Natural Hazards Mitigation Plan

City Council adopted on: November 22, 2004

Prepared for:
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Special Recognition

The Disaster Management Area Coordinators (DMAC) of Los Angeles County prepared planning guidance materials that were utilized by the City of Rolling Hills in preparing this Natural Hazards Mitigation Plan. The City extends special recognition to DMAC Coordinator Michael Martinet for his editing contribution to the Hazard-Specific Sections. The DMAC planning guidance materials were based on the Mitigation Plan from Clackamas County, Oregon. The City is grateful to DMAC and the Clackamas County Natural Hazards Mitigation Committee for their contributions to this project.

Special Thanks

Multi-Jurisdictional Hazard Mitigation Planning Team:

City of Rolling Hills

- Craig Nealis, City Manager
- Yolanta Schwartz, Planning Director
- Roger Vink, Rolling Hills Community Association Supervisor

Los Angeles County

- Ed Acosta, Building and Safety Engineering Specialist
- Doug Smith, Fire Department
- Captain Veronie Steele, Fire Department
- Tony Wright, Fire Department
- Greg Alldredge, Fire Department
- David Rozas, Sheriff Department
- Cory Johnston, Sheriff Department,
- Brandon Epp, Sheriff Department

Palos Verdes Peninsula Unified School District

- Peter Lyons, Community Services

Other Agencies:

- Office of Disaster Management, Area G: Mike Martinet, Executive Director
- Southern California Edison Co., Scott Gobble
- California Water Service Co., Ross Moilan

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City of Rolling Hills City Council

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Mapping

Other than Internet-sourced maps, the City of Rolling Hills provided all of the maps included in this plan.

Consulting Services

Project Management and Planning Services for this project were provided under contract by Emergency Planning Consultants of San Diego, California -

Project Management & Planning Services:	Carolyn J. Harshman, President
Planning Services:	Carolyn J. Harshman, President
	Eric Acacio, Assistant

List of Natural Hazards Mitigation Plan Tables, Maps, and Photos

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

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Executive Summary: Hazard Mitigation Action Plan

The City of Rolling Hills Natural Hazards Mitigation Plan includes resources and information to assist City residents, public and private sector organizations, and others interested in participating in planning for natural hazards. The mitigation plan provides a list of activities that may assist City of Rolling Hills in reducing risk and preventing loss from future natural hazard events. The action items address multi-hazard issues, as well as activities for earthquakes, windstorms, wildfires and land movement.

How is the Plan Organized?

The Mitigation Plan contains a Mitigation Actions Matrix, background on the purpose and methodology used to develop the mitigation plan, a profile of City of Rolling Hills, sections on four natural hazards that occur within the City, and a number of appendices. All of the sections are described in detail in Section 1, Introduction.

Who Participated in Developing the Plan?

The City of Rolling Hills Natural Hazards Mitigation Plan is the result of a collaborative planning effort between City of Rolling Hills, Rolling Hills Community Association, Los Angeles County Fire and Sheriff's Departments, Palos Verdes Peninsula Unified School District, citizens, public agencies, non-profit organizations, and regional and state organizations. Public participation played a key role in development of goals and action items. Interviews were conducted with stakeholders across the City, and public outreach activities were conducted to include City of Rolling Hills residents in plan development. A Planning Team guided the process of developing the plan.

The Planning Team was comprised of the following Individuals:

City of Rolling Hills	Craig Nealis, City Manager
	Yolanta Schwartz, Planning Director
	Roger Vink, Rolling Hills Community Supervisor
Los Angeles County	Tony Wright, Fire Department
	Ed Acosta, Engineering Specialist
	Greg Alldredge, Fire Department
	Captain Veronie Steele, Fire Department
	Doug Smith, Fire Department
	David Rozas, Sheriff Department
	Scott Cobble, Southern California Edison Co.
	Ross Moilan, California Water Service Co.

	Cory Johnston, Sheriff Department
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Utility Companies	Scott Gobble, Southern California Edison Co.
	Ross Moilan, California Water Service Co.
Palos Verdes Peninsula Unified School District	Peter Lyons, Community Services
Emergency Planning Consultants	Carolyn J. Harshman, President

What is the Plan Mission?

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

What are the Plan Goals?

The plan goals describe the overall direction that City of Rolling Hills 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 Mitigation Actions Matrix.

Protect Life and Property

Implement activities that assist in protecting lives by making homes, schools, infrastructure, critical facilities, and other property more resistant to losses from natural hazards.

Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.

Improve hazard assessment information to make recommendations for new and existing development in high hazard areas and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

Public Awareness

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

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

Natural Systems

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

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

Partnerships and Implementation

Strengthen communication and participation among and within public agencies, citizens, non-profit organizations, schools, and utility companies to gain a vested interest in implementation.

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

Emergency Services

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

Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, schools and utility companies.

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

How are the Action Items Organized?

The action items are a listing of activities in which City agencies and citizens can be engaged to reduce risk. Each action item includes an estimate of the timeline for implementation (see Executive Summary, Attachment 1: Mitigation Actions Matrix).

The action items are organized within the following matrix, which lists all of the multi-hazard and hazard-specific action items included in the mitigation plan. Data collection and research and the public participation process resulted in the development of these action items (see Appendix B: Public Participation).

The Action Items identified on the Mitigation Actions Matrix will be funded through a variety of sources, possibly including: operating budget, general fund, development fees, Community Development Block Grant (CDBG), Hazard Mitigation Grant Program (HMGP), other Grants, private funding, Capital Improvement Program (CIP), and other funding opportunities.

The matrix includes the following information for each action item:

Responsible Agency. The "responsible agency" is the public agency with regulatory responsibility to address natural hazards, or that is willing and able to

organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. The Responsible Agency may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs. The hierarchies of the assignments vary – some are positions, others departments, and others Committees. No matter, the primary responsibility for implementing the action item falls to the entity shown as the "Responsible Agency".

Timeline. Each action item includes an estimate of the timeline for implementation.

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

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

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

The Plan Maintenance Section (Section 2) of this document details the formal process that will ensure that the City of Rolling Hills Natural Hazards Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the City will integrate public participation throughout the plan maintenance process. Finally, this section includes an explanation of how the City of Rolling Hills government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the City's General Plan, and Building & Safety Codes.

Plan Adoption

Adoption of the Natural Hazards Mitigation Plan by the local jurisdiction's governing body is one of the prime requirements for approval of the plan. Once the plan is completed, the City Council will be responsible for adopting the City of Rolling Hills Natural Hazards Mitigation Plan. The local agency governing body has the responsibility and authority to promote sound public policy regarding natural hazards. The City Council will periodically need to re-adopt the plan as it is revised to meet changes in the natural hazard risks and exposures in the community. The approved Natural Hazard Mitigation Plan will be significant in the future growth and development of the community.

Coordinating Body

A City of Rolling Hills City Manager and Planning Director (Planning Team) will be responsible for coordinating implementation of Plan action items and undertaking the formal review process together with the agencies that represented the Hazard Mitigation Planning Team for this report.

Convener

The City Council will adopt the City of Rolling Hills Natural Hazards Mitigation Plan and the Planning Team take responsibility for plan implementation. The City Manager will serve as a convener to facilitate the Planning Teams meetings. Plan implementation and evaluation will be a shared responsibility among the City and the agencies on the Planning Team.

Implementation through Existing Programs

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

Economic Analysis of Mitigation Projects

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

Formal Review Process

The City of Rolling Hills Natural Hazards Mitigation Plan will be evaluated annually by the Planning staff to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. Every five years, prior to submitting an updated progress report to the Office of Emergency Services, the Planning staff will be responsible for contacting members of the other agencies constituting the Planning Team to evaluate, make comments and describe the progress of the mitigation strategies in the Plan.

Continued Public Involvement

City of Rolling Hills is dedicated to involving the public directly in the continual review and updates of the Mitigation Plan. Copies of the plan will be catalogued and made available at City Hall and Rolling Hills Community Association Administrative Office. The existence and location of these copies will be publicized in City Newsletters. The City Planning Department will be responsible for keeping track of public comments on the Plan.

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
Multi-Hazard Action Items								
MH #1-1	Continue policy to ensure mitigation projects are in place to safeguard critical facilities.	City Manager, Planning Department (Planning Team)	Ongoing	X				X
MH #1-2	Adopt updates to the Uniform Building Code.	City Manager, Planning Department	Ongoing	X				X
MH #1-3	Develop additional building and reconstruction policies and requirements in the City's building code for post-disaster situations.	City Manager, Planning Department	3–5 years	X				X
MH #1-4	Ensure compliance to rebuilding in conformance with applicable codes, specifications, and standards.	City Manager, Planning Department	Ongoing	X			X	
MH #1-5	Develop training and information program for action to take during hazard.	City Manager, Planning Department	Ongoing	X	X			
MH #1-6	Work with city service providers to develop local Natural Hazards Mitigation Plans that are consistent with the goals and framework of the City's Natural Hazards Mitigation Plan.	City Manager, Planning Department	Ongoing	X			X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
MH #1-7	Encourage reduction of nonstructural and structural earthquake hazards in homes, school, and government offices.	City Manager, Planning Department	Ongoing	X				
MH #1-8	Underground electric utility lines to reduce risk of arcing line in high wind.	City Manager, Planning Department	Ongoing	X		X		
MH #1-9	Review current building codes and standards to determine adequacy for disaster restoration of properties.	City Manager, Planning Department	Ongoing	X			X	
MH #1-10	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas.	City Manager, Planning Department	Ongoing	X	X	X		
MH #1-11	Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.	City Manager, Planning Department	Ongoing	X			X	
MH #1-12	Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.	City Manager, Planning Department	Ongoing	X	X		X	
MH	Integrate the goals and action items from the	City Manager,	Ongoing	X			X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
#1-13	city's Natural Hazard Mitigation Plan into existing regulatory documents and programs, where appropriate.	Planning Department						
MH #1-14	Coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures	City Manager, Planning Department	Ongoing	X			X	
MH #1-15	Identify critical facilities at risk from natural hazards events	City Manager, Planning Department	3 years	X	X	x		
MH #1-16	Encourage development and enforcement of wind-resistant building sites and construction codes.	City Manager, Planning Department	Ongoing	X	X	X		
MH #1-17	Enforce construction and subdivision design that can be applied to steep slopes to reduce the potential adverse impacts from development.	City Manager, Planning Department	Ongoing	X		X		
MH #1-18	Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration in city.	City Manager, Planning Department	Ongoing	X	X	X	X	
MH	Encourage the development of unifying	City Manager,	Ongoing	X	X		X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
#1-19	organizations to ensure communication and dissemination of natural hazard mitigation information.	Planning Department						
MH #1-20	Develop strategies to mitigate risk to these facilities, or to utilize alternative facilities should natural hazards events cause damages to the facilities in question	City Manager, Planning Department	Ongoing	X		X	X	
MH #1-21	Provide new home and property buyers with information on quality redevelopment and safe housing development. The information is probably most efficiently dispersed through city bi-weekly newsletter.	City Manager, Planning Department	Ongoing	X	X			
MH #1-22	Minimize the risk of erosion through policy development.	City Manager, Planning Department	Ongoing	X	X	X		
MH #1-23	Install and improve back-up power in critical facilities.	Utility Companies	Ongoing	X			X	
MH #1-24	Develop updates for the Natural Hazards Mitigation Action Plan based on new information	City Manager, Planning Department	Ongoing	X				
MH	Review observed damage with a view toward	City Manager,	3-5 years	X		X	X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
#1-25	revising codes to help mitigate damage from future disasters.	Planning Department Los Angeles County Building and Safety Department						
MH #1-26	Bury the utility lines on Crest Road. Fund/Code Regulations, in an effort to spearhead the utility line burial project.	City Manager, Southern California Edison Company	1-3 years	X			X	X
MH #1-27	Minimize suffering and disruption caused by disasters.	City Manager, Planning Department	Ongoing	X	X			
MH #1-28	Provide technical assistance to help the community develop disaster management operations capabilities.	City Manager Utility Companies, Los Angeles County Fire, Los Angeles County Area-G	Ongoing	X	X		X	
MH #1-29	Determine temporary protection measures; install plastic sheeting on roofs, cover exterior openings such as windows or doors, draining trapped water in ceilings or draining	City Manager, Planning Department	Ongoing	X	X			

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
	accumulated flood waters, temporary shoring to avoid imminent building collapse or damage.							
MH #1-30	Conduct site plan review to determine new constructions, repair and reconstruction of damaged structures.	City Manager, Planning Department	Ongoing	X				
MH #1-31	Partner with other organizations and agencies in the community to identify grant programs and foundations that may support mitigation activities.	City Manager, Planning Department	Ongoing	X		X	X	
MH #1-32	Allocate city resources and assistance to mitigation projects when possible.	City Manager	1-2 years	X			X	
MH #1-33	Identify and pursue funding opportunities to develop and implement local mitigation activities.	City Manager	Ongoing	X			X	
MH #1-34	Determine which costs will be reimbursed to government for the demolition of government buildings.	City Manager	2-4 years	X			X	
MH	Ensure repairs or construction funded by	City Manager,	As	X			X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
#1-35	Ensure that Federal disaster assistance conforms to applicable codes and standards.	Planning Department, Los Angeles County Building and Safety	Needed					
MH #1-36	Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.	City Manager, Planning Department	Ongoing	X	X			
MH #1-37	Identify opportunities for partnering with citizens, private contractors, and other jurisdictions to increase availability of equipment and manpower for efficiency of response efforts.	City Manager	Ongoing	X	X		X	
MH #1-38	Work with Community Association and other neighborhood groups to establish community response teams.	City Manager	Ongoing		X		X	X
MH #1-39	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.	City Manager	Ongoing	X			X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
MH #1-40	Encourage implementation wildfire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability.	City Manager, Planning Department	Ongoing	X		X		
MH #1-41	Conduct a full review of the Natural Hazards Mitigation Action Plan every 5 years by evaluating mitigation successes, failures, and areas that were not addressed.	City Manager, Planning Department	5 years	X				
MH #1-42	Establish a committee representative of all areas of the City that will include vets, pet store owners, the Humane Society, animal shelters, the Extension Office and other interested parties to work on animal-specific evacuation and sheltering needs.	City Manager, Planning Department	2-4 years				X	
MH #1-43	Assess availability of backup power resources (generators) of hospitals, nursing homes, and fire, police, rescue, and emergency management personnel; upgrade resources as necessary.	City Manager, City Contracted Service Providers	Ongoing	X				X

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
MH #1-44	Coordinate public education to increase awareness of hazards and opportunities for mitigation.	City Manager, Planning Department	2-3 years		X			
MH #1-45	Encourage interested individuals to participate in hazard mitigation planning and training activities.	City Manager, Planning Department	Ongoing		X			
MH #1-46	Educate the public about procedures for reporting human-caused incidents.	City Manager, Planning Department, And City Service Providers	2-3 years		X		X	
MH #1-47	Educate the public about emergency sheltering and evacuation procedures.	City Manager, Planning Department, And City Service Providers	2-3 years		X		X	
MH #1-48	Educate the public about hazards prevalent to their area.	City Manager, Planning Department, And City Service Providers	2-3 years		X		X	
MH	Hold a city-sponsored hazard mitigation	City Manager,	2-3 years		X		X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
#1-49	seminar for the community residents.	Planning Department, And City Service Providers						
MH #1-50	Publicize the documents associated with emergency response and mitigation.	City Manager, Planning Department, And City Service Providers	2-3 years		X		X	
MH #1-51	Distribute via gas/electric bills, maps of evacuation routes that will facilitate the community's safe evacuation.	City Manager, Planning Department, And City Service Providers	2-3 years		X		X	
MH #1-52	Develop informational literature on animal disaster plans and supply kits and have them available in veterinary clinics and pet stores.	City Manager, Area G Coordinator	Ongoing		X		X	
MH #1-53	Develop informational literature on disaster plans for livestock and make them available to the public.	City Manager, Area G Coordinator	Ongoing		X		X	
MH #1-54	Continue to distribute packets of information to all property owners of the city. The content	City Manager	2-3 years		X			

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
	of the packets include the following information of property protection measures. Maintenance for Fire and Watershed Safety, Do It Yourself Planning for Emergency Supplies, Emergency Numbers, List of Roofers, and List of Retail/Wholesale Supply Vendors.							
MH #1-55	Distribution of wildfire safety and prevention information to residents and businesses residing within identified forested land.	City Manager City Service Providers	Ongoing	X	X		X	
MH #1-56	Maintain materials at City Hall on disaster supplies kits and plans, etc.	City Manager City Service Providers	Ongoing	X	X		X	
MH #1-57	Work with the County Office of Emergency Services, the American Red Cross, the Board of Education, County Fire Department, churches and Social Services to hold work session to share information about local shelters. Information to include the site of each shelter, how many people it can house and feed, if it has back-up power available on site, completed site survey forms and types of	City Manager City Service Providers	Ongoing	X	X		X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
	resources that they have or that they need. This will benefit all areas of the City in the need to open shelters.							
MH #1-58	Establish a CERT Program in coordination with the County of Los Angeles.	City Manager, County of Los Angeles	1-2 years	X	X		X	X
MH #1-59	Conduct occasional tabletop disaster exercises with local law enforcement, emergency managers, town and county officials, the LEPC and other disaster response agencies.	City Manager, City Service Providers	Ongoing		X		X	
MH #1-60	Periodically review City's regulations to make sure that adequate zoning regulations are in place to reduce future development in high hazard areas.	Planning Department	Ongoing	X				
MH #1-61	Conduct a detailed vulnerability assessment in the future in order to accurately identify the extent of damages to vulnerable buildings, infrastructure, and critical facilities.	City Manager Planning Department	1-3 years	X		X	X	X
Earthquake Action Items								
EQ #2-1	Adopt County of Los Angeles earthquake Building Codes.	City Manager Planning Department	Ongoing	X			X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
EQ #2-2	Minimize earthquake damage risk by retrofitting critical facilities.	Utility Companies	Ongoing	X				
EQ #2-3	Integrate new earthquake hazard mapping data for the city and improve technical analysis of earthquake hazards as they become available.	City Manager Planning Department	Ongoing	X	X			
EQ #2-4	Allocate City resources and assistance to mitigation projects when possible.	City Manager	1-2 years	X			X	
Windstorm Action Items								
WS #3-1	Monitor trees and branches in public areas at risk of breaking or falling in wind and sand storms. Prune or thin trees or branches when they would pose an immediate threat to property, utility lines or other significant structures or critical facilities in the Community.	Rolling Hills Community Association	Ongoing	X		X		
WS #3-2	Encourage development and enforcement of wind-resistant building sites and construction codes.	City Manager Planning Department	Ongoing	X	X	X		
WS #3-3	Support/encourage electrical utilities to use underground construction methods where	City Manager Planning Department	Ongoing	X		X		

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
	possible to reduce power outages from windstorms.							
WS #3-4	Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.	City Manager Planning Department	Ongoing	X				
Wildfire Action Items								
WF #4-1	Continue to require Class A roofing standards and pool survey for additional water source.	City Manager Planning Department	Ongoing	X	X		X	
WF #4-2	Improve water systems to assist with Wildfire and Drought conditions.	California Water Service Company	3-5 years	X		X		
WF #4-4	Inventory alternative firefighting water sources and encourage the development of additional sources.	City Manager Planning Department	3-5 years	X	X			
WF #4-5	Enhance emergency services to increase the efficiency of wildfire response and recovery activities.	City Manager	Ongoing	X			X	
WF #4-6	Increase communication, coordination, and collaboration between wildland/urban interface property owners, local and county planners, and fire prevention crews and	City Manager Los Angeles County Fire Department	Ongoing	X	X		X	

City of Rolling Hills
Mitigation Actions Matrix

Natural Hazard	Action Item	Responsible Agency	Timeline	Plan Goals Addressed				
				Protect Life and Property	Public Awareness	Natural Systems	Partnerships and Implementation	Emergency Services
	officials to address risks, existing mitigation measures, and federal assistance programs.							
Land Movement Mitigation Actions Items								
LM #5-1	Improve knowledge of landslide hazard areas and understanding of vulnerability and risk to life and property in hazard-prone areas.	City Manager Planning Department	Ongoing	X	X			
LM #5-2	Identify safe evacuation routes in high-risk debris flow and landslide areas.	City Manager Los Angeles County Fire Department	Ongoing	X			X	
LM #5-3	Limit activities in identified potential and historical landslide areas through regulation and public outreach.	City Manager Planning Department	Ongoing	X				X

Section 1

Introduction

Throughout history, the residents of City of Rolling Hills have dealt with the various natural hazards affecting the area. Photos, journal entries, and newspapers show that the residents of the area dealt with earthquake, windstorm, wildfire, and land movement.

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

The City of Rolling Hills is located near the coast in Los Angeles County, and offers the benefits of living in a Mediterranean type of climate. The 3 square mile City is an entirely residential private gated community. The City is characterized by the unique and attractive landscape that makes the area so popular. However, the potential impacts of natural hazards associated with the terrain make the environment and population vulnerable to natural disasters.

The City is subject to earthquakes, windstorms, wildfires, and land movement. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the City. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from these natural disasters.

The Flying Triangle Area was determined to be in a landslide area when in 1948 the County of Los Angeles performed soil and geology studies for potential development below this area. At the time the area was vacant. However, due to lack of restrictions and building codes, and lack of technology, the County of Los Angeles allowed this area to be developed. The City of Rolling Hills incorporated in 1957 and since has adopted the County of Los Angeles Building Codes. The City of Rolling Hills continued to allow construction under the Los Angeles County Codes.

In 1973, there was a large fire in the Flying Triangle which burnt all of the vegetation, ten homes, five stables and other structures. All of the homes were built back, with a signed waiver that the owners are aware that this is a slide area and indemnifying the City and County from any liability. Most homes have leach fields lines, which was permitted then, but is not allowed now.

Why Develop a Mitigation Plan?

As the cost of damage from natural disasters continues to increase, the community realizes the importance of identifying effective ways to reduce vulnerability to disasters. Natural hazard mitigation plans assist communities in reducing risk from natural hazards by identifying resources, information, and strategies for risk reduction, while helping to

guide and coordinate mitigation activities throughout the City.

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

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

The mitigation plan works in conjunction with other City plans, including the City's General Plan and Multi-Hazard Functional Plan.

Whom Does the Mitigation Plan Affect?

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

Map 1-1: Base Map of City of Rolling Hills
(Source: Yahoo Internet Browser)

Natural Hazard Land Use Policy in California

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

The continuing challenge faced by local officials and state government is to keep the network of local plans effective in responding to the changing conditions and needs of California's diverse communities, particularly in light of the very active seismic region in which we live.

This is particularly true in the case of planning for natural hazards where communities must balance development pressures with detailed information on the nature and extent of hazards.

Planning for natural hazards, calls for local plans to include inventories, policies, and ordinances to guide development in hazard areas. These inventories should include the compendium of hazards facing the community, the built environment at risk, the personal

property that may be damaged by hazard events and most of all, the people who live in the shadow of these hazards.

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 this to end-users and the general public to increase earthquake awareness, reduce economic losses, and save lives.

- The California Division of Forestry (CDF) is responsible for all aspects of wildland fire protection on private, state, and administers forest practices regulations, including landslide 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, serves local water needs by providing technical assistance.

Plan Methodology

Information in the Mitigation Plan is based on research from a variety of sources. Staff from the City of Rolling Hills conducted data research and analysis, participated at Planning Team meetings, facilitated public outreach activities, and developed the final mitigation plan. The research methods and various contributions to the plan included:

Input from the Planning Team:

The Planning Team convened two times to guide development of the Mitigation Plan. The Team played an integral role in developing the mission, goals, and action items for the Mitigation Plan. The Planning Team consisted of representatives of ten local

government agencies, including:

City of Rolling Hills City Manager's Office
City of Rolling Hills Planning Department
Rolling Hills Community Association, a private corporation
County of Los Angeles Building and Safety
County of Los Angeles Sheriff's Department
County of Los Angeles Fire Department
Palos Verdes Peninsula Unified School District
Southern California Edison Company
California Water Service Company

Plan Reviewers:
The Planning Team identified common concerns related to natural hazards and identified key activities to reduce risk from natural hazards. The data and support gained from the review process was very valuable to the overall planning effort. A complete listing of all plan reviewers is located in Appendix B- Attachment 1.

State and federal guidelines and requirements for mitigation plans:

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

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

The following components must be part of the planning process:

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

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

Public participation opportunities were created through use of local media, the City's website, distribution of a natural hazards questionnaire, and the City Council public hearing. In addition, the makeup of the Planning Team insured a constant exchange of data and input from outside organizations.

Through its consultant, Emergency Planning Consultants, the City had access to numerous existing mitigation plans from around the country, as well as current FEMA hazard mitigation planning standards (386 series).

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

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

Hazard specific research: City of Rolling Hills staff collected data and compiled research on four hazards: earthquakes, windstorms, wildfires, and land movement. Research materials came from the City General Plan, the City's Threat Assessment contained in the Multi-Hazard Functional Plan, and state agencies including OES and CDF.

The City of Rolling Hills staff identified current mitigation activities, resources and programs, and potential action items from research materials and the plan review process.

Public Input

The City of Rolling Hills encouraged public participation and input in the Natural Hazards Mitigation Plan by publishing articles in the City's bi-monthly Newsletter. During the review period for the Plan Draft ten copies of the Plan were distributed to interested parties. Public copies of the Plan Draft were available at City Hall and the public was encouraged to participate in the City Council meeting which was held on November 22, 2004. During that public meeting the City Council praised the efforts of the Planning Team and voted unanimously to adopt the Plan. Public comments were solicited during the meeting, but no comments were offered.

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

How Is the Plan Used?

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

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

The mitigation plan is organized into three parts. Part I contains an executive summary, Mitigation Actions Matrix, introduction, and plan maintenance. Part II contains a city profile, risk assessment, and hazard-specific sections. Part III includes the appendices. Each section of the plan is described below.

Part I: Mitigation Actions

Executive Summary: Hazard Mitigation Action Plan

The Hazard Mitigation Action Plan provides an overview of the mitigation plan mission, goals, and action items.

Attachment 1: Mitigation Actions Matrix

The plan action items are included in this section, and address multi-hazard issues, as well as hazard-specific activities that can be implemented to reduce risk and prevent loss from future natural hazard events.

Section 1: Introduction

The Introduction describes the background and purpose of developing the mitigation plan for City of Rolling Hills.

Section 2: Plan Maintenance

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

Section 3: Community Profile

This section presents the history, geography, demographics, and socioeconomics

of the City of Rolling Hills. It serves as a tool to provide an historical perspective of natural hazards in the City.

Section 4: Risk Assessment

This section provides information on hazard identification, vulnerability and risk associated with natural hazards in City of Rolling Hills.

Part II: Hazard Analysis

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

Sections 5-8: Hazard-Specific Sections

Hazard-Specific Sections on the four 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 5: Earthquake
Section 6: Windstorm
Section 7: Wildfire
Section 8: Land Movement

Each of the hazard-specific sections includes information on the history, hazard causes, characteristics, and hazard assessment.

Part III: Resources

The plan appendices are designed to provide users of the City of Rolling Hills Natural Hazards Mitigation Plan with additional information to assist them in understanding the contents of the mitigation plan, and potential resources to assist them with implementation.

Appendix A: Plan Resource Directory

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

Appendix B: Public Participation

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

Appendix C: Benefit/Cost Analysis

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

Appendix D: List of Acronyms

This section provides a list of acronyms for City, regional, state, and federal agencies and organizations that may be referred to within the City of Rolling Hills Natural Hazards Mitigation Plan.

Appendix E: Glossary

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

Section 2:

Plan Maintenance

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

Monitoring and Implementing the Plan

Plan Adoption

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

Coordinating Body

The City's Planning Team will be responsible for coordinating implementation of plan action items and undertaking the formal review process. The City Manager will assign representatives from City agencies, including, but not limited to, the current Planning Team members. The City's Natural Hazards Planning Team consists of the following members:

City of Rolling Hills	Craig Nealis, City Manager
	Yolanta Schwartz, Planning Director
Rolling Hills Community Association	Roger Vink, Supervisor
Los Angeles County	Ed Acosta, Engineering Specialist

In order to make this Team as broad and useful as possible, the City Manager will engage other relevant organizations and agencies in hazard mitigation. Other potential additions to the Planning Team could include:

A representative from Los Angeles County Fire and Sheriff's Departments
A representative from the Rolling Hills Community Association
A utility company representative

The Planning Director will be responsible for evaluating the plan on an annual basis. Every five years, prior to submitting a progress report to the Office of Emergency Services, a meeting will be scheduled with the staff of the other agencies, constituting the Planning Team to review the progress of the City's implementation plan. These meetings will provide an opportunity to discuss the progress of the action items and maintain the partnerships that are essential for the sustainability of the mitigation plan.

Convener

The City Council adopted the Natural Hazards Mitigation Plan, and the Planning Team will take responsibility for plan implementation. The City Manager will serve as a convener to facilitate the meetings, and will assign tasks such as updating and presenting the Plan to the members of the Team. Plan implementation and evaluation will be a shared responsibility among all of the Team members.

Implementation through Existing Programs

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

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

The meetings of the Planning Team will provide an opportunity for members to report back on the progress made on the integration of mitigation planning elements into the City's planning documents and procedures.

Economic Analysis of Mitigation Projects

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

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

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

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

At the Planning Team's first implementation meeting, the FEMA STAPLEE Tool (Plan Maintenance – Attachment 1) or some other prioritizing tool will be utilized to prioritize the action items identified in the Mitigation Actions Matrix (Executive Summary – Attachment 1). In addition, appropriate funding sources will be identified for the "top ten" priority action items for the year.

Evaluating and Updating the Plan

Formal Review Process

The Natural Hazards Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The evaluation process includes a firm schedule and timeline, and identifies the local agencies and organizations participating in plan evaluation. The convener or designee will be responsible for contacting the Planning Team members and organizing the annual meeting.

Team members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan.

The Team will review the goals and action items to determine their relevance to changing situations in the City, as well as changes in State or Federal policy, and to ensure they are addressing current and expected conditions. The Team 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 Team

members. The Planning Team will also notify all holders of the City's Plan when changes have been made. Every five years the updated Plan will be submitted to the State Hazard Mitigation Officer and the Federal Emergency Management Agency for review.

Continued Public Involvement

The City is dedicated to involving the public directly in review and updates of the Natural Hazards Mitigation Plan. The Planning Team members are responsible for the annual review and update of the plan.

The public will also have the opportunity to provide feedback about the Plan. Copies of the Plan will be catalogued and kept at all of the appropriate agencies in the City. The existence and location of these copies will be publicized in the City's Newsletter which reaches every household in the City. The plan also includes the address and the phone number of the City Planning Division, responsible for keeping track of public comments on the Plan.

In addition, copies of the Plan and any proposed changes will be posted on the City's 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 as deemed necessary by the Planning Team. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan. The Team will be responsible for using City resources to publicize the annual public meetings and maintain public involvement through resources such as the City Newsletter.

Plan Maintenance – Attachment 1: Simplified STAPLEE Worksheet

Simplified STAPLEE Worksheet – Prioritizing Mitigation Actions (Social, Technical, Administrative, Political, Legal, Economic, Environmental)

1. Fill in the goal. Use a separate worksheet for each goal. The considerations under each criterion are suggested ones to use; you can revise these to reflect your own considerations.

2. Fill in the action items associated with the goal.

3. **Scoring:** For each action item, indicate a plus (+) for favorable, and a negative (-) for less favorable.

When you complete the scoring, add up the positives to establish your priorities. For STAPLEE categories that do not apply, fill in N/A for not applicable. Only leave a blank if you do not know an answer – seek the input of an expert.

Goal: _____

STAPLEE Category	**S (Social)**		**T (Technical)**			**A (Administrative)**			**P (Political)**		
Categories (right) **Action Items (below)**	**Community Acceptance**	**Effect on Segment of Population**	**Technical Feasibility**	**Long-term Solution**	**Secondary Impacts**	**Staffing**	**Funding Allocated**	**Maintenance/ Operations**	**Political Support**	**Local Champion**	**Public Support**
1.											
2.											
3.											
4.											
5.											
6.											

STAPLEE Categories	L (Legal)			E (Economic)				E (Environmental)				
Categories (right) Action Items (below)	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/ Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws
1.												
2.												
3.												
4.												
5.												
6.												

Section 3:

Community Profile

Why Plan for Natural Hazards in City of Rolling Hills?

Natural hazards impact citizens, property, the environment, and the economy of the City of Rolling Hills. Earthquakes, windstorms, wildfires, and earth movements have exposed City of Rolling Hills residents and utility companies 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.

Although the population of Rolling Hills has been constant at less than 2000 people in the last three decades, the adjoining communities are increasing their populations and densities at a greater rate. The inevitability of natural hazards, and the growing population and activity within the City create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future natural hazard events. Identifying the risks posed by natural hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the City to create a natural hazards mitigation plan that addresses the potential impacts of hazard events.

Geography and the Environment

The City of Rolling Hills is characterized by beautifully wooded deep canyons and hilly terrain located on the San Pedro Hills of the Palos Verdes Peninsula in Southern California. The City of Rolling Hills is 2.98 square miles and is an entirely residential private gated community consisting of mostly large estate size one-story ranch style residences with agricultural and equestrian accessory structures and uses. Lot sizes range from a minimum of one acre to several acres in size. (Source: General Plan Land Use-3)

The City of Rolling Hills is located in the northwestern quadrant of Los Angeles County. It is bordered on the west by the City of Rancho Palos Verdes and on the east by the City of Rolling Hills Estates. The City is bordered on the southeast by Miralest and southwest by Portuguese Bend.

Elevations in the City range from a high of 1350 feet above sea level to a low of 500 feet above sea level.

Community Profile

From its inception in 1936, Rolling Hills has been guided by deed restrictions established by the original developer. The City was incorporated January 24, 1957. From its inception, the emphasis in Rolling Hills has been to create and maintain a distinctive rural residential character which preserves the sense of openness created by the areas hilly

topography (Source: General Plan Intro-1, Housing Element-1, and Green Sheet).

Rolling Hills has no public roads or streets. Use of privately owned roadways requires approval of the Rolling Hills Community Association. The City's privately-owned road network is typified by winding roads with a 25-50 foot paved cross section lacking in curbs, gutters, or sidewalks. Road width, coupled with steep grades and private roadways, effectively precludes public transit within the City (Source: General Plan Housing Element-35).

The City has five major collector streets: Portuguese Bend Road, Crest Road, Eastfield Drive, Southfield Drive, and Saddleback Road (Source: General Plan Circulation-2). Direct public transit service is not provided since all of the City's roadways are private. Transit service is provided along the south perimeter of the City by RTD line 225 which runs along Palos Verdes Drive North. There are no current plans to expand transit services (Source: General Plan Circulation-5).

The City of Rolling Hills is 100% residential. There are no hospitals, large corporations, or transportation corridors located within the city limits. One school is located in the city, owned and operated by the Palos Verdes Peninsula Unified School District and is located outside of the gates into the city.

Major Rivers

Major rivers do not impact Rolling Hills.

Climate

Temperatures in the Peninsula range from 56.1 degrees in the winter months to 69.7 degrees in the summer months. However the temperatures can vary over a wide range, particularly when the Santa Ana winds blow, bringing higher temperatures and very low humidity. Temperatures rarely exceed 85 degrees in the summer months (June - September), and rarely drop below 45.3 degrees in the winter months (November-March). In September 1955, the highest temperature was recorded at 110 degrees in lower Rolling Hills. The lowest temperature of 21 degrees was in December 1990 at the Botanic Gardens in Rolling Hills Estates. (Peninsula News, 1997)

It is rare to have wind speeds over 30 mph in the planning area. This is largely due to phenomenon created by the peninsula's natural landform.

Rainfall in the planning area averages 13.57 inches of rain per year. Due to the Peninsula's topography, the south and west slopes tend to receive less rain than the north and east slopes. Furthermore, actual rainfall in Southern California tends to fall in large amounts during sporadic and often heavy storms rather than consistently during storms at somewhat regular intervals. In short, rainfall in Southern California might be characterized as feast or famine within a single year.

The City of Rolling Hills enjoys the advantages of being located on the San Pedro Hills of the Palos Verdes Peninsula, including cool sea breezes and low concentrations of smog in the summer months, more sunshine due to its elevation above much of the coastal fog, and commanding views of the Pacific Ocean and Los Angeles Basin (Source: General Plan Land Use-1).

Minerals and Soils

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

Soils in Rolling Hills consist primarily of those which exist on gently sloping or rolling foothills and terraces throughout the Los Angeles Basin. Soil types consist predominantly of fertile clays with some loams and shales. The following soil types have been identified in the City: Altamont-Diablo Association (30-50% of the slopes), Ramona-Placentia Association (5-9% of the slopes), and Diablo-Altamont Association (2-9% of the slopes) (Source: General Plan OSCE-12).

No mineral resources or mines are indicated for the Rolling Hills area (Source: General Plan OSCE-13).

Most of Rolling Hills is composed of “Altimara Shale”, which is a marine deposit composed of various types of shale, including: clay shale, diatomaceous shale diatoms are microscopic plants and animals whose skeleton is made of silicon dioxide), siliceous shale (silicon dioxide cement causing the rock to be very hard). The main contributor to land sliding are volcanic ash layers called “tuff”, which may be altered to a particular clay called “bentonite” that when wetted becomes conducive to sliding. Also common is basalt, the contact between the shale and basalt can be conducive to land sliding due to differences in permeability. Finally there is what is known as “catalina schist breccia”, it is not known to be particularly unstable.

As far as soils, the Altimera Shale weathers to “adobe clay” a black, clay soil that is very hard when dry and spongy when wet. It is very common throughout the peninsula as an alteration product of the shales. The diatomaceous shale, if abundant in diatoms, has been quarried at various locales on the peninsula. Its primary use is filtering material.

Other Significant Geologic Features

City of Rolling Hills, like most of the Los Angeles Basin, lie over the area of one or more known earthquake faults, and potentially many more unknown faults, particularly so-called lateral or blind thrust faults.

The major faults that have the potential to affect the greater Los Angeles Basin, and therefore the City of Rolling Hills are the:

Newport Inglewood
Palos Verdes
Santa Monica
Cabrillo

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

In addition, many areas in the Los Angeles Basin have sandy soils that are subject to liquefaction. The City of Rolling Hills has liquefaction zones that are discussed in Section 5: Earthquake.

The City of Rolling Hills also has areas with landslide potential. Currently the city has potentially active landslide activity in the Flying Triangle Area. Although Rolling Hills is subject to moderate to high seismic shaking, the general lack of thick, loose, sandy soils and saturated alluvial deposits makes the potential for liquefaction low to very low (Source: General Plan Safety Element-8).

The City of Rolling Hills, because of the nearby seismic sources and presence of large landslides and steep road cuts in some locations is vulnerable to earthquake-induced slope instability (Source: General Plan Safety Element-8). The City of Rolling Hills has the potential for complex, shallow and deep-seated earthquake-induced hillslope failure particularly if combined with high rain fall (Source: General Plan Safety Element-9).

Population and Demographics

City of Rolling Hills has a population of about 1,871 in an area of 2.98 square miles.

The increase of people living in City of Rolling Hills slowly creates more community exposure, and changes how agencies prepare for and respond to natural hazards. For example, more people living on the urban fringe can increase risk of fire. Wildfire has an increased chance of starting due to human activities in the urban/rural interface, and has the potential to injure more people and cause more property damage. But an

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

urban/wildland fire is not the only exposure to the City of Rolling Hills. In the 1987 publication, Fire Following Earthquake issued by the All Industry Research Advisory Council, Charles Scawthorn explains how a post-earthquake urban conflagration would develop. The conflagration would be started by fires resulting from earthquake damage, but made much worse by the loss of pressure in the fire mains, caused by either lack of electricity to power water pumps, and /or loss of water pressure resulting from broken fire mains.

The City of Rolling Hills is experiencing very little in-fill building. As a result, the population density is not expected to increase service loads on the built infrastructure, including roads, water supply, sewer services and storm drains. As a nearly built-out community, residential growth has begun to slow in Rolling Hills as the supply of buildable land becomes exhausted and various constraints prohibit redevelopment of existing lots at higher densities (Source: General Plan Housing Element-15).

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

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

Caucasian	79.8%
Hispanic	4.5%
African American	2%
Asian	14%
Native American	.03%

The ethnic and cultural diversity suggests a need to address multi-cultural needs and services.

The percentage of citizens living in poverty in the City of Rolling Hills is about 1.3% according to the 2000 Census. Of those, 0% are under 18 years old, and 0% are over 65.

Vulnerable populations, including seniors, disabled citizens, women, and children may be disproportionately impacted by natural hazards.

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

[2] www.fema.gov

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

Land and Development

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

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

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

Housing and Community Development

	City of Rolling Hills
Development Type	
Residential	100%
Commercial/Industrial	0%
Open Space	30%
Housing Type	
Single-Family	100%
Multi-Residential (20+ units)	0%
Mobilehomes	0%
Housing Statistics	
Total Available Housing Units	682

Owner-Occupied Housing	95.3%
Average Household Size	2.90
Average Home Value	$1,000,000+

Transportation and Commuting Patterns

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

According to the 2000 Census, the City has a population of 1,871. The mean travel time to work for the residents of the City of Rolling Hills is 32 minutes.

As stated in the City's General Plan, the City of Rolling Hills is served by the 405 and 110, connecting the city to adjoining parts of Los Angeles County. The City's includes 26 miles of roads and 23 miles of horse trails.

Section 4:

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 five levels of a risk assessment are as follows:

1) Hazard Identification
The Planning Team considered a range of natural hazards facing the region including: Earthquake, Flooding, Windstorms, Wildfires, Land Movement, Tsunami, and Drought. The attached Ranking Your Hazard (Risk Assessment – Attachment 1) handout guided the Team in prioritizing the natural hazards with the highest probability of significantly impacting the City of Rolling Hills. The Team agreed that any hazards receiving a Team average score of "3" or higher would be included in the Natural Hazards Mitigation Plan. Utilizing the ranking technique, the Team identified: Earthquakes, Windstorms, Wildfire, and Land Movement as the most prominent hazards facing the community.

This is the description of the geographic extent, potential intensity and the probability of occurrence of a given hazard. Maps are frequently used to display hazard identification data. The City of Rolling Hills identified four major hazards that affect this geographic area. These hazards – earthquakes, windstorms, wildfires, and land movement - were identified through an extensive process that utilized input from the Hazard Mitigation Planning Team. The geographic extent of each of the identified hazards has been identified by the City of Rolling Hills utilizing the maps contained in the City's General Plan and the MHFP Threat Assessment, and are illustrated in the tables, maps, and photos listed on page iii.

2) Profiling Hazard Events
This process describes the causes and characteristics of each hazard and what part of the City's population, infrastructure, and environment may be 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-Specific Sections (also see Risk Assessment – Attachment 2 Vulnerability: Location, Extend, and Probability).

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 facilities provide critical products and services to the general public that are necessary to preserve the welfare and quality of life in the City and fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities have been identified and are illustrated in Table

4-2. A description of the critical facilities in the City is also provided in this section. In addition, these tables indicate vulnerabilities to the various identified hazards.

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. Data was not available to make vulnerability determinations in terms of dollars losses. The Mitigation Actions Matrix (Executive Summary – Attachment 1) includes an action item to conduct such an assessment in the future.

5) Assessing Vulnerability/ Analyzing Development Trends

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

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

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

Federal Requirements for Risk Assessment

Recent federal regulations for hazard mitigation plans outlined in 44 CFR Part 201 include a requirement for risk assessment. This risk assessment requirement is intended to provide information that will help communities to identify and prioritize mitigation activities that will reduce losses from the identified hazards. There are four hazards profiled in the mitigation plan, including earthquakes, windstorms, wildfires, and earth

movements. The Federal criteria for risk assessment and information on how the City of Rolling Hills Natural Hazards Mitigation Plan meets those criteria is outlined in Table 4-1 below.

Table 4-1: 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 data are available; the existing maps identifying the location of the hazard were utilized. The Executive Summary and the Risk Assessment sections of the plan include a list of the hazard maps.
Profiling Hazard Events	Each hazard section includes documentation of the history, and causes and characteristics of the hazard in the City.
Assessing Vulnerability: Identifying Assets	Where data is available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of all publicly owned land within hazardous areas. Each hazard section provides information on vulnerable areas in the City in the Community Issues section. Each hazard section also identifies potential mitigation strategies.
Assessing Vulnerability: Estimating Potential Losses:	The Risk Assessment Section of this mitigation plan identifies key critical facilities 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 Community Profile Section of this plan provides a description of the development trends in the City, including the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns.

Critical and Essential Facilities

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

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. Table 4-2 illustrates the critical and essential facilities serving the City of Rolling Hills.

Table 4-2: City of Rolling Hills Critical and Essential Facilities Vulnerable to Hazards (data was not available to determine the extend of damages to the critical and essential facilities)

EQ	Fire	Wind	Land	Facility	Address
X		X		Los Angeles County Sheriff Substation	26123 Narborne Avenue, Lomita
X	X	X	X	Los Angeles County Fire Station #56	12 Crest Road, Rolling Hills
X	X	X	X	City Hall	2 Portuguese Bend Road, Rolling Hills
X	X	X	X	School	38 Crest Road W., Rolling Hills
X	X	X	X	Water Company, Water Tanks, and Pumps	Various Locations in the City. Main Office: 2632 W. 237th Street Torrance
X	X	X	X	Edison Company Utility Poles	Various Locations in the City. Main Office: 505 Maple Street, Torrance

Summary

It's important to emphasize that many of the critical and essential facilities serving the City of Rolling Hills are located outside of the city boundaries. In the event those outside services or facilities failed, the City of Rolling Hills would be greatly impacted.

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

Risk Assessment - Attachment 1

Ranking Your Hazards

It is important to keep in mind that your rankings should be based on a hazard event that would overwhelm your jurisdiction's ability to respond effectively.

For each hazard listed assign a score. Place a number in the appropriate box.

Hazard Scoring	
1	An event of that magnitude is not likely to occur
2	There is a slight chance that an event of that magnitude will occur
3	It is possible that an event of that magnitude will occur
4	An event of that magnitude has occurred here in the past and is likely to occur again
5	There is a high probability that an event of that magnitude will occur

Identify any additional hazards for the jurisdiction at the end of the list labeled as "Other Hazard."

Hazard	***Score***
Earthquake	
Flooding	
Wildfire	
Windstorm	
Earth Movement (Landslide/Debris Flow)	
Tsunami	
Drought	
Other Hazard _____	
Other Hazard _____	
Other Hazard _____	
Other Hazard _____	
Other Hazard _____	
Other Hazard _____	

Risk Assessment – Attachment 2
Vulnerability: Location, Extent, and Probability*

	Location (Where)	**Extent (How Big)**	**Probability (How Often)***
Hazard			
Earthquake	Entire Project Area	According to USGS, there is a 60% chance in the next 30 years of an earthquake measuring greater than 6.7 occurring in southern California.	Moderate
Windstorm	Entire Project Area	50 miles per hour or greater	Moderate
Wildfire	Entire Project Area	California CDF-FRAP wildfire rating is "Moderate"	Moderate
Land Movement	Entire Project Area	Inches to Several Feet	Moderate
* Probability is defined as: Low = 1:500 years, Moderate = 1:100 years, High = 1:10 years			

Section 5: Earthquake Hazards in the City of Rolling Hills

Why Are Earthquakes a Threat to the City of Rolling Hills?

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 moderate but very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures.

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

However, the earthquake occurred early in the morning on a holiday. This circumstance considerably reduced the potential effects. Many collapsed buildings were unoccupied, and most businesses were not yet open. The direct and indirect economic losses ran into the 10's of billions of dollars.

Although the Northridge Earthquake was felt by residents of City of Rolling Hills, there is no data concerning any actual damages or losses from that or any other historical earthquake.

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 crisscross Southern California. Some of the better known faults include the Newport-Inglewood, Whittier, Chatsworth, Elsinore, Hollywood, Los Alamitos, Puente Hills, 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 October 1987 Whittier Narrows Earthquake.

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 Fault would result in far more death and destruction than a "great" quake on the San Andreas Fault, because the San Andreas Fault is relatively remote from the urban centers of Southern California. For decades, partnerships have flourished between the USGS, Cal Tech, the California Geological Survey and universities to share research and educational efforts with Californians. Tremendous earthquake mapping and mitigation efforts have been made in California in the past two decades, and public awareness has risen remarkably during this time. Major federal, state, and local government agencies and private organizations support earthquake risk reduction, and have made significant contributions in reducing the adverse impacts of earthquakes. Despite the progress, the majority of California communities remain unprepared because there is a general lack of understanding regarding earthquake hazards among Californians.

Table 5-1: Earthquake Events in the Southern California Region

Southern California Region Earthquakes with a Magnitude 5.0 or Greater			
1769	Los Angeles Basin	1916	Tejon Pass Region
1800	San Diego Region	1918	San Jacinto
1812	Wrightwood	1923	San Bernardino Region
1812	Santa Barbara Channel	1925	Santa Barbara
1827	Los Angeles Region	1933	Long Beach
1855	Los Angeles Region	1941	Carpenteria
1857	Great Fort Tejon Earthquake	1952	Kern County
1858	San Bernardino Region	1954	W. of Wheeler Ridge
1862	San Diego Region	1971	San Fernando
1892	San Jacinto or Elsinore Fault	1973	Point Mugu
1893	Pico Canyon	1986	North Palm Springs
1894	Lytle Creek Region	1987	Whittier Narrows
1894	E. of San Diego	1992	Landers
1899	Lytle Creek Region	1992	Big Bear
1899	San Jacinto and Hemet	1994	Northridge
1907	San Bernardino Region	1999	Hector Mine
1910	Glen Ivy Hot Springs		
Source: http://geology.about.com/gi/dynamic/offsite.htm?site=http%3A%2F%2Fpasadena.wr.usgs.gov%2Finfo%2Fcahist_eqs.html			

To better understand the earthquake hazard, the scientific community has looked at historical records and accelerated research on those faults that are the sources of the earthquakes occurring in the Southern California region. Historical earthquake records can generally be divided into records of the pre-instrumental period and the instrumental period. In the absence of instrumentation, the detection 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 1857 Fort Tejon Earthquake (7.9) and the 1872 Owens Valley (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 1952 Kern County and 1992 Landers Earthquakes. 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.

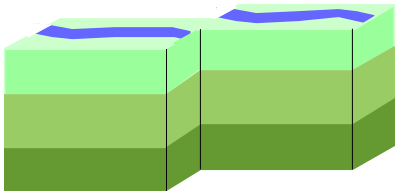
History of Earthquake Events in Southern California

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. Figure 5-1 describes the historical earthquake events that have affected Southern California.

Figure 5-1: Causes and Characteristics of Earthquakes in Southern California

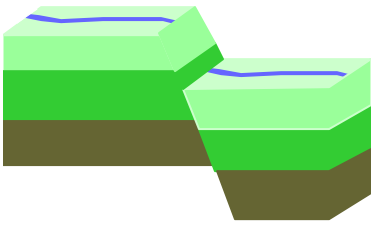
Earthquake Faults

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



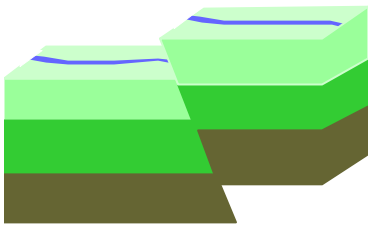
Strike-slip

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.



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

Earthquake Related Hazards

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

Ground Shaking

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

Earthquake-Induced Landslides

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

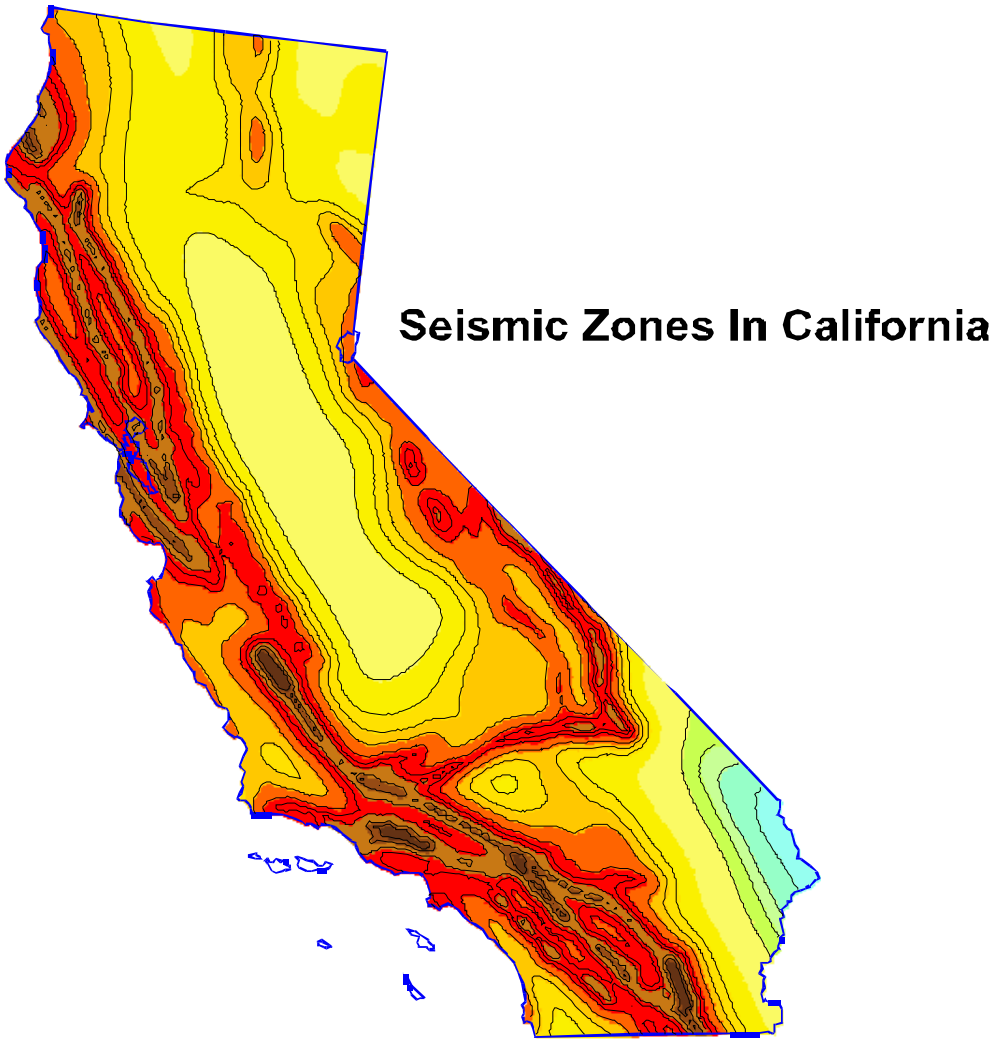
Liquefaction

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

Amplification

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

Map 5-1: Seismic Zones in California



Darker Shaded Areas indicate Greater Potential Shaking

Source: USGS Website

Earthquake Hazard Assessment

Hazard Identification

Earthquake-Attachment 1 Southern California Earthquake Fault Map plots the various major faults in the region. A list of Earthquake Probable Events gathered from the Southern California Earthquake Data Center is located in Earthquake-Attachment 2. The list includes various faults and projected magnitude earthquakes likely to impact the region. The Southern California Earthquake Data Center predicts that somewhere in southern California (not everywhere – many residents would not be affected) should experience a magnitude 7.0 or greater earthquake about seven times each century. About half of these will be on the San Andreas system (the San Andreas, San Jacinto, Imperial, and Elsinore Faults) and half will be on other faults. The equivalent probability in the next 30 years is 85%.

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

These organizations, in partnership with other state and federal agencies, have undertaken a rigorous program in California to identify seismic hazards and risks including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides. Seismic hazard maps have been published and are available for many communities in California through the State Division of Mines and Geology. Map 5-2 illustrates the known earthquake faults in Southern California.

Map 5-2: Major Active Surface Faults in Southern California

Source: Adapted from the map of major active Southern California surface faults published in "Seismic Hazards in Southern California: Probable Earthquakes, 1994-2024," Southern California Earthquake Center.

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

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

The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.[5] The State Department of Conservation operates the Seismic Mapping Program for California.

Extensive information is available at their website:
http://gmw.consrv.ca.gov/shmp/index.htm

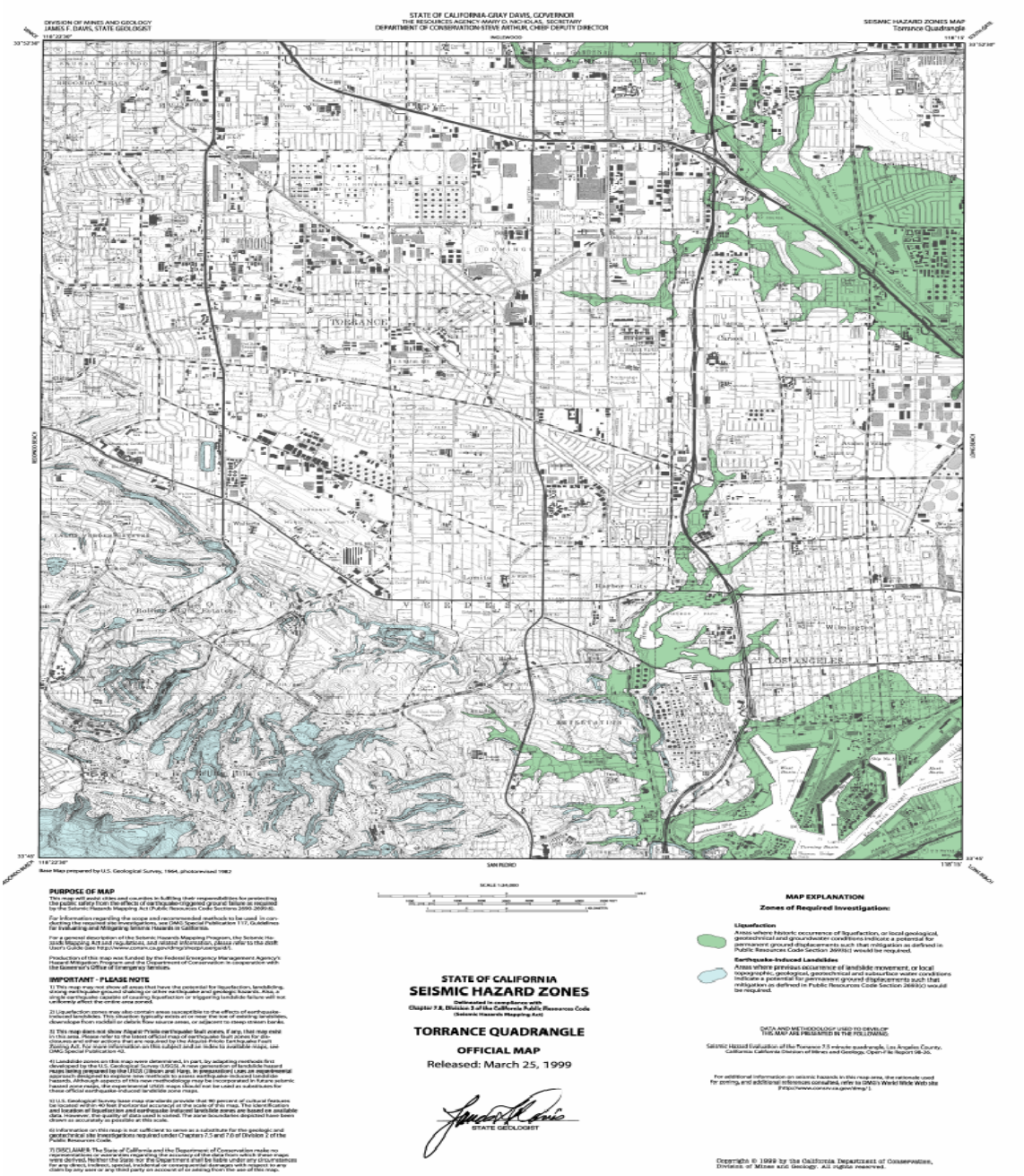
Vulnerability Assessment

The effects of earthquakes span a large area, and large earthquakes occurring in many parts of 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.

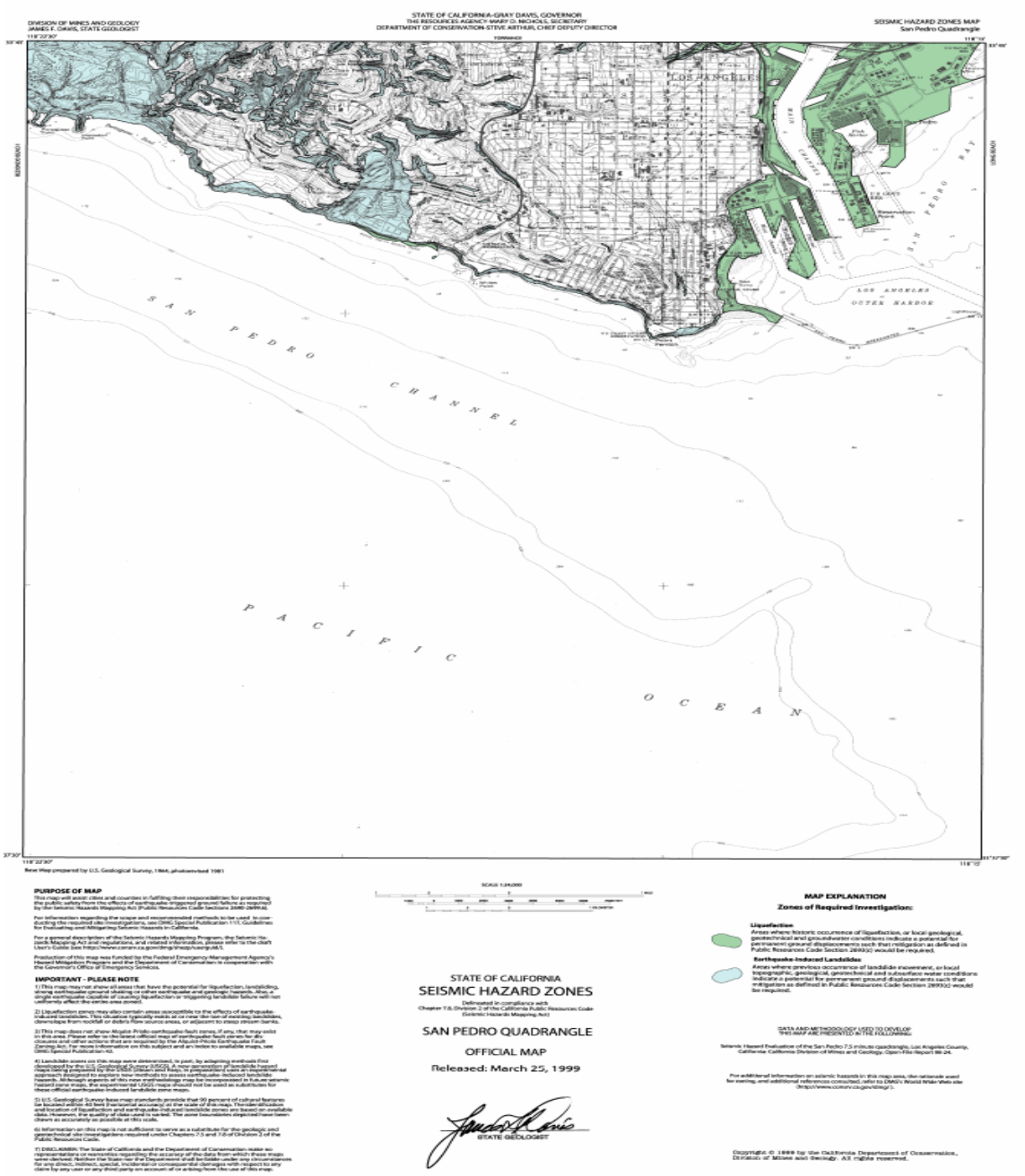
The California Geological Survey has identified areas most vulnerable to liquefaction. Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their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

The City of Rolling Hills has liquefaction zones and areas subject to earthquake-induced landslides, as shown on Maps 5-3 and 5-4.

Map 5-3: Liquefaction and EQ-Induced Landslide Zones in the City of Rolling Hills – Torrance Quadrangle
(Source: California Seismic Hazard Zones)
(Key: Green indicates area prone to liquefaction following earthquakes; Blue indicates area prone to landslides following earthquakes)



Map 5-4: Liquefaction and EQ-Induced Landslide Zones in the City of Rolling Hills – San Pedro Quadrangle
(Source: California Seismic Hazard Zones)
(Key: Green indicates area prone to liquefaction following earthquakes; Blue indicates area prone to landslides following earthquakes)



Southern California has many active landslide areas, and a large earthquake could trigger accelerated movement in these slide areas, in addition to jarring loose other unknown areas of landslide risk.

Risk Analysis

Risk analysis is the third phase of a hazard assessment. Risk analysis involves estimating the damage and costs likely to be experienced in a geographic area over a period of time.[6] Factors included in assessing earthquake risk include population and property distribution in the hazard area, the frequency of earthquake events, landslide susceptibility, buildings, infrastructure, and disaster preparedness of the region. This type of analysis can generate estimates of the damages to the 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.[7] 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 1994 Northridge Earthquake, Santa Monica suffered extensive damage, even though there was a range of mountains between it and the origin of the earthquake.

Damages for a large earthquake almost anywhere in Southern California are likely to run into the billions of dollars. Although building codes are some of the most stringent in the world, ten's of thousands of older existing buildings were built under much less rigid codes. California has laws affecting unreinforced masonry buildings (URM's) and although many building owners have retrofitted their buildings, hundreds of pre-1933 buildings still have not been brought up to current standards. The City of Rolling Hills does not have any unreinforced masonry public buildings.

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

Community Earthquake Issues

What is Susceptible to Earthquakes?

Earthquake damage occurs because humans have built structures that cannot withstand severe shaking. Buildings, airports, schools, and lifelines (highways and utility lines) suffer damage in earthquakes and can cause death or injury to humans. The welfare of homes, major businesses, and public infrastructure is very important. Addressing the reliability of buildings, critical facilities, and infrastructure, and understanding the

potential costs to government, businesses, and individuals as a result of an earthquake, are challenges faced by the city.

Dams

There are a total of 103 dams in Los Angeles County, owned by 23 agencies or organizations, ranging from the Federal government to Homeowner's Associations.[8] These dams hold billions of gallons of water in reservoirs. Releases of water from the major reservoirs are designed to protect Southern California from flood waters and to store domestic water. Seismic activity can compromise the dam structures, and the resultant flooding could cause catastrophic flooding. Following the 1971 Sylmar Earthquake the Lower Van Norman Dam showed signs of structural compromise, and tens of thousands of persons had to be evacuated until the dam could be drained. The dam has never been refilled.

The City of Rolling Hills is not subject to dam failure (Source: Threat Summary-1).

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, 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.

The Los Angeles County Building Code, Chapter 96, requires that all buildings built prior to March 20, 1933, except dwellings and lodging homes, and which have unreinforced masonry bearing walls, be retrofitted to reduce the risk of loss of life and injury. Los Angeles Building and Safety has no knowledge of any unreinforced masonry building in the City of Rolling Hills.

Almost all of the homes in Rolling Hills are engineered custom homes. The plan check staff reviews these designs for compliance with the current code seismic requirements.

Infrastructure and Communication

Residents in the City of Rolling Hills 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. Caltrans has retrofitted most bridges on the freeway systems; however there are still some county maintained bridges that are not retrofitted. The FHWA requires that bridges on the National Bridge Inventory be inspected every 2 years. Caltrans checks when the bridges are inspected because they administer the Federal funds for bridge projects.

Damage to Lifelines

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

Disruption of Critical Services

Critical facilities include police stations, fire stations, hospitals, shelters, and other facilities that provide important services to the community. These facilities and their services need to be functional after an earthquake event. See Section 4, Risk Assessment for critical and essential facilities vulnerable to earthquakes.

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.[9]

Although there are no businesses located within the boundaries of the City, the residents are dependent on the business services provided by the surrounding communities.

Individual Preparedness

Because the potential for earthquake occurrences and earthquake related property damage is relatively high in the City of Rolling Hills, 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 may trigger fires. When fire stations suffer building or lifeline damage, quick response to extinguish fires is less likely. Furthermore, major incidents will demand a larger share of resources, and initially smaller fires and problems will receive little or insufficient resources in the initial hours after a major earthquake event. Loss of electricity may cause a loss of water pressure in some communities, further hampering fire fighting ability.

Debris
After damage to a variety of structures, much time is spent cleaning up bricks, glass, wood, steel or concrete building elements, office and home contents, and other materials. Developing a strong debris management strategy is essential in post-disaster recovery. Disasters do not exempt the City of Rolling Hills from compliance with AB-939 regulations.

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

City of Rolling Hills Codes
Implementation of earthquake mitigation policy most often takes place at the local government level. The City of Rolling Hills contracts with the County of Los Angeles for enforcement of building codes pertaining to earthquake hazards.

The following sections of the Los Angeles County UBC address the earthquake hazard:

1605.2.1 (Distribution of Horizontal Shear);
1605.2.2 (Stability against Overturning);
1626-1629 (Seismic);
1605.2.3 (Anchorage); and
1110.2 (Geotechnical Hazards)

The City of Rolling Hills Planning Department enforces the zoning and land use regulations relating to earthquake hazards.
Generally, these codes seek to discourage development in areas that could be prone to flooding, land movement, wildfire and / or seismic hazards; and where development is

permitted, that the applicable construction standards are met. Developers in hazard-prone areas may be required to retain a qualified professional engineer to evaluate level of risk on the site and recommend appropriate mitigation measures.

Coordination Among Building Officials

The City of Rolling Hills Building Code sets the minimum design and construction standards for new buildings. In 2002 the City of Rolling Hills adopted the most recent seismic standards in its building code, which requires that new buildings be built at a higher seismic standard.

Since 2002 the City of Rolling Hills also requires that site-specific seismic hazard investigations be performed for new essential facilities, major structures, hazardous facilities, and special occupancy structures such as schools, hospitals, and emergency response facilities.

Hospitals

Although there are no hospitals in the City of Rolling Hills, earthquake damage to local hospitals would have a major effect on Rolling Hills residents. "The Alfred E. Alquist Hospital Seismic Safety Act ("Hospital Act") was enacted in 1973 in response to the moderate magnitude-6.6 1971 Sylmar Earthquake 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 1994 Northridge Earthquake 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 sub gradations 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.".[10]

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 developed, the risk will continue to increase. For decades the legislature has passed laws to strengthen the built environment and protect the citizens. Table 5-2 provides a sampling of some of the 200 plus laws in the State's codes.

Table 5-2: 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	

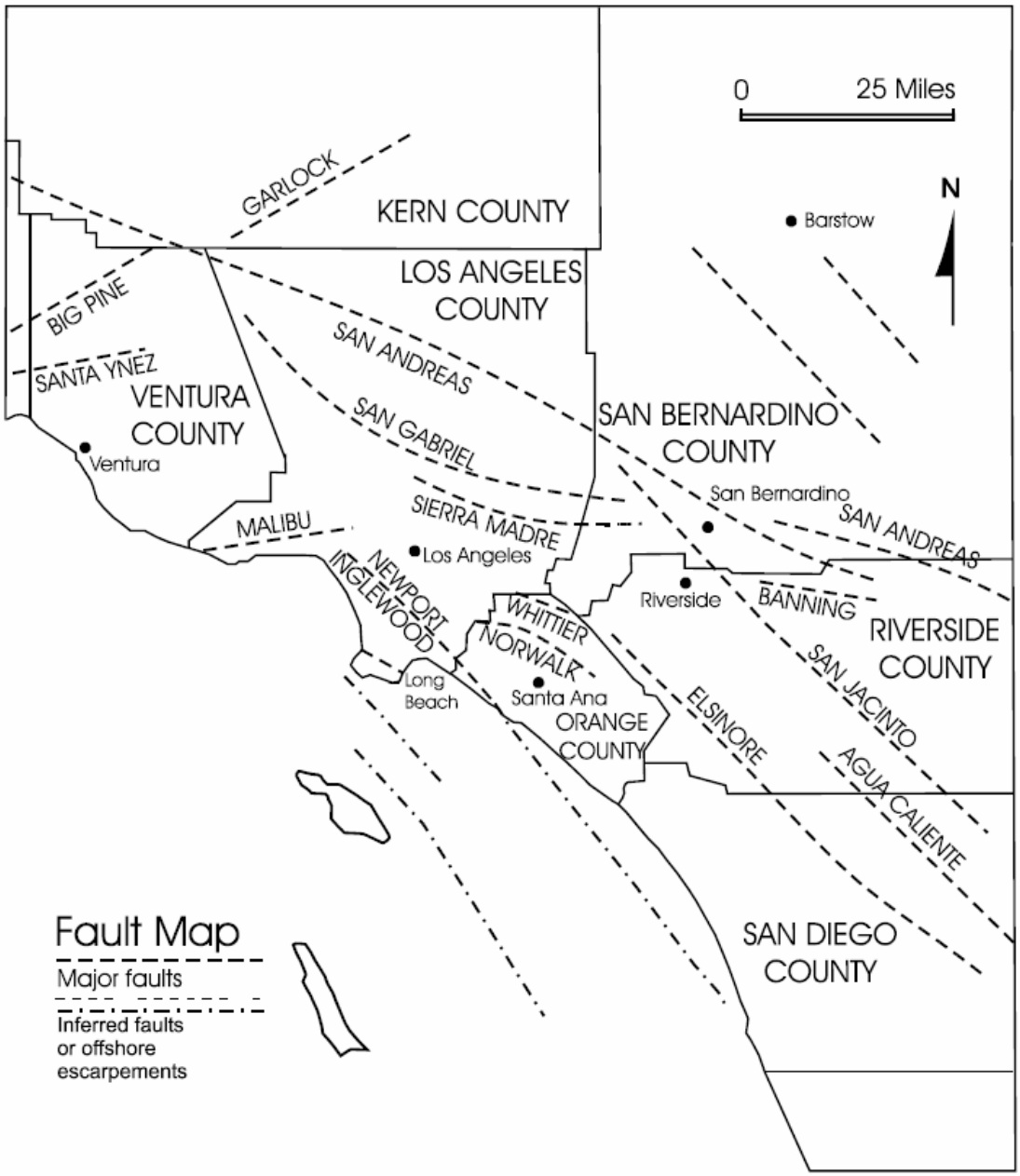
Earthquake Education

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 – Attachment 1

Southern California Earthquake Fault Map



Earthquake – Attachment 2

Earthquake Probable Events
(Source: Southern California Earthquake Data Center)

Elsinore Fault Zone
TYPE OF FAULTING: right-lateral strike-slip
LENGTH: about 180 km (not including the Whittier, Chino, and Laguna Salada faults)
NEARBY COMMUNITIES: Temecula, Lake Elsinore, Julian
LAST MAJOR RUPTURE: May 15, 1910; Magnitude 6 -- no surface rupture found
SLIP RATE: roughly 4.0 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: roughly 250 years
PROBABLE MAGNITUDES: M_w6.5 - 7.5
MOST RECENT SURFACE RUPTURE: 18th century A.D.(?)

Newport-Inglewood Fault Zone
TYPE OF FAULTING: right-lateral; local reverse slip associated with fault steps
LENGTH: 75 km
NEAREST COMMUNITIES: Culver City, Inglewood, Gardena, Compton, Signal Hill, Long Beach, Seal Beach, Huntington Beach, Newport Beach, Costa Mesa
MOST RECENT MAJOR RUPTURE: March 10, 1933, M_W6.4 (but no surface rupture)
SLIP RATE: 0.6 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown
PROBABLE MAGNITUDES: M_w6.0 - 7.4
OTHER NOTES: Surface trace is discontinuous in the Los Angeles Basin, but the fault zone can easily be noted there by the existence of a chain of low hills extending from Culver City to Signal Hill. South of Signal Hill, it roughly parallels the coastline until just south of Newport Bay, where it heads offshore, and becomes the Newport-Inglewood - Rose Canyon fault zone.

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 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 recurrence interval as between 100 and 300 years.

San Jacinto Fault Zone
TYPE OF FAULTING : right-lateral strike-slip; minor right-reverse

LENGTH: 210 km, including Coyote Creek fault
NEARBY COMMUNITIES: Lytle Creek, San Bernardino, Loma Linda, San Jacinto, Hemet, Anza, Borrego Springs, Ocotillo Wells
MOST RECENT SURFACE RUPTURE: within the last few centuries; April 9, 1968, M_w6.5 on Coyote Creek segment
SLIP RATE: typically between 7 and 17 mm/yr
INTERVAL BETWEEN SURFACE RUPTURES: between 100 and 300 years, per segment
PROBABLE MAGNITUDES: M_w6.5 - 7.5

Sierra Madre Fault System
TYPE OF FAULTING: reverse - ANIMATION
LENGTH: the zone is about 55 km long;
total length of main fault segments is about 75 km, with each segment measuring roughly 15 km long
NEARBY COMMUNITIES: Sunland, Altadena, Sierra Madre, Monrovia, Duarte, Glendora
MOST RECENT SURFACE RUPTURE: Holocene
SLIP RATE: between 0.36 and 4 mm/yr
INTERVAL BETWEEN SURFACE RUPTURES: several thousand years (?)
PROBABLE MAGNITUDES: M_w6.0 - 7.0 (?)
OTHER NOTES: This fault zone dips to the north. It was not the fault responsible for the 1991 Sierra Madre earthquake.

Whittier Fault
TYPE OF FAULTING: right-lateral strike-slip with some reverse slip
LENGTH: about 40 km
NEARBY COMMUNITIES: Yorba Linda, Hacienda Heights, Whittier
MOST RECENT SURFACE RUPTURE: Holocene
SLIP RATE: between 2.5 and 3.0 mm/yr
INTERVAL BETWEEN MAJOR RUPTURES: unknown
PROBABLE MAGNITUDES: M_w6.0 - 7.2
OTHER NOTES: The Whittier fault dips toward the northeast.

End Notes

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

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

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

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

[5] Ibid

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

[7] FEMA HAZUS http://www.fema.gov/hazus/hazus2.htm (May 2001).

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

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

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

Section 6: Windstorm Hazards in the City of Rolling Hills

Why are Severe Windstorms a Threat to the City of Rolling Hills?
Severe windstorms pose a significant risk to property and a risk to life in the region by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. High winds can and do occasionally cause tornado-like damage to local homes. Severe windstorms can present a very destabilizing effect on the dry brush that covers local hillsides and urban wildland interface areas. High winds can have destructive impacts, especially to trees, power lines, and utility services.

Figure 6-1: Santa Ana Winds (Source: NASA's "Observatorium")

Santa Ana Winds and Tornado-Like Wind Activity
Based on local history, most incidents of high wind in the City of Rolling Hills are the result of the Santa Ana wind conditions. While high impact wind incidents are not frequent in the area, significant Santa Ana wind events and sporadic tornado activity have been known to negatively impact the local community.

What are Santa Ana Winds?
"Santa Ana winds are generally defined as warm, dry winds that blow from the east or northeast (offshore). These winds occur below the passes and canyons of the coastal ranges of Southern California and in the Los Angeles basin. Santa Ana winds often blow with exceptional speed in the Santa Ana Canyon (the canyon from which it derives its name). Forecasters at the National Weather Service offices in Oxnard and San Diego usually place speed minimums on these winds and reserve the use of "Santa Ana" for winds greater than 25 knots."[1] These winds accelerate to speeds of 35 knots as they move through canyons and passes, with gusts to 50 or even 60 knots.

"The complex topography of Southern California combined with various atmospheric conditions creates numerous scenarios that may cause widespread or isolated Santa Ana events. Commonly, Santa Ana winds develop when a region of high pressure builds over the Great Basin (the high plateau east of the Sierra Mountains and west of the Rocky Mountains including most of Nevada and Utah). Clockwise circulation around the center of this high pressure area forces air downslope from the high plateau. The air warms as it descends toward the California coast at the rate of 5 degrees F per 1000 feet due to compressional heating. Thus, compressional heating provides the primary source of warming. The air is dry since it originated in the desert, and it dries out even more as it is heated."[2]

These regional winds typically occur from October to March, and, according to most accounts are named either for the Santa Ana River Valley where they originate or for the Santa Ana Canyon, southeast of Los Angeles, where they pick up speed.

What are Tornados?

Tornadoes are spawned when there is warm, moist air near the ground, cool air aloft, and winds that speed up and change direction. An obstruction, such as a house, in the path of the wind causes it to change direction. This change increases pressure on parts of the house, and the combination of increased pressures and fluctuating wind speeds creates stresses that frequently cause structural failures.

In order to measure the intensity and wind strength of a tornado, Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale. This scale compares the estimated wind velocity with the corresponding amount of suspected damage. The scale measures six classifications of tornadoes with increasing magnitude from an "F0" tornado to a "F6+" tornado.

Table 6-1: Fujita Tornado Damage Scale

Scale	Wind Estimate (mph)	Typical Damage
F0	< 73	**Light damage.** Some damage to chimneys and TV antennas; breaks twigs off trees; pushes over shallow-rooted trees.
F1	73-112	**Moderate damage.** Peels surface off roofs; windows broken; light trailer houses pushed or overturned; some trees uprooted or snapped; moving automobiles pushed off the road. 74 mph is the beginning of hurricane wind speed.
F2	113-157	**Considerable damage.** Roofs torn off frame houses leaving strong upright walls; weak buildings in rural areas demolished; trailer houses destroyed; large trees snapped or uprooted; railroad boxcars pushed over; light object missiles generated; cars blown off highway.
F3	158-206	**Severe damage.** Roofs and some walls torn off frame houses; some rural buildings completely demolished; trains overturned; steel-framed hangar-warehouse-type structures torn; cars lifted off the ground; most trees in a forest uprooted snapped, or leveled.

F4	207-260	**Devastating damage.** Whole frame houses leveled, leaving piles of debris; steel structures badly damaged; trees debarked by small flying debris; cars and trains thrown some distances or rolled considerable distances; large missiles generated.
F5	261-318	**Incredible damage.** Whole frame houses tossed off foundations; steel-reinforced concrete structures badly damaged; automobile-sized missiles generated; trees debarked; incredible phenomena can occur.
F6-F12	319 to sonic	**Inconceivable damage.** Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.
Source: http://weather.latimes.com/tornadoFAQ.asp		

Microbursts

Unlike tornados, microbursts, are strong, damaging winds which strike the ground and often give the impression a tornado has struck. They frequently occur during intense thunderstorms. The origin of a microburst is downward moving air from a thunderstorm's core. But unlike a tornado, they affect only a rather small area.

University of Chicago storm researcher Dr Ted Fujita first coined the term “downburst” to describe strong, downdraft winds flowing out of a thunderstorm cell that he believed were responsible for the crash of Eastern Airlines Flight 66 in June of 1975.[3]

A downburst is a straight-direction surface wind in excess of 39 mph caused by a small-scale, strong downdraft from the base of convective thundershowers and thunderstorms. In later investigations into the phenomena he defined two sub-categories of downbursts: the larger macrobursts and small microbursts.[4]

Macrobursts are downbursts with winds up to 117 mph which spread across a path greater than 2.5 miles wide at the surface and which last from 5 to 30 minutes. The microburst, on the other hand is confined to an even smaller area, less than 2.5 miles in diameter from the initial point of downdraft impact. An intense microburst can result in damaging winds near 270 km/hr (170 mph) and often last for less than five minutes.[5]

> “Downbursts of all sizes descend from the upper regions of severe thunderstorms when the air accelerates downward through either exceptionally strong evaporative cooling or by very heavy rain which drags dry air down with it. When the rapidly descending air strikes the ground, it spreads outward in all directions, like a fast-running faucet stream hitting the sink bottom.
> When the microburst wind hits an object on the ground such as a house, garage or tree, it can flatten the buildings and strip limbs and branches from the tree. After striking the ground, the powerful outward running gust can wreak further havoc along its path. Damage associated with a

> microburst is often mistaken for the work of a tornado, particularly directly under the microburst. However, damage patterns away from the impact area are characteristic of straight-line winds rather than the twisted pattern of tornado damage."[6]

Tornados, like those that occur every year in the Midwest and Southeast parts of the United States, are a rare phenomenon in most of California, with most tornado-like activity coming from micro-bursts.

Local History of Windstorm Events

While the effects of Santa Ana Winds are often overlooked, it should be noted that in 2003, two deaths in Southern California were directly related to the fierce condition. A falling tree struck one woman in San Diego.[7] The second death occurred when a passenger in a vehicle was hit by a flying pickup truck cover launched by the Santa Ana Winds.[8]

Table 6-2: Santa Ana Wind Events during 2003

The following Santa Ana wind events were featured in news resources during 2003:	
January 6, 2003 OC Register	"One of the strongest Santa Ana windstorms in a decade toppled 26 power poles in Orange early today, blew over a mobile derrick in Placentia, crushing two vehicles, and delayed Metrolink rail service." This windstorm also knocked out power to thousands of people in northeastern Orange County.
January 8, 2003 CBSNEWS.com	"Santa Ana's roared into Southern California late Sunday, blowing over trees, trucks and power poles. Thousands of people lost power."
March 16, 2003 dailybulletin.com	Fire Officials Brace for Santa Ana Winds - - "The forest is now so dry and so many trees have died that fires, during relatively calm conditions, are running as fast and as far as they might during Santa Ana Winds. Now the Santa Ana season is here. Combine the literally tinder dry conditions with humidity in the single digits and 60-80 mph winds, and fire officials shudder."

Table 6-3: Major Windstorms in the Vicinity of Rolling Hills

Date	Location and Damage
November 5-6, 1961	Santa Ana winds. Fire in Topanga Canyon
February 10-11, 1973	Strong storm winds: 57 mph at Riverside, 46 Newport Beach. Some 200 trees uprooted in Pacific Beach alone
October 26-27, 1993	Santa Ana winds. Fire in Laguna Hills

October 14, 1997	Santa Ana winds: gusts 87 mph in central Orange County. Large fire in Orange County
December 29, 1997	Gusts 60+ mph at Santa Ana
March 28-29, 1998	Strong storm winds in Orange County: sustained 30-40 mph. Gust 70 mph at Newport Beach, gust 60 Huntington Beach. Trees down, power out, and damage across Orange and San Diego Counties. 1 illegal immigrant dead in Jamul.
September 2, 1998	Strong winds from thunderstorms in Orange County with gusts to 40mph. Large fires in Orange County
December 6, 1998	Thunderstorm in Los Alamitos and Garden Grove: gust 50-60 mph called “almost a tornado”
December 21-22, 1999	Santa Ana winds: gust 68 mph at Campo, 53 Huntington Beach, 44 Orange. House and tree damage in Hemet.
March 5-6, 2000	Strong thunderstorm winds at the coast: gust 60 mph at Huntington Beach Property damage and trees downed along the coast
April 1, 2000	Santa Ana winds: gust 93 mph at Mission Viejo, 67 Anaheim Hills
December 25-26, 2000	Santa Ana winds: gust 87 mph at Fremont Canyon. Damage and injuries in Mira Loma, Orange and Riverside Counties
February 13, 2001	Thunderstorm gust to 89 mph in east Orange
Source:http://www.wrh.noaa.gov/sandiego/research/Guide/weatherhistory.pdf	

The following is a glimpse of major tornado-like events to hit in the vicinity of the City of Rolling Hills and surrounding areas:

Table 6-4: Major Tornado-like Events in the Vicinity of Rolling Hills

Major Tornado-like Events in the Orange County Area 1958-2001	
Date	**Location and Damage**
April 1, 1958	Tornado: Laguna Beach
February 19, 1962	Tornado: Irvine
April 8, 1965	Tornado: Costa Mesa
November 7, 1966	Newport Beach and Costa Mesa: Property Damage
March 16, 1977	Tornado skipped from Fullerton to Brea Damage to 80 homes and injured four people
February 9, 1978	Tornado: Irvine. Property damage and 6 injured
January 31, 1979	Tornado Santa Ana Numerous power outages
November 9, 1982	Tornadoes in Garden Grove and Mission Viejo. Property damage

January 13, 1984	Tornado: Huntington Beach. Property damage
March 16, 1986	Tornado: Anaheim. Property damage
February 22-24, 1987	Tornadoes and waterspouts: Huntington Beach
January 18, 1988	Tornadoes: Mission Viejo and San Clemente. Property damage
February 28, 1991	Tornado: Tustin
March 27, 1991	Tornado: Huntington Beach
December 7, 1992	Tornadoes: Anaheim and Westminster Property damage
January 18, 1993	Tornado: Orange County Property damage
February 8, 1993	Tornado: Brea. Property damage
February 7, 1994	Tornado from Newport Beach to Tustin. Roof and window damage. Trees were also knocked down
December 13, 1994	Two waterspouts about 0.5 mile off Newport Beach
December 13, 1995	Funnel cloud near Fullerton Airport
March 13, 1996	Funnel cloud in Irvine
November 10-11, 1997	Waterspout came ashore at Newport Pier on the 10th and dissipated over western Costa Mesa. Tornadoes in Irvine on the 11th and a funnel cloud developed. 10th: Winds estimated at 60-70 mph. 11th: Minor power outages occurred with little property damage. A fisherman was blown from one end of Newport Pier to the other. Property and vehicle damage in Irvine from flying debris. Ten cars were thrown a few feet.
December 21, 1997	Waterspout and tornado in Huntington Beach. Damage to boats, houses, and city property
February 24, 1998	Tornado in Huntington Beach. Property damage with a power outage, roof flew ¼ mile
March 13-14, 1998	Numerous waterspouts between Long Beach, Huntington Beach, and Catalina
March 31-April 1, 1998	Numerous funnel clouds reported off Orange County coastline, two of which became waterspouts off Orange County. One waterspout briefly hit the coast off the Huntington Beach pier.
June 6, 1998	Two funnel clouds off Dana Point
December 31, 1998	Funnel clouds in Santa Ana. Waterspout off Costa Mesa coast
February 21, 2000	Tornado: Anaheim Hills. Property damage
October 28, 2000	Funnel clouds around Newport Beach and Costa Mesa
January 10, 2001	Funnel cloud at Orange County airport and Newport Beach
February 24, 2001	Tornado in Orange. Damage to warehouse, 6 structures, fences, and telephone wires.

Source: http://www.wrh.noaa.gov/sandiego/research/Guide/weatherhistory.pdf

Windstorm Hazard Assessment

Hazard Identification

A windstorm event in the region can range from short term microburst activity lasting only minutes to a long duration Santa Ana wind condition that can last for several days as in the case of the January 2003 Santa Ana wind event. Windstorms in the City of Rolling Hills area can cause extensive damage including heavy tree debris, road and infrastructure, and critical utility facilities.

The map shows clearly the direction of the Santa Ana winds as they travel from the stable, high-pressure weather system called the Great Basin High through the canyons and towards the low-pressure system off the Pacific. Clearly the area of the City of Rolling Hills is in the direct path of the ocean-bound Santa Ana winds.

Vulnerability and Risk

With an analysis of the high wind and tornado events depicted in the "Local History" section, we can deduce the common windstorm impact areas including impacts on life, property, utilities, infrastructure and transportation. Additionally, if a windstorm disrupts power to local residential communities, the American Red Cross and City resources might be called upon for care and shelter duties. Displacing residents and utilizing City resources for shelter staffing and disaster cleanup can cause an economic hardship on the community.

Community Windstorm Issues

What is Susceptible to Windstorms?

Life and Property

Based on the history of the region, windstorm events can be expected, perhaps annually, across widespread areas of the region which can be adversely impacted during a windstorm event. This can result in the involvement of City of Rolling Hills emergency response personnel during a wide-ranging windstorm or microburst tornadic activity. Residential structures with weak reinforcement could be susceptible to damage. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift suction forces that pull building components and surfaces outward. With extreme wind forces, the roof or entire building can fail causing considerable damage. Typically, wind damage in the Rolling Hills has been limited to downed trees and minor damage to residential structures.

Debris carried along by extreme winds can directly contribute to loss of life and

indirectly to the failure of protective building envelopes, siding, or walls. When severe windstorms strike a community, downed trees, power lines, and damaged property can be major hindrances to emergency response and disaster recovery.

The Beaufort Scale below, coined and developed by Sir Francis Beaufort in 1805, illustrates the effect that varying wind speed can have on sea swells and structures:

Table 6-5: Beaufort Scale

BEAUFORT SCALE		
Beaufort Force	Speed (mph)	Wind Description - State of Sea - Effects on Land
0	Less 1	Calm - Mirror-like - Smoke rises vertically
1	1-3	Light - Air Ripples look like scales; No crests of foam - Smoke drift shows direction of wind, but wind vanes do not
2	4-7	Light Breeze - Small but pronounced wavelets; Crests do not break - Wind vanes move; Leaves rustle; You can feel wind on the face
3	8-12	Gentle Breeze - Large Wavelets; Crests break; Glassy foam; A few whitecaps - Leaves and small twigs move constantly; Small, light flags are extended
4	13-18	Moderate Breeze - Longer waves; Whitecaps - Wind lifts dust and loose paper; Small branches move
5	19-24	Fresh Breeze - Moderate, long waves; Many whitecaps; Some spray - Small trees with leaves begin to move
6	25-31	Strong Breeze - Some large waves; Crests of white foam; Spray - Large branches move; Telegraph wires whistle; Hard to hold umbrellas
7	32-38	Near Gale - White foam from breaking waves blows in streaks with the wind - Whole trees move; Resistance felt walking into wind
8	39-46	Gale - Waves high and moderately long; Crests break into spin drift, blowing foam in well marked streaks - Twigs and small branches break off trees; Difficult to walk
9	47-54	Strong Gale - High waves with wave crests that tumble; Dense streaks of foam in wind; Poor visibility from spray - Slight structural damage
10	55-63	Storm - Very high waves with long, curling crests; Sea surface appears white from blowing foam; Heavy tumbling of sea; Poor visibility - Trees

		broken or uprooted; Considerable structural damage
11	64-73	Violent Storm - Waves high enough to hide small and medium sized ships; Sea covered with patches of white foam; Edges of wave crests blown into froth; Poor visibility - Seldom experienced inland; Considerable structural damage
12	>74	Hurricane - Sea white with spray. Foam and spray render visibility almost non-existent - Widespread damage. Very rarely experienced on land.
Source: http://www.compuweather.com/decoder-charts.html		

Disruption of Critical Services

Critical facilities include sheriff 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 natural hazard event.

Utilities

Historically, falling trees have been the major cause of power outages in the region. Windstorms such as strong microbursts and Santa Ana Wind conditions can cause flying debris and downed utility lines. For example, tree limbs breaking in winds of only 45 mph can be thrown over 75 feet. As such, overhead power lines can be damaged even in relatively minor windstorm events. Falling trees can bring electric power lines down to the pavement, creating the possibility of lethal electric shock. Rising population growth and new infrastructure in the region creates a higher probability for damage to occur from windstorms as more life and property are exposed to risk.

Infrastructure

Windstorms can damage buildings, power lines, and other property and infrastructure due to falling trees and branches. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds.

Windstorms can result in collapsed or damaged buildings or blocked roads. Roads blocked by fallen trees during a windstorm may have severe consequences to people who need access to emergency services. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. There are direct consequences to the local economy resulting from windstorms related to both physical damages and interrupted services.

Increased Fire Threat

Perhaps the greatest danger from windstorm activity in Southern California comes from the combination of the Santa Ana winds with the major fires that occur every few years in the urban/wildland interface. With the Santa Ana winds driving the flames, the speed and reach of the flames is even greater than in times of calm wind conditions. The higher fire

hazard raised by a Santa Ana wind condition requires that even more care and attention be paid to proper brush clearances on property in the wildland/urban interface areas.

Transportation

Windstorm activity can have an impact on local transportation in addition to the problems caused by downed trees and electrical wires blocking streets and roadways. During periods of extremely strong Santa Ana winds, roadways can be temporarily closed to vehicle traffic. However, typically these disruptions are not long lasting, nor do they carry a severe long term economic impact on the city.

End Notes:

1http://nimbo.wrh.noaa.gov/Sandiego/snawind.html

2Ibid

3Keith C. Heidorn at http://www.suite101.com/article.cfm/13646/100918, June 1, 2003

4Ibid

5Ibid

6Ibid

7www.cbsnews.com, January 8, 2003

8www.cbsnews.com/stories/2003/01/06/national/

Section 7: Wildland/Urban Interface Fire Hazards in the City of Rolling Hills

Why are Wildfires a Threat to Southern California?

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

The 2003 Southern California Fires

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

Table 7-1: October 2003 Firestorm Statistics

County	Fire Name	Date Began	Acres Burned	Homes Lost	Homes Damaged	Lives Lost
Riverside	Pass	10/21/03	2,397	3	7	0
Los Angeles	Padua	10/21/03	10,446	59	0	0
San Bernardino	Grand Prix	10/21/03	69,894	136	71	0
San Diego	Roblar 2	10/21/03	8,592	0	0	0
Ventura	Piru	10/23/03	63,991	8	0	0
Los Angeles	Verdale	10/24/03	8,650	1	0	0
Ventura	Simi	10/25/03	108,204	300	11	0
San Diego	Cedar	10/25/03	273,246	2,820	63	14
San Bernardino	Old	10/25/03	91,281	1,003	7	6
San Diego	Otay / Mine	10/26/03	46,000	6	11	0
Riverside	Mountain	10/26/03	10,000	61	0	0
San Diego	Paradise	10/26/03	56,700	415	15	2
Total Losses			**749,401**	**4,812**	**185**	**22**
Source: http://www.fire.ca.gov/php/fire_er_content/downloads/2003LargeFires.pdf						

Historic Fires in Southern California

Large fires have been part of the Southern California landscape for millennia. "Written documents reveal that during the 19th century human settlement of southern California altered the fire regime of coastal California by increasing the fire frequency. This was an era of very limited fire suppression, and yet like today, large crown fires covering tens of thousands of acres were not uncommon. One of the largest fires in Los Angeles County (60,000 acres) occurred in 1878, and the largest fire in Orange County's history, in 1889, was over half a million acres."[3]

Table 7-2: Large Historic Fires in California 1961-2003

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

19	Kinneloa	October 1993	Los Angeles	5,485	196	1
20	Grand Prix	October 2003	San Bernardino	59,448	196	0
21	Old Gulch	August 1992	Calaveras	17,386	170	0
http://www.fire.ca.gov/FireEmergencyResponse/HistoricalStatistics/PDF/20LSTRUCTURES.pdf						
"Structures" is meant to include all loss - homes and outbuildings, etc.						

During the 2002 fire season, more than 6.9 million acres of public and private lands burned in the US, resulting in loss of property, damage to resources and disruption of community services.[4] Taxpayers spent more than $1.6 billion[5] to combat more than 88,400 fires nationwide. Many of these fires burned in wildland/urban interface areas and exceeded the fire suppression capabilities of those areas. Table 7-3 illustrates fire suppression costs for state, private and federal lands.

Table 7-3: National Fire Suppression Costs

Year	Suppression Costs	Acres Burned	Structures Burned
2000	$1.3 billion	8,422,237	861
2001	$0.5 billion	3,570,911	731
2002	$1.6 billion	6,937,584	815
http://research.yale.edu/gisf/assets/pdf/ppf/wildfire_report.pdf			

Wildfire Characteristics

There are three categories of interface fire:[6] The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas; the mixed wildland/urban interface is characterized by isolated homes, subdivisions and small communities situated predominantly in wildland settings; and the occluded wildland/urban interface exists where islands of wildland vegetation occur inside a largely urbanized area. Certain conditions must be present for significant interface fires to occur. The most common conditions include: hot, dry and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started, several conditions influence its behavior, including fuel topography, weather, drought and development.

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

> "Past fire suppression is not to blame for causing large shrub land wildfires, nor has it proven effective in halting them."" said Dr. Jon Keeley, a USGS fire researcher who studies both southern California shrub lands and Sierra Nevada forests. ""Under Santa Ana conditions, fires carry through all chaparral regardless of age class. Therefore, prescribed burning programs over large areas to remove old stands and maintain young growth as bands of firebreaks resistant to ignition are futile at stopping these wildfires."[7]

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

> "When Lewis and Clark explored the Northwest, the forests were relatively open, with 20 to 25 mature trees per acre. Periodically, lightning would start fires that would clear out underbrush and small trees, renewing the forests. Today's forests are completely different, with as many as 400 trees crowded onto each acre, along with thick undergrowth. This density of growth makes forests susceptible to disease, drought and severe wildfires. Instead of restoring forests, these wildfires destroy them and it can take decades to recover. This radical change in our forests is the result of nearly a century of well-intentioned but misguided management."[8]

The Interface

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

Fuel

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

The type of fuel also influences wildfire. Chaparral is a primary fuel of Southern California wildfires. Chaparral habitat ranges in elevation from near sea level to over

5,000' in Southern California. Chaparral communities experience long dry summers and receive most of their annual precipitation from winter rains. Although chaparral is often considered as a single species, there are two distinct types; hard chaparral and soft chaparral. Within these two types are dozens of different plants, each with its own particular characteristics.

"Fire has been important in the life cycle of chaparral communities for over 2 million years; however, the true nature of the "fire cycle" has been subject to interpretation. In a period of 750 years, it generally thought that fire occurs once every 65 years in coastal drainages and once every 30 to 35 years inland."[9]

> "The vegetation of chaparral communities has evolved to a point it requires fire to spawn regeneration. Many species invite fire through the production of plant materials with large surface-to-volume ratios, volatile oils and through periodic die-back of vegetation. These species have further adapted to possess special reproductive mechanisms following fire. Several species produce vast quantities of seeds which lie dormant until fire triggers germination. The parent plant which produces these seeds defends itself from fire by a thick layer of bark which allows enough of the plant to survive so that the plant can crown sprout following the blaze. In general, chaparral community plants have adapted to fire through the following methods; a) fire induced flowering; b) bud production and sprouting subsequent to fire; c) in-soil seed storage and fire stimulated germination; and d) on plant seed storage and fire stimulated dispersal."[10]

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

Topography

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

Weather

Weather patterns combined with certain geographic locations can create a favorable climate for wildfire activity. Areas where annual precipitation is less than 30 inches per year are extremely fire susceptible.[11] High-risk areas in Southern California share a hot,

dry season in late summer and early fall when high temperatures and low humidity favor fire activity. The so-called "Santa Ana" winds, which are heated by compression as they flow down to Southern California from Utah, create a particularly high risk, as they can rapidly spread what might otherwise be a small fire.

Drought

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

Development

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

Wildfire Hazard Assessment

Wildfire Hazard Identification

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

Table 7-4 illustrates a rating system to identify wildfire hazard risk (with a score of 3 equaling the most danger and a score of 1 equaling the least danger.)

Table 7-4: Sample Hazard Identification Rating System

Category	Indicator	Rating
Roads and Signage	Steep; narrow; poorly signed	3
	One or two of the above	2

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

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

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

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

Vulnerability and Risk

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

Key factors included in assessing wildfire risk include ignition sources, building materials and design, community design, structural density, slope, vegetative fuel, fire occurrence and weather, as well as occurrences of drought.

The National Wildland/Urban Fire Protection Program has developed the Wildland/Urban Fire Hazard Assessment Methodology tool for communities to assess

their risk to wildfire. For more information on wildfire hazard assessment refer to http://www.Firewise.org.

Community Wildfire Issues

What is Susceptible to Wildfire?

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

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

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

Disruption of Critical Services
Critical facilities include sheriff stations, fire stations, hospitals, shelters, and other facilities that provide important services to the community. These facilities and their services need to be functional during a wildfire event. See Section 4, Risk Assessment Table 4-2 for a listing of critical facilities and their vulnerability to wildfire.

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

Water Supply

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

Interface Fire Education Programs and Enforcement

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

The Need for Mitigation Programs

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

Wildfire End Notes

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

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

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

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

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

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

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

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

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

[10] Ibid

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

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

[13] http://www.fs.fed.us/land/wdfire7c.htm

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

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

Section 8:
Land Movement
in the
City of Rolling Hills

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

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

Historic Southern California Landslides

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

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

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

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

1963 Baldwin Hills Dam Failure
On December 14, the 650 foot long by 155 foot high earth fill dam gave way and sent 360 million gallons of water in a fifty foot high wall cascading onto the community

below, killing five persons, and damaging 50 million (1963 dollars) of dollars in property.

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

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

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

1971 Upper and Lower Van Norman Dams, San Fernando, California
Earthquake-induced landslide cost, $302.4 million (2000 dollars). Damage due to the February 9, 1971, M7.5 San Fernando Earthquake. The earthquake of February 9 severely damaged the Upper and Lower Van Norman Dams.[10]

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

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

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

1979 Big Rock, California, Los Angeles County
Cost, approximately $1.08 billion (2000 dollars) California's Pacific Coast Highway 1 rockslide.[14]

1980 Southern California Movements
$1.1 billion in damage (2000 dollars) Heavy winter rainfall in 1979-80 caused damage in six Southern California counties. In 1980, the rainstorm started on February 8. A sequence of 5 days of continuous rain and 7 inches of precipitation had occurred by February 14. Slope failures were beginning to develop by February 15 and then very high-intensity rainfall occurred on February 16. As much as 8 inches of rain fell in a 6 hour period in many locations. Records and personal observations in the field on

February 16 and 17 showed that the mountains and slopes literally fell apart on those 2 days.[15]

1983 San Clemente, California, Orange County
Cost, $65 million (2000 dollars), California Highway 1. Litigation at that time involved approximately $43.7 million (2000 dollars).[16]

1983 Big Rock Mesa, California
Cost, $706 million (2000 dollars) in legal claims condemnation of 13 houses, and 300 more threatened rockslide caused by rainfall [17]

1978-1979, 1980 San Diego County, California
Experienced major damage from storms in 1978, 1979, and 1979-80, as did neighboring areas of Los Angeles and Orange County, California. One hundred and twenty landslides were reported to have occurred in San Diego County during these 2 years. Rainfall for the rainy seasons of 78-79 and 79-80 was 14.82 and 15.61 inches (37.6 and 39.6 cm) respectively, compared to a 125-year average (1850-1975) of 9.71 inches (24.7 cm). Significant landslide occurred in the Friars Formation, a unit that was noted as slide-prone in the Seismic Safety Study for the City of San Diego. Of the nine landslides that caused damage in excess of $1 million, seven occurred in the Friars Formation, and two in the Santiago Formation in the northern part of San Diego County.[18]

1994 Northridge, California Earthquake Landslide
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. Landslide impacted dozens of homes, blocked roads, and damaged oil-field infrastructure. The spores released from the soil by the landslide activity[19] and blown toward the coastal populated areas caused deaths from Coecidioidomycosis (Valley Fever).

March 1995 Los Angeles and Ventura Counties, Southern California
Above normal rainfall triggered damaging debris flows, deep-seated landslide, and flooding. Several deep-seated landslide were triggered by the storms, the most notable was the La Conchita landslide, which in combination with a local debris flow, destroyed or badly damaged 11 to 12 homes in the small town of La Conchita, about 20 km west of Ventura. There also was widespread debris-flow and flood damage to homes, commercial buildings, and roads and highways in areas along the Malibu coast that had been devastated by wildfire 2 years before.[20]

Landslide Characteristics

What is a landslide?

"A landslide is defined as, the movement of a mass of rock, debris, or earth down a slope. Landslide 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. Landslide can also occur underwater, causing tidal waves and damage to coastal areas. These landslides are called submarine landslide."[21]

The size of a landslide usually depends on the geology and the initial cause. 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 landslide 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 landslide.[22]

"Failure of a slope occurs when the force that is pulling the slope downward (gravity) exceeds the strength of the earth materials that compose the slope. They can move slowly, (millimeters per year) or can move quickly and disastrously, as is the case with debris-flows. Debris-flows can travel down a hillside 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."[23]

What is a Debris 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.[24] This high rate of speed makes debris flows extremely dangerous to people and property in its path.

Landslide Events and Impacts

Landslides are a common hazard in California. Weathering and the decomposition of geologic materials produces conditions conducive to landslide 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, landslide will continue to threaten the safety of people, property, and infrastructure, but without proper

planning, landslide hazards will be even more common and more destructive.

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

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

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

Landslide Conditions

Landslides are often triggered by periods of heavy rainfall. Earthquakes, subterranean water flow and excavations may also trigger landslide. Certain geologic formations are more susceptible to landslide 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 landslide 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 landslide include: excavation, drainage and groundwater alterations, and changes in vegetation.[27]

Wildland fires in hills covered with chaparral are often a precursor to debris flows in burned out canyons. 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 landslide 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 landslide 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 landslide 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 landslide or places of known historic landslide (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 City of Rolling Hills. 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 landslide, these steeper slopes can be at an increased risk for landslide. The added weight of fill placed on slopes can also result in an increased landslide hazard. Small landslide 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 landslide. Any activity that increases the amount of water flowing into landslide-prone slopes can increase landslide hazards. Broken or leaking water or septic systems 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 landslide. 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 landslide.[28]

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.

Landslides are the most serious geological hazard facing the residential community of Rolling Hills. Many residences in Rolling Hills have been built upon pre-existing, unrecognized, or recognized, but unstabilized landslide. Geologically, most of the landslides within the City occur in the Altamira Shale Member of the Monterey Formation. Landslide rupture surfaces are commonly along plastic clay beds or seams within clayey shale or siltstone units (Source: General Plan Safety Element-13).

Slope modification during grading can render slopes unstable. Slope instability occurs when bedding planes intersect the slope face of either natural slopes or designed cut slopes. Site specific investigations are necessary to determine potential slope instability problems at specific sites.

Landslide are considered “potentially active”, meaning they could be reactivated in the future, either by excessive rainfall, introduction of artificial water in the slope (landscaping irrigation/broken water or septic systems), or improper site design or grading practices. Grading activities must consider these geologic constraints as a condition of project approval. The County of Los Angeles Public Works Department acts as reviewer for the City of Rolling Hills to ensure all potential geologic problems are addressed.

The Flying Triangle landslide occupies an area of approximately 70 acres on the south side of the crest of Palos Verdes Hills overlooking Portuguese Bend. It was observed to be moving since March 1980, but may have initiated movement as early as 1974. The current landslide represents reactivation of a relatively large complex compound ancient landslide of probable Pleistocene age unrelated to the infamous Portuguese Bend

landslide, cause of movement is directly related to a period of unusual heavy precipitation during the last decade, ending in March 1983, in common with activation of many other ancient landslide along the coastline of Los Angeles County.

Most of the homes in the Flying Triangle landslide which experienced severe damage were damaged during the early stages of landslide movement. It is understood that the present rate of movement is slower than in the late 1970's or 1980's. Recent efforts to remove water from the area of the landslide have apparently been successful in slowing the rate of movement. Some portions of the landslide have appeared to have stopped moving entirely. Public and private roads are continually being damaged and repaired within the active landslide and many utility lines have been placed above the ground with flex-joints to allow for the continual landslide movement. The Flying Triangle landslide is an ancient landslide that is likely several tens of thousands of years old that has recently become reactivated. The landslide area within the Flying Triangle has rendered a large amount of land within the City's southwest area unsuitable for residential development, and is subject to ongoing changes in topography (Source: General Plan Land Use-9).

The City of Rolling Hills adopts the Los Angeles County Building Codes for any development within the City, with minor modifications, when necessary to meet local goals and constraints. Any development in the Flying Triangle is subject to the County's Building Code relative to Geotechnical Hazards Zones. Pursuant to the Los Angeles Building Code very limited development is permitted in the Geotechnical Hazards Zones.

The City enforces strict grading regulations for all areas in the City. Property owners are required to prove soils and geologic stability of the parcel upon which they are planning to construct, based on Los Angeles County's factor of stability.

No mapping of the hazard area has been performed in the City since 1980, when the Flying Triangle landslide area was identified. However, as parcels are being developed throughout the City, data is collected on soils and geology since each developed requires that solid and geologic conditions be established, to determine if construction can take place.

Vulnerability and Risk

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

Rolling Hills, as a hillside coastal region community, may be described as having some of the most severe terrain of any jurisdiction in Los Angeles County. Slopes of 25 to 50 percent are present in virtually every remaining undeveloped parcel in the City (Source: General Plan Housing Element-34).

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 the City of Rolling Hills landslide events, there are many qualitative factors that point to potential vulnerability. Landslide can impact major transportation arteries, blocking residents from essential services.

Past landslide events have caused major property damage and significantly impacted city residents, and mapping city landslide and debris flow areas would help in preventing future loss.

Factors included in assessing landslide risks 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 city 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 and the software needed to conduct this type of analysis was not available.

Community Landslide Issues

What is Susceptible to Landslide?
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, 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.

Roads
Losses incurred from landslide hazards in the City of Rolling Hills have been associated with roads. The City contracts with the Los Angeles County Public Works Department for responding to slides that inhibit the flow of traffic or are damaging a road. The Rolling Hills Community Association provides road maintenance for addressing slow movement road damage. In the 1980 Landslide, the Rolling Hills Community Association incurred $300,000 loss for street repairs in this area.

It is not cost effective to mitigate all slides because of limited funds and the fact that some historical slides are likely to become active again even with mitigation measures.

Lifelines and Critical Facilities
Lifelines and critical facilities should remain accessible, if possible, during a natural hazard event. The impact of closed transportation arteries may be increased if the closed road is critical to access hospitals and other emergency facilities. Therefore, inspection and repair of critical transportation facilities and routes is essential and should receive high priority. Losses of power and phone service are also potential consequences of landslide events. Due to heavy rains, soil erosion in hillside areas can be accelerated,

resulting in loss of soil support beneath high voltage transmission towers in hillsides and remote areas.

Landslide Mitigation Activities
Landslide mitigation activities include current mitigation programs and activities that are being implemented by Rolling Hills Community Association, Los Angeles County and the City.

Landslide Building/Zoning Codes
The City of Rolling Hills Building/Zoning Codes addresses development on steep slopes in subsection 15.04.130. No development can take place on slopes greater than 2:1 or which exceed a vertical height of 30 feet. In addition, no structure may be located on the sides or bottoms of canyons or natural drainage courses. As stated previously, prior to any development, the applicants must prove stability of the lot proposed for development. Soils, geology, and hydrology studies area required to be performed, reviewed, and approved by the appropriate divisions of the Los Angeles County Public Works Department.

The City of Rolling Hills implements strict development requirements. Only 40% of the net lot area may be disturbed. Disturbances is defined as any activity on the lot, which will result in grading of slopes and area for the building pads and includes any nongraded area where impervious surfaces will remain or are proposed to be added. Structural lot coverage, including all the structures on the property such as residence, garage, swimming pool, sports court and any other use may not cover more than 20% of the net lot area. The total structural coverage, which includes all the structures and impervious surfaces, may not cover more than 35% of the net lot area. These restrictions apply to construction throughout the City.

The Los Angeles Bounty Building Code requirements in the Geotechnical Hazard Areas stipulate that the building official may not issue building permits if he/she finds that the property outside of the site proposed for development could be damaged by activation or acceleration of a geotechnical hazardous condition and such activation or acceleration could be attributed to the proposed work. Therefore, very limited development may occur in the Flying Triangle area of the City. Section 110 of the 2002 County of Los Angeles Building Code addresses prohibited uses of building sites on Geotechnical Hazards areas. Pursuant to the code repairs and minor alteration or reconstruction of existing structures in the Flying Triangle may be allowed. Certain types of new structures considered non-habitable, such as garage or a stable may also be permitted. Before a permit is issued, the owner must record a statement that the owner is aware that the subject property is subject to a physical hazard or a geotechnical nature and an agreement relieving the County and the City of any liability for any damages or loss which may result from issuance of such a permit.

Hazard Mapping
No mapping of the hazard area has been performed in the City since 1980, when the Flying Triangle landslide area was identified. However, as parcels are being developed

throughout the City, data is collected on soils and geology since each developed requires that solid and geologic conditions be established, to determine if construction can take place.

Community Issues Summary
Landslides are a problem in City of Rolling Hills, and often impact the private infrastructure as well as private property. Risk Assessment Table 4-2 lists the critical and essential facilities serving the City that are vulnerable to land movement.

Landslide Mitigation Action Items
The landslide mitigation action items provide direction on specific activities that the city, organizations, and residents in the City of Rolling Hills 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 Team and local decision makers in pursuing strategies for implementation.

Landslide End Notes

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3. Highland, L.M., and Schuster, R.L., *Significant Landslide Events in the United States.* (No Date) USGS, Washington D.C., http://landslides.usgs.gov.html_files/pubs/report1/Landslides_pass_508.pdf

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6. Ibid.

7. Ibid.

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21. Landslide Hazards, U.S. Geological Survey Fact Sheet 0071-00, Version 1.0, U.S. Department of the Interior - U.S. Geological Survey, http://pubs.usgs.gov/fs/fs-0071-00/

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

23. Ibid.

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

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

26. Ibid.

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

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

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

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

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

Federal Emergency Management Agency, Region IX			
Level: Federal	Hazard: Multi	www.fema.gov	
1111 Broadway		Suite 1200	
Oakland, CA 94607		Ph: 510-627-7100	Fx: 510-627-7112
Notes: The Federal Emergency Management Agency is tasked with responding to, planning for, recovering from and mitigating against disasters.			
Federal Emergency Management Agency, Mitigation Division			
Level: Federal	Hazard: Multi	www.fema.gov/fima/planhowto.shtm	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country.			
Floodplain Management Association			
Level: Federal	Hazard: Flood	www.floodplain.org	
P.O. Box 50891			
Sparks, NV 89435-0891		Ph: 775-626-6389	Fx: 775-626-6389
Notes: The Floodplain Management Association is a nonprofit educational association. It was established in 1990 to promote the reduction of flood losses and to encourage the protection and enhancement of natural floodplain values. Members include representatives of federal, state and local government agencies as well as private firms.			
Gateway Cities Partnership			
Level: Regional	Hazard: Multi	www.gatewaycities.org	
7300 Alondra Boulevard		Suite 202	
Paramount, CA 90723		Ph: 562-817-0820	Fx:
Notes: Gateway Cities Partnership is a 501 C 3 non-profit Community Development Corporation for the Gateway Cities region of southeast LA County. The region comprises 27 cities that roughly speaking extends from Montebello on the north to Long Beach on the South, the Alameda Corridor on the west to the Orange County line on the east.			

Governor's Office of Emergency Services (OES)			
Level: State	Hazard: Multi	www.oes.ca.gov	
P.O. Box 419047			
Rancho Cordova, CA 95741-9047		Ph: 916 845- 8911	Fx: 916 845- 8910
Notes: The Governor's Office of Emergency Services coordinates overall state agency response to major disasters in support of local government. The office is responsible for assuring the state's readiness to respond to and recover from natural, manmade, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response and recovery efforts.			
Greater Antelope Valley Economic Alliance			
Level: Regional	Hazard: Multi		
42060 N. Tenth Street West			
Lancaster, CA 93534		Ph: 661-945-2741	Fx: 661-945-7711
Notes: The Greater Antelope Valley Economic Alliance, (GA VEA) is a 501 (c)(6) nonprofit organization with a 501(c)(3) affiliated organization the Antelope Valley Economic Research and Education Foundation. GA VEA is a public-private partnership of business, local governments, education, non-profit organizations and health care organizations that was founded in 1999 with the goal of attracting good paying jobs to the Antelope Valley in order to build a sustainable economy.			
Landslide Hazards Program, USGS			
Level: Federal	Hazard: Landslide	http://landslides.usgs.gov/index.html	
12201 Sunrise Valley Drive		MS 906	
Reston, VA 20192		Ph: 703-648- 4000	Fx:
Notes: The NLIC website provides good information on the programs and resources regarding landslides. The page includes information on the National Landslide Hazards Program Information Center, a bibliography, publications, and current projects. USGS scientists are working to reduce long-term losses and casualties from landslide hazards through better understanding of the causes and mechanisms of ground failure both nationally and worldwide.			

Los Angeles County Economic Development Corporation			
Level: Regional	Hazard: Multi	www.laedc.org	
444 S. Flower Street		34th Floor	
Los Angeles, CA 90071		Ph: 213-236-4813	Fx: 213- 623-0281
Notes: The LAEDC is a private, non-profit 501 (c) 3 organization established in 1981 with the mission to attract, retain and grow businesses and jobs in the Los Angeles region. The LAEDC is widely relied upon for its Southern California Economic Forecasts and Industry Trend Reports. Lead by the renowned Jack Kyser (Sr. Vice President, Chief Economist) his team of researchers produces numerous publications to help business, media and government navigate the LA region's diverse economy.			
Los Angeles County Public Works Department			
Level: County	Hazard: Multi	http://ladpw.org	
900 S. Fremont Ave.			
Alhambra, CA 91803		Ph: 626-458-5100	Fx:
Notes: The Los Angeles County Department of Public Works protects property and promotes public safety through Flood Control, Water Conservation, Road Maintenance, Bridges, Buses and Bicycle Trails, Building and Safety, Land Development, Waterworks, Sewers, Engineering, Capital Projects and Airports			
National Wildland/Urban Interface Fire Program			
Level: Federal	Hazard: Wildfire	www.firewise.org/	
1 Batterymarch Park			
Quincy, MA 02169-7471		Ph: 617-770-3000	Fx: 617 770-0700
Notes: FIREWISE maintains a Website designed for people who live in wildfire- prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.			
National Resources Conservation Service			
Level: Federal	Hazard: Multi	http://www.nrcs.usda.gov/	
14th and Independence Ave., SW		Room 5105-A	
Washington, DC 20250		Ph: 202-720-7246	Fx: 202-720-7690
Notes: NRCS assists owners of America's private land with conserving their soil, water, and other natural resources, by delivering technical assistance based on sound science and suited to a customer's specific needs. Cost shares and financial incentives are available in some cases.			

National Interagency Fire Center (NIFC)			
Level: Federal	Hazard: Wildfire	www.nifc.gov	
3833 S. Development Ave.			
Boise, Idaho 83705-5354		Ph: 208-387- 5512	Fx:
Notes: The NIFC in Boise, Idaho is the nation's support center for wildland firefighting. Seven federal agencies work together to coordinate and support wildland fire and disaster operations.			
National Fire Protection Association (NFPA)			
Level: National	Hazard: Wildfire	http://www.nfpa.org/catalog/home/index.asp	
1 Batterymarch Park			
Quincy, MA 02169-7471		Ph: 617-770-3000	Fx: 617 770-0700
Notes: The mission of the international nonprofit NFPA is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically-based consensus codes and standards, research, training and education			
National Floodplain Insurance Program (NFIP)			
Level: Federal	Hazard: Flood	www.fema.gov/nfip/	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities providing 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 (NWS) products by: infusing new hydrologic science, developing hydrologic techniques for operational use, managing hydrologic development by NWS field office, providing advanced hydrologic products to meet needs identified by NWS customers			

National Weather Service			
Level: Federal	Hazard: Multi	http://www.nws.noaa.gov/	
520 North Elevar Street			
Oxnard, CA 93030		Ph: 805-988- 6615	Fx:
Notes: The National Weather Service is responsible for providing weather service to the nation. It is charged with the responsibility of observing and reporting the weather and with issuing forecasts and warnings of weather and floods in the interest of national safety and economy. Briefly, the priorities for service to the nation are: 1. protection of life, 2. protection of property, and 3. promotion of the nation's welfare and economy.			

San Gabriel Valley Economic Partnership			
Level: Regional	Hazard: Multi	www.valleynet.org	
4900 Rivergrade Road		Suite A310	
Irwindale, CA 91706		Ph: 626-856-3400	Fx: 626-856-5115
Notes: The San Gabriel Valley Economic Partnership is a non-profit corporation representing both public and private sectors. The Partnership is the exclusive source for San Gabriel Valley-specific information, expertise, consulting, products, services, and events. It is the single organization in the Valley with the mission to sustain and build the regional economy for the mutual benefit of all thirty cities, chambers of commerce, academic institutions, businesses and residents.			

Sanitation Districts of Los Angeles County			
Level: County	Hazard: Flood	http://www.lacsd.ora/	
1955 Workman Mill Road			
Whittier, CA 90607		Ph:562-699-7411 x2301	Fx:
Notes: The Sanitation Districts provide wastewater and solid waste management for over half the population of Los Angeles County and turn waste products into resources such as reclaimed water, energy, and recyclable materials.			

Santa Monica Mountains Conservancy			
Level: Regional	Hazard: Multi	http://smmc.ca.gov/	
570 West Avenue Twenty-Six		Suite 100	
Los Angeles, CA 90065		Ph: 323-221-8900	Fx:
Notes: The Santa Monica Mountains Conservancy helps to preserve over 55,000 acres of parkland in both wilderness and urban settings, and has improved more than 114 public recreational facilities throughout Southern California.			
South Bay Economic Development Partnership			
Level: Regional	Hazard: Multi	www.southbaypartnership.com	
3858 Carson Street		Suite 110	
Torrance, CA 90503		Ph: 310-792-0323	Fx: 310-543-9886
Notes: The South Bay Economic Development Partnership is a collaboration of business, labor, education and government. Its primary goal is to plan an implement an economic development and marketing strategy designed to retain and create jobs and stimulate economic growth in the South Bay of Los Angeles County.			
South Coast Air Quality Management District (AQMD)			
Level: Regional	Hazard: Multi	www.aqmd.gov	
21865 E. Copley Drive			
Diamond Bar, CA 91765		Ph: 800-CUT-SMOG	Fx:
Notes: AQMD is a regional government agency that seeks to achieve and maintain healthful air quality through a comprehensive program of research, regulations, enforcement, and communication. The AQMD covers Los Angeles and Orange Counties and parts of Riverside and San Bernardino Counties.			
Southern California Earthquake Center (SCEC)			
Level: Regional	Hazard: Earthquake	www.scec.org	
3651 Trousdale Parkway		Suite 169	
Los Angeles, CA 90089-0742		Ph: 213-740-5843	Fx: 213/740-0011
Notes: The Southern California Earthquake Center (SCEC) gathers new information about earthquakes in Southern California, integrates this information into a comprehensive and predictive understanding of earthquake phenomena, and communicates this understanding to end-users and the general public in order to increase earthquake awareness, reduce economic losses, and save lives.			

Southern California Association of Governments (SCAG)			
Level: Regional	Hazard: Multi	www.scag.ca.gov	
818 W. Seventh Street		12th Floor	
Los Angeles, CA 90017		Ph: 213-236-1800	Fx: 213-236-1825
Notes: The Southern California Association of Governments functions as the Metropolitan Planning Organization for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura and Imperial. As the designated Metropolitan Planning Organization, the Association of Governments is mandated by the federal government to research and draw up plans for transportation, growth management, hazardous waste management, and air quality.			
State Fire Marshal (SFM)			
Level: State	Hazard: Wildfire	http://osfm.fire.ca.gov	
1131 "S" Street			
Sacramento, CA 95814		Ph: 916-445-8200	Fx: 916-445-8509
Notes: The Office of the State Fire Marshal (SFM) supports the mission of the California Department of Forestry and Fire Protection (CDF) by focusing on fire prevention. SFM regulates buildings in which people live, controls substances which may, cause injuries, death and destruction by fire; provides statewide direction for fire prevention within wildland areas; regulates hazardous liquid pipelines; reviews regulations and building standards; and trains and educates in fire protection methods and responsibilities.			
The Community Rating System (CRS)			
Level: Federal	Hazard: Flood	http://www.fema.gov/nfip/crs.shtm	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fx:
Notes: The Community Rating System (CRS) recognizes community floodplain management efforts that go beyond the minimum requirements of the NFIP. Property owners within the County would receive reduced NFIP flood insurance premiums if the County implements floodplain management practices that qualify it for a CRS rating. For further information on the CRS, visit FEMA's website.			
United States Geological Survey			
Level: Federal	Hazard: Multi	http://www.usgs.gov/	
345 Middlefield Road			
Menlo Park, CA 94025		Ph: 650-853-8300	Fx:
Notes: The USGS provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.			

U.S. Army Corps of Engineers			
Level: Federal	Hazard: Multi	http://www.usace.army.mil	
P.O. Box 532711			
Los Angeles CA 90053- 2325		Ph: 213-452- 3921	Fx:
Notes: The United States Army Corps of Engineers work in engineering and environmental matters. A workforce of biologists, engineers, geologists, hydrologists, natural resource managers and other professionals provide engineering services to the nation including planning, designing, building and operating water resources and other civil works projects.			
USDA Forest Service			
Level: Federal	Hazard: Wildfire	http://www.fs.fed.us	
1400 Independence Ave. SW			
Washington, D.C. 20250-0002		Ph: 202-205-8333	Fx:
Notes: The Forest Service is an agency of the U.S. Department of Agriculture. The Forest Service manages public lands in national forests and grasslands.			
USGS Water Resources			
Level: Federal	Hazard: Multi	www.water.usgs.gov	
6000 J Street		Placer Hall	
Sacramento, CA 95819-6129		Ph: 916-278-3000	Fx: 916-278-3070
Notes: The USGS Water Resources mission is to provide water information that benefits the Nation's citizens: publications, data, maps, and applications software.			
Western States Seismic Policy Council (WSSPC)			
Level: Regional	Hazard: Earthquake	www.wsspc.org/home.html	
125 California Avenue		Suite D201, #1	
Palo Alto, CA 94306		Ph: 650-330-1101	Fx: 650-326-1769
Notes: WSSPC is a regional earthquake consortium funded mainly by FEMA. Its website is a great resource, with information clearly categorized - from policy to engineering to education.			

Westside Economic Collaborative C/O Pacific Western Bank			
Level: Regional	Hazard: Multi	http://www.westside-Ia.or	
120 Wilshire Boulevard			
Santa Monica, CA 90401		Ph: 310-458-1521	Fx: 310-458-6479
Notes: The Westside Economic Development Collaborative is the first Westside regional economic development corporation. The Westside EDC functions as an information gatherer and resource center, as well as a forum, through bringing business, government, and residents together to address issues affecting the region: Economic Diversity, Transportation, Housing, Workforce Training and Retraining, Lifelong Learning, Tourism, and Embracing Diversity.			

Appendix B:
Public Participation

Public participation is a key component to any strategic planning process. It is very important that such broad-reaching plans not be written in isolation. Agency participation offers an opportunity for impacted departments and organizations to provide expertise and insight into the planning process. Citizen participation offers citizens the chance to voice their ideas, interests, and opinions. The Federal Emergency Management Agency also requires public input during the development of mitigation plans.

The City of Rolling Hills Natural Hazards Mitigation Plan integrates a cross-section of public input throughout the planning process. To accomplish this goal, the Planning Team developed a public participation process through four components: 1) developing a Planning Team comprised of knowledgeable individuals representative of the City; 2) soliciting the assistance of local media representatives and community newsletters to announce the progress of the planning activities and to announce the availability of the Draft Natural Hazards Mitigation Plan; 3) creating opportunities for the citizens and public agencies to review the Draft Natural Hazards Mitigation Plan; 4) conducting a public meeting at the City Council meeting where the public had an opportunity to express their views concerning the Draft Natural Hazards Mitigation Plan.

Integrating public participation during the development of the Natural Hazards Mitigation Plan has ultimately resulted in increased public awareness. Through public involvement, the mitigation plan reflects community issues, concerns, and new ideas and perspectives on mitigation opportunities and plan action items.

Hazard Mitigation Planning Team

Hazard mitigation in the City of Rolling Hills is overseen by the Hazard Mitigation Planning Team, which consists of representatives from various city departments. The 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 Team guided the development of the Plan, and assisted in developing plan goals and action items, identifying stakeholders and plan reviewers, and sharing local expertise to create a more comprehensive plan. The Planning Team will also be responsible for implementation of the Plan.

Meetings
The following meetings were facilitated by the City's consultant, Carolyn J. Harshman of Emergency Planning Consultants:

Meeting #1: Pre-Training May 4, 2004
The meeting was hosted by the City of Rolling Hills. EPC delivered pre-training to the Planning Team. The pre-training consisted of the history of the Disaster Mitigation Act of 2000, the purpose and role of hazard mitigation, and the planning process. The Pre-

Training lasted approximately 2 hours.

Meeting #2: Kick-Off Meeting May 4, 2004
EPC facilitated the workshop where participants had an opportunity to learn about various natural hazards, assess and rank the local threats, examine hazard maps, and complete the FEMA Worksheets contained in FEMA 386-2 Understanding Your Risks. Part of the discussion included a presentation by EPC of historical disaster events across the country. Those slides served as a backdrop for discussing potential mitigation activities.

There was an extensive discussion on various methods of engaging the public in the mitigation process. The Planning Team prepared a draft media release and discussed a public opinion survey provided by EPC. EPC committed to revising the media release and survey and distributing electronic copies to each of the Planning Team entities. The Kick-Off Meeting lasted approximately 4 hours.

Meeting #3 Pre-Training Mitigation Workshop July 20, 2004
The meeting was hosted by the City of Rolling Hills. EPC delivered pre-training to the Planning Team. The pre-training consisted of the concepts and issues related to developing mitigation actions. The pre-training lasted approximately 1 hour.

Meeting #4 Mitigation Actions Workshop July 20, 2004
EPC delivered the Draft Hazard Analysis and the Planning Team discussed missing information, data, and maps. EPC distributed copies of the Mitigation Actions Planning Tools to assist the Team in developing Goals and Action Items appropriate to their natural hazards. The Planning Tools provided a process for collecting the mitigation actions presently in practice in the City of Rolling Hills, as well as identifying future mitigation actions.

Throughout the workshops and planning process, the consultant reminded the Planning Team of the importance of considering Benefit/Cost issues including: social issues, political realities, economic benefits, and environmental concerns. During Meeting #4, the consultant introduced the Planning Team to the FEMA's STAPLEE Tool (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) as one of many means available to prioritize mitigation actions. The Planning Team agreed that the STAPLEE Tool would be a useful tool at the first implementation meeting of the Hazard Mitigation Planning Team. A brainstorming process was then conducted to develop the goals for the Plan. The Planning Team discussed sample goal language then finalized the goal language. The Team agreed to cluster the categories of the Mitigation Actions by type of actions as follows: #1 Multi-Hazard, #2 Earthquakes, #3 Windstorms, #4 Wildfire, and #5 Land Movement. The Team was unanimous in its belief that the Multi-Hazard" actions would yield the greatest benefit to the jurisdiction.

The next task was to examine a FEMA-approved Mitigation Plan to get an idea of how mitigation actions are written. Team participants were pleased to discover the broad range of mitigation actions already being practiced by the City of Rolling Hills. The

Planning Tools, developed by EPC, consisted of nearly 300 mitigation actions gathered from dozens of Mitigation Plans across the country.

The City representatives developed their own mitigation actions, utilizing the sample plans and Planning Tools list. Because of the plan samples and Tools, the process of identifying appropriate mitigations actions was accomplished in a very efficient manner.

Public Meetings

The City of Rolling Hills conducted one public meeting where the Draft Natural Hazard Mitigation Plan was presented and discussed. The City Council (November 22, 2004) was impressed with the range of mitigation actions already in practice. The City Council was very supportive of the overall goal established by the Planning Team to become a Disaster Resistant Community.

Invitation Process

The Planning Team identified possible public notice sources. An article was placed in the City's Newsletter (see Appendix B – Attachment 2).

Results

Having read the Plan and having no questions, the City Council thanked the Planning Team for its efforts. The Mayor then solicited input from the audience, but no comments were offered. Following a motion and second, the Plan received unanimous approval at the November 22, 2004 meeting of the City Council. The meeting lasted less than 1 hour.

Decision

The City Council was unanimous in its adoption of the City of Rolling Hills Natural Hazards Mitigation Plan on November 22, 2004 (see Appendix B-Attachment 1 Resolution).

Appendix B – Attachment 1
Council Resolution

RESOLUTION NO. 970

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ROLLING HILLS ADOPTING THE NATURAL HAZARDS MITIGATION PLAN.

WHEREAS, the Federal Disaster Management Act of 2000 (DMA 2000), which amended the Robert T. Stafford Disaster Relief and Emergency Services Act, requires every local, county and state government to have an approved Natural Hazards Mitigation Plan ("Plan") in order to be eligible for pre-disaster and post-disaster grants and funding; and

WHEREAS, the City of Rolling Hills desires to comply with these requirements; and

WHEREAS, the City of Rolling Hills is interested in protecting the safety and welfare of its residents and infrastructure in the event of a natural disaster, and;

WHEREAS, the City of Rolling Hills has prepared a Natural Hazards Mitigation Plan based on the quidelines provided by the Disaster Management Area Coordinators (DMAC), as written herein and attached as Exhibit "A".

NOW, THEREFORE, the City Council of the City of Rolling Hills, California, does hereby resolve as follows:

Section 1. The City Council of the City of Rolliing Hills does hereby adopt the Natural Hazards Mitigation Plan, establishing goals and objectives to ensure the health, safety and welfare of its citizens, in the event of a natural disaster.

Section 2. The Natural Hazards Mitigation Plan comprises of a collection of policies and actions on how the community can achieve sustainability and disaster resilliency. The Plan is the result of a process iinvcolving city departments, city service providers and citizens and reflects local values and concerns.

Section 3. That the Natural Hazards Mitigation Plan willl meet the program criteria of the Disaster Mitigation Act of 2000 in order that the City of Rolling Hills will remain eligible for future pre-disaster and post-disaster mitigation program funds to ensure the health, safety and welfare of its citizens.

Section 4. That the City Clerk shall certify to the adoption of this Resolution and shall forward the Natural Hazards Mitigation Plan to the State of Californis Office of Emergency Services and the Federal Emergency Management Agency for review and approval.

PASSED, APPROVED AND ADOPTED THIS 22nd DAY OF NOVEMBER, 2004.

THOMAS HEINSHEIMER, MAYOR

ATTEST:

MARILYN L. KERN, DEPUTY CITY CLERK

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) §§
CITY OF ROLLING HILLS)

I certify that the foregoing Resolution No. 970 entitled:

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ROLLING HILLS ADOPTING THE NATURAL HAZARDS MITIGATION PLAN.

was approved and adopted at a regular meeting of the City Council on November 22, 2004 by the following roll call vote:

AYES: Councilmembers Black, Hill, Lay, Mayor Pro Tem Pernell and Mayor Heinsheimer.

NOES: None.

ABSENT: None.

ABSTAIN: None.

and in compliance with the laws of California was posted at the following:

Administrative Offices

DEPUTY CITY CLERK

Appendix B – Attachment 2
City of Rolling Hills Newsletters

City of Rolling Hills Newsletter

JUNE 9, 2004 — *Issue No. 04-11*

PLEASE REMEMBER ALL FIREWORKS ARE PROHIBITED IN THE CITY OF ROLLING HILLS!

Should you observe any fireworks being used in the City, please **immediately** contact the Sheriff's Department at 539-1661 or the Los Angeles County Fire Department at 377-1584.

FY 2004-05 BUDGET HEARING

A public hearing will be conducted by the City Council on Monday, June 14, 2004. Public comment is welcome. The City Council meeting will commence at 7:30 p.m. in the City Council Chambers at City Hall, 2 Portuguese Bend Road.

The City of Rolling Hills
Wildlife Preservation Committee
in cooperation with South Bay Wildlife Rehab
present a
NATIVE WILDLIFE PROGRAM
ON BIRDS OF PREY AND OTHER BIRDS
Monday, June 21st, 6:30-8:00 p.m. at City Hall
2 Portuguese Bend Road
SEE LIVE BIRDS OF PREY!
LEARN ABOUT THEIR BEHAVIOR
and **HABITAT!**
LEARN ABOUT SOUTH BAY WILDLIFE REHAB!
Bring the entire family!
Refreshments will be served!
If you have any questions, please call City Hall at 377-1521.
We look forward to seeing you!

MAIL BOX THEFTS

There have been a few recent reports of local thefts of both incoming and outgoing mail from residential mailboxes. Residents are urged to deposit their outgoing mail at a post office or a United States Post Office drop-off facility. An appropriate outgoing mailbox is located in the City Hall parking lot. Additionally, residents may wish to consider using locking mailboxes for their incoming mail. If you observe any suspicious activity, contact the Sheriff's Department immediately at 539-1661.

CITY COMMENCES PREPARATION OF HAZARD MITIGATION PLAN

The City of Rolling Hills has commenced the required preparation of its Hazard Mitigation Plan. Mitigation Plans are required of all cities in the United States. The purpose of creating the plan is to effectively address hazards that may exist in a community and assess potential impacts from natural disasters.

The plan will be created over the next several months. Although the City is in the beginning stages, ultimately, a draft plan will be available for review. Please watch upcoming City Newsletters for announcements.

WEED ABATEMENT . . . BE FIRE SAFE

The Los Angeles County Fire Department has commenced inspecting properties for compliance with fire prevention weed abatement standards. Weed abatement standards are strictly enforced and are designed to reduce the likelihood of residential structures becoming involved in a wildfire. For more information, contact Fire Station 56 in Rolling Hills at 377-1584.

ARE YOU RAISING MOSQUITOES IN YOUR YARD?

The L.A. County West Vector Control District reminds residents that it is important to eliminate standing water conditions on your property to abate mosquito breeding. Areas which should be inspected include: ornamental ponds, plastic wading pools, animal watering troughs, potted plants or other containers with standing water.

If you need help to prevent or control mosquito breeding call the Vector Control District at 915-7370. The District will furnish mosquito fish free of charge.

The District has provided flyers on **Mosquitoes, West Nile Virus, and Ticks and Lyme Disease.** If you would like this information mailed to you, please call City Hall at 377-1521.

IT'S TIME TO GET OUT YOUR BIB
To catch that scrumptious BBQ sauce as it rolls down your chin at the
ANNUAL HIX BBQ
Saturday, August, 28th
32 Portuguese Bend Road
Music, Dancin', Vittles, Fun
SAVE THE DATE

Save The Date
July 31st.

The Women's Club is sponsoring a 50's/60's dinner and dance. Get out your 50's outfit (optional) and dance to the music of "Sentimental Journeymen" (formerly the "Time Machine"). Dance all night, listen to fabulous music, enjoy a 50's/60's car display, tour gardens and grounds or join the dance contest. Anyway you look at it there is something fun for everyone. Watch for more details.

UPCOMING IMPORTANT EVENTS
City Council Meeting
6/14/04 and 6/28/04 at 7:30 p.m.
Planning Commission Meeting
6/15/04 at 7:30 p.m.

BULLETIN BOARD

WANTED: RH seller in escrow looking to buy RH home under 2.25M. No agent need be involved. Call 544-6061.
WANTED: Airline pilot, non-smoker seeking room rental. Current RH tenant, references. Call 541-8694 (home) or 686-4664 (cell).
THANK YOU: To all my clients who responded to my add for running errands and feeding pets. I enjoyed getting to know each of you. I am moving the first week of June so I will be unavailable. Charissa Hafer.
AVAILABLE: Housekeeper – very efficient, worked for resident for more than 10 years. Excellent references, call Dr. Wolinsky 541-6474.
FOR SALE: 1996 GMC Suburban – 2500, 7.4 liter, great for towing horse trailer. Call 541-7973.
WANTED: Garage for rent. Call Bob, 377-7162.
AVAILABLE: Housekeeper recommended by RH resident, full or part-time, speaks English, drives. Call (562) 927-7069.
FOR SALE: Olympic tickets, events and hotel stay. Call 541-1671.

City of Rolling Hills Newsletter

NOVEMBER 17, 2004 — *Issue No. 04-22*

HAPPY THANKSGIVING

City Hall will be closed on Thursday, November 25th and Friday, November 26th, in observance of the Thanksgiving Holiday. The City Council and staff wish all residents a Happy Thanksgiving!

CITY OF ROLLING HILLS ANNUAL HOLIDAY OPEN HOUSE

Monday, December 13th, 5:00 p.m. to 8:00 p.m.
We look forward to seeing you at this annual holiday event.

CITY OF ROLLING HILLS DRAFT NATURAL HAZARDS MITIGATION PLAN

All government agencies are required by the Federal Emergency Management Agency (FEMA) to develop a Disaster Mitigation Plan, assessing their community's susceptibility to various natural hazards and identifying activities to minimize potential impacts. The City of Rolling Hills, in cooperation with the Community Association, County Building and Safety Department, Fire Department, Sheriff's Department and other agencies prepared such a plan. A draft of the plan is available for review at City Hall. The City Council will review the draft at their November 22, 2004 meeting.

MUNICIPAL ELECTION

Prospective candidates interested in running for one of two City Council seats in the March 8, 2005 General Municipal Election may pick up nomination papers in the City Clerk's office beginning on Monday, November 15, 2004 during regular business hours, Monday-Friday from 7:30 a.m. to 5:00 p.m. Nomination packets will not be mailed and must be obtained from the Clerk's office in person. Please call the City Clerk at 377-1521 for further information.

The filing period closes at 5:00 p.m. Friday, December 10, 2004. However, if an incumbent fails to file, the nomination period will be extended to Wednesday, December 15, 2004 at 5:00 p.m.

Note: City offices will be closed during the nomination period on Thursday, November 25th and Friday, November 26th for Thanksgiving.

ROLLING HILLS ESTATES ANNUAL PENINSULA HOLIDAY PARADE SUNDAY, DECEMBER 5th, 12:00 Noon

The parade route will be along Silver Spur Road and Deep Valley Drive. Join in the community spirit for this "Heart of the Hill" parade. The parade will showcase the Palos Verdes Peninsula civic leaders, community organizations, youth groups, equestrian units, marching bands, drill teams and others. For more information, call Rolling Hills Estates at 377-1577.

DISPOSE OF HOUSEHOLD HAZARDOUS WASTE AND E-WASTE ON SATURDAY, DECEMBER 4, 2004

9:00 a.m. to 3:00 p.m.
Lomita City Hall Parking Lot
24300 Narbonne Ave.

For a complete listing of what you can and cannot bring or information on other events, contact: (888) CLEAN-LA, www.888CleanLA.com, (800) 238-0172.

RHCA ANNUAL MEETING

In order to provide review time, any material to be considered for inclusion with the ballot information must be received by December 1, 2004 to the Rolling Hills Community Association Office at 1 Portuguese Bend Road.

CHILDREN'S HOLIDAY PARTY

The Women's Community Club of Rolling Hills cordially invites all residents and their children and grandchildren to the annual Children's Holiday Party on Sunday, December 12th, from 1:00 p.m. to 3:00 p.m. in front of the RHCA Office, 1 Portuguese Bend Road. Beulah is back! Kids, have your picture taken with Beulah, the donkey, our two local goats, and Santa! Crawl through a genuine fire truck and enjoy snacks and crafts as you get in the holiday spirit! This is one of our most fun and popular community events, especially for our children, so come be a part of the fun!

10-S-N-E-1 ?

The Rolling Hills Tennis Club cordially invites new membership of all levels.

Call Lou Altman at 544-2365.

UPCOMING IMPORTANT EVENTS

City Council Meeting
11/22/04 at 7:30 p.m.
Holiday Open House
12/13/04 5-8 p.m.
Planning Commission Meeting
12/21/04 at 6:30 p.m.

BULLETIN BOARD

AVAILABLE: Mammoth Village Condo, 2bed/2bath, steps to gondola, short term rentals + week prior to Christmas available. Call Peter, 541-5546.

AVAILABLE: Reading tutor, 1 on 1 private instruction, credentialed specialist, K-8 and ESL. Call 377-8481 or www.pvreadingcenter.com.

WANTED: Reliable and dependable pet sitter to stay at house in RH, references needed. Call 541-5405.

FOR SALE: Large Sego Palms, huge Stag Horns and Cactus, also, Macaws and African Grey Parrots. Call 377-7494.

FOR SALE: 2000 Jaguar V8, beautiful, loaded, 49K miles. Call 541-2122.

City of Rolling Hills Newsletter

MEMBERS OF THE CITY COUNCIL

James Black
Thomas F. Heinsheimer
Frank E. Hill
Allen Lay
Godfrey Pernell

NOVEMBER 3, 2004 — *Issue No. 04-21*

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

City Hall will be closed on Thursday, November 11th in observance of the Veteran's Day Holiday.

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

CITY OF ROLLING HILLS ANNUAL HOLIDAY OPEN HOUSE

Monday, December 13th, 5:00 p.m. to 8:00 p.m. Please mark your calendars now and watch your mail for a formal invitation.

ROLLING HILLS MUNICIPAL ELECTION

Prospective candidates interested in running for one of two City Council seats in March 8, 2005 General Municipal Election may pick up nomination papers in the City Clerk's office beginning on Monday, November 15, 2004 during regular business hours, Monday-Friday from 7:30 a.m. to 5:00 p.m. Nomination packets will not be mailed and must be obtained from the Clerk's office in person. Please call the City Clerk at 377-1521 for further information.

The filing period closes at 5:00 p.m. Friday, December 10, 2004. However, if an incumbent fails to file, the nomination period will be extended to Wednesday, December 15, 2004 at 5:00 p.m.

Note: City offices will be closed during the nomination period on Thursday, November 25th and Friday, November 26th for Thanksgiving.

AVAILABILITY OF A DRAFT OF THE CITY OF ROLLING HILLS NATURAL HAZARD MITIGATION PLAN

All government agencies are required by the Federal Emergency Management Agency (FEMA) to develop a Disaster Mitigation Plan, assessing their community's susceptibility to various natural hazards and identifying activities to minimize potential impacts. The City of Rolling Hills in cooperation with the Community Association and the County Building and Safety Department, Fire Department, Sheriff's Department and other agencies prepared such a plan. A draft of the Plan is available for public review at City Hall.

It is anticipated that the City Council will review the draft plan at a public hearing at their November 22, 2004 meeting.

WOMEN'S COMMUNITY CLUB

Renoir to Matisse

Los Angeles County Museum of Art

Monday, November 8, 2004.
Depart at 9:30 a.m. Return by 3:30 p.m.
$75 per person includes transportation, guides, admission and lunch in the Grove Center.

For reservations call 541-6886.

A MESSAGE FROM THE WOMEN'S COMMUNITY CLUB

Women's Club Project

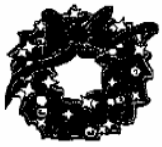
You might have noticed activity in the planted triangle area of Portuguese Bend, Saddleback and Poppy Trail. Native and drought resistant plants will take root in the fall with blooms expected in the spring. The goal is to enhance and preserve the rural beauty of our City. Remember it's a work in progress and will take two to three years to reach full maturity. We hope you enjoy it.

WANNA COME OUT AND PLAY?

The Rolling Hills Tennis Club cordially invites new membership of all levels.

- Monthly Dinner & Tennis Social – 3rd Sunday of each month.
- Ladies Round Robin – 3rd Wednesday of each month.
- Men's Workout – Wednesday, 7-9:30 a.m. and Saturday, 8:30-11:30 a.m.
- Women's Workout – Monday and Wednesday, 8:30-10:00 a.m.

Call Lou Altman at 544-2365.



Save the date for the Rolling Hills Tennis Club Annual Holiday Party
Friday, December 3rd
Frascati Ristorante
Redondo Beach
Cocktails, Dinner, DJ and dancing, and Lots of Fun!

Come meet new friends and celebrate with your "old" friends. All members of the Rolling Hills Tennis Club and their guests are welcome. Watch for your invitation around the second week of November.
For more information call Kay Lupo, 541-4143.

UPCOMING IMPORTANT EVENTS

City Council Meeting
11/8/04 and 11/22/04 at 7:30 p.m.
Wildlife Preservation Committee
11/15/04 at 6:00 p.m.
Planning Commission Meeting
11/16/04 at 6:30 p.m.

BULLETIN BOARD

FOR SALE: 2001 MBZ, S430, orig. owner, excel. condition, 35,000 miles, GPS, hands free phone, chrome wheels, next service 10,000 miles, new tires, new brakes, black Opal/Java lthr, $42,500. Call 543-0081 or 541-4143.

AVAILABLE: Auto detailing available for autos, motorcycles, boats & motorhomes, college grad and RH resident. Call Abe, 265-8330 or 809-5685.

AVAILABLE: Live-in housekeeper, recommended by RH resident. Call Kathleen, 377-2163.

FOR SALE: Used car, 1997 Ford Explorer, V-8, 4 door, all wheel drive, black w/gray leather interior, excellent condition, loaded with extras, 55,000 mi., 1 owner in RH, $8,300. Call Mike, 541-0854.

Appendix B – Attachment 3
List of Reviewers

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Appendix C:
Benefit/Cost Analysis

Benefit/Cost Analysis is a key mechanism used by the California Office of Emergency Services (OES), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

This Appendix outlines several approaches for conducting economic analysis of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: Federal Emergency Management Agency Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation.

This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?
Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred.

Evaluating natural hazard mitigation provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools.

Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster’s social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are Some Economic Analysis Approaches for Mitigation Strategies?
The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. The distinction between the two methods is the way in which the relative costs and benefits are measured. Additionally, there are varying approaches to assessing the value of mitigation for public sector and private sector activities.

Benefit/Cost Analysis
Benefit/Cost Analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

Cost-Effectiveness Analysis
Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in public sector mitigation activities
Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions that involve a diverse set of beneficiaries and non-market benefits.

Investing in private sector mitigation activities
Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, are required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;

3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

Estimating the costs and benefits of a hazard mitigation strategy can be a complex process.

Employing the services of a specialist can assist in this process.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

How can an Economic Analysis be Conducted?

Benefit/cost analysis and cost-effectiveness analysis are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating alternative mitigation activities is outlined below:

1. Identify the Alternatives: Alternatives for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits: Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate alternative. Potential economic criteria to evaluate alternatives include:

- **Determine the project cost.** This may include initial project development costs, and repair and operating costs of maintaining projects over time.

- **Estimate the benefits.** Projecting the benefits or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These

considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- Consider costs and benefits to society and the environment. These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.

- Determine the correct discount rate. Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Alternatives: Once costs and benefits have been quantified, economic analysis tools can rank the alternatives. Two methods for determining the best alternative given varying costs and benefits include net present value and internal rate of return.

- Net present value. Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.

- Internal Rate of Return. Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project.

Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk; project effectiveness; and economic, environmental, and social returns in choosing the appropriate project for implementation.

How are Benefits of Mitigation Calculated?

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owner as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of

mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

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Appendix D:
Acronyms

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
DOE	Department of Energy
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
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 (California Office of Emergency Services)

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
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
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 Southern California Organized for Potential Emergencies
FMA	Flood Management Assistance
FSR	Feasibility Study Report
FY	Fiscal Year
GIS	Geographical Information System
HAZMAT	Hazardous Materials
HAZMIT	Hazardous Mitigation
HAZUS	Hazards United States (an earthquake damage assessment prediction tool)
HAD	Housing and Community Development
HEICS	Hospital Emergency Incident Command System
HEPG	Hospital Emergency Planning Guidance
HIA	Hazard Identification and Analysis Unit

HMEP	Hazardous Materials Emergency Preparedness
HMGP	Hazard Mitigation Grant Program
IDE	Initial Damage Estimate
IA	Individual Assistance
IFG	Individual & Family Grant (program)
IRG	Incident Response Geographic Information System
IPA	Information and Public Affairs (of state Office of Emergency Services)
LAN	Local Area Network
LEMMA	Law Enforcement Master Mutual Aid
LEPC	Local Emergency Planning Committee
MARAC	Mutual Aid Regional Advisory Council
MHFP	Multi-Hazard Functional Plan
MHID	Multi-Hazard Identification
MOU	Memorandum of Understanding
NBC	Nuclear, Biological, Chemical
NEMA	National Emergency Management Agency
NEMIS	National Emergency Management Information System
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Association
NPP	Nuclear Power Plant
NSF	National Science Foundation
NWS	National Weather Service
OA	Operational Area
OASIS	Operational Area Satellite Information System
OCC	Operations Coordination Center
OCD	Office of Civil Defense
OEP	Office of Emergency Planning
OES	California Governor's Office of Emergency Services
OSHPD	Office of Statewide Health Planning and Development
OSPR	Oil Spill Prevention and Response
PA	Public Assistance
PC	Personal Computer
PDA	Preliminary Damage Assessment
PIO	Public Information Office
POST	Police Officer Standards and Training
PPA/CA	Performance Partnership Agreement/Cooperative Agreement (FEMA)
PSA	Public Service Announcement
PTAB	Planning and Technological Assistance Branch
PTR	Project Time Report
RA	Regional Administrator (OES)
RADEF	Radiological Defense (program)
RAMP	Regional Assessment of Mitigation Priorities
RAPID	Railroad Accident Prevention & Immediate Deployment
RDO	Radiological Defense Officer
RDMHC	Regional Disaster Medical Health Coordinator
REOC	Regional Emergency Operations Center

REPI	Reserve Emergency Public Information
RES	Regional Emergency Staff
RIMS	Response Information Management System
RMP	Risk Management Plan
RPU	Radiological Preparedness Unit (OES)
RRT	Regional Response Team
SAM	State Administrative Manual
SARA	Superfund Amendments & Reauthorization Act
SAVP	Safety Assessment Volunteer Program
SBA	Small Business Administration
SCO	California State Controller's Office
SEMS	Standardized Emergency Management System
SEPIC	State Emergency Public Information Committee
SLA	State and Local Assistance
SONGS	San Onofre Nuclear Generating Station
SOP	Standard Operating Procedure
SWEPC	Statewide Emergency Planning Committee
TEC	Travel Expense Claim
TRU	Transuranic
TTT	Train the Trainer
UPA	Unified Program Account
UPS	Uninterrupted Power Source
USAR	Urban Search and Rescue
USGS	United States Geological Survey
WC	California State Warning Center
WAN	Wide Area Network
WIPP	Waste Isolation Pilot Project

Appendix E:
Glossary

Acceleration	The rate of change of velocity with respect to time. Acceleration due to gravity at the earth's surface is 9.8 meters per second squared. That means that every second that something falls toward the surface of earth its velocity increases by 9.8 meters per second.
Asset	Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.
Base Flood	Flood that has a 1 percent probability of being equaled or exceeded in any given year. Also known as the 100-year flood.
Base Flood Elevation (BFE)	Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood Insurance Program.
Bedrock	The solid rock that underlies loose material, such as soil, sand, clay, or gravel.
Building	A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.
Coastal High Hazard Area	Area, usually along an open coast, bay, or inlet that is subject to inundation by storm surge and, in some instances, wave action caused by storms or seismic sources.
Coastal Zones	The area along the shore where the ocean meets the land as the surface of the land rises above the ocean. This land/water interface includes barrier islands, estuaries, beaches, coastal wetlands, and land areas having direct drainage to the ocean.
Community Rating System (CRS)	An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.
Computer-Aided Design And Drafting (CADD)	A computerized system enabling quick and accurate electronic 2-D and 3-D drawings, topographic mapping, site plans, and profile/cross-section drawings.
Contour	A line of equal ground elevation on a topographic (contour) map.

Critical Facility	Facilities that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.
Debris	The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.
Digitize	To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates) for use in computer applications.
Displacement Time	The average time (in days) which the building's occupants typically must operate from a temporary location while repairs are made to the original building due to damages resulting from a hazard event.
Duration	How long a hazard event lasts.
Earthquake	A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.
Erosion	Wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.
Erosion Hazard Area	Area anticipated being 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 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 wind speed 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, dry docks, 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 post-disaster 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 exceeds 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 Run-up	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.