City	Hidden Hills		
Hazard	Multi-Hazard		
Project Name	**Evacuation Routes**		
Status	Complete		
Strategy	Study the possibility of creating alternate evacuation routes in case of an emergency event		
Action Items	• Planning in progress for an assessment of current emergency routes • Determine if these routes are sufficient • Take necessary action to create alternative routes, means of city evacuation if current route is not sufficient		
Coordinating Department	Engineering/Public Works		
Timeline/Completion Date/Priority	2 years / YE 2006 Priority 2		
Total Cost	Unknown at this time		
BCR	BCR>1.0		
Funding Source(s)	Unknown at this time		
Constraints	Unknown at this time		
Implementation Description	There are 3 points of ingress/egress (security gates). When one of the gates is closed for any reason, signage is used to direct all persons to either or both of the open gates. Similar signage is used for evacuation routes in the case of emergency. Plus there is a pedestrian and equestrian exit to the Upper Las Virgenes Canyon Open Space Preserve.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Hidden Hills		
Hazard	Multi-Hazard		
Project Name	**City of Hidden Hills Communications Improvements**		
Status	Ongoing		
Strategy	Continue to improve cellular telephone reception in areas of the City that are currently underserved		
Action Items	• Continue to work with local carriers to improve cellular telephone reception in areas of the City that are currently underserved • Add repeaters and update existing radio systems, when necessary		
Coordinating Department	Public Works, Building and Safety		
Timeline/Completion Date/Priority	5 years / YE 2009 Priority 2		
Total Cost	$50,000		
BCR	BCR>1.0		
Funding Source(s)	FEMA HMGP funds / Internal time		
Constraints	Funding		
Implementation Description	Cellular telephone and radio coverage is regularly evaluated.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
X	Partnerships and Implementation	X	Emergency Management

Malibu Mitigation Projects

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**City of Malibu GIS Upgrade**		
Status	Complete / Ongoing		
Strategy	Upgrade the Geographic Information Systems to incorporate more information regarding trails, geological sensitive areas, and tsunami maps etc.		
Action Items	1. In progress, developing new system to utilize new technologies to better map the City and hazard areas in particular 2. Complete training and provide ongoing training to staff on how to use GIS		
Coordinating Department	Planning Department		
Timeline/Completion Date/Priority	2 years / 2006 Priority 1		
Total Cost	$40,000		
BCR	BCR>1.0		
Funding Source(s)	FEMA HMGP funds		
Constraints	Funding and time		
Implementation Description	GIS currently being updated.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Flood		
Project Name	**Cross Creek Road Redesign**		
Status	Complete		
Strategy	Improve drainage area between Civic Center Way and Pacific Coast Highway		
Action Items	1. Complete redesign of Creek Road to improve drainage and reduce flooding 2. Improve safety for pedestrians and vehicles 3. Improve traffic circulation		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Spring 2008 Priority 1		
Total Cost	$2.24 million		
BCR	BCR>1.0		
Funding Source(s)	General Fund, MTA, TEA-21, Prop. C Local Return		
Constraints	None		
Implementation Description	Cross Creek Road was redesigned in a manner that improves drainage, pedestrian safety, and traffic flow.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation		Emergency Management

City	Malibu
Hazard	Flood
Project Name	**Flood Action**
Status	Partially Complete / Ongoing
Strategy	Implement floodplain management activities as recommended by the Flood Mitigation Plan, City of Malibu.
Action Items	1. Floodplain Regulations 2. Flood Mapping 3. Flood Protections Assistance 4. Flood Protection Materials 5. Flood Protection Activities 6. Emergency Manager Training 7. Flood Warning and Preparedness
Coordinating Department	Public Works
Timeline/Completion Date/Priority	5 years / YE 2009 Priority 1
Total Cost	$25,000
BCR	BCR>1.0
Funding Source(s)	FEMA (HMGP)
Constraints	Time, Funding
Implementation Description	Included mitigation goals in the City of Malibu General Plan (see Mitigation Plan strategy). In addition, Flood Warning and Preparedness information is made available via the City of Malibu web site (Emergency Preparedness Library). Finally, the City of Malibu is a participant in the 2012 FEMA California Coastal Analysis and Mapping Project/Open Pacific Coast Study (CCAMP). These efforts will address gaps in required engineering and mapping for high flood risk areas impacted by coastal flooding, levee systems, and other flood hazards (e.g., lakes, rivers, and ponds).

Plan Goals Addressed			
X	Public Awareness	X	Protect Life, Property, and the Environment
X	Partnerships and Implementation	X	Emergency Management

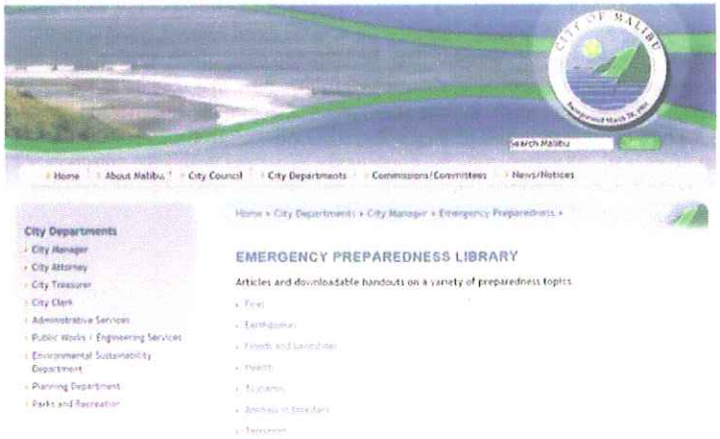


Figure 61: City of Malibu Emergency Preparedness Library

U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, CA 94607-4052

FEMA

October 7, 2011

Honorable John Sibert, Mayor
City of Malibu
23825 Stuart Ranch Road
Malibu, California 90265

RE: FEMA California Coastal Analysis and Mapping Project/Open Pacific Coast Study

Dear Mayor Sibert:

Thank you for your participation in the National Flood Insurance Program administered by the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA). Under the Risk Mapping, Assessment, and Planning (MAP) Program, Region IX has prioritized for fiscal year 2012 Flood Insurance Rate Map and Flood Insurance Study updates in support of the state of California for coastal analysis and mapping. This Program shifts focus from digital flood map production to new detailed engineering analysis, and mapping of coastal and flooding sources in many of the flood-prone communities throughout Region IX.

A feature of the Risk MAP program in Region IX is the re-study of the populated coastline for the state of California's coastal counties and communities. The California Coastal Analysis and Mapping Project (CCAMP) / Open Pacific Coast (OPC) Study will involve over 1,200 miles of new coastal flood hazard mapping and base-flood elevation determinations. Under this initiative, many coastal communities will have coastal flood data and mapping updated for the first time in over 20 years. This study effort will improve the quality of the coastal data used for both floodplain management and planning purposes.

The City of Malibu will be an important participant in the CCAMP / OPC Study. In the first phase of the re-study, coastal data from each community along the open Pacific Ocean shoreline and adjacent inland floodplains is being compiled. FEMA Region IX requests your support and assistance to identify local resources for coastal flood history, flood records, problematic flood-prone areas, topographic data, bathymetric data, beach erosion data, coastal storm or tsunami planning or mapping, and any other information that may be of importance when conducting the coastal re-study in your community. Geographic Information System (GIS) layers such as base maps, aerial photography, and land use information will be extremely useful as well. We appreciate the opportunity to partner with your community. Any data you provide will contribute significantly to an improved coastal flood mapping product which more accurately reflects your current flood risk.

Figure 62: CCAMP Letter (Page 1)

Honorable John Sibert
October 7, 2011
Page 2 of 2

FEMA will facilitate an initial kick-off meeting to discuss the following:

- Nature and intent of the re-study
- Study schedule and milestones
- Potential obstacles that might impact the study effort and potential solutions
- Available flood hazard information that could be used or incorporated into this study effort
- Key points of contact within your community, FEMA Region IX, and the Risk MAP Production and Technical Services Contractor (BakerAECOM, LLC)

In the near future, we will contact your staff to establish an available date for the initial kick-off meeting, anticipated to occur November, 2011 through January, 2012. Information will be provided at that meeting regarding how your community may benefit from the Risk MAP program and the CCAMP / OPC Study. Additionally, a new website has been developed to monitor the CCAMP / OPC Study online at www.r9coastal.org. This website allows each community to stay informed of the flood insurance re-study progress.

We look forward to working with the City of Malibu on this multi-year coastal re-study and mapping project. If you have questions about the CCAMP / OPC Study, you may contact Edward Curtis, Regional Engineer, at (510) 627-7207, or by e-mail at Edward.Curtis@dhs.gov. An alternate contact is Vince Geronimo, CCAMP / OPC Study Project Manager with BakerAECOM, at (510) 879-4533, or by email at Vince.Geronimo@aecom.com.

Sincerely,

Sally Ziolkowski

Sally Ziolkowski, Director
Mitigation Division

cc: Robert Brager, Public Works Director / Floodplain Manager, City of Malibu
Jim Thorsen, City Manager, City of Malibu
Senator Boxer, State Office
Senator Feinstein, State Office
Representative Henry Waxman, District Office

Figure 63: CCAMP Letter (Page 2)

City	Malibu
Hazard	Flood
Project Name	**Malibu Flood Mitigation Plan**
Status	Ongoing (covered in the City General Plan)
Strategy	Identify and implement recommendations presented in the Flood Mitigation Plan.
Action Items	1. Prioritize project recommendations 2. Develop projects and attempt to secure funding to implement
Coordinating Department	Public Works
Timeline/Completion Date/Priority	Complete/Ongoing Priority 1
Total Cost	None, in-house staff time
BCR	BCR>1.0
Funding Source(s)	General Fund
Constraints	Funding
Implementation Description	Implemented goals within the City of Malibu General Plan related to flood mitigation. Specific goals covered under 5.3.1 S Goal 1: A community that is free from all avoidable risks to safety, health and welfare from natural and man-made hazards include: • **S Policy 1.2.4:** The City shall require development to be consistent with minimum Federal Emergency Management Agency (FEMA) guidelines for flood plain management. • **S Implementation Measure 40**: Adopt and update as appropriate maps of extreme fire danger areas, 100-year flood plains, landslide and debris flow danger, active and potentially active faults, tsunami, and any other hazard areas; and inform residents of those areas of risks and possible mitigation measures. • **S Implementation Measure 43**: Encourage area residents to participate in National Flood Insurance Program. • **S Implementation Measure 44**: Design coastal development, except supporting structure, to be above the wave uprush level for storms within the past 100-years, and above the 100-year flood plain. • **S Implementation Measure 51**: Evaluate proposed development for its impact on, and from, geologic hazards, flood and mud flow hazard, and fire hazard.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation		Emergency Management

City	Malibu		
Hazard	Flood		
Project Name	**Las Flores Creek Restoration** (added after the 2005 HMP)		
Status	Complete		
Strategy	Restore the creek to prevent flooding and reduce erosion by increasing capacity and slowing the velocity of water		
Action Items	1. Develop project to provide bank stabilization and flood control 2. Implement project		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Completed Fall 2008 Priority 1		
Total Cost	$2.0M		
BCR	BCR>1.0		
Funding Source(s)	General Fund and State Grants		
Constraints	Funding		
Implementation Description	Creek reconstructed to improve drainage as well as reduce flooding and erosion		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation		Emergency Management

Figure 64: Las Flores Creek

City	Malibu
Hazard	Flood
Project Name	**Legacy Park Drainage** (added after the 2005 HMP)
Status	Complete
Strategy	Improve drainage in the Civic Center area
Action Items	1. Design and construct an 8 acre foot storm water detention pond 2. Construct drainage improvements to channel water to the detention pond
Coordinating Department	Public Works
Timeline/Completion Date/Priority	Completed Fall 2011 Priority 1
Total Cost	$32.45M
BCR	BCR>1.0
Funding Source(s)	General Fund, State and Local Grants, Certificates of Participation
Constraints	Funding
Implementation Description	Improvements to drainage in the Malibu Civic Center area complete. Designed and constructed an 8 acre foot storm water retention pond and improved drainage to channel water to the retention pond.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation		Emergency Management

Note: Since its completion, the Civic Center Storm water Treatment Facility received multiple awards:

- *Outstanding Storm water Best Management Practice (BMP) Implementation - Comprehensive Regional Project* - Presented by California Storm water Quality Association (CASQA), September 27, 2011
- *2011 Outstanding Sustainability Project* - presented by the Metropolitan Los Angeles Branch of the American Society of Civil Engineers (ASCE), October 14, 2011

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Bluffs Park Improvement Project** (added after the 2005 HMP)		
Status	In Progress/Ongoing		
Strategy	Upgrade critical infrastructure to improve reliability for emergency shelter		
Action Items	1. Assess building and identify needs 2. Design improvements 3. Secure funding to implement the improvement project 4. Construction of improvement project		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$2.5M		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funds		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

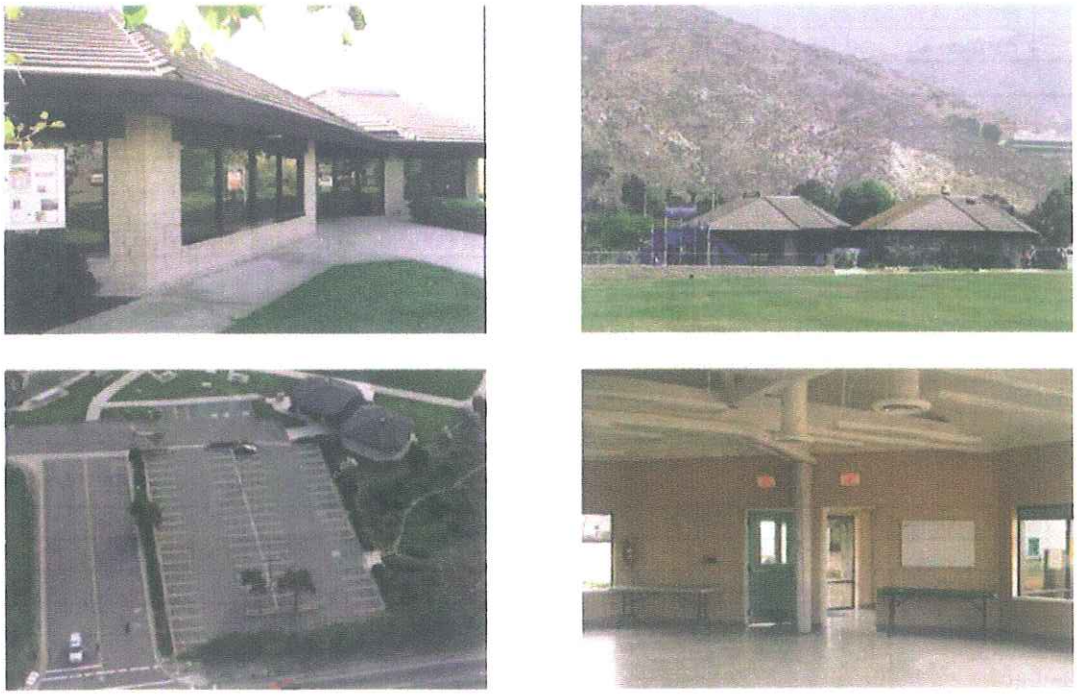


Figure 65: Michael Landon Center at Bluffs Park

City	Malibu		
Hazard	Flood		
Project Name	**Catch Basin and Culvert Upgrades** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Upgrade City catch basins and culverts to increase capacity in order to prevent flooding and landslides		
Action Items	1. Inventory catch basins and culverts 2. Identify catch basins and culverts that need upgrades 3. Design projects to increase capacity to accommodate larger water flows 4. Secure funding for project implementation 5. Implement project		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$1.0M		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation		Emergency Management

City	Malibu		
Hazard	Flood		
Project Name	**City Hall Drainage Improvements** (added after the 2005 HMP)		
Status	In-progress/Ongoing		
Strategy	Improve drainage around the City Hall building to channel water flow		
Action Items	1. Assess current drainage 2. Design drainage improvements 3. Secure funding to implement the drainage project 4. Construct drainage improvement project		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$200K		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Excavation and Emergency Shelter at Zuma Beach** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Work with LA County Beaches to develop the Zuma Beach parking lot as an emergency shelter location and secure access.		
Action Items	1. Work with LA County Beaches to establish the Zuma Beach parking lot as an emergency shelter 2. Perform clearing of LA County owned underpass to provide reliable access to the Zuma Beach parking lot		
Coordinating Department	**Public Works** and Emergency Preparedness		
Timeline/Completion Date/Priority	Timeline to be determined Priority		
Total Cost	$300K		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding, Time, and Permitting		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
X	Partnerships and Implementation		Emergency Management

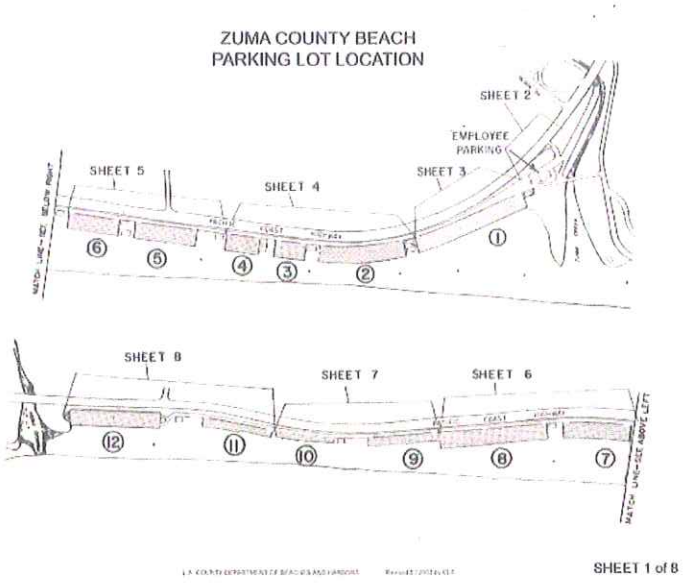


Figure 66: Zuma Beach Parking Lot

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Las Flores Road Canyon Improvements** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Improve pavement and draining to reduce flooding and erosion		
Action Items	1. Design road and drainage improvements to accommodate surface run-off 2. Secure funding to implement improvements 3. Construct road and draining improvements		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$250K		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Malibu Road Improvements** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Improve pavement and draining to reduce flooding and erosion		
Action Items	1. Design road and drainage improvements to accommodate surface run-off 2. Secure funding to implement improvements 3. Construct road and draining improvements		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$300K		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Malibu Road Storm Drain System Improvements** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Improve storm drains to reduce flooding and erosion as well as maintain evacuation route reliability.		
Action Items	1. Assess stormdrain system 2. Design stormdrain system improvements 3. Secure funding to implement stormdrain system improvements 4. Improvement project construction		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$600K		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Pacific Coast Highway Drainage Improvements** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Work with Caltrans to improve drainage and divert water into the Legacy Park detention basin and prevent flooding along Malibu Road as well as maintain evacuation route reliability.		
Action Items	1. Work with Caltrans to assess current drainage 2. Design drainage improvements 3. Secure funding to implement the drainage improvement project 4. Drainage improvement project construction		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$500K		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Rainsford Bridge Installation** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Improve reliability of evacuation routes by installing a bridge at Rainsford Place.		
Action Items	1. Design bridge project 2. Secure funding for project implementation 3. Construct project		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$750K		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Road Reconstruction** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Improve reliability of evacuation routes by reconstructing Latigo Canyon Road, Corral Canyon Road, Encinal Canyon Road and Malibu Road.		
Action Items	1. Design road reconstruction projects 2. Secure funding for project implementation 3. Construct project(s)		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Fall 2011 Priority 1		
Total Cost	$8.0M		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Tree Removal in City Right-of-Way** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Identify and remove trees in the City Right-of-Way to maintain a safe distance from power poles and reduce fire risk.		
Action Items	1. Develop tree inventory (complete) 2. Systematically remove tress from the Right-of-Way		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$100K		
BCR	BCR>1.0		
Funding Source(s)	General Fund		
Constraints	Funding and Time		
Implementation Description	Tree inventory complete. Tree removal in-progress.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation		Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Utility Facility and Distribution Upgrades** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Upgrade utility distribution facilities and systems to increase reliability and reduce fire hazards posed by heavily loaded utility poles		
Action Items	1. Work with utility companies to improve utility distribution facilities and systems such as power poles, utility boxes, etc.		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$100K		
BCR	BCR>1.0		
Funding Source(s)	General Fund		
Constraints	Funding and Time		
Implementation Description	In-progress, ongoing effort.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
X	Partnerships and Implementation		Emergency Management

City	Malibu		
Hazard	Multi-Hazard		
Project Name	**Water Storage** (added after the 2005 HMP)		
Status	In-Progress/Ongoing		
Strategy	Work with LA County Water District 29 to improve water storage systems throughout the City of Malibu.		
Action Items	1. Work with LA County Water District 29 to complete a critical needs assessment and create a Master Plan for water system improvements 2. Design improvements to the water system including additional storage tanks 3. Secure funding to implement the Master Plan 4. Implement the Master Plan		
Coordinating Department	Public Works		
Timeline/Completion Date/Priority	Timeline to be determined Priority 1		
Total Cost	$10.0M		
BCR	BCR>1.0		
Funding Source(s)	General Fund and/or Grant Funding		
Constraints	Funding		
Implementation Description	Currently working with LA County Water District 29 on a critical needs assessment.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
X	Partnerships and Implementation	X	Emergency Management

City	Malibu		
Hazard	Landslide, Flood		
Project Name	**Big Rock Drainage Improvements Project**		
Status	Removed		
Strategy	Improve drainage and prevent erosion on Big Rock Drive		
Action Items	1. Complete the Big Rock Drainage Project 2. Improve drainage to prevent flooding from mud and debris flows during heavy rainfall		
Coordinating Department	Public Works Department		
Timeline/Completion Date/Priority	2005 Priority 1		
Total Cost	$350,000		
BCR	BCR>1.0		
Funding Source(s)	FEMA (HMGP)		
Constraints	Coastal Development Permit		
Implementation Description	The Big Rock Drainage Project was dropped.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Malibu
Hazard	Flood
Project Name	**Annual Street Pavement Project**
Status	Complete / Ongoing
Strategy	Resurface the City's public roads by repaving damaged roadways
Action Items	1. Continue to plan and commence work to complete the Pavement Rehabilitation Project 2. Clear out damaged, worn pavement 3. Replace worn pavement with new pavement
Coordinating Department	Public Works
Timeline/Completion Date/Priority	1 year / 2006 Priority 2
Total Cost	$600,000
BCR	BCR>1.0
Funding Source(s)	General Fund
Constraints	Funding and Time
Implementation Description	• Rehabilitation work is performed every year on the City's public roads. • Rehabilitation projects have included Broad Beach Road, Malibu Canyon Road, Civic Center Way, and Cross Creek Road. • The City will continue to perform annual road rehabilitation projects as necessary.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation		Emergency Management

City	Malibu
Hazard	Earthquake
Project Name	**Soft Story Retrofitting**
Status	Removed
Strategy	Reinforce soft story buildings to mitigate damage due to an earthquake event
Action Items	5. Identify soft story buildings in the City of Malibu 6. Add shear panels or seismic frames to soft story buildings
Coordinating Department	Community Development
Timeline/Completion Date/Priority	5 years / YE 2009 Priority to be determined
Total Cost	$1,000,000
BCR	Additional data is required
Funding Source(s)	FEMA HMGP funds
Constraints	Time, funding
Implementation Description	An assessment was made of all buildings in the city of Malibu and no structures with a soft first story were identified.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation		Emergency Management

Other City of Malibu Hazard Mitigation Efforts

The City of Malibu television broadcast regularly provides public preparedness, prevention, and mitigation information. Examples are provided below:

Figure 67: City of Malibu Emergency Information TV Bulletins

Westlake Village Mitigation Projects

City	Westlake Village
Hazard	Multi-Hazard
Project Name	**City of Westlake Village Communications Improvements**
Status	Complete / Ongoing
Strategy	Improve cellular telephone reception in areas of the City that are currently underserved
Action Items	1. Continue to work with local carriers to improve cellular telephone reception in areas of the City that are currently underserved 2. Create antenna lease programs to avoid "black spots" in the Region 3. Add repeaters to existing radio systems
Coordinating Department	Public Works, Building and Safety
Timeline/Completion Date/Priority	5 years / YE 2009 Priority 1
Total Cost	$100,000
BCR	BCR>1.0
Funding Source(s)	FEMA HMGP funds
Constraints	Funding
Status Implementation	Westlake Village continues to work with wireless phone carriers to improve mobile phone reception in the areas of the city that are not adequately covered by wireless networks. The County-wide Integrated Radio System (CWIRS) was deployed. Furthermore, the City installed a satellite based computer network that allows the EOC to connect to the Internet in the event of a disruption to the landline computer network. The system was tested in November 2010 during a power outage and the EOC was able to remain connected to the Internet.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
X	Partnerships and Implementation	X	Emergency Management

City	Westlake Village
Hazard	Multi-Hazard
Project Name	**City of Westlake Village GIS Upgrade**
Status	Complete/Ongoing
Strategy	To upgrade the Geographic Information Systems in order to add a higher resolution backdrop to map trails, flood hazard areas, geologic sensitive areas and document more detailed information
Action Items	1. Complete upgrading the system using new technologies to better map hazard areas 2. Complete training and provide ongoing training to staff on how to use GIS technologies 3. Continue to seek funding through internal grant writers
Coordinating Department	Community Development
Timeline/Completion Date/Priority	1 year or less / Complete Priority 1
Total Cost	$1000
BCR	BCR>1.0
Funding Source(s)	FEMA HMGP funds
Constraints	Funding
Implementation Description	The Geographic Information System was updated and higher resolution maps were created of the Westlake Reservoir, the FEMA floodplain, and the fire hazard areas. A fire hazard severity map was created. Training of personnel on the GIS was conducted and will continue to be performed on an ongoing basis.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Westlake Village		
Hazard	Multi-Hazard		
Project Name	**Emergency Power Generation**		
Status	Complete		
Strategy	Ensure backup power supplies for key City facilities		
Action Items	1. Purchase generators		
Coordinating Department	Public Works, Building and Safety		
Timeline/Completion Date/Priority	Complete Priority 1		
Total Cost	$100,000		
BCR	BCR>1.0		
Funding Source(s)	FEMA HMGP funds		
Constraints	Funding		
Implementation Description	Generators were purchased for the EOC and the Community Room. Westlake Village now has a total of four portable generators.		
Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Westlake Village
Hazard	Fire
Project Name	**Smoke Detector Installation**
Status	Complete
Strategy	Encourage residents to install smoke detectors in existing residences built prior to January 1, 1986
Action Items	1. Implement a program to educate the public about the importance of smoke detectors 2. Provide instructional services on how to install a smoke detector 3. Provide smoke detectors to the public
Coordinating Department	Engineering/Public Works
Timeline/Completion Date/Priority	2 years / 2006 Priority 1
Total Cost	$15,000
BCR	BCR>1.0
Funding Source(s)	General Fund, HMGP funds
Constraints	Funding
Implementation Description	A program to educate the public about the importance of installing smoke detectors and replacing batteries periodically was instituted. Information was disseminated to the public through articles in a series of city newsletters.

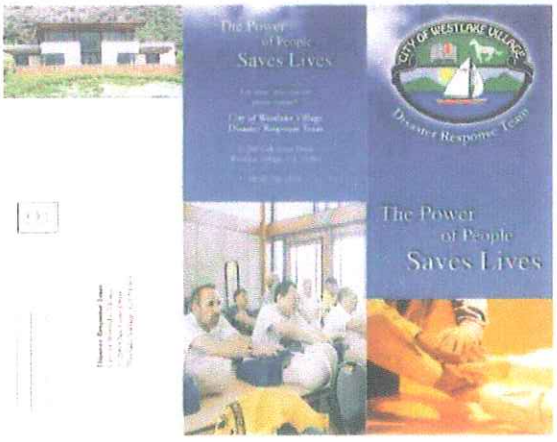
Plan Goals Addressed			
X	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

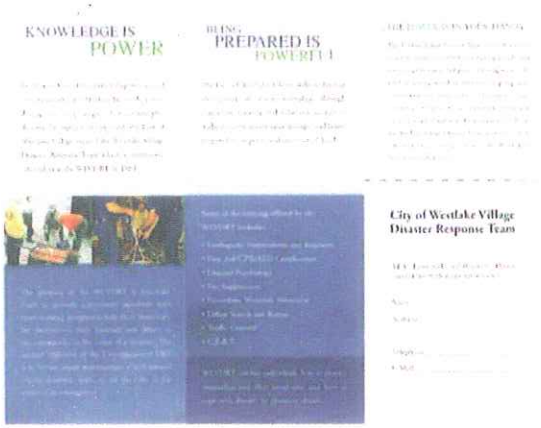
City	Westlake Village
Hazard	Windstorm/Fire
Project Name	**Tree Census**
Status	Complete / Ongoing
Strategy	Conduct a thorough census of the trees in the city to keep track of aging or poorly maintained trees that may create a fire or windstorm hazard
Action Items	1. Develop a team to manage the project 2. Obtain proper means of cataloguing and displaying such information such as GIS tools 3. Prepare map(s) identifying trees and separating those that pose a potential threat in case of a fire or windstorm event 4. Develop a strategy to eliminate problematic trees
Coordinating Department	Public Works
Timeline/Completion Date/Priority	One year from planning to end Priority 1
Total Cost	No Cost – In house staff time
BCR	BCR>1.0
Funding Source(s)	N/A
Constraints	Staff time
Implementation Description	The City's Public Works personnel identified and inspected every tree on public property in the City. Trees determined to be hazardous were cut down. The City continues to assess trees annually. In addition, a GIS tree mapping program has developed.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Westlake Village
Hazard	Multi-Hazard
Project Name	**Advanced Emergency Training**
Status	Complete/Ongoing
Strategy	Provide advanced emergency training for the City's Disaster Recovery Team (DRT)
Action Items	• Provide Advanced Emergency Training for DRT members
Coordinating Department	Westlake Village DRT Team
Timeline/Completion Date/Priority	Complete / Ongoing updates (as required) Priority 2
Total Cost	$25,000
BCR	BCR>1.0
Funding Source(s)	FEMA HMGP funds
Constraints	Funding and time
Implementation Description	Advanced training is provided to DRT members every year and will continue to be provided. The COG offered 2 to 3 CERT classes every year. The City of Malibu hosted shelter training to which Westlake sent representatives. Westlake Village also conducted two Point of Distribution exercises in November of 2009 and 2010. The POD exercises used CERT members within an Incident Command System structure.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management



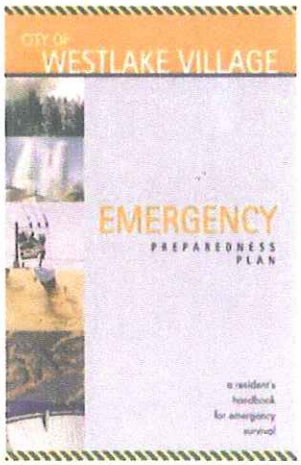


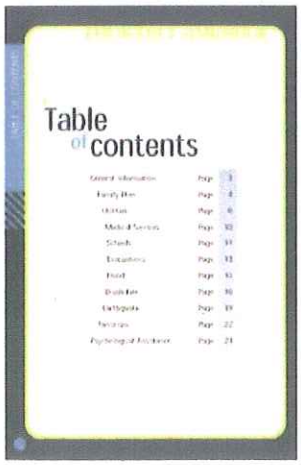
City	Westlake Village
Hazard	Flood
Project Name	**Annual Street Resurfacing Program**
Status	Complete/Ongoing
Strategy	Resurface the City's public roads by repaving damaged roadways.
Action Items	1. Continue the ongoing Street Resurfacing Program 2. Resurface and repair damaged and worn pavement
Coordinating Department	Public Works
Timeline/Completion Date/Priority	Ongoing Priority 2
Total Cost	$100,000 per year
BCR	BCR>1.0
Funding Source(s)	General Fund
Constraints	Funding, Time
Implementation Description	Ongoing effort. In 2009 completed rubberized asphalt overlay work on the following streets: Benchley Court, Clearford Court, Kentfield Court, Kingspark Court, Middlegate Road, Royceton Court, and Village Brook Road. Completed slurry seal work on the following streets: Lindero Canyon Road (Agoura Road to Via Colinas), Agoura Road (Lindero Canyon Road to western City limit), and First Neighborhood (southerly half). In 2010 for the second year in a row, Westlake Village undertook a joint bidding of street work with the Agoura Hills leading to reduced overall contract costs for both cities.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

City	Westlake Village
Hazard	Multi-Hazard
Project Name	**Public Emergency Preparedness**
Status	Complete/Ongoing
Strategy	A program to educate citizens about hazards within the City, how to prepare, and what actions to take in case of a disaster
Action Items	1. Update and distribute to all residents an emergency handbook.
Coordinating Department	Community Services
Timeline/Completion Date/Priority	1 year / Complete 2005 Priority 2
Total Cost	$20,000
BCR	BCR>1.0
Funding Source(s)	FEMA grants
Constraints	Funding
Implementation Description	Westlake Village completed an update to the Emergency Preparedness Plan (for residents) in 2005. The plan is available through the City's website. See example below. Los Angeles County established the California Fire Alliance which includes an information campaign aimed at educating the public about wildfire safety. The Los Angeles County Fire Department developed the Ready Set Go Wildfire Action Plan to inform residents of actions they can take to keep them safe from wildfires. Westlake Village and Agoura Hills hosted a joint emergency preparedness event in August 2010 aimed at educating the public.

Plan Goals Addressed			
X	Public Awareness	X	Protect Life, Property, and the Environment
X	Partnerships and Implementation	X	Emergency Management





City	Westlake Village
Hazard	Fire
Project Name	**Wood Shingle/Shake Roofs Removal Project**
Status	Removed
Strategy	Require all property owners to remove and replace wood shingle or shake roofs
Action Items	• Along with the Los Angeles County Fire Department, conduct an assessment of current buildings that have wood shake roofs • Implement a program to require residents to remove and replace wood shake roofs, with financial help from the city
Coordinating Department	Los Angeles County Fire Department, Engineering/Public Works
Timeline/Completion Date/Priority	5 years / Removed Priority to be determined
Total Cost	To be determined upon assessment of wood shingled roofs
BCR	N/A
Funding Source(s)	FEMA HMGP funds
Constraints	Funding and time
Implementation Description	An assessment was made and it was determined that the Los Angeles County Building and Safety Code was sufficient to encourage homeowners to replace existing wood roofs so the project was removed. Building and Safety requires that any home that requests a remodel permit for more than 50% of the property in a very high fire zone with a wood roof is required to change their roof materials to be more fire resistant.

Plan Goals Addressed			
	Public Awareness	X	Protect Life, Property, and the Environment
	Partnerships and Implementation	X	Emergency Management

SECTION 5. PLAN MAINTENANCE AND MONITORING

This plan maintenance section details the formal process that will ensure that the Las Virgenes-Malibu COG Hazard Mitigation Plan is an active and relevant document. This section includes a schedule for monitoring and evaluating the plan and producing a revision every five years. Additionally, a description of how the Las Virgenes-Malibu COG will integrate public participation throughout the plan maintenance process is provided. Finally, this section includes an explanation of how the city governments in the Las Virgenes-Malibu COG intend to incorporate the mitigation strategies outlined in this plan into existing planning mechanisms such as individual city General Plans, Capital Improvement Plans, Building & Safety Codes and other programs and or plans within the cities.

Implementation and Plan Adoption

The Las Virgenes-Malibu Council of Governments (COG) and individual cities within the COG were responsible for adopting the Las Virgenes-Malibu Hazard Mitigation Plan. These governing bodies have the authority to promote sound public policy regarding hazards.

The plan was adopted and submitted to the State Hazard Mitigation Officer at the California Emergency Management Agency (Cal EMA). Cal EMA is responsible for submitting the plan to the Federal Emergency Management Agency (FEMA) for review. The review includes the criteria outlined in FEMA Mitigation Planning Final Rule 44 CFR Part 201 (September 2009). Upon acceptance by FEMA, Las Virgenes-Malibu will maintain its eligibility for Hazard Mitigation Grant Program funds.

Continued Public Involvement

The cities within the Las Virgenes-Malibu COG are dedicated to involving the public in the Hazard Mitigation Plan process. Members of the public, businesses, and other interested parties had the opportunity to provide feedback on local area risks and the Hazard Mitigation Plan. Copies of the plan are catalogued and maintained in appropriate departments as well as on city Internet sites to be easily accessible for public viewing.

Coordinating Body

The Las Virgenes-Malibu Hazard Mitigation Steering Committee was responsible for coordinating and undertaking the formal review process. The Steering Committee members are responsible for ensuring that reviews and updates to the plan are performed.

The Steering Committee will conduct annual reviews of the Hazard Mitigation Plan; a public meeting is to be held annually or when deemed necessary by the Hazard Mitigation Steering Committee. The meetings will provide the public a forum where they can express their concerns, opinions, or ideas about the plan.

Adoption and Implementation

The COG has adopted the Las Virgenes-Malibu Hazard Mitigation Plan. The Hazard Mitigation Steering Committee is responsible for plan implementation. The Executive Director of the Las Virgenes-Malibu COG serves as a convener to facilitate the Hazard Mitigation Steering Committee meetings. Plan implementation and evaluation are a shared responsibility among all of the Hazard Mitigation Steering Committee Members. The Steering Committee is responsible for providing information gained from committee meetings with staff and community members in their respective cities.

Implementation Through Existing Programs

The Las Virgenes-Malibu COG addresses statewide planning goals and legislative requirements through their cities' General Plans, Capital Improvement Projects, and City Building and Safety Codes. The Hazard Mitigation Plan provides a series of recommendations - many of which are closely related to the goals and objectives of existing planning programs within the cities. The Las Virgenes-Malibu Regional cities have the opportunity to implement recommended mitigation action items through existing programs and procedures. The meetings of the Hazard Mitigation Steering Committee provide an opportunity for committee members to report back on the progress made on the integration of mitigation planning elements into city planning documents and procedures.

Economic Analysis of Mitigation Projects

FEMA's approaches to identify the costs and benefits associated with 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 the cities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. The individual cities review all projects based on the benefit/cost analysis.

Benefit/Cost Analysis

The benefit/cost analysis is used to determine if the cost of investing in a mitigation project, i.e., the "cost" will result in reduced damages in the future, i.e., the "benefits" and if the loss prevented justifies the expenditure of funds for the project. If the benefit is greater than the cost, then the project is cost effective; if the benefit is less than the cost, then the project is not cost effective.

The benefit/cost analysis is essentially the same for each type of hazard mitigation project. The only differences are the types of data that are used (e.g., if the project is for earthquake, flood, wind, or fire mitigation). To determine the benefit/cost, the project cost is compared to the anticipated dollar loss that will be prevented by the mitigation project. For example, if the project cost is $100,000 and the expected loss averted is $1,000,000, then the benefit exceeds the cost and is therefore cost effective. The ratio of the benefit versus the cost is 10:1 ($1,000,000 divided by $100,000). Priority is given to those projects with the highest benefit/cost ratio or those projects with the greatest benefit to the community.

Review Types

The Las Virgenes-Malibu COG utilizes three approaches to determine a project's benefit-cost ratio: lower-bound analysis, upper-bound analysis, and best estimate (per FEMA Mitigation Plan Guidelines). The benefit-cost analysis will yield one of three outcomes: (1) the project is cost effective (BCR>1.0); (2) the project is not cost effective (BCR<1.0), or (3) additional data is required:

Cost Effective

(a) No further analysis or additional data collection are required
(b) If a project is determined to be cost effective, then the project moves to the next step in the application process.

Not Cost Effective

(a) No further analysis or additional data collection are required. If the project is determined not to be cost effective, by the full data analysis, then the project is not eligible for funding.
(b) Because of incompleteness of applications, some projects require additional information to determine cost effectiveness

Additional Data Required

(a) Requires additional data and further analysis. If the cost effectiveness of a project cannot be determined, then additional data must be collected.
(b) It is important to recognize that only the minimum data necessary to reach a decision on project cost effectiveness must be collected. In many cases, the collection of one or two more pieces of information are sufficient to reach a decision.
(c) A complete analysis is conducted in those relatively few cases where the BCR is close to 1.0.

Benefit-Cost Analysis Exemptions

The following categories of mitigation measures are exempt from the FEMA policy on benefit/cost analysis:

- 5% Initiative Projects: States, which receive a Presidential declaration, are eligible to use up to 5% of available HMGP funding at their discretion.
- Tornado Initiative: States, which receive a Presidential declaration, are eligible to use up to an additional 5% of available HMGP funding at their discretion.
- Substantial Damage Waivers for acquisition of substantially damaged structures in 100-year floodplain.
- Mitigation planning related grants.

The lower- and upper-bound methods are used in many cases to make final determinations of cost effectiveness even when there is limited data. In these cases, no further benefit-cost analysis is needed. In other cases, quick screening analysis with these approaches yields inconclusive results and additional data and screening may be required. Each approach is described below:[5]

Analysis Type	Uses
Lower-Bound Analysis	• Used when data are incomplete. • It can determine that a project is cost effective. • It cannot determine that a project is not cost effective. • It uses data for one or two significant benefits.
Upper-Bound Analysis	• It can only determine that a project is not cost effective. • It used as the next step if the lower-bound analysis is negative (not cost effective). • Used if a project appears, at first glance, unlikely to be cost effective. • Uses the highest reasonable estimate of benefits for a project. • Analyzes as much data as are possible, assigning the highest reasonable value to each.
Best Estimate	• It should be used when the project application data are complete, or almost complete. • It produces a more accurate analysis than Lower-Bound and Upper-Bound analyses. • It determines whether a project is cost effective or not cost effective. • Can be used for ranking or setting priorities among projects

Lower-Bound Analysis

Lower-bound analysis is a powerful tool that can often demonstrate that projects are cost effective — in many cases regardless of whether the available data are complete or not. This is an important point, because a project's cost effectiveness can sometimes be determined by using only one or two key pieces of data. The lower-bound analysis was developed with this in mind. This is because the lower-bound analysis considers only *some* of a project's benefits — those that are the most important or those for which data exist — and ignores other benefits that may be difficult to estimate or for which data may not be available. In other words, this analysis purposely uses only a few data to determine the project's cost effectiveness and undercounts, or ignores other benefits that will be gained by funding the project. If these few data indicate that a project is cost effective, then no further analysis is needed. No additional data has to be collected. The following example illustrates this concept.

EXAMPLE: Assume that a proposed project will elevate a flood prone home at a cost of $20,000. Several types of damages will be prevented: damages to the structure, damages to the contents, the costs of temporary housing, etc. Now assume that the dollar-value of household contents is not known and temporary housing costs (which require information on area rental rates) are also unavailable. The only known damage is the estimated damage to the structure. Based on this damage information alone, if a lower-bound analysis determines that only the benefits of avoided structural damages are greater than the $20,000 cost of the project, then the project is cost effective. This is because the partial benefits of the project alone are *more* than the cost. Analyzing information about the contents and the temporary housing costs is unnecessary because it would only increase a benefit-cost ratio already above 1.0. No further data are needed and the analysis is complete. If the analysis in this example concludes that the project is not cost effective, then either additional data (contents and rental costs) would be needed, or an upper-bound analysis would be conducted, or both.

[5] FEMA *Mitigation Cost Analysis (BCA) Toolkit*

Upper-Bound Analysis

If a lower-bound analysis shows that a project is not cost-effective, then the next step is an upper-bound analysis. Sometimes, an upper-bound analysis is used if, at first glance, if the project not to be cost-effective. Like lower-bound analysis, upper-bound analysis relies on limited project data. Upper-bound analysis, however, also uses professional judgment to estimate about input data that give the highest reasonable benefits that can be expected from a mitigation project. ***It is extremely important to note that upper-bound analysis cannot determine that a project is cost-effective. Upper-bound analysis can only determine that a project is not cost-effective.***

Best Estimate Analysis

A best estimate analysis is used when the project application data are complete, or almost complete. This analysis provides a more accurate BCR than either lower- or upper-bound analysis because more data are considered in the analysis. A project is determined to be either cost-effective or not cost-effective, because all significant data are considered. Because this method of benefit-cost analysis provides the best estimate of cost-effectiveness, it can be used to rank (set priorities among) competing projects. Neither lower-bound nor upper-bound analysis are used to rank or set priorities among projects.

Plan Monitoring, Evaluation, Updates, and Formal Review Process

The Las Virgenes-Malibu Hazard Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in development or programs that may affect mitigation priorities. Steering Committee members are responsible for monitoring and evaluating the progress of the mitigation strategies in the plan. The Steering Committee is also responsible for updating the plan.

The Steering Committee will review the goals and action items to determine their relevance to changing conditions within the Region, as well as changes in State or Federal policy, and to ensure they are addressing current and expected conditions. The committee will also review the risk assessment portion of the plan to determine if this information should be updated or modified, given any new available data.

The Planning Group comprised of representatives from each LVMCOG city supports the Steering Committee by attending monthly meetings to review local planning efforts and evaluate progress on mitigation efforts. The Planning Group will report progress to the Steering Committee and work with other city departments to implement the mitigation strategies contained in this Hazard Mitigation Plan.

The city departments responsible for the various action items identified in Section 4: Hazard Mitigation Goals and Strategies will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies require revision.

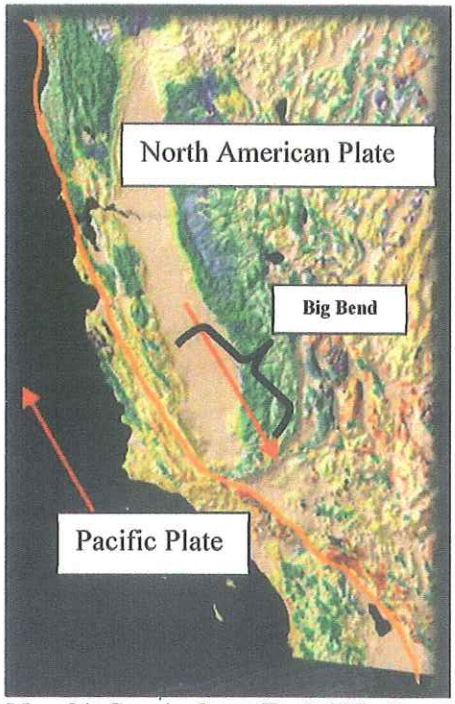
SECTION 6. EARTHQUAKE

The Nature of the Earthquake Threat

Earthquakes occur at the boundaries of the Earth's tectonic plates as they move relative to one another. The tectonic boundary between the Pacific Plate and the North American Plate in California is along the San Andreas Fault. The fault is a transform boundary where the plates are sliding horizontally past one another.

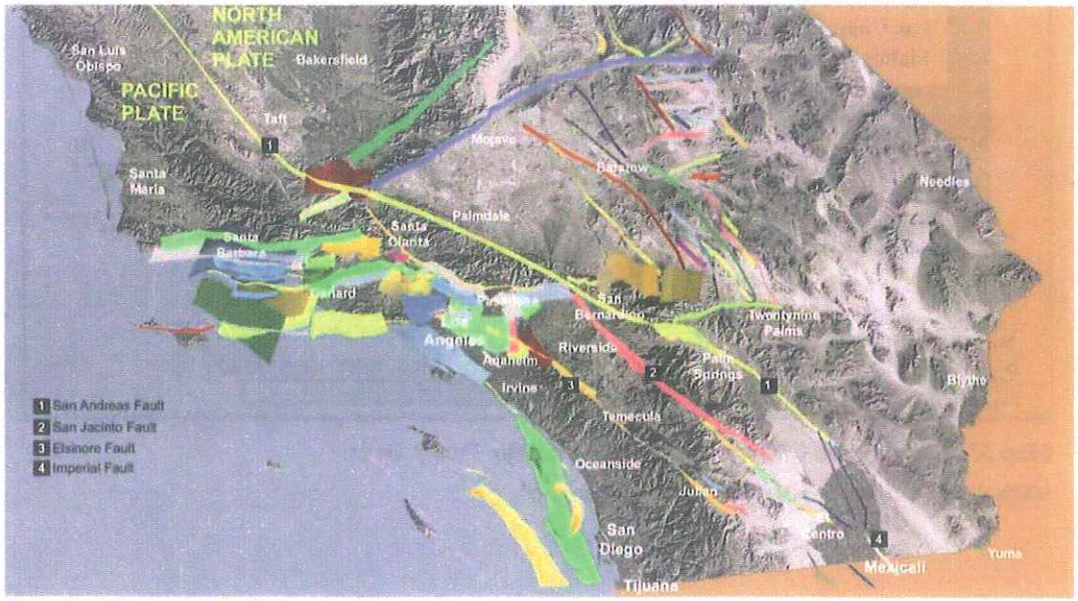
The risk of earthquakes in southern California is exacerbated by the fact that the two plates are inhibited in their motion by what is known as the "Big Bend". In this section of the San Andreas the fault curves to the west then curves back to the north. This creates a barrier to simple lateral motion. This bend is a convergent (restraining) bend, creating a localized collision of tectonic plates, generating a tremendous amount of compression stress.

To release this stress, additional faults have formed over time. The "Big Bend" of the San Andreas Fault is thought to be responsible for much of the complexity of faulting in Southern California



Map 31: San Andreas Fault "Big Bend"

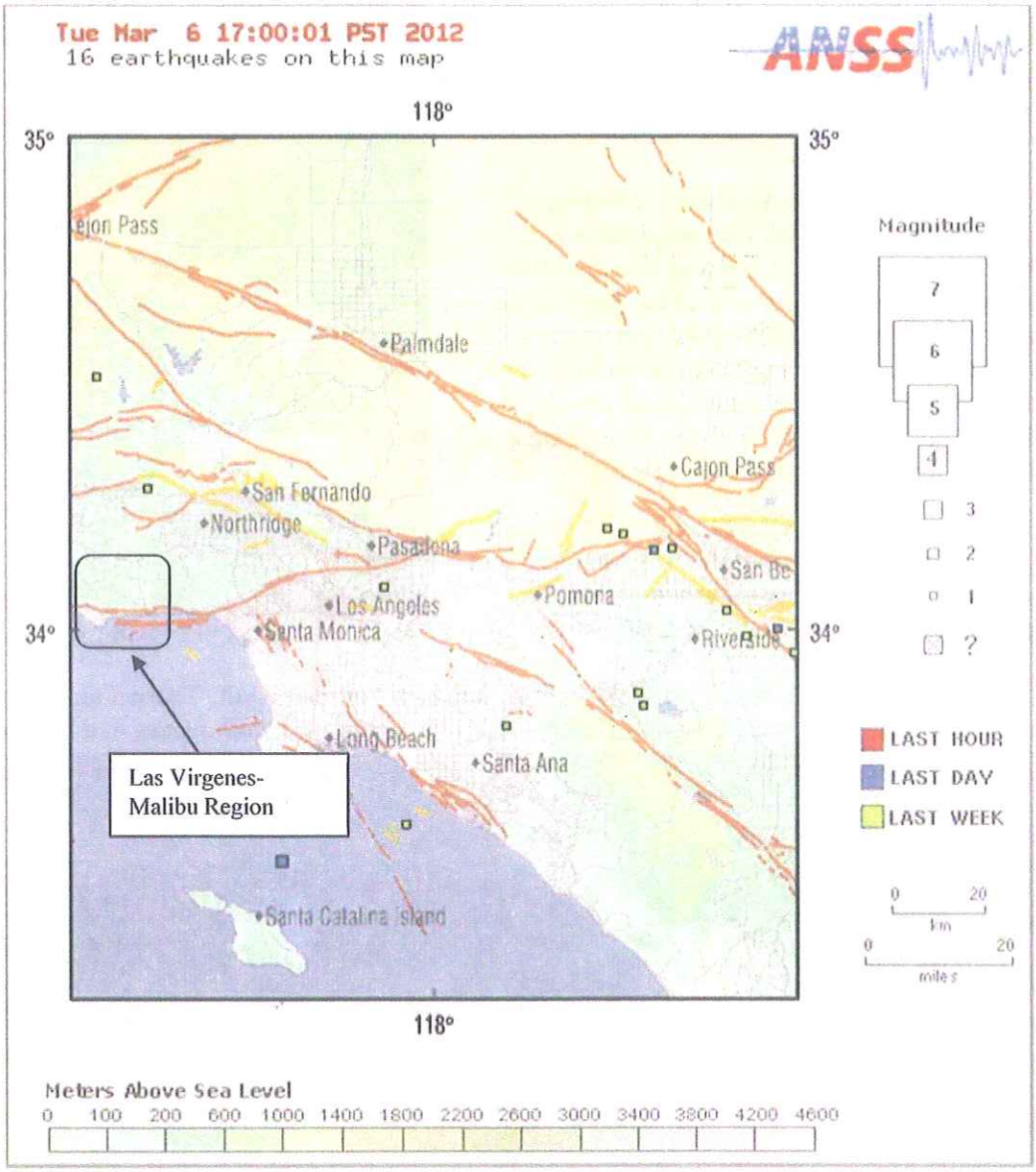
The map below depicts several parallel faults to the San Andreas Fault. These four faults are considered to be responsible for approximately half of the significant earthquakes in the region.



Map 32: Parallel Faults to the San Andreas Fault
SOURCE: Southern California Earthquake Center (SCEC)

Historical Record of Earthquakes in Southern California

Earthquakes occur *every* day in Southern California. Most are small with a magnitude less than The following map depicts major faults in the Southern California region and recent seismic activity.



Map 33: Los Angeles County Earthquakes for the Past 7 Days

SOURCE: http://earthquake.usgs.gov/earthquakes/recenteqsanim/la/

History of Significant Earthquakes in Southern California

The chart below provides examples of 24 significant earthquakes in Southern California since 1857.

Date	Time	Location	Magnitude
01.09.1857	8:24 am	Fort Tejon	7.9
02.24.1892	11:20 pm	Laguna Salada	7.3
12.25.1899	4:25 am	San Jacinto/Hemet	6.7
04.21.1918	2:31 pm	San Jacinto	6.8
06.29.1925	7:42 am	Santa Barbara	6.8
11.04.1927	5:51 pm	Offshore Lompoc	7.1
03.10.1933	5:54 pm	Long Beach	6.4
05.18.1940	8:37 pm	Imperial Valley	6.9
04.10.1947	7:58 am	Manix	6.5
07.21.1952	3:52 am	Kern County	7.5
04.09.1968	6:29 pm	Borrego Mountain	6.6
02.09.1971	6:01 am	San Fernando	6.6
10.15.1979	4:16 pm	Imperial Valley	6.4
07.08.1986	2:21 am	North Palm Springs	5.7
10.01.1987	7:42 am	Whittier Narrows	5.9
11.24.1987	5:15 am	Superstition Hills	6.6
06.28.1991	7:43 am	Sierra Madre	5.8
04.22.1992	9:50 pm	Joshua Tree	6.1
06.28.1992	4:57 am	Landers	7.3
06.28.1992	8:05 am	Big Bear	6.3
01.17.1994	4:30 am	Northridge	6.7
10.16.1999	2:46 am	Hector Mine	7.1
12.22.2003	11:15 am	San Simeon	6.5
07.29.2008	11:42 am	Chino Hills	5.4

Table 108: Significant Southern California Earthquakes Since 1857

SOURCE: Southern California Earthquake Center (SCEC)

In addition to the 1994 Northridge Earthquake, the Las Virgenes-Malibu Region has experienced two earthquakes M5.0 and over in the Malibu area. A M5.2 event occurred on January 1, 1979 and M5.0 event occurred on January 18, 1989. In both cases, only minor damage was recorded.