Newhall School District

25375 Orchard Village Road
Valencia, California 91355

Local Hazard Mitigation Plan

Developed by the Newhall School District Hazard Mitigation Planning Committee

June 2004

Plan Adopted & Approved
by the
Newhall School District
Governing Board
On
June 7, 2005

Special Thanks & Acknowledgments

- District's Hazard Mitigation Planning Committee
- City of Santa Clarita
- California Highway Patrol
- Southern California Edison
- Los Angeles County Fire Department
- Los Angeles County Sheriffs Department
- Caltrans
- National Weather Service
- The Gas Company

Newhall School District's Natural Hazard Mitigation Plan

Table of Contents

Acknowledgments.....3

Part I: Mitigation Action Plan

Executive Summary…… 5
Section 1: ……Introduction 22
Section 2: ……...Community Profile 30
Section 3: ……Risk Assessment 35
Section 4: ……Multi-Hazard Goals and Action Items 40
Section 5: ……Plan Maintenance 48

Part II: Specific Natural Hazards

Section 6: ……Earthquake 52
Section 7: ……...Earth Movement (Landslide / Debris Flow) 79
Section 8: ……...Flood 91
Section 9: ……... Wildfire 99
Section 10: …… Severe Weather Occasions 107

Part III: Resources

Appendix A: ……Plan Resource Directory 118
Appendix B: ……...Public Participation Process 130
Appendix C: ……...List of Acronyms 135
Appendix D: ……Glossary 141
Appendix E: ……...List of Maps 151

Executive Summary

Five Year Action Plan

The Newhall School District Natural Hazard Mitigation Action Plan includes resources and information to assist District employees, and others interested in participating in planning for natural hazards. The mitigation plan provides a list of activities that may assist Newhall School District in reducing risk and preventing loss from future natural hazard events. The action items address multi-hazard issues, as well as activities for earthquakes, flooding and severe weather occasions.

How is the Plan Organized?

The Mitigation Plan contains a five-year action plan matrix, background on the purpose and methodology used to develop the mitigation plan, a profile of the Newhall School District, sections on three natural hazards that occur within the District, 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 Newhall School District Natural Hazard Mitigation Plan is the result of a collaborative effort between Newhall School District staff, public agencies, and regional and state organization. Public input was asked for on the Districts' website. The Newhall School District Hazard Mitigation Planning Committee guided the process of plan development.

The Newhall School District Hazard Mitigation Planning Committee was comprised of the following representatives:

Assistant Superintendent of Business
Director of Facilities
Assistant Director of Facilities
Safety Coordinator / Risk Manager
Director of Technology

What is the Plan Mission?

The mission of the Newhall School District Natural Hazard Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, 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 District towards building a safer, more sustainable community.

What are the Plan Goals?

The plan goals describe the overall direction that the Newhall School District, City of Santa Clarita, and government 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.

1. Protect Life and Property

- Implement activities that assist in protecting lives by making our schools, critical support 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.

2. 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.

3. 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.

4. Emergency Services

- Establish policy to ensure mitigation projects for critical school 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 District emergency operations plans and procedures.

How are the Action Items Organized?

The action items are listed as activities in which the District can use to reduce risk. Each action item includes an estimate of the time line for implementation. Short-term action items are activities that the District 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 public participation 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 District Administrative Department(s) 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 Business Services, Facilities Maintenance & Operations and Personnel Services 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 the District is 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 the information can be found.

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

1. Protect Life and Property
2. Public Awareness
3. Natural Systems
4. Partnerships and Implementation
5. 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 Newhall School District Natural Hazard Mitigation Plan are potential partners recommended by the District's Hazard Mitigation Planning Committee, but may not have been 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 District staff, lack of funds, or vested property rights which might expose the District 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 Newhall School District Natural Hazard Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the District will integrate public participation throughout the plan maintenance process.

Finally, this section includes an explanation of how the Newhall School District intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as Building & Safety Codes updates and improvements and remodernization projects.

Plan Adoption

Once the plan is completed, the Newhall School District Governing Board will be responsible for adopting the "***Newhall School District Natural Hazard Mitigation Plan.***" The District's Board has the responsibility and authority to promote sound public policy regarding natural hazards. The District's Board 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 District.

Coordinating Body

The Newhall School District Hazard Mitigation Planning Committee will be responsible for coordinating implementation of Plan action items and undertaking the formal review process.

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 Newhall School District Natural Hazard Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities.

The evaluation process includes a firm schedule and time line, and identifies the local agencies and organizations participating in plan evaluation. The convener will be responsible for contacting the District's Hazard Mitigation Planning Committee members and organizing the annual meeting. Committee members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan.

Continued Public Involvement

The Newhall School District is dedicated to involving the public in the continual review and updates of the Hazard Mitigation Plan. Copies of the plan will be made available at the District administrative office. In addition, copies of the Plan and any proposed changes will be posted on the Newhall School District website. This site will also contain an email address to which people can direct their comments and concerns.

Newhall School District Sites and Facilities

DISTRICT OFFICE

Address:	**25375 Orchard Village Road** **Valencia, Ca. 91355**
Telephone:	**(661) 286-2200**
Fax:	**(661) 286-2290**
Website:	**www.newhall.k12.ca.us**

NEWHALL SCHOOL

Address:	**24607 Walnut Street** **Newhall, Ca. 91321**
Telephone:	**(661) 259-8480**
Fax:	**(661) 287-1572**

PEACHLAND SCHOOL

Address:	**24800 Peachland Ave.** **Newhall, Ca. 91321**
Telephone:	**(661) 259-1660**
Fax:	**(661) 259-5795**

WILEY CANYON SCHOOL

Address:	**24240 W. La Glorita Cir.** **Newhall, Ca. 91321**
Telephone:	**(661) 259-6061**
Fax:	**(661) 287-3526**

OLD ORCHARD SCHOOL

Address:	**25141 N. Avenida Rondel** **Valencia, Ca. 91355**
Telephone:	**(661) 259-1771**
Fax:	**(661) 255-9353**

MEADOWS SCHOOL

Address:	**25577 N. Fedala Road** **Valencia, Ca. 91355**
Telephone:	**(661) 255-8450**
Fax:	**(661) 255-5684**

VALENCIA VALLEY SCHOOL

Address:	**23601 Carrizo Dr.** **Valencia, Ca. 91355**
Telephone:	**(661) 253-1873**
Fax:	**(661) 287-3580**

STEVENSON RANCH SCHOOL

Address:	**25820 N. Carroll Lane** **Stevenson Ranch, Ca. 91381**
Telephone:	**(661) 290-2572**
Fax:	**(661) 290-2574**

PICO CANYON SCHOOL

Address:	**25255 Pico Canyon Road** **Stevenson Ranch, Ca. 91381**
Telephone:	**(661) 287-4511**
Fax:	**(661) 287-1698**

MCGRATH SCHOOL

Address:	**21501 Deputy Jake Dr.** **Newhall. Ca. 91321**
Telephone:	**(661) 287-4573**
Fax:	**(661) 287-4586**

DISTRICT FACILITIES and WAREHOUSE

Address:	**22245 Placerita Canyon Rd.** **Newhall, Ca. 91321**
Telephone:	**(661) 259-6250**
Fax:	**(661) 259-3290**

NEWHALL SCHOOL DISTRICT

March 1, 2004 - Keenan & Associates **Hazard:** Earthquake **Worksheet A**

Type of Structure (Occupancy Class)	Number of Structures			Value of Structures			Number of People		
	# in Site	# in Hazard Area	% in Hazard Area	$ in Site	$ in Hazard Area	% in Hazard Area	# in Site	# in Hazard Area	% in Hazard Area
Newhall School	34	34	100%	$ 13,913,200	$ 13,913,200	100%	781	781	100%
Peachland School	29	29	100%	$ 9,186,900	$ 9,186,900	100%	717	717	100%
Wiley Cyn. School	22	22	100%	$ 11,985,200	$ 11,985,200	100%	851	851	100%
Old Orchard School	34	34	100%	$ 10,658,700	$ 10,658,700	100%	693	693	100%
Meadows School	39	39	100%	$ 9,570,400	$ 9,570,400	100%	779	779	100%
Valencia Valley School	17	17	100%	$ 11,719,000	$ 11,719,000	100%	823	823	100%
Stevenson Ranch School	36	36	100%	$ 12,101,500	$ 12,101,500	100%	1110	1110	100%
Pico Canyon School	25	25	100%	$ 13,104,300	$ 13,104,300	100%	950	950	100%
McGrath School	16	16	100%	$ 12,213,550	$ 12,213,550	100%	738	738	100%
District Office	1	1	100%	$ 4,543,000	$ 4,543,000	100%	56	56	100%
Facilities	16	16	100%	$ 4,049,700	$ 4,049,700	100%	30	30	100%
Totals:	269	269	100%	$ 113,045,450	$ 113,045,450	100%	7528	7528	100%

Goals and Action Items	Coordinating Organization	Time line	Protect Life and Property	Public Awareness	Partnerships	Emergency Services
Earthquakes						
E1: Integrate new earthquake hazard mapping data for the Santa Clarita Valley and improve technical analysis of earthquake hazards. 1. Update earthquake HAZUS data using more localized data including the building inventory to improve accuracy of the vulnerability assessment for the Newhall School District; and 2. 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	Hazard Mitigation Planning Committee, City of Santa Clarita, FEMA	2 years	X		X	X
E2: Earthquake retrofit for Newhall Elementary School per 1999 AB300. 1. Explore sources for funding (loans, grants, etc.)	Hazard Mitigation Planning Committee	2 years	X			
E#3. Continue to conduct District wide disaster and earthquake drills to educate staff, students, and parents on District emergency procedures. 1. Encourage parents/public to read our evacuation and child pick up procedures that are in the student packets. 2. Encourage parents/public to visit one of our sites to observe a disaster drill.	Hazard Mitigation Planning Committee	Ongoing	X	X		X

Goals and Action Items	Coordinating Organization	Time line	Protect Life and Property	Public Awareness	Partnerships	Emergency Services
Earth Movement						
EM#1: Increase knowledge of landslide hazard areas and understanding of vulnerability and risk to life and property in hazard-prone areas. 3. Develop public information to emphasize risks when building on potential or historical landslide areas. 4. Continue to map new earth movement hazards and make information available to staff, developers, and residents so that soil types, slope percentage, drainage, or other critical factors are used to identify landslide prone areas. 5. Encourage design and placement of utilities outside of landslide areas to decrease the risk of service disruption.	Hazard Mitigation Planning Committee, City of Santa Clarita, Developers, Homeowners, Water and Utility Agencies.	Ongoing	X	X	X	X
EM#2: Continue in the participation of programs. 1. Continue the participation in the National Flood Insurance Program (NFIP). 2. Continue in the participation of the Community Rating System (CRS). This program consists of additional "activities" which are all defined by FEMA and have points associated with each activity.	Hazard Mitigation Planning Committee, City of Santa Clarita, Developers, Homeowners, FEMA	Ongoing	X			X
EM#3: Review, monitor, and update codes, regulations, and local ordinances. 1. Study ordinances including Zoning, Grading, Hillside, Subdivision, etc. and make recommendations to mitigate landslide prone areas. 2. Review and enforce building codes for construction standards, including minimum foundation requirements, in landslide prone areas. 3. Review drainage control regulations to control drainage, and reduce the risk of landslides resulting from saturated soils.	Planning Committee, City of Santa Clarita, Los Angeles County, State of California, Building and Industry Association (BIA)	Ongoing	X	X		

Goals and Action Items	Coordinating Organization	Time line	Protect Life and Property	Public Awareness	Partnerships	Emergency Services
Flood						
F#1: Minimize damage and hazards to development in areas subject to risk resulting from seismic activity, unstable soils, flooding conditions, and other geologic hazards. 1. Ensure that all new development has an adequate water supply, road widths, and reasonable secondary emergency access to minimize health and safety risks. 2. Implement the comprehensive emergency preparedness plan consistent with General Plan policy and distribute a summary of the plan indicating evacuation routes and shelters to businesses, residences, and public facilities in the planning area. 3. Require geotechnical studies for development proposals as appropriate. 4. Work with the California Division of Mines and Geology to review development proposals located within or adjacent to the Alquist-Priolo Special Studies Zone, along the San Gabriel Fault, and other potentially active faults. 5. Assist developers in obtaining necessary technical and policy information regarding seismic hazards and maintain a list of qualified geotechnical consultants. 6. Review the use of seismic design criteria and standards for linear system facilities, including transmission lines, water and sewage systems, and highways to ensure that they are adequate in protecting the public. Actual weaknesses or limitations within the system should also be determined and mitigated where feasible. 7. Require that soils containing toxic or hazardous substances be cleaned	Hazard Mitigation Planning Committee, City of Santa Clarita, CA Department of Mines and Geology, Los Angeles County, CalTrans, Department of Toxic Substance and Control (DTSC), local water agencies, local utility companies, and developers.	Ongoing	X	X	X	X

up to the satisfaction of the agency having jurisdiction prior to development or redevelopment. 8. Review development proposals located in or immediately adjacent to areas of soil instability, liquefaction areas, and steep slopes to determine if a significant constraint exists and to determine appropriate lane use and structural design. 9. Evaluate and review the potential for inundation from dam or levee failure from Castaic and Bouquet Reservoirs in the event of a major earthquake. 10. Promote open space and recreational uses in designated flood zones. 11. Continue clearance of the Santa Clara River channel of no-native plant species that may impede flood flow. 12. Implement the hillside grading standards to minimize the hazards of erosion and slope failure.						

Goals and Action Items	Coordinating Organization	Time line	Protect Life and Property	Public Awareness	Partnerships	Emergency Services
Wildfires						
WF#1: Work with Los Angeles County Fire Department Division III, North Regional Operations Bureau (LACOFD Division III) to enhance emergency services to increase the efficiency of wildfire response and recovery activities. 1. Support LACoFD Division III's efforts to install more fire reporting stations for better access and coverage. 2. Coordinate with LACoFD Division III to implement the Public Alert and Warning Notification System to quickly contact all at-risk urban/wildland interface residents in the Santa Clarita Valley regarding evacuations.	Hazard Mitigation Planning Committee, LACoFD Division III and City of Santa Clarita	1-4 years				X
WF#2: Collaborate with LACoFD Division III to 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. 1. Support LACoFD Division III's efforts to hire and educate fire prevention personnel to oversee education programs. 2. Work with LACoFD Division III to visit urban interface neighborhoods and rural areas and conduct education and outreach activities.	Hazard Mitigation Planning Committee, LACoFD Division III and City of Santa Clarita	Ongoing	X	X		

3. Work with LACoFD Division III to conduct specific community-based demonstration projects of fire prevention and mitigation in the urban interface. 4. Continue to work with LACoFD Division III to establish neighborhood "drive-through" activities that pinpoint site-specific mitigation activities. Fire crews can give property owners personal suggestions and assistance. 5. Continue to work with LACoFD Division III to organize public outreach and information activities at fire stations, such as "Wildfire Awareness Week" activities. This allows the public to visit fire stations, see the equipment, and discuss wildfire mitigation with the station crews.						
WF#3: Collaborate with LACoFD Division III to encourage implementation of wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability. 1. Support LACoFD Division III's effort to 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. 2. Support LACoFD Division III's efforts to clear trimmings, trees, brush and other debris completely from sites when performing routine maintenance and landscaping to reduce fire risk.	Hazard Mitigation Planning Committee, LACoFD Division III	Ongoing	X	X		

Goals and Action Items	Coordinating Organization	Time line	Protect Life and Property	Public Awareness	Partnerships	Emergency Services
Severe Weather Occasions						
SW#1: Create an Employee and Public Education program regarding proper precautions against exposure to heat and potential hazards of exposure to extreme heat. 1. Partner with the Los Angeles County Department of Health Services to create and or/adopt their existing information regarding heat, how to monitor and/or adjust behavior depending on the specific heat index, and information to seek should specific ailments from exposure to heat occur.	Hazard Mitigation Planning Committee, Division of Community Services, Los Angeles County, National Weather Service	Ongoing		X	X	X

SECTION 1: INTRODUCTION

Throughout history, the residents of Santa Clarita Valley have dealt with the various natural hazards affecting the area. Photos, journal entries, and newspapers from the 1800's show that the residents of the area dealt with earthquakes, flooding, and severe weather occasions.

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 area continues to increase, the exposure to natural hazards creates an even higher risk than previously experienced.

The Santa Clarita Valley is subject to earthquakes, flooding, and severe weather occasions. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the area and the District. 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.

Why Develop a Mitigation Plan?

As the costs of damage from natural disasters continue 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 the Newhall School District;
(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 the City of Santa Clarita's plan.

Whom Does the Mitigation Plan Affect?

The Newhall School District Natural Hazard Mitigation Plan affects the District and the City of Santa Clarita.

Map 1 and 2 (Appendix E), shows major roads and school attendance zones in the Newhall School District. This plan provides a framework for planning for natural hazards. The resources and background information in the plan are applicable throughout the affected area servicing the District.

Natural Hazard Land Use Policy in California

Planning for natural hazards should be an integral element of any city's or agencies 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.

Support for Natural Hazard Mitigation

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 it 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 land, and administers forest practices regulations, including landslide mitigation, on non-federal lands.

- The California Division of Mines and Geology (DMG) is responsible for geologic hazard characterization, public education, the development of partnerships aimed at reducing risk, and exceptions (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, and 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 Newhall School District conducted data research and analysis, facilitated planning committee meetings and public workshops, and developed the final mitigation plan. The research methods and various contributions to the plan include:

Input from the planning committee:

The Newhall School District Hazard Mitigation Planning Committee convened for a total of 7 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 serving the Newhall School District.

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 a District Facility Master Plan, 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 Newhall School District Governing Board;
- 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.

The Newhall School District Planning Committee examined existing mitigation plans from around the area, 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: The Newhall School District Planning Committee collected data and compiled research on 3 hazards: earthquakes, flooding and severe weather occasions. Research materials came from state agencies including OES and FEMA. The Committee conducted research by referencing historical local newspapers, researching the Internet and locating Newhall School District information in historical documents.

The Newhall School District Hazard Mitigation Planning Committee identified current mitigation activities, resources and action items from those research materials.

Public workshops

The Newhall School District Planning Committee facilitated two public forums to gather comments and ideas from the public about mitigation planning and priorities for mitigation plan goals. The first workshop, was held May 20, 2004, and the second, was held on November 8, 2004.

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

How Is the Plan Used?

Each section of the mitigation plan provides information and resources to assist people in understanding the area 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 hazard mitigation plan that remains current and relevant to the Newhall School District.

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 six natural hazard sections and Volume III includes the appendices. Each section of the plan is described below.

Executive Summary: Five-Year Action Plan

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

Section 1: Introduction

The Introduction describes the background and purpose of developing the mitigation plan for the Newhall School District.

Section 2: Community Profile

This section presents the history, geography, demographics, and socioeconomics of The Newhall School District. It serves as a tool to provide an historical perspective of natural hazards affecting the District and the communities it serves.

Section 3: Risk Assessment

This section provides information on hazard identification, vulnerability and risk associated with natural hazards in and around the Newhall School District.

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 five natural hazards addressed in the mitigation plan.

Section 5: Plan Maintenance

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

Hazard Specific Information

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

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

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. For the coastal areas of Southern California, tsunamis, while very rare, have the potential to calamitously devastate low-lying coastal areas.

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.

Resources

The plan appendices are designed to provide users of the Newhall School District Natural Hazard 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 the Newhall School District 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: 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 Newhall School District Natural Hazard Mitigation Plan.

Appendix D: Glossary

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

Appendix E: List of Maps

This section provides all of the maps referenced throughout the plan.

SECTION 2 : COMMUNITY PROFILE

Why Plan for Natural Hazards in the Newhall School District?

Natural hazards impact citizens, property, the environment, and the economy of the Newhall School District. Earthquakes, flooding and severe weather occasions have exposed the Newhall School District and the Santa Clarity Valley 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.

The inevitability of natural hazards, and growing population and activity with the city and county served by the District, create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce the risk and prevent loss from future natural 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 within the District. The city and county, their residents, and businesses can work together with the District to create a natural hazard plan that addresses the potential impacts of hazard events.

GEOGRAPHY

The Newhall School District is located in the Santa Clarita Valley with 7 of the school sites located within the city of Santa Clarita and 2 school sites located in the County of Los Angeles. The Santa Clarita Valley is located approximately 35 miles north of downtown Los Angeles, and 40 miles east of the Ventura harbor. The valley is surrounded by mountains and the terrain is considered hilly, with change in elevation ranging from 975 to 1470 feet above sea level.

COMMUNITY PROFILE

The town of Newhall was founded in 1876, and named after Henry Mayo Newhall. From 1872 to 1875, Newhall purchased about 100,000 acres in this valley, then known as the Santa Clara River Valley.

Since then, the Santa Clarita Valley has changed. From the early 1900's to the early 1970's, the valley was largely agricultural. Farmland was being developed for housing and retail business.

The City of Santa Clarita was formed by incorporation on December 15, 1987. We now have a population of over 162,000 in the city and over 213,000 in the valley.

This area has been through disasters. We have had numerous earthquakes, droughts, and flooding. The worst flood in the Santa Clarita Valley was a man made disaster “The St. Francis Dam Disaster”. On March 12, 1928, the St. Francis Dam collapsed, sending a 140 foot high wall of water into the Santa Clarita Valley. On its way to the ocean, it killed over 450 people and destroyed more than 900 buildings.

HIGHWAYS AND ROADS

There are two major freeways that accommodate major traffic flow for the valley. Interstate 5 runs north and south, right through the heart of the Santa Clarita Valley. Interstate 5 is a major freeway spanning the west coast from the state of Washington to the Mexican border. The other is the 14 freeway, which takes commuters from the Antelope Valley to the 5 freeway. The 14 freeway goes through Santa Clarita on the east side, and runs in a north-east direction.

RAIL SYSTEM

The railroad system serves commercial and light rail passenger transportation. The rail system runs through the east portion of Santa Clarita. Southern Pacific, Am Track, and Metro Link utilize the same rail system. Santa Clarita also has a Metro Link station as a stopping point to embark and disembark passengers.

AIR TRAVEL

The Santa Clarita Valley does not have an airport, however we are in a flight path for the Burbank-Glendale Airport. Burbank-Glendale is a commercial airport that serves passenger and freight airliners

CLIMATE

The climate for the Newhall School District can be characterized as a Mediterranean climate. During the summer months, it is warm and dry. The temperatures range from 75 degrees to 100 degrees. During the winter months, the temperatures range from 40 degrees to 65 degrees. The average rainfall amounts are 15 to 18 inches.

GEOLOGICAL FEATURES

The Newhall School District, like most areas in southern California, lie over or near the area of one or more known earthquake faults, and potentially many more unknown faults, particularly so-called lateral or blind thrust faults.

There are many faults that can affect Los Angeles County. These and other faults may also affect the Newhall School District. The Department of Mines and Geology Quadrangle map that shows the faults in our area, is labeled “Newhall R95”.

POPULATION and DEMOGRAPHICS

The Newhall School District serves over 6500 children at nine school sites and employs over 600 full and part time persons in certificated, management, and classified positions. All the schools are kindergarten through sixth grade.

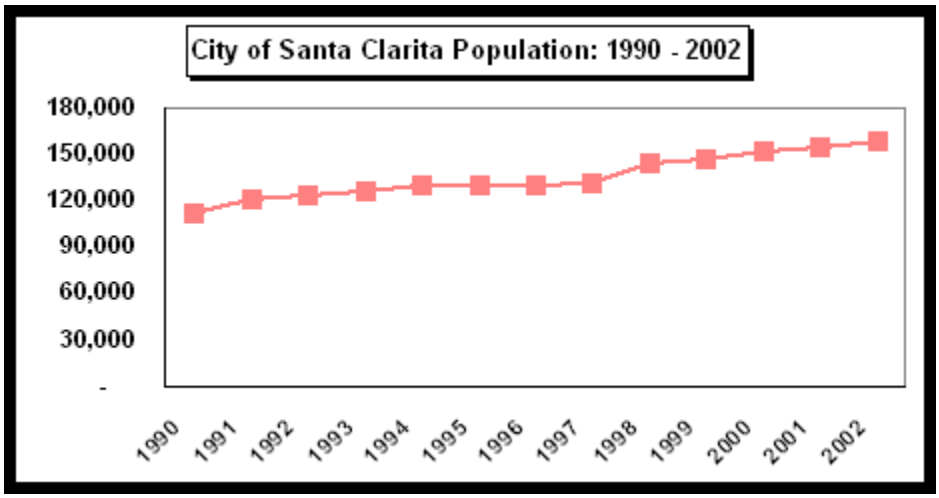
According to the US Bureau of the Census, in the year 2000, the Santa Clarita Valley had a population of 213,178.

AREA	YEAR	POPULATION	SOURCE
City of Santa Clarita	2000	151,088	US Bureau of the Census
City of Santa Clarita	2001	153,600	CA Dept. of Finance, 8/03
City of Santa Clarita	2002	158,200	CA Dept. of Finance, 8/03
City of Santa Clarita	2003	162,900	CA Dept. of Finance, 8/03
City of Santa Clarita	2008	177,520	Claritas, 8/03
Santa Clarita Valley	2000	213,178	US Bureau of the Census
Santa Clarita Valley	2010	243,104	SCAG, 6/02
Santa Clarita Valley	2015	272,260	SCAG, 6/02
Santa Clarita Valley	2020	313,290	SCAG, 6/02
Santa Clarita Valley	2025	352,382	SCAG, 6/02

In 2003, the City of Santa Clarita was the fastest growing city among all cities with a population size of at least 150,000 in Los Angeles County and well exceeded the state's growth rate of 1.7% from the previous year.

RANK	CITY	GROWTH RATE
1	Santa Clarita	3.0%
2	Long Beach	1.8%
3	Pomona	1.8%
4	Los Angeles	1.6%
5	Glendale	1.4%
	California	1.7%
	Los Angeles County	1.7%

During the 1990's the City of Santa Clarita's population grew by 35.5% from the 1990 population of 112,059 to the 2000 population of 151,800. The growth was due to in-migration to the city limits as well as a number of annexations that occurred since Cityhood in 1987. Annexations occurred in 1991 and 1992 as well as in 1994 and 1997.



The increase of people living in the Santa Clarita Valley creates more community exposure and changes how the City and the District prepare for and respond to natural hazards. For example, more people living on the urban fringe can have an 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/wild land fire is not the only exposure to the Newhall School District. In the 1987 publication, Fire Following Earthquakes, 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 would be made much worse by the loss of pressure in the fire mains, caused by 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 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.

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

LAND AND DEVELOPMENT

Development in Southern California from the earliest days was a cycle of boom or bust. The Second World War however dramatically changed the 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 development of residential and commercial areas would impact the Santa Clarita Valley area from 1960 to 2000 when population would increase by 200%. The growth placed a demand on the Newhall School District to secure land and construct new school sites to serve the rapidly growing population. In the early 1960's we had two school sites. We now have nine school sites, plus a District Office and Facilities location.

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 Newhall School District identified three major hazards that affect this geographic area. These hazards - earthquakes, firestorms and severe weather occasions - were identified through an extensive process that utilized input from the Hazard Mitigation Planning Committee. The geographic extent for two of the main identified hazards (earthquakes and firestorms) have been identified by the Newhall School District, the California Department of Conservation, and the U.S. Army Corps of Engineers using the best available data.

2) Profiling Hazard Events

This process describes the causes and characteristics of each hazard, how it has affected the Newhall School District in the past, and what part of the Newhall School District'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 Valley and fulfill important public safety, emergency response, and/or disaster recovery functions.

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 a description of the character of the Newhall School District in the Community Profile. This description includes the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns. Analyzing these components of the Newhall School District 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.

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.

Regardless of the data available for hazard assessments, there are numerous strategies the City and County 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 three hazards profiled in the mitigation plan, including *earthquakes, firestorms and severe weather occasions.* The Federal criteria for risk assessment and information on how the Newhall School District Natural Hazard Mitigation Plan meets those criteria is outlined in Table 3-2.

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 and around 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 county.
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 Newhall School District Profile Section of this plan provides a description of the development trends in the Valley, 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, and American Red Cross shelters. Facilities that, if damaged, could cause serious secondary impacts may also be considered "critical."
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 chart below illustrates the critical facilities within the Newhall School District. (Source: Keenan & Associates)

Critical Facilities

Name or Description of Asset	Sources of Information	Size of Buildings (in sq. ft.)	Replacement Value	Displacement Cost (per day)	Capacity
Newhall School	Property report	92,213	$13,913,200		800
Peachland School	Property report	57,364	$9,186,900		700
Wiley Canyon School	Property report	68,066	$11,985,200		850
Old Orchard School	Property report	66,673	$10,658,700		720
Meadows School	Property report	79,199	$9,570,400		800
Valencia Valley School	Property report	60,187	$11,719,000		850
Stevenson Ranch School	Property report	76,272	$12,101,500		1050
Pico Canyon School	Property report	69,768	$13,104,300		1000
McGrath School	Property report	59,806	$12,213,550		800
District Office	Property report	20,600	$4,543,000		200
Facilities	Property report	30,168	$4,049,700		200

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.

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 three 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 Newhall School District's Natural Hazard Mitigation Plan is to promote sound District policy designed to protect students, faculty and staff, infrastructure, school sites, critical support facilities, and the environment from natural hazards. This can be achieved by increasing awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the District towards building a safer and more sustainable District.

Goals

The plan goals describe the overall direction that the Newhall School District can take to minimize the impacts of natural hazards. These 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 the District 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 the District 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 our schools, support 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.

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 a 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 current District emergency operations plans and procedures.

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. 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.

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. For the Newhall School District, the Administrative staff in Business Services will be the main coordinating organization. Additional coordinating organizations may include local, city, or regional agencies that are capable of or responsible for implementing further 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 District's action items. These constraints unfortunately result from decreased or lack of state and federal funds, increased insurance costs, and the general health of the California economy.

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.

Multi-Hazard Action Items

Multi-hazard action items are those activities that pertain to two or more of the three hazards in the mitigation plan: flood, severe weather occasions and earthquakes. There are six short-term and one long-term multi-hazard action items described below.

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

Ideas for Implementation:

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

Coordinating Organization:	City of Santa Clarita and the Newhall School District Hazard Mitigation Planning Committee
Time line:	Ongoing
Plan Goals Addressed:	Partnerships and Implementation
Constraints:	Limited to time available from District staff.

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

Ideas for Implementation:

Allocate City and State resources and assistance to mitigation projects when possible: and

Partner with other organizations and agencies to identify grant programs and foundations that may support mitigation activities.

Coordinating Organization:	City of Santa Clarita
Time line:	Ongoing
Plan Goals Addressed:	Partnerships and Implementation
Constraints:	Limited to time available from District staff.

SHORT TERM ACTIVITY - MULTI HAZARD #3: Establish a formal role for the Newhall School District Natural Hazard Mitigation Planning Committee to develop a sustainable process for implementing, monitoring, and evaluating District 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 school site through surveys and other reporting methods.

Develop updates for the Natural Hazard Mitigation Action Plan when presented with new information.

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

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

Coordinating Organization: Hazard Mitigation Planning Committee
Time line: Ongoing
Plan Goals Addressed: Implementation
Constraints: Limited to time available from District staff.

SHORT TERM ACTIVITY - MULTI HAZARD #4: Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration in the Newhall School District.

Ideas for Implementation:

Work with the City of Santa Clarita and the County of Los Angeles to develop local Natural Hazard Mitigation Plans that are consistent with the goals and framework of their respective area plans.

Identify all organizations within Newhall School District that have programs or interests in natural hazard mitigation.

Involve private businesses throughout the Valley 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.

Coordinating Organization: Hazard Mitigation Planning Committee
Time line: Ongoing
Plan Goals Addressed: Partnerships and Implementation
Constraints: Limited to time available from District staff.

SHORT TERM ACTIVITY - MULTI HAZARD *#5:* Develop inventories of at-risk school buildings and facilities 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 hazard events cause damages to the facilities in question.

Coordinating Organization:	Hazard Mitigation Planning Committee
Time line:	1-2 Years
Plan Goals Addressed:	Protect Life and Property,
Constraints:	May be budgetary limits that can prolong the length of the project.

SHORT TERM ACTIVITY - MULTI HAZARD #6: Strengthen emergency service preparedness and response by linking with natural hazard mitigation programs, and enhancing community education throughout the District.

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:	Hazard Mitigation Planning Committee
Time line:	Ongoing
Plan Goals Addressed:	Emergency Services
Constraints:	Limited to time available from District staff.

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

Ideas for Implementation:

Multi hazard Action Items

Make the Newhall School District Natural Hazard Mitigation Plan available to the public by publishing the plan electronically on the District's website.

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.

Education: Develop curriculum for school programs and adult education on reducing risk and preventing loss from natural hazards.
Conduct natural hazards awareness programs in schools and community centers.

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

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

Coordinating Organization:	Hazard Mitigation Planning Committee
Time line:	Ongoing
Plan Goals Addressed:	Public Awareness, Protect Life and Property
Constraints:	Limited to time available from District staff.

SECTION 5: PLAN MAINTENANCE

The plan maintenance section of this document details the formal process that will ensure that the Newhall School District Natural Hazard Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the city will integrate public participation throughout the plan maintenance process. Finally, this section includes an explanation of how the Newhall School District intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms.

Plan Adoption

The Newhall School District Governing Board will be responsible for adopting the Newhall School District Natural Hazard Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazards. Once the plan has been adopted, the Assistant Superintendent of Business Services or the District Superintendent will be responsible for submitting it to the State Hazard Mitigation Officer at The Governor's Office of Emergency Services and the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the Newhall School District will gain eligibility for Hazard Mitigation Grant Program funds.

Coordinating Body

The Newhall School District Hazard Mitigation Planning Committee will be responsible for coordinating implementation of plan action items and undertaking the formal review process.

The Hazard Mitigation Planning Committee will meet no less than quarterly. Meeting dates will be scheduled once the final Hazard Mitigation Planning 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 Newhall School District Governing Board will adopt the Newhall School District Natural Hazard Mitigation Plan, and the Hazard Mitigation Planning Committee will take responsibility for plan implementation. The Assistant Superintendent of Business Services will serve as a convener to facilitate the Hazard Mitigation Planning 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 Planning Committee Members.

Implementation through Existing Programs

Newhall School District addresses statewide planning goals and legislative requirements through the City of Santa Clarita's Plan, Department of State Architects, 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 Newhall School District will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

The Newhall School District Maintenance & Operations Department is responsible for administering the Building & Safety Codes. In addition, the Maintenance & Operations Department will work with other agencies at the state level to review, develop and ensure Building & Safety Codes that are adequate to mitigate or present damage by natural hazards. This is to ensure that life-safety criteria are met for new construction.

Within six months of formal adoption of the mitigation plan, the recommendations listed above will be incorporated into the process of existing planning mechanisms throughout the District. The meetings of the Hazard Mitigation Planning Committee will provide an opportunity for committee members to report back on the progress made on the integration of mitigation planning elements, 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 Planning Committee may use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action items. For other projects and funding sources, the Hazard Mitigation Planning Committee will use other approaches to understand the costs and benefits of each action item and develop a prioritized list.

Evaluating and Updating the Plan

Formal Review Process

The Newhall School District Natural Hazard Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The evaluation process includes a firm schedule and time line, and identifies the local agencies and organizations participating in plan evaluation. The convener or designee will be responsible for contacting the Hazard Mitigation Planning 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 valley, 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 Committee members. Every five years the updated plan will be submitted to the State Hazard Mitigation Officer and the Federal Emergency Management Agency for review.

Continued Public Involvement

The Newhall School District is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. The Hazard Mitigation Planning 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 kept at the District Office. In addition, copies of the plan and any proposed changes will be posted on the District 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 Planning Committee. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan.

SECTION 6: EARTHQUAKES

Why Are Earthquakes a Threat to the Newhall School District?

The most recent significant earthquake event affecting Southern California was the January 17th 1994 Northridge Earthquake. At 4:31 A.M. on Monday, January 17, a strong and very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley, just about 7 miles south of us. 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, which connect us to the San Fernando Valley, created commuter havoc on the freeway systems. Extensive damage was caused by ground shaking, but the 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."[1]

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.

To better understand the earthquake hazard, the scientific community has looked at historical records and accelerated research on those faults that are the sources of the earthquakes occurring in the Southern California region. Historical earthquake records can generally be divided into records of the pre-instrumental period and the instrumental period. In the absence of instrumentation, the detection of earthquakes is based on observations and felt reports, and is 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 the 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.

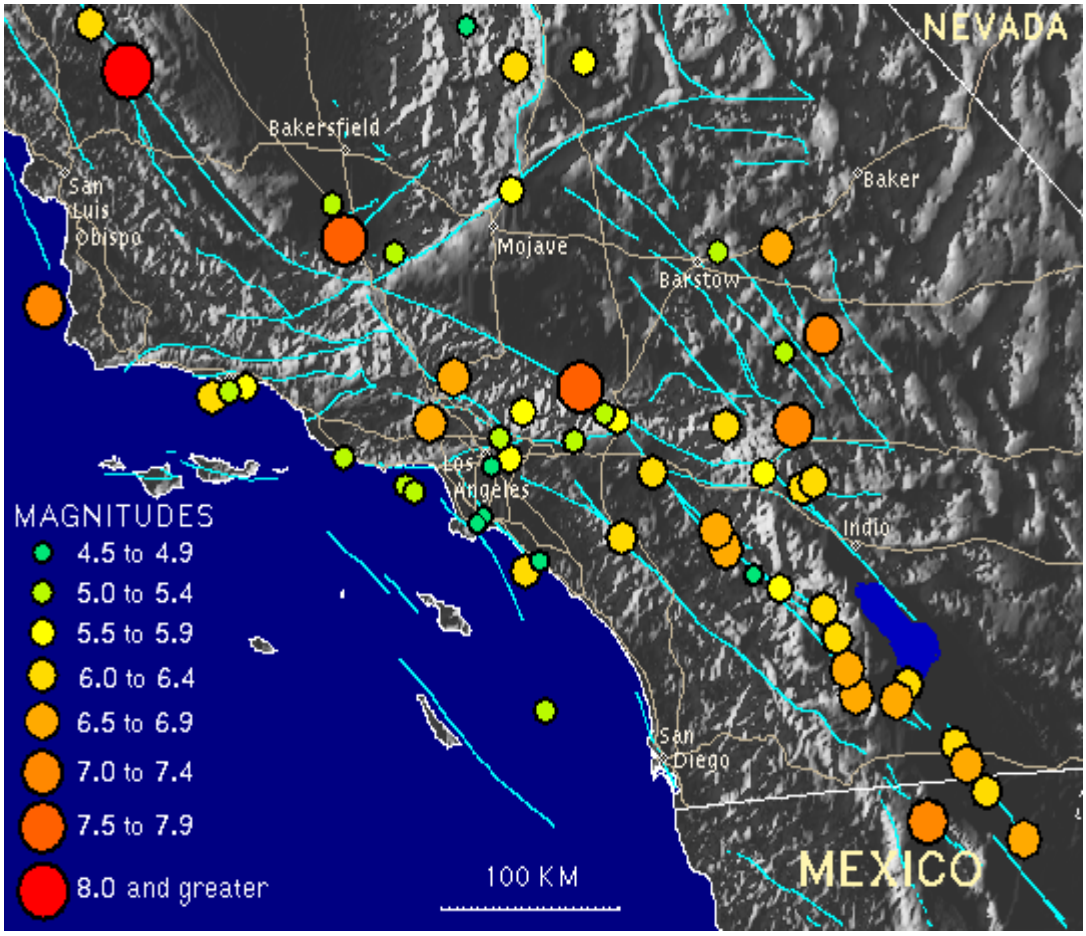
Table 6-1 of Earthquake Events in the Southern California Region

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

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 6-1 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 between 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.

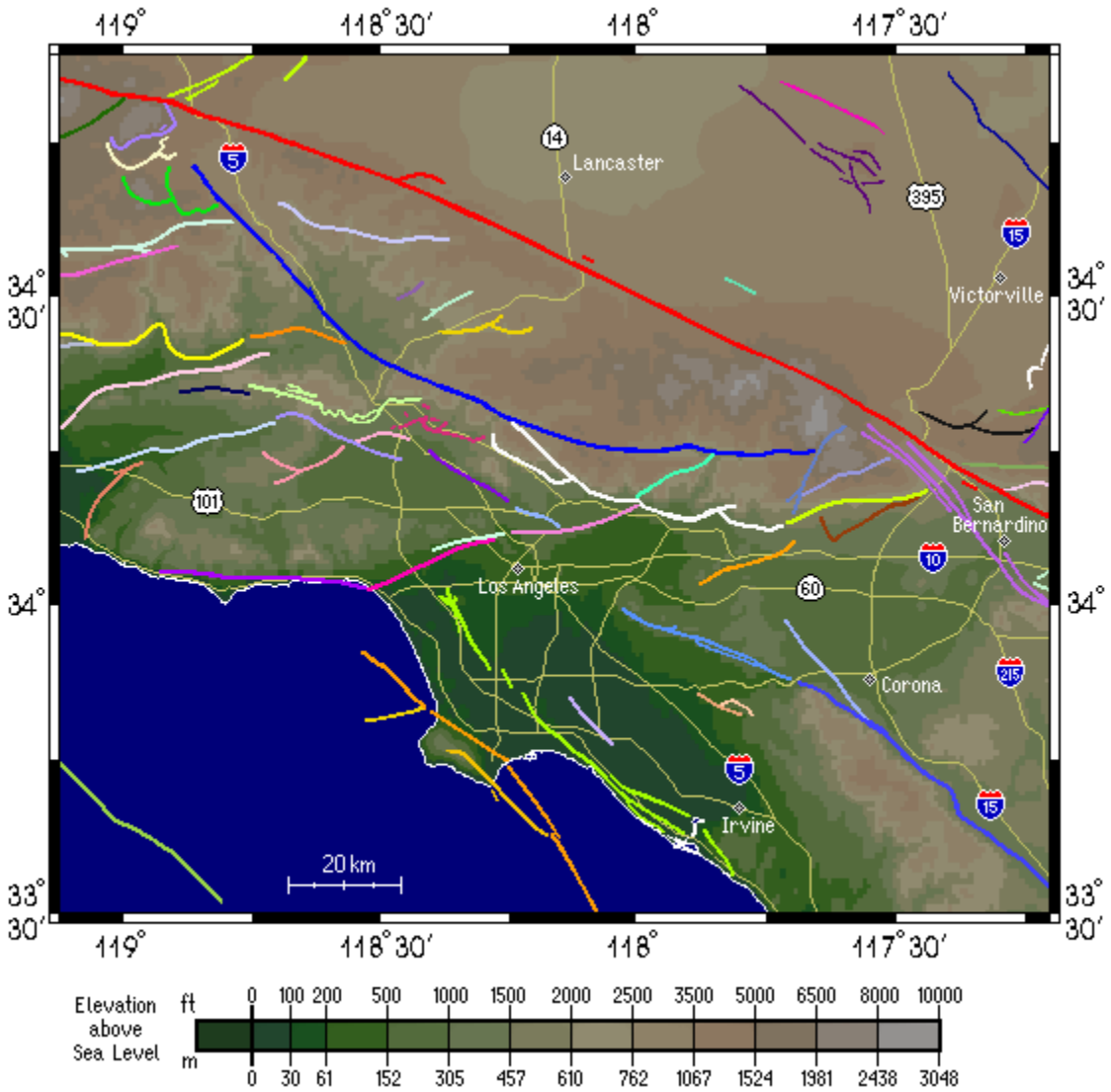
Dip-Slip

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.

Oblique-Slip Fault

Oblique-slip faulting suggests both dip-slip faulting and strike-slip faulting. It is caused by a combination of shearing and tension of compress ional forces.

Faults of Southern California



SAN ANDREAS FAULT ZONE

TYPE OF FAULT: right-lateral strike-slip
LENGTH: 1200 km
550 km south from Parkfield; 650km northward
NEARBY COMMUNITY: Parkfield, Frazier Park, Palmdale, Wrightwood, San Bernardino, Banning, Indio
LAST MAJOR RUPTURE: January 9, 1857 (Mojave segment); April 18, 1906 (Northern segment)
SLIP RATE: about 20 to 35 mm per year
INTERVAL BETWEEN MAJOR RUPTURES: average of about 140 years on the Mojave segment;
recurrence interval varies greatly -- from under 20 years (at Parkfield only) to over 300 years
PROBABLE MAGNITUDES: M_W6.8 - 8.0

San Andreas Fault Zone -- San Gorgonio Pass Area:

The San Gorgonio Pass area is fairly complex, geologically speaking. Here the San Andreas fault interacts with other faults (most notably the San Jacinto fault zone and the Pinto Mountain fault) and thereby becomes somewhat fractured, over the distance extending from just north of San Bernardino to just north of Indio, some 110 kilometers (70 miles). Because this deformation has been going on for well over a million years, ancient and inactive strands of the San Andreas fault can be found here. Other faults in this area are have been "reawakened" recently after being dormant for hundreds of thousands of years. There is even evidence to suggest that there is no active, continuous main trace of the San Andreas fault going all the way through the pass, not even at depth -- implying that the San Andreas fault may currently be in the process of creating a new fault path through this area! This could also mean that a single, continuous rupture from Cajon Pass to the Salton Sea (a stretch of the San Andreas that has not ruptured in historical times) is unlikely to occur. Fault rupture mechanics are still not well understood, however, and the discontinuity could prove to have little effect on tempering a major earthquake on this southern stretch of the San Andreas fault zone.

HOLSER FAULT

TYPE OF FAULT: reverse
LENGTH: 20 km
NEAREST COMMUNITIES: Castaic, Val Verde Park, Piru
MOST RECENT SURFACE RUPTURE: Late Quaternary
SLIP RATE: 0.4 mm/yr
OTHER NOTES: Dip is to the south.

SAN GABRIEL FAULT ZONE

TYPE OF FAULTING: primarily right-lateral strike-slip
LENGTH: roughly 140 km
NEARBY COMMUNITIES: Castaic, Saugus, Sunland
MOST RECENT SURFACE RUPTURE: Late Quaternary west of intersection with the Sierra Madre fault zone; Quaternary east of that intersection; Holocene only between Saugus and Castaic
SLIP RATE: 1 mm/yr to 5 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown
OTHER NOTES: Slip rate and recurrance interval probably vary significantly along the length of the San Gabriel fault zone. The western half is probably much more active than the eastern half. Dip is generally steep and to the north.

SOLEDAD FAULT

TYPE OF FAULTING: left-lateral normal
LENGTH: 20 km
NEARBY COMMUNITIES: Acton, Soledad Canyon
MOST RECENT SURFACE RUPTURE: Quaternary
OTHER NOTES: Dips to the north.

MINT CANYON FAULT

TYPE OF FAULT: left-lateral
LENGTH: 10 km
NEARBY COMMUNITIES: Sleepy Valley, Agua Dulce
MOST RECENT SURFACE RUPTURE: Quaternary
OTHER NOTES: The dip of the Mint Canyon fault is essentially vertical.

CLEARWATER FAULT

TYPE OF FAULT: reverse
LENGTH: 32 km
NEARBY COMMUNITIES: Lake Hughes, Leona Valley
MOST RECENT SURFACE RUPTURE: Late Quaternary
OTHER NOTES: This dip of this fault varies from steeply north-dipping to vertical

SANTA SUSANA FAULT ZONE

TYPE OF FAULTING: thrust
LENGTH: 38 km
NEARBY COMMUNITIES: Piru, Sylmar, San Fernando
MOST RECENT SURFACE RUPTURE: Late Quaternary, except for a short segment which ruptured slightly during the 1971 San Fernando earthquake
SLIP RATE: between 5 and 7 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: uncertain
PROBABLE MAGNITUDES: M_W6.5 - 7.3
OTHER NOTES: The faults in this complex zone primarily dip to the north.

SAN FERNANDO FAULT ZONE

TYPE OF FAULTING: thrust
LENGTH: 17 km
NEAREST COMMUNITIES: San Fernando, Sunland
LAST MAJOR RUPTURE: February 9, 1971, M_w6.6
SLIP RATE: 5 mm/yr (?)
INTERVAL BETWEEN MAJOR RUPTURES: roughly 200 years

PROBABLE MAGNITUDES: M_W6.0 - 6.8
OTHER NOTES: Dip is to the north. The slip rate is not well known, but trenching studies indicate recurrance interval as between 100 and 300 years.

MISSION HILLS FAULT

TYPE OF FAULT: reverse
LENGTH: 10 km
NEARBY COMMUNITIES: Pacoima, Mission Hills, Granada Hills
MOST RECENT SURFACE RUPTURE: Late Quaternary, possibly Holocene
SLIP RATE: less than 0.5 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown

NORTHRIDGE HILLS FAULT

TYPE OF FAULTING: reverse
LENGTH: 25 km
NEARBY COMMUNITIES: Sepulveda, Northridge, Chatsworth
MOST RECENT SURFACE RUPTURE:Late Quaternary
OTHER NOTES: Dip is probably to the north. This is **not** the fault on which the 1994 Northridge earthquake occurred. That was a south-dipping blind thrust fault, cut off at a depth of roughly 6 km by the Santa Susana fault zone, and probably connected at depth with the Oak Ridge fault.

VERDUGO FAULT

TYPE OF FAULTING: reverse
LENGTH: 21 km
NEARBY COMMUNITIES: Sun Valley, Burbank, Glendale
MOST RECENT RUPTURE: Holocene; Late Quaternary along northern segment
SLIP RATE: roughly 0.5 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown
PROBABLE MAGNITUDES: M_W6.0 - 6.8
OTHER NOTES: Dips to the northeast.

SIMI FAULT

TYPE OF FAULTING: reverse
LENGTH: 40 km
NEARBY COMMUNITIES: Santa Susana, Simi Valley, Moorpark, Camarillo
MOST RECENT SURFACE RUPTURE: Holocene
OTHER NOTES: This fault dips to the north.

Paleoseismic investigation of the Simi fault at Arroyo Simi, Simi Valley, Ventura County, California (off-site)

BIG MOUNTAIN FAULT

TYPE OF FAULT: reverse - ANIMATION
LENGTH: 12 km
NEAREST COMMUNITIES: Fillmore, Simi Valley
MOST RECENT RUPTURE: Early Quaternary

OAK RIDGE FAULT

TYPE OF FAULTING: thrust
LENGTH: 90 km
NEAREST COMMUNITIES: Santa Paula, Fillmore, Saticoy, Ventura
MOST RECENT MAJOR RUPTURE: Holocene, in part; mainly Late Quaternary
SLIP RATE: between 3.5 and 6 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown
PROBABLE MAGNITUDES: M_W6.5 - 7.5
OTHER NOTES: This fault dips to the south, at a fairly shallow (less than 45 degrees) angle. Thus, epicenters of earthquakes on this (and any other thrust) fault may appear far removed from the surface trace.

The surface trace of the Oak Ridge thrust is fairly easy to find on just about any map of the area you might have -- it forms a ridge (hence its name) to the south of its trace, and is roughly paralleled by both the Santa Clara River and California State Highway 126, from the town of Piru to the coast, just southeast of Ventura. The Oak Ridge thrust continues off shore, out to a point about 20 kilometers due south of Santa Barbara.

SAN CAYETANO FAULT

TYPE OF FAULT: thrust
LENGTH: about 45 km
NEARBY COMMUNITIES: Piru, Fillmore, Sulphur Springs, Ojai
LAST KNOWN SURFACE RUPTURE: less than 5,000 years ago
SLIP RATE: between 1.3 and 9 mm/yr, depending on location
INTERVAL BETWEEN MAJOR RUPTURES: uncertain
PROBABLE MAGNITUDES: M_W6.5 - 7.3
OTHER NOTES: Dip is to the north.

LION CANYON FAULT

TYPE OF FAULT: reverse - ANIMATION
LENGTH: 15 km
NEAREST COMMUNITIES: Ojai, Sulphur Springs, Oak View
MOST RECENT SURFACE RUPTURE: Lake Quaternary
OTHER NOTES: This is a south-dipping fault.

The Lion Canyon fault may act (or once have acted) as a link between the Arroyo Parida fault zone and the San Cayetano fault. A zone of short (about 3 km), Holocene-age reverse faults are situated just southwest of the western end of the Lion Canyon fault, along Highway 33, just north of the town of Oak View (they are not shown on the map). Among these faults are the **Devil's Gulch fault**, **La Vista fault**, **Villanova fault**, and the **Oak View fault**. They make up the **Oak View fault zone**.

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.

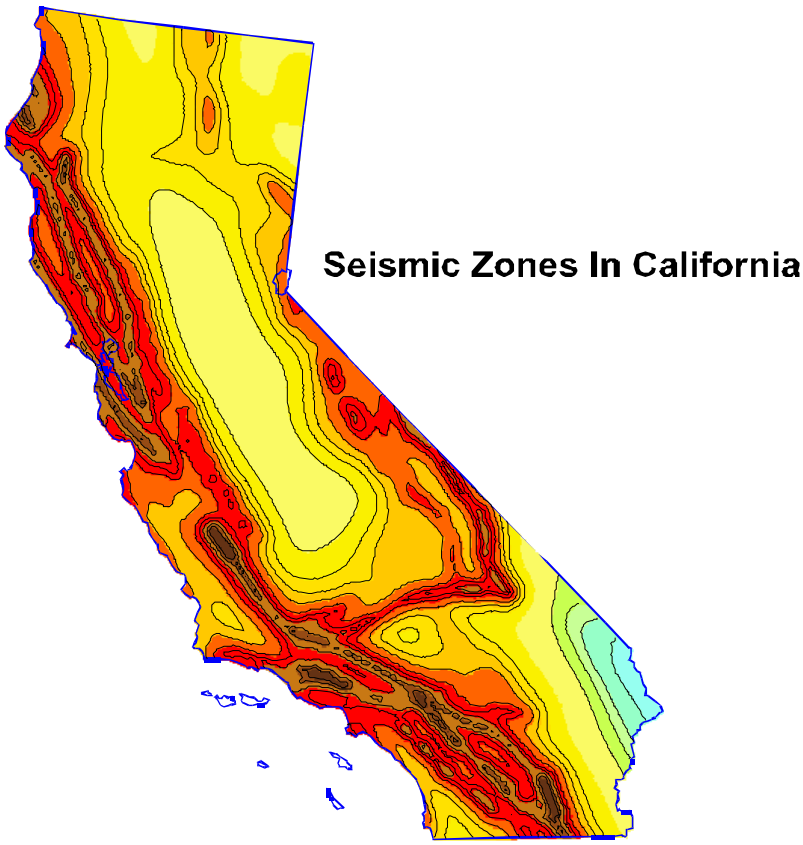
Liquefaction

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

Figure xx-x: Seismic Zones in California



Darker Shaded Areas indicate Greater Potential Shaking

Source: USGS Website

Earthquake Hazard Assessment

Hazard Identification:

In California, many agencies are focused on seismic safety issues: the State's Seismic Safety Commission, the Applied Technology Council, Governor's Office of Emergency Services, United States Geological Survey, 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.

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.

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

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. 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. 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.

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
Dams hold billions of gallons of water in reservoirs. Seismic activity can compromise the dam structures, and the resultant flooding could cause catastrophic flooding.
In the Santa Clarita Valley area, there are two Dams, the Castaic Lake Dam, and the Bouquet Reservoir Dam. These dams pose very little threat to the Newhall School District as they are located on the other side of the Santa Clara River.

Stevenson Ranch Dam (Debris Basin)

The purpose of this dam is to protect downstream residents and developments by collecting the mud and debris that flows from the canyon while allowing the stormwater to safely pass over the spillway and into the flood control channel. In engineering the debris dam, consideration was made for the fact that water may be periodically held in the dam following extreme events, such as heavy rains. The dam is designed to perform safely with the reservoir full even if a large earthquake were to occur. The State Office of Emergency Services does not require an emergency action plan for dams, such as the Stevenson Ranch Dam, that are identified as debris basins by the Division of Safety of Dams.
(letter from Brian T. Sasaki, Deputy Director L.A.Co. DPW)

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 Santa Clarita, 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.

Infrastructure and Communication
Residents in the Santa Clarita Valley, 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 Santa Clarita area 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.

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.

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.

Individual Preparedness
Because the potential for earthquake occurrences and earthquake related property damage is relatively high in the Santa Clarita area, 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.

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.

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."

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. In 1999 the Legislature passed AB300, requiring a seismic safety survey of concrete school buildings built prior to 1976. The Newhall School District has two school sites that qualify for seismic retrofits. One site was completed in August, 2004, the other site will be complete in the summer of 2006. Table 6.2 provides a sampling of some of the 200 plus laws in the State's codes.

Table 6-2: 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 the Newhall School District can undertake to reduce risk and prevent loss from earthquake events. Each action item is followed by ideas for implementation, which can be used by the planning committee and District Administration in pursuing strategies for implementation.

E#l: Integrate new earthquake hazard mapping data for the Santa Clarita Valley and improve technical analysis of earthquake hazards.

Ideas for Implementation:

1. Update earthquake HAZUS data using more localized data including the building inventory to improve accuracy of the vulnerability assessment for the Newhall School District; and
2. 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: Hazard Mitigation Planning Committee, City of Santa Clarita, FEMA
Timeline: 2 years
Plan Goals Addressed: Partnerships and Implementation, Protect Life and Property, Emergency Services

E#2: Earthquake retrofit for Newhall Elementary School per 1999 AB300.

Ideas for Implementation:

1. Explore sources for funding (loans, grants, etc.)

Coordinating Organization: Hazard Mitigation Planning Committee
Timeline: 2 years
Plan Goals Addressed: Protect Life and Property

E#3: Continue to conduct District wide disaster and earthquake drills to educate staff, students, and parents on District emergency procedures.

Ideas for Implementation:
1. Encourage parents/public to read our evacuation and child pick up procedures that are in the student packets.
2. Encourage parents/public to visit one of our sites to observe a disaster drill.

Coordinating Organization: Hazard Mitigation Planning Committee
Timeline: ongoing
Plan Goals Addressed: Emergency Services, Public Awareness, Protect Life and Property

Earthquake Resource Directory

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.

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 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 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.

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.

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.

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.

SECTION 7: EARTH MOVEMENT

Why are Landslides a Threat to the Santa Clarita Valley?

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

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

History of Landslide Events and Impacts

1928 St. Francis Dam failure
Construction began on the on the 600-foot-long, 185-foot-high St. Francis Dam in August 1924, and the dam was completed in May of 1926. With a 12.5 billion-gallon capacity, the reservoir began to fill with water on March 1, 1926. On March 12, 1928, the dam failed, sending a 180-foot-high wall of water crashing down San Francisquito Canyon. An estimated 470 people were dead by the time the floodwaters reached the Pacific Ocean south of Ventura 5 1/2 hours later.
The torrent did not discriminate among homes, cars, giant oak trees or anything else that stood in the way. It was the second-worst disaster in California history, after the great San Francisco earthquake and fire of 1906, in terms of lives lost. Damages were estimated at $672.1 million (year 2000 dollars).

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

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

Landslide Conditions

Landslide
A landslide is the movement of a mass of rock, debris, or earth down a slope. Landslides are a type of “mass wasting” which denotes any down slope movement of soil and rock under the direct influence of gravity. The term “landslide” encompasses events such as rock falls, topples, slides, spreads, and flows. Landslides can be initiated by rainfall, earthquakes, volcanic activity, changes in groundwater, disturbance and change of a slope by man-made construction activities, or any combination of these factors.

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

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

“Failure of a slope occurs when the force that is pulling the slope downward (gravity) exceeds the strength of the earth materials that compose the slope. They can move slowly, (millimeters per year) or can move quickly and disastrously, as is the case with debris-flows. Debris-flows can travel down a hillside of speeds up to 200 miles per hour (more commonly, 30 – 50 miles per hour), depending on the slope angle, water content, and type of earth and debris in the flow. These flows are initiated by heavy, usually sustained, periods

of rainfall, but sometimes can happen as a result of short bursts of concentrated rainfall in susceptible areas. Burned areas charred by wildfires are particularly susceptible to debris flows, given certain soil characteristics and slope conditions."

Debris Flow/Mud Flow

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

Sink Hole

Sinkholes are formed when rain dissolves underground limestone or when surface materials collapse into underlying cavities in the rock. Abrupt collapse-type sinkholes have become more common over the past twenty-five years, primarily due to activities of humans such as withdrawal of groundwater, diversion of surface water, or construction of ponds.

Sinkholes come in all sizes. They are unpredictable, but they all develop in basically the same way. As rainwater seeps into the ground, acid in the water dissolves the thick layers of underground limestone that underlie the entire state. This creates big, empty underground holes or gaps. If the layers of sand and dirt which sit on top of the limestone fall into these holes and gaps, the result is a sinkhole.

Factors which may contribute to sinkhole development include (as identified by sink hole website at http://www.sinkholelawyer.com):

- Large changes in the water table caused by too much to too little rain
- Drilling a well into the cavity
- Constructing buildings above the cavity
- Diverting drainage to the areas where a cavity exists

Liquefaction

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

Liquefaction occurs in saturated soils, that is, soils in which the space between individual particles is completely filled with water. This water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together. Prior to an earthquake, the water pressure is relatively low. However,

earthquake shaking can cause the water pressure to increase to the point where the soil particles can readily move with respect to each other.

Earthquake shaking often triggers this increase in water pressure, but construction related activities such as blasting can also cause an increase in water pressure. When liquefaction occurs, the strength of the soil decreases and, the ability of a soil deposit to support foundations for buildings and bridges is reduced. (As defined in University of Washington website at http://www.ce.washington.edu/~liquefaction/html/what/what1.html).

Landslide Events and Impacts

Landslides are a common hazard in California. Weathering and the decomposition of geologic materials produces conditions conducive to landslides and human activity further exacerbates many landslide problems. Many landslides are difficult to mitigate, particularly in areas of large historic movement with weak underlying geologic materials. As communities continue to modify the terrain and influence natural processes, it is important to be aware of the physical properties of the underlying soils as they, along with climate, create landslide hazards. Even with proper planning, landslides will continue to threaten the safety of people, property, and infrastructure, but without proper planning, landslide hazards will be even more common and more destructive. The increasing scarcity of build-able land, particularly in urban areas, increases the tendency to build on geologically marginal land. Additionally, hillside housing developments in Southern California are prized for the view lots that they provide.

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

Earth flows are plastic or liquid movements in which land mass (e.g. soil and rock) breaks up and flows during movement. Earthquakes often trigger flows.[9] Debris flows normally occur when a landslide moves downslope as a semi-fluid mass scouring, or partially scouring soils from the slope along its path. Flows are typically rapidly moving and also tend to increase in volume as they scour out the channel. Flows often occur during heavy rainfall, can occur on gentle slopes, and can move rapidly for large distances.

Landslides are often triggered by periods of heavy rainfall. Earthquakes, subterranean water flow and excavations may also trigger landslides. Certain

geologic formations are more susceptible to landslides than others. Human activities, including locating development near steep slopes, can increase susceptibility to landslide events. Landslides on steep slopes are more dangerous because movements can be rapid.

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

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

Natural Conditions

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

Particularly Hazardous Landslide Areas

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

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

Impacts of Development

Although landslides are a natural occurrence, human impacts can substantially affect the potential for landslide failures in the Santa Clarita Valley. Proper planning and geotechnical engineering can be exercised to reduce the threat of safety of people, property, and infrastructure.

Excavation and Grading

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

Drainage and Groundwater Alterations

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

Changes in Vegetation

Removing vegetation from very steep slopes can increase landslide hazards. Areas that experience wildfire and land clearing for development may have long periods of increased landslide hazard. Also, certain types of ground cover have a much greater need for constant watering to remain green. Changing away from native ground cover plants may increase the risk of landslide.

Landslide Hazard Assessment

Hazard Identification

Identifying hazardous locations is an essential step towards implementing more informed mitigation activities. The City of Santa Clarita has reviewed and analyzed the slide or potential slide areas in the City and has mapped those areas as either earthquake-induced landslide hazard zones or liquefaction hazard zones.

The Santa Clarita planning area consists of steep slopes and eroded hillsides of clays and shales. Shales are extremely susceptible to pervasive fracturing which weaken slopes. These slopes are apt to fail if disturbed by heavy rains or grading. Potential landslide areas have been identified. Clays become slippery when wet and are likely to slide against underlying rock if water enters a slope. Moreover, clays are considered expansive soils. When saturated, expansive soils lose all cohesiveness and fail. Damage from expansive soils can be hastened by landscape irrigation or long-term rainfall. Landslides caused by heavy rains and irrigation pose a danger to development on hillsides. The National Flood Insurance Program defines rain-induced failures along a continuum, beginning with clear water and mud floods and progressing into mud flows and debris flows. (Sourced from One Valley One Vision joint City/County General Plan)

Landslides are often associated with earthquakes though there are other factors that may influence the occurrence of landslides. These factors include the slope, the moisture content of the soil, and the composition of the soils and subsurface geology. In addition to an earthquake, heavy rain or the improper grading of a construction site may trigger a landslide. Much of the land area within the Planning Area consists of mountainous or hilly terrain. As a result, there are a number of areas in portions of the Planning Area where landslides and/or unstable soils are present. According to the State Department of Mines and Geology (CDMG), landslides represent a significant geologic constraint to development in portions of the Santa Clarita Valley. The CDMG has compiled extensive data regarding potential landslide hazards in the Santa Clarita Valley based on soil types and underlying formations. Development in these areas would be subject to both County and City ordinances to minimize landslide hazards, as discussed below.

The Planning Area consists of steep slopes and eroded hillsides of clays and shales. Shales are extremely susceptible to pervasive fracturing which weaken slopes. These slopes are apt to fail if disturbed by heavy rains or grading. Clays become slippery when wet and are likely to slide against underlying rock if water enters a slope. Moreover, clays are considered expansive soils. When saturated, expansive soils lose all cohesiveness and fail. Damage from expansive soils can be hastened by landscape irrigation or long-term rainfall.

Vulnerability and Risk

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

The City of Santa Clarita's Transportation and Engineering Services Department requires applicants who wish to grade any property for land development purposes to submit a geotechnical study to determine the suitability of existing terrain and proposed modifications so that the stability of slopes will be assured. The City's Planning and Building Services Department uses a 10% or greater threshold to identify areas for specific "hillside reviews," during which the Transportation and Engineering Services Department would also require professionally prepared geotechnical reports to identify potentially unstable hill slopes and specify remediation or relocation of development.

While a quantitative vulnerability assessment (an assessment that describes number of lives or amount of property exposed to the hazard) has not yet been conducted for City of Santa Clarita landslide events, there are many qualitative factors that point to potential vulnerability. Landslides can impact major transportation arteries, blocking residents from essential services and businesses.

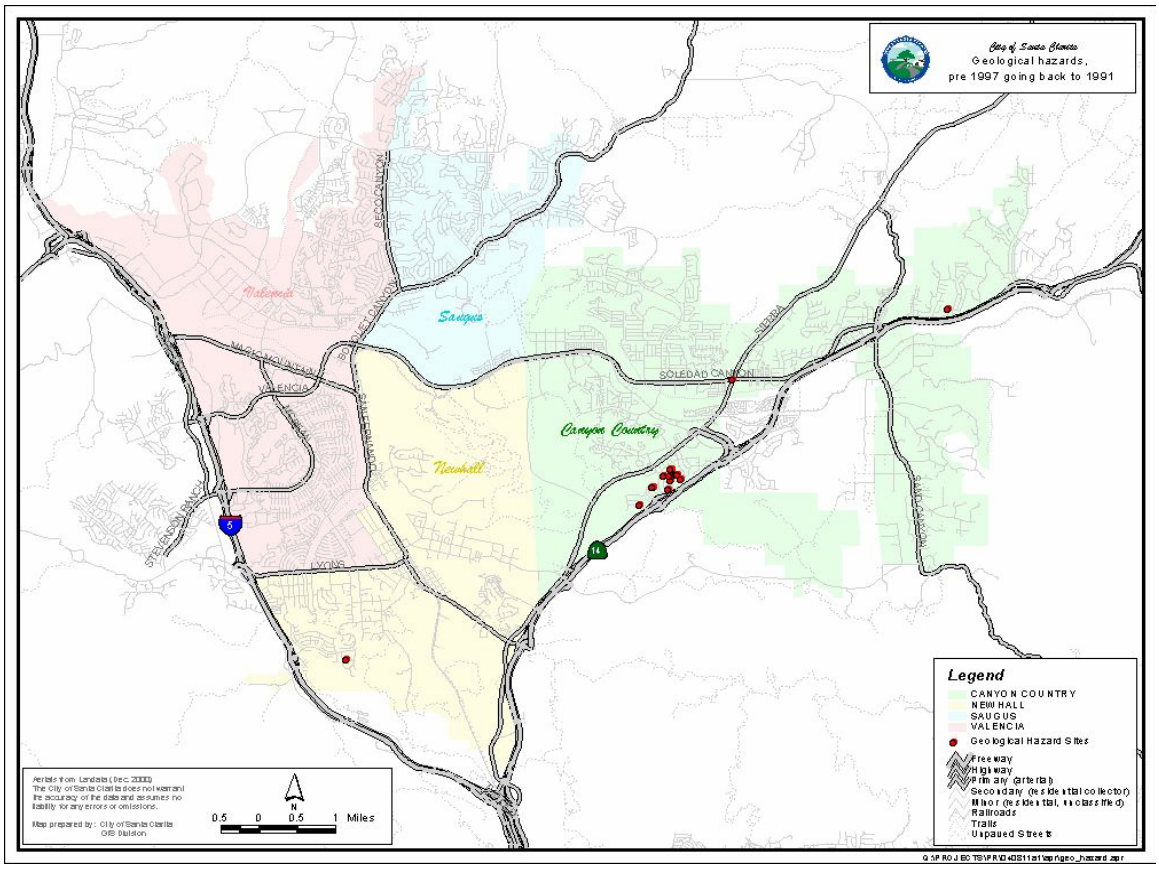
Past landslide events have caused property damage or impacted Valley residents, and mapping city landslide and debris flow areas will help in preventing future loss.

Events, pre 1997 going back to 1991, that have occurred in the Santa Clarita Valley, include the following: (note that the cause of each occurrence varies)

• Goldstream	Rear hill slope failure and V-ditch washing out
• Oat Flat Ct., Area	Slope failure, retaining wall put in place with out proper footing.
• Abdale	Vacant lot, slope failures from
• Green Mountain	V-ditches blocked and some surface slope failures
• Larkhaven	Slide area from the 1960s

• Fairgate	Surface slope failure. Very large hole dug behind hou on slope, filled and small retaining wall done without engineering, permits or inspections. Slope failure problem, earth movement with v-ditch at top destroyed.
• Beach Grove	Slope failure
• Maple Bay	Slope failure
• Bougainvillea Way	Large bolder and surface slide behind house.
• Rosemont Drive	V-ditch unclean causing overflow on to rear up slope of homes because all down drain are full of rock and silt.
• Point Arena, Fairgate	Rear property V-ditch falling apart
• Bella Ct.	Lot sinking and movement, house not being lived in. Vacant two years.

See mapping of locations on Geological Hazards Map in Figure 1.



Factors included in assessing landslide risk include population and property distribution in the hazard area, the frequency of landslide or debris flow occurrences, slope steepness, soil characteristics, and precipitation intensity. This type of analysis could generate estimates of the damages to the valley due to a specific landslide or debris flow event. At the time of publication of this plan, data was insufficient to conduct a risk analysis.

Community Landslide Issues

Landslides can affect utility services, transportation systems, and critical lifelines. Communities may suffer immediate damages and loss of service. Disruption of infrastructure, roads, and critical facilities may also have a long-term effect on the economy. Utilities, including potable water, wastewater, telecommunications, natural gas, and electric power are all essential to service community needs. Loss of electricity has the most widespread impact on other utilities and on the whole community. Natural gas pipes may also be at risk of breakage from landslide movements as small as an inch or two.

Landslide Mitigation Activities

Landslide mitigation activities include current mitigation programs and activities that are being implemented by local or city organizations.

Landslide Mitigation Action Items

The landslide mitigation action items provide direction on specific activities that the county, city, organizations, and residents in the Santa Clarita Valley can undertake to reduce risk and prevent loss from landslide events. Each action item is followed by ideas for implementation, which can be used by the planning committee and local decision makers in pursuing strategies for implementation.

EM#1: Increase knowledge of landslide hazard areas and understanding of vulnerability and risk to life and property in hazard-prone areas.

Ideas for Implementation:

1. Develop public information to emphasize risks when building on potential or historical landslide areas.
2. Continue to map new earth movement hazards and make information available to staff, developers, and residents so that soil types, slope percentage, drainage, or other critical factors are used to identify landslide prone areas.
3. Encourage design and placement of utilities outside of landslide areas to decrease the risk of service disruption.

Coordinating Organization: Planning Committee,City of Santa Clarita,
Developers, Homeowners,
Water and Utility Agencies.

Timeline: Ongoing

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

EM#2: Continue in the participation of programs.

Ideas for Implementation:

1. Continue the participation in the National Flood Insurance Program (NFIP).
2. Continue in the participation of the Community Rating System (CRS). This program consists of additional "activities" which are all defined by FEMA and have points associated with each activity.

Coordinating Organization: Planning Committee,City of Santa Clarita,
Developers, Homeowners, FEMA

Timeline: Ongoing

Plan Goals Addressed: Protect Life and Property, Natural Systems, Emergency Services

EM#3: Review, monitor, and update codes, regulations, and local ordinances.

Ideas for Implementation:

1. Study ordinances including Zoning, Grading, Hillside, Subdivision, etc. and make recommendations to mitigate landslide prone areas.
2. Review and enforce building codes for construction standards, including minimum foundation requirements, in landslide prone areas.
3. Review drainage control regulations to control drainage, and reduce the risk of landslides resulting from saturated soils.

Coordinating Organization: Planning Committee, City of Santa Clarita, Los Angeles County, State of California, Building and Industry Association (BIA)
Timeline: Ongoing
Plan Goals Addressed: Protect Life and Property, Public Awareness

Landslide Resource Directory

County Resources
Los Angeles County Department of Public Works

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

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

SECTION 8: FLOOD

When rivers overflow their banks, or flood, they can cause damage to property and crops. Floods are common and costly natural disasters. In the United States, the average annual cost of flood damage is more than $2 billion. Each year about 100 people lose their lives to floods.

Floods usually are local, short-lived events that can happen suddenly, sometimes with little or no warning. They usually are caused by intense storms that produce more runoff than an area can store or a stream can carry within its normal channel. Rivers can also flood when dams fail, when ice jams or landslides temporarily block a channel, or when snow melts rapidly. In a broader sense, normally dry lands can be flooded by high lake levels, by high tides, or by waves driven ashore by strong winds. Small streams, particularly in the Southwest, are subject to flash floods (very rapid increases in runoff), which may last from a few minutes to a few hours. On larger streams, floods usually last from several hours to a few days. A series of storms might keep a river above flood stage (the water level at which a river overflows its banks) for several weeks.

Floods can occur at any time, but weather patterns have a strong influence on when and where floods happen. Cyclones, or storms that bring moisture inland from the ocean, can cause floods in the winter and early spring in the western United States. Thunderstorms are relatively small but intense storms that can cause flash floods in smaller streams in late summer and fall in the Southwest.

Southern California has experienced very heavy rains during an El Nino condition. The part of an El Nino condition that impacted southern California is referred to as the Southern Oscillation that is an irregular "see-saw" in which atmospheric pressure and wind patterns shift across the Pacific. When normally high pressure in the eastern Pacific decreases and normally low pressure over Australia and northern Indonesia rises, conditions are right for an El Nino event to develop.

As warm water shifts eastward, so do the convection and heavy rains caused by the increased buoyancy of air warmed by the underlying water. As warm water piles up in the east, upwelling of cold, nutrient-rich water is inhibited. Latent heat of condensation further warms the air, further decreases atmospheric pressure in the east. The thunderstorms that have shifted from the western to the central and eastern Pacific disrupt high-level jet stream circulation by pumping warm air and moisture high into the atmosphere.

California is impacted as the El Nino storm track affects the location of jet streams, which are a major factor in producing winter weather patterns at mid-latitudes. Instead of coming ashore in the Pacific Northwest as usual, the

southern jet stream hits California, carrying moisture and storms. In general, the effect of El Nino on Southern California is increased rainfall with accompanying floods, landslides, and coastal erosion.

The Santa Clara River is the largest river system in southern California that remains in a relatively natural state. The river originates in the northern slopes of the San Gabriel Mountains in north Los Angeles County, traverses in a westerly direction into Ventura County, and discharges into the Pacific Ocean near the City of Ventura. The river runs approximately 100 miles from its headwaters near Acton, California, to its outlet, and drains an area of approximately 1,600 square miles.

For ease of reference, the portion of the river within Los Angeles County is generally referred to as Upper Santa Clara River, and the portion within Ventura County is generally referred to as Lower Santa Clara River. The Upper Santa Clara River watershed consists of approximately 680 square miles of mostly natural land with some mixed use developed areas. Much of the development concentrates in or near the City of Santa Clarita, the lone incorporated city in the Upper Santa Clara River watershed.

Some of the major tributaries in the Upper Santa Clara River watershed include Castaic Creek, San Francisquito Canyon, Bouquet Canyon, Sand Canyon, Mint Canyon, and Santa Clara River South Fork.

History of Flooding in the Santa Clarita Valley

1928 St. Francis Dam failure

Construction began on the on the 600-foot-long, 185-foot-high St. Francis Dam in August 1924. With a 12.5 billion-gallon capacity, the reservoir began to fill with water on March 1, 1926. On March 12, 1928, the dam failed, sending a 180-foot-high wall of water crashing down San Francisquito Canyon, washing out the original Santa Clara River Bridge and parts of Piru, Fillmore, Santa Paula, Montalvo, Saticoy, and Ventura. An estimated 470 people were dead by the time the floodwaters reached the Pacific Ocean south of Ventura 5 1/2 hours later. It was the second-worst disaster in California history, after the great San Francisco earthquake and fire of 1906, in terms of lives lost. Damages were estimated at $672.1 million (year 2000 dollars). This event pre-dates Santa Clarita cityhood.

1983 El Nino

In January and February of 1983, the Sand Canyon Road Bridge was washed out by El Nino floods. This event pre-dates Santa Clarita cityhood.

1992 Winter Storms

The winter storms in February of 1992 resulted in flooding, rainstorms, and mud slides in the Santa Clarita Valley. FEMA declared parts of Los Angeles County a disaster area on February 12, 1992. (FEMA 935-DR-CA)

1992 Late Winter Storms

In December of 1992, rain and high winds resulted in FEMA declaring Los Angeles County a disaster area on February 19, 1993. (FEMA 979-DR-CA)

1995 Severe Winter Storms

In January of 1995, severe winter storms resulted in FEMA declaring Los Angeles County a disaster area on January 6, 1995. (FEMA 1044-DR-CA)

1995 Late Winter Storms

In February of 1995, late winter storms resulted in FEMA declaring Los Angeles County a disaster area.

1998 El Nino

In February of 1998, the El Nino condition resulted in a Federal declaration of a disaster.

Potential Winter Storm Danger Situations in the Santa Clarita Valley

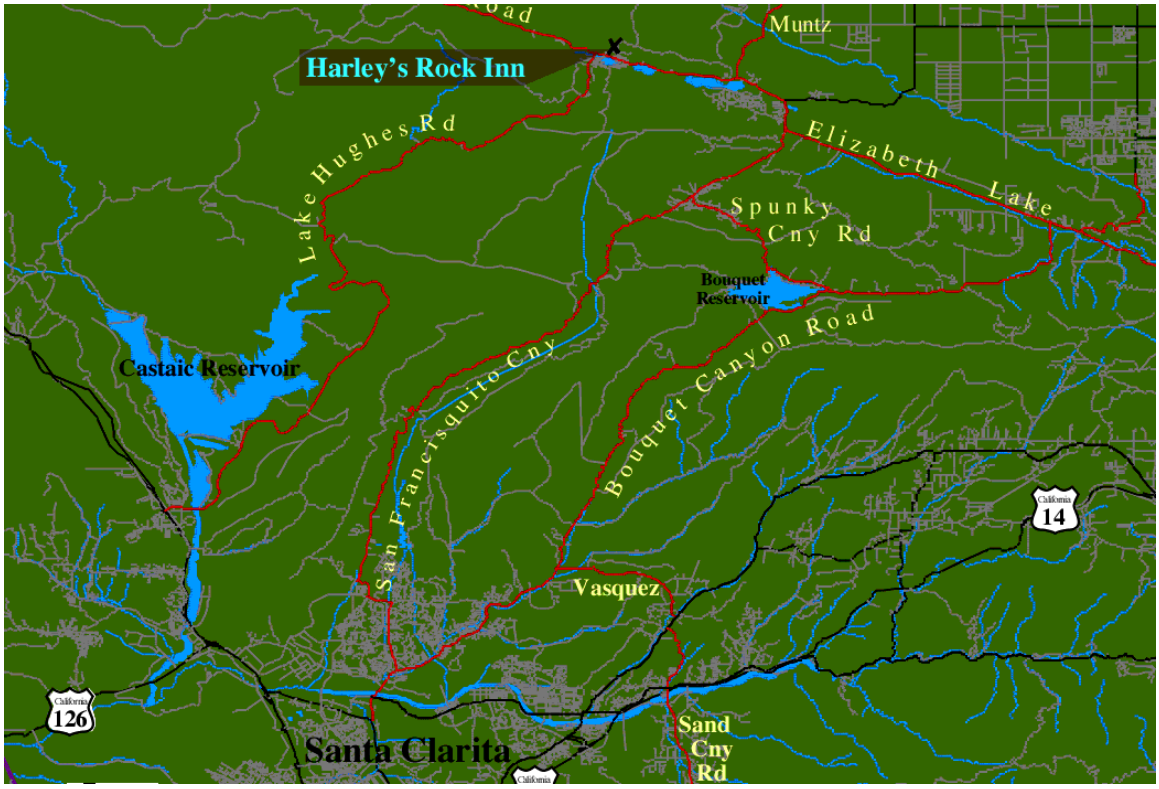
Flash flooding in canyons - Heavy rain and saturated soils can cause very sudden increases in the depth and velocity of runoffs. This can happen without warning.
Danger from burn areas - Areas that have recently been burned are susceptible to mud flows. If new vegetation has not yet matured, the top soil can wash off creating serious mud flows down slope from the fire burn areas.
Local flooding - Heavy rains can cause ponding of water in low lying areas. These areas are potentially deep and dangerous.
Electrical outages - Storm conditions, including heavy rains, flooding, and strong winds can cause local power outages. Residents should be prepared to live without electricity for periods of time.
Mud flows in vicinity foothills - During heavy rains, the ground can become so saturated that it can no longer absorb water. This can lead to water flows that strip off the top soil, creating mud flows.
Sewage system problems - Local flooding can have the potential to overwhelm sewage systems. Residents should be careful about wading in flooded areas.
Water contamination - Local flooding can impact the water distribution system. Residents should monitor local media for information on any problems with drinking water.

Castaic Lake Dam

Castaic Lake State Recreation Area (8,800 Acres) is a reservoir of the State Water Project. It is one of the Project's largest recreational lakes and the terminal of its west branch. The site includes 29 miles of shoreline. A major attraction is the 425-foot tall Castaic Dam.

Bouquet Reservoir

One of Los Angeles' largest reservoirs. completed in 1934, it has a capacity of 36,505 acre feet with high water elevation at 2,993 feet. This reservoir provides important safety storage downstream from the San Andreas Fault, as well as water from peak hydroelectric power generation at San Francisquito Power Plants 1 and 2.



Risk Assessment

There are acceptable and unacceptable risks that face the residents of the Santa Clarita Valley. Acceptable and avoidable risks generally require little or no participation on the part of the government. The Safety Element of Santa Clarita's General Plan focuses on unacceptable levels of risk that can be identified and addressed by the government. Goals and policies established by the government require action to protect life and property from those hazards with unacceptable levels of risk.

Table F-3 summarizes risks associated with various natural and man-made hazards that could affect residents in Santa Clarita. The risk assessment matrix measures the potential for occurrence, scope, and the appropriate emergency response level of the event. The disaster event is measured on a risk scale containing three levels that are used to determine the probability of occurrence, the extent and magnitude, and the governmental body accountable for emergency response. The scope of risk refers to the geographic area that could be affected, and includes the local, Citywide, or regional level.

Risk Assessment Matrix (Table F-3)

Hazard	Potential of Occurrence	Scope of Risk	Emergency Response
Earthquake			
Surface Rupture	Low	---	---
Liquefaction	Medium-High	Local	Level I, Level II, Level III
Groundshaking	High	Citywide/Regional	Level I, Level II, Level III
Slope Failure	Low-Medium	Local	Level I, Level II
Tsunami	Low	Local	Level I, Level II
Dam Failure	Low	Local/Citywide	Level I, Level II
Landslide	Low-Medium	Local	Level I, Level II
Flooding			
Local ponding	Low	Local	Level I
100-year flood	Medium	Citywide/Regional	Level I, Level II, Level III

- • Local is the affected geographic area that would be directly affected and would be localized or site specific.
- • Citywide is the affected area that includes a significant portion or the entire City.
- • Regional is the affected area that includes the entire City of Santa Clarita and areas of the County. Potential of occurrence is assessed according to three levels of risk: low, medium, and high.
- • Low risk is the level at which no specific action is deemed necessary.
- • Medium risk is the level above which specific action is required to protect life and property.
- • High-risk levels indicate that the occurrence of a particular emergency is highly probably or inevitable, and will require specific action to protect life and property.

Emergency response is assessed according to the criteria established by the State Office of Emergency Services (OES). The different levels of emergency response are based on the severity of the situation and the availability of local resources responding to that emergency. The three levels are as follows:

- • Level I - Relates to a minor-to-moderate incident where local resources are adequate in dealing with the current emergency.

- • Level II - Relates to a moderate-to-severe emergency where local resources are not adequate in dealing with the emergency and mutual assistance would be required on a regional or statewide basis.

- • Level III - Relates to a major disaster where local resources are overwhelmed by the magnitude of the disaster and state and federal assistance are required.

Hazard Mitigation Recommendations

This section identifies flood hazard mitigation projects which the City has identified. Once implemented, these projects should substantially reduce or eliminate flood or mudflow hazards within the City.

Flood Mitigation Action Items

F#1: Minimize damage and hazards to development in areas subject to risk resulting from seismic activity, unstable soils, flooding conditions, and other geologic hazards.

Ideas for Implementation:

1. Ensure that all new development has an adequate water supply, road widths, and reasonable secondary emergency access to minimize health and safety risks.
2. Implement the comprehensive emergency preparedness plan consistent with General Plan policy and distribute a summary of the plan indicating evacuation routes and shelters to businesses, residences, and public facilities in the planning area.
3. Require geotechnical studies for development proposals as appropriate.

4. Work with the California Division of Mines and Geology to review development proposals located within or adjacent to the Alquist-Priolo Special Studies Zone, along the San Gabriel Fault, and other potentially active faults.
5. Assist developers in obtaining necessary technical and policy information regarding seismic hazards and maintain a list of qualified geotechnical consultants.
6. Review the use of seismic design criteria and standards for linear system facilities, including transmission lines, water and sewage systems, and highways to ensure that they are adequate in

protecting the public. Actual weaknesses or limitations within the system should also be determined and mitigated where feasible.

7. Require that soils containing toxic or hazardous substances be cleaned up to the satisfaction of the agency having jurisdiction prior to development or redevelopment.
8. Review development proposals located in or immediately adjacent to areas of soil instability, liquefaction areas, and steep slopes to determine if a significant constraint exists and to determine appropriate lane use and structural design.
9. Evaluate and review the potential for inundation from dam or levee failure from Castaic and Bouquet Reservoirs in the event of a major earthquake.
10. Promote open space and recreational uses in designated flood zones.
11. Continue clearance of the Santa Clara River channel of no-native plant species that may impede flood flow.
12. Implement the hillside grading standards to minimize the hazards of erosion and slope failure.

Coordinating Organization: Planning Committee,City of Santa Clarita, CA Department of Mines and Geology, Los Angeles County, CalTrans, Department of Toxic Substance and Control (DTSC), local water agencies, local utility companies, and developers.

Timeline: Ongoing

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

SECTION 9: WILDFIRES

Why are Wildfires a Threat to Southern California and the Santa Clarita Valley?

October 2003, California's deadliest blazes in more than a decade raged through areas as far north as Simi Valley in Ventura County, east to San Bernardino County and south to San Diego County -- scorching more than 300,000 acres. Weather forecasts indicate more hot and dry conditions that will mix with the Santa Ana winds and could fan the flames that have reached 100 feet tall in places. President Bush declared Los Angeles, San Bernardino, San Diego and Ventura counties major disaster areas Monday, opening the way for federal dollars for governments, businesses and people affected by the fires. California Gov. Gray Davis, who has declared states of emergency in those counties, activated the National Guard to help with disaster relief. Davis said 135 fire engines from other areas -- including Nevada and Arizona -- are headed to San Diego County. More than 8,000 firefighters were trying to contain at least 10 fires in the region early Monday. But Dallas Jones, director of the Governor's Office for Emergency Services, said most of the fires were less than 20 percent contained, and some weren't contained at all. The fires have destroyed more than 1,000 homes and left tens of thousands in houses without electricity.

Eleven deaths in San Diego County are attributed to the so-called Cedar Fire, which at 150,000 acres was the largest fire as of Monday afternoon. Three people died in San Bernardino in the so-called Old Fire. According to the latest figures available from fire officials, more than 40,000 people have been evacuated as a result of the Old Fire.

An 85,000-acre fire raging in Simi Valley, northwest of San Bernardino, moved past the Ronald Reagan Presidential Library and Museum, which had been threatened earlier. The blaze worked its way over Highway 118 and into the San Fernando Valley, and residents of the Los Angeles neighborhood Porter Ranch were told that they may have to evacuate. It was the first time since the blazes began that such a warning was given to anyone inside the city. Two days latter the fire went up and over the Santa Susana Mountains into Santa Clarita where residents were forced to evacuate.

October 2003 Firestorm Statistics (Table WF-1)						
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 and the Santa Clarita Valley

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.”

Records from the U.S. Department of Forestry reveal that wildland fires occur on a regular basis almost every year, while large fires occur fairly regularly every ten years. The occurrence of major wildfires in a particular region corresponds to the age of its vegetation. Often, renewed growth of vegetation after a major fire tends to pose a lesser risk during the first ten years of growth. However, as dead vegetation accumulates, the potential for a major wildfire increases as these materials are more susceptible to ignition and facilitate the spreading of flames. Therefore, the occurrence of wildland fires tends to be cyclical, where a decade will pass with few fires followed by a decade with several large fires. In addition, the occurrence of the largest fires also corresponds to periods of extremely high wind conditions.

The tables below reveal major wildland fires in the Santa Clarita Valley since 1991 and Historic Fires in California from 1961 to 2003.

Major Wildland Fires in the Santa Clarita Valley Since 1991 (Table WF-2)

Year	***Name***	***Acres***
1990	Calgrove Fire	89
1990	Cypress Fire	105
1991	Polk Fire	115
1991	Sylmar Fire	235
1992	Bouquet Fire	120
1992	Devil Fire	1,351
1992	Huntstock Fire	40
1992	Madd Fire	71
1993	Rio Vista Burn	307
1993	San Fernando Fire	177
1993	Tapia Burn	464
1994	Agua Dulce Fire	1,155
1994	San Fran Burn	24
1994	Shooting Fire	3,538
1995	East Burn	57
1995	Freeway Fire No 1	235
1995	Freeway Fire No. 2	1,223
1995	Rio Visa Burn	45
1995	Towsley Fire	813
1995	Trotter Fire	267
1996	Agua Dulce Fire	237
1996	Bouquet Fire No. 2	99
1996	Camp ANF Fire	794
1996	Haskell Fire	84
1996	Hasley Fire	238
1996	Marple Fire	19,861
1997	Freeway IC Fire	45
1997	Linda Fire	215
1997	Placerita Fire	459
1997	Sierra Fire	522
1997	Soledad Fire	166
1998	Derby Fire	362
1998	San Fran Fire	233
1998	Wayside Fire	19
1999	Holser Fire	106
1999	Interstate Complex Fire	273
1999	Shannon Fire	206
2000	Burke Fire	171

2000	Dry Fire	253
2000	Paradise Fire	350
2000	West Fire	121
2000	Yucca Fire	788
2001	Bouquet Fire	194
2001	Sloan Fire	1,789
2001	Stables Fire	6,402
2002	Bouquet Fire	4,458
2002	Copper Fire	19,104
2002	Freeway Fire 2	1,028
2002	Oasis Fire	1,151
2003	Verdale Fire	8,650
2003	Piru Fire	63,991*
2004	Foothill Fire	6,002
*Includes acres burned in Ventura County		
Source: LACoFD		

Wildland fire is a serious and growing hazard over much of the United States, posing a great threat to life and property, particularly when it moves from forest or rangeland into developed areas. However, wildland fire is also a natural process, and its suppression is now recognized to have created a larger fire hazard, as live and dead vegetation accumulates in areas where fire has been excluded. In addition, the absence of fire has altered or disrupted the cycle of natural plant succession and wildlife habitat in many areas.

Consequently, U.S. land management agencies are committed to finding ways, such as prescribed burning to reintroduce fire into natural ecosystems, while recognizing that fire fighting and suppression are still important. The U.S. Geological Survey (USGS) conducts fire-related research to meet the varied needs of the fire management community and to understand the role of fire in the landscape; this research includes fire management support, studies of postfire effects, and a wide range of studies on fire history and ecology.

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.

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.

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

Wildfire Services and Mitigation Activities

The City of Santa Clarita and the unincorporated parts of the Santa Clarita Valley receive urban and wildland fire suppression service from the Los Angeles County Fire Department (LACoFD). Mutual aid or assistance pacts are maintained with several local, state, and federal agencies. As of January 1, 2003, there are eleven fire stations with 12 engine companies, four paramedic squads, one hazardous materials squad, and one ladder truck serving the Santa Clarita Valley. The five person hazardous materials squad operates out of Station 76. Approximately 55 firefighters are on duty every day, 24 hours a day (not including chief officers and fire prevention staff). A list and location of the eleven facilities are shown in the table below.

Aside from the personnel and equipment listed above, the LACoFD has additional resources available to provide back-up services to the Santa Clarita Valley as needed, including additional engine companies, truck companies, paramedic squads, hazardous material squads, firefighting helicopters, other fire camps, and a variety of specialty equipment.

Fire Station Facilities (Table WF-3)

Station	***Location***
Fire Station 73	24875 N. San Fernando Road Newhall, CA 91321
Fire Station 76	27223 Henry Mayo Drive Valencia, CA 91355
Fire Station 77**	46833 Peace Valley Road Gorman, CA 93243
Fire Station 80	1533 W. Sierra Highway Acton, CA 93510
Fire Station 81	8710 W. Sierra Highway Agua Dulce, CA 91350
Fire Station 107*	18239 W. Soledad Canyon Canyon Country, CA 91351
Fire Station 111*	26829 Seco Canyon Road Saugus, CA 91350
Fire Station 123	26321 N. Sand Canyon Road Canyon Country, CA 91387

Fire Station 124*	25870 Hemingway Avenue Stevenson Ranch, CA 91381
Fire Station 126	26320 Citrus Street Santa Clarita, CA 91355
Fire Station 149*	31770 Ridge Route Castaic, CA 91384

**Outside of the Santa Clarita Valley
* Paramedic Units

Source: LACoFD 2002

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 of U.S. forest lands.

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."

The wildfire mitigation action items provide direction on specific activities the local fire agency, Los Angeles County Fire Department, Division III, North Regional Operations Bureau, the City of Santa Clarita, and residents in the City 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 local decision makers in pursuing strategies for implementation.

WF#1: Work with Los Angeles County Fire Department Division III, North Regional Operations Bureau (LACOFD Division III) to enhance emergency services to increase the efficiency of wildfire response and recovery activities.

Ideas for Implementation:

1. Support LACoFD Division III's efforts to install more fire reporting stations for better access and coverage.

2. Coordinate with LACoFD Division III to implement the Public Alert and Warning Notification System to quickly contact all at-risk urban/wildland interface residents in the Santa Clarita Valley regarding evacuations.

Coordinating Organization: LACoFD Division III and City of Santa Clarita

Timeline: 1-4 years

Plan Goals Addressed: Emergency Services

WF#2: Collaborate with LACoFD Division III to enhance outreach and education programs aimed at mitigating wildfire hazards and reducing or preventing the exposure of citizens, public agencies, private property owners, and businesses to natural hazards.

Ideas for Implementation:

1. Support LACoFD Division III's efforts to hire and educate fire prevention personnel to oversee education programs.
2. Work with LACoFD Division III to visit urban interface neighborhoods and rural areas and conduct education and outreach activities.
3. Work with LACoFD Division III to conduct specific community-based demonstration projects of fire prevention and mitigation in the urban interface.
4. Continue to work with LACoFD Division III to establish neighborhood "drive-through" activities that pinpoint site-specific mitigation activities. Fire crews can give property owners personal suggestions and assistance.
5. Continue to work with LACoFD Division III to organize public outreach and information activities at fire stations, such as "Wildfire Awareness Week" activities. This allows the public to visit fire stations, see the equipment, and discuss wildfire mitigation with the station crews.

Coordinating Organization: LACoFD Division III and City of Santa Clarita

Timeline: Ongoing

Plan Goals Addressed: Protect Life and Property, Public Awareness

WF#3: Collaborate with LACoFD Division III to encourage implementation of wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability.

Ideas for Implementation:

1. Support LACoFD Division III's effort to 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.
2. Support LACoFD Division III's efforts to clear trimmings, trees, brush and other debris completely from sites when performing routine maintenance and landscaping to reduce fire risk.

Coordinating Organization: LACoFD Division III

Timeline: Ongoing

Plan Goals Addressed: Natural Systems

SECTION 10: SEVERE WEATHER OCCASIONS

Why is Severe Weather a Threat to the City of Santa Clarita?

Severe weather manifests itself in the Santa Clarita Valley in many ways. Extreme heat and violent winds present the greatest threat to health and safety. The affects of extreme weather leave a mark on the community.

Extreme heat places an extraordinary demand on the regional power grid to supply air conditioners with the needed electricity to operate. In addition, long periods of extreme heat can affect the local water table and soil quality, making the risk of flash flooding prevalent. Temperatures often exceed 100° F between the months of July and September. Weather conditions in Santa Clarita are extremely dry. An average of just under fourteen inches of precipitation occurs in Santa Clarita each year.

Santa Clarita is also subject to continual strong winds. Although these winds are far from the force of a tornado, they still represent a significant threat to life and property. Between the months of October and March, winds may reach speeds of up to (and over) 60 miles-per-hour. Common affects of high winds in Santa Clarita include the overturning of trees, and creating unsafe driving conditions for motorists on the local roads and freeways. In some cases, winds can reach a force great enough to threaten above ground utilities, although this is rare. However, the potential for utility failure remains real. This is compounded by the fact that most of the high wind events occur during the summer months when the demand on the power grid is at its height. A utility failure at this time would be catastrophic.

The prolonged extreme heat in Santa Clarita makes the community prone to drought. Extreme heat and drought affects the overall condition of vegetation throughout the valley. Generally, under such conditions, vegetation tends to become more dry. This in turn creates a greater risk of fire danger. Because much of the Santa Clarita Valley surrounding the City is in its natural state, increased fired danger has a significant impact on the health and property of the entire regional population.

According to the South Coast Air Quality Management District, the City of Santa Clarita's air quality ranks among the worst in the nation. Specifically, high levels of ozone threaten the area on a year-round basis. The affects of ozone are made worse in a higher temperature environment.

Historical Severe Weather Events

Heat

Extreme heat occurs on a yearly basis in the Santa Clarita Valley. As such, there are no finite events to reference. What makes heat in Santa Clarita so potentially devastating is both its seasonal repetition and duration, combined with the lack of regional precipitation. By comparison, Santa Clarita's yearly annual average high temperature is only two degrees Fahrenheit below the yearly annual average high temperature for Las Vegas, Nevada.

Recently, however, hot and dry conditions in Santa Clarita have been more prevalent than normal. The National Weather Service, Los Angeles Region, reports that 2003 was the driest year on record. This, in turn, was a major contributor to the extensive wildfires that plagued the region (including the Santa Clarita Valley) in October of that year.

Wind

No specific wind events have been recorded. Like heat, wind events occur each year seasonally with great regularity and predictability. The City of Santa Clarita experiences as many as ten "Santa Ana" conditions per year between the months of October and March. These rapid, hot, dry winds originate in the high desert and descend to the west, gathering speed while shedding relative humidity. Santa Ana winds may exceed gusts of over 60 miles-per-hour.

Characteristics of Severe Weather Events

Heat

Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. Among the natural hazards, only the cold of winter – not lightning, hurricanes, tornadoes, floods, or earthquakes – takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the disastrous heat wave of 1980, more than 1,250 people died. These are the direct casualties. No one can know how many more deaths are advanced by heat waves.

North American summers are hot; most summers see heat waves in one section or another of the United States. East of the Rockies, they tend to combine both high temperature and high humidity, although some of the worst have been catastrophically dry.

Considering this tragic death toll, the National Weather Service (NWS) has stepped up its efforts to more effectively alert the general public and appropriate authorities to the hazards of heat waves, those prolonged excessive heat/humidity episodes.

Based on the latest research findings, the NWS has devised the “Heat Index” (HI), (sometimes referred to as the “apparent temperature”). The HI, given in degrees Fahrenheit, is an accurate measure of how hot it really feels when relative humidity (RH) is added to the actual air temperature.

To find the HI for any given air temperature, refer to SW-1. As an example, if the air temperature is 95°F (found on the left side of the table) and the RH is 55 percent (found at the top of the table), the HI, or how hot it really feels, is 110°F. This is at the intersection of the 95° row and the 55 percent column.

Table SW-1
Heat Index Values
(National Weather Service)

	Relative Humidity														
Temp	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**
125	123	131	141												
120	116	123	130	139	148										
115	111	115	120	127	135	143	151								
110	105	108	112	117	123	130	137	143	150						
105	100	102	105	109	113	118	123	129	135	142	149				
100	95	97	99	101	104	107	110	115	120	126	132	138	144		
95	90	91	93	94	96	98	101	104	107	110	114	119	124	130	136
90	85	86	87	88	90	91	93	95	96	98	100	102	106	109	113
85	80	81	82	83	84	85	86	87	88	89	90	91	93	95	97
80	75	76	77	77	78	79	79	80	81	81	82	83	85	86	86
75	70	71	72	72	73	73	74	74	75	75	76	76	77	77	78

Table SW-2
Possible Heat Disorders Associated with Specific Heat Index Ratings
(National Weather Service)

Heat Index	**Associated Disorders for Higher Risk Groups**
130°or Greater	Heatstroke likely with continued exposure.
105°to 130°	Heat cramps or heat exhaustion likely with prolonged exposure or activity. Heat stroke possible
90°to 105°	Heat stroke, heat cramps, and heat exhaustion possible with prolonged exposure or activity.
80°to 90°	Fatigue possible with prolonged exposure or activity.

Symptoms of the conditions referred to in Table SW-2 are defined by the National Weather Service as follows:

Heat Cramps: Painful spasms usually in muscles of the legs and abdomen possible. Profuse sweating.

Heat Exhaustion: Profuse sweating, weakness, skin may be cold, pale, and clammy. Fainting and vomiting may occur.

Heat Stroke (or sunstroke): High body temperature (106° F. or higher). Hot dry skin. Rapid and strong pulse. Possible unconsciousness.

Ranging in severity, heat disorders share one common feature: the individual has overexposed or over-exercised for his age and physical condition in the existing thermal environment.

Sunburn, with its ultraviolet radiation burns, can significantly retard the skin's ability to shed excess heat. Studies indicate that, other things being equal, the severity of heat disorders tend to increase with age – heat cramps in a 17 year-old may be heat exhaustion in someone 40 years-old, and heat stroke in a person over 60 years-old.

Table SW-3 details the average high temperatures and precipitation for the City of Santa Clarita. For the purpose of comparison the figures for Los Angeles, California and Las Vegas, Nevada are also included.

Table SW-3 Comparison of Average Temperature and Precipitation Data (30 year averages) For Santa Clarita, CA; Las Vegas, NV; and Los Angeles, CA (National Weather Service)						
	Santa Clarita, CA		**Las Vegas, NV**		**Los Angeles, CA**	
Month	Avg. High Temp.	Avg. Precip.	Avg. High Temp.	Avg. Precip.	Avg. High Temp.	Avg. Precip.
Jan	64 °F	2.99”	57 °F	0.59”	68 °F	3.33”
Feb	66 °F	3.50”	63 °F	0.69”	70 °F	3.68”
Mar	68 °F	3.03”	69 °F	0.59”	70 °F	3.14”
April	74 °F	0.63”	78 °F	0.15”	73 °F	0.83”
May	79 °F	0.22”	88 °F	0.24”	75 °F	0.31”
June	88 °F	0.01”	99 °F	0.08”	80 °F	0.06”
July	94 °F	0.01”	104 °F	0.44”	84 °F	0.01”
Aug	95 °F	0.11”	102 °F	0.45”	85 °F	0.13”
Sept	91 °F	0.27”	94 °F	0.31”	83 °F	0.32”
Oct	82 °F	0.36”	81 °F	0.24”	79 °F	0.37”
Nov	72 °F	1.22”	66 °F	0.31”	73 °F	1.05”
Dec	65 °F	1.61”	57 °F	0.40”	69 °F	1.91”
Yearly Avg.	78 °F	13.96” per year	80 °F	4.5” per year	76 °F	15.14” per year

As Table SW-3 demonstrates, extreme heat can last for prolonged periods of time in Santa Clarita. It is not uncommon for temperatures to exceed 100° F during the day for several consecutive weeks between July and August. Temperatures are nearly always in excess of 90° F between the months of June and September. As a result, the population is subjected to an extended period where outdoor activity can lead to a variety of heat related ailments including heat stroke, heat cramps, and fatigue. It is estimated that the local hospital, Henry Mayo Newhall Memorial Hospital, treats multiple cases of heat-related illness per year in the Santa Clarita Valley.

In addition to subjecting the population to heat related health issues, extreme heat also helps to deteriorate local air quality. Because Santa Clarita is situated in a valley, heat creates an “inversion layer.” In essence, heat traps polluted air and prevents it from rising. As a result, pollutants are less likely to disperse, and the air quality in the Santa Clarita Valley exceeds state and federal standards for ozone and particulates.

Air pollutant emissions within the air basins are generated by stationary, mobile, and natural sources. Stationary sources can be divided into two major subcategories: point and area sources. Point sources occur at an identified

location, and are usually associated with manufacturing and industry. Examples are boilers or combustion equipment that produce electricity or generate heat.

Construction activities, such as excavation and grading, also contribute to point source emissions. Area sources are widely distributed, and produce many small emissions. Examples of area sources include residential and commercial water heaters, painting operations, portable generators, lawn mowers, agricultural fields, landfills, and consumer products such as barbeque lighter fluid and hair spray. Mobile sources refer to emissions from on and off-road motor vehicles, including tailpipe and evaporative emissions. On-road sources may be legally operated on roadways and highways. Off-road sources include aircraft, trains, and construction vehicles. Mobile sources account for the majority of the air pollutant emissions within the air basin. Air pollutants can also be generated by the natural environment such as when fine dust particles are pulled off the ground surface and suspended in the air during high winds. Both the federal and state governments have established ambient air quality standards for outdoor concentrations of various pollutants in order to protect public health.

The federal and state ambient air quality standards have been set at levels whose concentrations could be generally harmful to human health and welfare, and to protect the most sensitive persons from illness or discomfort with a margin of safety. Applicable ambient air quality standards are identified later in this section. The South Coast Air Quality Management District (SCAQMD) is responsible for bringing air quality within the South Coast Air Basin into conformity with the federal and state standards. The air pollutants for which federal and state standards have been promulgated and which are most relevant to air quality planning and regulation in the air basins include ozone, carbon monoxide (CO), fine suspended particulate matter (PM10), sulfur dioxide (SO2), and lead. In addition, toxic air contaminants are of concern in the air basins.

The entire South Coast Air Basin is designated as a federal-level extreme nonattainment area for ozone, meaning that federal standards are not expected to be met for more than 17 years from the time of designation, and a nonattainment area for PM10. It has recently improved from nonattainment to attainment with the federal standard for nitrogen dioxide (NO2) – a pure form of NOx and is about to be designated an attainment area for CO. The South Coast Air Basin is a state-level nonattainment area for ozone, CO (Los Angeles County only), and PM10. However, regional air quality throughout the Basin has improved substantially over the 1980s and 1990s, even as substantial growth has occurred.

The entire South Coast Air Basin is designated as a federal-level extreme nonattainment area for ozone, meaning that federal standards are not expected to be met for more than 17 years from the time of designation, and a nonattainment area for PM10. It has recently improved from nonattainment to attainment with the federal standard for nitrogen dioxide (NO2) – a pure form of

NOx and is about to be designated an attainment area for CO. The South Coast Air Basin is a state-level nonattainment area for ozone, CO (Los Angeles County only), and PM10. However, regional air quality throughout the Basin has improved substantially over the 1980s and 1990s, even as substantial growth has occurred.

Toxic air contaminants are airborne substances that are capable of causing chronic (i.e., of long duration) and acute (i.e., severe but of short duration) adverse effects on human health. They include both organic and inorganic chemical substances that may be emitted from a variety of common sources including gasoline stations, motor vehicles, dry cleaners, industrial operations, painting operations, and research and teaching facilities. Toxic air contaminants are different than the “criteria” pollutants previously discussed in that ambient air quality standards have not been established for them, largely because there are hundreds of air toxics and their effects on health tend to be local rather than regional. Lifetime cancer risk is defined as the increased chance of contracting cancer over a 70-year period as a result of exposure to a toxic substance or substances. It is the product of the estimated daily exposure of each suspected carcinogen by its respective cancer unit risk. The end result represents a worst-case estimate of cancer risk. The California Air Resources Board (ARB) has produced a series of estimated inhalation cancer risk maps based on modeled levels of outdoor composite toxic pollutant levels. Data from the City of Santa Clarita’s One Valley One Vision technical document indicates that the City area of the Planning Area is exposed to an estimated inhalation cancer risk of more than 250 persons per million. The risk is less than 250 persons per million in the County area of the Planning Area. The largest contributors to inhalation cancer risk are diesel engines.

As discussed previously, the federal and state ambient air quality standards have been set at levels whose concentrations could be generally harmful to human health and welfare, and to protect the most sensitive persons from illness or discomfort with a margin of safety. The SCAQMD defines typical sensitive receptors as residences, schools, playgrounds, child care centers, athletic facilities, hospitals, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Each of these land use types is present within the Santa Clarita Valley.

In general, air quality is significantly more of a health threat during the hot summer months. Because of the extreme prolonged heat in Santa Clarita, poor air quality can last for several months at a time. Table SW-4 details the number of days the South Coast Air Quality Management District reported air quality in the Santa Clarita Valley was in excess of federal and state (or both) standards in 2003.

Table SW-4 Days in Excess of State and Federal Air Quality Standards - 2003 Santa Clarita, CA (South Coast Air Quality Management District)		
	Ozone	**PM_{10}**
Federal Standard	69	0
State Standard	89	10

Because ozone is invisible, it presents a considerable health risk to the general public. Even days when ozone levels are far in excess of state and federal standards, the sky will appear blue and clear giving no indication of the danger present. It is therefore essential that, particularly during the summer months, citizens of the Santa Clarita Valley consult the wide variety of information sources that report on the relative air quality for the area. An affective public education program that alerts the public to these information sources is also essential.

Wind

The Santa Clarita Valley experiences a typical daily wind pattern for valley/mountain areas. During the day, ocean air typically flows inland, and is enhanced by localized up-valley or mountain pass wind. During the night, air in the mountain, desert, and valley cools and flows toward the ocean, producing a gentle “drainage wind.” On practically all spring and early summer days, the daily wind patterns flush the Valley of high levels of air pollutants. From late summer through the winter months, the flushing is less pronounced because of lighter wind speeds.

This regime is broken by occasional winter storms and infrequent strong northerly or northeasterly (from the north or northeast, respectively) Santa Ana winds from the desert of the Great Basin. Usually warm, always very dry, and often suspending great amounts of dust, Santa Ana winds are particularly strong in mountain passes and at the mouths of canyons. With canyons to the northeast and Tejon Pass to the north, the Planning Area is extremely susceptible to Santa Ana conditions. On the average, Santa Ana winds occur 5 to 10 times per year and can last up to several days per occurrence.

The topography of the area leads to two separate wind flow patterns in the Santa Clarita Valley, and a convergence of these winds in the Valley. In the southern part of the Valley, the predominant wind flows from the south/southeast as the effects of the regional onshore flow are modified by the upwind flow from the San Fernando Valley through the Newhall Pass. This pattern is most dominant during summer, the peak smog season. At night, the local drainage flows down the Santa Clara River Valley. In the northern part of the valley, a different pattern is

observed. This area receives westerly daytime winds from Ventura County by way of the Santa Clara River Valley. The nighttime flow reverses this pattern.

On most days, a convergence zone will exist in the valley area as the two flow patterns meet, usually in the northern half of the valley. Wind speeds accelerate where these winds meet with gusts that may exceed 60 miles-per-hour.

According to the National Weather Service, winds of this speed are powerful enough to threaten above ground utilities (specifically power lines), cause minor structural damage, uproot trees, and cause unsafe driving conditions for high profile vehicles.

The winds most commonly associated with the area (and indeed associated with Southern California) are the Santa Ana winds. Generally occurring between the months of October and March, many long time residents of Southern California relate “Santa Ana Season” to the occurrence of earthquakes in the region. This, of course, is a myth. However, many call the typical hot, dry, windy day during a Santa Ana condition as “earthquake weather.”

One of the many misconceptions regarding the Santa Ana winds, is they are hot due to their desert origin. In fact, at the beginning of their cycle, Santa Ana winds are cold, and are thus more frequent during the fall and winter months than during the summer. High pressure builds over Nevada and the cold air begins to sink. As it sinks, it compresses and increases approximately 30°F per mile of descent. The relative humidity also drops dramatically. As the winds continue to move, they pick up speed as they pass through valleys and canyons until they ultimately reach sea level. By that time the winds, which started cool, have become very hot, very dry, and very rapid, often with sustained speeds of twenty-five miles-per-hour.

Santa Ana winds can cause considerable damage, particularly because they are so fast, hot, and dry. Generally speaking, Santa Ana winds create ideal conditions for origin and spread of wildfires by drying out vegetation. Once ignited, the wind spreads the fire quickly. Most recently, the fires that burned in and around the Santa Clarita Valley in October of 2003, were made far more dangerous by the Santa Ana winds which continually changed directions and allowed the fire to spread extremely quickly. Eventually, the fire threatened thousands of homes in the western Santa Clarita Valley before firefighters gained control of the blaze.

Table SW-5 Effects of Wind Speed (Washington County Office of Consolidated Emergency Management)	
Wind Speed (mph)	**Wind Effects**
0 - 24	Marginal affects.
25-31	Large branches and/or small trees in motion.
32-38	Trees begin to move significantly. Inconvenient to walk into the wind.
39-54	Twigs and small branches begin to break away from main trunks. Wind generally impedes progress when walking. High profile vehicles become difficult to control.
55-74	Potential damage to building mounted antennas. Some trees with shallow rot systems may be overturned.
75-95	Potential for minimal structural damage, particularly to unanchored buildings such as mobile homes. Power lines and street signs may be overturned.
96-110	Moderate structural damage to walls, roofs and windows. Large signs and branches blown down. Most vehicles uncontrollable on roadways.
111-130	Extensive structural damage to walls, roofs, and windows. Trees overturned. Mobile homes lifted and/or destroyed.
131-155	Extreme damage to structures. Trees entirely uprooted or snapped.
Greater Than 155	Catastrophic damage. Structures destroyed. Flying debris is lethal.

Severe Weather Hazard Assessment

Heat:

Severe heat occurs in the Santa Clarita Valley seasonally and predictably. Greater emphasis must be placed on the creation and dissemination of public education materials designed to inform community members on how to modify behavior when exposed to heat, how to get updated information on air quality on days when the Valley is out of state and/or federal compliance, and how to treat the many ailments associated with prolonged exposure to heat.

All of our school sites have Heat Day Plans in place. When the heat and humidity outside reaches a dangerous level, the students are kept inside.

Winds:

A high wind event generally lasts for a period of one to many days, and occurs between 5 and 10 times per year. It is not uncommon for gusts to exceed 50 to 60 miles-per-hour, and sustain speeds of 25 miles-per-hour. Wind events affect areas of the City with significant tree stands as well as areas with exposed property, and above ground utility lines. The City of Santa Clarita has a unique level of exposure to wind events because of the mountains and canyons that surround and comprise the Santa Clarita Valley. This local topography funnels and channels winds, making them intense and prolonged.

Severe Weather Mitigation Activities

SW#1: Create an Employee and Public Education program regarding proper precautions against exposure to heat and potential hazards of exposure to extreme heat.

Ideas for Implementation:

1. Partner with the Los Angeles County Department of Health Services to create and or/adopt their existing information regarding heat, how to monitor and/or adjust behavior depending on the specific heat index, and information to seek should specific ailments from exposure to heat occur.

Coordinating Organization: Planning Committee, Division of Community Services, Los Angeles County, National Weather Service

Timeline: Ongoing

Plan Goals Addressed: Public Awareness, Partnerships and Implementation, Emergency Service

APPENDIX

A

PLAN RESOURCE DIRECTORY

Master Resource Directory

The Resource Directory provides contact information for local, regional, state, and federal programs that are currently involved in hazard mitigation activities. The Newhall School District Hazard Mitigation Planning 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 Newhall School District Hazard Mitigation Planning Committee will continue to add contact information for organizations currently engaged in hazard mitigation activities. This section may also be used by various community members interested in hazard mitigation information and projects.

American Public Works Association			
Level: National	Hazard: Multi	http://www.apwa.net	
2345 Grand Boulevard		Suite 500	
Kansas City, MO 64108-2641		Ph: 816-472-6100	Fx: 816-472-1610
Notes: The American Public Works Association is an international educational and professional association of public agencies, private sector companies, and individuals dedicated to providing high quality public works goods and services.			
Association of State Floodplain Managers			
Level: Federal	Hazard: Flood	www.floods.org	
2809 Fish Hatchery Road			
Madison, WI 53713		Ph: 608-274-0123	Fx:
Notes: The Association of State Floodplain Managers is an organization of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning and recovery			
Building Seismic Safety Council (BSSC)			
Level: National	Hazard: Earthquake	www.bssconline.org	
1090 Vermont Ave., NW		Suite 700	
Washington, DC 20005		Ph: 202-289-7800	Fx: 202-289-109
Notes: The Building Seismic Safety Council (BSSC) develops and promotes building earthquake risk mitigation regulatory provisions for the nation.			

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

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

California Division of Forestry (CDF)			
Level: State	Hazard: Multi	http://www.fire.ca.gov/php/index.php	
210 W. San Jacinto			
Perris CA 92570		Ph: 909-940-6900	Fx:
Notes: The California Department of Forestry and Fire Protection protects over 31 million acres of California's privately-owned wildlands. CDF emphasizes the management and protection of California's natural resources.			

California Division of Mines and Geology (DMG)			
Level: State	Hazard: Multi	www.consrv.ca.gov/cgs/index.htm	
801 K Street		MS 12-30	
Sacramento, CA 95814		Ph: 916-445-1825	Fx: 916-445-5718
Notes: The California Geological Survey develops and disseminates technical information and advice on California''s geology, geologic hazards, and mineral resources.			

California Environmental Resources Evaluation System (CERES)			
Level: State	Hazard: Multi	http://ceres.ca.gov/	
900 N St.		Suite 250	
Sacramento, Ca. 95814		Ph: 916-653-2238	Fx:
Notes: CERES is an excellent website for access to environmental information and websites.			

California Department of Water Resources (DWR)			
Level: State	Hazard: Flood	http://wwwdwr.water.ca.gov	
1416 9th Street			
Sacramento, CA 95814		Ph: 916-653-6192	Fx:
Notes: The Department of Water Resources manages the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments.			

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

California Planing Information Network			
Level: State	Hazard: Multi	www.calpin.ca.gov	
		Ph:	Fx:
Notes: The Governor's Office of Planning and Research (OPR) publishes basic information on local planning agencies, known as the California Planners' Book of Lists. This local planning information is available on-line with new search capabilities and up-to-the- minute updates.			

EPA, Region 9			
Level: Regional	Hazard: Multi	http://www.epa.gov/region09	
75 Hawthorne Street			
San Francisco, CA 94105		Ph: 415-947-8000	Fx: 415-947-3553
Notes: The mission of the U.S. Environmental Protection Agency is to protect human health and to safeguard the natural environment through the themes of air and global climate change, water, land, communities and ecosystems, and compliance and environmental stewardship.			

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

Federal Emergency Management Agency, Mitigation Division			
Level: Federal	Hazard: Multi	www.fema.gov/fima/planhowto.shtm	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country.			

Floodplain Management Association			
Level: Federal	Hazard: Flood	www.floodplain.org	
P.O. Box 50891			
Sparks, NV 89435-0891		Ph: 775-626-6389	Fx: 775-626-6389
Notes: The Floodplain Management Association is a nonprofit educational association. It was established in 1990 to promote the reduction of flood losses and to encourage the protection and enhancement of natural floodplain values. Members include representatives of federal, state and local government agencies as well as private firms.			

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.			

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.			

APPENDIX

B

THE PUBLIC PARTICIPATION PROCESS

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 Newhall School District Local Hazard Mitigation Plan integrates a cross-section of citizen input throughout the planning process. To accomplish this goal, the Newhall School District Hazard Mitigation Planning Committee developed a public participation process through these components: (1) developing a planning committee comprised of knowledgeable individuals representative of the District & the community; 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.

Hazard mitigation at the Newhall School District is overseen by the Newhall School District Hazard Mitigation Planning Committee. Planning 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 planning committee guided the development of the plan, and assisted in developing plan goals and action items, and sharing local expertise to create a more comprehensive plan.

Table B.1 lists the various people and organizations that participated on the Newhall School District Hazard Mitigation Plan.

Table B.1

Mike Clear – Assistant Superintendent of Business, Newhall School District
Tim Palmer – Newhall School District Safety Coordinator / Risk Manager
Jared Cascadden – Director of Facilities, Newhall School District
Vic Nardiello – Assistant Director of Facilities, Newhall School District
Matt Milando – Manager of Technology Services, Newhall School District
Michelle Esposito – California Highway Patrol
Brad Berans – Santa Clarita Senior Center
Glen Becerra – Southern California Edison
Reggie Agee – The Gas Company
Sam Esquenazi – CalTrans
Tim McClung – National Weather Service
Larry Manklin – Santa Clarita Chamber of Commerce

David Doughman – Henry Mayo Hospital
Jaime Garcia – Castaic School District
Bob Cutting – Saugus Unified School District
Tony Tartaglia – The Gas Company
Wallie Jordan - CalTrans
Tina Haddad – City of Santa Clarita
Adele Macpherson - City of Santa Clarita
Elena Galvez - City of Santa Clarita
Sarona Vivianco - City of Santa Clarita
Toi Chisom - City of Santa Clarita
Dave Peterson - City of Santa Clarita
Donna Nuzzi - City of Santa Clarita
Robert Marinelli – ASCIP
Tony Recalde – Consultant

Meeting Process Flow

January 22, 2004 – LACOE
Director of facilities and the Safety Coordinator attended a workshop at the Los Angeles County Office of Education headquarters in Downey. This workshop was intended to introduce the DMA of 2000 act to School Districts.

January 23, 2004 – District Meeting
Director of Facilities and the Safety Coordinator meet with the Assistant Superintendent of Business to up date him on the meeting at LACOE. At this time, we discussed who would be good candidates for the Planning Committee.

February 19, 2004 – District - Kick Off Meeting
The Assistant Superintendent of Business held the meeting with management and staff, and assigned the Natural Hazard Mitigation Plan project. He provided this core internal committee with an overview about the Disaster Mitigation Act of 2000 and the planning process that would be undertaken, and assignments were handed out. This group was our core Hazard Mitigation Planning Committee.

April 5, 2004 – Strategy Meeting
The Planning Committee met at the District Office. We discussed public input and how we could draw the public to contribute. The Director of Technology will post a questionnaire on the District Web Site, and invite the public to our next meeting. We also discussed mitigation strategies for all of our possible hazards.

May 13, 2004 – LHMP Meeting at LACOE #2
Director of Facilities and the Safety Coordinator attended the second meeting at LACOE for an update on the Local Hazard Mitigation Plan. The meeting included such updates as the crosswalk and mapping.

May 20, 2004 – First Public Meeting
Planning committee met at the District Office. No one from the public was present at this meeting and no questionnaires were submitted on our web site. The planning committee continued discussing hazard strategies, hazard action items, hazard matrix, and ranking system.

June 1, 2004 – City Public Meeting
The Assistant Superintendent of Business and the Safety Coordinator attended this meeting. The City of Santa Clarita proposed some of the hazards they thought were important and asked everyone in attendance to write down hazards and rank them by importance.

June 15, 2004 – City Public Meeting #2
The Assistant Superintendent of Business and the Safety Coordinator attended this meeting. The City put us in groups with flips charts. We were asked to provide input on each of the hazards.

June 21, 2004 – District Planning Committee Meeting
Planning Committee met at the District Office to discuss action items for our plan and to discuess public input from our web stie.

July 27, 2004 – Meeting with Outside Organizations
Planning Committee met at the District Office with other public organizations from the Santa Clarita Valley to get input from them on our hazards and mitigations ideas.

September 13, 2004 - District Planning Committee Meeting
Preliminary draft was presented to the committee for review. Committee reviewed questionnaires from our web site and Mitigation Action Items were discussed in detail.

November 8, 2004 – Second Public Meeting
Planning Committee met at the District Office. There was no public particapation. Second draft was reviewed by committee members.

May 5, 2005 - District Planning Committee Meeting
Final draft was presented to the committee for review. Committee reviewed the Plan and voted to present the Plan to the Board for approval.

STAFF REPORTS:

Administrative Services:

The Board reviewed the Summer Board Meeting Schedule and the schedule remains unchanged.

Business Services:

Newhall School District Hazard Mitigation Plan

Mr. Tim Palmer explained to Board members that this plan was developed in conjunction with the City of Santa Clarita, Los Angeles County Fire Department, and other regional and state organizations. It provides a list of ways that may help the District reduce the risk and prevent losses from future natural hazard events.

Board members thanked and congratulated Mr. Palmer for a well-developed plan.

M/S/C/ - (Tannehill-Neiberger) - Vote: 5-0	*Approved the Newhall School District Hazard Mitigation Plan.*	***HAZARD MITIGATION PLAN***

Mr. Clear informed the Board that during the recent rain there was some erosion to the slopes surrounding Dr. J. Michael McGrath School. To avoid future erosion it is necessary to reconstruct some portions of the slopes, plant trees, and reseed the area. The funds received from FEMA will be used for that purpose.

M/S/C -(Shapiro-Tannehill) - Vote: 5-0	*Adopted Resolution No. 04/05-34 regarding Designation of Applicant's Agent for the Office of Emergency Services and FEMA.*	***FEMA DESIGNATION***

Preview of the 2005-2006 Proposed Budget

Mr. Clear reviewed for the Board the proposed 2005-2006 General Fund budget. He explained the breakdown of the resources, Unrestricted and Restricted programs, state and federal. He added that the proposed budget is based on budget assumptions, negotiated settlements, estimated .5% ADA growth, staffing changes, COLA of 4.23%, and this gives the District a reserve of 3.23%.

Replacement of Fire Alarm and Communication Systems

Mr. Clear informed the Board that the fire alarm, telephones and public address systems at Stevenson Ranch and Valencia Valley Schools have been failing for several years. The fire marshal has threatened to either shut the schools down or place the schools on fire watch status due to the intermittent operable fire alarm systems. Hence the need to replace the systems. These will be replaced this summer, and will be the same as those installed at

APPENDIX

C

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)
LACOE	Los Angeles County Office of Education
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 (FEMA)	Performance Partnership Agreement/Cooperative Agreement
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

D

Glossary

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.

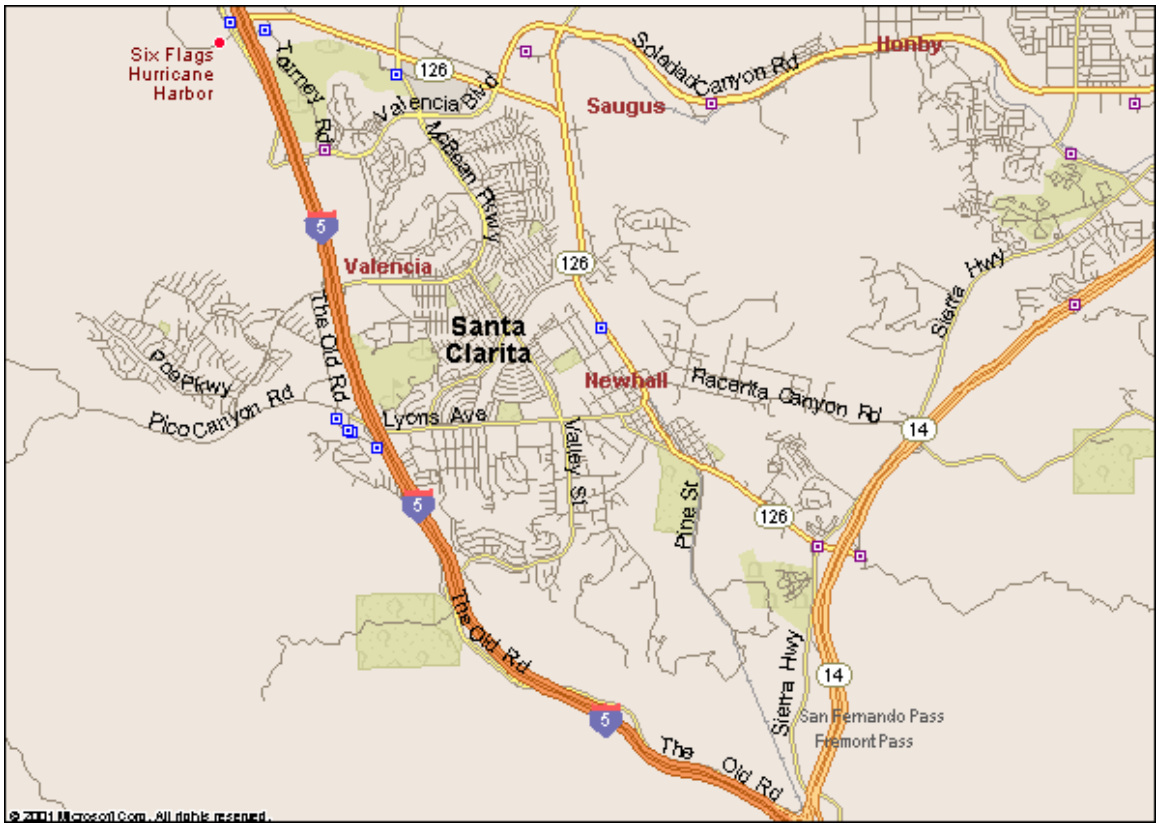
APPENDIX

E

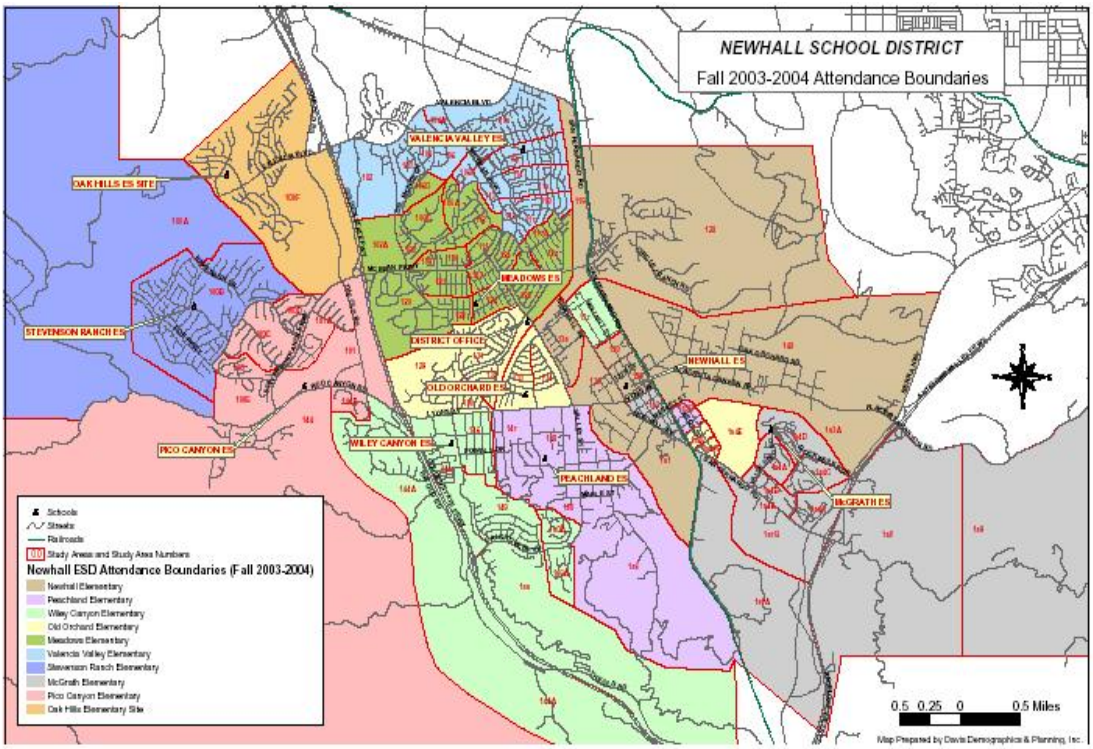
List of Maps

Map 1

Santa Clarita

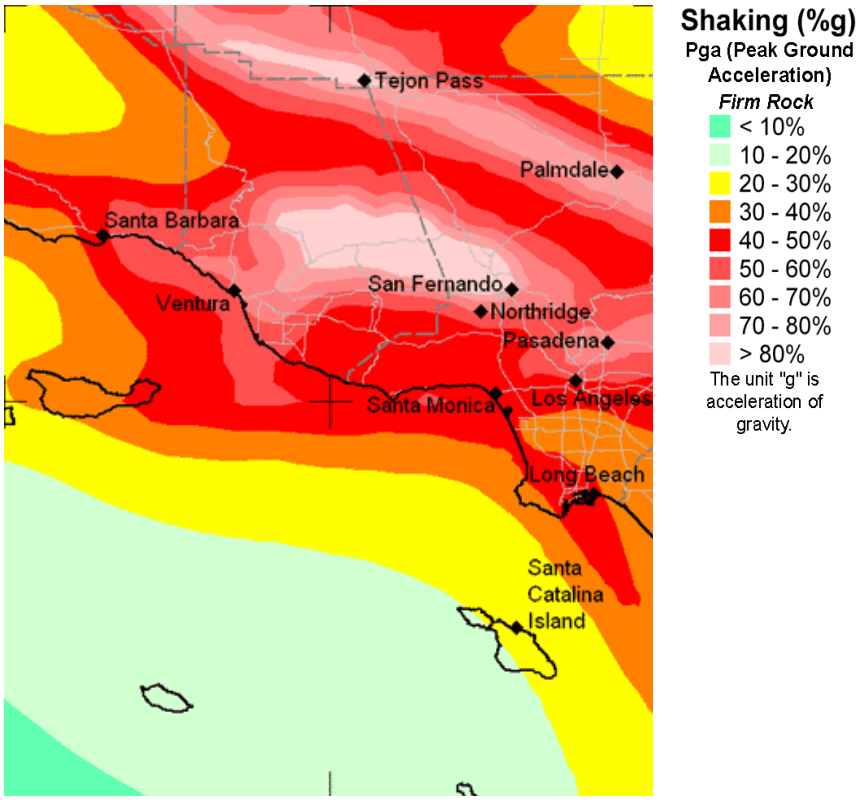


Map 2
Attendance Zones



Map 3

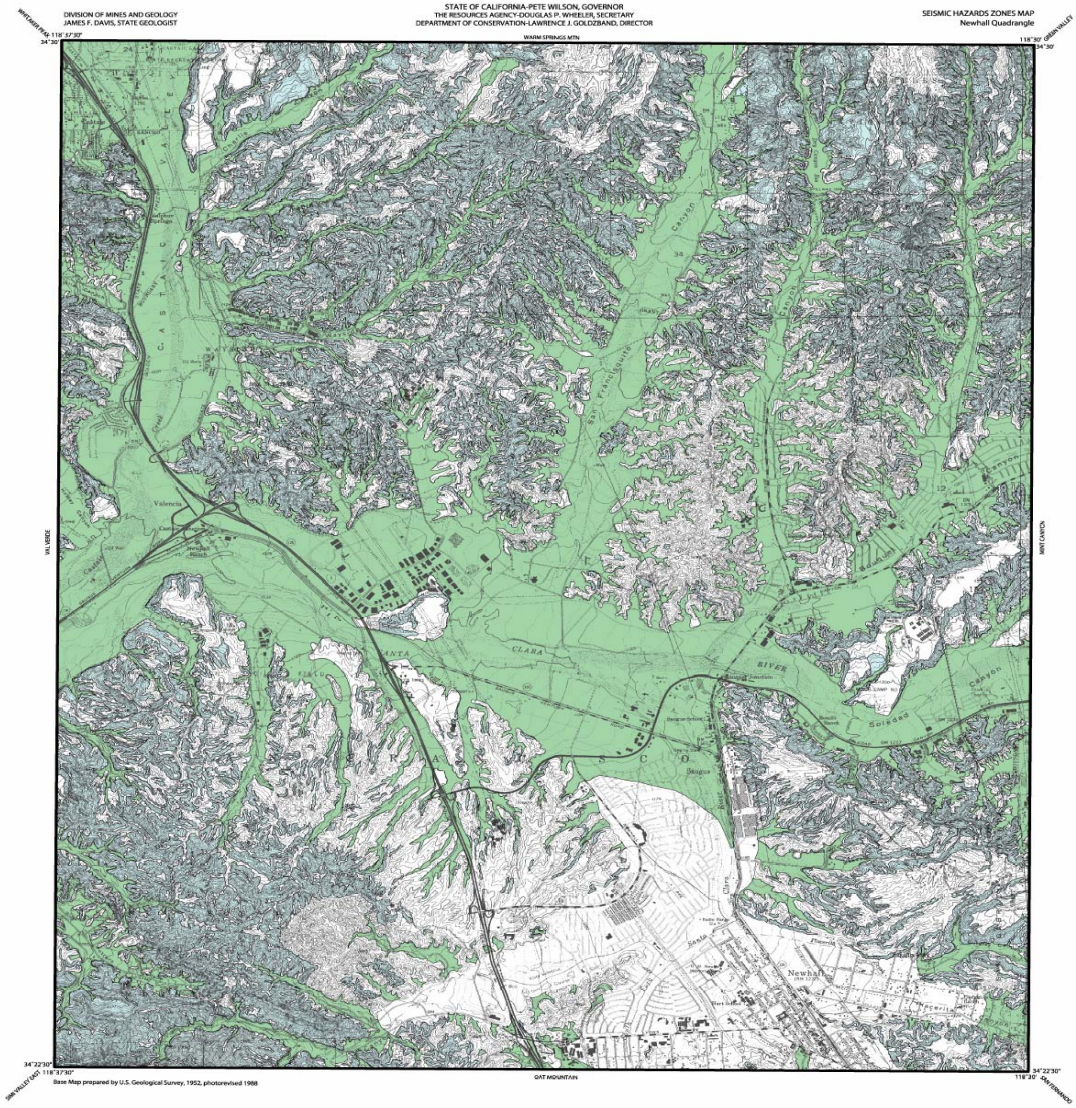
Ground Shaking



Map 4

Watershed – Santa Clara River

Map 5
Seismic Hazard Zones



PURPOSE OF MAP

This map will assist cities and counties in fulfilling their responsibilities for protecting the public safety from the effects of earthquake-triggered ground failure as required by the Seismic Hazards Mapping Act (Public Resources Code Sections 2690-2699.6).

For information regarding the scope and recommended methods to be used in conducting the required site investigations, see DMG Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California.

For a general description of the Seismic Hazards Mapping Program, the Seismic Hazards Mapping Act and regulations, and related information, please refer to the draft User's Guide (see http://www.consrv.ca.gov/dmg/shezp/userguid.html).

Production of this map was funded by the Federal Emergency Management Agency's Hazard Mitigation Program and the Department of Conservation in cooperation with the Governor's Office of Emergency Services.

IMPORTANT - PLEASE NOTE

1) This map may not show all areas that have the potential for liquefaction, landsliding, strong earthquake ground shaking or other earthquake and geologic hazards. Also, a single earthquake capable of causing liquefaction or triggering landslide failure will not uniformly affect the entire area zoned.

2) Liquefaction zones may also contain areas susceptible to the effects of earthquake-induced landslides. This situation typically exists at or near the toe of existing landslides, downslope from rockfall or debris flow source areas, or adjacent to steep stream banks.

3) This map does not show Alquist-Priolo earthquake fault zones, if any, that may exist in this area. Please refer to the latest official map of earthquake fault zones for disclosure and other actions that are required by the Alquist-Priolo Earthquake Fault Zoning Act. For more information on this subject and and index to available maps, see DMG Special Publication 42.

4) Landslide zones on this map were determined, in part, by adapting methods first developed by the U.S. Geological Survey (USGS). A new generation of landslide hazard maps being prepared by the USGS (Jibson and Harp, in preparation) uses an experimental approach designed to explore new methods to assess earthquake-induced landslide hazards. Although aspects of this new methodology may be incorporated in future seismic hazard zone maps, the experimental USGS maps should not be used as substitutes for these official earthquake-induced landslide zone maps.

5) U.S. Geological Survey base map standards provide that 90 percent of cultural features be located within 40 feet (horizontal accuracy) at the scale of this map. The identification and location of liquefaction and earthquake-induced landslide zones are based on available data. However, the quality of data used is varied. The zone boundaries depicted have been drawn as accurately as possible at this scale.

6) Information on this map is not sufficient to serve as a substitute for the geologic and geotechnical site investigations required under Chapters 7.5 and 7.8 of Division 2 of the Public Resources Code.

7) DISCLAIMER: The State of California and the Department of Conservation make no representations or warranties regarding the accuracy of the data from which these maps were derived. Neither the State nor the Department shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this map.

SCALE 1:24,000

STATE OF CALIFORNIA
SEISMIC HAZARD ZONES

Delineated in compliance with
Chapter 7.8, Division 2 of the California Public Resources Code
(Seismic Hazards Mapping Act)

NEWHALL QUADRANGLE
OFFICIAL MAP
Released: February 1, 1998

STATE GEOLOGIST

MAP EXPLANATION
Zones of Required Investigation:

Liquefaction
Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

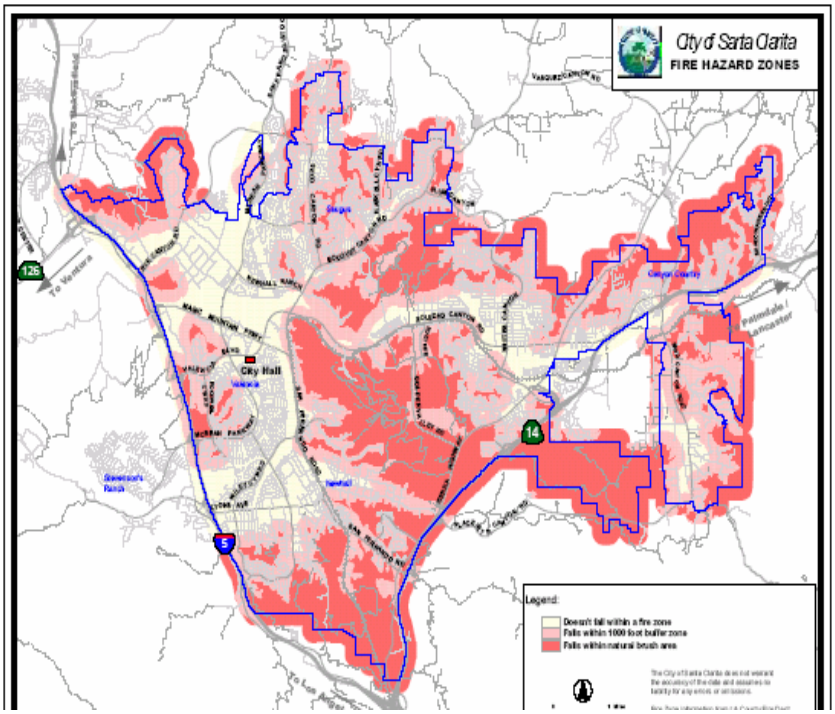
Earthquake-Induced Landslides
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

DATA AND METHODOLOGY USED TO DEVELOP
THIS MAP ARE PRESENTED IN THE FOLLOWING:

Seismic Hazard Evaluation of the Newhall 7.5-minute quadrangle,
Los Angeles County, California: California Department of Conservation
Division of Mines and Geology Open-File Report 97-11.

For additional information on seismic hazards in this map area, the rationale used for zoning, and additional references consulted, refer to DMG's World Wide Web site (http://www.consrv.ca.gov/dmg/).

Copyright © 1998 by the California Department of Conservation,
Division of Mines and Geology. All rights reserved.

Map 6
Los Angeles

Map 7
Fire Hazard Zones