 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 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 particularly 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 live in the shadow of these hazards.

All mitigation is local, and the primary responsibility for development and implementation of risk reduction strategies and policies lies 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 this information on earthquake phenomena, and communicates this 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 wildland fire protection on private, state, and administers forest practices regulations, including landslide litigation, 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 (based on science-based refinement of tsunami inundation zone delineation) to state mandated tsunami zone restrictions; and

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, serves local water needs by providing technical assistance

Plan Methodology

Information in the Mitigation Plan is based on research from a variety of sources. Staff from the City of Glendora conducted data research and analysis, facilitated steering committee meetings and public workshops, and developed the final mitigation plan. The research methods and various contributions to the plan include:

Input from the steering committee:

The Hazard Mitigation Advisory Committee convened weekly (a total of over 20 meetings) 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 representatives of public and private agencies and organizations in City of Glendora, including:

- City of Glendora Building and Safety
- City of Glendora Emergency Management
- City of Glendora GIS
- City of Glendora Planning
- City of Glendora Public Information Officer
- City of Glendora Streets Department
- City of Glendora Community Services
- City of Glendora Water Department

Stakeholder interviews:

City staff conducted over 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:

School District(s)
Los Angeles County Fire Department
Los Angeles County Public Works
Los Angeles County Office of Emergency Management
Utility Providers
Local Businesses
City of Glendora Chamber of Commerce
Citizens past and present

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 All 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.

A minimum of two public workshops (or other public forums) is recommended to meet the requirement for public participation, in addition to the inclusion of representatives from outside organizations on the planning committee itself. The timing and scheduling of the workshops may vary from one community to another depending on how each city's committee organizes its work and the particular needs of the community.

City of Glendora 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 Glendora 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 Glendora staff conducted research by referencing historical local newspapers, interviewing long time residents, long time City of Glendora employees and locating City of Glendora information in historical documents.

The City of Glendora staff identified current mitigation activities, resources and programs, and potential action items from research materials and stakeholder interviews.

Public workshops

The City of Glendora staff facilitated six public workshops to gather comments and ideas from City of Glendora citizens about mitigation planning and priorities for mitigation plan goals.

The resources and information cited in the mitigation plan provide a strong local perspective and help identify strategies and activities to make City of Glendora more disaster resilient.

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 City of Glendora.

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

Volume 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 City of Glendora.

Section 2: Community Profile

This section presents the history, geography, demographics, and socioeconomics of City of Glendora. It serves as a tool to provide an 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 City of Glendora.

Section 4: Multi-Hazard Goals and Action Items

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

Section 5: Plan Maintenance

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

Volume II: Hazard Specific Information

Hazard-Specific Information on the six 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: Wildfire
- Section 8: Windstorm
- Section 9: Flooding Earth Movement (Landslide / Debris Flow)

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 includes information on the history, hazard causes and characteristics, hazard assessment, goals and action items, and local, state, and national resources.

Volume III: Resources

The plan appendices are designed to provide users of the City of Glendora Natural Hazards Mitigation Plan 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 City of Glendora during plan implementation.

Appendix B: Public Participation Process

This appendix includes specific information on the various public processes used during development of the plan.

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 Glendora Natural Hazards Mitigation Plan.

Appendix E: Glossary

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

Section 2:

Community Profile

Why Plan for Natural Hazards in City of Glendora

Natural hazards impact citizens, property, the environment, and the economy of City of Glendora. Earthquakes, earth movements, flooding, wildfires and wind storms have exposed City of Glendora 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

City of Glendora has an area of 20.3 square miles and is located in eastern Los Angeles County.

Elevations in the City range from the high of 3,600 feet to a low of 776 feet. The terrain of the city is flat urban area to hillside communities.

Community Profile

The City of Glendora is as rich in history. The area comprising the City of Glendora was first settled in 1887 and the city itself was incorporated in 1911.

The City is served by the 210 and 57 freeways, and the major arterial highway is historic Route 66, which runs east to west.

The Metrolink railroad serves the city with tracks in the center area of the community. Passenger transportation in the future will be provided by Metrolink Gold Line.

Major Rivers

The nearest major river is the San Gabriel River. This river does not have any potential impact on the City of Glendora. Normally this river channel is dry and only carries a significant water flow during a major rainstorm.

Climate

Temperatures in the City of Glendora range from 40 degrees in the winter months to 90 degrees 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 100 EF in the summer months (June - September), and rarely drop below 30EF in the winter months (November-March).

Rainfall in the city averages less than 12 inches of rain per year. However the term “average rainfall” is misleading because over the recorded history of rainfall in the City of Glendora rain fall amounts have ranged from no rain at all in some years to over 20 inches of rain in very wet years.

Further more actual rainfall in Southern California tends to fall in large amounts during sporadic and often heavy storms rather than consistently over storms at somewhat regular intervals. In short rainfall in Southern California might be characterized as feast or famine within a single year. Because the metropolitan basin is 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 City of Glendora 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.

Geological conditions- 3 types of bedrock

1. Sedimentary units of sandstone and siltstone
2. Volcanic lavas, tuffs and mixtures of both
3. Ingenous-metamorphic complex of resistant crystalline rocks

Valley Area:

1. Majority of the valley falls in Hanford association of soils. Occur on gently sloping alluvial fans from near sea level to 3,500 feet.
2. Soils over 60 inches deep, well drained, moderately rapid subsoil permeability.
3. Pale-brown coarse sandy loam surface layers, 8 inches thick underlain by light yellowish-brown coarse sandy loam and gravelly loamy coarse sand substratum.
4. Areas with soil primarily residential.

Hillside areas has 3 soil types:

Romona-Placentia

Well drained, slow subsoil permeability

Brown to reddish brown loam or sandy loam surface layers 18 inches thick

Generally developed residential

Vista-Amargosa and San Andres- San Benito

Steep mountainous area

Well drained

Brown to grayish brown sandy loam surface layer

Soils used primarily for watershed, wildlife and range uses

Other Significant Geologic Features

City of Glendora, like most of the Los Angeles Basin, lie 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 Glendora are the:

San Andreas

Newport Inglewood

Whittier

Santa Monica and

Sierra Madre

The Los Angeles Basin has a history of powerful and relatively frequent earthquakes, dating back to the powerful 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 years¹. 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 Glendora has liquefaction zones as shown on map 9. The areas affected are in the canyon areas of the foothills and around the Glendora Market Place

The City of Glendora also has areas with land movement potential. Currently the city has active land slide activity in the following areas: South Hills and the foothill canyons.

Population and Demographics

City of Glendora has a population of about 50,000 in an area of 20.3 square miles. The population of City of

¹ Peacock, Simon M., <http://aamc.geo.lsa.umich.edu/eduQuakes/EQpredLab/EQprediction.peacock.html>

Glendora has steadily increased from the mid 1800's through 2000, and increased 6.3 % from 1990 to 2000 according to the 2000 Census.

The increase of people living in City of Glendora creates more community exposure, 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 damage. But an Urban/wildland fire is not the only exposure to the city of Glendora. 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.

Furthermore, increased density can affect risk. For example, narrower streets are more difficult for emergency service vehicles to navigate, the higher ratio of residents to emergency responders affects response times, and homes located closer together increase the chances of fires spreading.

The City of Glendora is experiencing a great deal of in-fill building, which is increasing the population density creating greater service loads on the built infrastructure, including roads, water supply, sewer services and storm drains.

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

According the latest census figures, (2000) the demographic make up of the city is as follows:

- Caucasian 62.3%
- Hispanic 22.5%
- African American 1.5%
- Asian 6.2%
- Native American .6%
- Other 7.2%

Vulnerable populations, including seniors, disabled citizens, women, and children, as well as those people 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

² www.fema.gov

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. The Second World War however 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 virtually built out. This pushed new development further and further away from the urban center.

The City of Glendora 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

In the City of Glendora the demand for housing outstrips the available supply, and the recent low interest rates have further fueled a pent up demand.

Total Housing units: 17,141
Homes 13,500
Apartments 2,888
Trailers 883

Owner occupied percentage 73.6%

Vacancy rate less than 2%

The average value for homes in the City of Glendora is estimated at \$485,000.

The City participates in the Community Development Block Grant (CDBG) program. The primary resource available to address non-housing community development needs is the CDBG. City of Glendora's CDBG allocation for the year 2000 will be \$400,000. This is used for home repairs to qualified owners.

There is an increased concentration of resources and capital in City of Glendora. 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 the 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/less 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 number of factors that contribute to this increasing loss potential. First, populations continue to increase, putting more people at risk within a defined geographic space. Second, inflation constantly increases the worth 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
Increased Size of new homes	1645 sq. ft.	2190 sq. ft.
% of homes with 4 + bedrooms	21%	33%
% of homes with 2 ½ or more baths	20%	52%
Source: U.S. Department of Census		

If we look at the greatest 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

Employment and Industry

Education and health care and commerce are City of Glendora's principal employment activities. City of Glendora provided over 6,000 jobs in 2000 with over 3,000 in education and health care.

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

Private automobiles are the dominant means of transportation in Southern California and in the City of Glendora.

However, the City of Glendora meets its public transportation needs through a mixture of a regional transit system, and various city contracted bus systems. MTA and Foothill Transit provides both bus and light rail service to the City of Glendora and to the Los Angeles County metropolitan area. In addition to this service, the City promotes alternative transportation activities. The city has 2 bikeways that transverse the city providing access to schools and parks.

The City of Glendora is served by the 57 and 210, connecting the city to adjoining parts of Los Angeles County. The City's over 400 miles road system includes over 10 miles of arterial highways and over 390 miles of local roads. As daily transit rises, there is an increased risk that a natural hazard event will disrupt the travel plans of residents across the region, as well as both 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 3:

Risk Assessment

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 Glendora 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 has been identified by the City of Glendora's GIS department using the best available data, and is illustrated by the charts/maps listed in the plan.

2) Profiling Hazard Events

This process describes the causes and characteristics of each hazard, how it has affected City of Glendora in the past, and what part of the City of Glendora'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, charted / mapped, and are illustrated in *Chart/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.

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 comprehensive description of the character of City of Glendora 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 City of Glendora 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.

Table 3-1. List of Hazard Mitigation Plan Charts/maps

Map #	Type of Map	Section of the Plan
1	Base Map of City of Glendora	Section 1: Introduction
2	Critical Facilities (Public Safety & Hospitals)	Section 3: Risk Assessment
3	Essential Facilities	Section 3: Risk Assessment
5	Infrastructure	Section 3: Risk Assessment
6	Earthquake Fault map (L.A. Basin)	Section 6: Earthquake
7	Earthquake Fault Map (Local)	Section 6: Earthquake
8	Liquefaction Areas	Section 6: Earthquake
9	Wildland / Urban Interface Areas	Section 7: Wildfire
10	Dam Innundation Areas	Section 8: Flood
11	City 100- Year Flood plain	Section 8: Flood
12	Landslide Areas	Section 8: Earth Movement
13	Debris Flow Areas	Section 8: Earth Movement

Note: The information on the maps in this plan was derived from City of Glendora's GIS. Care was taken in the creation of these maps, but is provided "as is" City of Glendora cannot accept any responsibility for any errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these products (the maps). Although information from land surveys may have been used in the creation of these products, in no way does this product represent or constitute a land survey. Users are cautioned to field verify information on this product before making any decisions.

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.

City of Glendora conducted a vulnerability assessment for the flood hazard using Geographic Information Systems (GIS) to identify the geographic extent of the hazard and assess the land use and value at risk from the flood hazard. The vulnerability assessment for the earthquake hazard is addressed in part from FEMA's HAZUS analysis model. Insufficient data exists to conduct vulnerability assessments and risk analyses for the other hazards addressed in the plan: earthquakes, earth movements, flooding, wildfires and wind storms.

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 six hazards profiled in the mitigation plan, including earthquakes, earth movements, flooding, wildfires and wind storms. The Federal criteria for risk assessment and information on how the City of Glendora Natural Hazard Mitigation Plan meets those criteria is 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. To the extent GIS data are available, 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, and 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 Glendora 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, and 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 maps on the following pages illustrate the critical facilities, essential facilities , public infrastructure, and emergency transportation routes within the City of Glendora

Methodology

To determine values of assets at risk, the City of Glendora asked the local reality board to determine the cost of replacing structures from the various hazards facing the community. The reality board determined the average cost of similar structures at today’s value. We did this for government, residential, commercial, utilities, and educational institutions.

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.

RISK ASSESSMENT 2004 VALUES AND STATISTICS

TYPE OF HAZARD	HOMES AT RISK	VALUE	BUSINESS AT RISK	VALUE	POPULATION AT RISK	
EARTHQUAKE	17,500	8.7 billion	2,200	520 billion	Day 90,000 Night 55,000	note 1
WILD FIRE	1,500	1.2 billion	0		10,000	note 2
WIND	17,500	8.7 billion	2,200	2 million	55,000	note 3
FLOOD MUD SLIDE	1,700	1.36 billion	0		3,500	note 4
DAM BREAK	17,000	8.7 billion	2,200	480 billion	Day 90,000 Night 55,000	note 5

1. Depending on size and location of an earthquake, damage could range from no-damage to total destruction of all buildings
2. Homes in Fire Zone 4 are always at risk to wild land fire. Damage amounts would depend on Wind Speed and drought conditions
3. Depending on Santa Ana wind speed which can get to 85 MPH or tornado damage rarely is more than downed trees, downed wires, missing roof, and debris damage.
4. Since the 1968 floods extensive debris basins being built, flood control channels and extensive maintenance by County Flood department has greatly reduced this threat. Using historical data 1700 homes would be at risk...homes values rise daily in this area.
5. Dalton Dam break with full capacity would cover 97% of the city and take out all businesses and over 95% of the homes

Risk assessment for Critical Facilities and Infrastructure

Hazard	What is at risk	Possible Loss Estimate (includes contents) In millions of dollars
Earthquake (large)	1 police station	30
	3 fire stations	40
	city hall, library	60
	3 community centers	60
	1 railroad bridge	5
	6 freeway overpasses	unk
	1 interchange	unk
	18 schools	220
Wild fire	1 fire station	5
Wind	police station	<1
	3 fire stations	<1
	city hall, library	<1
	3 community center	<1
	18 schools	<1
Flood \mud	none at risk	
Dam failure	1 police station	3
	1 fire station	1
	city, hall library	10
	13 schools	40
	2 community centers	20

Section 4:

Multi-Hazard Goals and Action Items

This section provides information on the process used to develop goals and action items that pertain to the six 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.

Mission

The mission of the City of Glendora Natural Hazards Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment 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.

Goals

The plan goals describe the overall direction that City of Glendora 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.

Action Items

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 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.

Protect Life and Property

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 steering committee, stakeholder interviews, and a public workshop 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 Glendora

On July 27, 2004, the first public workshop was held to gather ideas from City of Glendora residents regarding the goals for the City of Glendora Natural Hazards Mitigation Plan. Over 15 attendees included

representatives from public agencies, private organizations, Community Planning Organizations, and private residents. The attendees identified goals for the plan by examining the issues and concerns that they have had regarding natural hazards, and further discussed potential action items for the Plan.

The second public workshop was held August 10, 2004 to review mitigation plan action items and provide the participants with a chance to comment on the final plan recommendations. Eight members of Community Planning Organizations attended this workshop.

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. The City Manager is responsible for implementation of action items.

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.

Multi-Hazard Action Items

Implementation Methodology

Multi-hazard action items are those activities that pertain to two or more of the six hazards in the mitigation plan: flood, landslide, wildfire, severe winter storm, windstorm and earthquake. Action Items are listed in order of priority. The City Manager is responsible for the implementation of the action items. The City Manager will review the recommendations from the committee and determine which Action Items are obtainable with the current financial restrictions caused by the state taking funding from the local cities. The City Manager will then attempt to get the most results from the funding sources available. The City Manager will determine which activities will benefit the community the most and which ones will be the most cost-effective. The City Manager will then prioritize the Action Items in order of importance and the likely hood of receiving funding in future budgets for implementation. This will ensure that the city will get the best cost-benefit with the current budget restriction issues.

SHORT TERM ACTIVITY - MULTI HAZARD # 1: Integrate the goals and action items from the City of Glendora 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 Glendora.

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 Advisory Committee

Time line: Ongoing

Plan Goals Addressed: Partnerships and Implementation

Constraints: funding about \$100,000

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 City of Glendora to identify grant programs and foundations that may support mitigation activities.

Coordinating Organization: Planning Department
Time line: Ongoing
Plan Goals Addressed: Partnerships and Implementation
Constraints: funding about \$100,000

SHORT TERM ACTIVITY - MULTI HAZARD # 3: Establish a formal role for the City of Glendora 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 Hazards 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 Advisory Committee
Time line: Ongoing
Plan Goals Addressed: Partnerships and Implementation
Constraints: funding about \$ 40,00

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.

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

Coordinating Organization: City Planning Department
Time line: Ongoing
Plan Goals Addressed: Protect Life and Property, Public Awareness, Partnerships and Implementation
Constraints: funding about \$50,000

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

Ideas for Implementation:

Work with city governments to develop local Natural Hazards Mitigation Plans that are consistent with the goals and framework of the city plan.

Identify all organizations within City of Glendora 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 electric providers and the Department of Transportation and Development to assure rapid restoration of transportation capabilities.

Coordinating Organization: City Planning Department
Time line: Ongoing
Plan Goals Addressed: Partnerships and Implementation
Constraints: funding about \$ 30,000

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 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:	City Planning Department
Time line:	1-2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships and Implementation
Constraints: funding	about \$ 40,000

LONG TERM ACTIVITY - MULTI HAZARD # 1: 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:

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

Coordinate the maintenance of emergency transportation routes through communication among the City Roads 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:	City Planning Department
Time line:	Ongoing

Plan Goals Addressed: Emergency Services
Constraints: funding about \$20,000

LONG TERM ACTIVITY - MULTI HAZARD-MH # 2: 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 Glendora Natural Hazards Mitigation Plan available to the public by publishing the plan electronically on the city and emergency management websites.

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 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.

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: Public and Government Relations, City Geographic Information Systems

Time line: Ongoing

Plan Goals Addressed: Public Awareness, Protect Life and Property

Constraints: funding about \$100,000

LONG TERM ACTIVITY - MULTI HAZARD # 3: 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: funding	about \$110,000

Project Evaluation Worksheet

Jurisdiction:		Contact:	
Project Title		Phone:	
Agency:		E-mail:	
Hazard(s):			
Flood Zone:		Base Flood Elevation:	
		Erosion Rate:	
Critical Facility/Population At Risk:			
Environmental Impact:		Historic Preservation Impact:	
High	Medium	Low	
High	Medium	Low	
Importance to Protection of Life/Property and Disaster Recovery		Risk of Hazard Impact:	
High	Medium	Low	
High	Medium	Low	
Estimated Cost:		Project Duration:	
Value of Facility:		Value of Contents:	
Source(s) of Financing:			
Project Objectives:			
Project Description:			
Proposal Date:			
Evaluation Category	Considerations	Comments	
Social	Community Acceptance		
	Adversely Affects Segments of the Population		
Technical	Technical Feasibility		
	Long Term Solution		
	Secondary Impacts		
Administrative	Staffing		
	Funding Allocated		
	Maintenance / Operations		
Political	Political Support		
	Plan Proponent		
	Public Support		
Legal	Authority		
	Action Subject to Legal Challenge		
Economic	Benefit		
	Cost of Action		
	Contributes to Economic Goals		
	Outside Funding Required		
Environmental	Affects Land / Water Bodies		
	Affects Endangered Species		
	Affects Hazardous Materials and Waste Sites		
	Consistent with Community Environmental Goals		

Section 5:

Plan Maintenance

The plan maintenance section of this document details the formal process that will ensure that the City of Glendora Natural Hazards 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 City of Glendora 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

Plan Adoption

The City Council will be responsible for adopting the City of Glendora Natural Hazards Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazards. Once the plan has been adopted, the City Emergency Manager 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, City of Glendora will gain eligibility for Hazard Mitigation Grant Program funds.

Coordinating Body

A City of Glendora 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 Glendora Emergency Management
- City of Glendora Finance
- City of Glendora Fire Department
- City of Glendora Planning Division
- City of Glendora Public Information Officer
- City of Glendora Streets Division
- City of Glendora Community Services
- City of Glendora Building and Safety Department
- City of Glendora Water

In order to make this committee as broad and useful as possible, the City Administrator 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
- Community Planning Organization representatives
- A representative from the City Manager/Administrator's office

The Hazard Mitigation Advisory Committee will meet no less than quarterly. 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 Glendora 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

City of Glendora 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 Glendora will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

The City of Glendora Building & Safety 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 prevent 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 the 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

Formal Review Process

The City of Glendora Natural Hazards 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

City of Glendora 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 plan also includes the address and the phone number of the city Planning Division, responsible for keeping track of public comments on the Plan.

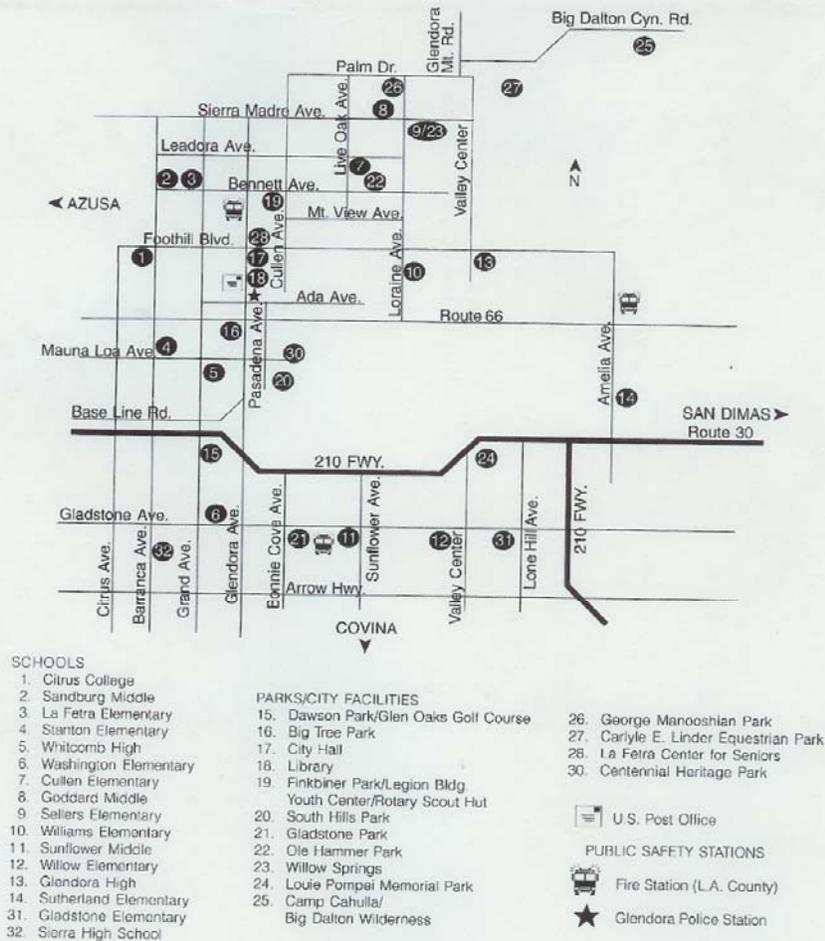
In addition, copies of the plan and any proposed changes will be posted on the city website. This site will also contain an email address and phone number to which people can direct their comments and concerns.

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 City Public Information Officer 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.

Earthquake Hazards in Southern California

Hazard: Earthquake

Glendora Schools, Parks, Critical Facilities and Public Facilities



City of Glendora

116 E. Foothill Blvd. Glendora, CA 91741 • (626) 914-8200 • www.ci.glendora.ca.us

Area of city affected: City wide

Hazard overview.....a quick look

Hazard : **Earthquake**

Affected Area of Glendora: **Entire City**

Historical Events: **None locally**

Whittier Earthquake 1987 , Northridge Earthquake 1994

Local Damage : **None.....shaking felt**

Probability of future occurrence: **High along with the rest of Southern California**

At Risk:

Population 49,215

Housing

13,500 homes,

2,888 apartment units,

883 trailers\mobile homes

Businesses

3,620

Mitigation Steps Taken

1. Adoption of State Building Code revisions
2. 99.9 % compliance in retro fitting of non-reinforced brick masonry buildings in the city.
3. Preparedness information available on city web site and all city facilities

Damage

Small Earthquake

Large Earthquake

cosmetic damage and utility interruptions

major structural damage to homes and businesses

Some people homeless, transportation routes closed do to bridge collapse. Major utility break: gas and water

Section II:

Earthquake

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Why Are Earthquakes a Threat to the City of Glendora

The City of Glendora is located in an area where there is a high probability of a future damaging earthquake. Glendora has not had any damage due to any recent earthquake activity in Southern California, but its just a matter of time before an earthquake does cause damage to the area.

The most recent significant earthquake event affecting the City of Glendora was the January 17th 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. While not causing any damage in Glendora the shaking woke the residents. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures.

57 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.

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."^a

But 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.

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

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 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. In more recent times 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 which 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.

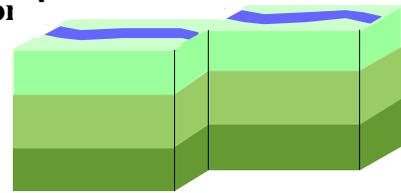
History of Earthquake Events in Southern California

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. Table -1 describes the historical earthquake events that have affected Southern California.

Causes and Characteristics of Earthquakes in Southern California

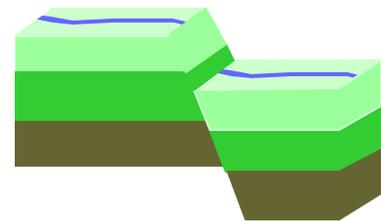
Earthquake Faults

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



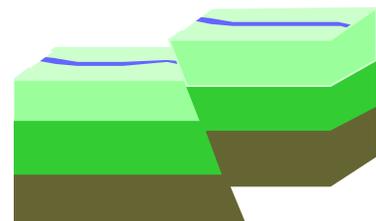
Strike-slip

Strike-slip faults are vertical or almost vertical rifts where the earth's plates move mostly horizontally. From the observer's 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.

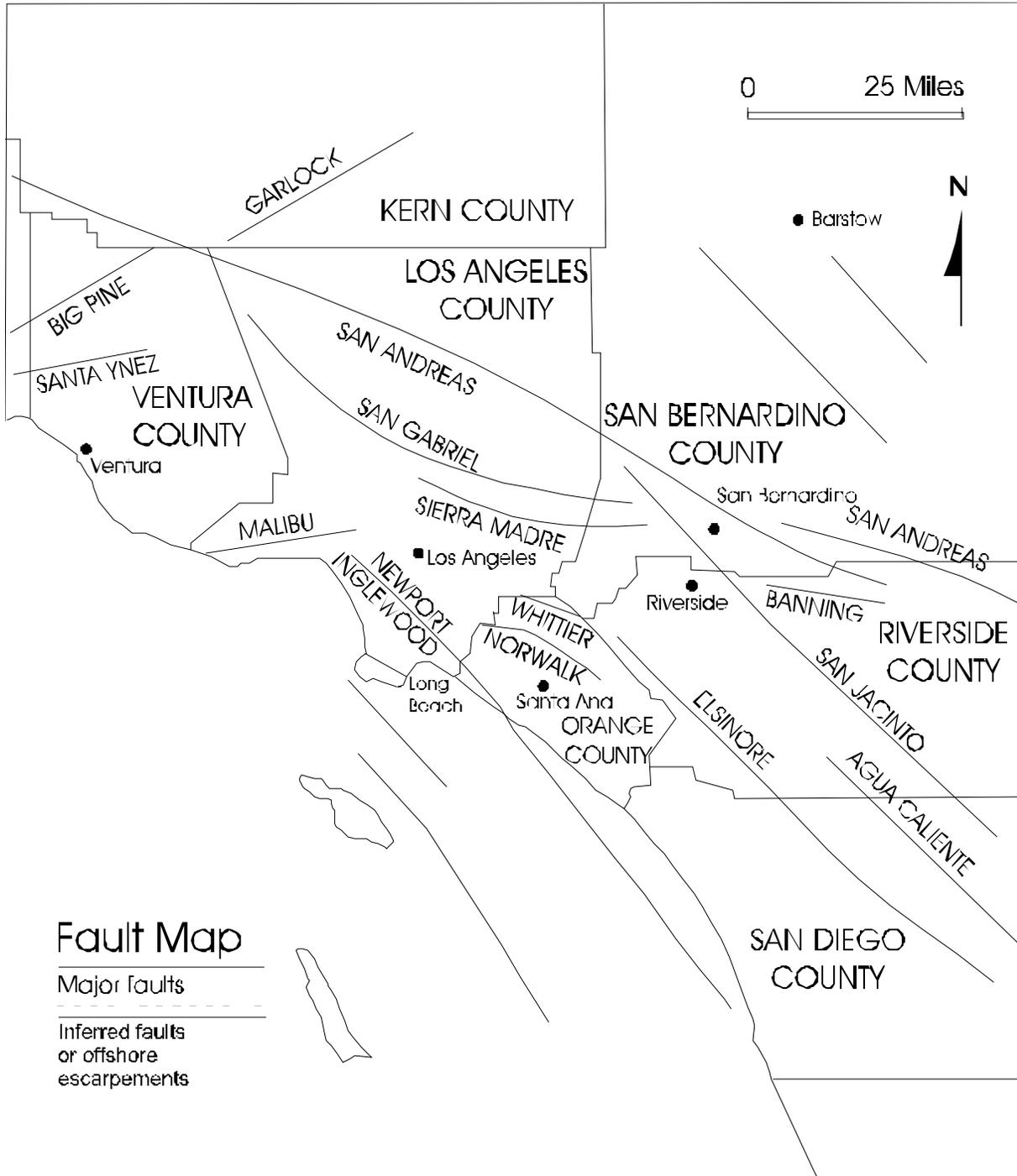


Dip-slip

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



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.”^b 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.

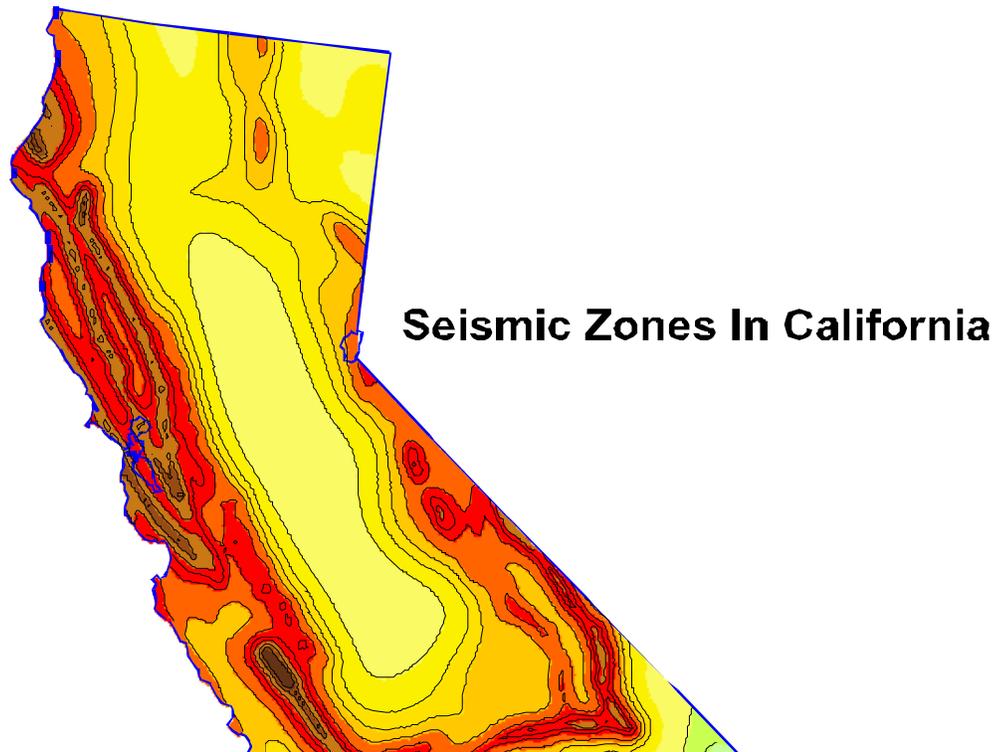
Liquefaction

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 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.^c Amplification can also occur in areas with deep sediment filled basins and on ridge tops.

Seismic Zones in California



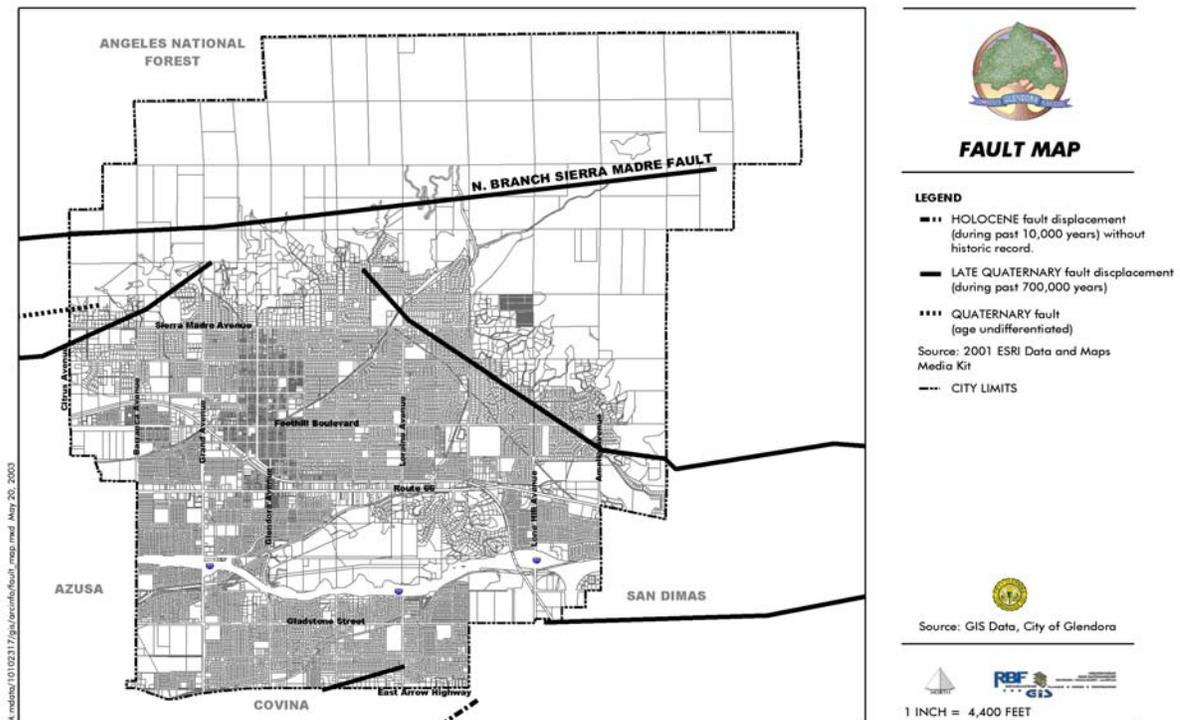
Earthquake Hazard Assessment

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, Cal Tech, 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 xxx illustrates the known earthquake faults in Southern California.

LOCAL FAULTS



Past fault history

Newport-Inglewood Fault

Nearest Communities: Culver City, Inglewood, Gardena, Compton, Signal Hill, Long Beach, Seal Beach, Huntington Beach, Newport Beach, Costa Mesa

Most Recent Major Rupture: March 10, 1933, M6.4 (but no surface rupture)

Interval Between Major Ruptures: unknown

Probable Magnitudes: M6.0 - 7.4

This represents a worst-case earthquake that could affect the urban areas of Central - South Eastern Los Angeles County.

Palos Verdes Fault Zone^d

Nearby Communities: San Pedro, Palos Verdes Estates, Torrance, Redondo Beach

Most Recent Surface Rupture: Holocene, offshore; Late Quaternary, onshore

Interval Between Major Ruptures: unknown

Probable Magnitudes: M6.0 - 7.0 (or greater?); fault geometries may allow only partial rupture at any one time

Depending on which segments, or combination of segments rupture, the damage to the South Bay could be moderate to severe.

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.

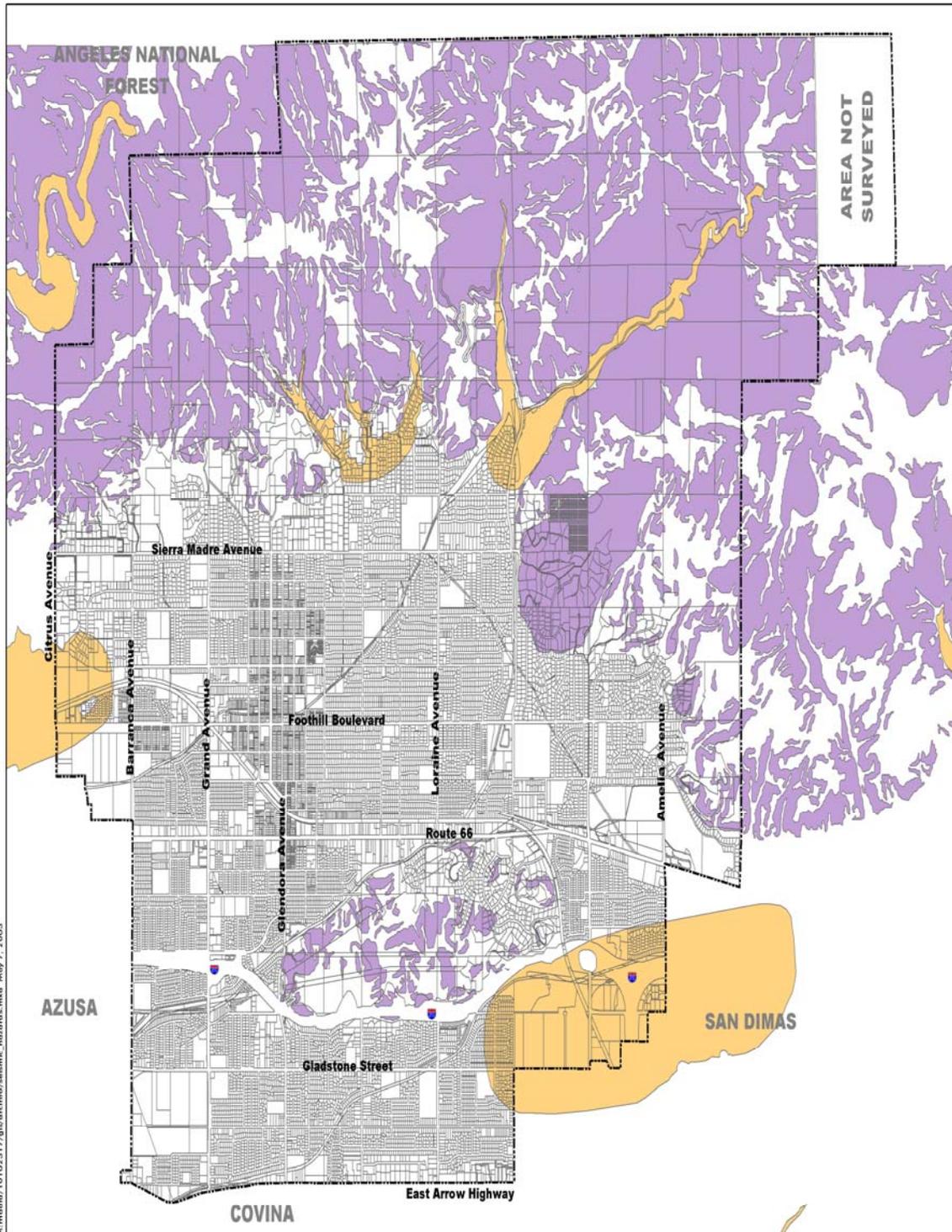
The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. This state law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes,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

The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.^f 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 the Southern California region 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.



SEISMIC HAZARDS

LEGEND

EARTHQUAKE - INDUCED LANDSLIDES

Areas where previous occurrence of landslide movement, or local topographical, geological, geotechnical, and subsurface water conditions indicated a potential for permanent ground displacements.

LIQUEFACTION

Areas where historic occurrence of liquefaction of local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacement.

Source: California Department of Conservation, Division of Mines and Geology, March 1999 (<http://gmw.consrv.ca.gov/shmp/>)

CITY LIMITS

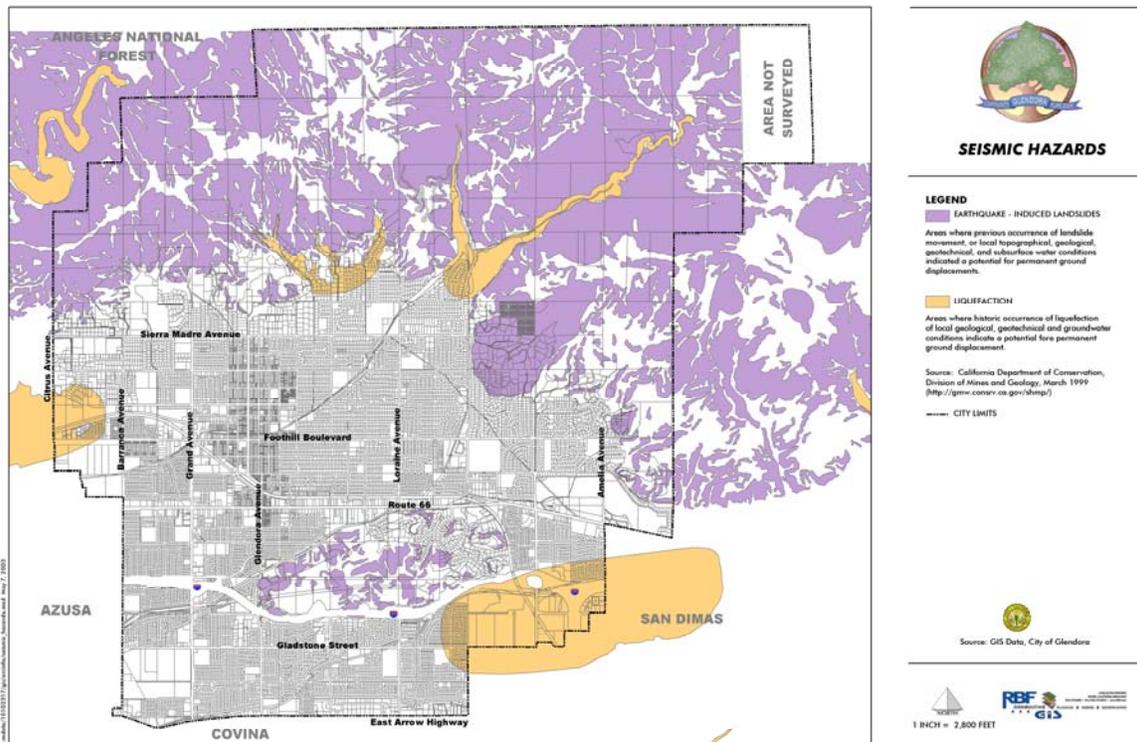


Source: GIS Data, City of Glendora



1 INCH = 2,800 FEET

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.



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^g. 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 region due to an earthquake event in a specific location. FEMA's software program, HAZUS, uses mathematical formulas and information about building stock, local geology and the location and size of potential earthquakes, economic data, and other information to estimate losses from a potential earthquake.^h The HAZUS software is available from FEMA at no cost.

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 Northridge 1994 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 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 Glendora has 2 unreinforced masonry buildings.

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.

Community Earthquake Issues

What is Susceptible to Earthquakes?

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.

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.¹ These dams hold billions of gallons of water in reservoirs. Releases of water from the major reservoirs are designed to protect Southern California from flood waters and to store domestic water. Seismic activity can compromise the dam structures, and the resultant flooding could cause 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.

Buildings

The built environment is susceptible to damage from earthquakes. Buildings that collapse can trap and bury people. Lives are at risk and the cost to clean up the damages is great. In most California communities, including the city of Glendora, many buildings were built before 1993 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. 99.9% of the buildings in Glendora have been retrofitted.

Infrastructure and Communication

Residents in the City of Glendora commute frequently by automobiles and public transportation such as buses and light 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,

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 Glendora are state, county or privately owned (including railroad bridges). Cal Trans has retrofitted most bridges on the freeway systems, however there are still some county maintained bridges that are not retrofitted. 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 earthquake to allow for rescue, recovery, and rebuilding efforts and to relay important information to the public.

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. Many critical facilities are housed in older buildings that are not up to current seismic codes.

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 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.^j

Individual Preparedness

Because the potential for earthquake occurrences and earthquake related property damage is relatively high in the City of, increasing individual preparedness is a significant need. Strapping down heavy furniture, water heaters, and expensive personal property, as well as being earthquake insured, and anchoring buildings to foundations are just a few steps individuals can take to prepare for an earthquake.

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,

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 communities, further hampering fire fighting ability.

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 Glendora from compliance with AB 939 regulations.

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 Glendora Codes

Implementation of earthquake mitigation policy most often takes place at the local government level. The City of Glendora Department of Building and Safety enforces building codes pertaining to earthquake hazards.

The following sections of the UBC address the earthquake hazard:

- 1605, 1 (Distribution of Horizontal Shear);
- 1605. 2 (Stability against Overturning);
- 1626 (Seismic);
- 1605. 3 (Anchorage); and
- 1632, 1633, 1633. 9 deal with specific earthquake hazards.

The City of Glendora Planning Department enforces the zoning and land use regulations relating to earthquake hazards.

Glendora Municipal Code

Title 19

19.03 seismic strengthening of unreinforced masonry buildings

Title 21 Zoning
21.04.020 Hillside development

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 Glendora Building Code sets the minimum design and construction standards for new buildings. In November 2003 the City of Glendora adopted the most recent seismic standards in its building code, which requires that new buildings be built at a higher seismic standard.

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.^k 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 affects 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.

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)

The Seismic Safety Commission Evaluation of the State’s Hospital Seismic Safety Policies

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.”¹

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 xx-xx provides a sampling of some of the 200 plus laws in the State’s codes.

Table xx-xx: 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 central 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, UCI, and UCSB. 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.

Earthquake Mitigation Action Items

The earthquake mitigation action items provide guidance on suggesting specific activities that agencies, organizations, and residents in the City of Glendora can undertake to reduce risk and prevent loss from earthquake events. Each action item is prioritized in order followed by ideas for implementation, which can be used by the steering committee and local decision makers in pursuing strategies for implementation. The City manager is responsible for implementation of the action items.

ST-EQ # 1: Integrate new earthquake hazard mapping data for the City of Glendora and improve technical analysis of earthquake hazards.

Ideas for Implementation:

- Update the City of Glendora earthquake HAZUS data using more localized data including the building inventory to improve accuracy of the vulnerability assessment for the City of Glendora; and
- Conduct risk analysis incorporating HAZUS data and hazard maps using GIS technology to identify risk sites and further assist in prioritizing mitigation activities and assessing the adequacy of current land use requirements,

Coordinating Organization: The City of Glendora Planning Department

Timeline: 2 years

Plan Goals Addressed: Partnerships and Implementation , Protect Life and Property

Constraints: Funding about \$10,000

ST-EQ # 2: Incorporate the Regional Earthquake Transportation Evacuation Routes developed by the Regional Emergency Managers Group into appropriate planning documents.

Ideas for Implementation:

- Update the transportation routes map in the City of Glendora Natural hazard Mitigation Plan with the evacuation routes data; and
- Integrate the evacuation routes data into the City of Glendora Emergency Operations Plan,

Coordinating Organization: The City of Glendora Public Works Department

Timeline: 2 years

Plan Goals Addressed: Emergency Services

Constraints: funding about \$5,000

LT-EQ # 1: Identify funding sources for structural and nonstructural retrofitting of structures that are identified as seismically vulnerable.

Ideas for Implementation:

- Provide information for property owners, small businesses, and organizations on sources of funds (loans, grants, etc.); and
- Explore options for including seismic retrofitting in existing programs such as low-income housing, insurance reimbursements, and pre and post disaster repairs,

Coordinating Organization: Hazard Mitigation Advisory Committee

Timeline: ongoing

Plan Goals Addressed: Partnerships and Implementation , Public Awareness

Constraints: funding about \$100,000

LT-EQ # 2: Encourage purchase of earthquake hazard insurance.

Ideas for Implementation:

- Provide earthquake insurance information to the City of Glendora residents; and
- Coordinate with insurance companies to produce and distribute earthquake insurance information,

Coordinating Organization: Hazard Mitigation Advisory Committee

Timeline: ongoing

Plan Goals Addressed: Protect Life and Property, Public Awareness

Constraints: funding and lack of public interest

LT-EQ # 3: Encourage seismic strength evaluations of critical facilities in the City of Glendora to identify vulnerabilities for mitigation of schools and universities, public infrastructure, and critical facilities to meet current seismic standards.

Ideas for Implementation:

- Develop an inventory of schools, universities, and critical facilities that do not meet current seismic standards;
- Encourage owners of non-retrofitted structures to upgrade them to meet seismic standards; and
- Encourage water providers to replace old cast iron pipes with more ductile iron, and identify partnership opportunities with other agencies for pipe replacement,

Coordinating Organization: Hazard Mitigation Advisory Committee

Timeline: 5 years

Plan Goals Addressed: Protect Life and Property, Emergency Services

Constraints: funding about \$200,000

LT-EQ # 4: Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.

Ideas for Implementation:

- Provide information to government building and school facility managers and teachers on securing bookcases, filing cabinets, light fixtures, and other objects that can cause injuries and block exits; and
- Encourage facility managers, business owners, and teachers to refer to FEMA's practical guidebook: "Reducing the Risks Nonstructural Earthquake Damage"; and
- Encourage homeowners and renters to use "Is Your Home Protected from Earthquake Disaster? A Homeowner's Guide to Earthquake Retrofit" (IBHS) for economic and efficient mitigation techniques; and
- Explore partnerships to provide retrofitting classes for homeowners, renters, building professionals, and contractors; and
- Target development located in potential fault zones or in unstable soils for intensive education and retrofitting resources,

Coordinating Organization: Hazard Mitigation Advisory Committee

Timeline: Ongoing

Plan Goals Addressed: Protect Life and Property, Public Awareness

Constraints: funding about \$50,000

Earthquake Resource Directory

Local and Regional Resources

[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

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.

State Resources

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		
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 Mines and Geology (DMG)		
Level: State	Hazard: Multi	www.consrv.ca.gov/cgs/index.htm
801 K Street		
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		
Level: State	Hazard: Multi	www.consrv.ca.gov
655 S. Hope Street		
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 Planning 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.		
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.

Federal and National Resources

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.		
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 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		
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.		
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.		
Institute for Business & Home Safety		
Level: National	Hazard: Multi	http://www.ibhs.org/

4775 E. Fowler Avenue

Tampa, FL 33617

Ph: 813-286-3400

Fx: 813-286-9960

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. al., (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>

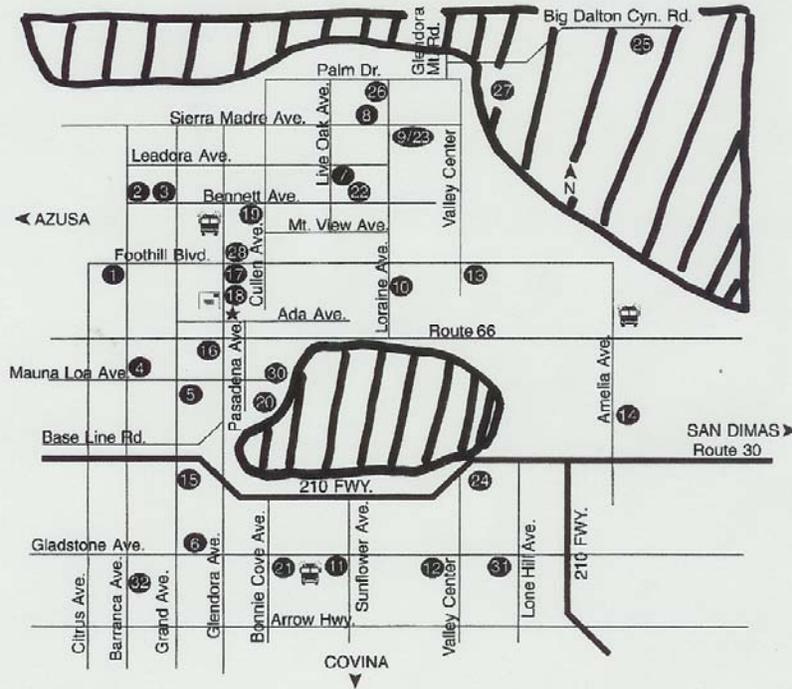
“Public Assistance Debris Management Guide”, FEMA (July 2000).

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.

Wildland/Urban Interface Fire Hazards in Glendora

Hazard: Wildfire

Glendora Schools, Parks, Critical Facilities and Public Facilities



SCHOOLS

1. Citrus College
2. Sandburg Middle
3. La Feira Elementary
4. Stanton Elementary
5. Whitcomb High
6. Washington Elementary
7. Cullen Elementary
8. Goddard Middle
9. Sellers Elementary
10. Williams Elementary
11. Sunflower Middle
12. Willow Elementary
13. Glendora High
14. Sutherland Elementary
31. Gladstone Elementary
32. Sierra High School

PARKS/CITY FACILITIES

15. Dawson Park/Glen Oaks Golf Course
16. Big Tree Park
17. City Hall
18. Library
19. Finkbinder Park/Legion Bldg. Youth Center/Pottery Scout Hut
20. South Hills Park
21. Gladstone Park
22. Ole Hammer Park
23. Willow Springs
24. Louie Pompei Memorial Park
25. Camp Cahulla/Big Dalton Wilderness

26. George Manooshian Park
27. Carlyle E. Linder Equestrian Park
28. La Feira Center for Seniors
30. Centennial Heritage Park

 U.S. Post Office

PUBLIC SAFETY STATIONS

 Fire Station (L.A. County)

 Glendora Police Station



City of Glendora

116 E. Foothill Blvd. Glendora, CA 91741 • (626) 914-8200 • www.ci.glendora.ca.us

Area of city affected:



Hazard overview.....a quick look

Hazard : **WILD FIRE**

Affected Area of Glendora: **Northern Edge and the South Hills**

Historical Events: **1968 and 2002**

Local Damage : **No structures lost only out buildings and fences**

Probability of future occurrence: **High**

At Risk:

Population 5,000

Housing

1,200 homes,

0 apartment units,

0 trailers/mobile homes

Businesses

0

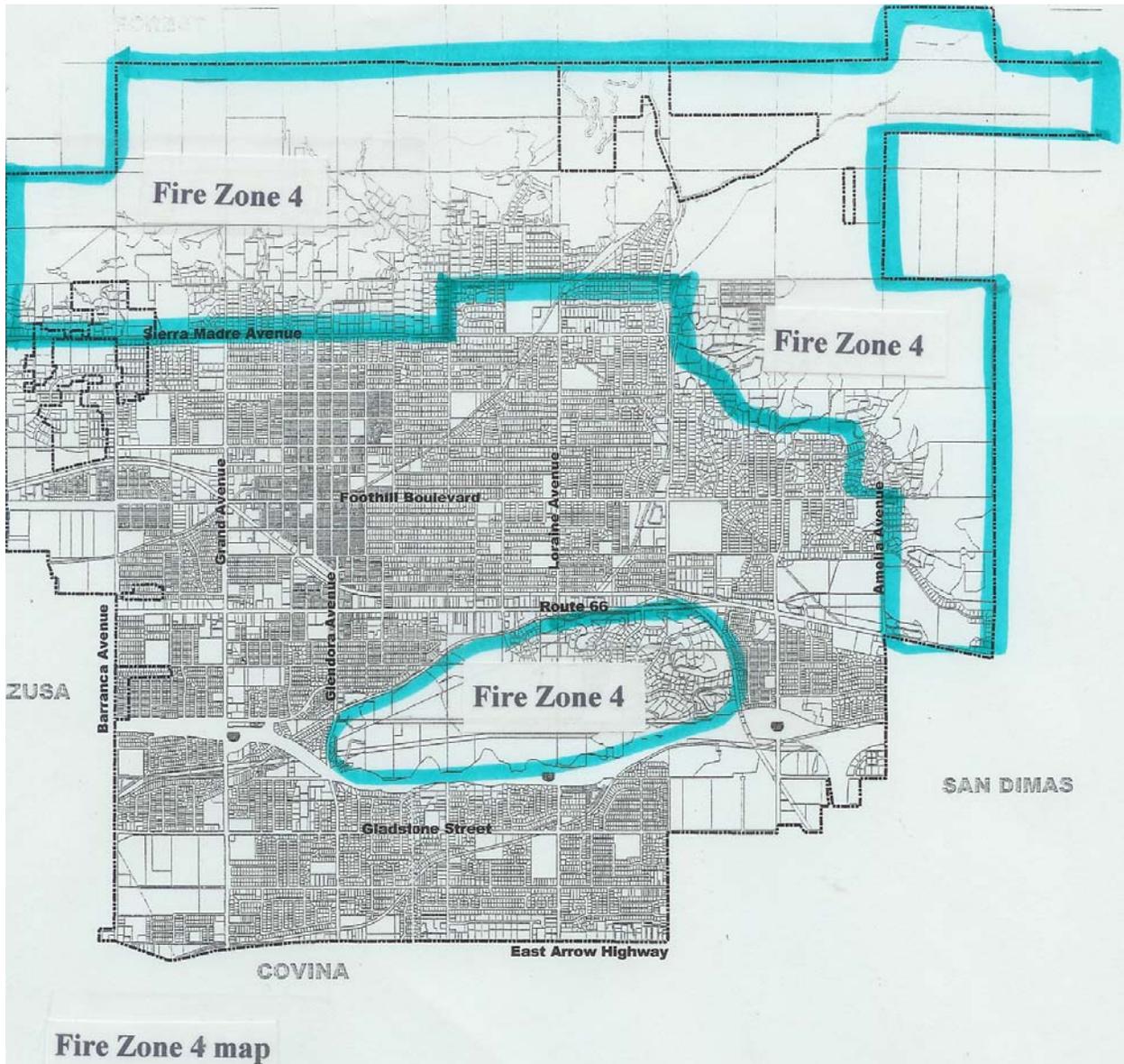
Mitigation Steps Taken

1. tighter building codes in Fire Zone 4
2. mandatory weed abatement
3. no wood shake roofs
4. tighter codes on landscaping and width of streets and driveways

Damage

So far historically no homes have been lost. County Fire Department has been able to protect the homes in the threatened area. With a large fire, small resources, multiyear drought and high winds or a series of the fore mention combinations could result in structure losses. Homes in Fire Zone 4 are selling at 2 million dollars or more. There are 1,200 homes at risk. A large fire could easily cause over a half billion dollars in damage.

WILDLAND FIRE URBAN INTERFACE GLENDDORA FIRE ZONE 4



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Wild fire threat to the City of Glendora.

Glendora is situated up against the foothills of the San Gabriel Mountains. There is a high probability of a major fire each year. There have been major fires in 1968 and 2003 in the foothills, but there has been no property damage as of yet. A fire with winds and drought conditions could have enough fuel to push the fire into the residential areas of the city. Strict enforcement of codes has reduced the danger to the city.

Fire Zone 4

The City and the County Fire Department has identified areas in the city at high risk for fire. These areas are called Fire Zone 4. The City has strict building and landscaping codes for buildings in these areas. These mitigation measures greatly reduce the possibility of a loss of structures in the event of a Wildland fire coming into the urban interface.

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.^m According to CDF statistics, in the October, 2003 Firestorms, over 4,800 homes were destroyed and 22 lives were lost.ⁿ

The 2003 Southern California Fires

The fall of 2003 marked the most destructive wildfire season 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.

Table 8-1. 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 Fires 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.”⁹⁰

Table 8-2. Large Historic Fires in California 1961-2003
20 Largest California Wildland Fires (Structures Destroyed)

	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>

“Structures” is meant to include all loss - homes and outbuildings, etc.

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.^p Taxpayers spent more than \$1.6 billion^q 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 8-3 illustrates fire suppression costs for state, private and federal lands.

Table 8-3. 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:^r 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.””^s

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.”^t

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 forest lands. 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.”^u

“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.”^v

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.^w 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 Assessment

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 8- 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 8-4. 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 included 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.

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

What is Susceptible to Wildfire?

Growth and Development in the Interface

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 wildlands and is expanding the wildland/urban interface. The interface neighborhoods are characterized by a diverse mixture of varying housing structures, development patterns, ornamental and natural vegetation and natural fuels. Areas in Fire Zone 4 (see map on page 81) are at high risk for wildfire. Homes

and businesses in Fire Zone 4 must meet more stringent building and use requirements by the City.

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.

Road Access

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 heavily more 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 are 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 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 earthquake 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 km² 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."^x

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

Fire Codes

Following pages will highlight local and county codes

Local Fire Codes

**CITY OF GLENDORA
INTER-OFFICE MEMORANDUM**

TO: John Schmidt, Emergency Services/Training Coordinator **DATE:** 7/12/04

FROM: David Davies, Deputy Public Works Director/Building Official

SUBJECT: DMA 2000

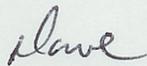
John,

Attached, as requested are copies of the base maps, Fire Zone 4 boundaries and Ordinance 19.02.060, Restrictions in Fire Zone 4.

We adopt Title 24, Parts 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 12 as mandated by State law as our building codes. They include the 2001 California Building Standards Administrative Code, the 2001 California Building Code Volumes 1 and 2, the 2001 California Electrical Code, the 2001 California Mechanical Code, the 2001 California Plumbing Code, the 2001 California Energy Code, the 2001 California Elevator Safety Construction Code, the 2001 California Historical Building Code, the 2001 California Fire Code, the 2001 California Code for Building Conservation and the 2001 California Referenced Standards Code.

The codes mandated by the State can only be amended for geographical, climatic or topographical reasons. Ordinance 19.02.060 was adopted considering geographical concerns. The code specifically addresses wind loads for each region. We use 70 M.P.H, Exposure C. The code specifically addresses each Seismic Zone. We are in Seismic Zone 4 and use the most restrictive code provisions for seismic concerns. These provisions determine nailing schedules for plywood diaphragms.

We have approved plans for the three flood control channels dated 1959 and 1960. They were constructed following approval of the plans. Please contact me with any questions.



David Davies

Att: Base Maps

Fire Zone 4 Map

Ordinance 19.02.060

Chapter 18 Glendora Municipal Code

Adopt 2000 Uniform Fire Code 11/2003

Adopt County Fire Code 11/2003

Fire Zone 4 Chapter 19 Glendora Municipal Code

19.02.060 Restrictions in Fire Zone No. 4:
Effective 1-12-01

Buildings or structures hereinafter erected, constructed or moved within or into Fire Zone shall be one of the types of construction as defined in this Chapter and shall meet the requirements of this Section as follows:

- (1) **Exterior Walls:** For fire-resistive protection of exterior walls and openings, as determined by location on property, section 503 of Volume 1 of the Uniform Building Code shall apply.
- (2) **Roofs:** Roof covering shall be Class A roofing as specified in subsections 1504.1 of the 1997 Uniform Building Code, Volume 1. Tile roofs shall be fire stopped at the eave ends to preclude entry of flame or embers under the tile.

Wood-shingle and wood-shake roofs are prohibited in Fire Zone 4 and in Very High Hazard Severity Zones regardless of classification under UBC Standard 15-2.

Every existing structure when twenty-five (25) per cent or more of the total roof area is re-roofed within a one-year period commencing on any date on or after the date of this ordinance, shall have at least a Class A roof.

- (3) **Unenclosed Underfloor Area:** Except as hereinafter provided, buildings and structures shall have all underfloor areas enclosed to the ground with construction as required for exterior walls, except for required vents. The following buildings or construction are exempt from the foregoing requirement:
 - (A) Complete enclosure shall not be required where the underside of all exposed floors and all exposed structural columns, beams, and supporting walls are protected as required for one-hour fire-resistive construction.
 - (B) The area under cantilevered balconies and unroofed walking decks need not be considered as underfloor areas provided exposed utilities, pipes, or other mechanical devices are not located in the area.
- (4) **Utilities:** Utilities, pipes, furnaces, water heaters or other mechanical devices located in an exposed underfloor area of a building or structure shall be enclosed with materials as required for one-hour fire-resistive construction. Adequate covered access openings for servicing such utilities shall be provided as required by appropriate codes.
- (5) **Protections of Openings:** Openings into attics, floors or other enclosed areas shall be covered with corrosion-resistant wire mesh not less than one-fourth inch (1/4") nor more than one-half inch (1/2") in any dimension, except where such openings are equipped with sashes or doors. Chimneys shall have spark arresters of maximum one-half inch (1/2") screen

(6) Automatic Fire Sprinkler System:

- (A) All new residential buildings or structures shall be equipped with an interior automatic fire sprinkler system, utilizing residential or quick response standard sprinklers.

Exceptions:

Sprinkler systems shall not be required for any addition to an existing non-sprinklered residential building or structure in Fire Zone 4 when the area of the addition totals no more than fifty per cent (50 %) of the area of the residential building, nor for alterations or repairs with a valuation not exceeding an addition valuation of 50% of the area of the residential building. Valuation of work shall be set by the Building Official in accordance with Section 19.02.030 of the Glendora Municipal Code and as established by resolution of the City Council.

- (B) An interior automatic fire sprinkler system shall be required for a new detached garage located within twenty (20) feet of any residential building or structure, or for any new detached accessory structure containing more than 400 square feet of floor area and located within twenty (20) feet of any residential building or structure.

- (7) **Enforcement:** The Building Official is hereby authorized to enforce all provisions of this section. The powers and duties of the Building Official shall be as provided in Section 104.2 of the Uniform Building Code, 1997 Edition.

19.02.70 Fire Warning Systems: Volume 1 of the Uniform Building Code, 1997 Edition, is amended by adding subsection 310.9.1.6 as follows:

In all residences with attached garages a smoke detector, conforming to the UBC Section 310.9.1.3, shall be installed in each attached garage. Such detectors shall be wired or connected to the other detectors in the residence to provide an alarm audible in the sleeping areas when the detector in the garage is activated.

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.^y

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.

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 forest lands. 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 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 - slash, 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.^z

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.

FireFree Program

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 3D-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.

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.”^{aa}

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. The City Manager will be responsible for implementation of the action items. The action items are listed in order of priority.

ST -WF#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:

- Investigate potential funding opportunities for individual mitigation projects; and
- Develop, approve and promote Fire Protection Agreements and partnerships to clarify roles and responsibilities and to provide for fire mitigation activities and suppression preparedness,

Coordinating Organization: County Fire Department

Timeline: 1-2 years

Plan Goals Addressed: Protect Life and Property, Public Awareness

Constraints: funding

LT-WF#1: 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:

- Update wildland/urban interface maps.
- 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
- 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: 1-3 years

Plan Goals Addressed: Protect Life and Property

Constraints: funding

L T - WF#2: 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:

- Encourage the hiring of fire prevention and education personnel to oversee education programs;
- Visit urban interface neighborhoods and rural areas and conduct education and outreach activities;

Conduct specific community-based demonstration projects of fire prevention and mitigation in the urban interface;

Establish neighborhood "drive-through" activities that pinpoint site-specific mitigation activities. Fire crews can give property owners personal suggestions and assistance; and Perform public outreach and information activities at fire stations by creating "Wildfire Awareness Week" activities, Fire stations can hold open houses and allow the public to visit, see the equipment and discuss wildfire mitigation with the station crews.

Coordinating Organization: Planning Department and County Fire Department

Timeline: Ongoing

Plan Goals Addressed: Protect Life and Property, Public Awareness

Constraints: funding

L T - WF#3: 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:

Encourage single-family residences to have fire plans and practice evacuation routes;

Encourage fire inspections in residential homes by fire departments to increase awareness among homeowners and potential fire responders;

Encourage a standard for the State Fire Marshall to evaluate fire plans and emergency plans;

Require fire department notification of new business applications to ensure that appropriate fire plans have been developed;

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.

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

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: Planning, Building and Safety and County Fire Department

Timeline: Ongoing

Plan Goals Addressed: Protect Life and Property, Public Awareness, Emergency Services, Partnerships and Implementation

Constraints: funding

L T - WF#4: Encourage implementation of wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability.

Ideas for Implementation:

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 Clear trimmings, trees, brush and other debris completely from sites when performing routine maintenance and landscaping to reduce fire risk.

Coordinating Organization: County Fire Department

Timeline: Ongoing

Plan Goals Addressed: Natural Systems

Constraints: funding

Wildfire Resource Directory

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

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>

An International Collection of Wildland- Urban Interface Resource Materials
(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

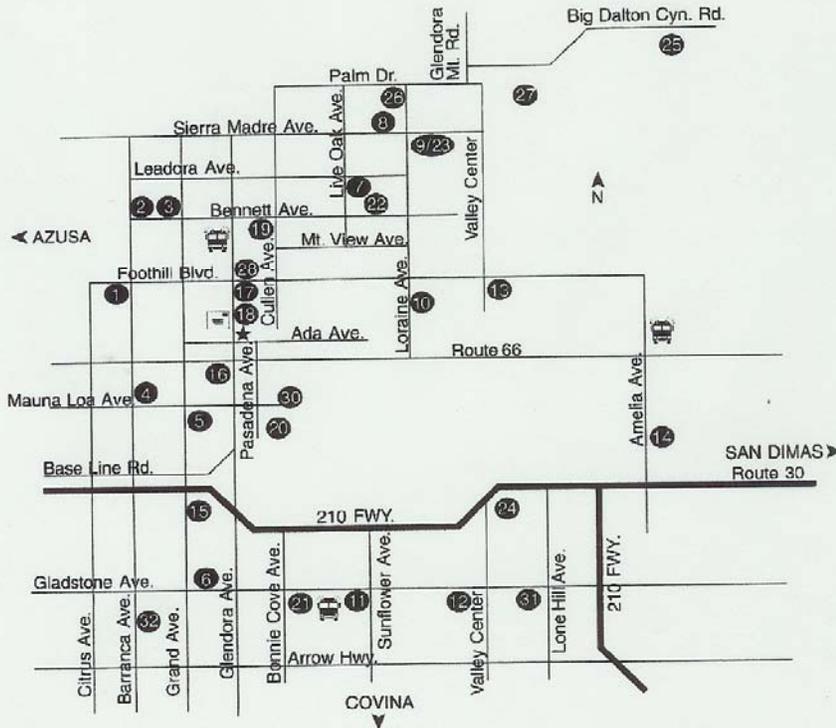
<http://www.firewise.org>

Wildfire Endnotes

Windstorm
Hazards
in
Glendora

Hazard: Winds

Glendora Schools, Parks, Critical Facilities and Public Facilities



SCHOOLS

1. Citrus College
2. Sandburg Middle
3. La Feira Elementary
4. Stanton Elementary
5. Whitcomb High
6. Washington Elementary
7. Cullen Elementary
8. Goddard Middle
9. Sellers Elementary
10. Williams Elementary
11. Sunflower Middle
12. Willow Elementary
13. Glendora High
14. Sutherland Elementary
31. Gladstone Elementary
32. Sierra High School

PARKS/CITY FACILITIES

15. Dawson Park/Glen Oaks Golf Course
16. Big Tree Park
17. City Hall
18. Library
19. Finkbinder Park/Legion Bldg. Youth Center/Rotary Scout Hut
20. South Hills Park
21. Gladstone Park
22. Ole Hammer Park
23. Willow Springs
24. Louie Pompei Memorial Park
25. Camp Cahulla/Big Dalton Wilderness

26. George Manooshian Park
27. Carlyle E. Linder Equestrian Park
28. La Feira Center for Seniors
30. Centennial Heritage Park

 U.S. Post Office

PUBLIC SAFETY STATIONS

 Fire Station (L.A. County)

 Glendora Police Station



City of Glendora

116 E. Foothill Blvd. Glendora, CA 91741 • (626) 914-8200 • www.ci.glendora.ca.us

Area of city affected: City wide

Hazard overview.....a quick look

Hazard : **Wind**

Affected Area of Glendora: **Entire City**

Historical Events: **every fall**

1998 85 MPH winds downed over 1,300 trees

Local Damage : **downed trees, utility interruptions, limbs or trees causing property damage (homes, businesses, vehicles)**

Probability of future occurrence: **High**

At Risk:

Population 49,215

Housing

13,500 homes,

2,888 apartment units,

883 trailers/mobile homes

Businesses

3,620

Mitigation Steps Taken

1. work with home owners to trim trees correctly
2. work with Edison to keep limbs away from power lines.
3. work with Community Services to trim city trees and replaced diseased trees
4. annual survey of city trees

Damage

Mostly old oak trees. More trees uprooted after a period of wet weather before the windstorms

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Windstorms:

Why are Severe Windstorms a threat to the entire City of Glendora?

Severe wind storms pose a significant risk to life and property in Glendora 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.



Map from NASA's "Observatorium"

Historical occurrences

Each year there is a high probability that Glendora will be affected by high winds coming down the local canyons. These winds affect the entire city. In 1998 the City lost over 1000 trees due to high winds coming after a few days of rain, which caused the mature trees to uproot.

Windstorm Characteristics in Southern California

Santa Ana Winds and Tornado-Like Wind Activity

Based on local history, most incidents of high wind in the City of Glendora 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.

What are Santa Ana Winds?

“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.”^{bb} These winds accelerate to speeds of 35 knots as they move through canyons and passes, with gusts to 50 or even 60 knots.

“The complex topography of Southern California combined with various atmospheric conditions create 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 downslope 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.”^{cc}

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 Tornadoes?

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		

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.^{dd}

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.^{ee}

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.^{ff}

“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.”^{gg}

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 micro-bursts.

Area 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.^{hh} The second death occurred when a passenger in a vehicle was hit by a flying pickup truck cover launched by the Santa Ana Winds.ⁱⁱ

The following Santa Ana wind events were featured in news resources during 2003:	
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.”

Customize the following two tables to accommodate local events.

The following is a glimpse of some major Santa Ana wind/windstorm events to hit the local area:

Major Windstorms / Santa Ana Wind Events
Orange County Area from 1961- 2001

<i>Date</i>	<i>Location and Damage</i>
<i>November 5-6, 1961</i>	<i>Santa Ana winds. Fire in Topanga Canyon</i>
<i>February 10-11, 1973</i>	<i>Strong storm winds: 57 mph at Riverside, 46 Newport Beach. Some 200 trees uprooted in Pacific Beach alone</i>
<i>October 26-27, 1993</i>	<i>Santa Ana winds. Fire in Laguna Hills</i>
<i>October 14, 1997</i>	<i>Santa Ana winds: gusts 87 mph in central Orange County. Large fire in Orange County</i>
<i>December 29, 1997</i>	<i>Gusts 60+ mph at Santa Ana</i>
<i>March 28-29, 1998</i>	<i>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.</i>

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.
March 5-6, 2000	Strong thunderstorm winds at the coast: gust 60 mph at Huntington Beach. Property damage and trees downed along the coast
April 1, 2000	Santa Ana winds: gust 93 mph at Mission Viejo, 67 Anaheim Hills
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
Source: http://www.wrh.noaa.gov/sandiego/research/Guide/weatherhistory.pdf	

Windstorm Hazard Assessment

Hazard Identification

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 Glendora area can cause extensive damage including heavy tree stands, exposed coastal properties, road and highway infrastructure, and critical utility facilities.

The map 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 Glendora is in the direct path of the ocean-bound Santa Ana winds.

With an analysis of the high wind and tornado events depicted in the "Local History" section, we can deduce the common windstorm impact areas



Map from NASA's "Observatorium"

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?

Life and Property

Based on the history of the region, windstorm events can be expected, perhaps annually, across widespread areas of the region which can be adversely impacted during a windstorm event. This can result in the involvement of City of Glendora emergency response personnel during a wide-ranging windstorm or microburst tornadic 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.

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>

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.

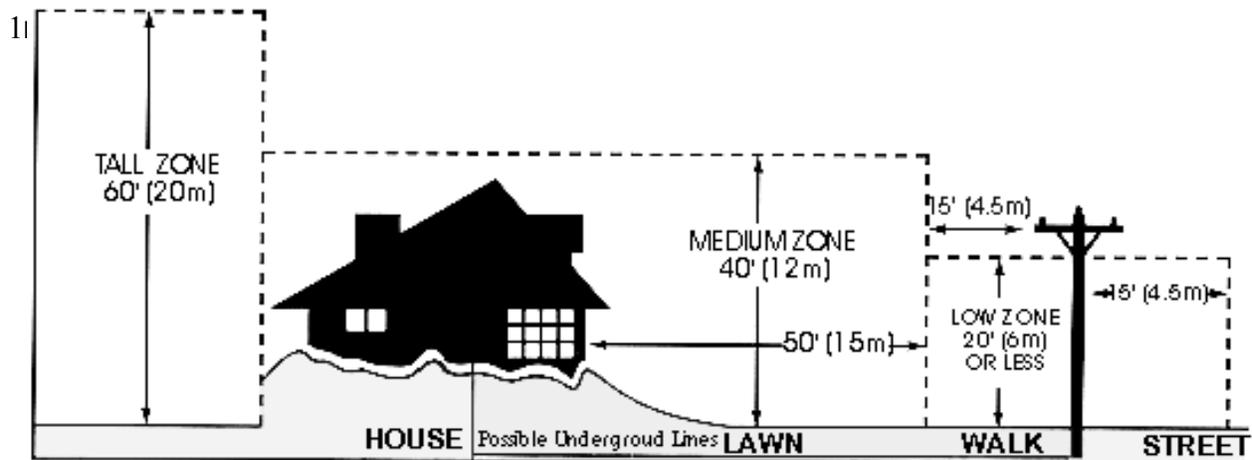
Infrastructure

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.

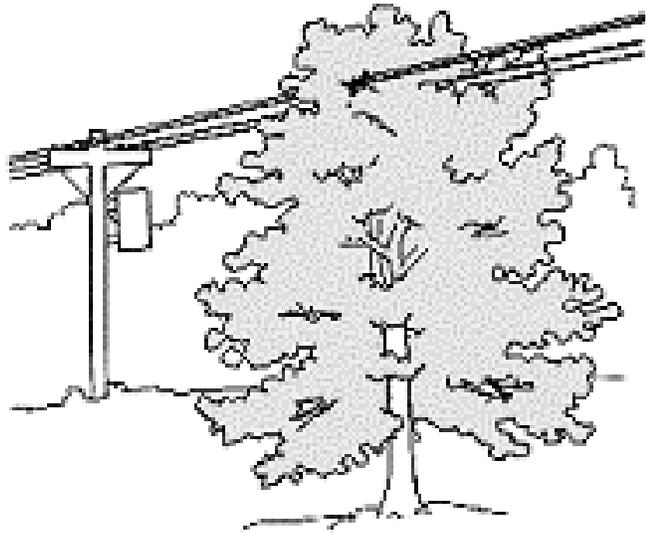
Existing Windstorm Mitigation Activities

As stated, one of the most common problems associated with windstorms is power outage. 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.

Enforcement of the following California Public Resource Code Sections provides guidance on tree pruning regulations:^{jj}

- 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

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:

Windstorm Mitigation Action Items

The windstorm mitigation action items provide direction on specific activities that organizations and residents in City of Glendora 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. The action items are listed in order of priority and the implementation will be under the direction of the City Manager.

City of Glendora Mitigation Strategy Recommendations

LT - Wind #1: Public Awareness Campaign: To provide public education materials to City of Glendora 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:

- ✓ Compile mitigation brochures from the following organizations: FEMA; California Public Utilities Commission; County of Los Angeles Public Works; Southern California Edison; Tree Line Connection
- ✓ Distribute these materials to City of Glendora 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.
- ✓ 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: City of Glendora Planning

Timeline: Ongoing

Plan Goals Addressed: Public Awareness, Protection of Life and Property

Constraints: funding

LT - Wind #2: Create local City and utility awareness of tree pruning and Fire Code Sections relevant to wind-resistant utility operations

Ideas for Implementation: Provide information to City Planning Departments and local utility companies encouraging compliance with State and Local tree clearance and integrity guidelines by:

- ✓ Compile comprehensive list of pertinent State and local regulations
- ✓ Send letters of encouragement from Hazard Mitigation Planning Committee and local City and School officials encouraging utility compliance with guidelines

Coordinating Organization: Planning Dept, Public Works

Timeline: Ongoing

Plan Goals Addressed:

Constraints: funding

LT - Wind #3: Encourage Critical City Facilities to purchase and/or test backup power facilities

for use during a power failure. Create an equipment/testing log to ensure backup power equipment is in working service.

Ideas for Implementation:

- ✓ Gather all databases of backup power equipment for critical facilities.
- ✓ Test all critical facility backup power generators.
- ✓ Keep an accurate record of equipment specification and testing date information.

Coordinating Organization: Public Works

Timeline: Ongoing

Plan Goals Addressed:

Constraints: funding

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

[WINDSTORMS: Protect Your Family and Property from the Hazards of Violent Windstorms](http://emd.wa.gov/5-prep/trng/pubed/Windstrm.pdf)
<http://emd.wa.gov/5-prep/trng/pubed/Windstrm.pdf>

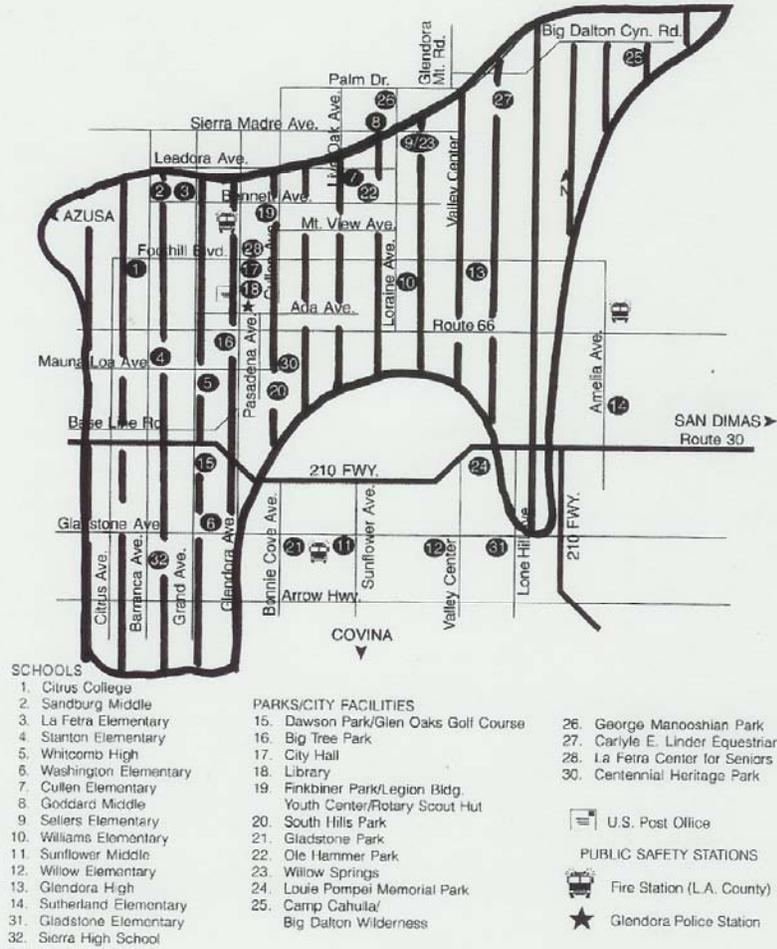
Preparing Your Home for Severe Windstorms is available from
http://www.chubb.com/personal/html/helpful_tips_home_windstorm.html

End Notes:

Flooding, Landslides and Mud Flow Hazards in Glendora

Hazard: Flood, Dam failure

Glendora Schools, Parks, Critical Facilities and Public Facilities



City of Glendora

116 E. Foothill Blvd. Glendora, CA 91741 • (626) 914-8200 • www.ci.glendora.ca.us

Area of city affected:



Hazard overview.....a quick look

Hazard : **Dam Failure**

Affected Area of Glendora: **85-90% of Glendora**

Historical Events: **none**

Local Damage : **Temporary flooding due to dam failure**

Probability of future occurrence: **very low**

At Risk:

Population 48,000 to 90,000 depending on time of day

Housing

13,000 homes,

2,888 apartment units,

833 trailers\mobile homes

Businesses

3,600

Mitigation Steps Taken

1. Dam level kept at minimum
2. Debris cleared after each heavy rain
3. Conditions heavily monitored during storms

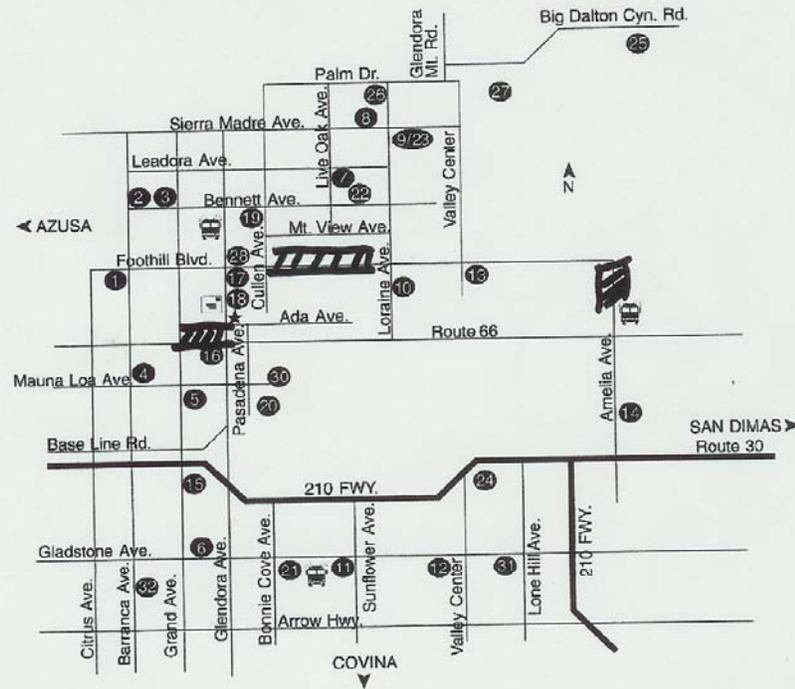
Damage

If the Dalton Dam fails the water will cover 85-90 % of Glendora

18 public schools will be damaged, 2 fire stations, City hall, Library, Police station and City EOC, 3 community centers, 2 electrical facilities, 1 phone main switch, and 6 cell phone sites will be affected. 1 main rail line and 2 freeways will be closed till bridges are inspected. Estimate multiple Billions of dollars in damage due to water, debris, lack of utilities, lack of use and accessibility and interruption of services.

Hazard: urban flooding

Glendora Schools, Parks, Critical Facilities and Public Facilities



SCHOOLS

1. Citrus College
2. Sandburg Middle
3. La Fetra Elementary
4. Stanton Elementary
5. Whitcomb High
6. Washington Elementary
7. Cullen Elementary
8. Goddard Middle
9. Sellers Elementary
10. Williams Elementary
11. Sunflower Middle
12. Willow Elementary
13. Glendora High
14. Sutherland Elementary
31. Gladstone Elementary
32. Sierra High School

PARKS/CITY FACILITIES

15. Dawson Park/Glen Oaks Golf Course
16. Big Tree Park
17. City Hall
18. Library
19. Finkbiner Park/Legion Bldg. Youth Center/Rotary Scout Hut
20. South Hills Park
21. Gladstone Park
22. Ole Hammer Park
23. Willow Springs
24. Louie Pompei Memorial Park
25. Camp Cahulla/Big Dalton Wilderness

26. George Manooshian Park
27. Carlyle E. Linder Equestrian Park
28. La Fetra Center for Seniors
30. Centennial Heritage Park

 U.S. Post Office

PUBLIC SAFETY STATIONS

 Fire Station (L.A. County)

 Glendora Police Station



City of Glendora

116 E. Foothill Blvd. Glendora, CA 91741 • (626) 914-8200 • www.ci.glendora.ca.us

Area of city affected:



Hazard overview.....a quick look

Hazard : **URBAN FLOODING**

Affected Area of Glendora: **Foothill Blvd, Route 66, Amelia Ave**

Historical Events: **1968 and 2002**

Local Damage : **Temporary flooding during heavy downpour**

Probability of future occurrence: **High**

At Risk:

Population 500

Housing

50 homes,

0 apartment units,

30 trailers\mobile homes

Businesses

60

Mitigation Steps Taken

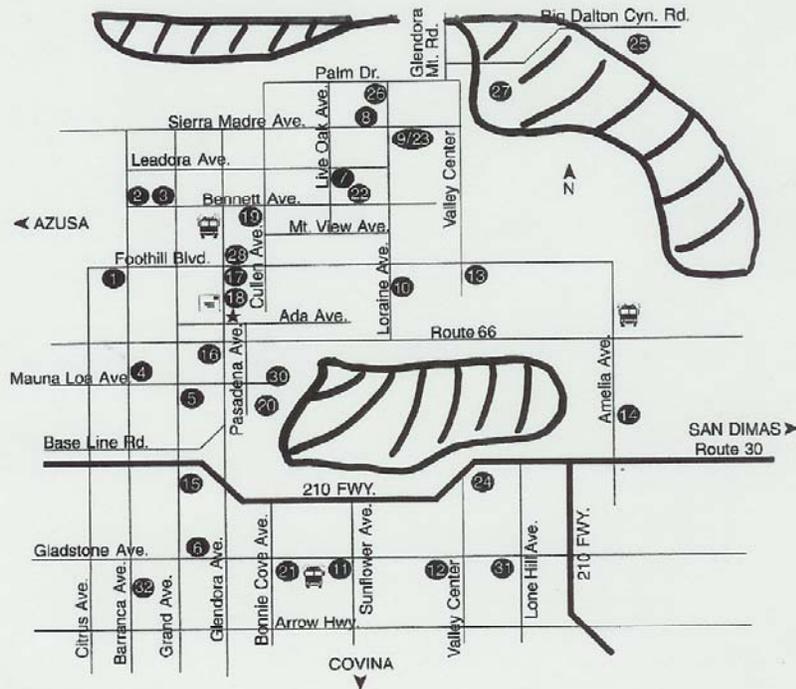
1. monitor storm forecasts.....issue warnings
2. place sandbags as necessary
3. monitor water level
4. storm drain upgrades as soon as funding is available

Damage

During heavy down pours the storm drain system gets temporarily overwhelmed. Water backs up and floods homes and businesses

Hazard: mudslide earth movement

Glendora Schools, Parks, Critical Facilities and Public Facilities



SCHOOLS

1. Citrus College
2. Sandburg Middle
3. La Fetra Elementary
4. Stanton Elementary
5. Whitcomb High
6. Washington Elementary
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8. Goddard Middle
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City of Glendora

116 E. Foothill Blvd. Glendora, CA 91741 • (626) 914-8200 • www.ci.glendora.ca.us

Area of city affected:



Hazard overview.....a quick look

Hazard : **Mud , Debris, and Earth movement**

Affected Area of Glendora: **Local foothills**

Historical Events: **1939 and 1969**

Local Damage : **Mud and debris flow into homes in the foothills area**

Probability of future occurrence: **low**

At Risk:

Population 2,000 depending on time of day

Housing

1,200 homes,

0 apartment units,

0 trailers\mobile homes

Businesses

0

Mitigation Steps Taken

1. Dams built in local canyons
2. Debris basins built in foothills
3. 3 flood control channels built to channel water away from homes
4. Storm drains added to city streets
5. Dams and basins are kept clean on a regular basis

Damage

Since the 1969 incident the County and the city have done multiple projects to keep the 1969 incident from reoccurring. Dams and basins hold and channel the mud and debris. Flood control channels and storm drain flow the water away from homes. After wild fires the county cleans the basins and recleans after the first rain. Estimates of 60 million tons of debris have been removed in the past 2 years. The 1969 incident had 50 million dollars in damage with 120 homes damaged. All the homes in the affected area today retail for over 1.3 million dollars each! So a reoccurrence could easily reach almost a ½ billion dollars in damage and lack of use.

This is a prime example of what mitigation steps can do. In the 2005 rainy season, a record rainy year with over 65 inches of rain, there was not a reported incident of mud slides, earth movement or flooding. This was also after the Williams Fire which stripped the hillsides of vegetation.

Flood Section
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Why are Floods a Threat to the City of Glendora

The City of Glendora is located up against the San Gabriel Mountains. Historically in 1938 and 1969 the City had significant flooding. Since 1969 the City and the County have built dams, basins and flood control channels that have greatly deduced the flooding hazard in Glendora. A major flood now has a low probability of an occurrence in the City due to the mitigation projects

The City of Glendora was most recently affected by the flooding in 1969 when mud slides and flooding affected the north part of the city.

The damage to The City of Glendora businesses, residences, and infrastructure was estimated at over \$50 million, which was 200% of the city's annual budget. The city sought and received a Presidential Disaster Declaration to obtain federal assistance for its flood recovery effort. The City of Glendora Risk Management Office estimated that the flood of 1969 directly or indirectly affected 100% of the city's residents.

Although this flood was a large-scale disaster, it was not unprecedented. During the 1938, over \$ 1 million in damage was done. Residents in the City of Glendora share a statewide concern about flood issues.

History of Flooding in The City of Glendora

The City of Glendora is susceptible to flooding from hill side run off. Major floods have affected the citizens of the city since as early as 1938, when it was reported that flood waters 6 feet deep came from the Big Dalton Canyon area

Historic Flooding in Los Angeles County

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.^{kk}

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)	

While the City of Glendora is 15 miles east of Los Angeles, it is not so far away as to not be affected by the heavy rains that brought flooding to Los Angeles. In addition, the towering mountains that give the Los Angeles region its spectacular views 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.

“The Santa Monica, Santa Susana and Verdugo mountains, which surround three sides of the 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”¹¹

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 regions 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 Glendora, geography and climate combine to create chronic seasonal flooding conditions.

Winter Rainfall

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 City of Glendora is in the northern section of the Los Angeles Basin (or San Gabriel Valley). It is up against the mountains and hills, which increases the collection of rainwater.

Monsoons

Another relatively regular source for heavy rainfall, particularly in the mountains and adjoining cities is from summer tropical storms. These tropical storms usually coincide with El Niño years.

Tropical cyclones that have affected Southern California during the 20th Century			
Month-Year	Date(s)	Area(s) Affected	Rainfall
July 1902	20th & 21 st	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	28 th - 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	30 th - Oct 1 st	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/el_n_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 places these sediments are as much as twenty thousand feet thick”^{mm}

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. 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. And 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 replacing it with three or four town homes or apartments which 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 flood water 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 Glendora regulations prohibit all 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.

Development

For floodplain ordinance purposes, development is broadly defined by the City of Glendora Zoning Ordinance to mean "any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations located within the area of special flood hazard." 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 Glendora: 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 of rivers and streams. 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.

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.

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 flood waters that rise very rapidly and peak with violent force.

Almost 100 percent of the area in the City of Glendora 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 and basements can fill with water. Storm drains often back up with vegetative debris causing additional, localized flooding.

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 one of the major dams in the City of Glendora. There is 1 dam and many reservoirs in the City of Glendora holding billions of gallons of 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 City of Glendora Emergency Action Plan.

There have been a total of 45 dam failures in California, since the 19th century. The significant dam failures in Southern California are listed below:

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.”^{nm}

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

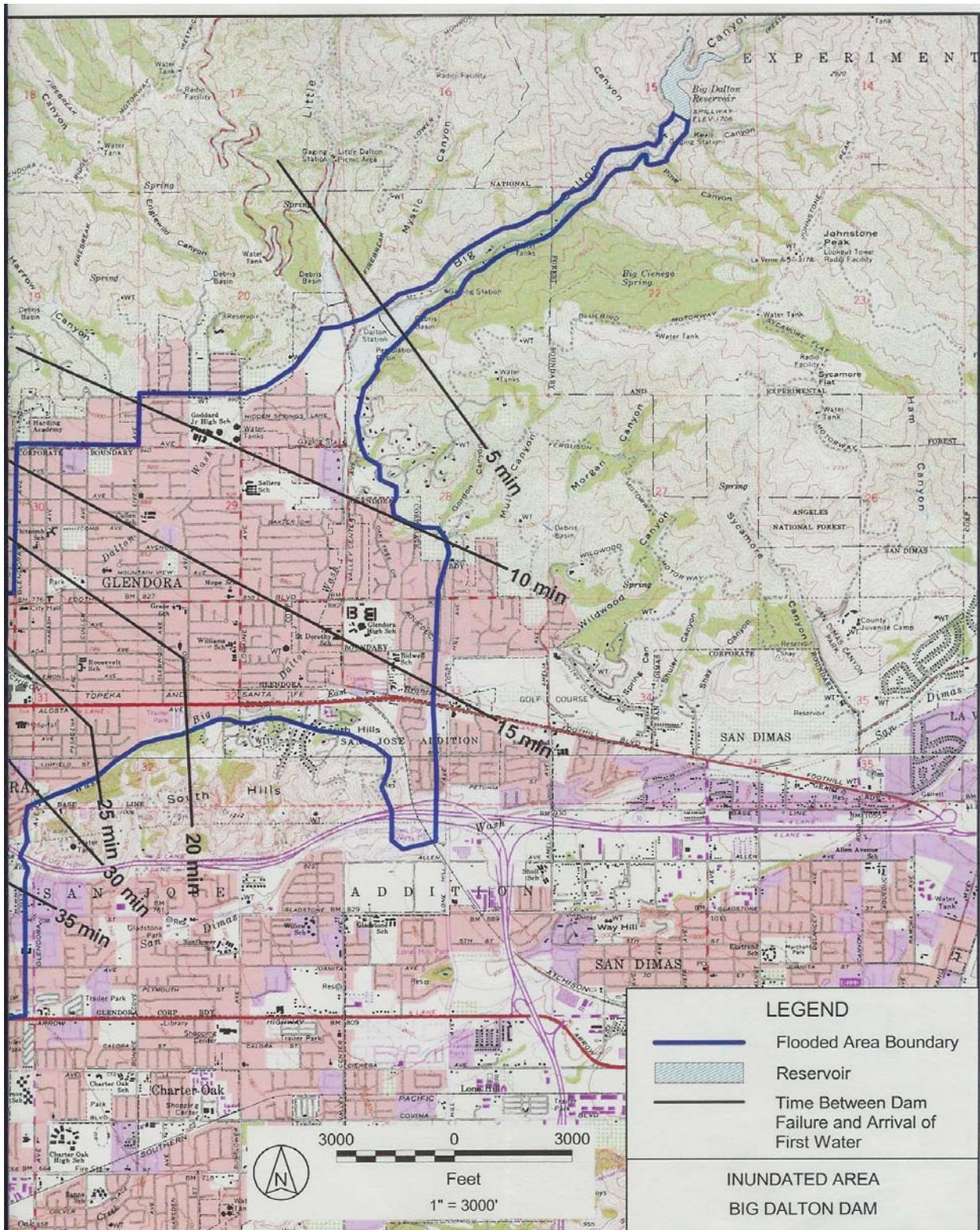


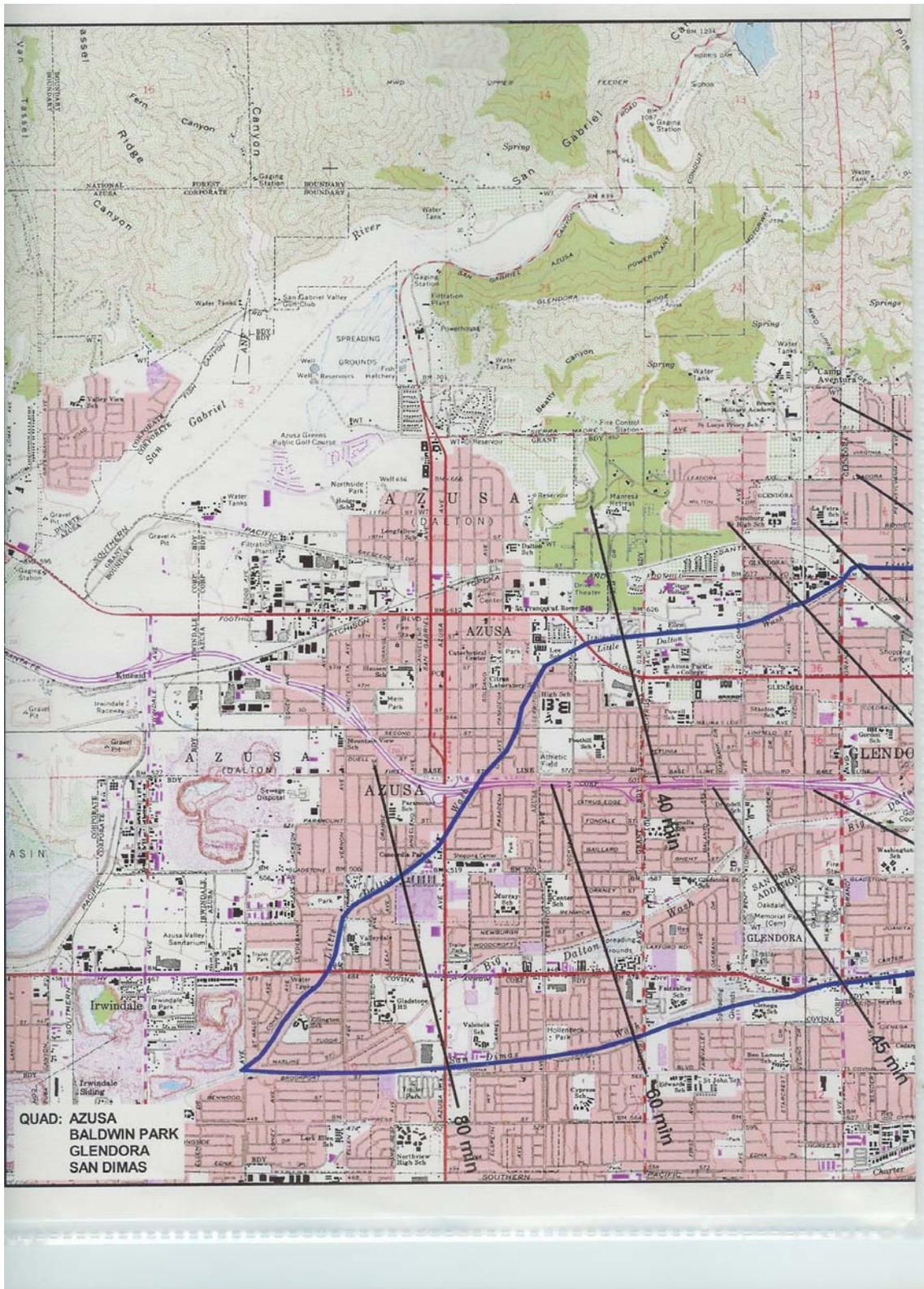
Baldwin Hills Dam - Dark spot in upper right hand quadrant shows the beginning of the break in the dam.

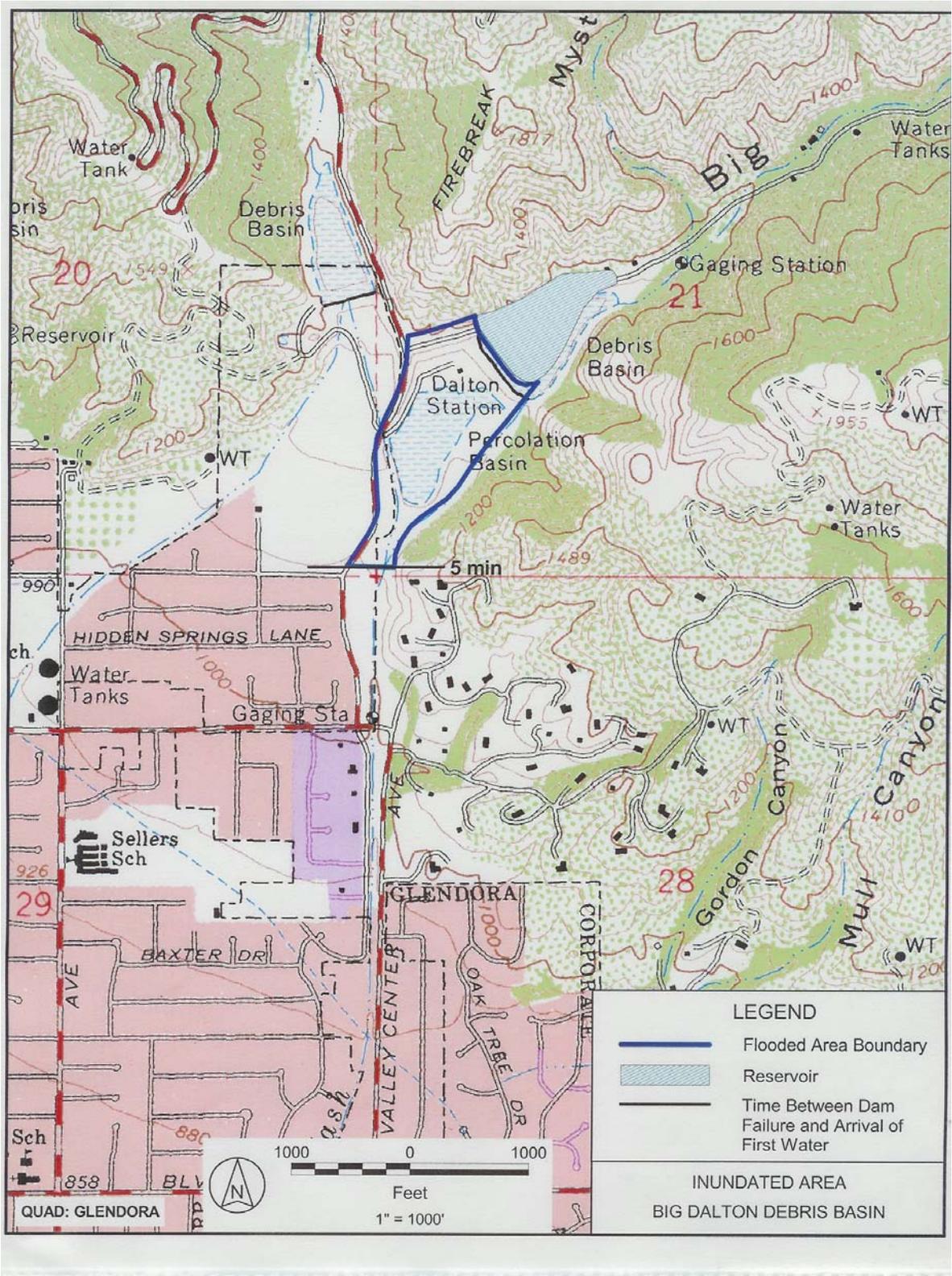
Angeles and beyond. It foreshadowed the end of urban-area earthen dams as a major element of the Department of Water and Power's water storage system. It prompted a tightening of Division of Safety of Dams control over reservoirs throughout the state.

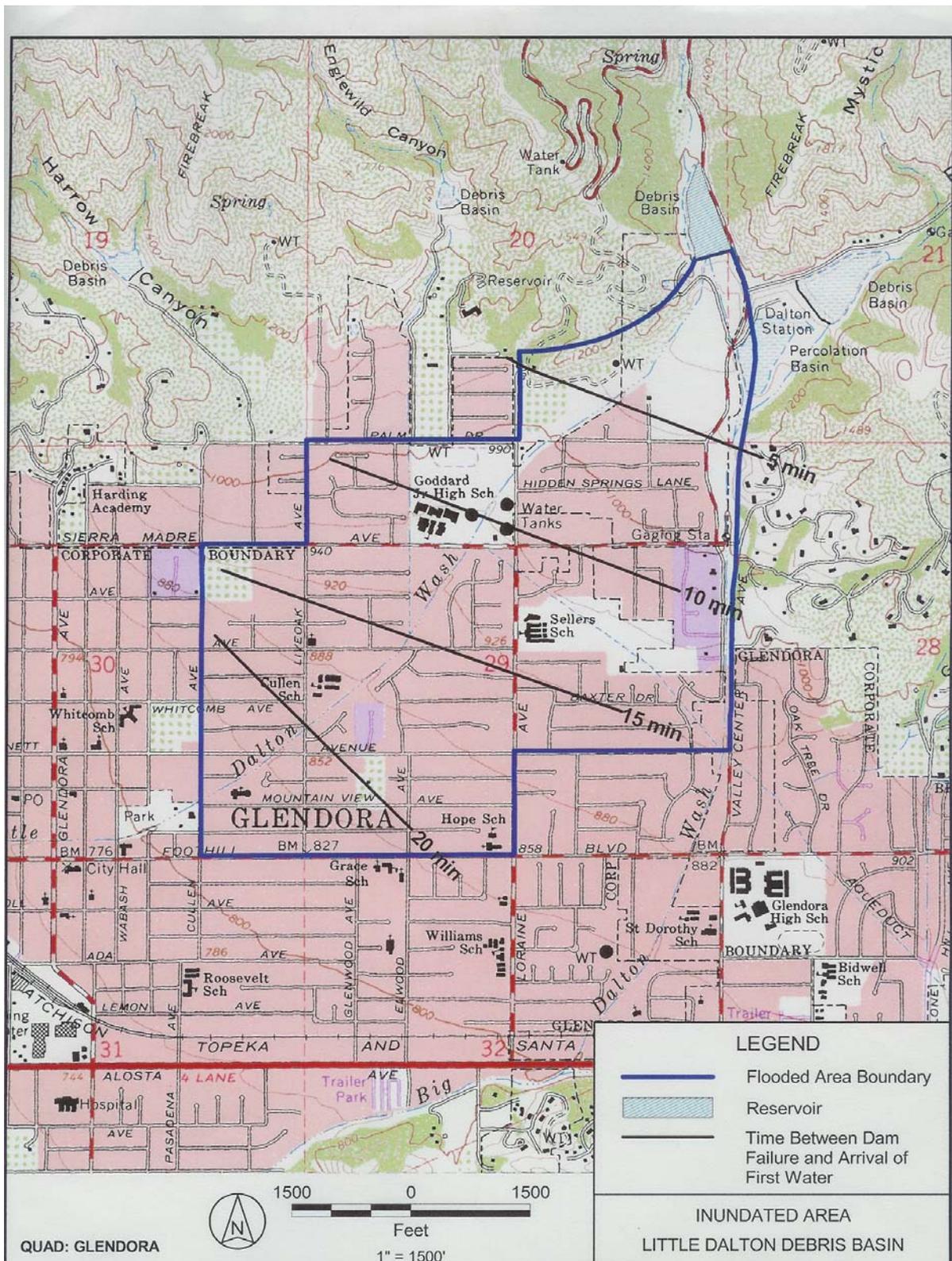
The live telecast of the collapse from a KTLA-TV helicopter is considered the precursor to airborne news coverage that is now routine everywhere.”⁰⁰

On the following pages are the Dam Inundation Maps for the Big Dalton Dam, the Little Dalton debris basin and the Big Dalton Debris basin.









Debris Flows

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.”^{pp}

Following is a National Geographic Article from October 1969, which featured the Spring 1969 Mud Slide and Flood that occurred in Glendora.

DOUBLE MAP SUPPLEMENT: THE PACIFIC OCEAN'S FACE AND FLOOR (page 496)

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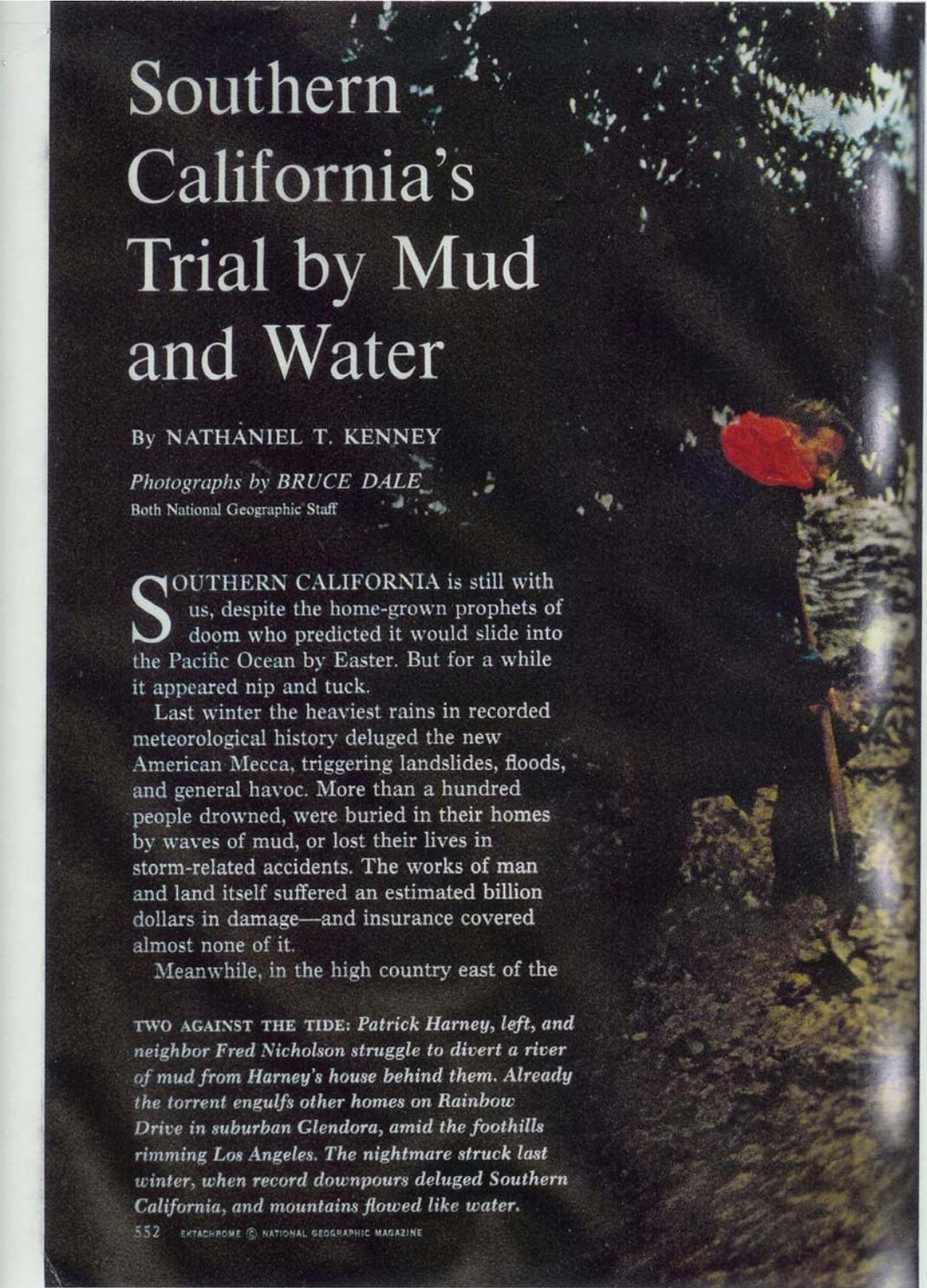
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OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY WASHINGTON, D.C.



Southern California's Trial by Mud and Water

By NATHANIEL T. KENNEY

Photographs by BRUCE DALE
Both National Geographic Staff

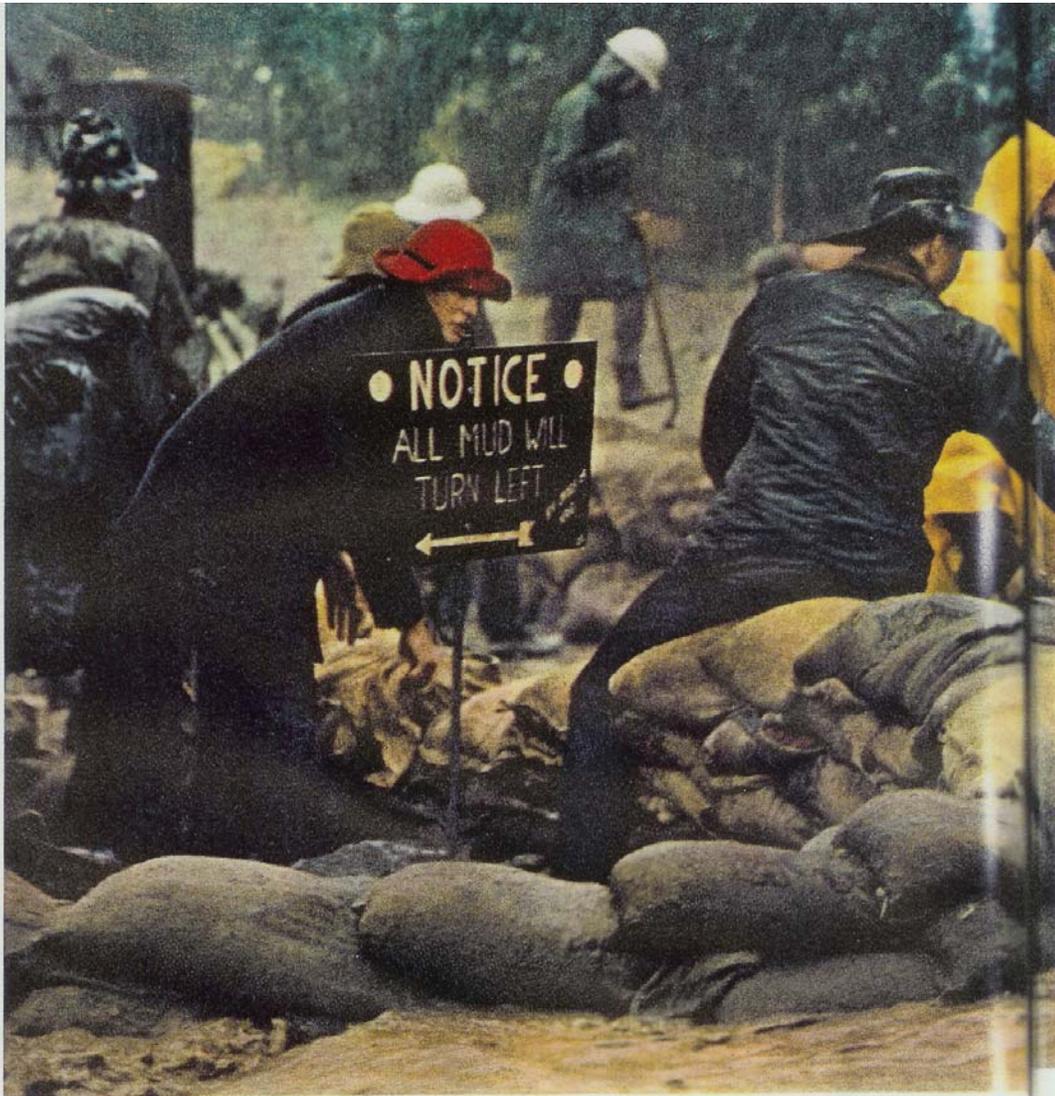
SOUTHERN CALIFORNIA is still with us, despite the home-grown prophets of doom who predicted it would slide into the Pacific Ocean by Easter. But for a while it appeared nip and tuck.

Last winter the heaviest rains in recorded meteorological history deluged the new American Mecca, triggering landslides, floods, and general havoc. More than a hundred people drowned, were buried in their homes by waves of mud, or lost their lives in storm-related accidents. The works of man and land itself suffered an estimated billion dollars in damage—and insurance covered almost none of it.

Meanwhile, in the high country east of the

TWO AGAINST THE TIDE: Patrick Harney, left, and neighbor Fred Nicholson struggle to divert a river of mud from Harney's house behind them. Already the torrent engulfs other homes on Rainbow Drive in suburban Glendora, amid the foothills rimming Los Angeles. The nightmare struck last winter, when record downpours deluged Southern California, and mountains flowed like water.

552 EKTACHROME © NATIONAL GEOGRAPHIC MAGAZINE



Soldiers in a losing battle stack sandbags against rising water and mud on Glendora's Glencoe Heights Drive. A sign, posted by neighborhood bachelors who call themselves the Royal Guard, bespeaks the community's pluck. Seconds later a mighty surge swept away the

coastal plains, record snows caused death-dealing avalanches and yet more property damage. As in the Midwest, spring thaws later produced further floods in the lowlands.

Much of the catastrophe I witnessed myself, especially in the steeply tilted canyons ringing midtown Los Angeles. Chiefly I sought to learn its causes, and whether anything can be done to prevent a recurrence.

Within an hour of landing in Los Angeles, I heard a proposed solution. One of those robed and bearded soothsayers you're bound

to meet eventually in the Los Angeles area was haranguing passers-by on Hollywood's Sunset Boulevard.

"Shape up, sinners!" he shouted. "Make your peace with mother nature or she'll wash you into the Pacific!"

Next day, when I met Dr. Martin L. Stout, associate professor of geology from California State College at Los Angeles and a leading engineering geologist, I quoted the street-corner prophet with some amusement.

"He's more right than he realizes," said



ERTACHROME BY BRUCE DALE © N.G.S.

barricade. Fires last fall in the surrounding San Gabriel Mountains set the stage for disaster by denuding slopes, reducing their capacity to absorb water. Then the skies opened—44 inches of rain fell in 42 days—to trigger a succession of floods, mud and gravel flows, and slides.

Dr. Stout. "The Southern California environment is hostile and tricky, and it has been ever since the coast rose from the sea.

"Violent floods, landslides, erosion, the brush fires that help cause them—all are natural processes, responding remorselessly to a pattern of feast-or-famine rains. The very earth we tread out here is young and geologically unstable, prone to dramatic movement without any help from us.

"And the corner preacher is right again when he says our transgressions of natural

laws have speeded and intensified these primeval forces. Frantically building a megalopolis, we've heedlessly altered the land, with little thought for nature.

"Meanwhile, the population has increased so drastically that some people inevitably are getting in the way of natural changes in the environment."*

The summer before had seemed a normal one, with its smidgen of rain and the famed

*See "California, The Golden Magnet," by William Graves, NATIONAL GEOGRAPHIC, May 1966.

southland sun shining day after pleasant day. On the hills and mountains the thick chaparral dried into explosive tinder, as always, and upwards of 100,000 acres burned.

"In our area we answered more than 6,000 alarms in grass and brush during the last high-fire season," said Chief Engineer Keith E. Klinger of the Los Angeles County Fire Department.

"It was a record, but as the population

increases, we have to expect this. Each year more people go into the hills, and wherever you have people, you have the danger of fire."

A rule of thumb applies to any Southern California watershed: Flood follows fire.

"Burn a hill, and it loses nearly all its capacity to soak up even a normal rain," explained Supervisor William T. Dresser of the big Angeles National Forest overlooking Los Angeles. "The water rushes right off,

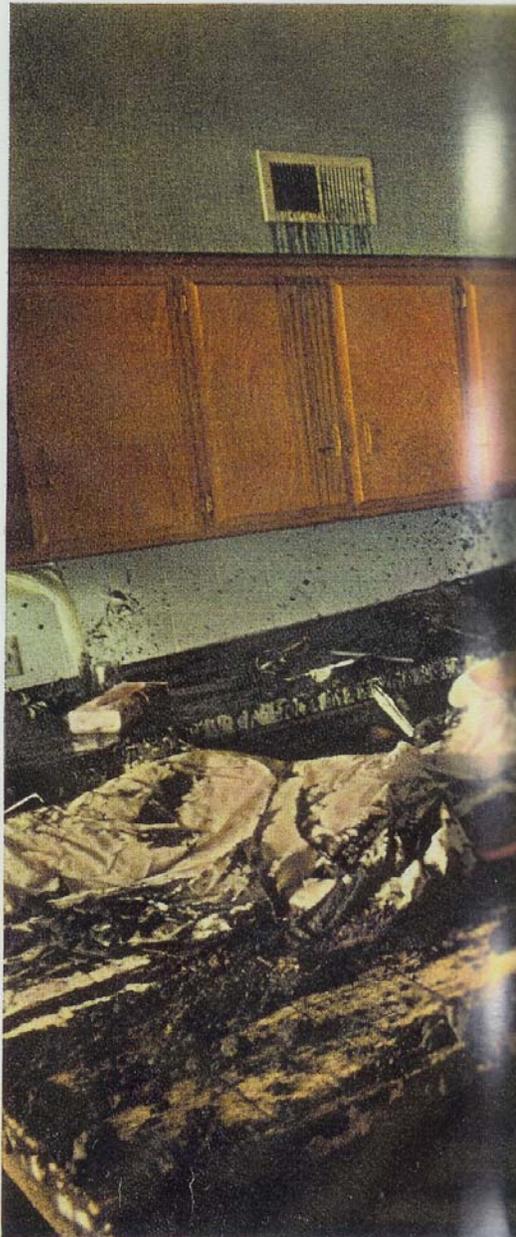


EKTACHROMES © N.G.S.

Strain of his ordeal reflects in the face of Patrick Harney, bone-weary after a night of fending off freshets of mud. Ultimately, he and a band of volunteers saved his house from the fate of a neighbor's (right).

Ruin reigns in the kitchen of the John R. Caufield home on Glencoe Heights Drive. A high-school volunteer inspects litter borne in on a sticky flow that rose above the level of the stove, upper right; a heat register at left trickles ooze from the living room, which filled with mud.

One of Glendora's hardest-hit families, the Caufields abandoned their \$55,000 home as a total loss. Cruelly, another slide destroyed furniture they had stored for safe-keeping in a neighbor's garage. Insurance covered nothing; most home underwriters refuse the risks of slide country.



tearing the slopes to bits as it goes, and it ends as certain flood in the lowlands.”

At summer’s end the rains began, but precipitation records show them as average. Then, in the middle of January, a record-breaking storm rolled in from the Pacific.

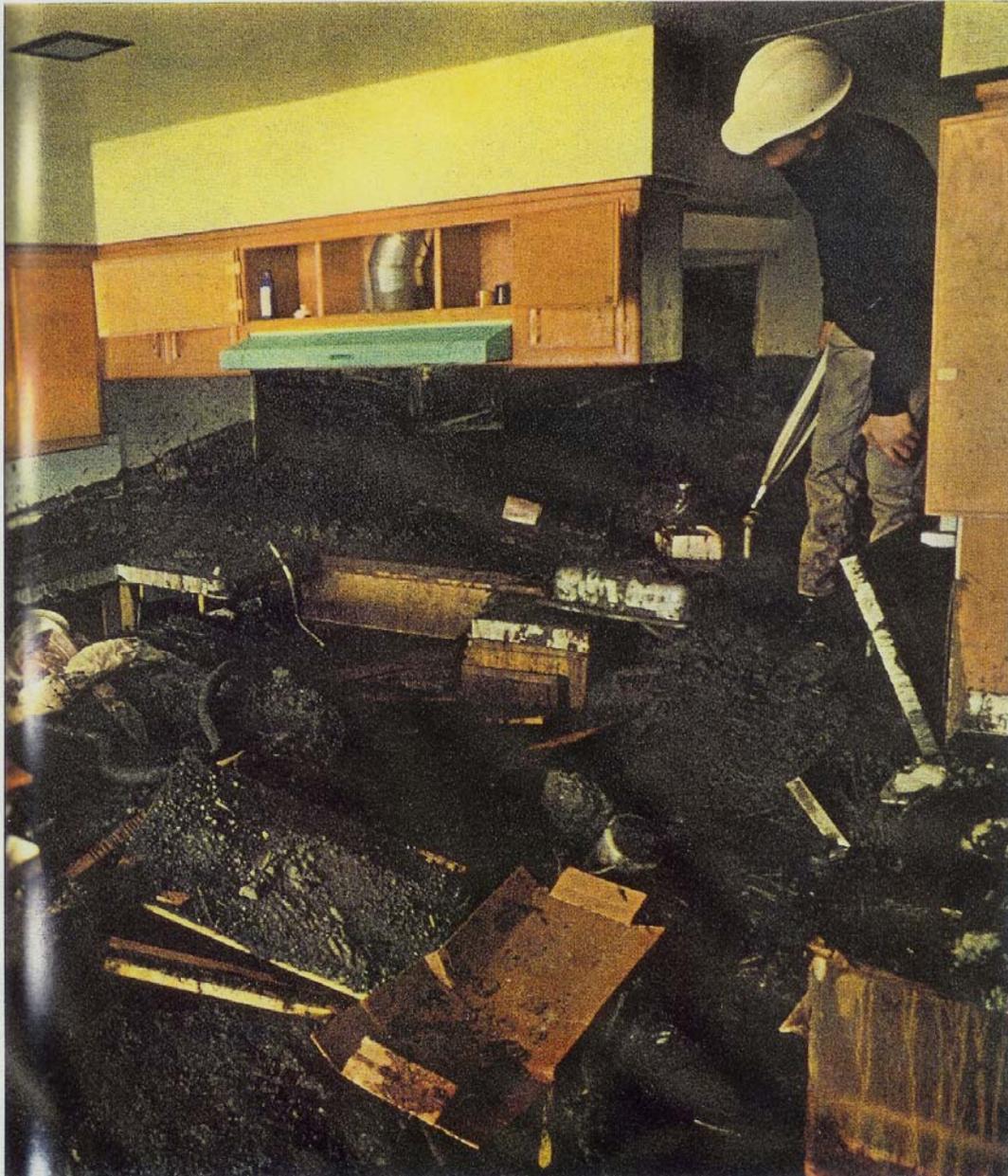
“Normal West Coast rains fall from storms originating off Alaska,” said Anselmo Lewis, Angeles National Forest district ranger. “The one that started all the trouble here came

from the Pacific near Hawaii. Moreover, it was hidden behind a minor disturbance just ahead of it, and caught us napping.”

“No, we didn’t predict its onset well,” said George Kalstrom, meteorologist in charge of the Weather Bureau’s Los Angeles Forecast Office. “Once it started, though, we were accurate to the end. Satellite photographs helped.

“If not unique, it was an unusual storm. We felt its effects for nine days, during which we

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measured rainfall never equaled during any like period on record.”

Immediately the surface mud and gravel, already well soaked, washed from the slopes, smashing into hillside homes through doors and windows and trapping people in their beds. In their lower reaches, outrageously swollen rivers choked themselves with debris and rampaged out of their courses.

After flood came landslide—to be expected in view of the area’s geology. Formed by deposits on the bed of an ancient sea, the subterranean earth consists of many layers, some of them clay or other slippery material.

Over the centuries, movements of the earth that characterize this highly active earthquake zone have tilted and fractured the layers into a jumble. The mid-January rains penetrated to normally dry sloping layers and loosened their bonds. Also, the sheer weight of water soaking the upper soils may have been partly responsible; in any event, sliding began at once and in some places will continue.

Foothill Cities Suffered Most

The February rains that followed the tropical deluge came from normal North Pacific storms. However, stations reported rainfall as much as 800 percent above normal. It rained frequently, with occasional clear periods, from mid-January until Sunday, March 2. By that time Los Angeles had received a record 25 inches of rain—almost twice the yearly average—with the wet season still not over.

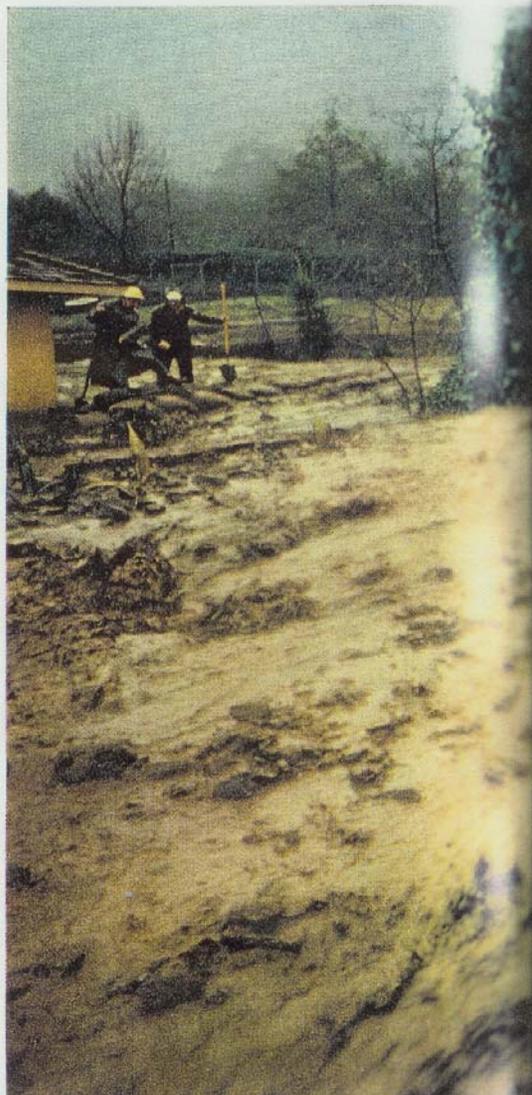
In the Los Angeles Basin, a sluggishly drained coastal plain ringed by mountains, nearly 100 cities occupy land once devoted to agriculture. A score of these cities nestle in the foothills. As they grow, they push ever farther up the slopes and into the canyons that drain the San Gabriel Mountains (map, page 566). The flat land of the basin yearly grows scarcer and more expensive. And a house with a view is fashionable, even if it must be pegged to the hillside by stilts.

Glendora, population 32,050, is a typical foothill city, an attractive, self-contained

community replacing the fragrant trees of large citrus groves. Although the city suffered no fatalities, it counted 160 homes badly damaged and five destroyed or stricken beyond repair.

Glendora’s experience, it seemed to me, was the entire Southern California catastrophe in microcosm. And the personal disaster of Lorin Rimer, who owned a \$45,000 rambler on Glendora’s moderately steep Rainbow Drive, typified the experiences of hundreds.

“Mrs. Rimer and I came here from Punxsutawney, Pennsylvania, in 1947,” he said, “and bought a house on a nice hillside. Then last summer the slopes behind us burned—for



Anything may help. A neighbor adds a mailbox to a dike protecting the home of Glendora Police Sgt. William H. Hayes, Jr. Though the gravelly stream fast erodes the barricade, rains slackened just in time to save Sergeant Hayes’s home—already inundated three times. During this onslaught, the sergeant watched helplessly from across the street, trapped there by the sudden cascade when he went to rouse a neighbor.

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the first time in half a century, I was told.

"The neighborhood realized the danger; we held block meetings to make plans; we stocked up with shovels and sandbags: The canyon above Rainbow Drive has no flood-control works.

"The first heavy rain came on Sunday, January 19. On Monday so much mud and water was coming out of the canyon into the street that many of us stayed home to sandbag and shovel muck.

"By Tuesday the torrent was carrying coarse gravel and boulders. We fought it all day and into the night, then went to bed thinking we had things under control.

"Early Wednesday a cloudburst woke us up. By the time I reached the window, the lawn was gone. A neighbor was clinging to the low eaves of our house. The current ripped off his boots, but he made it to high ground.

Escape Hazard: A "Hot" Window Frame

"By now our house was an island. A window let go, letting in a wall of water and gravel. We knew the muck would be up to the ceiling in a few minutes. Our front door was blocked, so I told my wife to get out through a window, fast.

"When she touched the sill, she was knocked right back inside. A short circuit in the house

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EXTACHROME © NATIONAL GEOGRAPHIC SOCIETY





wiring had charged the metal window frame.

"I can't do it!" she shouted.

"You'll have to," I said. "Otherwise we'll be buried alive."

"On the third try she went out, and I went through behind her. I was so keyed up that I barely felt the electricity.

"The water swept us maybe a hundred yards before we could crawl to a house on a high lawn. I couldn't understand why I was unable to stand up. Then I discovered my pajamas were filled with heavy gravel. My legs were cut and bleeding. But we were safe."

Nightmare on the Freeway

The experience of Edward R. Jennings of Fullerton contained a peculiarly modern element of nightmare. Mr. Jennings was driving on the Pomona Freeway when an unseen force seized his car and carried it sideways onto the median strip! The cliff above the highway had collapsed (page 568).

"I hadn't seen the landslide come down, and I felt as though I were in a boat being tossed about in a storm," Mr. Jennings told me.

Then there was the Soledad Canyon incident, a Hollywood terror movie come alive. It centered on Ralph D. Helfer's ranch on the Santa Clara River. Africa, U.S.A., as Mr. Helfer calls his place, rents exotic animals to makers of movies and TV films. You may have seen some of them: the tiger in the Esso commercial; the Ford Motor Company cougar.

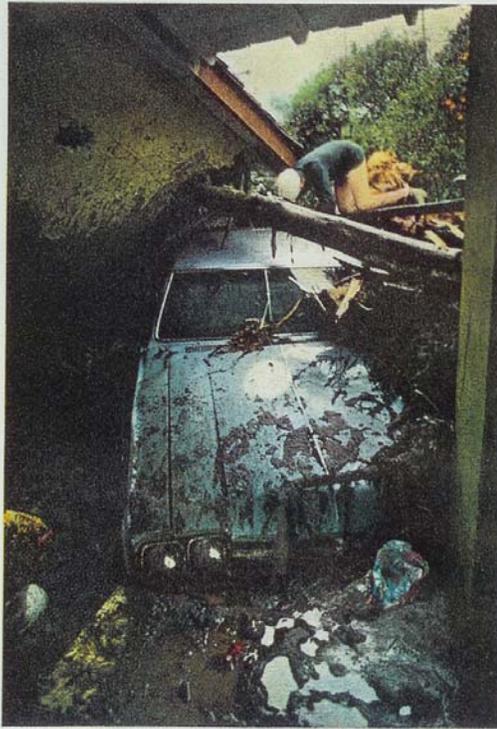
The Santa Clara inundated Africa, U.S.A., and many of Mr. Helfer's great carnivores were free in the night to roam the countryside, where possibly 10,000 people live within a 15-mile radius. One can imagine the panic had the Helfer neighbors known the facts. But they didn't, for all communications with the ranch were out.

Actually, there was little danger.

"When the water reached the cages," Mr. Helfer said, "we tranquilized what untamed animals we had. Unfortunately, we lost a dozen—lions, tigers, a jaguar—when a dam burst before we could carry them out.

"After we'd attended to this sad business, we turned to the rescue of our gentle animals,

Children's treasures clutter John Caufield's roof, tossed there out of the way of the mudslide. As an epitaph to the mud's grim work, a book at lower left displays the title *Lost Worlds*. Ladder offers the family an escape to the roof—a vantage point that a volunteer has reached by walking up eave-high debris on the other side of the house.



EKTACHROMES © N.P.S.

Mud took the wheel of this driverless station wagon, sweeping it a quarter of a mile and smashing it into a garage. A volunteer worker checks damage to the auto.

Mired in muck, a bicycle awaits rescue from the quagmire that choked Glendora.



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mostly lions and tigers. These have been patiently tamed with kindness alone and are about as savage as well-bred Great Danes.

"The river by now had made an island of their cage area. We reached it by forming a human chain. We opened the cage doors and called the animals to follow us.

"Then came the only beautiful thing in our catastrophe. Together the men and the wonderful animals struggled to save each other. The men provided the leadership, the animals the power to overcome the current while the men clung to their fur. All were saved.

"In the noise and confusion the animals waited patiently while we made makeshift quarters for them. Certainly they could have run away, but they didn't. They wanted to be near their human friends."

Children Die in Their Beds

Of human tragedies none so moved me as the deaths of little children where they had most reason to feel secure—in their own homes, in their beds. An avalanche of mud that damaged no other house in the block thus suffocated two tots in Highland Park (opposite), while a slide in Topanga Canyon killed two other children and their mother as well.

As pure spectacle, I saw nothing that matched the tumble of a house from atop a Castellamore cliff onto Route 101, the heavily traveled Pacific Coast Highway, near Sunset Boulevard (map, page 566).

In Santa Ana, near Disneyland, ingenuity saved several blocks of houses along Santiago Creek. When the swollen stream threatened to cut the lots from beneath the homes, city officials bought hundreds of junked automobiles, then called on the United States Marines.

Out of the sky swooped a huge Marine Corps helicopter, bringing car after car as an eagle carries a rabbit (page 569). Five thousand volunteer workers gathered in Santa Ana, risking their lives to help position the wrecks in the breached banks, to shovel, and to fill sandbags.

"The workers included people of all ages and stations in life," said Assistant City Man-

ager G. David Tayco, himself about to drop from exhaustion when I saw him. "Most of them are young people, some from Watts, the black ghetto in Los Angeles. You're not likely to hear me criticizing our youth from now on."

In the plush Hollywood Hills, homes of affluent Angelenos slid down vertiginous slopes as though on rollers. Chunks of Gould Avenue cascaded into Laurel Canyon, leaving nine houses precariously perched over the abyss. Authorities ordered them abandoned.

In the Santa Monica Mountains, Twentieth Century-Fox's set for Charlton Heston's film *Planet of the Apes* became a tangle of flood-twisted wreckage.

Driving through the stricken countryside north of Los Angeles, I found no community that had not sustained visible damage. At Ventura the river burst into the yacht marina from the land side, filling the harbor with silt and wrecking most of the wharves. A hundred boats were buried or swept to sea, and two hundred others suffered damage.

Santa Barbara, Carpinteria, and Montecito took savage beatings. Raily water inundated ranches in Ventura, Santa Barbara, and San Luis Obispo counties, destroying \$30,000,000 worth of oranges, lemons, flowers, sugar beets, vegetables—and a mushroom farm.

A few people, a very few, left the area permanently. Television cameras caught one small automobile caravan leaving Los Angeles with residents who had had enough. On each day of their journey east they passed, statistics say, between 600 and 800 people happily headed westward for new lives in the southland!

Defenses Paid For Themselves

And what will be done to make these new lives safe ones?

"In the main, improve and expand what's already been accomplished," said Brig. Gen. William M. Glasgow of the U. S. Army Corps of Engineers. He is division engineer in charge of operations in the Pacific Southwest.

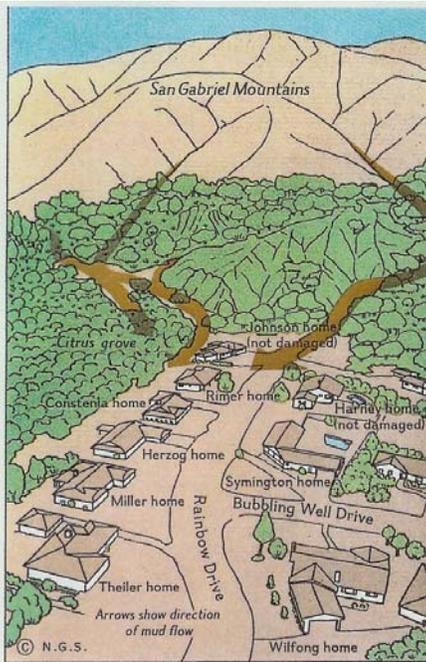
"People are usually surprised, especially after a winter like this one, to learn what big steps Southern California has already

(Continued on page 569)

Nearly buried alive, Mrs. John Gonzales lies pinned beneath the rubble of her home. "My babies are in the front room," she screamed as neighbor Jerry Hand arrived to help. After three hours, rescuers uncovered the lifeless bodies of Joe Gonzales, 2 years old, and Steve, 10 months. Disaster struck when rains loosened a wedge of hillside behind houses lining El Paso Drive in the Highland Park area of Los Angeles. Hurling down, the slide singled out the Gonzales home and slammed it onto the street.

STEVE FONTANINI, LOS ANGELES TIMES





Where men met mud

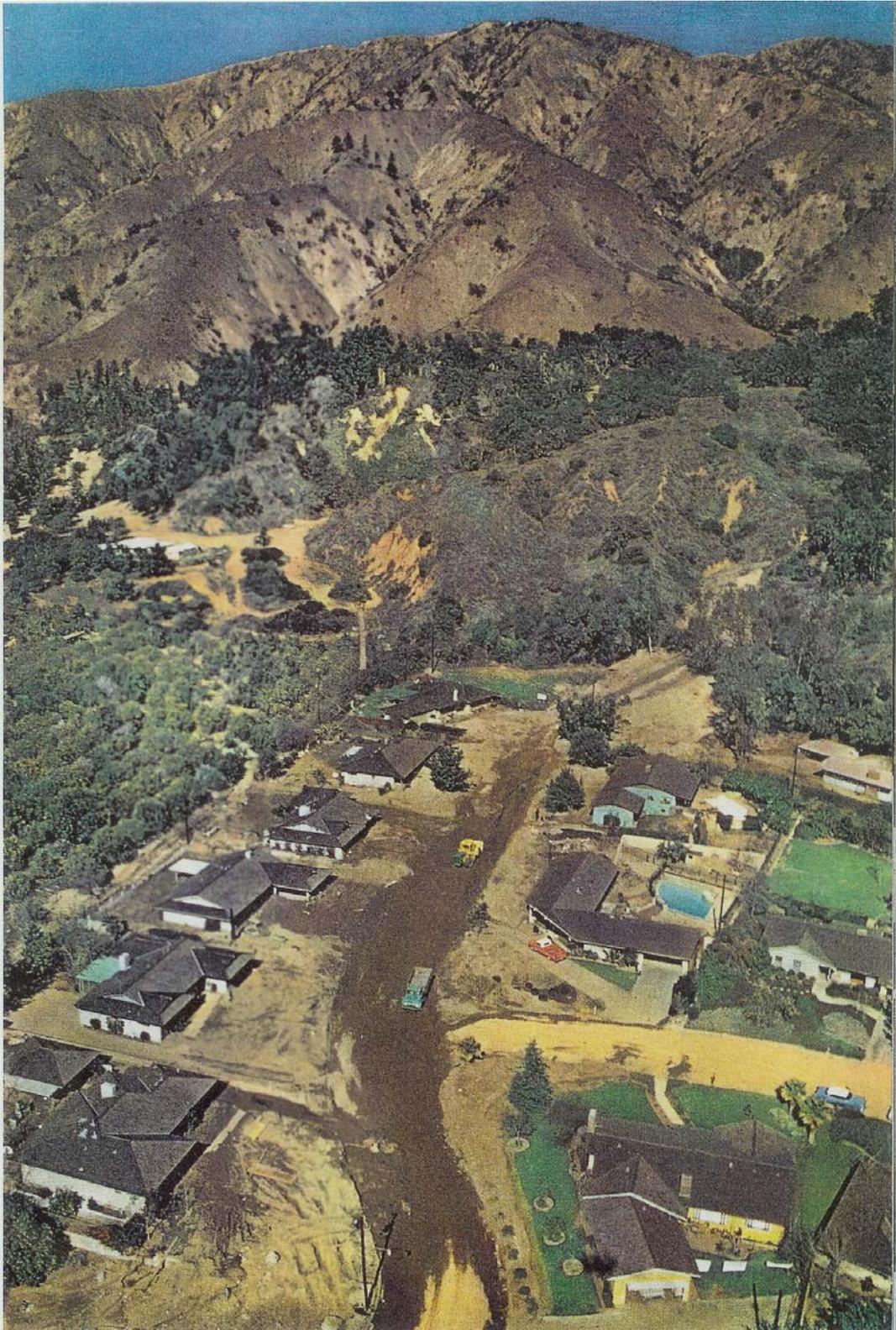
ITS LONG SIEGE ENDED, Rainbow Drive in Glendora slowly digs out beneath a sparkling sun (opposite). Rumples foothills of the San Gabriels, stripped by fire and gouged by rains, wall canyons that sped devastation with every cloudburst.

Glendora suffered the worst onslaught on January 22, when torrential rains funneled a wall of water, mud, and debris into Rainbow Drive (photo key at left). The roaring flood shot past Ralph Johnson's house and hurled itself at the home of the Lorin Rimers, who barely escaped through a window (text, pages 560-63). On down Rainbow Drive it swept, leaving few homes untouched.

In scores of other Glendoras (below), mud and water brought havoc and heartbreak. The final toll: 101 lives lost, a billion dollars in property damage, 15,000 persons evacuated. Heartwarming, wherever misfortune threatened, friends and strangers flocked to help.

As the rains spent their wrath, a scourge struck from the sea. An oil well in Santa Barbara Channel sprang a leak, gushing hundreds of thousands of gallons of oil to smear beaches and destroy wildlife.







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A mountain moves: Heavy equipment gnaws at a mammoth slide blocking eastbound traffic on the Pomona Freeway, normally one of Los Angeles's most frenetic arteries. Rains seeping through the soil lubricated a layer of clay, triggering the avalanche in the San Gabriel Valley. More than 200,000 cubic yards of earth clogged the highway. One horrified driver felt the shifting mass lift his speeding auto and carry it onto the median, but he escaped unscathed (text, page 563). Grading and terracing the slope may prevent future slides.

Wrecks to the rescue! As floodwaters rage down usually dry Santiago Creek in Santa Ana, a U. S. Marine Corps helicopter airlifts junked autos to shore up banks that might crumble under homes.

taken to tame floods and slides.

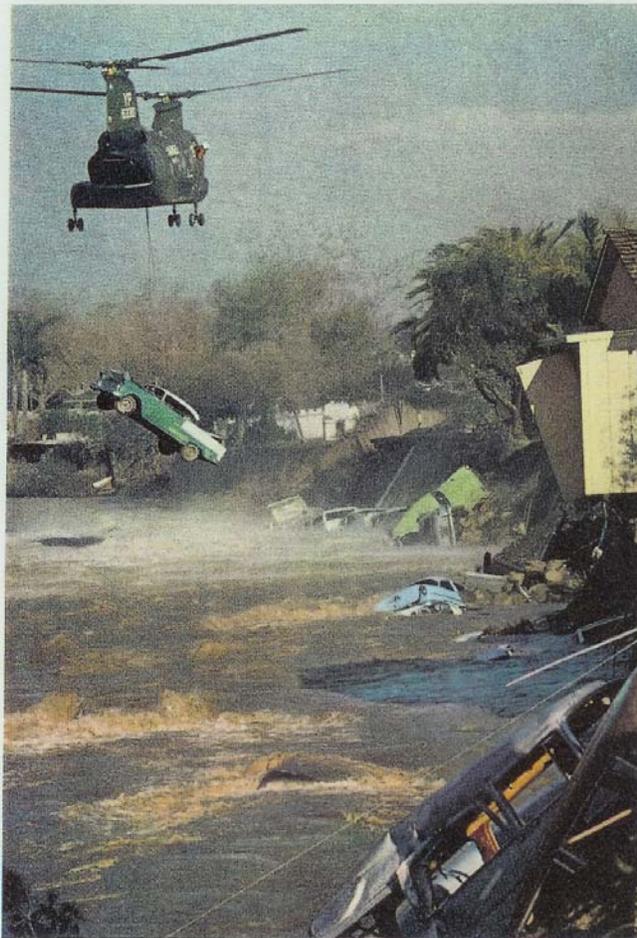
"In the Los Angeles Basin, for example, the lower San Gabriel and Los Angeles Rivers burst their banks in 1938, causing heavy damage and loss of life. Both rivers have now been brought under control. Last winter they gave almost no trouble—and the rainfall was double what it had been in 1938.

"The Los Angeles County Flood Control District was established as long ago as 1915, after a bad flood the year before. The Federal Government began aiding such local groups on a major scale in 1936. Since that time, 1.3 billion dollars in federal and local funds has been spent in Southern California for flood control.

"Were the results worth it? Well, we believe the present system saved 1.5 billion in damages that didn't occur, meaning that every dam and dike more than paid for itself.

"The big problem is building adequate defenses before more people arrive and get clobbered. The Santa Clara River, for example, has flooded for centuries, but it didn't make much difference until the recent population explosion in the valley.

"This winter the river really hurt a lot of folks. Now, while the control agencies are busy working to tame the Santa Clara, it's a good bet that some other valley will fill up with people overnight and take a beating before we can get to it."



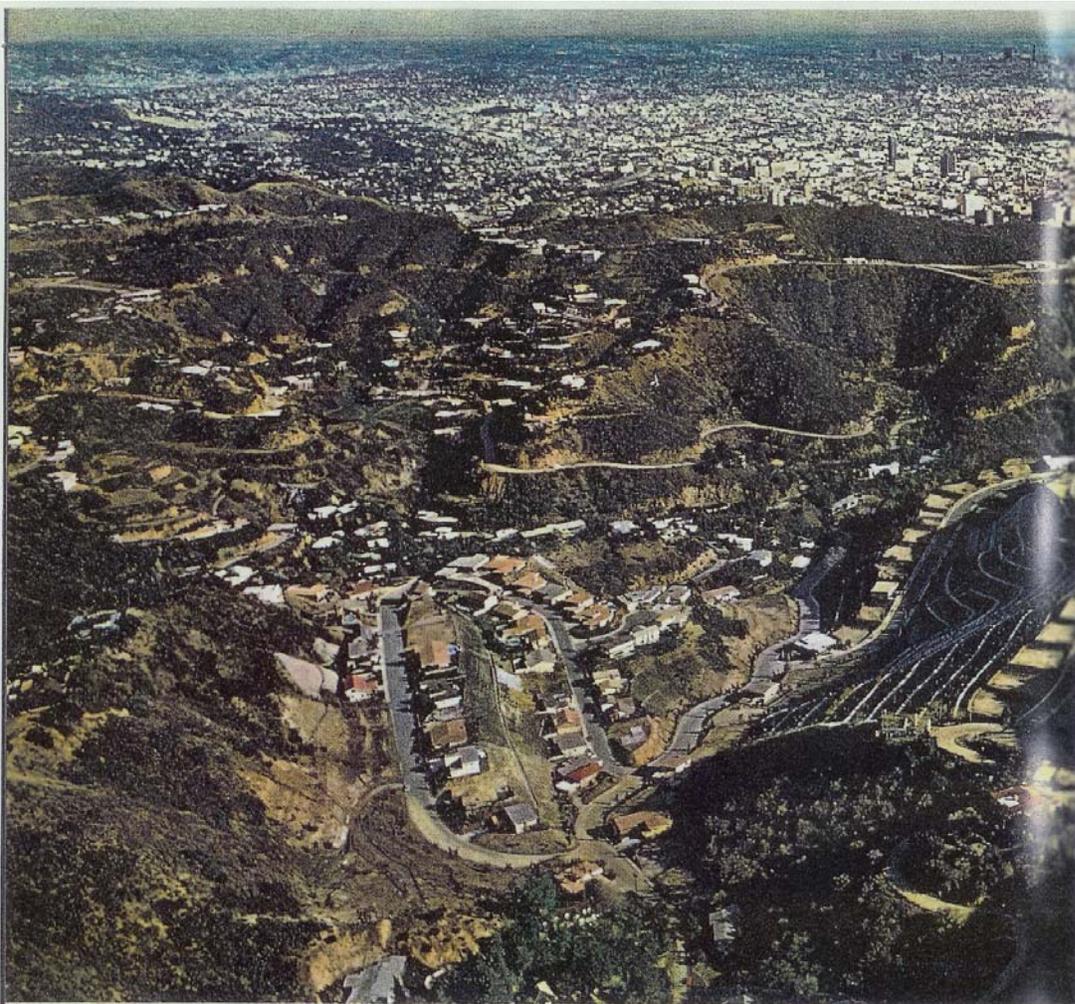
ENTACHROME (ABOVE) BY CHARLES O'HEAR; KODACHROME BY J. R. EYERMAN © N.G.S.

To defend against rains, the triggers of flood, you must know the worst you can expect, based on measurements made over many years. Few of Southern California's rainfall records go back more than sixty years, and the recent rains, as the newspapers put it, were "hundred-year rains." Thus flood defenses planned to cope with the worst rains on record were not quite enough. In the future they will be designed to a higher standard.

Scientists Chart Earth's Hidden Flaws

Earth scientists have done much for Southern California, and will do a lot more. I talked again with my geologist friend Martin Stout.

"Out here the ground structures are so jumbled we must have a detailed underground map of every piece of land we use," he said. "Seismologists chart earthquake-causing faults; soil and earth scientists map unstable surface soils; foresters select appropriate vegetation for cover.



“Geologists like myself also inspect and map the deeper strata. And I mean ‘inspect.’ We sink borings and even go down into some of them. Air photos often show things you can’t see on the ground, and we use them regularly.”

With better knowledge of the environment have come sound building laws and fire regulations—probably the best in the Nation, says Dr. Stout. In 1952 Los Angeles passed a city ordinance prohibiting construction on dangerously steep slopes, on uncompacted fill, or on known unstable areas. Surrounding counties have since passed similar codes. The city’s effective “green hills” statute, requiring scientific landscaping and dry-season irrigation of the ground cover, went on the books in 1961.

“Last winter proved the worth of the city regulations,” said Martin Stout. “Few struc-

tures built to their grading specifications sustained more than minor damage.”

Among the regulations specifically aimed at preventing the classic fire-flood sequence is a ban on smoking (even in automobiles) in critical foothill areas during the dry season.

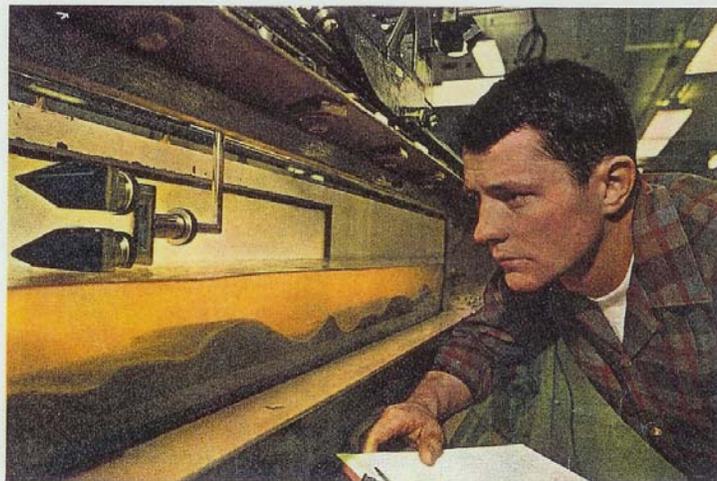
A \$10,000,000 Repair Job

In the southland, virtually all major watersheds are in four national forests. The agency charged with caring for these natural flood defenses is the U. S. Forest Service. Actually, “forest” is a misnomer for the scrub-covered foothills, although timber clothes the high country farther east. Originally established solely to preserve the delicate watershed, the forests now play host to increasing millions of vacationists; rangers counted 19,000,000 individual visits in 1968.



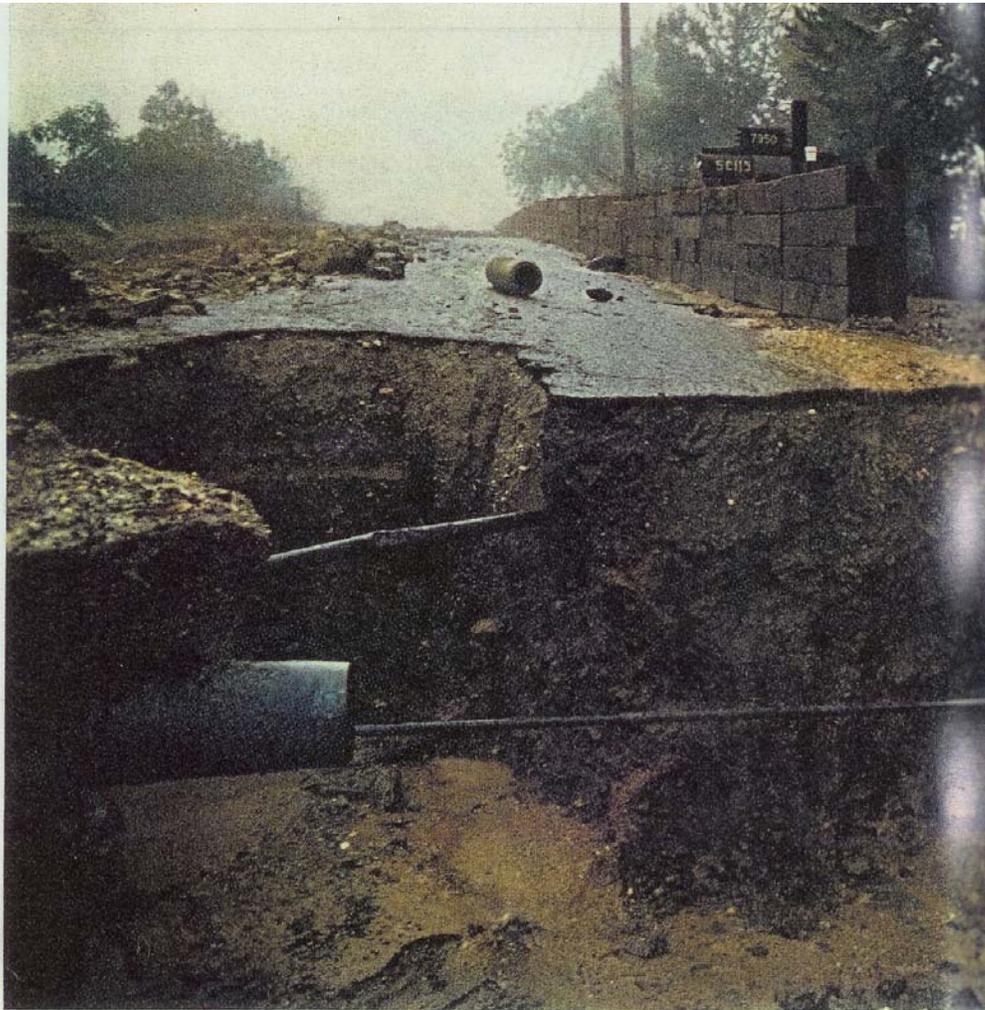
A lesson learned: Picturesquely sited homes at left, built before Los Angeles stiffened its building codes, cling to slide-prone slopes in the Santa Monica Mountains. To protect Mount Olympus in Hollywood, right, developers graded slopes and moated lots with storm drains. Sites near the summit sell for as much as \$85,000.

Fathoming the ways of water, a graduate student experiments with sedimentation at California Institute of Technology in Pasadena. Paired sonar prongs profile the shifting bed. Findings could help engineers curb Southern California's rampaging erosion.



KODACHROME (ABOVE) AND EKTACHROME BY BRUCE DALE © N.G.S.

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Dead end: An ever-deepening washout cleaves Glencoe Heights Drive as rains still pelt Glendora. Gas pipes stretch like bared tendons beside a sheared irrigation pipe. Barricade of railroad ties thrown up by Detro H. Sells eventually succumbed to floods, and slides piled 10 feet of debris against his

"This season visitor wear and tear will be the least of our problems," I heard Angeles Forest Supervisor Bill Dresser tell the Los Angeles County Watershed Commission. "We've lost so many bridges, roads, and trails that people simply won't be able to get in. We think it will take all summer and the better part of \$10,000,000 to put us back into the recreation business."

When the streams leave the national forest, they become the responsibility of local district flood-control organizations. Their debris basins cleanse the water of silt; their holding dams store it until it is safe to release in con-

trolled amounts. After this the streams cross the coastal plains in sturdy concrete channels built, like other major flood defenses in the southland, by the U. S. Army Corps of Engineers but turned over, with a few exceptions, to the local authorities for operation and maintenance.

Water Is Short Despite Floods

In the plains the flow is swelled by heavy runoff from the roofs and streets of the urban areas. Thus augmented, the rivers head for the sea, most of them still in artificial channels of heavy concrete.



EXTACHROME BY BRUCE DALE © N.S.S.

house, right. Unlike his next-door neighbors the Caufields (pages 558-9), Mr. Sells was able to restore his home. Now, with other Southern Californian communities, Glendora plans to strengthen its defenses of storm drains, debris basins, and dams so that its nightmare may never be repeated.

"Do we now sit back and watch them go?" said Stanley Steenbock of the Los Angeles County Flood Control District. "No. Whatever it looked like this winter, Southern California has a water shortage because of its dry summers. We import 60 percent of our water at high cost from across the mountains.

"So we catch all the local water we can in reservoirs and turn it onto 26 'spreading grounds,' where it seeps into natural underground storage basins. From these it can be pumped up as necessary."

When the floods ended, I returned East. While writing this article, I telephoned my

friend Lorin Rimer to confirm several details.

"How are you making out?" I asked in the course of the conversation.

"Fine, fine," said Mr. Rimer. "What with all the flood deductions, it was almost fun paying income taxes. And my real estate business has never been better."

"But what about your house?"

"Oh, that," said Mr. Rimer. "That's past history. It's still up there under the mud. We bought a new place."

"In Glendora?" I wanted to know.

"Where else?" said Mr. Rimer. "Finest place on earth."

* * *

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. Flood waters may be forced away from historic floodplain areas. As a result, other existing floodplain areas may experience flood waters that rise above historic levels. Local governments must require 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?

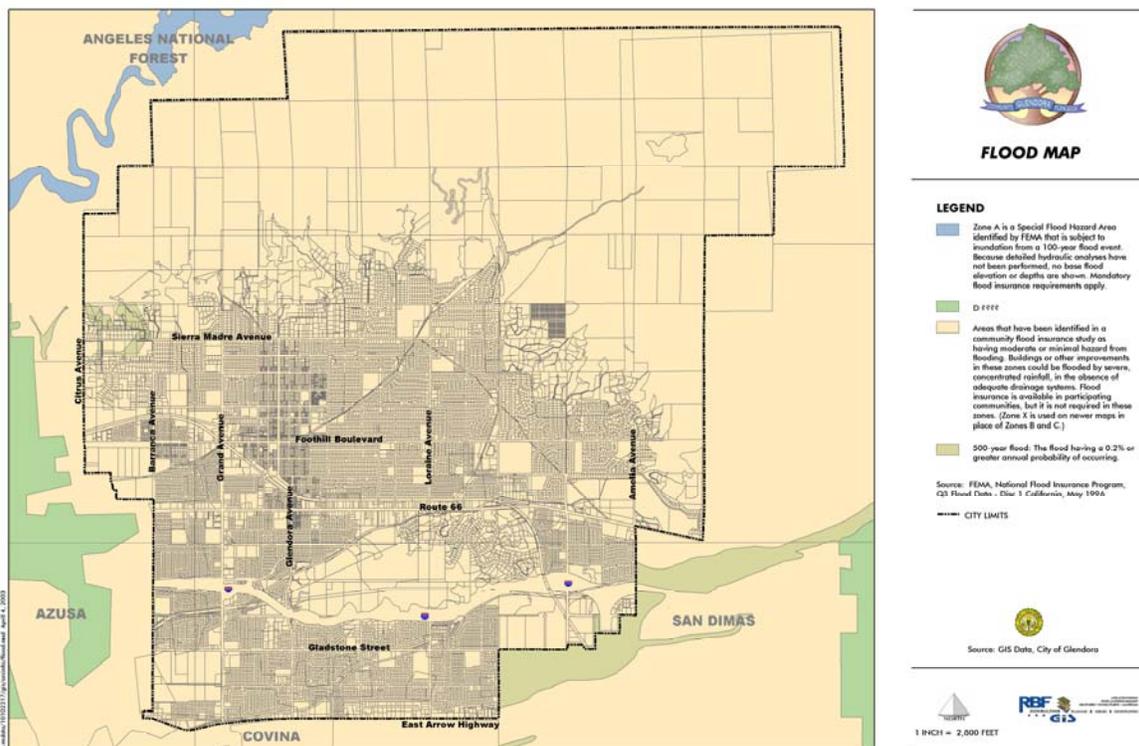
Flood maps and Flood Insurance Studies (FIS) are often used to identify flood-prone areas. The NFIP was established in 1968 as a means of providing low-cost flood insurance to the nation's flood-prone communities. The NFIP also reduces flood losses through regulations that focus on building codes and sound floodplain management. In the City of Glendora, 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. However, it is important to note that not all 100-year or 500-year floodplains have been mapped by FEMA.

FEMA flood maps are not entirely accurate. These studies and maps represent flood risk at the point in time when FEMA completed the studies, and does not incorporate planning for floodplain changes in the future due to new development. Although FEMA is considering changing that policy, it is optional for local communities. The FEMA FIRM map for the City of Glendora was completed in 1996. Man-made and natural changes to the environment have changed the dynamics of storm water run-off since then.

Glendora Flood Map



Flood Mapping Methods and Techniques

Although many communities rely exclusively on FIRMs to characterize the risk of flooding in their area, there are some flood-prone areas that are not mapped but remain susceptible to flooding. These areas include locations next to small creeks, local drainage areas, and areas

susceptible to manmade flooding.

In order to address this lack of data, the City of Glendora, as well as other jurisdictions, has taken efforts to develop more localized flood hazard maps. One method that has been employed includes using highwater marks from flood events or aerial photos, in conjunction with the FEMA maps, to better reflect the true flood risk. The use of GIS (Geographic Information System) is becoming an important tool for flood hazard mapping. FIRM maps can be imported directly into GIS, which allows for GIS analysis of flood hazard areas.

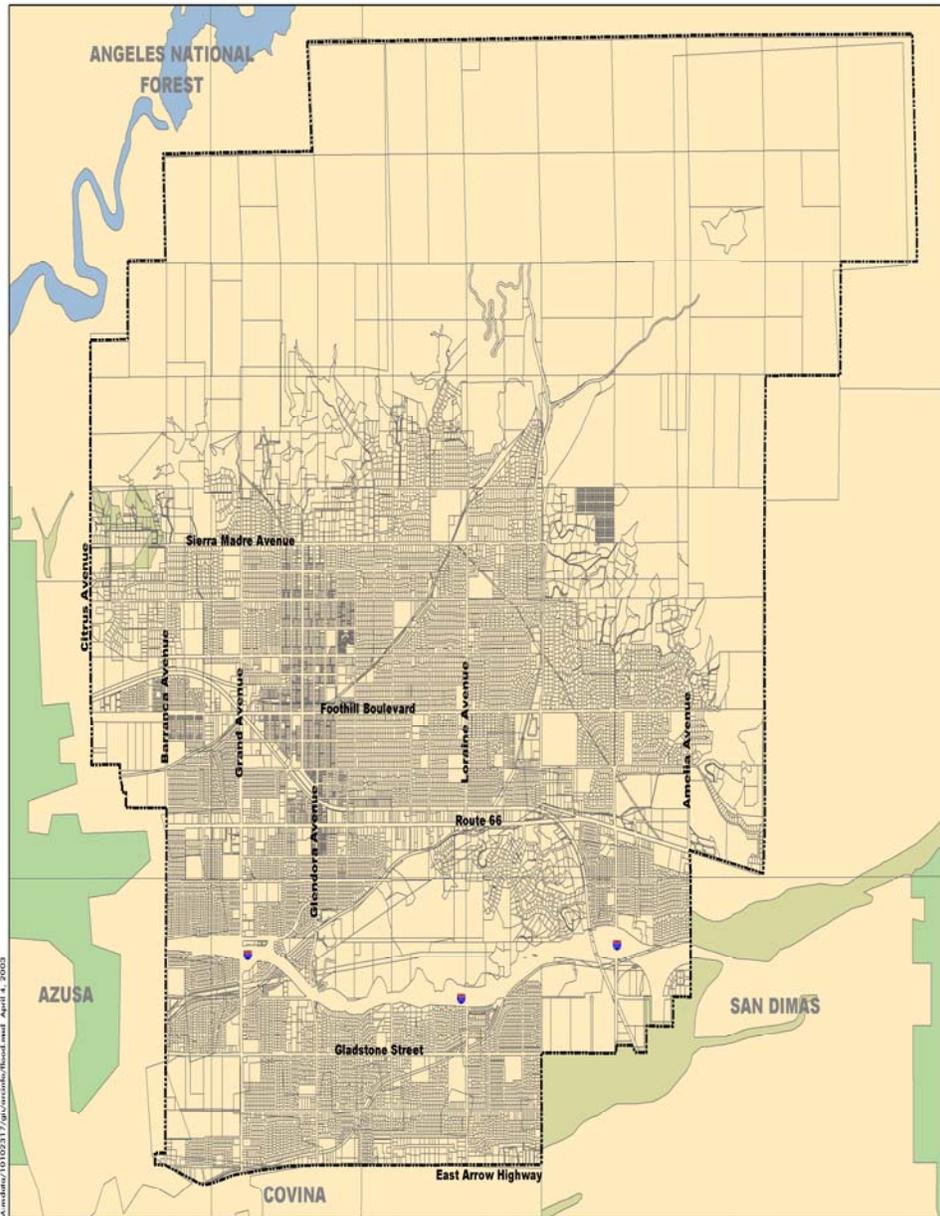
Communities find it particularly useful to overlay flood hazard areas on tax assessment parcel maps. This allows a community to evaluate the flood hazard risk for a specific parcel during review of a development request. Coordination between FEMA and local planning jurisdictions is the key to making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



FLOOD MAP

LEGEND

- Zone A is a Special Flood Hazard Area identified by FEMA that is subject to inundation from a 100-year flood event. Because detailed hydraulic analyses have not been performed, no base flood elevation or depths are shown. Mandatory flood insurance requirements apply.
- D FFFF
- Areas that have been identified in a community flood insurance study as having moderate or minimal hazard from flooding. Buildings or other improvements in these zones could be flooded by severe, concentrated rainfall, in the absence of adequate drainage systems. Flood insurance is available in participating communities, but it is not required in these zones. (Zone X is used on newer maps in place of Zones B and C.)
- 500-year flood: The flood having a 0.2% or greater annual probability of occurring.

Source: FEMA, National Flood Insurance Program, Q3 Flood Data - Disc: 1 California, May 1996

--- CITY LIMITS



Source: GIS Data, City of Glendora



1 INCH = 2,000 FEET

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, This is when the City of Glendora initially entered into the NFIP. The county has updated portions of the USACE and FEMA maps through smaller drainage studies in the county since that time.

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. No area of the City of Glendora is in a 100 year flood plain.

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 Glendora 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. Flow velocity models can assist in predicting the amount of damage expected from different magnitudes of flood events. The data used to develop these models is based on hydrological analysis of landscape features. Changes in the landscape, often associated with human development, can alter the flow velocity and the severity of damage that can be expected from a flood event.

Using GIS technology and flow velocity models, it is possible to map the damage that can be expected from flood events over time. It is also possible to pinpoint the effects of certain flood events on individual properties. At the time of publication of this plan, data was insufficient to conduct a risk analysis for flood events in the City of Glendora. However, the current mapping projects will result in better data that will assist in understanding risk. This plan includes recommendations for building partnerships that will support the development of a flood risk analysis in the City of Glendora.

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 damage are extensive. Development in the floodplains of the City of Glendora 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.

Property Loss Resulting from Flooding Events

The type of property damage caused by flood events depends on the depth and velocity of the flood waters. Faster moving flood waters 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.

Manufactured Homes

Statewide, the 1996 floods destroyed 156 housing units. Of those units, 61 % were mobile homes and trailers. Many older manufactured home parks are located in floodplain areas. Manufactured homes have a lower level of structural stability than stick-built homes, and must be anchored to provide additional structural stability during flood events. Because of confusion in the late 1980s resulting from multiple changes in NFIP regulations, there are some communities that do not actively enforce anchoring requirements. Lack of enforcement of manufactured home construction standards in floodplains can contribute to severe damages from flood events.

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 Glendora are maintained by multiple jurisdictions. Federal, state, county, and city governments all have a stake in protecting roads from flood damage. Road networks often traverse floodplain and floodway areas. Transportation agencies responsible for road maintenance are typically aware of roads at risk from flooding.

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 Glendora are state, county, city, or privately owned. A state-designated inspector must inspect all state, county, and city bridges every two years; but private bridges are not inspected, and can be very dangerous. The inspections are rigorous, looking at everything from seismic capability to erosion and scour.

Storm Water Systems

Local drainage problems are common throughout the City of Glendora. There is a drainage master plan, and City of Glendora public works staff are aware of local drainage threats. The problems are often present where storm water run off enters culverts or goes underground into storm sewers. Inadequate maintenance can also contribute to the flood hazard in urban areas.

Water/Wastewater Treatment Facilities

There is a sanitary district in the City of Glendora ran by the County, and no sewage treatment facilities are in the City limits.

Water Quality

Environmental quality problems include bacteria, toxins, and pollution.

Existing Flood Mitigation Activities

Flood mitigation activities listed here include current mitigation programs and activities that are being implemented by the City of Glendora agencies or organizations.

The City of Glendora Codes

The City of Glendora uses building codes, zoning codes, and various planning strategies to address the goals which aims at restricting development in areas of known hazards, and applying the appropriate safeguards.

Mitigation Requirements

Water Districts

All of the water districts in the City of Glendora are in the process of replacing old cast iron pipes with more ductile iron pipes, which will be more resilient in disaster situations. During a disaster, water districts in the region work together to provide water for the City of Glendora citizens. For example, MWD Water company has built inter-ties with for emergency situations.

Riparian Areas

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 various improvement projects, such as the work in Big Dalton canyon.

Wastewater Management

Waste water is managed by both the City of Glendora and the County

Mitigation

It should be noted that after the disastrous 1969 floods the City of Glendora implemented a number of flood mitigation projects which has reduced the flood threat to minor street flooding during down pour conditions.

- ✓ County installed and maintains over 30 debris basins above Glendora
- ✓ County maintains the Big Dalton Dam and spreading basin
- ✓ City storm drains connect with County flood control system
- ✓ City requires storm drains in all new construction
- ✓ County installed and maintains a series of flood control channels through out the City
- ✓ All hillside construction must meet strict city requirements to prevent mudslides and run off.

Flood Mitigation Action Items

The flood mitigation action items provide direction on specific activities that organizations and residents in the City of Glendora can undertake to reduce risk and prevent loss from flood 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. The items are listed in order of priority and will be monitored by the City Manager for implementation

ST - FL#1: Analyze each repetitive flood property within the City of Glendora and identify feasible mitigation options.

Ideas for Implementation:

- ✓ Identify appropriate and feasible mitigation activities for identified repetitive flood properties. Funding may be available through FEMA's Hazard Mitigation Grant and Flood Mitigation Assistance Programs and the Pre-disaster Mitigation Program;
- ✓ 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 to engage in mitigation.

Coordinating Organization: Hazard Mitigation Advisory Committee

Timeline: : 1-2 years

Plan Goals Addressed: Protect Life and Property, Partnerships and Implementation

Constraints: funding

ST - FL#2: Develop better flood warning systems.

Ideas for Implementation:

- ✓ Coordinate with appropriate organizations to evaluate the need for more stream gauges; and
- ✓ Distribute information regarding flooding to the general public efficiently.

Coordinating Organization: City Emergency Management, County and City Public and Government Relations, Department of Transportation and Development

Timeline: : 2 years

Plan Goals Addressed: Protect Life and Property, Emergency Services

Constraints: funding

LT - FL#1: Enhance data and mapping for floodplain information within the county, and identify and map flood-prone areas outside of designated floodplains.

Ideas for Implementation:

- ✓ Apply for FEMA's cooperative technical partnership using the 2-foot contour interval floodplain mapping data acquired by the City of Glendora GIS;
- ✓ Use WES inventory and mapping data to update the flood-loss estimates for the City of Glendora; and
- ✓ Encourage the development of floodplain maps for all local streams not currently mapped on Flood Insurance Rate Maps or county maps, with special attention focused on mapping rural and unincorporated areas. The maps should show the expected frequency of flooding, the level of flooding, and the areas subject to inundation. The maps can be used for planning, risk analysis, and emergency management.

Coordinating Organization: County and City Geographic Information Services, County Department of Transportation and Development, Water Environment Services

Timeline: : 3 years (as funding allows)

Plan Goals Addressed: Protect Life and Property

Constraints : funding

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 ???? 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 ????.

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 than 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

NFIP 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

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- 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.data.scec.org/fault_index/palos.html
 - 5 <http://www.consrv.ca.gov/CGS/rghm/ap/>
 - 6 Ibid

Appendix A

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://www.dwr.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.org/	
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 and 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-la.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 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 Federal Emergency Management Agency also requires public input during the development of mitigation plans.

The City of Glendora Natural Hazards Mitigation Plan integrates a cross-section of citizen input throughout the planning process. To accomplish this goal, the City of Glendora Hazard Mitigation Advisory Committee developed a public participation process through three components: (1) developing a project steering committee comprised of knowledgeable individuals representative of the community; (2) conducting stakeholder interviews to target the specialized knowledge of individuals working with populations or areas at risk from natural hazards; and (3) conducting public workshops 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 Glendora Natural Hazards Mitigation Plan 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.

Steering Committee

Hazard mitigation in City of Glendora is overseen by the Hazard Mitigation Advisory Committee, which consists of representatives from various city departments, representatives from local business and community organizations and the public. Steering 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 steering committee guided the development of the plan, and assisted in developing plan goals and action items, identifying stakeholders, and sharing local expertise to create a more comprehensive plan.

Table B.1 lists the various people and organizations that participated on the City of Glendora Natural Hazard Mitigation Planning Committee.

<i>Project Steering Committee:</i>
<i>- City of Glendora Building and Safety</i>
<i>- City of Glendora Economic Development</i>
<i>- City of Glendora Emergency Services Coordinator</i>
<i>- City of Glendora Finance</i>
<i>City of Glendora Planning</i>
<i>- City of Glendora Community Development</i>
<i>- City of Glendora Public Information</i>
<i>- City of Glendora Public Works Department</i>
<i>- City of Glendora Community Services</i>
<i>- Glendora Unified School District</i>
<i>- Citrus Community College</i>
<i>-Various Community Citizens</i>

Disaster Mitigation Assessment Public meetings 2004

Public displays and presentations for community input

January

January 5	Department Head meeting	12 in attendance
January 13	Community meeting	10 in attendance

February

February 10	Community meeting	9 in attendance
February 19	Area D meeting	30 in attendance

March

March 9	Community meeting	15 in attendance
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March 18	Area D meeting	25 in attendance
April		
April 12	Department head meeting	12 in attendance
April 13	Community meeting	13 in attendance
April 15	Area D meeting	20 in attendance
May		
May 11	Community meeting	18 in attendance
May 17	Department Head meeting	12 in attendance
May 20	Area D meeting	30 in attendance
June		
June 8	Community meeting	7 in attendance
June 26	Field Day at Library parking lot	60 in attendance
July		
July 13	Community meeting	8 in attendance
July 26	La Fetra Senior Center presentation	50 in attendance
July 27	City Council meeting open hearing	20 in attendance
August		
August 10	Community meeting	10 in attendance
August 30	Community Display in Village	20 people stopped by
August 31	Community Display in Village	10 people stopped by
September		
September 1	Community display	25 people stopped by
September 13	Presentation at Coordinating Council	50 people in attendance
September 14	Presentation at Rotary Club	40 people in attendance
September 14	Presentation at City Council open hearing	97 people in attendance
October		
October 7	Public meeting with reporter from San Gabriel Valley Tribune about the DMA 2000 project. Set up display and spoke with passer bys about hazard mitigation in the Village area down town	
October 8	presentation at Chamber of Commerce	30 people in attendance
October 12	presentation at City Council meeting	15 people in attendance

NOTICE OF HEARING

NOTICE IS HEREBY GIVEN that on Tuesday, September 14, 2004, at 7:00 p.m., in the Council Chambers of the City Hall, 116 E. Foothill Boulevard, Glendora, California, the Glendora City Council will hold a public hearing on the proposed Disaster Mitigation Assessment (DMA 2000 Project).

The Federal Government is requiring communities nation wide to develop hazard mitigation plans. In these plans communities are to identify what natural hazards could affect the communities. Citizens are asked to give direction in what steps the City can take to mitigate the hazard and for the City to develop a plan and funding to implement the plan. The development of the plan is called the DMA 2000 Project

The City will be holding a series of community meetings to receive citizen's input for the plan. The City is interested in hearing from the public about the history of disasters in Glendora, the areas of the City affected by the disaster and what the City can do to prevent the emergency from happening again or to minimize the effects of the disaster.

All interested parties are invited to provide information to the City Council by oral presentation or present information to the City Council in writing.

Jo Ann Sharp
City Clerk

**Publish September 2, 2004, San Gabriel Valley
Examiner Ad #G103**

AGENDA

CITY OF GLENDORA

CITY COUNCIL REGULAR MEETING

SEPTEMBER 14, 2004

COUNCIL CHAMBERS OF THE CITY HALL
116 E. FOOTHILL BOULEVARD, GLENDORA, CA

7:00 P.M.

MAYOR: CLIFF HAMLOW

COUNCILMEMBERS: GARY M. CLIFFORD, MIKE CONWAY,
KEN HERMAN, DOUG TESSITOR

In compliance with the Americans with Disabilities Act, if special assistance is needed to participate in this meeting, please contact the City Clerk's Office at (626) 914-8210. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

1. INVOCATION, PLEDGE OF ALLEGIANCE, CALL TO ORDER

- (A) Invocation Reverend Susan Scranton, Grace Episcopal Church
- (B) Pledge of Allegiance
- (C) Call to order of the Glendora City Council regular meeting

2. SPECIAL ITEMS

- (A) Proclamation declaring September 13-19, 2004 as *History and Hospitality Week* in Glendora

Debbie Dozal and Karen Davis, representing the La Fetra Center, and Community Services Commission Chairman Nikki Hull will accept the Proclamation.
- (B) Proclamation declaring September 17-23, 2004 as *Constitution Week* in Glendora

Lynda Siminski, from the Daughters of the American Revolution, will accept the Proclamation.
- (C) Senator Bob Margett to make presentation in honor of Art and Sarah Ludwick who were honored by the Los Angeles County Fair Association Board of Directors, and to report on recent events in Sacramento

7. PUBLIC HEARINGS

(A) Public Hearing relative to the City's Disaster Mitigation Plan

Emergency Services Coordinator John Schmidt to report.

Staff recommends that the City Council open and conduct the Public Hearing, accept evidence and testimony presented, and close the hearing. Council action is not required at this time.

(B) Public Hearing for the purpose of hearing both sides of issues regarding labor negotiations now at "impasse" between the City and the Glendora Municipal Employees Association per City Personnel Rule Section 13.4.2.3d.

Deputy City Manager to report.

Staff recommends that the City Council open and conduct the Public Hearing, accept evidence and testimony presented, close the hearing, and in the absence of evidence and testimony to the contrary, consider one of the following actions:

- 1. A motion to go into Closed Session to instruct your negotiators; or*
- 2. A motion to take no action nor grant any salary increases; or*
- 3. A motion to make a better offer to the employees; or*
- 4. A motion to instruct both sides to go back to the bargaining table; or*
- 5. A motion to institute mediation or fact-finding; or*
- 6. A motion to implement Management's last, best, and final offer for up to a 12-month period by adopting the enclosed Resolution.*

8. CITY CONSENT CALENDAR

All items listed under the City Consent Calendar will be enacted by a single vote. There will be no separate discussion of these items unless a member of the City Council requests specific items to be removed from the Consent Calendar for separate action. Any items removed from the Consent Calendar will be considered after the regular items. Anyone wishing to address a Consent Calendar item should do so during the Public Comment Period.

(A) Council approval of minutes: August 24, 2004

(B) Council adoption of a resolution entitled: A resolution approving a Memorandum of Understanding with the Glendora Mid-Management & Confidential Employees Association, authorizing compensation adjustments for City Department Heads and certain other Contract Employees and appropriating the necessary funds

(C) Council authorization to file a Notice of Completion for the Grinder Overlay Project (FY 2003-2004), Plan No. 850

AMENDED AGENDA

CITY OF GLENDORA

CITY COUNCIL REGULAR MEETING

JULY 27, 2004

COUNCIL CHAMBERS OF THE CITY HALL
116 E. FOOTHILL BOULEVARD, GLENDORA, CA

7:00 P.M.

MAYOR: CLIFF HAMLOW

COUNCILMEMBERS: GARY M. CLIFFORD, MIKE CONWAY,
KEN HERMAN, DOUG TESSITOR

In compliance with the Americans with Disabilities Act, if special assistance is needed to participate in this meeting, please contact the City Clerk's Office at (626) 914-8210. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

1. INVOCATION, PLEDGE OF ALLEGIANCE, CALL TO ORDER

- (A) Invocation by Pastor Karen Komsak-Davis, Chaplain, Glendora Police Department
- (B) Pledge of Allegiance
- (C) Call to order of the Glendora City Council regular meeting

2. SPECIAL ITEMS

- (A) Consideration of City Council ratification of the action taken by City Council at its June 22, 2004 regular meeting wherein the City Council adopted an urgency ordinance to enact a moratorium on new development on certain real properties described as follows:
 - 1. Certain real property located at the northeast corner of Valley Center Avenue and Gladstone Street
 - 2. Certain real properties fronting along and on the north and south side of Route 66 between Grand Avenue and 500 feet east of Forestdale Avenue

This agenda item is offered for Council's consideration to cure any alleged defect in the June 22, 2004 agenda and to ratify the City Council action taken on June 22, 2004 adopting the urgency ordinance pursuant to Government Code Section 54960.1(C)(2).

Agenda Item 2A is continued on the next page.

2. SPECIAL ITEMS

(A) City Attorney to report.

Staff recommends that the City Council consider the following:

1. *A motion to ratify the City Council action on June 22, 2004 wherein the City Council: (a) adopted a motion to waive reading of an ordinance entitled: An urgency ordinance of the City Council of the City of Glendora enacting a moratorium on new development on certain real property located at the northeast corner of Gladstone Street and Valley Center Avenue and certain properties fronting along the north and south side of Route 66 between Grand Avenue and 500 feet east of Forestdale Avenue; and (b) adopted a motion to adopt the urgency ordinance as read.*

3. STUDENT REPORTS - None

4. PUBLIC COMMENT PERIOD

Public comment shall conform to the protocol established in Council Resolution No. 03-37, the highlights of which are listed below:

Any person may request to address the City Council by submitting to the City Clerk a Speakers Request form asking to address the Council and stating the topic to be addressed. Speakers Request forms shall be available at the Council Chambers throughout the Council meeting.

Under the agenda item "Public Comment", the Mayor may recognize any person desiring to address the City Council concerning any subsequent item calendared for action or discussion at that meeting or on any matter within the jurisdiction of the City Council. Public comment may also be given when an item is scheduled for consideration. Comments on Consent Calendar items should be made during the Public Comment Period. The Public Comment Period is limited to 30 minutes.

Each speaker shall be limited to three minutes unless, upon motion, such time is extended by the Council.

Any person given permission to address the Council shall advance to the rostrum and state his/her name and the subject matter he/she wishes to discuss.

All remarks shall be addressed to the Council as a body and not to any member thereof. No question shall be asked of a Councilmember or a member of the staff, except through the presiding officer.

5. COUNCIL REPORTS AND STATEMENTS

6. REORDER OF THE AGENDA

At this time Council may revise the order of business on the agenda.

7. PUBLIC HEARINGS

Following the staff report, the applicant/appellant will be allowed ten minutes in which to make a presentation. The public hearing will then be opened. Testimony by proponents shall be limited to three minutes per speaker and to a total of 15 minutes. Testimony by opponents shall be limited to three minutes per speaker and to a total of 15 minutes. The Mayor may permit a five minute summation by a representative of proponents, followed by a five minute summation by a representative of opponents. The public hearing will then be closed and no member of the public shall be allowed to speak further without consent of the Mayor. Any person desiring to speak to a Public Hearing item shall make his/her presence known to the Mayor. Speaker cards are available in the lobby. Speakers are entitled to submit written or other graphic evidence. All such evidence presented shall be retained by the City Clerk as part of the Clerk's record.

- (A) Continue Council/CRA Joint public hearing regarding the proposed creation of CRA Project Area No. 5, merger of existing CRA Project Area Nos. 1, 2 and 3, and amendments to Redevelopment Plan for CRA Project Area Nos. 1, 2 and 3 (Continued from meeting of June 29, 2004)

Department of Planning and Redevelopment to report.

Staff recommends that the Council/CRA consider a motion to continue the Joint City Council/CRA public hearing regarding creation of CRA Project Area No. 5, merger of existing CRA Project Area Nos. 1, 2 and 3, and amendments to Redevelopment Plan for CRA Project Area Nos. 1, 2 and 3 to the meeting of August 24, 2004.

- (B) Public Hearing relative to amending the Route 66 Specific Plan

- (1) Environmental Review – Negative Declaration: Consideration of a determination the proposed project will not have a negative impact on the environment
- (2) Zone Amendment (ZA04-04): Consideration of an ordinance to amend an approved Specific Plan (properties in vicinity of Route 66 and Grand Avenue)

Department of Planning and Redevelopment to report.

Staff recommends that the City Council open and conduct the Public Hearing, accept evidence and testimony presented, close the hearing, and in the absence of evidence and testimony to the contrary, consider the following:

- 1. *A motion to adopt a Negative Declaration pursuant to the California Environmental Quality Act*

Agenda Item 7B is continued on the next page.

7. PUBLIC HEARINGS

Following the staff report, the applicant/appellant will be allowed ten minutes in which to make a presentation. The public hearing will then be opened. Testimony by proponents shall be limited to three minutes per speaker and to a total of 15 minutes. Testimony by opponents shall be limited to three minutes per speaker and to a total of 15 minutes. The Mayor may permit a five minute summation by a representative of proponents, followed by a five minute summation by a representative of opponents. The public hearing will then be closed and no member of the public shall be allowed to speak further without consent of the Mayor. Any person desiring to speak to a Public Hearing item shall make his/her presence known to the Mayor. Speaker cards are available in the lobby. Speakers are entitled to submit written or other graphic evidence. All such evidence presented shall be retained by the City Clerk as part of the Clerk's record.

- (A) Continue Council/CRA Joint public hearing regarding the proposed creation of CRA Project Area No. 5, merger of existing CRA Project Area Nos. 1, 2 and 3, and amendments to Redevelopment Plan for CRA Project Area Nos. 1, 2 and 3 (Continued from meeting of June 29, 2004)

Department of Planning and Redevelopment to report.

Staff recommends that the Council/CRA consider a motion to continue the Joint City Council/CRA public hearing regarding creation of CRA Project Area No. 5, merger of existing CRA Project Area Nos. 1, 2 and 3, and amendments to Redevelopment Plan for CRA Project Area Nos. 1, 2 and 3 to the meeting of August 24, 2004.

- (B) Public Hearing relative to amending the Route 66 Specific Plan

- (1) Environmental Review – Negative Declaration: Consideration of a determination the proposed project will not have a negative impact on the environment
- (2) Zone Amendment (ZA04-04): Consideration of an ordinance to amend an approved Specific Plan (properties in vicinity of Route 66 and Grand Avenue)

Department of Planning and Redevelopment to report.

Staff recommends that the City Council open and conduct the Public Hearing, accept evidence and testimony presented, close the hearing, and in the absence of evidence and testimony to the contrary, consider the following:

- 1. *A motion to adopt a Negative Declaration pursuant to the California Environmental Quality Act*

Agenda Item 7B is continued on the next page.

7. PUBLIC HEARINGS

- (B) 2. *A motion to waive reading of an ordinance entitled: An urgency ordinance of the City Council of the City of Glendora amending the Glendora Municipal Code—1967, Title 21 Zoning, Route 66 Specific Plan creating a new subdistrict for properties in the vicinity of the Grand Avenue and Route 66 Intersection including 530, 545, 600, 601 and 602 West Route 66*
- 3. *A motion to adopt the urgency ordinance as read*
- 4. *A motion to waive reading of an ordinance entitled: An ordinance of the City Council of the City of Glendora amending the Glendora Municipal Code—1967, Title 21 Zoning, Route 66 Specific Plan creating a new subdistrict for properties in the vicinity of the Grand Avenue and Route 66 intersection including 530, 545, 600, 601 and 602 West Route 66*
- 5. *A motion to introduce the ordinance as read*

- (C) Public Hearing relative to extending the provisions of Ordinance No. 1804 relating to a moratorium on new development on properties described as follows:
 - 1. Property located on the northeast corner of Valley Center Avenue and Gladstone Street
 - 2. Property located on the north and south side of Route 66, west of Grand Avenue to a point 500 feet east of Forestdale Avenue

Department of Planning and Redevelopment to report.

Staff recommends that the City Council open and conduct the Public Hearing, accept evidence and testimony presented, close the hearing, and in the absence of evidence and testimony to the contrary, consider the following:

- 1. *A motion to waive reading of an ordinance entitled: An urgency ordinance of the City Council of the City of Glendora extending a moratorium on new development on certain real property located at the northeast corner of Gladstone Street and Valley Center Avenue and terminating the interim urgency ordinance enacting a moratorium on new development on certain real properties fronting along the north and south side of Route 66 between Grand Avenue and 500 feet east of Forestdale Avenue*
- 2. *A motion to adopt the urgency ordinance as read*

7. PUBLIC HEARINGS

- (D) Public Hearing relating to the proposed Disaster Mitigation Assessment (DMA 2000 Project)

Police Department to report.

Staff recommends that the City Council open and conduct the Public Hearing, accept evidence and testimony presented, close the hearing. Council action is not required at this time.

8. CITY CONSENT CALENDAR

All items listed under the City Consent Calendar will be enacted by a single vote. There will be no separate discussion of these items unless a member of the City Council requests specific items to be removed from the Consent Calendar for separate action. Any items removed from the Consent Calendar will be considered after the regular items. Anyone wishing to address a Consent Calendar item should do so during the Public Comment Period.

- (A) Council approval of minutes:
 1. Special Council/CRA/GPFA Meeting of June 14, 2004
 2. Special Council/CRA/GPFA Meeting of July 13, 2004
 3. Regular Meeting of July 13, 2004
- (B) Council review of Investment Reports:
 1. City and Water Bond Series 2003A Investment Reports for June 2004
 2. Revised City and Water Bond Series 2003A Investment Reports for May 2004
- (C) Council approval of matters relating to the City Hall Basement and Unisex Restroom Retrofit Project (Plan No. 853):
 1. Award of contract to Rick Akers in the amount of \$56,696
 2. Appropriation of \$9,747 from General Fund reserves
- (D) Council approval of Fund Transfer Agreement with the City of Manhattan Beach for Prop A funds
- (E) Council override of transfer of 2003-04 General Fund residual fund balance to the Capital Projects Fund and approval of retaining all such funds in the General Fund beginning balance for Fiscal Year 2004-05
- (F) Council renewal of agreement with L.A. Works for Community Beautification Program (weed abatement, debris clean-up and public facility painting services) for Fiscal Year 2004-05 in the amount of \$35,211

8. CITY CONSENT CALENDAR

- (G) Council award of a two-year contract to B-Z Printing in the amount of \$16,038 per year for production of the Community Services Brochure
- (H) Council approval of an agreement with Albert Grover & Associates in an amount not to exceed \$24,930 for traffic engineering services for Fiscal Year 2004-05
- (I) Council review of City bills:
 1. City General Warrants for 7-8-04: \$1,455,919.48
 2. City Trust Warrants for 7-8-04: \$12,089.46
 3. City Payroll Wire Transfer for 7-9-04: \$533,928.13
 4. City General Warrants for 7-14-04: \$279,543.93
 5. City Trust Warrants for 7-14-04: \$3,393.76

Staff recommends that Council consider a motion to approve Consent Calendar Items A through I.

9. UNFINISHED BUSINESS - None

10. NEW BUSINESS

- (A) Review/discussion/provide direction regarding Louie Pompei Park design

Community Services to report.

Staff recommends that Council review discuss and provide direction to move the project forward to the Design Review Committee for comment and recommendation and then to the Planning Commission for project approval.

- (B) Council designation of a voting delegate and alternate voting delegate to represent the City at the League of California Cities' Annual Conference in September 2004

City Clerk to report.

Staff recommends that Council consider a motion to designate _____ as the voting delegate and _____ as the alternate voting delegate to represent the City at the League of California Cities' Annual Conference in September 2004.

Council to recess the City Council meeting and convene as the Glendora Community Redevelopment Agency (CRA).

11. COUNCIL AND STAFF ITEMS

Council action is limited to requests and directives.

12. CLOSED SESSION

(A) Government Code Section 54956.9(b), Potential Litigation – One case

Staff recommends that Council consider a motion to adjourn to Closed Session for the reason stated.

13. ADJOURNMENT

Agenda packets containing staff reports and/or other written documentation pertaining to the items on the agenda are available for public inspection at the City Clerk's Office and at the Library during regular posted business hours.

Next Regular City Council Meeting: August 10, 2004 at 7:00 p.m.



GOVERNOR'S OFFICE OF EMERGENCY SERVICES
HAZARD MITIGATION SECTION
POST OFFICE BOX 419023
RANCHO CORDOVA, CALIFORNIA 95741-9023
PHONE: (916) 845-8150 FAX: (916) 845-8386



RECEIVED

JUN 21 2004

CITY OF GLENDORA
CITY MANAGER

Glendora
Attn: City Manager Eric Ziegler
116 East Foothill Blvd.
Glendora, CA 91741-3380

SUBJECT: Letter of Intent to develop a Local Hazard Mitigation Plan (LHMP)

This notice is being sent to ensure that all California local governments, (counties, cities, special districts and other local government jurisdictions), are aware that mitigation project funding is at risk due to the changes in federal, pre-disaster mitigation planning requirements. These new requirements are in accordance with the Disaster Mitigation Act of 2000. In addition, this notice requests a signed letter of intent to develop a LHMP (Enclosure 1), from each local government jurisdiction.

As you may be aware, the Disaster Mitigation Act of 2000 (DMA 2000) (Public Law 106-390) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act) by repealing the previous mitigation planning section (Section 409) and replacing it with Section 322. To implement the DMA 2000 planning requirements, the Federal Emergency Management Agency (FEMA) published Interim Final Rules (IFRs) in the Federal Register on February 26, 2002 and October 1, 2002. These IFRs established the mitigation planning requirements for local governments and required that in order to remain eligible to receive federal funding for both pre-disaster and post-disaster mitigation project funding, a local government must, by November 1, 2004, have a FEMA approved LHMP written in accordance with Section 322 of the Act. Plans approved after November 1, 2004 will restore eligibility.

Local governments without an approved LHMP will not be eligible to receive Hazard Mitigation Grant Program (HMGP) project grants for disasters declared after November 1, 2004. Also affected by the November 1, 2004 date will be future mitigation project funding awarded through the Flood Mitigation Assistance (FMA) program, the Pre-Disaster Mitigation (PDM) grant programs, and the U.S. Small Business Administration's (SBA) low-interest, pre-disaster, small business loan program. To further emphasize the type of funding that is at risk after November 1, 2004, Enclosure 2 is a listing, by county, of federal HMGP funds that have been awarded for mitigation project grants since 1989.

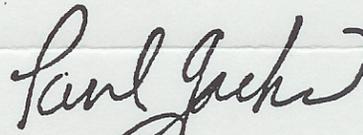
Since March 2003, OES has been providing information and holding LHMP development workshops in order to provide guidance, resources and training to local governments. (Please contact OES for a copy of Reference 1, which is a listing of local government representatives from within your Mutual Aid Region that have attended a LHMP Development Workshop.)

Memo to Council or Board Chair for City/Special District/Other Jurisdiction
Page 2

We request a response from your city/special district/other jurisdiction on Enclosure 1, as soon as possible. Please note that local governments choosing not to respond to this notice will be designated, in our report to DHS, as "non-participating," local governments.

For further information regarding California's LHMP Program, or to obtain a copy of any of the reference documents listed below, please contact Mr. Ken Worman, LHMP Program Manager, or Mr. Frank Hauck, LHMP Program Coordinator, at (916) 845-8150. Frank's e-mail address is Frank.Hauck@oes.ca.gov.

Sincerely,



PAUL JACKS
Deputy Director

Enclosures:

1. City/Special District/Other Jurisdiction's Letter Of Intent To Develop A Local Hazard Mitigation Plan

References: (Available upon request from OES)

1. HMGP Obligated Funds by County
2. Mutual Aid Region (I-VI) LHMP Workshop Attendees
3. Disaster Mitigation Act of 2000 (text)
4. 44 CFR Parts 201 and 206, IFR dated February 26, 2002 (text)
5. 44 CFR Parts 201 and 206, IFR dated October 1, 2002 (text)

**Letter of Intent
(to develop a Local Hazard Mitigation Plan)**

Name of City/Special District/Jurisdiction: _____
County of _____ **in the State of California.**

The above named **City/Special District/Jurisdiction**, does not intend to develop Local Hazard Mitigation Plan (LHMP), at this time. [The jurisdiction understands that it will not be eligible to receive mitigation project funding after November 1, 2004.]

The above named **City/Special District/Jurisdiction** intends to develop and submit for State review and FEMA approval, a LHMP, written in accordance with Section 322 of the Stafford Act, as indicated below. (**Check One**) (Please provide the name of the jurisdiction's LHMP contact person below.)

Single Jurisdiction LHMP or a **Multi-Jurisdictional LHMP**. (If Multi-Jurisdictional; Name of **LEAD Jurisdiction:**_____.)

CONCERNING THE LHMP:

The above named City/Special District/Jurisdiction has begun development of a LHMP.

The above named City/Special District/Jurisdiction will begin development of a LHMP by **Date:** _____.

The above named City/Special District/Jurisdiction does not have enough information to complete this Letter of Intent. Please contact the person listed below to provide clarifications or additional information to the Jurisdiction's.

Signed: _____ Date: _____
(Council/Board Chair or Designated Representative) (Print name & title of signing official): _____

Name of Local Contact Person: _____

Title: _____

Telephone () _____ - _____

E-mail address: _____

Please complete the enclosed *Letter of Intent* ASAP.

FAX to the OES Hazard Mitigation Section at (916) 845-8385 or 845-8386

THE GLENDORA WHEEL



SEPTEMBER 14, 2004 BULLETIN OF THE GLENDORA ROTARY CLUB ORGANIZED IN 1956 • DISTRICT 5300

This Week's Program: John Schmidt: Disaster Planning



John Schmidt receives congratulations from President Pat Janes for having the city of Glendora so well prepared for any disaster.

Annette Wins 50/50!



Annette Whistler won \$3 in the 50/50!

Next Week's Program: Norm Nichols Craft Talk

International Service

Focometer Program Travels To Tijuana

The Glendora Rotary Club travels to Tijuana to examine and fit with eye-glasses some of the sweetest, poorest kids in the world.

Saturday, October 9, 2004

Our trips are now designed to be as easy as possible. To join us, you can drive to the border on Saturday morning, park in a safe location, be picked up by members of the Tijuana Agua

- continued on page 3 -

Who Is This?



Is this a future Rotarian? Or perhaps an early picture of a current Rotarian? Find out at the next meeting!



Gordy Norman and Linda Dagne lead the club in a rousing rendition of "Clap your hands if your happy"! This club knows how to sing and dance!

SEPTEMBER IS NEW GENERATIONS MONTH:

Involve young people in Rotary!



GLENDORA
Chamber New
Member Breakfast

The Glendora Chamber of Commerce will be having its new member/general membership breakfast on **Friday, Oct. 8** at 7:30am at East Valley Hospital Medical Center located at 130 W. Route 66, Glendora. Topic to be discuss: "Find out how the City of Glendora is planning for natural disasters" with Guest Speaker John Schmidt of the Glendora Police Department. RSVP Glendora Chamber of Commerce 626-963-4128. \$5 with reservation or \$7 at the door.

San Gabriel Valley Tribune

City's disaster plan on track

Glendora will try to mitigate effects of natural calamities

By Marianne Love

Staff Writer

Monday, October 11, 2004 - GLENDORA -- The city is poised to approve a plan to lessen losses from earthquakes, wildfires, floods, mudslides and other cyclical natural disasters.

From the repetitive fires and mudslides in Malibu to tornadoes in the Midwest and hurricanes in Florida, some natural disasters have a tendency to strike in the same area, in the same city, in the same state.

Four years ago, Congress passed the Disaster Mitigation Act as part of the Robert T. Stafford Disaster Assistance and Emergency Relief Act.

Under the act, every local, county and state government must assess natural hazards that pose a threat, determine the potential financial impact and have a plan in place to reduce the impacts if they want Uncle Sam's help.

"Most cities are pretty much where they should be in terms of meeting the Nov. 1 deadline. This is a good thing," said Brenda Hunemiller, coordinator of area D's office of disaster management. "Every community needs to know their risks and what to do to lessen the impact of a disaster."

Area D covers 25 cities between Sierra Madre and Claremont and south to Diamond Bar. Each city faces different risks. All of them are held hostage by earthquakes but foothill communities, such as Glendora, are also threatened by brush fires and heavy rains that could bring mudslides. Strong winds can tear off rooftops.

Glendora officials have retrofitted unreinforced public buildings and kept up on trimming trees that threaten power lines in Santa Ana winds.

"Glendora is ahead of the curve. We have strict fire codes, stringent wind speed and building codes," said John Schmidt, the city's full-time emergency services coordinator.

He said the city's disaster mitigation plan will be posted on the city's Web site. Residents can zoom in on their personal lots to check where it is in relation to hazardous conditions.

Marianne Love can be reached at (626) 962-8811, Ext. 2108, or by e-mail at marianne.love@sgvn.com.

AGENDA
CITY OF GLENDORA
CITY COUNCIL REGULAR MEETING
OCTOBER 12, 2004
COUNCIL CHAMBERS OF THE CITY HALL
116 E. FOOTHILL BOULEVARD, GLENDORA, CA
7:00 P.M.

MAYOR: CLIFF HAMLOW

COUNCILMEMBERS: GARY M. CLIFFORD, MIKE CONWAY,
KEN HERMAN, DOUG TESSITOR

In compliance with the Americans with Disabilities Act, if special assistance is needed to participate in the meeting, please contact the City Clerk's Office at (626) 914-8210. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

1. INVOCATION, PLEDGE OF ALLEGIANCE, CALL TO ORDER

- (A) Invocation by Pastor Doug Hodson, United Methodist Church
- (B) Pledge of Allegiance
- (C) Call to order of the Glendora City Council regular meeting

2. SPECIAL ITEMS - None

3. STUDENT REPORTS - None

4. PUBLIC COMMENT PERIOD

Public comment shall conform to the protocol established in Council Resolution No. 03-37, the highlights of which are listed below:

Any person may request to address the City Council by submitting to the City Clerk a Speakers Request form asking to address the Council and stating the topic to be addressed. Speakers Request forms shall be available at the Council Chambers throughout the Council meeting.

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All remarks shall be addressed to the Council as a body and not to any member thereof. No question shall be asked of a Councilmember or a member of the staff, except through the presiding officer.

5. COUNCIL REPORTS AND STATEMENTS

6. REORDER OF THE AGENDA

At this time Council may revise the order of business on the agenda.

7. PUBLIC HEARINGS

Following the staff report, the applicant/appellant will be allowed ten minutes in which to make a presentation. The public hearing will then be opened. Testimony by proponents shall be limited to three minutes per speaker and to a total of 15 minutes. Testimony by opponents shall be limited to three minutes per speaker and to a total of 15 minutes. The Mayor may permit a five minute summation by a representative of proponents, followed by a five minute summation by a representative of opponents. The public hearing will then be closed and no member of the public shall be allowed to speak further without consent of the Mayor. Any person desiring to speak to a Public Hearing item shall make his/her presence known to the Mayor. Speaker cards are available in the lobby. Speakers are entitled to submit written or other graphic evidence. All such evidence presented shall be retained by the City Clerk as part of the Clerk's record.

7. PUBLIC HEARINGS

- (A) Public Hearing relative to the City's Disaster Mitigation Plan required by the Disaster Mitigation Act of 2000 (DMA 2000)

Emergency Services Coordinator John Schmidt to report.

Staff recommends that Council open the public hearing, accept evidence and testimony presented, close the hearing, and in the absence of evidence and testimony to the contrary, consider the following:

1. *A motion to adopt a resolution entitled: A resolution of the City Council of the City of Glendora adopting a Disaster Mitigation Plan pursuant to requirements of the Disaster Mitigation Act of 2000*

- (B) Public Hearing relative to property at 425 N. Pasadena Avenue (Property Owner: M. & K. Visconti):

- (1) Miscellaneous (M04-37): A request to designate the property as a Historic Landmark
- (2) A request to execute a Mills Act Agreement

Department of Planning and Redevelopment to report.

Staff recommends that the City Council open and conduct the Public Hearing, accept evidence and testimony presented, close the hearing, and in the absence of evidence and testimony to the contrary, consider the following:

1. *A motion to adopt the resolution entitled: A resolution approving a Miscellaneous request to designate certain property located at 425 N. Pasadena Avenue as a Historical Landmark, Glendora, California*
2. *A motion to authorize the City Manager to execute the requested Mills Act Agreement for this property*

San Gabriel Valley Tribune

Glendora City Council approves disaster plan

Tuesday, October 12, 2004 - The City Council on Tuesday approved a plan that outlines ways to prevent damage from natural disasters in exchange for federal funding.

For the first time, every city in the San Gabriel Valley must come up with a plan, before Nov. 1, if it expects to apply for money under the Disaster Mitigation Act of the Robert T. Stafford Disaster Assistance and Emergency Relief Act.

Federal funding is imperative, in many cases, for small cities that could possibly face bankruptcy without Uncle Sam's help.

By Marianna Love

Appendix C:

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.

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

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

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.
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.