ITEM 8.A.

MOORPARK CITY COUNCIL
AGENDA REPORT

TO: Honorable City Council

FROM: John Brand, Senior Management Analyst

DATE: January 31, 2013 (CC Meeting of 2/06/2013)

SUBJECT: Consider Resolution Adopting the 2010 Ventura County Hazard Mitigation Plan and the City of Moorpark 2013 Update to the Mitigation Plan

SUMMARY

The Hazard Mitigation Plan is a multi-hazard plan that identifies hazards and their effects on the community, and sets goals and specific actions to effectively mitigate these hazards. The City's adoption of the 2010 Ventura County Hazard Mitigation Plan and the City of Moorpark 2013 Update to the Plan will allow the City to apply to the Federal Emergency Management Agency for pre-disaster and post-disaster grant funding and maintains compliance with state and federal requirements for plan maintenance.

Incorporation of the City's plan into the County of Ventura Multi-Jurisdictional Hazard Mitigation Plan will provide significant operational efficiencies and economies of scale for the City. The Ventura County Hazard Mitigation Plan includes Ventura County, the cities of Camarillo, Ojai, Oxnard, Port Hueneme, Santa Paula, Thousand Oaks, San Buenaventura, as well as the Calleguas Municipal Water District, Casitas Municipal Water District, Channel Islands Beach Community Services District, Conejo Recreation and Park District, Ojai Valley Sanitary District, United Water Conservation District, Ventura County Fire Protection District, Ventura County Office of Education, and the Ventura and County Watershed Protection District.

BACKGROUND

The Disaster Mitigation Act of 2000 (DMA 2000) amended the Federal Disaster Relief and Emergency Assistance Act by requiring that local governments reduce risks from natural hazards through mitigation planning and activities carried out in advance of natural disasters. The general purpose of DMA 2000 was to reduce preventable, repetitive disaster losses by encouraging states and local jurisdictions to plan more wisely through mitigation of natural hazards, vulnerability, and risk. The basic reason for its passage was the growing volume and severity of preventable, repetitive losses from natural disasters aggravated by the widespread problem of poorly planned local development.

Pursuant to DMA 2000, a local agency must adopt a Hazard Mitigation Plan and update it every five years to remain eligible for various pre and post disaster grants and community assistance from the Federal Emergency Management Agency (FEMA). A Hazard Mitigation Plan is a planning document which assesses a local jurisdiction's vulnerabilities to natural hazards and identifies mitigation strategies that the jurisdiction can take before natural disasters occur in order to reduce the property damage and injury that otherwise might result from such hazard events. It differs from an emergency response plan in that it is proactive rather than reactive. The Hazard Mitigation Plan must include mitigation strategies in a five–year implementation plan that the local agency will strive to carry out.

DISCUSSION

The Hazard Mitigation Plan documents the mitigation planning effort (i.e. the process of learning about hazards that affect the community, setting goals, identifying actions, and applying a mitigation strategy). Implementation of the Plan can reduce long-term hazard vulnerability and the cost of disasters to property owners and local government.

The hazards identified and profiled in the Plan were considered to be of paramount importance within the City of Moorpark. The following hazards of concern, in order of significance, were selected for evaluation in the mitigation plan:

Natural Hazards

- Earthquake
- Wildfire
- Flooding/Winter Storm
- Landslide/Mudslide
- Dam Failure
- Utility Failure

Mitigation Measures

Mitigation activities for each hazard include a range of options consistent with the six broad categories of mitigation actions outlined in FEMA publication 386-3 "Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies."

- ✓ **Prevention:** Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.

- ✓ **Property Protection:** Actions that involve modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.

- ✓ **Public Education and Awareness:** Actions to inform and educate citizens, property owners, and elected officials about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

- ✓ **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. Examples include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

- ✓ **Emergency Services:** Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.

- ✓ **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, retaining walls, and safe rooms.

Should the City not adopt the Plan update, then the City would not be eligible to apply for FEMA grant assistance. Once the Plan is adopted, not only will the City be compliant with the DMA 2000 requirement to update the Plan every five years, the City will become eligible to apply for hazard mitigation funding from both the Pre-Disaster Mitigation Grant Program (PDM) and the Hazard Mitigation Grant Program (HMGP). The PDM competitive grant program provides funds to State, Tribal, and local governments for pre-disaster mitigation planning and projects primarily addressing natural hazards. The HMGP provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The mitigation measures in the proposed Hazard Mitigation Action Plan (Exhibit A, Table I-12) would be eligible for PDM funding, and reimbursement for emergency expenses and disaster recovery activity would be eligible for HMGP funds if the proposed plan is approved. In the past the City received reimbursements for three declared disasters that affected the City of Moorpark: $5,614 for the 2003 Simi Fire; $27,785 for the 2005 Winter Storms; and $16,518 for the 2009 Guiberson Fire.

Public contact was made through posting of the agenda on the City's official notice bulletin board, posting of the agenda on the City's web page, and availability of the agenda and staff report in the City Clerk's office, and at the Moorpark City Library.

County wide Integration
In 2011, the County of Ventura Emergency Planning Council adopted 2010 Ventura County Hazard Mitigation Plan that includes nine cities and nine special districts. Simi Valley retains a stand-alone plan. There may be significant advantages to integrate the City's plan into the county wide plan. As Council is aware, the bulk of our first responder resources are provided by other agencies. Law enforcement services are provided under contract with the Ventura County Sheriff's Department, and fire protection services are provided by the Ventura County Fire Protection District.

Since none of the hazards likely to affect Moorpark are confined to the City itself, integrating the City's mitigations with the rest of the county may make sense.

The Ventura County Hazard Mitigation Plan is structured as follows: Sections 1-9 cover general information (introduction, statutory prerequisites, the planning process) followed by Hazard Analysis, Vulnerability Analysis, Capability Assessment, Mitigation Strategy, Plan Maintenance, and References. Each participating jurisdiction or agency has its specific information in the Appendices. The City of Moorpark's information is Appendix I, and attached as Exhibit A to the proposed Resolution. Included in the Critical Facilities listed in Table I-4 are water storage and transmission facilities of other agencies that are critical to Moorpark, and not yet identified in the County Hazard Mitigation Plan, such as the water wells, storage tanks, pump stations, and wastewater treatment plant of the of Ventura County Waterworks District #1, and the new Calleguas pump station on Spring Road. A copy of the full plan document is available for Council review in Conference room reading file.

FISCAL IMPACT

Staff effort, and consideration of mitigation priorities during annual budget preparation, including seeking competitive grant funding when available. In previous Fiscal Years, approximately $12,000 has been spent in preparation of the Hazard Mitigation Plan. It is anticipated that future updates if the Hazard mitigation Plan will be eligible for PDM grant funding.

STAFF RECOMMENDATION

1. Open the public hearing, accept public testimony and close the public hearing
2. Adopt Resolution No. 2013-____.

Attachment 1:	Resolution
Exhibit A:	2013 City of Moorpark Hazard Mitigation Plan Update
Exhibit B:	2010 Ventura County Hazard Mitigation Plan Summary

ATTACHMENT 1

RESOLUTION NO. 2013-____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MOORPARK, CALIFORNIA, ADOPTING THE VENTURA COUNTY HAZARD MITIGATION PLAN AND THE CITY OF MOORPARK UPDATE TO ITS PORTION OF THE LOCAL HAZARD MITIGATION PLAN

WHEREAS, the City of Moorpark recognizes the threat that hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the City of Moorpark fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

WHEREAS, the Ventura County Emergency Planning Council, and Emergency Coordinators Council has updated the Hazard Mitigation Plan to advance better mitigation planning and projects within the county; and

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

SECTION 1. That the 2013 update to its City of Moorpark Hazard Mitigation Plan included as an Exhibit "A" to this resolution, is approved.

SECTION 2. That the plan entitled "The Hazard Mitigation Plan for Ventura County, California" is adopted by reference by the City Council as an updated regional plan and a guidebook to a more disaster resistant community, and summarized in Exhibit "B".

SECTION 3. That the City of Moorpark adopts, and adapts with this multi-jurisdictional plan as its Local Hazard Mitigation Plan, subject to final language approval by the City Manager.

SECTION 4. The City of Moorpark commits to continuing to take those actions and initiating further actions, as appropriate, as identified in the City of Moorpark Local Hazard Mitigation Plan for inclusion in the multi-jurisdictional Local Hazard Mitigation Plan.

SECTION 5. The City Clerk shall certify to the adoption of the resolution and shall cause a certified resolution to be filed in the book of original resolutions.

PASSED AND ADOPTED this 6th day of February, 2013.

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Janice S. Parvin, Mayor

ATTEST:

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Maureen Benson, City Clerk

Attachments:
Exhibit A: 2013 City of Moorpark Hazard Mitigation Plan Update
Exhibit B: 2010 Ventura County Hazard Mitigation Plan Summary

Exhibit A

Appendix I
City of Moorpark

Table I-1. City of Moorpark, Total Population and Residential Buildings

Population	Residential Buildings	Total Residential Building Value
34,421	10,738	$215,373,500

Table I-2. City of Moorpark, Total Critical Facilities and Infrastructure

CATEGORY	NAME	ADDRESS, CITY, ST, ZIP	VALUE
City Government	Arroyo Vista Recreation Center	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 3,598,577
City Government	AVRC Well House No 1	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 76,668
City Government	AVRC Well House No 2	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 58,633
City Government	Moorpark Civic Center (City Hall, Library, Active Adult Center, and Community Center)	699-799 Moorpark Avenue, Moorpark, CA 93021-1136	$ 6,003,338
City Government	Public Services Facility (City Yard)	629 Fitch Avenue, Moorpark, CA 93021-2061	$ 10,325,486
Social Services and Medical Clinic	Ruben Castro Human Services Facility	612 Spring Road, Moorpark, CA 93021	$ 14,255,000
County Government	Ventura County Road Maintenance Yard	1750 Walnut Canyon Road, Moorpark, CA 93021	
County Government	Ventura County Waterworks District No. 1	6767 Spring Road, Moorpark, CA 93021	
Emergency Response	Police Services Center (Police, CHP, Sheriff)	610 Spring Road, Moorpark, CA 93021-1278	$ 9,341,915
Public Utility	Detention Basin Site No. "1" (above Valley Rd.)	34.290313,-118.876716	
Public Utility	Detention Basin Site No. "2" (near Campus Drive)	34.297235,-118.833876	
Public Utility	Detention Basin Walnut Canyon Meridian Hills	34.29638,-118.879361	
Public Utility	Moorpark Edison Company Substation	5027 Gabbert Road, Moorpark, CA 93021-1776	
Public Utility	Moorpark Waste Water Treatment Plant	9550 W. Los Angeles Avenue, Moorpark, CA 93021	
Public Utility	Fairview Water Reservoir Tank west	34.327188,-118.928354	
Public Utility	Stockton Water Reservoir Tank	34.321269,-118.923976	
Public Utility	Skyline Water Reservoir Tank	34.330519,-118.900781	
Public Utility	Fruitvale Water Reservoir	34.328685,-118.890529	
Public Utility	Fairview Water Reservoir Tank east	34.328659,-118.882627	
Public Utility	Palmer Water Reservoir Tank	34.307587,-118.884194	
Public Utility	Gabbert Road Water Reservoir Tank	34.29704,-118.903441	
Public Utility	Moorpark Yard Water Reservoir Tank	34.295268,-118.876534	
Public Utility	College Water Reservoir Tank #1	34.295658,-118.831258	
Public Utility	College Water Reservoir Tank #2	34.295374,-118.831344	
Public Utility	Grimes Canyon Road Water Reservoir Tank	34.288708,-118.92374	
Public Utility	Temez Water Reservoir Tank	34.261168,-118.919452	
Public Utility	Mountain Meadows Water Reservoir Tank #1	34.258912,-118.895084	
Public Utility	Mountain Meadows Water Reservoir Tank #2	34.259056,-118.894617	
Public Utility	Peach Hill Water Reservoir Tank	34.261091,-118.8784	
Public Utility	Miller Water Reservoir Tank #1	34.268101,-118.859662	
Public Utility	Miller Water Reservoir Tank #2	34.267838,-118.859909	
Public Utility	VCWWD #1 Pumping Stations (5)	various	
Public Utility	Moorpark Pump Station	4764 Spring Road, Moorpark, CA 93021	
State Government	Caltrans Maintenance Yard	626 Fitch Avenue, Moorpark, CA 93021	
Transportation	Tierra Rejada Bridge	S.R. 23 At Tierra Rejada Road	
Transportation	Los Angeles Ave Underpass Bridge	Los Angeles Ave/S.R. 23, Moorpark, CA 93021	
Transportation	Princeton Avenue Bridge	S.R. 118 At Princeton Avenue	
Transportation	Collins Drive Bridge	S.R. 118 At Collins Drive	
Transportation	Moorpark Station – Metrolink/Amtrak	310 High Street, Moorpark, CA 93021	
Transportation	Spring Road Bridge	Spring Road at Arroyo Simi , Moorpark, CA 93021	
Transportation	State Route 23/188 Transition Bridge	S.R. 23/118 at Arroyo Simi, Moorpark, CA 93021	
Transportation	Tierra Rejada Road Bridge	Tierra Rejada Road at Arroyo Simi , Moorpark, CA 93021	
Transportation	Transition Bridge	23 - 118 Moorpark, Moorpark, CA 93021	

Table I-3. City of Moorpark, Vulnerable Population and Residential Buildings

Hazard	Population	Residential buildings	Total Residential Building Value
Earthquake - Groundshaking Extreme	19,404	4,933	$1,141,828,807
Earthquake - Groundshaking High	12,007	3,631	$1,010,896,193
Earthquake - Groundshaking Moderate	0	0	$0
Flooding - 100 Year Flood Zone	6,464	1,386	$319,749,866
Flooding - 500 Year Flood Zone	3,342	668	$160,327,877
Flooding - Dam Failure	12,544	2,906	$709,081,857
Flooding - Levee Failure	165	58	$17,257,908
Geological - Landslide	592	172	$43,697,657
Geological - Liquefaction	15,355	3,706	$849,635,544
Post-Fire Debris Flow	8	2	$506,246
Severe Winter Storm - Freeze Moderate	0	0	$0
Severe Winter Storm - Freeze Low	31,411	8,564	$2,152,725,000
Tsunami	0	0	$0
Wildfire - Very High	13,043	3,904	$959,770,765
Wildfire - High	4,360	1,225	$299,899,435
Wildfire - Moderate	3,362	840	$212,390,422

Table I-4. City of Moorpark, Vulnerable Critical Facilities and Infrastructure

Hazard	CATEGORY	NAME	ADDRESS, CITY, ST. ZIP	VALUE
Earthquake - Groundshaking Extreme	City Government	Arroyo Vista Recreation Center	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 3,598,577
Earthquake - Groundshaking Extreme	City Government	Moorpark City Hall and Community Center	799 Moorpark Avenue, Moorpark, CA 93021-1136	$ 6,003,338
Earthquake - Groundshaking Extreme	City Government	Public Services Facility (City Yard)	629 Fitch Avenue, Moorpark, CA 93021-2061	$ 10,325,486
Earthquake - Groundshaking Extreme	County Government	Ventura County Road Maintenance Yard	1750 Walnut Canyon Road, Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	County Government	Ventura County Waterworks District No. 1	6767 Spring Road, Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	Emergency Response	Police Services Center (Police, CHP, Sheriff)	610 Spring Road, Moorpark, CA 93021-1278	$ 9,341,915
Earthquake - Groundshaking Extreme	Public Utility	Detention Basin Site No. "1"	34.290313,-118.876716	
Earthquake - Groundshaking Extreme	Public Utility	Detention Basin Site No. "2"	34.297235,-118.833876	
Earthquake - Groundshaking Extreme	Public Utility	Moorpark Edison Company Substation	5027 Gabbert Road, Moorpark, CA 93021-1776	
Earthquake - Groundshaking Extreme	Public Utility	Moorpark Waste Water Treatment Plant	9550 W. Los Angeles Avenue, Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	State Government	Caltrans Maintenance Yard	626 Fitch Avenue, Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	Transportation	Tierra Rejada Bridge	S.R. 23 At Tierrqa Rejada Road	
Earthquake - Groundshaking Extreme	Transportation	Los Angeles Ave Underpass Bridge	Los Angeles Ave/S.R. 23, Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	Transportation	Princeton Avenue Bridge	S.R. 118 At Princeton Avenue	
Earthquake - Groundshaking Extreme	Transportation	Collins Drive Bridge	S.R. 118 At Collins Drive	
Earthquake - Groundshaking Extreme	Transportation	Moorpark Station – Metrolink/Amtrak	310 High Street, Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	Transportation	Spring Road Bridge	Spring Road at Arroyo Simi , Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	Transportation	State Route 23/188 Transition Bridge	S.R. 23/118 at Arroyo Simi, Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	Transportation	Tierra Rejada Road Bridge	Tierra Rejada Road at Arroyo Simi , Moorpark, CA 93021	
Earthquake - Groundshaking Extreme	Transportation	Transition Bridge	23 - 118 Moorpark, Moorpark, CA 93021	
Flooding - 500 Year Flood Zone	City Government	AVRC Well House No 1	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 76,668
Flooding - 500 Year Flood Zone	City Government	AVRC Well House No 2	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 58,633
Flooding - 500 Year Flood Zone	Public Utility	Moorpark Edison Company Substation	5027 Gabbert Road, Moorpark, CA 93021-1776	
Flooding - Dam Failure	City Government	Arroyo Vista Recreation Center	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 3,598,577
Flooding - Dam Failure	City Government	Moorpark City Hall and Community Center	799 Moorpark Avenue, Moorpark, CA 93021-1136	$ 6,003,338
Flooding - Dam Failure	City Government	Public Services Facility (City Yard)	629 Fitch Avenue, Moorpark, CA 93021-2061	$ 10,325,486
Flooding - Dam Failure	Emergency Response	Police Services Center (Police, CHP, Sheriff)	610 Spring Road, Moorpark, CA 93021-1278	$ 9,341,915
Flooding - Dam Failure	Public Utility	Detention Basin Site No. "1"	34.290313,-118.876716	
Flooding - Dam Failure	Public Utility	Detention Basin Site No. "2"	34.297235,-118.833876	
Flooding - Dam Failure	Public Utility	Moorpark Edison Company Substation	5027 Gabbert Road, Moorpark, CA 93021-1776	
Flooding - Dam Failure	Public Utility	Moorpark Waste Water Treatment Plant	9550 W. Los Angeles Avenue, Moorpark, CA 93021	
Flooding - Dam Failure	State Government	Caltrans Maintenance Yard	626 Fitch Avenue, Moorpark, CA 93021	
Flooding - Levee Failure	Public Utility	Detention Basin Site No. "2"	34.297235,-118.833876	
Flooding - Levee Failure	City Government	Arroyo Vista Recreation Center	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 3,598,577
Flooding - Levee Failure	City Government	AVRC Well House No 1	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 76,668
Flooding - Levee Failure	City Government	AVRC Well House No 2	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 58,633

Table I-4. City of Moorpark, Vulnerable Critical Facilities and Infrastructure

Hazard	CATEGORY	NAME	ADDRESS, CITY, ST. ZIP	VALUE
Geological - Liquefaction	City Government	Arroyo Vista Recreation Center	4550 Tierra Rejada Rd, Moorpark, CA 93021	$ 3,598,577
Geological - Liquefaction	City Government	Moorpark City Hall and Community Center	799 Moorpark Avenue, Moorpark, CA 93021-1136	$ 6,003,338
Geological - Liquefaction	City Government	Public Services Facility (City Yard)	629 Fitch Avenue, Moorpark, CA 93021-2061	$ 10,325,486
Geological - Liquefaction	Emergency Response	Police Services Center (Police, CHP, Sheriff)	610 Spring Road, Moorpark, CA 93021-1278	$ 9,341,915
Geological - Liquefaction	Public Utility	Detention Basin Site No. "1" (above Valley Rd.)	34.290313,-118.876716	
Geological - Liquefaction	Public Utility	Detention Basin Site No. "2" (near Campus Drive)	34.297235,-118.833876	
Geological - Liquefaction	Public Utility	Detention Basin Walnut Canyon Meridian Hills	34.29638,-118.879361	
Geological - Liquefaction	Public Utility	Moorpark Edison Company Substation	5027 Gabbert Road, Moorpark, CA 93021-1776	
Geological - Liquefaction	Public Utility	Moorpark Waste Water Treatment Plant	9550 W. Los Angeles Avenue, Moorpark, CA 93021	
Geological - Liquefaction	State Government	Caltrans Maintenance Yard	626 Fitch Avenue, Moorpark, CA 93021	
Severe Winter Storm - Freeze Low	Public Utility	Moorpark Edison Company Substation	5027 Gabbert Road, Moorpark, CA 93021-1776	
Severe Winter Storm - Freeze Low	Public Utility	Detention Basin Site No. "1"	, ,	
Wildfire - Very High	City Government	Moorpark City Hall and Community Center	799 Moorpark Avenue, Moorpark, CA 93021-1136	$ 6,003,338
Wildfire - Very High	Public Utility	Moorpark Edison Company Substation	5027 Gabbert Road, Moorpark, CA 93021-1776	

Table I-5. City of Moorpark, Summary of Impacts for Population and Residential Buildings

Hazard	Population	% of Population	No. of Residential Buildings	% of Residential Buildings
Earthquake - Groundshaking Extreme	19,404	62%	4,933	58%
Earthquake - Groundshaking High	12,007	38%	3,631	42%
Earthquake - Groundshaking Moderate	0	0%	0	0%
Flooding - 100 Year Flood Zone	6,464	21%	1,386	16%
Flooding - 500 Year Flood Zone	3,342	11%	668	8%
Flooding - Dam Failure	12,544	40%	2,906	34%
Flooding - Levee Failure	165	1%	58	1%
Geological - Landslide	592	2%	172	2%
Geological - Liquefaction	15,355	49%	3,706	43%
Post-Fire Debris Flow	8	0%	2	0%
Severe Winter Storm - Freeze Moderate	0	0%	0	0%
Severe Winter Storm - Freeze Low	31,411	100%	8,564	100%
Tsunami	0	0%	0	0%
Wildfire - Very High	13,043	42%	3,904	46%
Wildfire - High	4,360	14%	1,225	14%
Wildfire - Moderate	3,362	11%	840	10%

Table I-6. City of Moorpark, Vulnerable Critical Facilities and Infrastructure

Hazard	No. of Critical Facilities and Infrastructure	% of Critical Facilities and Infrastructure
Earthquake - Groundshaking Extreme	20	40%
Earthquake - Groundshaking High	0	0%
Earthquake - Groundshaking Moderate	0	0%
Flooding - 100 Year Flood Zone	0	0%
Flooding - 500 Year Flood Zone	3	6%
Flooding - Dam Failure	9	18%
Flooding - Levee Failure	4	8%
Geological - Landslide	0	0%
Geological - Liquefaction	10	20%
Severe Winter Storm - Freeze Moderate	0	0%
Severe Winter Storm - Freeze Low	2	4%
Tsunami	0	0%
Wildfire - Very High	2	4%
Wildfire - High	0	0%
Wildfire - Moderate	0	0%

Table I-7. City of Moorpark, Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s) and technical staff with knowledge of land development, land management practices, and human-caused and natural hazards.	City of Moorpark, Community Development Department	Develops and maintains the General Plan, including the Safety Element. Develops area plans based on the General Plan, to provide more specific guidance for the development of more specific areas. Reviews private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan. Anticipates and acts on the need for new plans, policies, and Code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), Building Inspectors/Code Enforcement Officers or other professional(s) and technical staff trained in construction requirements and practices related to existing and new buildings.	City of Moorpark, Community Development Department Building & Safety Contract Services Charles Abbott & Associates	Oversees the effective, efficient, fair, and safe enforcement of the California Building Code
Engineers, construction project managers, and supporting technical staff.	City of Moorpark, City Engineer/Public Works Department	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	City of Moorpark, City Engineer/Public Works Department County of Ventura, Water & Sanitation Department, VC Waterworks District 1	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights and traffic

Table I-7. City of Moorpark, Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
		signals.
Floodplain Administrator	City of Moorpark, City Engineer/Public Works Department, County of Ventura, Watershed Protection District	Reviews and ensures that new development proposals do not increase flood risk, and that new developments are not located below the 100 year flood level. In addition, the Floodplain Administrator is responsible for planning and managing flood risk reduction projects throughout the local jurisdiction.
Emergency Manager	City of Moorpark, Assistant City Manager/Community Services Department, EOC Coordinator	Maintains and updates the Emergency Operations Plan for the local jurisdiction. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with County, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	City of Moorpark, Deputy City Manager, Administration and Finance Department	Provides a full range of municipal financial services, administers several licensing measures, and functions as the local jurisdiction's Procurement Services Manager.

Table I-8. City of Moorpark, Financial Resources for Hazard Mitigation

Type	Subtype	Administrator	Purpose	Amount
Local	General Fund	City of Moorpark, City Manager	Program operations and specific projects.	Variable.
	General Obligation (GO) Bonds	City of Moorpark, Finance Department	GO Bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include, but are not limited to, libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable
	Lease Revenue Bonds	City of Moorpark, Finance Department	Lease revenue bonds are used to finance capital projects that (1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts, etc.), (2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs, or (3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable
	Public-Private Partnerships	City of Moorpark, City Manager	Includes the use of local professionals, business owners, residents, and civic groups and trade associations, generally for the study of issues and the development of guidance and recommendations.	Project-specific.

Table I-8. City of Moorpark, Financial Resources for Hazard Mitigation

Type	Subtype	Administrator	Purpose	Amount
Federal	Hazard Mitigation Grant Program (HMGP)	Federal Emergency Management Agency (FEMA)	Supports pre- and post-disaster mitigation plans and projects.	Available to California communities after a Presidentially declared disaster has occurred in California. Grant award based on specific projects as they are identified by eligible applicants.
	Pre-Disaster Mitigation (PDM) grant program	FEMA	Supports pre-disaster mitigation plans and projects.	Available on an annual basis as a nationally competitive grant. Grant award based on specific projects as they are identified (no more than $3M federal share for projects).
	Flood Mitigation Assistance (FMA) grant program	FEMA	Mitigates repetitively flooded structures and infrastructure.	Available on an annual basis, distributed to California communities by the California Emergency Management Agency (Cal EMA). Grant award based on specific projects as they are identified.
Federal (cont)	Assistance to Firefighters Grant (AFG) Program	FEMA/USFA (U.S. Fire Administration)	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.	Available to fire departments and nonaffiliated emergency medical services providers. Grant awards based on specific projects as they are identified.
	Community Block Grant Program Entitlement Communities Grants	U.S. HUD (U.S. Department of Housing and Urban Development)	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Available to entitled cities. Grant award based on specific projects as they are identified.
	Community Action for a Renewed Environment	U.S. Environmental Protection Agency (EPA)	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., stormwater) in its local	Competitive grant program. Grant award based on specific projects as they are identified.

Table I-8. City of Moorpark, Financial Resources for Hazard Mitigation

Type	Subtype	Administrator	Purpose	Amount
	(CARE)		environment. Through CARE, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.	
	Clean Water State Revolving Fund (CWSRF)	EPA	The CWSRF is a loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects.	CWSRF programs provided more than $5 billion annually to fund water quality protection projects for wastewater treatment, non-point source pollution control, and watershed and estuary management.
Federal (cont)	Public Health Emergency Preparedness (PHEP) Cooperative Agreement.	Department of Health and Human Services' (HHS') Centers for Disease Control and Prevention (CDC)	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.	Competitive grant program. Grant award based on specific projects as they are identified. Madera would participate through the County's Public Health Department.
	Homeland Security Preparedness Technical Assistance Program (HSPTAP)	FEMA/DHS	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.	Technical assistance services developed and delivered to state and local homeland security personnel. Grant award based on specific projects as they are identified.

Table I-9. City of Moorpark, Legal and Regulatory Resources for Hazard Mitigation

Regulatory Tool	Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Mitigation, Preparedness, Response, or Recovery	Affects Development in Hazard Areas?
Plans	General Plan: Safety Element (2001-2005)	Describes hazard areas and regulates current and future development based on known hazard areas.	Seismic, Geologic, Flooding and inundation, Fire, and Hazardous Materials	Mitigation & Preparedness	Yes
	Multihazard Functional Plan (2004)	Describes what the local jurisdictions' actions will be during a response to an emergency. Includes annexes that describe in more detail the actions required of the local jurisdiction's departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and the local jurisdiction's departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	Seismic, Hazardous Materials, Flooding, Inundation (dam failure), Fire, Transportation Incident, Civil unrest, Terrorism, Geologic (landslide)	Response	No
	Stormwater Quality Management Program (SWQMP) (2006)	Describes measures that the local jurisdiction will take to minimize stormwater pollution. The SWQMP is required by the National Pollutant Discharge Elimination System Phase II regulations, which became effective in March 2003.	Stormwater	Mitigation & Preparedness	Yes

Table I-9. City of Moorpark, Legal and Regulatory Resources for Hazard Mitigation

Regulatory Tool	Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Mitigation, Preparedness, Response, or Recovery	Affects Development in Hazard Areas?
Policies	Code of Ordinances	The purpose of this code is to establish the minimum requirements to safeguard the public health, safety, and general welfare through structural strength, means of egress facilities, stability, access to persons with disabilities, sanitation, adequate lighting and ventilation and energy conservation, and safety to life and property from fire and other hazards attributed to the built environment; to regulate and control the demolition of all buildings and structures, and for related purposes.	Flood, seismic earthquake, fire, traffic, vehicle, animals, industrial, nuisances, safety hazards,	Mitigation, Preparedness, and Response	Yes

Table I-10. City of Moorpark Current, Ongoing, and Completed Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Ongoing	Community Emergency Response Team (CERT) Training to prepare residents to help themselves and their neighbors before, during, and after emergencies such as earthquakes, fires, and floods.	Up to two 20-hour CERT classes and one refresher drill conducted each year. Periodic tips distributed, and activation of CERT to support fire and public safety operations during the Guiberson Fire in 2009 and the Amgen Bike Run in 2011	2006- current
Completed ,Ongoing	Distribute emergency preparedness information via newsletter, website, special events, and refuse bills.	Prepared 22-page Emergency Preparedness Handbook and distrusted approx. 10,000 copies to every household and business in Moorpark. Periodic preparedness tips in quarterly newsletters, and on city TV channel.	2010 - current, possible update in 2015
Completed, Current	Update the 20004 Multihazard Functional Plan with an Emergency Operations Plan	The emergency operations plan clearly and concisely describes a jurisdiction's emergency organization, its means of coordination with other jurisdictions, and its approach to protecting people and property from disasters and emergencies caused by any of the hazards to which the community is particularly vulnerable. It assigns functional responsibilities to the elements of the emergency organization, and details tasks to be carried out at times and places projected as accurately as permitted by the nature of each situation addressed. Emergency operations plans are multi-hazard, functional plans that treat emergency management activities generically. They have a basic section that provides generally applicable information without reference to any particular hazard. They also address the unique aspects of individual disasters in hazard-specific appendixes.	Emergency Operations Plan update to be completed in 2013

Table I-10. City of Moorpark Current, Ongoing, and Completed Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
Ongoing	SEMS/NIMS ICS. Train City employees in Standardized Emergency Management System (SEMS), the National Incident Management System (NIMS), and the Incident Command System (ICS)	SEMS/NIMS - INCIDENT COMMAND SYSTEM (ICS) is the model tool for command, control, and coordination of a response and provides a means to coordinate the efforts of individual agencies as they work toward the common goal of stabilizing the incident and protecting life, property, and the environment. "Incident Command System" uses principles that have been proven to improve efficiency and effectiveness in a business setting and applies the principles to emergency response.	2006- current
Current	Los Angeles Avenue Widening. .	Los Angeles Avenue Widening at Spring Road - Preparing plans to widen Los Angeles Avenue between Spring Road and Moorpark Avenue to provide total of six travel lanes, as well as curbs, gutters, and sidewalks	On going
Completed	Realignment and Reconstruction of Flinn Avenue	Realignment and Reconstruction of Flinn Avenue - Realigned and reconstructed Flinn Avenue at Second Street, and installed traffic signal at new four-way intersection.	2006
Completed	Spring Road Widening -.	Spring Road Widening - Prepared plans to widen east side of Spring Road between Flinn Avenue and point south of Los Angeles Avenue to provide bike lanes and raised landscaped median.	2012
Completed	Public Services Facility	The Public Services Facility (City Maintenance Yard) located at 627 Fitch Avenue houses the City's Public Works, Parks and Facilities Maintenance, and Vector/Animal Control staff. Consolidating these operations in one location	2007

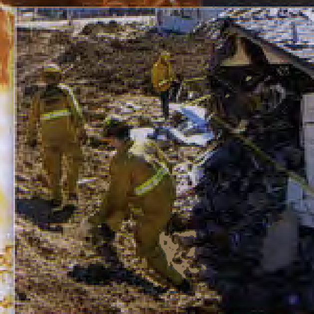
Table I-10. City of Moorpark Current, Ongoing, and Completed Hazard Mitigation Projects and Programs

Status (Current, Ongoing, or Completed)	Project / Program Name	Description	Year(s)
		allows for better communication and workflow. I tis also adjacent to the Caltrans maintenance yard, the Police Services Center, Reuben Castro Human Services Center, and the county's contract ambulance provider.	
Completed	Water Main Project (Calleguas Municipal Water District) -	Construction of a 72" diameter water main through the City. The pipe will run under Los Angeles Avenue from the westerly City limits to Spring Road, then south along Spring Road, and under the Arroyo to a pump station southeast of the Spring Road Bridge. This project connects the District's facilities east of the City to its underground water storage facilities west of the City near Grimes Canyon Road.	2010

Table I-12. City of Moorpark Mitigation Action Plan

Number	Description	Prioritization Numbers (1-5)	Potential Facility to Mitigate	Responsible Department or Agency	Potential Funding Sources	Implementation Timeframe
2	Integrate the LHMP, in particular the hazard analysis and mitigation strategy sections, into local planning documents, including general plans, emergency operations plans, and capital improvement plans.	1,3,4,5	All facilities	Community Development, Emergency management	PDM and HMGP	1 year
8	Work with FEMA Region IX to address any floodplain management issues that may have arisen/arise from the DFIRM, Community Assessment Visits, and/or DWR.	1,2,3,4	Unknown	Public Works & Engineering	PDM and HMGP	3 years
9	Increase participation in the NFIP by entering the Community Rating System program which through enhanced floodplain management activities would allow property owners to receive a discount on their flood insurance	1,2,3,4,5	Unknown	Public Works & Engineering	PDM and HMGP	3 years
11	Manage vegetation in areas within and adjacent to rights-of-way and in close proximity to critical facilities in order to reduce the risk of tree failure and property damage and avoid creation of wind acceleration corridors within vegetated areas.	2,3,4,5	Various	Parks and Landscape Maintenance and Community Development	PDM and HMGP	3 years

Exhibit B



2010 Ventura County Hazard Mitigation Plan

Final Draft | October 2010

Ventura County
City of Camarillo
City of Moorpark
City of Ojai
City of Oxnard
City of Port Hueneme
City of Santa Paula
City of Thousand Oaks
City of Ventura
Calleguas Municipal Water District
Casitas Municipal Water District
Channel Islands Beach Community Services District
Conejo Recreation and Park District
Ojai Valley Sanitary District
United Water Conservation District
Ventura County Fire Protection District
Ventura County Office of Education
Ventura County Watershed Protection District

URS

TABLE OF CONTENTS

Tables

Figures

Appendices

TABLE OF CONTENTS

Acronyms and Abbreviations

2010 HMP	Ventura County 2010 Hazard Mitigation Plan
CalEMA	California Emergency Management Agency
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
County	Ventura County
CRS	Community Rating System
DFIRM	Digital Flood Insurance Rate Map
DMA 2000	Disaster Mitigation Act of 2000
DSOD	California Division of Safety of Dams
ECC	Emergency Coordinators' Council
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HLB	Huanglongbing (bacterial disease affecting citrus trees)
HMGP	Hazard Mitigation Grant Program
M	moment magnitude
MMI	Modified Mercalli Intensity
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OES	Office of Emergency Services
PAL	Provisionally Accredited Levee
PDM	Pre-Disaster Mitigation (Program)
PGA	peak ground acceleration
RFCP	Repetitive Flood Claims Program
RL	repetitive loss
SRL	severe repetitive loss
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988
USC	United States Code
VCOE	Ventura County Office of Education
VCWPD	Ventura County Watershed Protection District

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This section provides a brief overview of the topic, an introduction to hazard mitigation planning, and a brief description of the Disaster Mitigation Act of 2000, grant programs with mitigation plan requirements, local participants, and the 2010 Hazard Mitigation Plan.

1.1 OVERVIEW

Ventura County (the County) has developed this Hazard Mitigation Plan (hereinafter referred to as the 2010 HMP) to assess risks posed by natural and human-caused hazards and to develop a mitigation strategy for reducing the County's risks. The County has prepared the 2010 HMP in accordance with the requirements of the Disaster Mitigation Act of 2000 (DMA 2000). The Ventura County Sheriff's Office of Emergency Services (OES), in conjunction with the Ventura County Watershed Protection District (VCWPD), has coordinated the preparation of the 2010 HMP in cooperation with cities and special districts. The 2010 HMP replaces the HMP that the County prepared in 2005 (URS 2005).

1.2 HAZARD MITIGATION PLANNING

As defined in Title 44 of the Code of Federal Regulations (CFR), Subpart M, Section 206.401, hazard mitigation is "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." As such, hazard mitigation is any work to minimize the impacts of any type of hazard event before it occurs. Hazard mitigation aims to reduce losses from future disasters. It is a process in which hazards are identified and profiled, the people and facilities at risk are analyzed, and mitigation actions to reduce or eliminate hazard risk are developed. The implementation of the mitigation actions, which include short- and long-term strategies that may involve planning, policy changes, programs, projects, and other activities, is the end result of this process.

1.3 DISASTER MITIGATION ACT OF 2000

In recent years, local hazard mitigation planning has been driven by DMA 2000. On October 30, 2000, Congress passed the DMA 2000 (Public Law 106-390), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act) (Title 42 of the United States Code [USC] Section 5121 et seq.) by repealing the act's previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasizes the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. This new section also provides the legal basis for the Federal Emergency Management Agency's (FEMA's) mitigation plan requirements for mitigation grant assistance.

To implement these planning requirements, FEMA published an Interim Final Rule in the Federal Register on February 26, 2002 (44 CFR Part 201). The local mitigation planning requirements are identified in their appropriate sections throughout this 2010 HMP and in the FEMA Local Mitigation Planning Crosswalk in Appendix A. In addition, this HMP addresses the Community Rating System (CRS) 10-step planning process requirements. The compliance requirements for CRS are identified in Activity Worksheet 510, which is located in Appendix A.

1.4 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

Currently, five FEMA grant programs are available to participating jurisdictions that have FEMA-approved HMPs and are members of the National Flood Insurance Program (NFIP). Two of the grant programs are authorized under the Stafford Act and DMA 2000, and the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act.

1.4.1 Stafford Act Grant Programs

- **Hazard Mitigation Grant Program.** The Hazard Mitigation Grant Program (HMGP) provides grants to state, local, and tribal entities to implement long-term hazard mitigation measures after declaration of a major disaster. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem (for example, elevation of a home to reduce the risk of flood damage rather than buying sandbags and pumps to fight the flood). Also, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. Under the program, the Federal government may provide a state or tribe with up to 20 percent of the total disaster grants awarded by FEMA and may provide up to 75 percent of the cost of projects approved under the program.
- **Pre-Disaster Mitigation Program.** The Pre-Disaster Mitigation (PDM) Program provides funds to state, local, and tribal entities for hazard mitigation planning and the implementation of mitigation projects before a disaster. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, the potential savings of a PDM project must be more than the cost of implementing the project, and funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. The cost-sharing for this grant is 75 percent Federal and 25 percent non-Federal, although cost-sharing of 90 percent Federal and 10 percent non-Federal is available in certain situations.

  Since the completion of the 2005 HMP, Ventura County and other local participants of the 2005 HMP have submitted nine PDM grant applications. FEMA determined that five of the projects were not eligible and four of the projects were eligible. As of September 2010, the status of the eligible grants is not clear, but it does appear that they have been funded. The PDM grants for the four eligible projects range from $114,000 to $2.8 million.

1.4.2 National Flood Insurance Act Grant Programs

- **Flood Mitigation Assistance (FMA) Grant Program.** The goal of the FMA Grant Program is to reduce or eliminate flood insurance claims under the NFIP. This program places particular emphasis on mitigating repetitive loss (RL) properties. The primary source of funding for this program is the National Flood Insurance Fund. Grant funding is available for three types of grants: planning, project, and technical assistance. Project grants, which use the majority of the program's total funding, are awarded to local entities to apply mitigation measures to reduce flood losses to properties insured under the NFIP. Cost-sharing for this grant is 75 percent Federal and 25 percent non-Federal, though cost-sharing of 90 percent Federal and 10 percent non-Federal is available in certain situations to mitigate severe repetitive loss (SRL) properties. Information about RL properties in Ventura County is provided in Section 5.6.

Since the completion the 2005 HMP, Ventura County and other 2005 HMP local participants have applied for three FMA grants. One project application was withdrawn, one was denied, and the third, submitted by the Ojai Valley Sanitary District in 2007 for trunk sewer relocation, is still open.

- **Repetitive Flood Claims Program.** The Repetitive Flood Claims Program (RFCP) provides funding to reduce or eliminate the long-term risk of flood damage to residential and non-residential structures insured under the NFIP. Structures considered for mitigation must have had one or more claim payments for flood damages. All Repetitive Flood Claims Program grants are eligible for up to100 percent Federal assistance.
- **Severe Repetitive Loss Program.** The SRL Program provides funding to reduce or eliminate the long-term risk of flood damage to residential structures insured under the NFIP. Structures considered for mitigation must have had at least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any 10-year period, and the cumulative amount of such claim payments exceeds $20,000; or for which at least two separate claims payments have been made, with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any 10-year period. The cost-sharing ratio for this grant is 75 percent Federal and 25 percent non-Federal. Information about SRL properties in Ventura County is provided in Section 5.6.

1.5 LOCAL PARTICIPANTS

The participating jurisdictions and special districts, referred to in this plan as local participants, are listed below.

- Ventura County
- City of Camarillo
- City of Moorpark
- City of Ojai
- City of Oxnard
- City of Port Hueneme
- City of Santa Paula
- City of Thousand Oaks
- City of Ventura
- Calleguas Municipal Water District

- Casitas Municipal Water District
- Channel Islands Beach Community Services District
- Conejo Recreation and Park District
- Ojai Valley Sanitary District
- United Water Conservation District
- Ventura County Fire Protection District
- Ventura County Office of Education, on behalf of the following school districts: Briggs Elementary School District, California State University, Channel Islands, Conejo Valley Unified School District, Fillmore Unified School District, Hueneme School District, Mesa Union School District, Moorpark Unified School District, Moorpark Unified School District, Mupu Elementary School District, Oak Park Unified School District, Ocean View School District, Ojai Unified School District, Oxnard Elementary School District, Pleasant Valley School District, Rio School District, Santa Clara Elementary School District, Santa Paula Union High School, Simi Valley Unified School District, Somis Union School District, Ventura County Community College District and Ventura Unified School District.
- Ventura County Watershed Protection District

The following cities and special districts participated in the 2005 HMP, but did not participate in this 2010 HMP:

- City of Fillmore
- Camrosa Water District

1.6 COMMUNITY DESCRIPTION

1.6.1 County of Ventura

Ventura County, one of 58 counties in the state, is located on southern California's Pacific coast, just northwest of Los Angeles. Ventura County is bordered by Kern County to the north; Santa Barbara County and the Pacific Ocean to the northwest and southwest, respectively; and Los Angeles County to the east and southeast. Ventura County stretches across 2,208 square miles, of which 1,845 square miles is land and 363 square miles is water. Anacapa Island of the Channel Islands National Park and San Nicholas Island are located within Ventura County. The county seat is the City of Ventura.

Ventura County consists of 10 cities and a number of unincorporated communities. The majority of the county's population resides within the cities. According to the U.S. Census Bureau, and using the Population Estimates Program which produces July 1 estimates for years after the last published decennial census (2000) the Ventura County has a population of 802,983, representing a 6.6 percent increase from 2000. The county has 274,062 housing units. The racial makeup of the county is 87.1 percent White, 2.2 percent Black, 1.3 percent Native American, 6.7 percent Asian, 0.3 percent Pacific Islander and 2.4 percent from two or more races. Over 38 percent of the population is Hispanic or Latino.

In the county, the age breakdown of the population is as follows: 26.1 percent under 18 (7.5 percent of whom are under 5), 62.1 percent from 18 to 64, and 11.8 percent 65 years of age or older.

1.6.1.1 Economy

Ventura County has a wide and strong economic base with most industries represented. The county's economy was dominated by agriculture in the early part of its history, and later by oil production. However, in recent years, Ventura's economy has seen increasing job growth in technology-related fields such as biotechnology, computer software, and multimedia.

Services, retail trade, government, and manufacturing account for approximately 70 percent of employment in Ventura. Some cities have also become closely aligned with particular industries. For example, Oxnard is known for its manufacturers and farm production. Health care has a major presence in the Thousand Oaks area. Camarillo is at the heart of what has been dubbed the Highway 101 Tech Corridor, attracting companies that produce everything from silicon chips and consumer electronics components to solar power systems. Simi Valley and Moorpark also have a growing high-tech presence. Agriculture remains important along the coastal Oxnard Plain and interior Santa Clara River Valley communities of Santa Paula, Fillmore, and Piru. The county's agricultural output exceeds $1 billion annually, with the county boasting the state's highest crop revenue-per-acre for the multiple years.

With several hotels and attractions at or near the beaches and harbors in Ventura and Oxnard, tourism is important to west Ventura County's economy. Both cities are popular weekend destinations for visitors from the Central Valley and Los Angeles areas.

Companies in the region also take advantage of the nearby Port Hueneme, the smallest and only deep-water port between San Francisco and Los Angeles. The port and surrounding city are important locations for receiving automobiles and bananas from overseas and shipping local citrus to Asian markets. In addition, the U.S. Navy and other military units have large facilities at the port and nearby Point Mugu.

1.6.1.2 Employment

Ventura County's diversified economic base is reflected in its employment patterns. Of the 411,554 people making up Ventura County's labor force as of 2008, approximately 11.3 percent were employed in manufacturing; 17.3 percent in educational services, and health care and social assistance; and 9.1 percent finance and insurance. The largest employer in the county, however, is the naval base, which provides over 19,000 jobs.

According to the U.S. Census Bureau, the median household income was $76,190 in 2008. The per capita income for the county is $24,600, but has not been adjusted since 1999. Approximately 8.7 percent of the population is below the poverty line.

1.6.1.3 Physical Features

Ventura County is located along California's Gold Coast (between Santa Barbara and Los Angeles), including 43 miles of coastline. The highest point in the county, Mount Pinos, is 8,831 feet above sea level. The county has six microclimates with varying weather patterns, but the climate is generally Mediterranean with an average annual temperature of 74.2 degrees Fahrenheit.

1.6.1.4 Infrastructure

Transportation

Ventura County has a well-developed multimodal transportation system, although most travel is concentrated along key highways and arterial streets. Several highways bisect the county, including 1, 23, 33, 101, 118, 126, and 150.

There are a variety of local bus systems that serve Ventura County, Gold Coast Transit and the Ventura Intercity Service Transit Authority being the most comprehensive systems. Ventura County also offers a dial-a-ride service, available to seniors and disabled persons.

Ventura offers both the level topography and mild climate to support an extensive bikeway system. However, the system is only beginning to connect throughout the various communities within the county. Existing pedestrian facilities consist of sidewalks, off-street paths shared with bicyclists and other users, neighborhood and park path systems, pedestrian plazas, and river-to-river shoreline bike and pedestrian pathways.

Metrolink provides commuter train service that connects Ventura County with Los Angeles and other areas in Southern California. At present, there are three Metrolink runs Monday to Friday to accommodate the Ventura to Los Angeles commute. Two Amtrak routes stop in Ventura County: the Pacific Surfliner, which connects San Luis Obispo to San Diego, and the Coast Starlight, which connects Seattle to Los Angeles. Union Pacific trains run through the county daily, providing freight service out of Los Angeles.

Utilities

Southern California Gas Company provides gas service to the 10 cities and the surrounding unincorporated areas of Ventura County. Southern California Edison (listed under Edison International) provides electricity service.

Telephone and cable services are provided by Verizon and SBC Pacific Bell to incorporated and unincorporated areas throughout the county.

Special districts, cities, and private water companies provide water service in the county.

1.6.2 Participating Cities

Ventura County has 10 cities, eight of which participated in the preparation of this Plan. Using the most up-to-date information provided by the U.S. Census Bureau, these cities and key aspects of their socioeconomic and demographic qualities are described below.

1.6.2.1 City of Camarillo

Camarillo had an estimated population of 62,489 in 2006, with 21,946 housing units in the City. The City has a total area of 19 square miles. The median income for a household in the City is $62,457 and the per capita income for the City is $28,635. Approximately 5.3 percent of the population is below the poverty line (1999 data, U.S. Census Bureau).

1.6.2.2 City of Moorpark

Moorpark had an estimated population of 34,421, with 10,738 housing units. The City has a total area of 12.4 square miles. The median income for a household in the City is $103,009, and the per capita income for the City is $36,375. About 3.9 percent of the population is below the poverty line (2010 data, U.S. Census Bureau).

1.6.2.3 City of Ojai

The City of Ojai had a total population of 7,862, making it one of the smallest cities in the county. The City of Ojai is situated in the Ojai Valley, which is approximately 10 miles long and 3 miles wide and is surrounded by hills and mountains. The City has a total area of 4.4 mi^2. The City is approximately 15 miles inland. The median income for a household in the City is $44,593, and the per capita income for the City is $25,670. Approximately 10.7 percent of the population is below the poverty line (U.S. Census Bureau 2000).

1.6.2.4 City of Oxnard

As of 2006, Oxnard had an estimated population of 184,463, with 45,166 housing units. The City has a total area of 36.6 mi^2, 25.3 mi^2 of which is land and 11.3 mi^2 of which is water. The median income for a household in the City is $48,603 and the per capita income for the City is $15,288. An estimated 15.1 percent of the population lives below the poverty line.

1.6.2.5 City of Port Hueneme

Port Hueneme is a charter City located in Ventura County. As of the 2008, the City had a total population of 23,687. Port Hueneme has a total area of 4.7 mi^2, 4.4 mi^2 of which is land and 0.2 mi^2 of which is water. There are 8,074 households in the City as of 2008. The average household size is 2.86 people, and the average family size is 3.42 people. The median income for a household in the City is $52,183, and the per capita income for the City is $22,262. An estimated 12.6 percent of the population is below the poverty line.

1.6.2.6 City of Santa Paula

Santa Paula had an estimated total population of 28,531 in 2006, with 8,341 housing units. The City has a total area of 4.6 mi^2. The median income for a household in the City is $41,651, and the per capita income for the City is $15,736. An estimated 14.7 percent of the population is below the poverty line.

1.6.2.7 City of Thousand Oaks

Thousand Oaks had an estimated total population of 124,207 in 2006, with 42,958 housing units. The City has a total area of 54.0 mi^2. The median income for a household in the City is $76,815, and the per capita income for the City is $35,314. An estimated 5.0 percent of the population is below the poverty line.

1.6.2.8 City of Ventura

San Buenaventura (Ventura) is the county seat of Ventura County. In 2006 the estimated population was 104,092, with 39,803 housing units. The City has a total area of 32.7 mi², 21.1 mi² of which is land and 11.6 mi² of which is water. The median income for a household in the City is $52,298 and the per capita income for the City is $25,065. An estimated 9.0 percent of the population is below the poverty line.

1.6.3 Participating Special Districts

As noted previously, half of the participating communities are special districts. Information about each district is described as follows.

1.6.3.1 Calleguas Municipal Water District

The Calleguas Municipal Water District was formed in 1953. In 1960, the District joined the Metropolitan Water District of Southern California as a way of securing water from the state water system. In 1965, the District completed Lake Bard. The 2005 state-of-the-art treatment plant for Lake Bard treats 65 million gallons of water a day.

Communities served include the cities of Oxnard, Port Hueneme, Camarillo, Thousand Oaks, Moorpark, Simi Valley, and the unincorporated areas of Oak Park, Santa Rosa Valley, Bell Canyon, Lake Sherwood, Somis, Camarillo Estates, Camarillo Heights and Naval Base Ventura County. The district serves an area of approximately 365 square miles and approximately 75 percent of Ventura County's population.

1.6.3.2 Casitas Municipal Water District

The Casitas Municipal Water District was formed in 1952. In 1956, the Ventura River Project was authorized by Congress, which included the Robles Diversion facility on the Ventura River, the Robles Canal, and the Casitas Dam.

Currently, the district supplies water to 60,000 to 70,000 people in western Ventura County and to hundreds of farms. The district boundaries encompass the City of Ojai, Upper Ojai, the Ventura River Valley area, the City of Ventura to Mills Road and the Rincon and beach area to the ocean and Santa Barbara County line. The district is governed by a five member board of directors.

1.6.3.3 Ojai Valley Sanitary District

The Ojai Valley Sanitary District was established in 1985 as the result of a consolidation of the Ventura Avenue, Oak View, and Meiners Oaks sanitary districts and the Sanitation Department of the City of Ojai. The district provides sanitary sewer service for about 20,000 residents of the City of Ojai and the unincorporated Ojai Valley. It collects and transports wastewater for treatment at the Ojai Valley Treatment Plant and disposes of effluent and sludge.

The district is a public agency organized under the Sanitary District Act of 1923 and is governed by an elected seven-member board. The district's collection system consists of approximately 120 miles of trunk and main sewer lines.

1.6.3.4 United Water Conservation District

Local landowners formed the Santa Clara River Water Conservation District in 1927. As cities and agricultural areas grew, water usage increased rapidly. By 1950, the district was reorganized and renamed the United Water Conservation District. The district constructed the Santa Felicia Dam, three spreading grounds, and distribution facilities, all of which were urgently needed to combat seawater intrusion.

The United Water Conservation District is governed by seven directors, one elected from each of the seven district divisions. The district administers a "basin management" program for the Santa Clara Valley and Oxnard Plain that uses the surface flow of the Santa Clara River and its tributaries for replenishment of groundwater. Facilities include Santa Felicia Dam; Lake Piru Recreation Area; the Piru, Saticoy, and El Rio spreading grounds; the Pleasant Valley Pipeline and Reservoirs; the Oxnard-Hueneme Pipeline, Pumping Plant, and Pumping Trough Pipeline; and other facilities.

1.6.3.5 Ventura County Fire Protection District

In 1928, the Ventura County Fire Protection District was formed to provide fire protection to the county, with the exception of the four established cities. Since that time, six additional cities have become incorporated. Today, the Ventura County Fire Protection District acts as the Ventura County Fire Department in the unincorporated areas of the county and as the City fire department for six cities (Camarillo, Moorpark, Ojai, Port Hueneme, Thousand Oaks, and Simi Valley).

1.6.3.6 Ventura County Office of Education

Ventura County is comprised of 20 K-12 school districts. The Ventura County Office of Education (VCOE) provides facility planning, construction, and maintenance to the school districts. VCOE also operates specialized schools in the county. For the 2010 HMP, the VCOE will represent all of 20 K-12 school districts within Ventura County as well as the Ventura County Community College District.

1.6.3.7 Ventura County Watershed Protection District

The VCWPD is a dependent district governed by the county board of supervisors. Formerly known as the Ventura County Flood Control District, the VCWPD was renamed in 2002. The district is the responsible sponsoring local agency for Federal flood control projects throughout the county. The VCWPD also serves as the principal co-permittee and manages the implementation of the Ventura Countywide Stormwater Quality Management Program under the municipal National Pollutant Discharge Elimination System (NPDES) permit for urban stormwater runoff discharges in Ventura County. The entire county, except for the islands of Anacapa and San Nicholas, is within the district's sphere of influence and boundaries.

1.7 DESCRIPTION OF THE HAZARD MITIGATION PLAN

The remainder of this HMP consists of the sections described below.

1.7.1 Section 2: Prerequisites

Section 2 addresses the adoption of the 2010 HMP by the local participants. The adoption resolutions are provided in Appendix B.

1.7.2 Section 3: Planning Process

Section 3 describes the planning process. Specifically, this section describes the plan development process and identifies members of the Planning Committee, including a description of the meetings held as part of the planning process (relevant documents are attached in Appendix D). This section also documents public outreach and stakeholder involvement activities (relevant documents are attached in Appendix E) and discusses the review and incorporation of relevant plans, reports, and other appropriate information.

1.7.3 Section 4: Hazard Analysis

Section 4 describes the process through which the Planning Committee identified, screened, and selected the hazards to be profiled in the 2010 HMP. The hazard analysis includes the nature, history, location, extent, and probability of future events for each hazard. Location and historical hazard figures are provided in Appendix C.

1.7.4 Section 5: Vulnerability Analysis

Section 5 identifies the methodology for analyzing potentially vulnerable assets—population, residential building stock, RL and SRL properties, and critical facilities and infrastructure. This information was compiled by assessing the potential impacts from each hazard using Geographic Information System (GIS) data. The resulting information identifies the full range of hazards that each plan participant could face and the potential social impacts, damages, and economic losses. The results of the analysis are provided in each local-participant-specific appendix (Appendix G through Appendix X).

1.7.5 Section 6: Capability Assessment

Section 6 describes the capability assessment for hazard mitigation planning for each local participant based on the capability assessment recommendations of the California Emergency Management Agency (CalEMA). Local-participant-specific capability assessments are provided in each local-participant-specific appendix (Appendix G through Appendix X).

In each of these appendices, the capability assessment evaluates the human and technical, financial, and legal and regulatory resources available for hazard mitigation for each participating jurisdiction. The results of the capability assessment in each appendix also list current, ongoing, and completed mitigation projects and programs for each plan participant.

1.7.6 Section 7: Mitigation Strategy

Section 7 provides a blueprint for reducing the potential losses identified in the vulnerability analysis. The Planning Committee, with support from URS Corporation (URS), reviewed mitigation projects identified in the 2005 HMP and revised the existing list to include only the most relevant and fundable mitigation projects. Through a re-evaluation and re- prioritization process described in this section, each plan participant selected high-priority projects to include in his/her updated mitigation action plan.

1.7.7 Section 8: Plan Maintenance

Section 8 describes the formal plan maintenance process to ensure that the 2010 HMP remains an active and applicable document. The process includes monitoring, evaluating, and updating the plan (relevant documents are attached in Appendix F); monitoring mitigation projects and closeout procedures (relevant documents attached in Appendix F); implementing the plan through existing planning mechanisms; and achieving continued public involvement.

1.7.8 Section 9: References

Section 9 lists the sources used to develop this document.

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The requirements for the adoption of this 2010 HMP by the participating local governing bodies, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PREREQUISITES
Adoption by the Local Governing Body
Requirement §201.6(c)(5): [The local hazard mitigation plan **shall** include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has formally adopted the plan.
Element
▪ Does the new or updated plan indicate the specific jurisdictions represented in the plan?
▪ For each jurisdiction, has the local governing body adopted the new or updated plan?
▪ Is supporting documentation, such as a resolution, included for each participating jurisdiction?
Source: FEMA 2008.

Ventura County; the cities of Camarillo, Moorpark, Ojai, Oxnard, Port Hueneme, Santa Paula, Thousand Oaks, and Ventura; and the participating special districts of Calleguas Water District, Casitas Municipal Water District, Channel Islands Beach Community Services District, Conejo Recreation and Park District, Ojai Valley Sanitary District, United Water Conservation District, Ventura County Fire Protection District, Ventura County Office of Education, and Ventura County Watershed Protection District are the local participants represented in this HMP and meet the requirements of Section 409 of the Stafford Act and Section 322 of the DMA 2000.

Each local participant's governing body has adopted this 2010 HMP by resolution. A scanned copy of each resolution is included in Appendix B, Adoption Resolutions.

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3.1 PLANNING PROCESS DOCUMENTATION OVERVIEW

This section summarizes the original planning efforts; details how the plan was updated and who was involved in this process; documents public outreach and stakeholder involvement efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to update the HMP. Additional information regarding the meetings and public outreach efforts is discussed below and provided in more detail in Appendix D and Appendix E.

The requirements for the planning process, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PLANNING PROCESS

Documentation of the Planning Process

Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and

(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

- Does the new or updated plan provide a narrative description of the process followed to prepare the plan?
- Does the new or updated plan indicate who was involved in the current planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Does the new or updated plan indicate that an opportunity was given for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the updated plan document how the planning team reviewed and analyzed each section of the plan?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- Does the updated plan indicate for each section whether or not it was revised as part of the update process?

Source: FEMA 2008.

3.2 INITIAL PLANNING PROCESS, 2004–2005

As noted previously, the initial basis for this plan was 2005 HMP. This plan was prepared by Ventura County, the Local Hazard Mitigation Group, which consisted of members of the Inter-Agency Coordination Group, including fire chiefs/officials, emergency managers, safety coordinators, planners, and other officials and staff from 34 local participants including the Ventura county, cities, and special districts, and URS Corporation. The 2005 HMP development occurred from June 2004 to January 2005. The 2005 HMP was adopted by the Ventura County Board of Supervisors on June 7, 2005.

3.3 PLAN UPDATE PROCESS, 2010

In April 2010, during the fifth year of the 2005 HMP, the Ventura County OES kicked off the update process. The Ventura County OES determined that the standing Emergency Coordinators' Council (ECC) included almost all of the relevant stakeholders. The ECC consists of local emergency managers from the County, cities, and special districts as well as non-governmental agencies, military, private sector, and special districts that have been delegated the authority of local government emergency services directors or City Managers.

For special districts not represented in the ECC, Ventura County OES extended an invitation to participate on the ECC for the purposes of updating the HMP.

Table 3-1. Planning Committee

Department or Agency	Name
Sheriff's Department OES	Laura D. Hernandez
Sheriff's Department OES	Gil Zavlodaver
VCWPD	Norma Camacho
VCWPD	Sergio Vargas
VCWPD	Bruce Rindahl
VCWPD	Phil Raba
VCWPD	Brian Trushinski
Channel Islands Beach Community Services District	Jared Bouchard
City of Camarillo	Bruce Feng
City of Camarillo	John Fraser
City of Moorpark	John Brand
City of Ojai	Chris Dunn
City of Oxnard	Deborah Omalia
City of Port Hueneme	Maggie Federico
City of Santa Paula	Steve Lazenby
City of Thousand Oaks	Angela Wolf
City of Ventura	Brian Clark
Briggs Elementary School District	Deborah Cuevas
California State University, Channel Island	John M Reid
California State University, Channel Island	Jeff Cowgill
Calleguas Municipal Water District	Bruce Fischer
Camrosa Water District	Tony Stafford
Camrosa Water District	MJ Mitchell
Casitas Muni. Water District	Neil Cole
Conejo Recreation & Park District	Matt Kouba
Conejo Valley Unified School District	John Baarstad
Fillmore Unified School District	Jeff Sweeney
Hueneme School District	Dr. Gerald Dannenberg
Mesa Union School District	John Puglisi
Moorpark Unified School District	Ellen Smith

Table 3-1. Planning Committee

Department or Agency	Name
Mupu Elementary School District	Jeanine Gore
Oak Park Unified School District	Tony Knight
Ocean View School District	Nancy Carroll
Ojai Unified School District	Henry Bangser
Ojai Valley Sanitary District	John Correa
Oxnard Elementary School District	Mary Gonzalez
Oxnard Elementary School District	Norma Magana
Oxnard Union High School District	Bob Carter
Oxnard Union High School District	Vickory Steinman
Rio School District	Sherinne Cotterell
Rio School District	Kevin Mitchell
Santa Clara Elementary School District	Kari Skidmore
Santa Paula Elementary School District	Winston A Braham
Santa Paula Union High School District	Dr. David A Gomez
Simi Valley Unified School District	Dr. Scroggin
Somis Union School District	Mary H Mckee
United Water Conservation District	Jim Kentosh
Ventura County Community College District	Susan Johnson
Ventura County Community College District	Richard DeLao
Ventura County Fire Protection	Vaughan Miller
Ventura County Fire Protection	Dave Chovanec
Ventura County Office of Education	Stan Mantooth
Ventura County Office of Education	Poul Hanson
Ventura County Office of Education	Russ Olsen
Ventura Co. Sheriff Dept/ Ojai	Chris Dunn
Ventura Unified School District	Dr Trudy Arriaga
VCWPD = Ventura County Watershed Protection District	

A consultant, URS Corporation, also attended and facilitated meetings with the Planning Committee, and coordinated numerous activities to create the 2010 HMP. On May 20, 2010 Ventura County OES held the first Planning Committee meeting to begin the plan update process. As shown in Appendix D, the consultant and Ventura County OES Points-of-Contact Laura Hernandez and Gil Zavlodaver familiarized the Planning Committee with the DMA 2000, the plan update process, the plan outline, and the plan schedule. The Planning Committee also assessed a matrix of hazards which illustrates which hazards were addressed in the following plans: 2005 HMP, 2005 General Plan, draft 2010 State of California Multi Hazard Mitigation Plan as well as state and Presidentially declared disasters within Ventura County. Using this information, the Planning Committee developed a preliminary list of hazards to be profiled in the new plan. During this meeting, the consultant asked that each member of the Planning Committee review a copy of the 2005 HMP (which was posted on the Website for the 2010

HMP) with staff from other relevant departments and agencies from his/her jurisdiction and email the consultant with any proposed changes to be made to the updated plan.

During the second meeting, held on July 17, 2010 the consultant presented the Planning Committee with the draft hazard profiles and maps and summarized the initial update findings (Table 3-2). The consultant also discussed the next steps, creating an asset inventory and developing capability assessment, and explained the involvement needed by the stakeholders. As follow up to the meeting, the Planning Committee members were emailed an electronic template for the capability assessment and were provided a draft list of assets/critical facilities within his/her jurisdiction/special district. Each Planning Committee member was asked to complete the capability assessment on behalf of his/her jurisdiction/special district and review the asset/critical facility list for accuracy and completion.

Table 3-2. Summary of Initial Update Findings

2005 HMP	Actions to Take
Prerequisites	Adopt the 2010 HMP by each local participant's governing body
Background	Rename as "Community Description" section Update demographic information
Planning Process Documentation	Create new Planning Committee Determine new hazards to be profiled and assets to be analyzed Develop a public outreach and stakeholder strategy Incorporate other existing relevant plans and reports into 2010 HMP Document entire plan update process
Risk Assessment	Rename as "Hazards Analysis" and "Vulnerability Analysis" sections. Update hazards and assets, per discussion at Planning Team meeting #1 and subsequent emails Update hazards profiled in the 2005 HMP. Utilize various hazard data sources to determine recent historical events, new hazard areas, and new subhazards Update the asset lists to include only local and public critical facilities and infrastructure Include RL properties in vulnerability analysis Conduct vulnerability analysis, using updated asset and hazard information, interpret analysis, and discuss new findings Meet with the Planning Team to discuss vulnerability analysis findings Remap hazard areas and asset locations in GIS
Mitigation Strategy	Rename as "Mitigation Strategy" section Develop a "Capability Assessment" section Review and document all local legal and regulatory, administrative and technical, and financial resources available for hazard mitigation Meet with the Planning Team to determine if the 2005 HMP goals are still relevant Revise the list of mitigation actions in the 2005 HMP to be more mitigation-focused (rather than focused on response, recovery, and preparedness) Develop a new mitigation action evaluation/prioritization process Determine the mitigation action plan for selected mitigation actions
Plan Maintenance	Rename as "Plan Maintenance" section Create a more realistic Planning Team monitoring and evaluation process Identify how elements from the HMP will be implemented into other planning mechanisms
GIS = Geographic Information System HMP = Hazard Mitigation Plan RL = repetitive loss	

On August 19, 2010 a third Planning Committee meeting was held via conference call to discuss the development of the mitigation strategy and the completion of the Mitigation Strategy Workbook. Two days prior each committee member received a workbook, designed to accomplish the following: familiarize the participant with eligible and ineligible FEMA mitigation actions; provide a list of potential mitigation actions for the participant to review and add additional mitigation actions, if necessary; and to select and prioritize mitigation actions to be included in each local participant's mitigation action plan. Over a two week period, each Planning Committee member worked with staff from other relevant departments and agencies from his/her jurisdiction to develop or update their mitigation action plan.

On September 24, 2010 the consultant prepared the Initial Draft 2010 HMP for the Planning Committee to review. Over a two week period, the Planning Committee provided comments to the consultant and the consultant addressed, as necessary. On October 15, 2010 the consultant prepared the Final Draft 2010 HMP for a two week public comment period. During this time, Ventura County OES sent the draft to CalEMA and FEMA for a courtesy review.

Copies of the agenda and meeting minutes for each of the three Planning Committee meetings are provided Appendix D.

3.4 PUBLIC OUTREACH AND STAKEHOLDER INVOLVEMENT

3.4.1 Meetings

During the planning process, Ventura County OES and the consultant attended two Ventura County Emergency Planning Council meeting to discuss the 2010 HMP. The Ventura County Emergency Planning Council is an advisory body whose mission is to lead a unified effort in improving disaster preparedness, mitigation, response and recovery countywide. These efforts are achieved through a partnership of cooperation and collaboration with all levels of government, non-government and the private sector. 2010 Emergency Planning Council members include representatives from Ventura County OES, VCFPD, American Red Cross of Ventura County, Ventura County Voluntary Organizations Active in Disasters, Ventura County Economic Development Agency, and the California Air National Guard, to name a few. The Ventura County Emergency Planning Council meetings are open to the public and the details for each meeting (including time, date, location, and agenda) are posted on the county Website. At the July 30, 2010 meeting the consultant gave a presentation on the 2010 HMP and discussed progress to date, including hazard-specific maps, and answered any questions and comments about the update process. At the October 22, 2010 meeting the consultant gave a presentation on the Final Draft 2010 HMP and discussed the CalEMA and FEMA courtesy review and upcoming plan adoption process.

Copies of the agenda and meeting minutes for the July 30, 2010 EPC meeting and a copy of the agenda for the October 22, 2010 are provided in Appendix E.

3.4.2 Media Announcements

Ventura County OES issued a media release announcing the kick-off of the 2010 HMP update process. The media release also provided the 2010 HMP Website link and contact information should further information be desired. Ventura County OES also announced the 2010 HMP via

Twitter on August 6, 2010 and an announcement was published in the Thousand Oaks Acorn on August 19, 2010.

Copies of the media release, Twitter announcement, and Thousand Oaks Acorn article are provided in Appendix E.

3.4.3 Website

As noted above, Ventura County OES re-launched the County's HMP Website, which was first used during the development of the 2005 HMP. For the 2010 HMP, the Website provided information about disasters in Ventura County, the DMA 2000, HMP update requirements, and the planning process overview. In addition, Ventura County OES posted hazard maps as they were completed and provided copy of the Final Draft online for review and comment. The 2010 HMP Website is located at http://portal.countyofventura.org/portal/page/portal/cov/emergencies/mitigation/plan. A snapshot of the 2010 HMP Website is provided in Appendix E.

3.5 INCORPORATION OF EXISTING PLANS AND OTHER RELEVANT INFORMATION

During the plan update process, the consultant and Planning Committee reviewed hazard and mitigation information from other relevant existing plans, studies, and reports into the 2010 HMP. Based on feedback from the Planning Committee, the consultant incorporated relevant information into the 2010 HMP as warranted. The local and State plans integrated into this document are listed below. A complete list of the sources consulted is provided in Section 9.

- *Ventura County Community Wildfire Protection Plan* (Ojai Valley Fire Safe Council 2010): The Community Wildfire Protection plan provided hazard information and mitigation strategies to be used in the 2010 HMP wildfire hazard profile and for wildfire mitigation strategies.
- *Ventura County General Plan* (2005): The goals and policies in this document provided guidance for the mitigation strategies identified in the 2010 HMP. The hazards identified provided supplementary information for the hazard profiles.
- *Ventura County Building Codes*: These codes regulate new construction and major remodels/additions; they were used to develop the capability assessment.
- *Draft State of California Multi-Hazard Mitigation Plan* (2010): This plan, prepared by CalEMA, was consulted to ensure that the hazard profiles and mitigation strategy in the 2010 HMP are consistent with state hazard profiles and the state's mitigation strategy.

4.1 HAZARD ANALYSIS OVERVIEW

A hazard analysis includes the identification and screening of each hazard and then the profiling of each hazard. The hazard analysis includes natural, human-caused, and technological hazards. Natural hazards result from unexpected or uncontrollable natural events of significant size and destructive power. Human-caused hazards result from human activity and include technological hazards. Technological hazards are generally accidental or result from events with unintended consequences (for example, an accidental hazardous materials release).

Per the local mitigation planning requirements, this hazard analysis consists of the following two steps:

- Hazard identification and screening
- Hazard profiles

4.2 HAZARD IDENTIFICATION AND SCREENING

The requirements for hazard identification, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Risk Assessment – Identifying Hazards

Requirement 44 CFR § 201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.

Element

- Does the new or updated plan include a description of all of the types of all natural hazards that affect the jurisdiction?

Source: FEMA 2008.

As the first step in the hazard analysis, the ECC reviewed the list of hazards presented in Table 4-1 and the following questions:

- Is the hazard included in the 2005 HMP?
- Is the hazard included in the 2005 Ventura County General Plan?
- Is the hazard included in the Draft 2010 State of California Multi-HMP?
- Has the hazard occurred in Ventura County and been declared a Presidential or State emergency or disaster in the past 40 years?

The results of the screening are presented in Table 4-1.

Table 4-1. Ventura County Hazard Screening

Hazard	Profiled in 2005 HMP	Profiled in 2005 Ventura County General Plan	Declared Emergencies and Disasters in Ventura County, 1970 to Present	
			State	Presidential
Agricultural biological			X	
Avalanche				
Coastal erosion		X		X
Civil unrest		X		
Dam failure	X	X		
Drought			X	
Earthquake	X	X		X
Expansive soils & subsidence		X		
Flood(2)	X	X	X	X
Fog				
Hailstorm				
Hazardous materials		X		
Heat				
Hurricane				
Infectious disease				
Landslide/mudslide	X	X		X
Levee failure				
Liquefaction		X		
Severe wind & tornado				
Severe winter storm			X	X
Terrorism				
Volcano				
Tsunami/seiche		X		
Wildfire/fire	X	X	X	X
Sources: Cal EMA, 2010. Ventura County, 2005.				

After discussing each hazard listed in Table 4-1, the ECC determined that the following hazard groups pose the greatest threat to the County and should therefore be profiled or reprofiled in the 2010 HMP. The ECC's decisions were based on the likelihood of the hazard's occurrence and the feasibility of mitigation.

- Agricultural biological
- Earthquake
- Flooding
  - Riverine and coastal
  - Dam failure
  - Levee failure
- Geological
  - Liquefaction
  - Landslide
- Post-fire debris flow
- Severe winter storm
- Tsunami
- Wildfire

All hazards included in the 2005 HMP are included in this HMP update. Hazards new to the 2010 HMP are: agricultural biological, severe winter storm, and tsunami. Agricultural biological hazards are included due to recent threats to agricultural areas. Severe winter storm was previously not included because it was considered to include heavy snowfall, which only affects the mountainous, mostly uninhabited areas of the County. However, this hazard also includes freezing, severe winds, and hail, all of which may affect agricultural or populated areas of the County. Tsunami was previously not included because the areas affected were assumed to be the same areas affected by coastal flooding, which was included in the 2005 HMP. However, the ECC has determined that areas that could be affected by tsunami are different than areas that could be affected by coastal flooding, particularly if a large tsunami event were to occur.

One hazard that is profiled in the County's General Plan that has also received a Presidential Disaster Declaration is coastal erosion. Coastal erosion is addressed in the flooding profile in Section 4.3.3.

4.3 HAZARD PROFILES

The requirements for hazard profiles, as stipulated in DMA 2000 and its implementing regulations, are provided below.

DMA 2000 Requirements: Risk Assessment – Profiling Hazards

Requirement 44 CFR § 201.6(c)(2)(i): [The risk assessment shall include a] description of the location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Element

- Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan?
- Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?
- Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?
- Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the new or updated plan?

Source: FEMA 2008.

The hazards selected by the Planning Committee were profiled based on existing available information. The hazard profiling consisted of describing the nature of the hazard, disaster history, location of hazard, and extent and probability of future events. The sources of information are listed in Section 9 of this document.

The hazards profiled for Ventura County are presented below in alphabetical order. The order does not signify level of risk.

4.3.1 Agricultural Biological Hazards

4.3.1.1 Nature of Hazard

Agricultural infestation generally involves the artificial introduction of an insect, disease, vertebrate, or weed pest. These pests are particularly destructive to the local agricultural crops because they have no natural enemies to keep them under control. The type and severity of an agricultural infestation will vary based on many factors, including weather, crop diversity, and proximity to urban areas.

The onset for an agricultural infestation can be rapid. Controlling its spread is critical to limiting the impacts of the infestation. Methods for detecting, limiting and eradicating exotic pests include: delimitation trapping, quarantining the area and preventing the shipment of products from the designated area, aerial and ground application of pesticides, and in extreme cases, premature harvest and/or crop destruction. Duration is largely affected by the degree to which the infestation is aggressively controlled, but is commonly more than one week. The warning time needed to control infestation is typically more than 24 hours. Maximizing warning time is also critical for reducing damage from this hazard.

The County's agriculture industry provides a very significant base to the County's economy. The agricultural output of Ventura County exceeds $1.5 billion annually and encompasses over 100,000 acres of irrigated cropland. Ventura County is one of the top 10 agricultural counties in California. The impact of infestation of a particular pest or disease would include economic losses due to crop losses from pest damage, limitations on the ability to export products from the area, and increased costs for pest control. The diversity and location of crops produced in the County is shown in Figure C-1. Many of the agricultural areas shown may be affected by the insect pests and agriculture biological diseases described in this section.

Many pests not only damage the agricultural economy but also affect residential areas and open space. Damage to landscape plants and vegetable gardens can be significant. Pests such as the Gypsy Moth damage primarily hardwood trees in open space areas such as Oak Woodlands.

The most likely biological hazards to agriculture in Ventura County are:

- **Huanglongbing (HLB) disease.** This is a devastating bacterial disease affecting citrus trees carried by the Asian citrus psyllid, an invasive, aphid-like insect pest that spreads the bacteria from tree to tree. The disease ruins the taste and appearance of citrus fruit and eventually kills the infected trees. There is no treatment or cure, and all commercially valuable varieties of citrus fruit are vulnerable.
- **Laurel wilt disease.** An insect-borne fungal disorder, laurel wilt disease is spreading through the United States and is potentially a hazard to the County's avocado crop. laurel wilt disease is carried by the redbay ambrosia beetle which affects trees in the Laurel family. The disease is transmitted in the United States by humans and can be spread in wooden packing materials, potted plants, firewood, logs, and wood chips. When a beetle carrying the fungus bores into a tree, the fungus spreads and begins digesting the wood. Within 6 months of being infected, the tree dies.
- **Mediterranean fruit fly.** The damage caused by larval feeding makes fruit unfit for human consumption. An established population can have a severe economic impact from restrictions or prohibitions on the export of fresh fruit, both domestically and internationally. Many of the crops in the County can be affected by this pest. The Mediterranean fruit fly has infested more than 300 cultivated and wild fruits.
- **Gypsy moth.** The larva of this moth are destructive to forest and landscape trees. The gypsy moth has defoliated millions of acres of forest and urban trees in the eastern United States. Repeated defoliation renders trees more susceptible to other pests and diseases, possibly leading to tree death and an increased potential for fire and erosion. Gypsy moth infestations generally affect the recreational use of forests, parks, and backyards. However, when populations are high, gypsy moth caterpillars are also a threat to forests and agricultural crops such as fruit trees. Gypsy moths can feed on more than 500 plants.
- **Charcoal rot.** It has recently been confirmed that the soil-borne disease of charcoal rot has been affecting strawberry plants in coastal and inland counties of California. Charcoal rot causes wilting of foliage, plant stunting, and drying and death of older leaves, though the central youngest leaves often remain green and alive. The disease can survive for extended periods in the soil and is probably spread within and between fields mostly by the movement of soil during soil tillage and preparation operations. Once infected, the affected plants begin to collapse within days and will eventually die.

4.3.1.2 Disaster History

In 1994, the Mediterranean fruit fly affected 11 counties in California, including Ventura County. The loss in Ventura County was about $22 million. In 2007, four gypsy moths were trapped in Ojai; then in October 2008, a 5-square-mile quarantine area was established in the City of Ojai, centered around two egg mass sites located on South Rice Road. Since 2008, no gypsy moths have been detected. Likewise, in 2007-2009, the Charcoal Rot disease suddenly affected strawberry plants in several fields throughout Ventura County in 2007 and 2008, but the loss of crops was limited. The fungus was limited when growers routinely fumigated fields, but because of restrictions on some fumigation chemicals, many growers have turned to less-potent chemical alternatives. Fields afflicted by charcoal rot have typically been fumigated for several successive seasons with these less-potent chemicals; the effectiveness of the chemicals is still being determined. Research is underway in Ventura County on epidemiology and fungicide treatment.

As of 2010, the HLB disease has not occurred in Ventura County. However, the Asian citrus psyllid pest, which carries HLB disease, was identified in San Diego County in 2008, and by 2009 it was also found in Imperial, Orange, and Los Angeles counties. Control and quarantine activities are currently underway in counties where the insect has been found.

4.3.1.3 Location

Ventura County's agricultural areas are most susceptible to insect pests and agriculture biological diseases, such as those described above. The County's farm landscape is illustrated on Figure C-1. In addition to agricultural areas, the entire county is susceptible to the Gypsy Moth. In 2008, a quarantine area for the gypsy moth was centered around a six-mile square area in Ojai. In the spring of 2009, hundreds of gypsy moth traps were placed in the same area; no adult gypsy moths were detected in 2009. Visual inspection in the quarantined area began in the fall of 2009. If no gypsy moths are detected, the quarantine will end in September 2010.

4.3.1.4 Extent and Probability of Future Events

Future agricultural infestations in Ventura County are likely based on past occurrences. Based on previous history, infestations causing widespread damage have occurred about once every 10 to 20 years. Another factor increasing the likelihood of future infestations is the mild climate in Ventura County, which increases the ability of pests to proliferate. However, the extent and probability of a devastating event are unknown. Other factors that influence agricultural infestations are described below.

High population mobility within the country and the increasing number of immigrants who come and go between the United States and their home countries make the introduction of exotic insect pests of all types more likely. Decreased funding at the Federal and State levels for inspection of incoming commodities at high risk centers such as the USPS, UPS, and FedEx increase the ability of non-native insects and plant diseases to enter the area undetected. The agricultural industry is currently preparing for the likely spread of the Asian Citrus Psyllid into the area sometime this year. The disease carried by the insect has not yet been detected in the state, however once the insect is present many experts feel that it is only a matter of time before the disease is also detected.

Methyl Bromide has been the fumigant of choice for controlling soil-borne insect and disease pests in many of the county's highest value crops, including bell peppers, tomatoes, berries (including strawberries, raspberries, and blueberries), and cut flowers. With the phase out of Methyl Bromide, control of diseases such as charcoal rot will depend on the availability of alternative methods, including fumigants such as choropicrin, 1,3 D, metam/potassium sodium and methyl iodide.

The extent and probability of a devastating event would depend on a number of factors, including the specific pest introduced, climactic conditions at the time of introduction, fluctuations in funding for pest detection and eradication, public pressure regarding aerial and ground applications of pesticides proximate to urban areas, and many other factors.

4.3.2 Earthquake

4.3.2.1 Nature of Hazard

An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and can cause massive damage and extensive casualties in a few seconds. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is 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. Soft soils can amplify ground motions.

The Richter scale is often used to rate the strength of an earthquake and is an indirect measure of seismic energy released. The scale is logarithmic, with each 1-point increase corresponding to a 10-fold increase in the amplitude of the seismic shock waves generated by the earthquake. However, in actual energy released, each 1-point increase on the Richter scale corresponds to about a 32-fold increase in energy released. Therefore, a magnitude (M) 7 earthquake is 100 times (10×10) more powerful than an M5 earthquake and releases 1,024 times (32×32) the energy.

The Modified Mercalli Intensity (MMI) scale is another way of rating earthquakes. This method attempts to quantify the intensity of ground shaking. Intensity in this scale is a function of distance from the epicenter (the closer a site is to the epicenter, the greater the intensity at that site), ground acceleration, duration of ground shaking, and degree of structural damage. The MMI rates the level of severity of an earthquake by the amount of damage and the perceived shaking, as shown in Table 4-2.

Table 4-2. Modified Mercalli Intensity Scale

MMI Value	Description of Shaking Severity	Summary Damage Description	Full Description
I	Micro	Little to none	Not felt.
II	Minor	Little to none	Felt by persons at rest, on upper floors, or favorably placed.
III	Minor	Hanging objects move	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV	Light	Hanging objects move	Hanging objects swing. Vibration like passing of heavy trucks or sensation of a jolt like a heavy ball striking the walls. Standing motorcars rock. Windows, dishes, doors rattle. In the upper range of IV, wooden walls and frames creak.
V	Light	Pictures move	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.
VI	Moderate	Objects fall	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., fall off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked.
VII	Strong	Nonstructural damage	Difficult to stand. Noticed by drivers of motorcars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roofline. Fall of plaster, loose bricks, stones, tiles, cornices. Some cracks in masonry C. Small slides and caving in along sand or gravel banks. Concrete irrigation ditches damaged.
VIII	Very Strong	Moderate damage	Steering of motorcars affected. Damage to masonry C, partial collapse. Some damage to masonry B, none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, and elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Cracks in wet ground and on steep slopes.
X	Very Violent	Extreme damage	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land.
XI	Very Violent	Extreme damage	Rails bent greatly. Underground pipelines completely out of service.
XII	Very Violent	Total damage	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.

Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces.
Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces.
Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.
Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.
Sources: Association of Bay Area Governments 2003; USGS 2009.

4.3.2.2 Disaster History

While no large (M 5.0>) earthquakes have occurred recently within the County's boundaries, a number of relatively large earthquakes outside the County have caused damage within the County. These earthquakes occurred in 1925 (Santa Barbara), 1927 (Point Arguello), 1933 (Long Beach), 1941 (Santa Barbara), 1952 (Tehachapi), 1971 (San Fernando), and 1994 (Northridge). Additionally, damaging earthquakes within the County occurred in 1950 (north of Ojai), 1957 (Hueneme), 1963 (Camarillo), and 1973 (Point Mugu). The three most recent events (San Fernando, Point Mugu, and Northridge) are discussed below.

- **San Fernando, M 6.5, February 9, 1971:** This event was caused by oblique-slip reverse faulting in the San Fernando fault zone. The earthquake caused the destruction of freeway interchanges, houses, and buildings and severe damage to three hospitals in the San Fernando Valley. The earthquake claimed 65 lives. Although the epicenter was within 25 miles of Ventura County, damage sustained within the County was minor.
- **Point Mugu, M 5.3, February 21, 1973:** The Point Mugu earthquake was responsible for at least five injuries and more than $1 million damage in the Point Mugu–Oxnard area, though damage was confined mainly to the vicinity of the epicenter. Large boulders fell down onto State Route 1 at Point Mugu, partially blocking the road. More than 7,000 customers lost electricity for several hours. Most reported damage was to windows, ceilings, plaster, chimneys, and shelved goods, though structural damage and broken pipes were also reported. Although much less powerful than the San Fernando earthquake of 1971, the Point Mugu earthquake was similar in focal mechanism.
- **Northridge, M 6.7, January 17, 1994:** This blind thrust earthquake occurred along the Northridge thrust fault. It was the strongest earthquake instrumentally recorded in an urban setting in North America and caused parking structures, apartments, office buildings, and sections of freeways to collapse. Approximately 25,000 dwellings were rendered uninhabitable. Total damage exceeded $44 billion. The incident resulted in 51 deaths.

4.3.2.3 Location

As in most of southern and coastal California, the potential for earthquake damage exists throughout Ventura County because of the number of active faults within and near the County. These faults are shown on the California Geological Survey (CGS) Fault Activity Map of California. Descriptions of the active faults are provided below. The location of the active and potentially active faults is shown on Figure C-2. Some of the more significant faults are described below:

- **San Andreas fault:** San Andreas is the longest and most significant fault in California. Because of clearly established historical earthquake activity, this fault has been designated as active by the State of California. The last major earthquake on this fault near Ventura County was the Fort Tejon earthquake of 1857, estimated at M 8.0, and would have caused considerable damage if there had been structures in the southern part of the County. There is a 59% chance that an M 6.7 quake or larger will occur on this fault within the next 30 years.
- **Malibu Coast fault system:** The Malibu Coast fault system includes the Malibu Coast, Santa Monica, and Hollywood faults. The system begins in the Hollywood area, extends along the southern base of the Santa Monica Mountains, and passes offshore a few miles

west of Point Dume. The 1973 Point Mugu earthquake, described in the previous section, is believed to have originated on this fault system.

- **San Cayetano–Red Mountain–Santa Susana fault system:** This fault system consists of a major series of north-dipping reverse faults that extend over 150 miles from Santa Barbara County into Los Angeles County. Within this system, the San Cayetano fault is the greatest hazard to Ventura County; it is a major, north-dipping reverse fault that extends for 25 miles along the northern portion of the Ventura Basin. The San Fernando earthquake of 1971, described in the previous section, was caused by activity along this fault.
- **Oak Ridge fault system:** The Oak Ridge fault system is a steep (65 degrees) southerly dipping reverse fault that extends from the Santa Susana Mountains westward along the southerly side of the Santa Clara River Valley and into the Oxnard Plain. The system is more than 50 miles long on the mainland and may extend an equal or greater distance offshore. Several recorded earthquake epicenters on land and offshore may have been associated with the Oak Ridge fault system. Portions of the system are zoned by the state as active.
- **Simi–Santa Rosa fault system:** This fault system extends from the Santa Susana Mountains westward along the northern margin of the Simi and Tierra Rejada valleys and along the southern slope and crest of the Las Posas Hills to their westerly termination.
- **Pine Mountain thrust fault and Big Pine fault:** These two large faults occur in the mountainous portion of Ventura County north of the Santa Ynez fault; the faults are located 9 and 16 miles north of the City of Ojai, respectively. The Pine Mountain thrust fault is reported to have ruptured the ground surface for a distance of 30 miles along its length during the northern Ventura County earthquakes of November 1852.
- **Ventura-Pitas Point fault:** The western half of this fault is known as the Pitas Point fault, and the eastern half is known as the Ventura fault. The Pitas Point fault extends offshore into the Pacific Ocean and is roughly 14 miles long. The Ventura fault extends into the communities of Ventura and Sea Cliff and runs roughly parallel to portions of U.S. 101 and State Route 126. The fault is roughly 12 miles long. The Ventura-Pitas Point fault is a left-reverse fault.

4.3.2.4 Extent and Probability of Future Events

Ongoing field and laboratory studies suggest the following maximum likely magnitudes and recurrence intervals for the major local faults:

- San Andreas (M 8.0, recurrence interval of 300 years)
- Malibu Coast fault system (M 6.7, recurrence interval 2,908 years)
- San Cayetano fault system (M 6.8, recurrence interval 150 years)
- Oak Ridge fault system (M 6.9, recurrence interval 299 years)
- Simi–Santa Rosa fault system (M 6.7, recurrence interval 933 years)
- Ventura-Pitas Point fault system (M 6.9, recurrence interval not available)

- Red Mountain fault system (M 6.8, recurrence interval 507 years)
- Santa Susana fault system (M 6.6, recurrence interval 138 years)

The strength of an earthquake's ground movement can be measured by peak ground acceleration (PGA). PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g = 980 centimeters per second, per second). PGA is used to project the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (e.g., 10 percent, 5 percent, or 2 percent) of being exceeded in 50 years. The ground motion values are used for reference in construction design for earthquake resistance and can also be used to assess relative hazard between sites when making economic and safety decisions.

In 2003, CGS developed an updated map of earthquake shaking potential for California. The map shows the relative intensity of ground shaking and damage in California from anticipated future earthquakes. Regions near major, active faults are shown in red and pink and experience stronger earthquake shaking more frequently. Regions that are distant from known, active faults are shown in orange and yellow experience lower levels of shaking less frequently. Figure C-2 indicates the level of earthquake hazard for Ventura County based on the 2003 CGS data.

Ventura County falls within the middle to top levels of earthquake hazard, as indicated by the red and pink regions on Figure C-2. This intense shaking can damage even newer buildings built to current building codes.

4.3.3 Flooding: Riverine and Coastal

4.3.3.1 Nature of Hazard

A flood occurs when the existing channel of a stream, river, canyon, or other watercourse cannot contain excess runoff from rainfall or snowmelt, resulting in overflow on to adjacent lands. In coastal areas, flooding may occur when high winds or tides result in a surge of seawater into areas that are above the normal high tide line.

A floodplain is the area adjacent to a watercourse or other body of water that is subject to recurring floods. Floodplains may change over time from natural processes, changes in the characteristics of a watershed, or human activity such as construction of bridges or channels. In areas where flow contains a high sediment load, such as along the Santa Clara River in Ventura County, the course of a river or stream may shift dramatically during a single flood event. Coastal floodplains may also change over time as waves and currents alter the coastline.

Physical damage from floods includes the following:

- Inundation of structures, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- Impact damage to structures, roads, bridges, culverts, and other features from high velocity flow and from debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects.

- Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands.
- Release of sewage and hazardous or toxic materials when wastewater treatment plants are inundated, storage tanks are damaged, and pipelines severed.

Floods also cause economic losses through closure of businesses and government facilities; disrupt communications; disrupt the provision of utilities such as water and sewer; result in excessive expenditures for emergency response; and generally disrupt the normal function of a community.

In areas such as Ventura County that do not have extended periods of below-freezing temperatures or significant snowfall, floods usually occur during the season of highest precipitation or during heavy rainfalls after prolonged dry periods. Ventura County is dry during the late spring, summer, and early fall and receives most of its rain during the winter months. The rainfall season extends from November through April, with approximately 95 percent of the annual rainfall occurring during this period. The average annual rainfall in Ventura County ranges from less than 8 inches in the Cuyama Valley in northwestern Ventura County to 38 inches in the Ventura River watershed west of the City of Ojai. Along the coast near Oxnard, San Buenaventura, Simi Valley, and Thousand Oaks, the average rainfall is approximately 14 inches.

The prevailing weather patterns during the winter and the orientation of the mountain ranges in the northern half of the County combine to produce extremely high-intensity rainfall. The peak historic rainfall intensity recorded by a Ventura County rain gage occurred on February 12, 1992. A rainfall intensity of approximately 4 inches per hour was measured during a 15-minute period at the Wheeler Gorge gage approximately 3 miles northeast of Matilija Dam. Such intensities can produce severe flooding conditions, particularly in small watersheds where flash floods are likely.

Flash floods are particularly dangerous. The National Weather Service defines a flash flood as one in which the peak flow travels the length of a watershed within a 6-hour period. These floods arise when storms produce a high volume of rainfall in a short period over a watershed where runoff collects quickly. They are likely to occur in areas with steep slopes and sparse vegetation. They often strike with little warning and are accompanied by high velocity flow.

4.3.3.2 Disaster History

Damaging floods in Ventura County were reported as early as 1862. A 1945 report by the Ventura County Flood Control District reported that floods of sufficient magnitude to cause extensive damage occurred in 1862, 1867, 1884, 1911, 1914, 1938, 1941, 1943, and 1944.

The largest and most damaging natural floods recorded in the Santa Clara and Ventura watersheds occurred in January and February of 1969. The January flood was a result of the highest monthly precipitation total ever recorded in Ventura County at that time. The February flood was a result of intense rainfall similar in magnitude to the rainfall that caused the record-breaking flood in January. During these floods, the 50- and 100-year peak discharge levels were reached in many channels. The combined effects of the 1969 floods were disastrous: 13 people lost their lives, and property damage was estimated at $60 million (1969 dollars). Homes in Casitas Springs, Live Oak Acres, and Fillmore were flooded, and 3,000 residents in Santa Paula and several families in Fillmore were evacuated twice. A break in the Santa Clara River levee threatened the City of Oxnard. Agricultural land, primarily citrus groves, was seriously damaged or destroyed. All over the County, transportation facilities, including roads, bridges, and railroad tracks, were damaged. The Fillmore, Oak View, and Ventura sewage treatment plants were severely damaged and dumped raw sewage into the Santa Clara and Ventura rivers. The untreated sewage polluted the rivers and the beaches at their outlets into the ocean. In addition, sewer trunk lines were broken along the Ventura River and its tributary, San Antonio Creek. Suspended sediment concentrations and discharge in many streams greatly exceeded any previously measured levels in the flood-affected areas. Suspended sediment concentrations reached a maximum of about 160,000 milligrams per liter in the Santa Clara River at Saticoy, and the maximum daily sediment discharge was 20 million tons during the storm peak (FEMA 2010a).

After 1969, significant development in the Calleguas Creek watershed increased peak flows in that channel. Historically, flood flows in the Calleguas Creek portion of the Oxnard Plain had been able to spread across the floodplain and deposit their sediment, creating the rich agricultural lands of the Oxnard Plain. Currently, the Oxnard floodplain is used for primarily year-round agricultural activities, and the Calleguas Creek has been channelized through the construction of levees. However, the channel has insufficient capacity for the 50- and 100- year flows, leading to levee breaks and extensive storm damage of the year-round agricultural crops. The creek channelization has also caused increased sediment to be delivered to its outlet in Mugu Lagoon, a sensitive wetlands area.

In 1980, Calleguas Creek breached its levee in the Oxnard Plain and caused approximately $9 million (in 1980 dollars) in damage to the Point Mugu Naval Base from flooding and sediment deposition. In addition, approximately 1,500 acres of farmland were covered by floodwaters. The peak discharge was 9,310 cubic feet per second (cfs) at the Madera Road Bridge in Simi Valley.

In 1983, a Federal disaster was declared because of storm damage. Repairs to flood-control facilities have been estimated to cost $15 million (in 1983 dollars). Improved channels in Moorpark and Simi Valley suffered severe damage from erosion during this event, and Calleguas Creek experienced record flooding. Damage to other public and private facilities has been estimated at approximately $39 million, with little more than half of that total due to damage to agricultural lands.

In the winter of 1997–1998, several heavy rainfall events hammered southern California. Some of the most intense rains occurred in Ventura County, causing flooding of dozens of homes and closure of approximately 35 roadways. A falling hillside in Ventura forced more than 60 residents to evacuate. Heavy storms caused an oil pipeline rupture, sending 8,000 gallons of crude oil into the Pacific Ocean and severing a natural gas pipeline that sparked a 100-foot flame. Countywide damages exceeded $50 million. However, no lives were lost.

In January 2005, winter storms brought heavy rains to the region. The Ventura River reached a maximum stage of 17.5 feet and maximum discharge of 152,560 cfs. High water flows, scouring, and washouts in the Ventura River damaged several water wells and exposed water lines owned by the Ojai Valley Sanitary District. Severe erosion occurred along both embankments of the Ventura River. Damage from the January 2005 storms totaled more than $200 million.

In January 2010, a series of powerful winter storms swept over Central and Southern California. Heavy rain, gusty winds, and heavy snow were witnessed in Ventura County. Rainfall totals ranged from 4-8 inches over coastal areas to 8-16 inches in the foothills and mountains. Flash flood watches were issued in areas of Ventura County that were damaged by wildfires in 2008.

The January 2010 storm was initially anticipated to be similar in size to the January 2005 storm. However, actual rain totals showed that this storm was not as severe. According to the Ventura County Watershed Protection District, the watershed levels during the January 2010 storm were nowhere near the levels reached in 2005.

4.3.3.3 Location

Figure C-3 shows the locations and types of flooding in Ventura County:

- **Upland flooding:** The mountainous terrain of northern Ventura County and the hills in the central and eastern parts of the County give rise to numerous annual streams, many draining into steep canyons. These streams are subject to floods of relatively short duration, often following high-intensity rainfall. Such floods may occur with little warning and carry large quantities of sediment and debris. Communities adjacent to the upland areas, such as Fillmore, Ojai, Piru, and Santa Paula, are subject to this hazard. Many of the watersheds in question contain dams or basins designed to attenuate flow and trap debris, reducing the effects on downstream communities.
- **Broad floodplains:** The Santa Clara River (watershed area of 1,650 square miles), Ventura River (watershed area of 226 square miles), and Calleguas Creek (watershed area of 325 square miles) watersheds drain to the broad coastal plain in the southern part of Ventura County. This plain is subject to inundation during longer intervals of rain, typically as the result of a series of winter storms. These floods typically have longer duration and may be forecast with more warning time. The Santa Clara River Valley, which crosses central Ventura County, is also subject to flooding. Numerous levees have been built to protect the agricultural lands along the river, which, because of its sediment load, has historically migrated across the valley floor during flooding intervals. These levees are typically not sufficient to withstand severe flood events.
- **Coastal flooding:** The County's 43-mile coastline is subject to tidal flooding, storm surge, and wave action, all of which usually occur during winter storms. Areas that are susceptible to severe wave action are generally confined to a narrow area immediately adjacent to the tidal zone, including Sea Cliff Colony, Oxnard Shores, Silver Strand Beach, and several sections of U.S. 101 from Rincon Point to Emma Wood State Park. However, the effects of coastal flooding can be severe—in addition to wave action, beach and bluff erosion can cause significant damage to coast-side homes and infrastructure. Coastal flooding may also occur as the result of tsunamis, which are extreme tidal surges caused by distant earthquakes or massive undersea landslides. In addition to flooding, winter coastal storms can cause minor coastal erosion along the shores of Ventura County. Coastal erosion is a natural process which occurs particularly in the winter when coastal storms wear away land by wave action, tidal currents, or wave currents. Material deposited on beaches during the mild summer and fall months gets redistributed by the waves. According to City of Ventura engineers, the majority of the sand is pulled just off coast and then comes back to shore over time. While most receding sand stays fairly close to shore, some sand is driven south by currents until it reaches Hueneme Canyon, a large deep-water depression near the Port of Hueneme.

4.3.3.4 Extent and Probability of Future Events

The magnitude of flooding that is used as the standard for floodplain management in the United States is a flood with a probability of occurrence of 1 percent in any given year. This flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the NFIP. FEMA has prepared a countywide Digital Flood Insurance Rate Map (DFIRM) for the unincorporated areas of Ventura County and for each incorporated city in the County, effective January 20, 2010. Figure C-3 shows the 100- and the 500-year floodplains for flooding sources, as identified in the Ventura County DFIRM.

On average, floods causing damage within Ventura County occurs every 5 years.

4.3.3.5 Additional NFIP Information

As noted in Section 1, Ventura County and its cities participate in the NFIP. The NFIP makes Federally-backed flood insurance available to homeowners, renters, and business owners in communities that adopt and enforce floodplain management ordinances to reduce future flood damage. Table 4-3 lists the date of the initially mapped FIRM, the emergency/regular program entrance date into the NFIP, and the number of policies in force.

Table 4-3. Date of Initially Mapped FIRM and Emergency/Regular Program Entrance Date into NFIP for Ventura County and Cities

County/Community Name	Date of Initially Mapped FIRM	Emergency/Regular Program Entrance Date into NFIP	Number of Policies in Force
Ventura County	10/31/1985	10/31/1985	1,525*
City of Camarillo	9/29/1986	9/29/1986	1,673
City of Fillmore	10/17/1978	10/17/1986	195
City of Moorpark	9/29/1986	9/29/1986	776
City of Ojai	10/17/1978	10/17/1978	70
City of Oxnard	3/1/1979	3/1/1979	475
City of Port Hueneme	9/24/1984	9/24/1984	41
City of Santa Paula	4/15/1980	4/15/1980	1,063
City of Simi Valley	9/27/1991	9/27/1991	2,202
City of Thousand Oaks	9/29/1978	9/29/1978	335
City of Ventura	9/29/1986	9/29/1986	321

Source: FEMA n.d.

FIRM = Flood Insurance Rate Map
NFIP = National Flood Insurance Program

* Additional NFIP information about Ventura County for the CRS 510 Activity Worksheet: As of July 31, 2010, there are 1,525 policies and $397,771,200 of insurance in force. The 1,525 insurance policies are broken out as follows: 1,403 single-family units; 39 2-4 family units; 12 all other residential units, and 71 nonresidential units. Since Ventura County joined the NFIP in 1985, 471 paid losses have been made for a total of $9,238,788.50. The 470 losses are broken out as follows: 388 single-family units; 22 2-4 family units; 3 all other residential units; and 47 nonresidential units.

4.3.4 Flooding: Dam Failure

4.3.4.1 Nature of Hazard

Dam failure can result in severe flood events. A dam failure is usually the result of the age of the structure, inadequate spillway capacity used in construction, or structural damage caused by an earthquake or flood. When a dam fails, a large quantity of water is suddenly released with a great potential to cause human casualties, economic loss, and environmental damage. This type of disaster is especially dangerous because it can occur suddenly, providing little warning and evacuation time for the people living downstream. The flows resulting from dam failure generally are much larger than the capacity of the downstream channels and therefore lead to extensive flooding. Flood damage occurs as a result of the momentum of the flood caused by the sediment-laden water, flooding over the channel banks, and impact debris carried by the flow.

A dam subject to state regulations concerning construction and operation is called a "state-size" dam. Such dams are either more than 25 feet tall and hold back more than 15 acre-feet of water or are more than 6 feet tall and hold back more than 50 acre-feet of water. Table 4-4 lists the state-size dams that are operated by the VCWPD, Table 4-5 lists the state-size dams that are not operated by VCWPD, and Table 4-6 lists dams and basins in Ventura County that are not state-size.

The VCWPD's basins and dams play an important role in the control of floodwaters and sediment in Ventura County. The debris basins capture primarily sediment mobilized by stream and watershed erosion. Debris basins can also attenuate flood peaks if enough storage volume is available in the basin and depending on the design of the outlet works. If basin volumes or dam designs exceed certain state criteria, they are regulated as "state-size" basins by the California Division of Safety of Dams (DSOD). State-size basins store more than 50 acre-feet of water or have dams that are more than 25-feet tall and are inspected annually by DSOD. Ventura County VCWPD's state-size basins are Arundell Barranca, Ferro, Lang Creek, Las Llajas Canyon, Runkle Canyon, Stewart Canyon Creek, and Sycamore Canyon Basins (Table 4-7). For more information on debris basins and the post-fire debris flow hazard, see Section 4.3.5.

Table 4-4. State-Size Dams Operated by Ventura County Watershed Protection District

Zone	Dam	Year Completed	Capacity
1	Matilija Dam	1949	Design: 7,018 acre-feet After notching: 3,800 acre-feet (excluding sedimentation losses) Original spillway capacity: 60,000 cubic feet per second at water elevation 1,137 feet
	Stewart Canyon	1963	Level capacity: 64.6 acre-feet Maximum debris capacity: 203.5 acre-feet
2	Arundell Barranca	1970 (modified 1995)	Flood storage: 138 acre-feet Maximum debris capacity: 17.5 acre-feet
3	Ferro Debris Basin	1933 (1992 embankment repair)	Level capacity (top of spillway): 21.4 acre-feet Maximum debris capacity: 23.4 acre-feet
	Lang Creek Detention Basin	2004	Flood storage (top of spillway): 263 acre-feet
	Las Llajas	1981	Flood storage: 1,250 acre-feet Maximum debris capacity: 280 acre-feet
	Runkle Debris Basin (Runkle Canyon Dam)	1949	Level capacity: 99.8 acre-feet Maximum debris capacity: not available
	Sycamore Canyon	1981	Flood storage: 660 acre-feet Maximum debris capacity: 107 acre-feet
	Sycamore Canyon	1981	Flood storage: 660 acre-feet Maximum debris capacity: 107 acre-feet

Sources: Ventura County Watershed Protection District. 2010; DSOD 2010.

Table 4-5. State-Size Dams Not Operated by the Ventura County Watershed Protection District

Zone	Dam	Owner	Dam Capacity (acre-feet)
1	Anola Dam	U.S. Bureau of Reclamation	30
	Casitas Dam	U.S. Bureau of Reclamation	245,000
	Senior Canyon Dam	Senior Canyon Mutual Water Company	78
3	Bard Reservoir Dam (Wood Ranch)	Calleguas Municipal Water District	11,000
	Lake Eleanor Dam	Conejo Open Space Conservation Agency	128
	Santa Felicia Dam (Lake Piru)	United Water Conservation District	100,000
	Sinaloa Lake	Sinaloa Lake Owners Association	205
4	Lake Sherwood Dam	Sherwood Valley Homeowners Association	2,694
	Las Virgenes Reservoir Dam (Westlake)	Las Virgenes Municipal Water District	10,000
Los Angeles County	Bouquet Canyon	Los Angeles Department of Water and Power	36,500
	Castaic Dam	California Department of Water Resources	325,000
	Pyramid Dam	California Department of Water Resources	179,000
Sources: Ventura County Watershed Protection District. 2010; DSOD 2010.			

Table 4-6. Non-State-Size Dams and Basins in Ventura County

Zone	Basin/Dam	Year Constructed	Watershed Area (acres)	Flood Storage Volume (acre-feet)
1	Dent Debris Basin	1981	27	2.5
	Live Oak Detention Basin	2002	794	17.8
	McDonald Detention Basin	1998	565	14.5
2	Adams Barranca Debris Basin	1994	5,408	44.6
	Cavin Road Debris Basin	1933	90	2.5
	Fagan Canyon Debris Basin	1994	1,856	44.6
	Franklin Barranca Debris Basin	1934	330	3.1
	Jepson Wash Debris Basin	1961	858	21.0
	Lake Canyon Dam and Detention Basin	2008	732	180.0
	Real Wash Debris Basin	1964	160	13.6
	Warring Canyon Debris Basin	1952	695	20.5
3	Castro Williams Debris Basin	1955	637	50.0
	Coyote Canyon Debris Basin	1955	4,550	15.2
	Crestview Debris Basin	1934	80	1.5
	Edgemore Debris Basin	1955	105	1.8
	Erringer Road Debris Basin-Upper	1957	105	20.5

Table 4-6. Non-State-Size Dams and Basins in Ventura County

Zone	Basin/Dam	Year Constructed	Watershed Area (acres)	Flood Storage Volume (acre-feet)
	Fox Barranca Debris Basin	1956	3,100	9.1
	Gabbert Canyon Debris Basin	1963	2,350	10.1
	Honda West Debris Basin	1955	740	6.4
	Lang Creek Debris Basin	2004	2,325	16.7
	Las Posas Estates Dam	1992	168	15.3
	North Simi Drain Dam	2002	1,200	50.0
	Peach Hill Wash Detention Dam	1988	1,589	25.5
	Ramona Detention Dam	1992	254	25.5
	Santa Rosa Road Debris Basin No. 2	1957	1,101	4.5
	South Branch Arroyo Conejo Debris Basin	1995	2,542	18.4
	Tapo Hills No. 1 Debris Basin	1971	104	25.5
	Tapo Hills No. 2 Debris Basin	1977	133	15.6
	West Camarillo Hills East Branch Debris Basin	1955	92	1.1
	West Camarillo Hills West Branch Debris Basin	1955	74	3.2
Source: VCWPD 2010.				

4.3.4.2 Disaster History

One dam failure had catastrophic effects in Ventura County. The St. Francis Dam in the San Francisquitos Canyon in Los Angeles County (within the Santa Clara River watershed) was constructed to provide 38,000 acre-feet of storage for water from the Los Angeles–Owens River Aqueduct. The midnight collapse of the dam in March 1928 occurred after the newly constructed concrete-arch dam was completely filled for the first time. The resulting flood swept through the Santa Clara Valley in Ventura County toward the Pacific Ocean, about 54 miles away. At its peak, the wall of water was reported to be 78 feet high; by the time it hit Santa Paula, 42 miles south of the dam, the water was estimated to be 25 feet deep. Almost everything in its path was destroyed including structures, railways, bridges, livestock, and orchards. By the time the flood subsided, parts of Ventura County lay under 70 feet of mud and debris. Nearly 500 people were killed, and damage estimates topped $20 million. The communities of Piru, Fillmore, Santa Paula, Bardsdale, Saticoy, Montalvo, and El Rio sustained extensive life and property loss from the flood.

There is no record of a failure of any dam located in Ventura County.

4.3.4.3 Location

Figure C-4 shows the locations and extent of the dam failure hazard areas for Ventura County. This map provides an approximate assessment of risk and does not indicate specific areas that may be affected by failure of a particular dam. Information on the latter may be obtained from the agency that owns the dam. The map shows that dam failures may occur outside Ventura County but still pose a threat. In particular, if dams in the Santa Clara River watershed in Los

Angeles County fail, the resulting flood would affect the Santa Clara River corridor, which includes the cities of Santa Paula and Oxnard, as demonstrated by the 1928 event.

4.3.4.4 Extent and Probability of Future Events

FEMA characterizes a dam as a high hazard if it stores more than 1,000 acre-feet of water, is taller than 150 feet, and has the potential to cause downstream property damage. The hazard ratings for dams are set by FEMA and confirmed with site visits by engineers. Most dams in the County are characterized by increased hazard potential because of downstream development and increased risk as a result of structural deterioration or inadequate spillway capacity.

The DSOD regulates state-size dams and inspects them annually to ensure that they are in good operating condition. Also, as required by DSOD regulations, the flood inundation limits resulting from a dam breach during the design storm are established for each state-size dam. The resultant maps contain flood-wave arrival time estimates and flood inundation limits. These maps are developed by CalEMA and provided to DSOD and local communities.

The largest state-size water storage reservoirs (Pyramid, Castaic, and Piru) that can affect Ventura County are located on the Santa Clara River system and are intended to be used as flood or debris control during storm events. To cause a significant flood, dam failure would have to occur during extreme storm events that caused inflow to the basin above the outlet capacity. Many of the basins are intended to capture debris and do not provide significant detention benefits for downstream flow. A few of the older district basins have earthen spillways that are subject to erosion and scour during overtopping. Sycamore Dam was originally designed as a retention basin but does not have the design capacity available at this time and thus could overtop during an extreme storm event and cause flooding in downstream areas.

The probability of dam failure inundation is unknown, but as described above, would be the result of certain types of extreme storm events.

4.3.5 Flooding: Levee Failure

4.3.5.1 Nature of Hazard

Levees are typically earthen embankments designed to contain, control, or divert the flow of water to provide some level of protection from flooding. Some levee systems are built for agricultural purposes and provide flood protection and flood loss reduction for farm fields and other land used for agricultural purposes. Urban levee systems are built to provide flood protection and flood loss reduction for population centers and the industrial, commercial, and residential facilities within them.

Levees are designed to provide a specific level of flood protection. Agricultural levee systems provide a level of protection that is appropriate based on the value of the assets being protected. Because urban levee systems are designated to protect urban areas, they are generally built to higher standards. No levee system provides full protection from all flooding events to the people and structures located behind it. Some level of flood risk exists in the levee-affected areas.

Levee failure is the overtopping, breach or collapse of the levee wall. Levees can fail in the event of an earthquake, internal erosion, poor engineering/construction or landslides, but levees most commonly fail as a result of significant rainfall. During a period of heavy rainfall, the water inside the levee can build up and flow over the top of its boundary. The overflow of water washes away the top portion of the levee, creating deep grooves. Eventually the levee weakens, resulting in a breach or collapse of the levee wall and the release of uncontrollable amounts of water.

4.3.5.2 Disaster History

No significant levee failures have occurred in Ventura County.

In recent years, FEMA has embarked on a Flood Map Modernization initiative to update and modernize the existing FIRMs for the majority of the United States. During this process, it has been revealed that a number of levees have not been assessed since their original inclusion in the NFIP and may no longer be in compliance with FEMA regulations. If a levee is found to be noncompliant, it will be decertified, and the residential structures behind the levee will be subject to the mandatory purchase of flood insurance and additional floodplain regulations. Levees in question are considered Provisionally Accredited Levees (PALs). Before producing new FIRMs, FEMA has allowed time for the PALs to be recertified.

Eleven levees in Ventura County have been deemed PALs. In response, the Ventura County VCWPD has initiated the VCWPD FEMA Levee Certification and Rehabilitation Project. Under this project, the VCWPD has engaged in preliminary design engineering work in support of levee retrofit and/or enhancement projects required to certify the 11 levees in full compliance with the Federal levee certification requirements, 44 CFR § 65.10.

4.3.5.3 Location

Figure C-5 shows the 9 PALs and 2 non-provisionally accredited levees: Arroyo Santa Rosa 2, Arroyo Simi 6, Arroyo Simi 7, Calleguas Creek 2, Calleguas Creek 3, Santa Clara River 1, Santa Clara River 3, Sespe Creek 1, Sespe Creek 2, Ventura River 1, and Ventura River 3. As can be seen in the map, these levees are located throughout the populated portion of Ventura County.

4.3.5.4 Extent and Probability of Future Events

The 11 levees are currently being studied for recertification.

The probability of future levee failures in Ventura County is unknown but may result from a large winter storm or seismic event. However, for the purpose of planning and identification of potential projects eligible for funding, Figure C-5 illustrates the extent of flooding greater than 3 feet if the levees are decertified and are prone to failure. Once released, official FIRMs produced by FEMA will vary and will be subject to community input and appeal.

4.3.6 Geological

For purposes of this analysis, geologic hazards are defined as events resulting in liquefaction and landslide.

4.3.6.1 Liquefaction

Nature of Hazard

Liquefaction occurs when ground shaking causes loose, saturated soil to lose strength and act as a viscous fluid. When liquefaction occurs, water pressure in the interstitial pores of the soil increases; the friction between soil particles decreases as the particles are effectively suspended and cohesion between particles is lost. Liquefaction causes two types of ground failure: lateral spreading and loss of bearing strength. Lateral spreads develop on gentle slopes and result in the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength results when the soil supporting structures liquefies and causes structures to collapse. After a liquefaction event, consolidation due to soil settlement can result in decreased soil surface elevations.

Disaster History

During the 1994 Northridge earthquake, liquefaction occurred at the mouth of the Santa Clara River in Oxnard, Ventura, Simi Valley, and along the Santa Clara River between Fillmore and Newhall. Settlement and lateral spreading resulted in the rupture of an oil pipeline near the Interstate 5 crossing of the Santa Clara River, directly east of Ventura County. The rupture initiated an oil spill that contaminated large portions of the river downstream. Liquefaction also caused damage to two major aqueduct pipelines in Simi Valley, resulting in prolonged loss of water service in the Simi Valley area. Ground failure throughout Simi Valley caused numerous reported service line breaks, roadway and curb damage, and considerable damage to private and public property.

Location

The CGS has developed Seismic Hazard Zone Maps for portions of California. These maps show zones where liquefaction and landslides may occur during a strong earthquake. A new Seismic Hazard Zone Map was developed for Ventura County in 2003. Figure C-6 shows areas of Ventura County that are susceptible to liquefaction.

The Seismic Hazard Zone Maps were originally developed under the requirement of the Seismic Hazards Mapping Act of 1990, which directs CGS to delineate seismic hazard zones for public health and safety. CGS prepared these maps by considering topography, surface and subsurface geology, borehole data, historical ground-water levels, existing landslide features, slope gradient, rock-strength measurements, geologic structure, and probabilistic earthquake shaking estimates. A single earthquake or precipitation event capable of causing geologic hazard failures will not uniformly affect an entire zone area; conversely there may be areas outside the zones that have the potential for liquefaction or landslides that may not be identified.

Extent and Probability of Future Events

The potential for liquefaction in Ventura County is evident in flat areas that contain low-density, saturated, sandy soils. Extensive young gravel, sand, and silt deposits in the Oxnard Plain and along the Santa Clara River, shallow groundwater, and the presence of nearby potentially active faults suggest that nearly all of Ventura County is susceptible to liquefaction-related hazards. Because of the history of strong ground motions along active faults in the County, future events are likely to trigger liquefaction.

4.3.6.2 Landslide

Nature of Hazard

Landslide is a general term for the dislodging and fall of a mass of soil or rocks along a sloped surface or the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rock slides, debris avalanches, debris slides, and slump-earth flows.

Landslides can be earthquake-induced or non-earthquake induced. Earthquake-induced landslides occur as a result of ground shaking. The most common earthquake-induced landslides include shallow rock falls, disrupted rock slides, and disrupted slides of earth and debris. Non-earthquake induced landslides may involve a wide range of combinations of natural rock, soil, or artificial fill. The susceptibility of hillside and mountainous areas to non-earthquake induced landslides depends on variations in geology, topography, vegetation, and weather. They may also occur due to indiscriminate development of sloping ground or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions. Non-earthquake-induced landslides can often occur as a result of intense or prolonged precipitation that can saturate slopes and cause failures.

Disaster History

Landslides have occurred in areas along the Rincon Fault, hillsides south of the Santa Clara River, and the east side of the Ventura River. In recent years, the most damaging landslides in Ventura County have occurred in the coastal community of La Conchita, located just southeast of the Santa Barbara county line. La Conchita has been the site of multiple non-earthquake induced landslides.

La Conchita was built on ground that had been graded by the Southern Pacific Railroad after a 1909 landslide slid into the railroad tracks. The land was intended to be a buffer zone between the retreating and eroding cliff and the Pacific Ocean. However, it was subdivided into smaller residential lots in 1924. Along the bluff face above La Conchita, the upper portion of the bluff is underlain by two rock formations separated by the Red Mountain fault.

The bluff above La Conchita has been associated with a variety of landslide activity, with historical accounts dating back to 1865. More recently, two small slides occurred in 1988 and 1991, followed by large movements of the same landslide mass in 1995 and 2005. The 1995 landslide, which occurred 1 month after the heaviest rainfall of an extraordinarily wet year, was considered to be a deep, slow-moving landslide. This landslide destroyed nine houses. The January 2005 event was a shallow and highly fluid remobilization of the same material that carried a thick layer of dry, viscous material. This landslide, which occurred at the peak of an extremely wet 2-week period, killed 10 people and destroyed 13 homes. Approximately 400,000 tons of debris cascaded down the slope behind the La Conchita housing development. Historic landslide locations are shown on Figure C-6.

Location

As noted in Section 4.3.2, the Seismic Hazard Zone Map for Ventura County was developed by CGS in 2003 and shows earthquake-induced landslide hazard zones. These zones are shown on Figure C-6. CGS has not prepared maps for Ventura County that identify hazards associated with non-earthquake induced landslides. However, Ventura County has kept records of historical landslide areas, such as the La Conchita landslides. These areas are shown on Figure C-6 and are likely to be sites of recurring non-earthquake induced landslides.

Extent and Probability of Future Events

Slope instability throughout much of Ventura County is greatly related to the intensity of the past faulting and folding of strata, the weak rock and/or the clay content of certain sedimentary formations, and the subsurface moisture content. Landslides and potentially unstable slopes are especially common in weak rock formations in hillside areas underlain by sedimentary bedrock of the Pico, Santa Barbara, Monterey/Modelo, and Rincon formations. Many landslides are also associated with steep slopes that have been undercut by erosion (such as the several landslides that have occurred along the easterly side of Big Sycamore Canyon northeast of Point Mugu) and downslope inclination of bedding planes (such as in the Ventura Anticline area).

Despite the rugged physiography of the County's northern, mountainous areas, the strength of the older bedrock in these areas reduces the incidence of landsliding. Nonetheless, many hillsides and existing landslide features are only marginally stable; therefore, slight changes in conditions, whether temporary (such as earthquake ground motion or intense rainfalls) or more long-term (such as grading and irrigation), can trigger landsliding. In La Conchita, renewed landslide activity will most likely occur during or after future periods of prolonged or intense rainfall.

Because of the history of occurrence and the potential for landslides as a result of the conditions in the County, future events are likely to occur, based on historic landslides occurring about once every 10 years. The extent of future events is unknown, but could be similar to historic events: up to 400,000 tons or more of debris could be involved in one event.

4.3.7 Post-Fire Debris Flow

4.3.7.1 Nature of Hazard

The VCWPD's basins and dams play an important role in the control of floodwaters and sediment in Ventura County. The debris basins capture primarily sediment mobilized by stream and watershed erosion. Debris basins can also attenuate flood peaks if enough storage volume is available in the basin and depending on the design of the outlet works. Debris basins are designed primarily with outlet works and enough storage volume to significantly reduce flood peaks but can also capture sediment. If basin volumes or dam designs exceed certain state criteria, they are regulated as "state-size" basins by the DSOD. State-size basins store more than 50 acre-feet of water or have dams that are more than 25 feet tall and are inspected annually by DSOD. VCWPD's state-size basins are Arundell Barranca, Ferro, Lang Creek, Las Llajas Canyon, Runkle Canyon, Stewart Canyon Creek, and Sycamore Canyon Basins (see Table 4-4).

Wildfires are a common occurrence in the hills and mountainous regions of Ventura County. By reducing or destroying vegetative cover and altering soil characteristics, fires often result in conditions that can significantly increase runoff and erosion when winter rains begin to fall. These conditions may result in a debris flow (also referred to as mud flow), which is a slurry of water, sediment, and rock that converges in a stream channel.

The threats of erosion, flooding, and debris flows are significantly increased by the following processes:

- **Reduced infiltration and increased runoff:** A fire's consumption of vegetative cover increases exposure of the soil surface to raindrop impact. Soil heating destroys organic matter that binds the soil together. Extreme heating may also cause the development of water-repellant, or "hydrophobic," soil conditions that further reduce infiltration.
- **Changes in hill slope conditions:** Fires remove obstructions to overland flow, such as trees, downed timber, and plants, increasing flow velocity and therefore erosive power. Increased sediment movement also fills depressions, reducing storage capacity and further contributing to increased velocity and volume of flow. These factors combine to allow more of the watershed to contribute flow to the flood at the same time, increasing the volume of the flood.
- **Changes in channel conditions:** Increased overland flow and sediment transport result in increased velocity and volume of flow in defined channels. Channel erosion increases, as do peak discharges.

The occurrence of erosion, floods, and debris flows in burned areas is also dependent on precipitation intensity—storms with high intensity are more likely to initiate the processes described above and result in flood events. Additionally, easily eroded soils facilitate changes in hill slope conditions and increase the volume of runoff. Both of these conditions are likely to occur in Ventura County.

In extreme situations, the conditions described above combine to form a debris flow. These flows are often the most destructive events resulting from heavy rainfall in fire-affected areas. They occur with little warning, carry vast quantities of rock and other material, and strike objects with extreme force. Because of their viscosity and density, debris flows can move or carry away objects as large as vehicles and bridges, and they may travel great distances down canyons and stream valleys. Debris flow fronts may also travel at high speeds, exceeding 50 miles per hour. In most cases, only large basins designed specifically to trap these flows are capable of resisting the forces that accompany them. Table 4-7 lists the debris and detention basins owned by the County.

Table 4-7. Summary of Debris and Detention Basin Data for Facilities Owned by the Ventura County Watershed Protection District

Zone	Basin Name	State-Size Dam (Y/N)	Watershed Area (acres)	Maximum Debris Storage Capacity (cubic yards)	Annual Sediment Production (cubic yards)	Expected Debris Production for 100-Year Storm (cubic yards)
1	Dent Debris Basin	N	19	4,100	263	1,624
	Live Oak Diversion Dam	N	794	45,527	NA	20,952
	McDonald Canyon Detention Basin	N	573	32,393	NA	20,179
	Stewart Canyon Creek Debris Basin	Y	1,266	104,215	2,781	209,000
2	Adams Barranca Debris Basin	N	5,387	72,023	3,792	149,00
	Arundell Barranca Detention Basin	Y	1,754	223,150	5,308	22,576
	Cavin Road Debris Basin	N	90	4,100	362	13,413
	Fagan Canyon Debris Basin	N	1,856	72,000	4,800	104,600
	Franklin Barranca Debris Basin	N	330	5,050	890	11,507
	Jepson Wash Debris Basin	N	858	33,850	3,953	55,800
	Real Wash Debris Basin	N	160	22,000	5,225	11,500
	Warring Canyon Debris Basin	N	695	33,100	5,962	52,400
3	Castro Williams Debris Basin	N	330	58,403	NA	8,599
	Coyote Canyon Debris Basin	N	4,400	24,500	2,938	152,459
	Crestview Debris Basin	N	80	2,350	100	1,005
	Edgemore Debris Basin	N	105	2,950	276	1,188
	Erringer Road Debris Basin – Upper	N	315	33,250	900	11,633
	Ferro Debris Basin	Y	395	34,500	451	7,758
	Fox Barranca Debris Basin	N	3,100	14,700	3,060	99,181
	Gabbert Canyon Debris Basin	N	2,350	16,300	4,742	56,900
	Honda West Debris Basin	N	740	10,350	129	55,662
	Line "C" Arroyo Simi Detention Basin	N	766	16,330	NA	12,956
	Lang Creek Debris Basin	N	2,325	26,942	NA	22,052
	Lang Creek Detention Basin	Y	2,352	425,270	NA	0

Table 4-7. Summary of Debris and Detention Basin Data for Facilities Owned by the Ventura County Watershed Protection District

Zone	Basin Name	State-Size Dam (Y/N)	Watershed Area (acres)	Maximum Debris Storage Capacity (cubic yards)	Annual Sediment Production (cubic yards)	Expected Debris Production for 100-Year Storm (cubic yards)
3	Las Llajas Canyon Detention Dam	Y	4,384	2,017,000	15,200	190,983
	Las Posas Estates Detention Basin	N	168	24,684	655	1,018
	Peach Hill Wash Retention Basin	N	1,589	121,950	350	4,541
	Ramona Detention Dam	N	254	41,230	284	3,732
	Runkle Canyon Detention Basin	Y	958	161,000	3,200	41,613
	Santa Rosa Road Debris Basin No. 2	N	1,101	49,000	612	12,505
	South Branch Arroyo Conejo Debris Basin	N	2,542	50,417	10,000	100,850
	St. John's Debris Basin (to be transferred)	N	240	50,000	NA	2,849
	Sycamore Canyon Dam	Y	4,380	106,460	1,000	59,260
	Tapo Hills No. 1 Detention Basin	N	104	41,190	440	5,730
	Tapo Hills No. 2 Debris Basin	N	133	25,200	NA	4,000
	West Camarillo Hills East Branch Debris Basin	N	92	1,840	183	1,432
	West Camarillo Hills West Branch Debris Basin	N	74	5,250	1,103	1,268
4	Potrero Creek Sediment Control Basin	N	1,541	5,628	NA	10,340

Source: VCWPD 2005.

4.3.7.2 Disaster History

Evidence of debris-flow movement was widespread following the 1969 storms throughout the mountain ranges in Ventura County. Debris flows occurred in numerous watersheds, including Cozy Dell Canyon, Stewart Canyon, Senior Canyon, Orcutt Canyon, Jepson Wash, and others. Mudflows also occurred in 1969 and 1971 in watersheds that were underlain by fine-grained sedimentary rocks and had been more recently burned by wildfires near Ojai. Witnesses to the mudflows described surges of what appeared to be mud covered with water behind a moving boulder.

In recent years, post-fire debris flows have occurred in neighboring counties, most recently after the 2003 wildfires that burned over 700,000 acres in southern California. Following the wildfires, a storm on Christmas Day 2003 dropped several inches of rain in a short period of time in the San Gabriel and San Bernardino mountain ranges in San Bernardino County (approximately 80 miles east of Ventura County). The rainfall caused widespread occurrence of debris flows, including a 15-foot high wall of water and debris in Waterman Canyon that killed 16 people. Fifty-two homes were damaged and losses of residential and commercial buildings and infrastructure were estimated to be $38 million.

4.3.7.3 Location

Portions of Ventura County that have been subject to wildfires are susceptible to potentially hazardous debris flows. Areas susceptible to debris flow include localities that are adjacent to and downslope of these burn areas, especially in locations that are in ravines and canyons and at the mouths of canyons.

Figures C-7, C-8, and C-9 show debris basin areas of concern for post-fire debris flow.

4.3.7.4 Extent and Probability of Future Events

A comprehensive, watershed-by-watershed analysis of debris flow hazards is not available. However, an exposure analysis was conducted with consideration of existing analyses performed by the VCWPD and the locations of existing basins designed to reduce the threat from debris flow hazards.

The VCWPD uses a computer program called SCOTSED to determine debris quantities and bulked flow estimates for design storms. SCOTSED relies on an equation generated through multiple linear regressions of channel cleanout data with rain gage data and parameters representing watershed characteristics to estimate the expected debris load from a watershed. The SCOTSED parameters include the following:

- **Fire factor:** Represents the condition of a watershed after a burn; VCWPD design standards assume that a debris basin is designed to receive debris 4.5 years after a burn occurs. After a burn, it is assumed that 6 months will elapse before a major storm occurs.
- **Slope failure:** Represents the area of identified unstable slopes and soils in a watershed expected to yield significant quantities of sediment.
- **Elongation ratio:** Geometric factor that accounts for the shape of the watershed (long and narrow, with relatively short overland flow paths versus short and broad with relatively long overland flow paths).
- **Rainfall factor:** Generated using the 24-hour precipitation for a design storm to represent the peak rainfall that occurs and the 10-day total rainfall that occurs to represent the antecedent moisture conditions.

SCOTSED also calculates the increase in peak runoff rates due to bulking of the flow based on data the VCWPD obtained from Los Angeles County. Because the SCOTSED algorithm was developed using volumes of deposited suspended and bedload material, it does not include an estimate of the wash load quantity. The increase in peak runoff rates due to bulking based on these data range from an average of 40 to 60 percent.

To reduce the threat posed by debris flows in the hills and mountainous areas, the VCWPD (and its predecessor, the Ventura County Flood Control District), Federal agencies, and private landowners have constructed a network of debris basins in the canyons and stream valleys above populated areas. The basins that VCWPD operates are listed in Table 4-7. These basins are designed to trap sediment and rock before it reaches populated areas or clogs downstream channels, bridges, and culverts. The VCWPD periodically removes accumulated debris from its basins when the debris storage reaches 25 percent of the estimated 100-year debris inflow. Aerial topography of the basins is obtained every year, and the current debris contours are compared to the design basin elevations to generate an estimate of the debris storage and compare it to the 100-year estimate. Current VCWPD design standards require a basin to have enough storage to hold 125 percent of the estimated 100-year debris inflow so that it can reach the 25 percent storage level and still have sufficient space for the expected 100-year debris flow.

To develop debris flow hazard information that could be used for the risk assessment in this HMP, the following information was considered:

- The level of wildfire risk
- The potential for slope failure
- The existence of development in downstream areas
- The existence of VCWPD-operated debris basins and whether those basins are adequate to provide protection during the occurrence of a 100-year event. As shown in Table 4-7, 10 VCWPD basins may not have adequate capacity to contain debris produced during a 100-year event.

Extent of future occurrences is likely similar to past occurrences. The most recent fires which had the potential of leading to a sizable amount of post-fire debris were the Piru and Semi wildfires of 2003. The VCWPD used SCOTSED to evaluate potential debris production following these two wildfires. The predicted bulking factors for the analyzed watersheds ranged from an average increase of 42 percent at the lower storm recurrence intervals to an average increase of 54 percent for the 100-year storm. The average increase in sediment yield from the watersheds at all design storm levels from the SCOTSED program was 160 percent. For example, the 100-year peak flow for the Pole Creek watershed tributary to the Santa Clara River was estimated to increase from 5,740 to 9,930 cfs due to bulking, and the 100-year sediment yield from the watershed was estimated to increase from 173,600 to 485,400 cubic yards due to the burn. The 100-year peak flow for the Tapo Canyon watershed tributary to Arroyo Simi was estimated to increase from 3,469 to 5,342 cfs due to bulking, and the 100-year sediment yield from the watershed was estimated to increase from 149,100 to 436,300 cubic yards. Because the winter of 2003–2004 was drier than normal, significant debris flows did not occur. However, these analyses demonstrate the significant increase in the risk and the extent of a damaging event after an extensive wildfire.

Ventura County has a long history of flooding and wildfires which are two major factors in occurrence of post-fire debris flow. However, because a number of complex factors lead to debris flow (rainfall, wildfire, and slope and soil conditions), the probability of post-fire debris flow in Ventura County is unknown.

4.3.8 Severe Winter Storm

4.3.8.1 Nature of Hazard

The climate on California's southern coast is hot Mediterranean, in which summers are hot and dry and winters are cool and damp. A dominating factor in the weather of California is the semi-permanent high pressure area of the North Pacific Ocean, sometimes called the Pacific High. This pressure center moves northward in summer, holding storm tracks well to the north, and as a result California receives little or no precipitation during that period. The Pacific High decreases in intensity in winter and moves farther south, permitting storms to move into and across the state and producing high winds, widespread rain at low elevations, and snow at high elevations. Occasionally the state's circulation pattern permits a series of storm centers to move into California from the Southwest. This type of storm pattern is responsible for occasional heavy rains that can cause serious winter flooding. From mid-autumn to mid-spring is the rainy season. During these months, winter storms may occur.

In addition to high winds and flooding, winter storms may bring hail and/or lightning to all areas of the County. Winter storms can also bring extended periods of freezing temperatures, which can cause damage to agricultural crops and lead to farming losses and loss of jobs.

4.3.8.2 Disaster History

Ventura County was included in the Presidential Disaster Declarations for freezing or severe winter storms that occurred in December 1998 and January 2007. The 1998 freeze was particularly damaging to citrus crops.

A review of the National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center (NCDC) database reveals that, although not considered disasters, 71 storms causing high winds occurred in Ventura County between 1996 and 2010. These storms included wind speeds of up to nearly 100 miles per hour, and in rare cases, the storms caused deaths or injuries. Storms with high winds also knocked down trees and power lines.

Also according to the NCDC database, 51 winter storms causing snow and ice have occurred in Ventura County since 1996. Some of the storms also caused hail; in addition, four hailstorms have been recorded in Ventura County since 1987, with reported hail of up to 1.5 inches in diameter.

4.3.8.3 Location

Many events in the NCDC database described above affected all of Ventura County. The entire County is susceptible to winter storms and damage from wind. However, only the higher elevation areas (typically at or above 4,000 to 5,000 feet) experience snowfall, while lower elevation areas experience heavy rains. Hail has occurred throughout the county.

4.3.8.4 Extent and Probability of Future Events

A storm can cause high rains, flooding, up to 18 inches of snow at the highest elevations in the County (e.g., Mount Pinos), and wind speeds of up to 70 miles per hour. Hail of up to 1.5 inches in diameter has been recorded. Based on recent history, severe winter storms occur every year, but those causing injury or damage occur about once every 10 years.

4.3.9 Tsunami

4.3.9.1 Nature of Hazard

A tsunami is a series of traveling ocean waves of extremely long length generated by disturbances associated primarily with earthquakes occurring below or near the ocean floor. Subduction zone earthquakes at plate boundaries often cause tsunamis. However, tsunamis can also be generated by submarine landslides, submarine volcanic eruptions, the collapse of volcanic edifices, and in very rare instances, large meteorite impacts in the ocean.

In the deep ocean, the length of a tsunami from wave crest to wave crest may be a hundred miles or more but have a wave height of only a few feet or less. Thus, the wave period can be up to several hours and wavelengths can exceed several hundred miles. Thus, tsunamis are unlike typical wind-generated swells on the ocean, which might have a period of about 10 seconds and a wavelength of up to 300 feet. Tsunamis cannot be felt aboard ships nor can they be seen from the air in the open ocean. In deep water, the waves may reach speeds exceeding 700 miles per hour.

Tsunamis reaching heights of more than 100 feet have been recorded. As a tsunami wave approaches the shallow coastal waters, it appears normal and its speed decreases. Then as the tsunami nears the coastline, it may grow to great height and smash into the shore, causing much destruction.

Tsunamis not only affect beaches that are open to the ocean, but also bay mouths, tidal flats, and the shores of large coastal rivers. Tsunami waves can also diffract around land masses. Since tsunamis are not symmetrical, the waves may be much stronger in one direction than another, depending on the nature of the source and the surrounding geography. However, tsunamis do propagate outward from their source, so coasts in the shadow of affected land masses are usually fairly safe.

Tsunamis can originate hundreds or even thousands of miles away from coastal areas. Local geography may intensify the effect of a tsunami. Areas at greatest risk are less than 50 feet above sea level and within one mile of the shoreline. Tsunamis arrive as a series of successive "crests" (high water levels) and "troughs" (low water levels). These successive crests and troughs can occur anywhere from 5 to 90 minutes apart. They usually occur 10 to 45 minutes apart.

Tsunami run-up occurs when a peak in the tsunami wave travels from the near-shore region onto shore. Run-up is usually expressed in meters above normal high tide. Except for the largest tsunamis, such as the 2004 Indian Ocean event, tsunamis generally do not result in giant breaking waves (like normal surf waves at the beach that curl over as they approach shore). Rather, they come in much like very strong and fast-moving tides (i.e., strong surges and rapid changes in sea level). Much of the damage inflicted by tsunamis is caused by strong currents and floating debris. Tsunamis often travel much farther inland than normal waves. Most deaths during a tsunami are a result of drowning. Associated risks include flooding, polluted water supplies, and damaged gas lines.

4.3.9.2 Disaster History

According to the NOAA National Geophysical Data Center Website, 13 tsunami run-ups have been recorded or observed on the Ventura County coastal area since 1812. More information about tsunami run-ups is provided in Table 4-8.

Table 4-8. Past Tsunami Run-ups in Ventura County

Year	Location	Tsunami Cause	Water Height (feet)
1812	City of Ventura	Earthquake and Landslide	6.5
1941	Port Hueneme	Earthquake	—
1944	Port Hueneme	Earthquake	0.36
1946	Port Hueneme	Earthquake	2.6
1946	City of Ventura	Earthquake	—
1952	Port Hueneme	Earthquake	0.36
1952	Port Hueneme	Earthquake	2.2
1957	Port Hueneme	Earthquake	1.7
1958	Port Hueneme	Earthquake	0.33
1960	Port Hueneme	Earthquake	4.4
1964	City of Ventura	Earthquake and Landslide	—
1964	Oxnard	Earthquake and Landslide	—

Source: NCDC 2010.
— = no data available

Data regarding property damage, deaths, or injuries for these tsunami run-ups are not available, except for the 1960 tsunami at Port Hueneme, in which the value of the damage was listed as less than $1 million.

In April 2010; a major earthquake off the coast of Chile generated a tsunami; the effects of the tsunami in Ventura County were felt approximately 12 hours after the earthquake. A rapid change in sea level caused in excess of $ 200,000 damage to structures and vessels in Ventura Harbor.

4.3.9.3 Location

Figure C-10 shows a tsunami inundation map prepared by the CGS. This map illustrates coastal land areas that can become submerged due to tsunami run-up. The area of land subject to inundation is a factor of:

- Distance of shoreline from the tsunami generating event
- Magnitude of the earthquake causing the event; duration and period of waves
- Run-up elevations
- Tidal level at time of occurrence

- Location along shore and direction of shore in respect to propagated waves
- Topography of the seabed

4.3.9.4 Extent and Probability of Future Events

Tsunamis that reach the California coast can be caused by local or distant sources. Local sources include local earthquakes and landslides off the California, Oregon, and Washington coasts. However, earthquakes off the southern California coast (south of Cape Mendocino) take place mainly on strike-slip faults, and because the movement they generate is mostly lateral, tsunamis from local sources are less likely to occur in Ventura County because the ocean floor and overlying water is not typically thrust upward.

The primary tsunami threat along the southern California coast is from distant source earthquakes elsewhere in the Pacific basin, including South America. For example, the magnitude 9.5 earthquake in Chile in 1960, the largest earthquake ever recorded, resulted in a 1.6-meter (5.2-foot) wave that reached Santa Monica about 14 hours after the earthquake.

Based on the history of tsunami run-ups in the region and the history of earthquakes in the Pacific Rim, another tsunami event is likely to occur. Historical data show that tsunamis tend to occur about once every 17 years on average, although there have been no recorded run-ups since 1964 according to the NOAA National Geophysical Data Center. The average water height of the past run-ups is 27 inches. The extent of tsunami run-ups that may occur in the future can be similar to past tsunami run-ups, or higher if the run-ups are due to a tsunami caused by an extremely large earthquake.

4.3.10 Wildfire

4.3.10.1 Nature of Hazard

A wildfire is an uncontrolled fire that spreads through consumption of vegetation. Wildfires often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may be visible from miles around. Wildfires can be human-caused by arson or campfires or can be caused by natural events such as lightning. Wildfires can be categorized into four types:

- **Wildland fires** occur mainly in areas under Federal control, such as national forests and parks, and are fueled primarily by natural vegetation.
- **Interface or intermix fires** occur in areas where both vegetation and structures provide fuel. These are also referred to as urban-wildland interface fires.
- **Firestorms** occur during extreme weather (typically high temperatures, low humidity, and high winds) with such intensity that fire suppression is virtually impossible. These events typically burn until the conditions change or the fuel is exhausted.
- **Prescribed fires and prescribed natural fires** are intentionally set or natural fires that are allowed to burn for beneficial purposes.

The following three factors contribute significantly to wildfire behavior, and as described more fully below, these factors can be used to identify wildfire hazard areas:

- **Topography:** As slope increases, the rate of wildfire spread increases. South-facing slopes are also subject to greater solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridgetops may mark the end of wildfire spread because fire spreads more slowly or may even be unable to spread downhill.
- **Fuel:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildfires. Certain types of plants are more susceptible to burning or burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"); the ratio of living to dead plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel's continuity is also an important factor, both horizontally and vertically.
- **Weather:** The most variable factor affecting wildfire behavior is weather. Variables such as temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. By contrast, cooling and higher humidity often signals reduced wildfire occurrence and easier containment. Years of precipitation followed by warmer years tend to encourage more widespread fires and longer burn periods. Also, since the mid 1980s, earlier snowmelt and associated warming due to global climate change has been associated with longer and more severe wildfire seasons in the western United States.

If not promptly controlled, wildfire may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. It is also important to note that in addition to affecting people, wildfire may severely affect livestock and pets. Such events may require the emergency watering/feeding, shelter, evacuation, and even burying of animals.

Wildfires can have serious effects on the local environment. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways and the land itself. Soil exposed to intense heat may lose its capacity to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thereby enhancing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards, as described above. Wildfires can also greatly affect the air quality of the surrounding area.

4.3.10.2 Disaster History

Wildfires are a common occurrence in Ventura County. From 1953 to 2009, 72 wildfires, each with an extent greater than 1,000 acres, occurred in Ventura County (see Table 4-9). 24 of the fires burned more than 10,000 acres. In more recent years, wildfires have been among the largest ever recorded, but they have also been less detrimental to infrastructure and emergency responders. In October 2007, the Ranch fire burned just over 58,000 acres, and the Day fire of September 2006 was responsible for almost 163,000 burned acres; one home was destroyed and no injuries have been recorded. In comparison, in October 2003, the Piru fire burned almost 64,000 acres and the Simi Valley fire burned over 108,000 acres. These fires destroyed 40 homes and injured over 40 people.

Table 4-9. Ventura County Fires of Over 1,000 Acres, 1953–2009

Name	Start Date	Acres Affected*	Name	Start Date	Acres Affected*
Ventu Park	11/55	13,840	Peach Hill	10/85	1,861
Hoffman (Red Mtn.)	08/55	1,200	Pioneer	10/85	1,238
Sexton Canyon	12/56	2,500	South Tapo	10/85	16,995
Little Sycamore	12/56	1,617	Ferndale	10/85	47,064
Lake Sherwood	12/56	7,747	Rock Peak	10/85	1,983
Conejo Grade	06/57	1,000	Fish	10/87	4,341
Santa Susana Pass	07/57	1,482	Peppertree (Control)	11/87	1,088
Boulder Creek	08/57	3,987	Hall-Barlow (Control)	05/88	2,227
Calumet Canyon	10/58	17,000	Piru	09/88	12,068
Broome Ranch	11/59	1,350	Kuehner	09/88	3,761
Doncon & Fletcher	1/61	2,700	Pacific	10/89	3,153
Culbert Lease	12/62	5,525	Los Padres	1991	2,849
Warring Canyon	08/67	3,808	Broome Ranch (Control)	07/92	1,310
Sence Ranch	10/67	17,431	Green Meadow	10/93	38,477
Ditch Road	10/67	11,20	Steckel	10/93	27,088
Parker Ranch	10/67	25,000	Dragnet	10/93	1,962
Timber Canyon	10/67	11,448	Wheel	10/93	1,475
Torrey Canyon	11/69	1,800	Boundary 1	07/95	1,010
Ventura City Foothill	09/70	5,241	Aliso II	11/96	1,200
Mayo Brush	09/70	4,390	Sexton II (Control)	09/96	1,273
Goodenough Road	10/71	2,100	Grand	07/96	10,949
Potrero	09/73	12,214	Hopper (Control)	08/97	1,500
Sence Ranch	09/73	1,008	Hopper	08/97	24,793
South Mountain	11/75	6,500	Piru	10/98	12,613
Potrero	12/75	2,773	Ranch	12/99	4,371
Los Robles	06/76	2,000	Leslie (Control)	06/99	1,087
Santa Susana	09/79	1,003	Bradley	12/99	3,332
Creek Road	09/79	32,000	Holser	07/99	2,525
Hill Canyon	10/80	8,700	Piru	10/03	63,991
South Mountain	10/80	3,600	Simi Valley	10/03	108,204
Loma	06/81	1,331	Topanga	09/05	24,175
Oat Mountain	10/81	6,005	School	11/05	3,891
Matilija	7/83	4,600	Day	09/06	162,702
Grimes	5/84	11,164	Shekell	12/06	13,600
Squaw Flat	10/84	6,010	Ranch**	10/07	58,401
Wheeler	7/85	118,000	Guiberson	09/09	17,500
Black Mountain	7/85	1,025			

Source: Cal FIRE 2010.
Control = controlled burn
*Acres affected = total acreage
** Fire occurred in both Ventura and Los Angeles counties.

4.3.10.3 Location

Public Resources Code 4201-4204 and Government Code 51175-89 directed Cal FIRE to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones are referred to as Fire Hazard Severity Zones and represented as very high, high and moderate. Specifically, the maps were created using data and models describing development patterns, potential fuels over a 30-50 year time horizon, expected fire behavior, and expected burn probabilities. The maps are divided into "local responsibility areas" and "state responsibility areas". Local responsibility areas generally include cities, cultivated agriculture lands, and portions of the desert. Local responsibility area fire protection is typically provided by city fire departments, fire protection districts, counties, and by Cal FIRE under contract to the local government. State responsibility area is a legal term defining the area where the State has financial responsibility for wildfire protection. Incorporated cities and Federal ownership are not included. The prevention and suppression of fires in all areas that are not state responsibility areas are primarily the responsibility of Federal or local agencies.

Figure C-11 displays the areas of Ventura County most susceptible to wildfires. Within the County, zones of very high fire hazard severity are located in mountainous or hillside areas (west of Lake Casitas, northeast of Ojai, north of Fillmore, and surrounding Thousand Oaks and Simi Valley) where the greatest fuel density exists as well as throughout much of the County's large agricultural and cattle-grazing areas. Although these areas are not heavily populated, they are near populated communities.

4.3.10.4 Extent and Probability Future Events

The climate in Ventura County is characterized as Mediterranean dry-summer featuring cool, wet winters and warm, dry summers. High moisture levels during the winter rainy season significantly increase the growth of plants. However, the vegetation is dried during the long, hot summers, decreasing plant moisture content and increasing the ratio of dead fuel to living fuel. As a result, fire susceptibility increases dramatically, particularly in late summer and early autumn. In addition, the presence of chaparral, a drought-resistant variety of vegetation that is dependent on occasional wildfires, is expected in Mediterranean dry-summer climates. Also, the history of plant succession in Ventura County is important in predicting fire susceptibility. For several years after a fire has occurred, easily flammable herbaceous species predominate and increase the likelihood of new fires. When woody species become re-established, they contribute to a lower overall level of fire susceptibility for approximately 10 years. However, after this period, the slow aging plant community becomes ever more likely to burn because of increased levels of dead plant material and lowered plant moisture levels.

In addition, the local meteorological phenomenon known as the Santa Ana winds contributes to the high incidence of wildfires in Ventura County. These winds originate during the autumn months in the hot, dry interior deserts to the north and east of Ventura County. They often sweep west into the County, bringing extremely dry air and high wind speeds that further desiccate plant communities during the period of the year when the constituent species have very low moisture content. The effect of these winds on existing fires is particularly dangerous; the winds can greatly increase the rate at which fires spread.

Based on the conditions described above and the history of occurrence in the past, future events are very likely to occur. In the past, fires burning over 1,000 acres have occurred about every 1-3 years. The extent of future events will depend on specific conditions at the time of the fire.

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5.1 VULNERABILITY ANALYSIS OVERVIEW

A vulnerability analysis predicts the extent of exposure that may result from a hazard event of a given intensity in a given area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage.

Per the local mitigation planning requirements, this vulnerability analysis consists of the following seven steps:

- Asset inventory
- Methodology
- Data limitations
- Exposure analysis
- RL and SRL properties
- Summary of impacts

Tables that support the asset inventory, exposure analysis, RL properties, and summary of impacts are provided in each local-participant-specific appendix (Appendix G through Appendix X).

5.2 ASSET INVENTORY

Assets that were included in this HMP's vulnerability analysis are as follows:

- Population (for the unincorporated area of Ventura County and the participating cities)
- Residential building stock (for the unincorporated area of Ventura County and the participating cities)
- RL properties (for the County of Ventura, the City of Oxnard, the City of Santa Paula, the City of Thousand Oaks, and the City of Ventura)
- Critical facilities and infrastructure:
  - Government facilities for Ventura County and participating cities
  - Community facilities, including libraries, community centers, and parks
  - County jails
  - Emergency response facilities, including police and fire stations
  - Public hospitals and medical clinics
  - Public utilities, including pump stations, electric substations, potable water facilities, wastewater facilities, wells, dams, reservoirs, debris basins hydrostations, meter stations, and stream and river gages (including those used for emergency warnings)

- Educational facilities, including school buildings and district offices
- Transportation infrastructure, including airports, transit stations, and County-maintained bridges

The total assets inventoried for each local participant are located within the first table of each local-participant-specific appendix (Appendix G through Appendix X).

5.3 METHODOLOGY

A conservative exposure-level analysis was conducted to assess the risks associated with the identified hazards. This analysis is a simplified assessment of the potential effects of the hazards on values at risk without consideration of the probability or level of damage.

Population and residential building information was derived from HAZUS data at the census block level. HAZUS stands for HAZards United States, and is a geographic information system-based natural hazard loss estimation software package developed and distributed by FEMA. Counts and values per census block come from the 2000 Census. In cases in which the census blocks did not exactly match with city boundaries, a manual process was used to better match population and residential buildings to each city. Population and residential building vulnerability was determined through a combination of spatial overlay, and proportional analysis if only part of the census block was affected by the hazard.

The list of critical facilities and infrastructure came from a combination of HAZUS-provided facilities and infrastructure and participant-provided facilities information. The only HAZUS-provided critical facilities and infrastructure used were ones that are directly relevant to the plan. Some of the HAZUS data were modified using an aerial photo to improve the accuracy of their locations. Participant-provided facilities and infrastructure were submitted with either a full street address, latitude and longitude coordinates, or with a verbal description of the location of the facility (e.g., ½ mile west of an intersection). Facilities and infrastructure with a full street address were located through address matching (geocoding) in GIS. Addresses that didn't match were located through Google Earth and then imported into the GIS database. The accuracy of the point location for a critical facility or infrastructure will vary depending on the method used. For example, the latitude and longitude coordinates are very precise, while the address match is less precise. Critical facility point locations were overlaid onto each hazard to determine vulnerability.

If the location representing the asset fell within a hazard area, it was counted as impacted. Estimated replacement values were provided by each local participant, if available. If not available, the estimated replacement value was taken from HAZUS for the type or category of facility.

For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). The aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

5.4 DATA LIMITATIONS

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment as well as the use of approximations and simplifications that are necessary for a comprehensive analysis.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, and assets to the identified hazards. It was beyond the scope of this HMP update to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the HMP.

5.5 EXPOSURE ANALYSIS

The recommendations for identifying structures and estimating potential losses, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 RECOMMENDATIONS: RISK ASSESSMENT

Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA 2008.

Vulnerable population and existing structures, including residential buildings and critical facilities and infrastructure, at risk to each identified hazard are located in each local-participant-specific appendix (Appendix G through Appendix X). For Ventura County and the participating cities, the exposure analysis was prepared for population, residential buildings, and critical facilities and infrastructure. In addition, for Ventura County and the City of Oxnard, the City of Santa Paula, the City of Thousand Oaks, and the City of Ventura, RL properties are also included in each local participant's analysis. The analysis for each Special District included only the critical facilities and/or infrastructure owned or maintained by the Special District.

DMA 2000 RECOMMENDATIONS: RISK ASSESSMENT
Assessing Vulnerability: Estimating Potential Losses
Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.
Element
▪ Does the new or updated plan estimate potential dollar losses to vulnerable structures?
▪ Does the new or updated plan reflect changes in development in loss estimates?
▪ Does the new or updated plan describe the methodology used to prepare the estimate?
Source: FEMA 2008.

The estimated potential dollar losses for residential buildings and critical facilities and infrastructure at risk to each identified hazard are shown in each local-participant-specific appendix (Appendix G through Appendix X). As noted previously, estimated values were provided by the local jurisdiction or HAZUS software, if available. The methodology used to prepare the estimate is described in Section 5.3.

5.6 RL PROPERTIES

The requirements for addressing RL properties, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: RISK ASSESSMENT
Assessing Vulnerability: Addressing Repetitive Loss Properties
Requirement §201.6(c)(2)(ii): [The risk assessment] must address NFIP-insured structures that have been repetitively damaged by floods.
Element
▪ Does the new or updated plan describe vulnerability in terms of the types and numbers of Repetitive Loss properties located in the identified hazard areas?
Source: FEMA 2008.

There are 61 RL properties, including 3 SRL properties, located in the unincorporated area of Ventura County, 6 RL properties in the City of Oxnard, 3 RL properties in the City of Santa Paula, 3 RL properties in the City of Thousand Oaks, and 4 RL properties in the City of Ventura. The majority of these properties are single family homes. A few of the properties are 2-4 family homes and multifamily condos.

Information about each RL property, including occupancy type, flood insurance status, flood zone, and number of losses, is located in the local-participant-specific appendix for Ventura County (Appendix G) and the cities of Oxnard (Appendix K), Santa Paula (Appendix M), Thousand Oaks (Appendix N), and Ventura (Appendix O). A RL property map is provided in Appendix C, Figure C-12. This information was obtained using FEMA's SQANet dated April 30, 2010. The VCWPD, the NFIP coordinator for Ventura County, has made revisions to the RL property data for the county, based on the new DFIRM. These revisions have been incorporated into this plan.

5.7 SUMMARY OF IMPACTS

The requirements for an overview of the vulnerability analysis, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: RISK ASSESSMENT

Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Element

- Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?
- Does the new or updated plan address the impact of each hazard on the jurisdiction?

Source: FEMA 2008.

The summary of impacts (i.e., percentage at risk) for the population, residential buildings, and critical facilities and infrastructure at risk to each identified hazard are shown in each local-participant specific appendix (Appendix G through Appendix X) for Ventura County and each participating city. For special districts, the analysis only includes the critical facilities owned or maintained by the Special District.

Based on the 2010 HMP's hazard analysis and vulnerability analysis as well previous State and Presidential Disaster Declarations in Ventura County, the County is most vulnerable to earthquakes, coastal and riverine flood hazards, geologic hazards, and wildfire hazards.

- Nearly the entire County is located within high and extreme shaking hazard areas. The extreme shaking hazard areas include the central and northern portions of Ventura County, where all but three cities (Simi Valley, Thousand Oaks, and Port Hueneme) are located. As a result, the intense shaking that the County could experience may compromise modern buildings and infrastructure.
- Riverine and coastal flooding is prevalent within the three Ventura County watersheds (Ventura River, Santa Clara River, and Calleguas Creek) and along the county's coastline. Ventura County and all of the cities have SFHAs. However, flood risks are minimal in the cities of Ojai, Thousand Oaks, and Ventura.
- All but the three watershed areas are susceptible to landslide hazards. These hilly or mountainous areas include the northern, eastern, and southern portion of the County, including portion of the cities of Fillmore, Moorpark, Ojai, Santa Paula, Simi Valley, Thousand Oaks, and Ventura. The watersheds, and specifically the broad coastal plains, are susceptible to liquefaction. Only a very small portion of the cities of Ojai and Thousand Oaks are susceptible to liquefaction while several areas if not all areas of the other cities are susceptible to liquefaction.
- Very high fire hazard areas are located in mountainous or hillside areas of the Los Padres National Forest in the northern half of the County and throughout much of the County's large agricultural and cattle-grazing areas in the eastern and southern portions of the County. Although these wildfire hazard areas are not heavily populated, the majority of the cities

(with the exception of Camarillo, Oxnard, and Port Hueneme) and several towns within the unincorporated County are located along the wildland urban interface, where the built environment meets the wildland.

6.1 CAPABILITY ASSESSMENT OVERVIEW

A capability assessment is not required by the DMA 2000 for local jurisdictions and special districts. However, it is recommended by CalEMA. A capability assessment identifies and evaluates the human and technical, financial, and legal and regulatory resources available for hazard mitigation, and describes the current, ongoing, and recently completed mitigation projects.

6.2 CALEMA CAPABILITY ASSESSMENT RECOMMENDATIONS

The recommendations for developing a local capability assessment, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 RECOMMENDATIONS: LOCAL CAPABILITY ASSESSMENT

Local Capability Assessment
Element

- Does the new or updated plan provide a description of the human and technical resources available within this jurisdiction to engage in a mitigation planning process and to develop a local hazard mitigation plan?
- Does the new or updated plan list local mitigation financial resources and funding sources (such as taxes, fees, assessments or fines) which promote mitigation within the reporting jurisdiction?
- Does the new or updated plan list local ordinances which affect or promote disaster mitigation, preparedness, response, or recovery within the reporting jurisdiction?
- Does the new or updated plan describe the details of in-progress, ongoing, or completed mitigation projects and programs within the reporting jurisdiction?

Source: FEMA 2008.

Similar to the 2005 HMP, the human and technical, financial, and legal and regulatory resources are discussed in each local-participant-specific appendix (Appendix G through Appendix X). In addition, the 2010 HMP lists the current, ongoing, and completed mitigation projects and programs. This information can also be found in each local-participant-specific appendix (Appendix G through Appendix X).

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7.1 MITIGATION STRATEGY OVERVIEW

A mitigation strategy includes the identification of mitigation goals and actions that will reduce the risks of each hazard and vulnerability to the local population and built environment for each local participant.

Per the local mitigation planning requirements, this mitigation strategy consists of the following four steps:

- Local hazard mitigation goals
- Identification and analysis of mitigation actions
- Implementation of mitigation actions
- Identification and analysis of mitigation actions for NFIP compliance

7.2 MITIGATION GOALS

The requirements for developing local hazard mitigation goals, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: MITIGATION STRATEGY

Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Element

- Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?

Source: FEMA 2008.

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide vision. For the 2010 HMP, the consultant and Planning Committee developed one goal for each identified hazard. As shown in Table 7-1, these goals are agricultural biological; earthquake; flooding (riverine and coastal flooding, dam failure, and levee failure); geological (liquefaction and landslide); post-fire debris flow; severe winter storm; tsunami; and wildfire.

Table 7-1. Mitigation Goals

Goal Number	Goal Description
1	Reduce the possibility of damages and losses due to agricultural biological hazards.
2	Reduce the possibility of damages and losses due to earthquakes.
3	Reduce the possibility of damages and losses due to flooding, including riverine and coastal flooding, dam failure, and levee failure.
4	Reduce the possibility of damages and losses due to geological hazards, including liquefaction and landslide.
5	Reduce the possibility of damages and losses due to post-fire debris flow.
6	Reduce the possibility of damages and losses due to severe winter storm.
	Reduce the possibility of damages and losses due to severe tsunami.
	Reduce the possibility of damages and losses due to severe wildfires.

7.3 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

The requirements for the identification and analysis of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: MITIGATION STRATEGY

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Element

- Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?
- Does the mitigation strategy identify actions related to the participation in and continued compliance with the NFIP?

Source: FEMA 2008.

Mitigation actions are activities, measures, and/or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects.

In the 2005 HMP, the Planning Committee developed overarching mitigation actions to be applied throughout the county. In addition, each local participant identified other jurisdiction-specific mitigation actions by reviewing existing resources, identifying past success stories and best management practices, and soliciting input from pertinent departments including planning, public works, and emergency management staff. As a result of both mitigation action identification processes, each local participant developed several dozen mitigation actions. During the 2010 HMP update process, the Planning Committee reviewed the 2005 HMP mitigation strategy. This process revealed that the majority of the mitigation actions identified in the 2005 HMP were not suitable to be included in the 2010 HMP for the following reasons:

- Mitigation actions were ineligible for FEMA funding
- Mitigation actions were emergency response, preparedness, and/or recovery focused rather than mitigation focused
- Mitigation actions were not well defined
- Mitigation actions were not stand-alone projects
- Mitigation actions were continued-compliance and/or maintenance focused

As such, for the 2010 HMP, the consultant, with input from the Planning Committee, developed a handful of new mitigation actions based on the 2010 HMP's hazard analysis, vulnerability analysis, and capability assessments. The list of potential mitigation actions in the 2010 HMP was condensed so local participants would focus their attention and effort on projects that would likely be implemented over the next 5 years (the lifespan of the 2010 HMP). Criteria considered for the development of the new mitigation actions included the following:

- Mitigation action must be mitigation-focused (as opposed to response, recovery, and preparedness-driven)
- Mitigation action must meet the 2011 HMA Unified Guidance project criteria eligibility
- Mitigation action must address the DMA 2000 requirements for the identification and analysis of mitigation actions
- Mitigation actions must address the 2010 HMP vulnerability analysis results

In addition to the 20 potential mitigation actions developed for the local participants, the consultant asked each local participant to review his/her 2005 HMP mitigation strategy with staff from other relevant departments and agencies within his/her jurisdiction and reselect mitigation actions and/or develop new mitigation actions specific to mitigating a hazard in his/her jurisdiction.

As shown below, for each potential mitigation action, the following information is listed: mitigation action description; mitigation action category; hazard(s) addressed; and type of development affected by mitigation action. As noted above, the first 20 potential mitigation actions were developed by the consultant and the Planning Committee. Additional mitigation actions reselected and/or added by a local participant and supporting staff are located in his/her local-participant-specific appendix (Appendix G through Appendix X).

Table 7-2. Potential Mitigation Actions

No.	Description	Mitigation Category	Hazard Addressed	New or Existing Construction
1	Create a GIS-based pre-application review for new construction and major remodels in hazard areas, such levee break, high and/or very high danger wildfire areas.	Property protection	All	New
2	Integrate the 2010 HMP, in particular the hazard analysis and mitigation strategy sections, into local planning documents, including general plans, emergency operations plans, and capital improvement plans.	Property protection	All	New/existing
3	Seismic structural retrofit of or replacement of County and local ramps and bridges that are categorized as structurally deficient by Caltrans, are located in an extreme ground shaking areas, and/or are necessary for first responders to use during an emergency.	Property protection, structural project	Earthquakes	Existing – County and local ramps and bridges identified by Caltrans as structurally deficient or located within an extreme ground shaking area.
4	Stabilize landslide-prone areas through stability improvement measures, including interceptor drains, in situ soil piles, drained earth buttresses, and subdrains.	Prevention, property protection	Geologic (landslide and liquefaction)	New/existing
5	Acquire, relocate, or elevate residential structures, in particular those that have been identified as RL properties, within the 100-year floodplain.	Property protection	Flooding (coastal and riverine)	Existing – residential structures, including RL properties, within the 100-year floodplain.
6	Acquire, relocate, elevate, and/or floodproof critical facilities within the 100-year floodplain.	Property protection	Flooding (coastal and riverine)	Existing - critical facilities within the 100-year floodplain.
7	Reinforce County and local ramps, bridges, and roads from flooding through protection activities, which may include elevating the road and installing culverts beneath the road or building a bridge across the area that experiences regular flooding.	Property protection, structural project	Flooding (coastal and riverine)	Existing – County and local ramps, bridges, and roads identified in the 100-year floodplain.
8	Work with FEMA Region 9 to address any floodplain management issues that may have arisen/arise from the countywide DFIRM, Community Assessment Visits, and/or DWR.	All	Flooding (coastal and riverine)	New/existing properties within the County and cities.

Table 7-2. Potential Mitigation Actions

No.	Description	Mitigation Category	Hazard Addressed	New or Existing Construction
9	Increase participation in the NFIP by entering the Community Rating System program, which through enhanced floodplain management activities would allow property owners to receive a discount on their flood insurance.	Prevention, property protection	Flooding (coastal and riverine)	New/existing –County and cities that have RL properties. In particular, residential structures and critical facilities within the 100-year floodplain.
10	Seismic non-structural and structural retrofit of critical facilities and infrastructure.	Property protection	Earthquake	Existing – critical facilities and infrastructure in areas that are vulnerable to high to extreme ground shaking.
11	Manage vegetation in areas within and adjacent to rights-of-way and in close proximity to critical facilities to reduce the risk of tree failure and property damage and avoid creation of wind acceleration corridors within vegetated areas.	Prevention, property protection, natural resource protection	Severe winter storm (severe wind)	Existing – critical facilities in areas that experience severe wind.
12	Develop a free annual tree chipping and tree pick-up day that encourages residents living in very high and high severe wind hazard areas to manage trees and shrubs at risk of falling on nearby structures	Property protection	Severe winter storm (severe wind)	Existing – residential buildings that experience severe wind.
13	Bolt down the roofs of critical facilities to prevent wind damage.	Property protection	Severe winter storm (severe wind)	Existing – critical facilities in areas that experience severe wind.
14	Participate in the NOAA Tsunami Ready Program.	Public outreach	Tsunami	New and existing – residential buildings and critical facilities and infrastructure in the tsunami inundation area.
15	Implement better record keeping measures on the part of food processors and handlers	Prevention	Agricultural biological	Not applicable.
16	Implement a fuel reduction program, such as the collection and disposal of dead fuel, within open spaces and around critical facilities and residential structures within an SRA or LRA high or very high wildfire zone.	Prevention, property protection, natural resource protection	Wildfire	Existing – critical facilities and residential structures within an SRA or LRA high or very high wildfire zone.

Table 7-2. Potential Mitigation Actions

No.	Description	Mitigation Category	Hazard Addressed	New or Existing Construction
17	Create a vegetation management program that provides vegetation management services to elderly, disabled, or low-income property owners who lack the resources to remove flammable vegetation around their homes.	Property Protection	Wildfire	Existing
18	Implement post-fire debris flow hillslope and channel treatments, such as seeding, mulching, check dams, and debris racks, as needed.	Prevention, property protection	Post-fire debris flow	Existing
19	Encourage property owners in the dam or levee inundation hazard areas to purchase voluntary flood insurance.	Property protection	Flooding (levee and dam failure)	Existing
20	Implement a fuel modification program, which includes residential maintenance requirements and enforcement, plan submittal and approval process, guidelines for planting, and a listing of undesirable plant species. Require builders and developers to submit their plans, complete with proposed fuel modification zones, to the local fire department for review and approval before beginning construction.	Prevention, property protection	Wildfire	New/ existing – focus should be on residential buildings in the high and very high wildfire areas.
21	Local-participant-specific mitigation action*			
22	Local-participant-specific mitigation action*			
23	Local-participant-specific mitigation action*			
24	Local-participant-specific mitigation action*			
25	Local-participant-specific mitigation action*			

*For local participants that reselected mitigation actions identified in their 2005 mitigation strategy or identified mitigation actions not itemized in Table 7-2. Applicable local-participant-specific mitigation actions are shown in each local-participant-specific appendix (Appendix G through Appendix X).

DFIRM = Digital Flood Insurance Rate Map
DWR = California Department of Water Resources
FEMA = Federal Emergency Management Agency
GIS = Geographic Information System
HMP = Hazard Mitigation Plan
LRA = Local Responsibility Area
NFIP = National Flood Insurance Program
NOAA = National Oceanic and Atmospheric Administration
RL = repetitive loss
SRA = State Responsibility Area

7.4 IMPLEMENTATION OF MITIGATION ACTIONS

The requirements for the evaluation and prioritization of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: MITIGATION STRATEGY

Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Element

- Does the new or updated mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the new or updated mitigation strategy address how the actions will be implemented and administered? (For example, does it identify the responsible department, existing and potential resources, and timeframe?)
- Does the new or updated prioritization process include an emphasis on the use of a cost-benefit review to maximize benefits?

Source: FEMA 2008.

After the list of potential mitigation actions had been developed, each plan participant, along with staff from other relevant departments/agencies within his/her jurisdiction, evaluated and prioritized the potential mitigation actions to determine which mitigation actions would be included in his/her local-participant-specific mitigation action plan. Only mitigation actions that met at least four or more of prioritization criteria listed below was included in the mitigation action plan. Criteria considered for this evaluation process included:

1. Current or potential support from the plan participant
2. Plan participant department or agency champion
3. Ability to be implemented during the 5-year lifespan of the HMP
4. Ability to reduce expected future damages and losses (cost-benefit)
5. Mitigates a high-risk hazard or multiple hazards

Each local participant's mitigation action plan is included in the local-participant-specific appendix (Appendix G through Appendix X). Each mitigation action plan includes: a description of each mitigation action; prioritization criteria selected (numbers 1-5, as shown above); potential facility to be mitigated (if known); responsible department or agency; potential funding source; and implementation timeframe.

7.5 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS: NFIP COMPLIANCE

The requirements for the identification and analysis of mitigation actions: NFIP compliance, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: MITIGATION STRATEGY
Identification and Analysis of Mitigation Actions: NFIP Compliance
Requirement §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program and continued compliance with NFIP requirements, as appropriate.
Element
▪ Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?
▪ Does the mitigation strategy identify, analyze, and prioritize actions related to continued compliance with the NFIP.
Source: FEMA 2008.

As noted in Section 4.3.4, Ventura County and all of its cities participate in the NFIP. Table 4-3 lists the following for each NFIP participant: date of initially mapped FIRM; emergency/regular NFIP entrance date; number of flood policies in force. As of September 2010, Ventura County nor any of its cities are participants of the Community Rating System (CRS) program. The VCWPD, which administers the NFIP for Ventura County, is currently seeking entrance into the CRS program.

Mitigation actions #8 and #9 in Table 7-2 address the continued compliance with the NFIP. These projects were analyzed and prioritized each NFIP participant in the local-participant-specific mitigation action plan (Appendix G through Appendix X), as necessary.