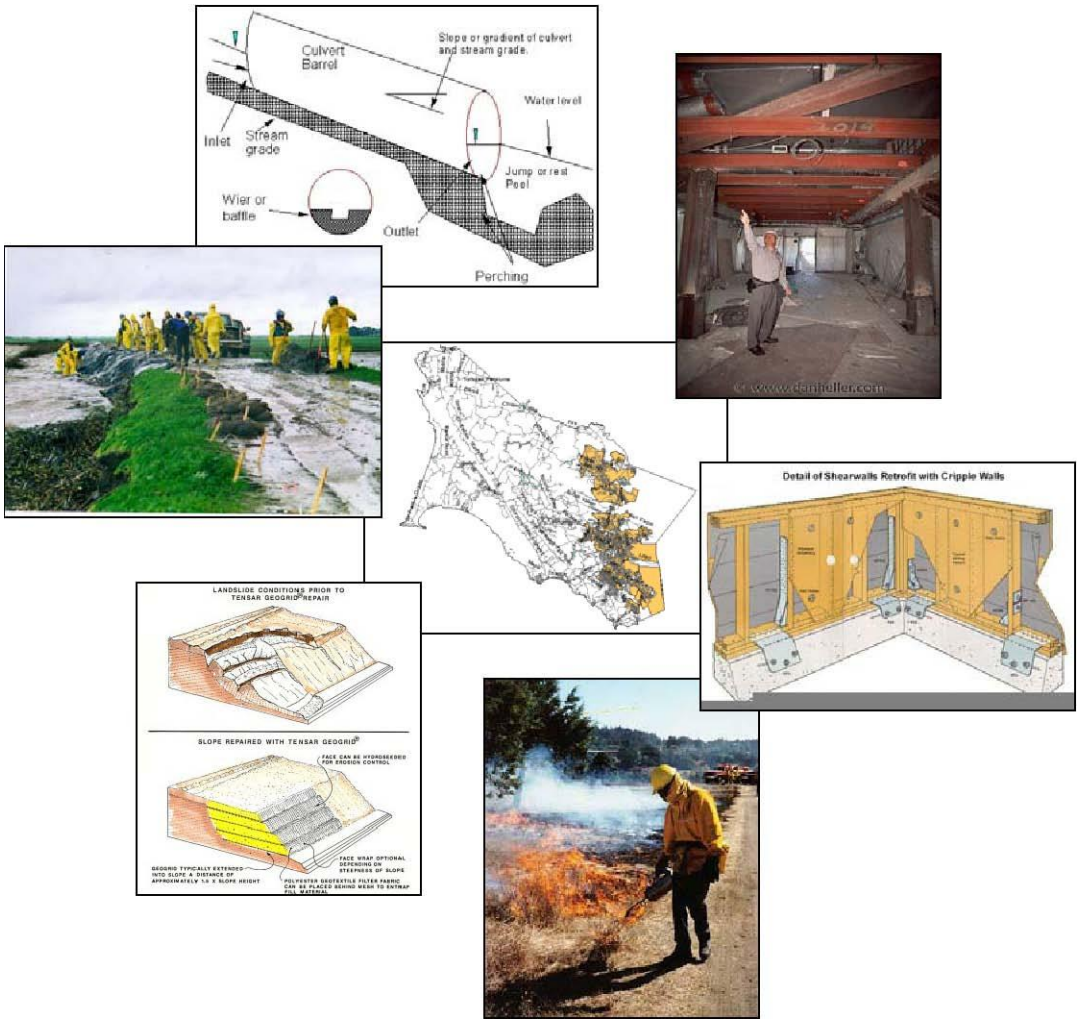
MARIN COUNTY LOCAL HAZARD MITIGATION PLAN



2012 Update

Prepared By:

MARIN COUNTY SHERIFF'S OFFICE OF EMERGENCY SERVICES

3501 Civic Center Drive, Room 266 San Rafael, CA 94903

www.readymarin.org

In partnership with:

Marin County Fire Department

Marin County Department of Public Works

Marin County Community Development Agency

RESOLUTION NO. 2012-109

RESOLUTION OF THE MARIN COUNTY BOARD OF SUPERVISORS

WHEREAS, the preservation of life, property, and the environment is an inherent responsibility of local government, and

WHEREAS, natural and man-made disasters pose a significant threat to the lives and property of Marin County residents and visitors, and

WHEREAS, natural and man-made disasters can occur with little or no warning, and

WHEREAS, the Marin County Sheriff's Office of Emergency Services, in concert with local public safety organizations, in an effort to identify best practices used in response to the threat and occurance of natural and man-made disasters, did update the Marin County Local Hazard Mitigation Plan, and

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors of the County of Marin hereby takes the following action:

1. Adopts the Marin County Local Hazard Mitigation Plan Update 2012 as presented to the Board and attached to this Resolution.
2. The Board of Director's gives authority to the County Emergency Services Manager to make any FEMA required changes to the Local Hazard Mitigation Plan as necessary.

BE IT FURTHER RESOLVED, by the Board of Supervisors of the County of Marin that the effective date of the Marin County Local Hazard Mitigation Plan shall be October 31, 2012.

PASSED AND ADOPTED at a regular meeting of the Board of Supervisors of the County of Marin held on this 16th day of October, 2012 by the following vote:

AYES: SUPERVISORS Katie Rice, Susan L. Adams, Judy Arnold, Kathrin Sears, Steve Kinsey

NOES: NONE

ABSENT: NONE

PRESIDENT, BOARD OF SUPERVISORS

ATTEST:

CLERK

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EXECUTIVE SUMMARY

This Hazard Mitigation Plan is the product of an ongoing planning process undertaken by the County of Marin. The purpose is to meet the requirements of the Disaster Mitigation Act of 2000 (DMA) - (Public Law 106-3900) and thereby maintain continued eligibility for certain Hazard Mitigation – or disaster loss reduction – programs from the Federal Emergency Management Agency (FEMA), part of the Department of Homeland Security. The Interim Final Rule published in the Federal Register on February 26, 2002 and October 1, 2002 established mitigation planning requirements for local governments.

The Marin County Local Hazard Mitigation Plan (LHMP) describes strategies for sustaining and building on current mitigation activities to ensure the future safety of lives, preservation of property, and protection of the environment during times of disaster. State and Federal guidance also encourages mitigation planning to address man-made hazards including terrorism. This plan includes terrorism only broadly since mitigation for this hazard is addressed by other agencies operating at a higher level of security.

Mitigation planning will improve the ability to recover after disaster. The LHMP is based on critical data with a focus on Hazard Identification, Vulnerability Analysis, and Mitigation Strategies, with a breakout of the major and minor hazards. The major hazards include significant risk detail. The minor hazards are less detailed, using a broader approach.

Marin County Operational Area

Marin County is located on the central coast of California, north of the Golden Gate Bridge. It is part of the California Emergency Management Agency (CalEMA) Coastal Region.

Marin County covers 521 square miles with a population of over 250,000 in eleven incorporated cities and towns and the county's unincorporated area. Most of the population is located in the urban corridor located along the east-central part of the county, adjacent to Highway 101. Marin County plays a large part in the economy of the San Francisco Bay Area.

Marin County is surrounded by water on three sides: the Pacific Ocean on the west, the San Pablo Bay on the east and the San Francisco Bay on the south. It is adjacent to Sonoma County on the north.

Marin County is connected to its surrounding neighbors by bridges. The Golden Gate Bridge is to the south; the Richmond/San Rafael Bridge is to the east; State Highway 37 is to the north east (along the north part of San Pablo Bay across filled bay land); and Highway 101 is to the north (which narrows to a 4-lane uncontrolled road that transverses the Antonio Creek).

One of the major problems Marin County faces during any emergency is the possibility of being isolated from the surrounding communities and any resources or help.

Planning Process

The process for updating the Marin County Local Hazard Mitigation Plan (LHMP) began in January 2012 and follows the FEMA prescribed methodology.. Various forums and meetings defined the scope of the work for the Local Hazard Mitigation Plan to update the recorded history of losses from natural hazards, and to update the analysis of future risks posed to the county by these hazards. The risk assessment portion of the plan was defined and specific recommendations for actions to mitigate future disaster losses were identified (*Section 2 – Hazard Mitigation*).

The update team consisted of four lead departments/agencies who were each responsible for outreach to their stakeholders, subject matter experts, and constituents, as well as the elements of the LHMP that were specific to their discipline. These leads were: Marin County Sheriff's Office of Emergency Services (OES), Marin County Fire Department, Marin County Department of Public Works, and the Marin County Community Development Agency.

The members of the committees, county department heads, the Disaster and Citizens Corps Council, and the Board of Supervisors are asked to monitor the plan as it is amended, at least annually. Stakeholders will monitor progress on individual projects, will be solicited to provide periodic reports on project development, and will be instrumental in evaluating the goals and objectives for expected outcomes of mitigation projects.

Local Planning Mechanisms

This plan considers current Marin County planning mechanisms including existing capital improvement plans, zoning, building codes, agency forums, and comprehensive plans for purposes of mitigation projects and activities. Key components of major plans are integrated in

this LHMP.

Marin Countywide Plan

The Marin Countywide Plan 2007, developed by the Marin County Community Development Agency, is a long range general plan that includes a significant section on environmental hazards addressing earthquake, fire, flooding and landslide threats. Community Development Agency public hearings conveyed concern for safety of lives and threats from the environment, extensively reflected in the Hazard Mitigation Plan. This plan provides an important reference and basis to the Marin County LHMP.

Marin County Fire Management Plan

The Marin County Strategic Fire Plan is a document prepared by the Marin County Fire Department, updated yearly, and is an integral part of the California Department of Forestry and Fire Protection's California Strategic Fire Plan. The plan's overall goal is to save lives, protect the environment, and to reduce the total cost and losses from wildland fire. Its major components, including elements identifying assets at risk and mitigation strategies to reduce risks are integrated into the plan. Ongoing mitigation efforts include multi-agency and multi-jurisdictional, as well as private landowner coordinated efforts as described in the plan. Future projects under consideration for Community Wildfire Protection will be coordinated with LHMP/FEMA prescribed guidelines.

Marin Operational Area Emergency Operations Plan

The Marin County Operational Area Emergency Operations Plan (EOP) includes threat-specific annexes, which were developed using a whole community approach, and which serve as a significant basis of reference for hazard mitigation and planning.

Other Planning Elements

Comments from the communities of Marin County were encouraged during an outreach effort put forth by the planning team. The outreach effort included the following activities:

- Posting of the Local Hazard Mitigation Plan on the County of Marin website, encouraging comment from the public
- Two publicly announced workshops to provide a forum for discussion of the LHMP update and to provide access to the CalEMA "portal" webpage dedicated to LHMP work
- Press releases identifying the planning process and requesting feedback from interested community members

Strategies

Strategies for current, ongoing mitigation projects have defined elements and follow specific practices. Mitigation plan requirements to be incorporated into planning of projects follow basic current practices:

- Identify lead agency, stakeholders
- Define applicable policies, regulations, funding or practices
- Identify point of contact
- Conduct mitigation capability assessment
- Evaluate criteria for mitigation actions
- Apprise current elected officials/solicit support
- Evaluate alternative mitigation actions
- Identify how mitigation actions will be implemented
- Identify responsible parties and partners
- Identify funding sources

Current Priorities

Current priorities for the county include vegetation management and flood control projects in several communities of the county. This plan identifies specific projects related to these priorities.

Vegetation management has included a special Fuel Crew Program to significantly reduce the fuel loading contributor to potential large wildland-urban interface fires in the county.

As part of the Countywide Watershed Program flood damage reduction planning efforts have expanded from the Ross Valley to include four other watersheds, Novato, Las Gallinas, Richardson Bay, and Easkoot Creek.

Jurisdiction Vulnerability- Major And Minor Hazards

The planning team in Marin County primarily targeted its major hazards, Earthquake, Fire and Flood, with the intention of meeting FEMA's requirements for the DMA 2000. Specifics on past occurrences for major hazards are discussed in this plan.

The other hazards identified in this plan are addressed to meet State and Federal guidance that will encourage mitigation planning. Significantly less detail is provided for these hazards.

Earthquake - Major

The major hazard, earthquake, with a significant seismic event could result in severe property damage to public and private infrastructure including electric distribution lines, telecommunications infrastructure, water, and gas lines.

The damage from a rupture generated by a magnitude of a 7.3 earthquake is predicted to cause large numbers of uninhabitable housing units in the county. Based on selected earthquake scenarios for the jurisdiction's vulnerability, the Association of Bay Area Governments (ABAG) has developed estimated numbers of these losses to the county. The scenarios generally reflect activity on specific local geographic fault lines.

The median age of structures in Marin County is 41 years old. The County of Marin, by Ordinance No. 3354, has adopted California Building, Plumbing, Electrical and Mechanical Codes whereby no building or structure is erected, constructed, enlarged, improved, removed, or converted without a permit. Adherence to these codes currently allows the county to gather data on retrofitting and current building code compliance. It is important to note that this data

continues to have limitations for assessing overall vulnerability in the county for all structures.

The county's topography includes large areas of steep slopes, adding to the vulnerability of earthquake induced disasters with the additional danger of landslide. Bluff erosion along the coastal areas also poses unique threats to coastal structures and roads during times of earthquake.

Fire - Major

The major hazard, fire, threatens life, safety, rangeland, recreation, water and watershed, air quality, erosion, structures, cultural assets, and wildlife.

Due to landscape and the wildland-urban interface (WUI), the population of Marin County is extremely vulnerable and the threat is exceedingly high during summer and early fall months. Today's wildfires are very costly. The Mount Vision Fire of 1995 in West Marin is an example of a very damaging and costly fire. Mount Vision Fire Costs (in 1995 dollars):

Extinguish Fire	$ 6	million
Structure Damage	$ 23	million
Repair – Utilities, Roads, Slopes	$ 1.3	million

Currently total loss figures are difficult to calculate and to predict. Fire departments alone cannot fix the problems. It will take cooperation from stakeholders to design mitigation strategies, as well as individual homeowners to take responsibility for developing and maintain defensible space around their homes. The largest landowner within Marin County is the United States Government, which owns 80,233 acres most of which is found in the Golden Gate National Recreation Area, Point Reyes National Seashore, and Muir Woods National Monument.

Flood - Major

Flooding, a major hazard threatening the county continues to create numerous risks to people and the environment, particularly in numerous low-lying and coastal areas.

Flood and inundation hazard areas along the San Francisco Bay, San Pablo Bay, Tomales Bay, and the Pacific Ocean are a constant threat. Although restrictions exist for development in flood prone areas as they apply to the County's Floodplain Management Ordinance, recurring flooding occurs throughout the county due to the unpredictability of tides and heavy rainfall.

Other Hazards - Minor

Other hazards in Marin County include threats that provide limited historical data as a basis to assess vulnerability. This plan addresses threats to Agriculture, Terrorism, Tsunami, and Landslides in addition to most common major hazards known within its jurisdiction. Landslides are generally associated with earthquake and flooding. Tsunami threat assessments are currently underway, particularly for the immediate coastal and San Francisco Bay land areas. A Tsunami Ready™ program, currently being developed by Marin County OES, provides a solid basis for response and mitigation planning. Terrorism is the most difficult hazard to predict and assess, and this activity is done at a different jurisdictional level. The greatest threat to agriculture in the county is the possibility of significant drought.

In addition, the update team recommends that a study be conducted on climate change, and it's impact on the county (to include sea level rise). Findings of that study will be identified in the next update to this plan.

Section 1: Risk Assessment - Major

NOTE: Unless otherwise cited, the primary source for hazard impacts is the Association of Bay Area Governments (ABAG). Because of independent rounding, subcategories in the tables of data may not add to totals.

As the impacts of the "major" threats – earthquake, wildfire, and flood – are not completely developed, the Marin County LHMP update team has reviewed the hazards identified based on past disasters and projected future impacts.

Earthquake

Faults and Probabilities

The San Andreas Fault traverses Marin County running north and south in the western quarter of the county. It enters Marin on the Pacific Coast near Bolinas, follows the path of Highway 1 and Tomales Bay, exiting Marin at sea just west of Dillon Beach. In addition, the eastern, more heavily populated part of Marin is less than ten miles from the northern section of the Hayward fault. The northern part of Marin is less than ten miles from the Rodgers Creek fault.

According to a 2007 study of earthquake probabilities prepared by the Working Group on California Earthquake Probabilities (a multi-disciplinary collaboration of scientists and engineers) and published by the U.S. Geological Survey, the chance of a major (6.7 or greater magnitude) earthquake occurring in the Bay Area during the period of 2007 to 2037 is 63%. For the State of California at large, the chance of a major earthquake occurring is 99.7% percent during the period of 2007 to 2037. See San Francisco Bay Region Earthquake Probability diagram on next page (Figure 1).

The Working Group on California Earthquake Probabilities study further states that other faults in the area (including the Rodgers Creek Fault and the Hayward Fault) pose a major threat. Potential slippage of the San Andreas fault could severely impact the county's coastal communities like Bolinas, Point Reyes Station, Stinson Beach and Muir Beach.

An earthquake occurring in or near area faults could result in significant deaths, casualties, damage to property and environment, and disruption of normal government and community services and activities. Ground failures (fissuring, settlement, and permanent horizontal and vertical shifting of the ground such as surface breaks caused by faulting) that often accompany earthquakes could cause significant damage to network infrastructure such as water, power, communication, and transportation lines in Marin County. These effects could be aggravated by secondary emergencies such as fires, floods, tsunamis, hazardous material spills, utility disruptions, landslides, automobile accidents, transportation emergencies and dam failures.

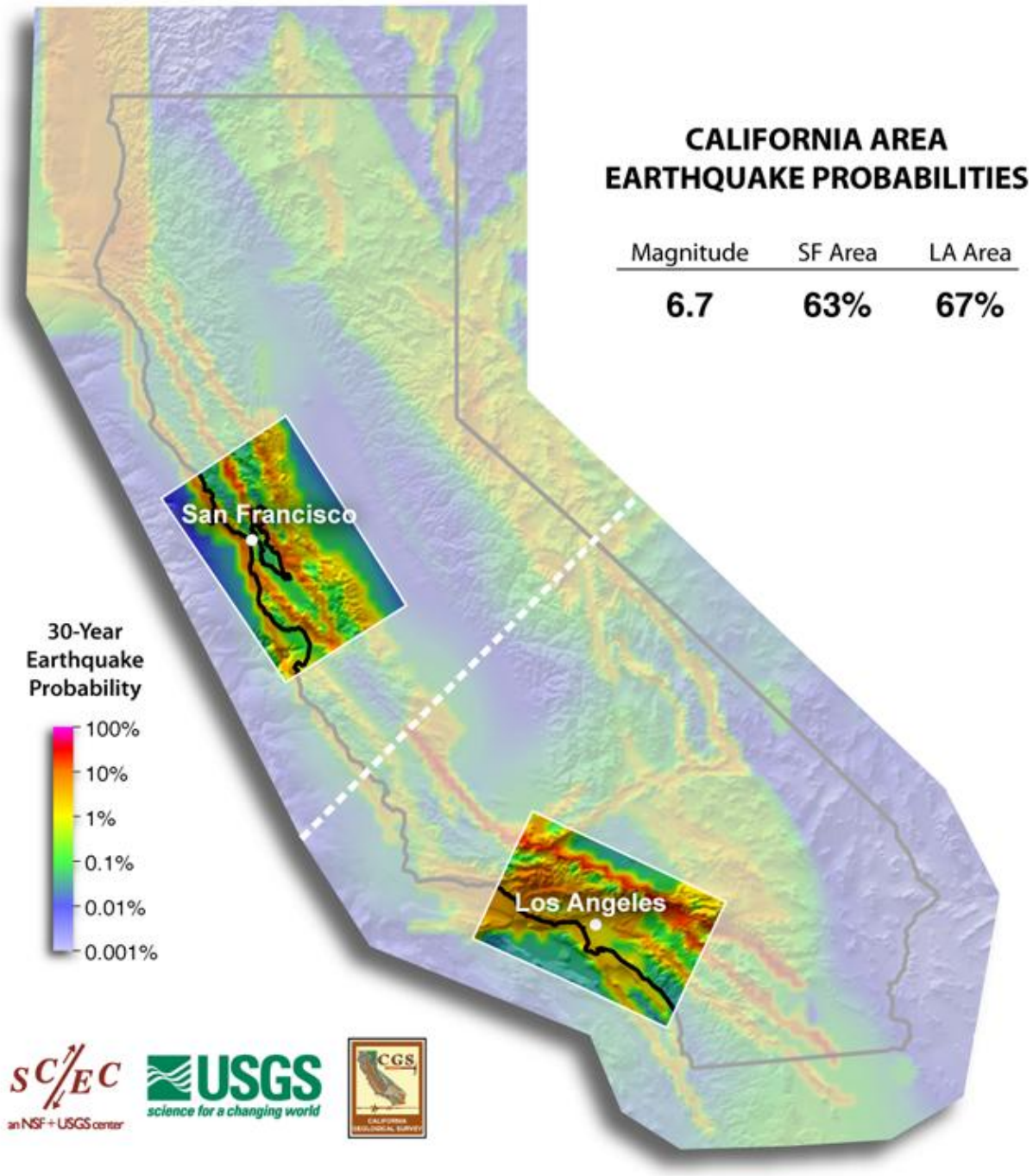


Figure 1 - UCERF: Map of Earthquake Probabilities, San Francisco and Los Angeles Areas

Marin County Earthquake History

The San Andreas Fault was the source of the 1906 earthquake with a magnitude of 7.8. Marin County was sparsely inhabited at that time and experienced relatively moderate property loss and only two deaths. Although the epicenter was south of San Francisco, West Marin experienced some pronounced earthquake phenomena. This included a horizontal earth displacement of 21 feet near the head of Tomales Bay. On October 17, 1989, a magnitude 7.1 earthquake occurred on the San Andreas Fault, the largest earthquake to occur in the San Francisco Bay Area since 1906. This earthquake was named the Loma Prieta Earthquake due to it's calculated epicenter.

The impact of the Loma Prieta Earthquake was most apparent in the northeast area of Santa Cruz. Depending on fault rupture location, a strong shaking such as this would cause severe damage within Marin County, including damage to life-line routes. The Loma Prieta earthquake was not "the big one," which is a common reference to an event with a magnitude of 8 or larger (such as the 1906 San Francisco quake). Earthquake aftershocks often occur with additional and unforeseen damage to our infrastructure.

Profiling Earthquake Hazards

Ground shaking damage will vary from slight to intensive depending upon the magnitude of the earthquake and proximity to the epicenter. It is expected that a major earthquake on the Hayward fault could leave Marin County cut off from surface access; therefore movement within the county would be severely limited. Projections indicate up to 58 locations where roads could be impassible. In addition, outside resources would be focused on the more severely impacted East Bay communities.

Marin County owns and leases buildings considered to be "critical buildings" which include those that have architectural or historic distinction, cultural value critical to the recovery of our community, and are vital to the continuity of government functioning (including provision of social services). (*APPENDICES Reference Section #2:* Ground Shaking Tables, Building Log; Government Facilities Inventory Collection Forms)

- **Shaking Potential**

The majority of Marin County's single-family buildings with foundations to bedrock will perform well in a shake. Modern multi-story buildings with foundations to bedrock should not be subject to collapse, although some serious damage may occur. However, many heavier developed areas of Marin are built on soft alluvial soils or filled-in water ways. These soils will significantly increase the shaking effects and will account for the majority of damaged and destroyed structures, regardless of their proximity to the fault line.

Shaking Potential	Total Acres	Lowest	>>	>>>	>>>>	Highest
RESIDENTIAL (excluding mixed use):	30,229	251	0	18,692	8,036	3,250

1 unit/1-5 acre lot (Rural Residential)	11,148	89	0	6,539	3,661	859
1-3 units/acre (Not Mobile Home Parks)	8,719	95	0	5,829	1,924	871
3-8 units/acre (Not Mobile Home Parks)	8,213	59	0	5,122	1,959	1,072
>8 units/acre, Multifamily, Group Quarters	1,953	8	0	1,106	491	348
Mobile Home Parks	196	0	0	96	0	99
INDUSTRIAL (excluding mixed):	592	8	0	239	20	325
Salvage/Recycling, Mixture	592	8	0	239	20	325
TOTAL INFRASTRUCTURE:	10,149	80	0	5,361	2,410	2,298
TOTAL COMMERCIAL SERVICES (excluding mixed)	6,120	82	0	3,061	1,010	1,968
Subtotal-Commercial:	5,666	82	0	2,791	912	1,880
Retail/Wholesale	156	1	0	59	8	89
Research/Office	107	0	0	107	0	0
Other, Mixture or Unknown	5,402	81	0	2,625	905	1,791
Subtotal-Education:	54	0	0	36	14	3
Colleges/Universities	51	0	0	36	14	0
Subtotal-Hospitals and Health Care Facilities	256	0	0	156	75	25
Trauma Center Hospitals	49	0	0	29	1	19
State Prisons	207	0	0	127	75	6
Subtotal-Public Institutions:	144	0	0	77	7	59
Convention Centers	73	0	0	16	0	57
City Halls/County/Admin	55	0	0	52	0	2

Other-Community Centers and Libraries	9	0	0	2	7	0
TOTAL URBAN OPEN:	5,409	105	0	2,784	1,590	929
Golf Courses	1,083	0	0	576	424	83

Cemeteries	225	0	0	173	30	22
Parks	360	1	0	184	124	50
Vacant--Undeveloped	3,559	105	0	1,774	976	705
TOTAL AGRICULTURE:	8,379	108	0	4,203	1,007	3,061
Cropland and Pasture	8,293	108	0	4,169	996	3,020
Farmsteads and Inactive	77	0	0	34	12	32
TOTAL RANGELAND:	156,110	1,304	365	61,683	71,877	20,881
Herbaceous Range	141,325	1,182	347	56,746	64,413	18,638
Shrub and Brush	12,556	82	18	3,621	7,026	1,810
Mixed Range	2,229	41	0	1,317	438	433
TOTAL WETLANDS (Based on USGS Mapping):	3,760	213	3	764	1,150	1,630
Forested	329	7	0	72	142	108
Non-Forested	3,431	207	3	692	1,008	1,522
TOTAL FOREST LAND:	106,231	217	344	41,740	49,447	14,483
Deciduous	5,508	26	29	2,977	2,116	359
Evergreen	67,893	104	94	21,965	34,398	11,333
Mixed Forest	32,830	87	220	16,799	12,933	2,791
	======	======	======	======	======	======
	Total Acres	Lowest Potential	>>	>>>	>>>>	Highest Potential
TOTAL URBAN LAND:	52,784	541	0	30,198	13,066	8,980
TOTAL NON-URBAN LAND:	274,517	1,842	711	108,428	123,482	40,055
GRAND TOTAL:	327,302	2,382	711	138,626	136,547	49,034

- **Liquefaction Susceptibility**

Subsidence and differential settlement can occur along Bay Mud and Marshland areas of Marin, leading to damage of any structures sited on those lands. Many of these areas have been artificially filled over the years causing differential settlement. To date, most liquefaction hazard investigations have focused on assessing the risks to commercial buildings, homes, and other structures.

Liquefaction Susceptibility	Total Acres	Moderate	High	Very High
TOTAL RESIDENTIAL LAND (excluding mixed use):	30,229	2,249	3,445	1,624
1 unit/1-5 acre lot (Rural Residential)	11,148	574	483	121
1-3 units/acre (Not Mobile Home Parks)	8,719	505	923	371
3-8 units/acre (Not Mobile Home Parks)	8,213	976	1,526	801
>8 units/acre, Multifamily, Group Quarters	1,953	117	512	275
Mobile Home Parks	196	77	1	55
TOTAL INDUSTRIAL [excluding mixed]:	592	46	117	223
Salvage/Recycling, Mixture or Unknown	592	46	117	223
TOTAL MAJOR INFRASTRUCTURE:	10,149	1,176	2,159	1,507
Roads, Highway and Related Facilities	9,644	1,158	1,972	1,385
Airports	113	0	113	0
Ports	9	0	0	7
Infrastructure--Other, Unknown	383	18	73	115
TOTAL MILITARY:	286	0	32	176
General Military	286	0	32	176
TOTAL COMMERCIAL/SERVICES	6,120	731	1,712	1,243
Subtotal-Commercial:	5,666	646	1,664	1,130
Retail/Wholesale	156	38	33	64
Research/Office	107	85	0	0
Other, Mixture or Unknown	5,402	523	1,631	1,066
Subtotal-Education:	54	18	21	3
Elementary/Secondary	3	0	0	3
Colleges/Universities	51	18	21	0
Subtotal-Hospitals and Health Care Facilities	256	48	0	57
Trauma Center Hospitals	49	9	0	9
State Prisons	207	39	0	48
Subtotal-Public Institutions:	144	19	27	52
Convention Centers	73	19	5	48
City Halls/County	55	0	10	4

Administration				
Local Jails	8	0	8	0
Other-Community Centers/Libraries	9	0	4	0
TOTAL URBAN OPEN:	5,409	576	536	580
Golf Courses	1,083	310	41	140
Cemeteries	225	0	14	0
Parks	360	21	133	50
Vacant--Undeveloped	3,559	221	321	318
Mixed Urban Open, Including Parks	182	24	26	72
TOTAL AGRICULTURE:	8,379	666	3,285	106
Cropland and Pasture	8,293	658	3,259	102
Orchards/Groves/Vineyards	9	0	9	0
Farmsteads and Inactive	77	8	18	3
TOTAL RANGELAND:	156,110	11,367	7,488	1,998
Herbaceous Range	141,325	10,833	6,970	1,755
Shrub and Brush	12,556	436	340	127
Mixed Range	2,229	98	179	116
TOTAL WETLANDS (Based on USGS Mapping):	3,760	180	1,340	367
Forested	329	21	81	34
Non-Forested	3,431	160	1,259	334
Salt Evaporators	0	0	0	0
Wetlands--Unknown	0	0	0	0
TOTAL FOREST LAND:	106,231	1,855	1,208	413
Deciduous	5,508	189	103	41
Evergreen	67,893	568	546	91
Mixed Forest	32,830	1,098	559	282
TOTAL SPARSELY VEGETATED:	38	5	0	0
Mines/Quarries	38	5	0	0
	=========	=========	=========	=========
	Total Acres	Moderate	High	Very High
TOTAL URBAN LAND:	52,784	4,779	8,001	5,354
TOTAL NON-URBAN LAND:	274,517	14,074	13,321	2,884
GRAND TOTAL:	327,302	18,852	21,322	8,238

Fire

Overview

The fire problem in Marin County resides in the Wildland-Urban Interface (WUI), where houses and businesses meet or intermingle with wildland vegetation. This is where wildfire poses the greatest risk to human life and property. Principal County stakeholders—those people with an interest in protecting their assets from wildfire—coordinate their public education and project management through FIRE Safe Marin (the local Fire Safe Council).

The California Fire Plan provides a framework that is applied in Marin for defining fire hazards and ranking assets at risk in order to identify areas where fire threats can be mitigated. A countywide assessment of the wildland fire threat undertaken by The California Department of Forestry and Fire Protection (CAL FIRE) revealed that nearly 80,000 acres of the County are ranked as having moderate to very high wildfire hazard ratings. Similarly, an analysis of the WUI by Marin County Fire Department revealed that there are 56,534 developed parcels (with 68,599 living units) totaling 59,121 acres in Marin County, which have an assessed value of $38.2 billion.

Marin County will continue reducing this hazard using an integrated approach that includes the following elements: (1) ridge top fuelbreak network, (2) fire-prone forest clearing, (3) access improvements, (4) wildfire awareness campaign, and (5) International Urban-Wildland Interface Code (with extensive Marin County amendments) implementation. The location of nearly 70 miles of fuel breaks have been identified and will be constructed and maintained along ridge top emergency access roads, highways, and other existing barriers. About 10 percent of this fuelbreak network is already in place. Bluegum eucalyptus and Monterey pine forest within and immediately adjoining created fuelbreaks will be cleared. Overgrown roadside vegetation will be trimmed and turnouts will be improved along primary access roads in interface communities. Our wildfire awareness campaign encourages individual and community responsibility for creating fire-safe conditions. Finally, the International Urban-Wildland Interface Code is being enforced; this code combines building standards, fire apparatus access, and fire-fighting water supply, and defensible space/vegetation management requirements to reduce losses caused by wildfire.

Even though the Marin County Fire Department has been successful in controlling a large portion of all wildland fires within its jurisdiction, one only needs to examine our fire history to understand the risk our communities face. Being able to identify areas where cost-effective, pre-fire management investments can be made will help minimize citizen losses and reduce costs from a major wildfire.

County description

The fire environment of a community is primarily the product of two factors: the area's physical geographic characteristics and the historic pattern of urban-suburban development. These two factors create a mixture of environments which ultimately determines the area's fire-protection needs.

The basic geographical boundaries of Marin County include National and State Park lands along the Pacific Ocean to the west and south, several suburban communities neighboring the Highway 101 corridor and San Francisco baylands to the east, and rural Sonoma County to the north.

Because of the size of Marin County and its varied microclimates, the characteristics of the fire environment are quite heterogeneous. As such, Marin County has not one, but numerous fire environments, each of which has its individual fire protection demands.

Furthermore, Marin County has varied topography and vegetative cover. A conglomeration of hills and ridges, with vegetative cover ranging from open grass lands studded with oak to dense forests of Douglas-fir, bishop's pine and coast redwood make up the terrain. Development has occurred as the communities along the Highway 101 corridor have extended west. In addition, development has further spread into the hills and the smaller valleys and canyons of the San Geronimo Valley, Nicasio and Point Reyes Station.

Size and Population. Marin County covers nearly 520 square miles with a population estimated at 252,000. The Marin County Fire Department (MCFD) serves the largest geographic area in Marin County. Within MCFD's service area are six (6) fire stations and a total of 86 fire department personnel. The MCFD is an all risk agency that provides a full range of emergency response services including Emergency Medical Services (EMS), Urban Search and Rescue (USAR) and water rescue teams, structural and wildland fire protection, fire prevention, public education, and hazardous material discharge response. As one of six contract counties with the State of California Department of Forestry and Fire Protection (CAL FIRE), the department is responsible for the protection of 205,000 acres of State Responsibility Area (SRA) within the county. MCFD's contract also includes the responsibility of preparing and periodically updating a Community Wildfire Protection Program (CWPP) for Marin County, and managing and enforcing vegetation management and defensible space regulations in the Marin County SRA. In addition to MCFD, there are twelve additional fire agencies within Marin County (three of which are staffed with volunteers and a paid/full-time Chief).

Roads and Streets. Lengthy cul-de-sacs generally service new developments in the County. Cul-de-sacs and dead-end roads serve most of the smaller canyons, valleys, and hillsides, as well. Some planned unit developments are served by private roads, which create access problems (i.e., narrow paved widths and limited on-street parking). Roadways with a width of less than 20 feet of unobstructed paved surface, with a dead-end longer than 150 feet, with a cul-de-sac longer than 800 feet, or with a cul-de-sac diameter less than 68 feet, are considered hazardous in terms of fire access and protection. A large number of roadways within Marin County fall into one or more of the above four categories.

Topography. Marin County is a mosaic of rolling hills, valleys and ridges that trend from northwest to southeast. Flat lands are found in the central and northern portions of the County. Most of the existing urban and suburbanized areas are on relatively flat lands (0 – 5% slope). Future residential development is expected in the hill areas of the San Geronimo Valley, Lucas Valley/Nicasio and Point Reyes Station. In addition, as the value of parcels increases, more marginal lots along Throckmorton Ridge/Panoramic Highway are being developed. The majority of the hillsides and ridges in these areas have slopes ranging from 15 – 30%, and some are 30+%. Elevations are varied within the county, for example; Mt. Tamalpais rises 2,600 feet above sea level; Marin City and Point Reyes Station are approximately 20 feet above sea level; the San Geronimo Valley rests at 485 feet; and the Throckmorton Fire Station is at 1,160 feet

above sea level. Correspondingly, there is considerable diversity in slope percentages. San Geronimo Valley's slopes run from level (in the valley, itself) to near 70%; Mt. Barnabe has slopes that run from 20 to 70%; and Throckmorton Ridge's slopes run from 40 – 80%. Slope is an important factor in fire spread. As a basic rule, the rate of spread will double as the slope percentage doubles, all other factors remaining the same.

Vegetation. Marin County's semi-arid climate produces vegetation with specific growth as a result of local topography, proximity to the coast and prevailing wind. In the central and eastern portions of our service area, the south facing exposure is primarily perennial Rye Grass with occasional clumps of California Bay and Coast Live Oak trees in the more sheltered pockets. The north facing slopes are heavily wooded from lower elevations to ridge with Oak and Bay trees and minor shrubs of the general chaparral class. Many areas in the western portion of our district are heavily forested with Bishop's Pine, Douglas-Fir and Coast Redwood. Expansion of the residential community into areas of heavier vegetation has resulted in homes existing in close proximity to dense natural foliage. Often such dwellings are completely surrounded by highly combustible vegetation compounding the fire problem from a conflagration point of view.

Marin County Fire Service Preparedness and Firefighting Capabilities

The MCFD is an all risk agency that provides a full range of emergency response services including Emergency Medical Services (EMS), Urban Search and Rescue (USAR) and water rescue teams, structural and wildland fire protection, fire prevention, public education, and hazardous material discharge response. As one of six contract counties with the State of California, the department is responsible for the protection of 205,000 acres of State Responsibility Area (SRA) within the county. Significantly, the MCFD staffs an Emergency Command Center (ECC) that dispatches for MCFD and local volunteer fire departments, coordinates wildland incidents within the SRA and FRA, and may act as the County of Marin's Office of Emergency Services (OES) coordination center for fire dispatching. During peak season preparedness, MCFD resources include:

MCFD Resources	City/District Resources
59 Personnel	140 Personnel
6 Fire Stations	34 Fire Stations
7 Engines	57 Engines
1 Transport/bulldozer	1 Transport/bulldozer
2 Water Tenders	1 Water Tender

The MCFD also participates in local and state mutual aid and auto aid agreements, and various contracts for service:

Memorandums of Understanding/Automatic Aid Agreements

The Marin County Fire Department is one of six counties who contract with CalFire to provide all-risk emergency services to state responsibility areas. In addition to this contract there is a well-organized local mutual aid system in Marin County based on the principles of resource sharing and cooperation, the goal of which is to provide the public with the highest level of service no one agency is equipped to provide. These agreements include resources from all fire agencies, law enforcement, volunteer fire departments, the Office of Emergency Services (OES), the National Parks Service (NPS) agencies CALFIRE, and local landowners. When MCFD resources are drawn down to a minimum standard while providing assistance to other agencies through the mutual aid system or assistance by hire process, off-duty personnel and reserve equipment are used to maintain standard operational readiness in all of MCFD's responsibility zones.

The following is a list of the mutual aid agreements/plans in which MCFD participates:

- Marin County Mutual Threat Zone Response Plan
- Southern Marin Mutual Threat Zone Plan
- Marin County Mutual Aid Agreement
- County of Marin Urban Search and Rescue MOU
- County of Marin Office of Emergency Services MOU
- State of California Master Mutual Aid

In addition, MCFD provides resources to local stakeholders through various agreements that do not include an annual revenue resource, but in some cases funds are recovered through an assistance-for-hire agreement.

- Marin Municipal Water District
- Skywalker Ranch Fire Brigade
- National Park Service
- Point Reyes National Seashore
- Golden Gate National Recreation Area
- Muir Woods National Monument

The MCFD has maintained an independent dispatch center since the 1930s. The Emergency Command Center (ECC) functions to receive, disseminate, and transmit information to field units. The ECC has the additional responsibility to act in a supervisory role for incidents prior to the arrival of field units. The ECC also acts as the central ordering point for all state resources that are committed to SRA incidents in Marin County. In addition to the State Responsibility Areas, the ECC acts as a central ordering point for Region II OES requests and OES coordination of local government resources entering or leaving the County of Marin Operational Area.

The ECC is staffed by one 24-hour dispatcher year round. Beginning in the spring each year, a dispatch clerk is hired to work 10 hour shifts, 7 days a week through the end of fire season (generally May 1 through October 31), supplementing the dispatcher. During complex

emergencies the ECC utilizes a call back system to assist in up-staffing for large scale emergencies and has the ability to set up an expanded dispatch center when necessary. The ECC processes approximately 3,000 calls annually, and is also responsible for handling all business calls received by the department. In 2005, the ECC was remodeled and upgraded to incorporate a Computer Aided Dispatch (CAD) system. Additionally, to order, fill, and track requests for OES and State resources, the ECC uses a statewide intercom system and the Resource Ordering Status System (ROSS).

The California Legislature has directed the Board of Forestry, the California Department of Forestry and Fire Protection, and contract counties including Marin to deliver a fire-protection system that provides an equal level of protection for lands of similar type (Public Resources Code §4130). To evaluate this standard, County Fire used an analysis process that defines a level of service rating that is applied to the wildland areas. The rating is expressed as the percentage of fires that are successfully extinguished with initial-attack resources. The level of service rating provides a powerful tool for setting program priorities and defining program benefits. The level of service rating also provides a way to evaluate the contribution of various program components (fire prevention, fuels management, engineering and suppression) toward the goal of keeping damage and cost within acceptable limits. During the most recent five year period for which data is available (2005-2010), a total of 318 wildland fires occurred within MCFD's. Vehicular and power line fires were the two most common known causes of fires. Fires ranged in size from small roadside spots to 330 acres, averaging 1.0 acre (excluding the two largest fires). Extended attack was required in all cases where fires burned more than 10 acres; additional support in the form of a hand crew was also needed where fires burned in heavy fuels. Level of Service is calculated as follows:

Fires Extinguished by Initial Attack	308
Total State Responsibility Area Fires	318
Level of Service = ------ x 100 =	**97%**

Collaboration

Community / Agencies / FIRESafe Council

Representatives involved in the development of the MCFD's Strategic Fire Plan are included in the following table. Their organization and title are indicated below:

Plan Development Team:

Organization	Title
Marin County Board of Supervisors	Susan Adams, Board of Supervisors
Marin County Fire Department	Scott D. Alber, P.E., Fire Marshal
FIRESafe Marin	Lynne Osgood, Council Coordinator
Marin County Fire Chiefs' Association	Mark Horick, President
National Park Service	Roger Wong, Fire Chief
Marin Municipal Water District	Michael Swezy, Watershed Superintendent
California State Parks	Danita Rodriguez, Superintendent
Pacific Gas & Electric Company	Daniel Kida, North Bay Forester

Values

Values at risk are defined as important resources that can be damaged or destroyed by wildland fire. In addition to protecting citizen and firefighter safety, the California Fire Plan identifies the following assets warranting consideration in pre-fire planning: watersheds and water, wildlife, habitat, special status plants and animals, scenic, cultural and historic areas, recreation, rangeland, structures, and air quality.

The Marin Municipal Water District is the oldest private water purveyor in the State of California. The Mt. Tamalpais watershed, feeding a system of six reservoirs, supplies central and southern Marin County with 75% of their fresh water. Given the area's seasonal rainfall, any major wildfire impacting the heavily forested watershed will result in major silting and subsequent degradation of water quality in the watershed.

This watershed—as well as lands managed by Marin County Open Space, State Parks, and the National Park Service—are largely contiguous. They harbor several endangered, threatened, and special-status species. Two prominent species that come to mind are coho salmon and northern spotted owl. The area is also part of a major migrating bird flyway and nesting area.

Marin County is also a major tourist destination. The California State Parks (Mt. Tamalpais, Samuel P. Taylor, China Camp, and Stinson Beach), the National Park Service's Golden Gate National Recreation Area, Muir Woods National Monument, and Pt. Reyes National Seashore attract 2.5 million visitors annually. A major wildfire affecting any of these attractions would have an enormous impact on the local economy for years after the event.

Marin County's agricultural land base includes nearly 137,000 acres of privately owned agriculturally zoned land and 32,000 acres of federally owned land that is leased to agricultural operators. Types of agricultural operations include cow/calf, dairy, sheep, row crops, grapes, hay/silage, tree crops, poultry/eggs, aquaculture, cut flowers, and nursery crops. The gross value of all agricultural production was $56,181,338 in 2010.

Finally, there are 68,599 living units in the County's identified Wildland-Urban Interface, with an assessed value of $38.2 billion. The impact of a major wildland fire on Marin County's property tax base, and hence the County's budget would be catastrophic. As such, we have focused on the most highly valued asset—structures—with the greatest at-risk structures within the wildland-urban interface.

Communities

To help protect people and property from potential catastrophic wildfire, the National Fire Plan allocates funding for projects designed to reduce the fire risks to communities. A fundamental step in achieving this goal was the identification of communities that are at high risk of damage from wildfire. With California's extensive Wildland-Urban Interface situation, the list of communities extends beyond just those adjacent to Federal lands. There are 1,287 communities

currently on the California Communities at Risk List. Marin County has 23 communities at risk that are tabulated below.

Community	California At-Risk	Federal Threat	Federally Regulated
Bolinas	√	√	√
Corte Madera	√		
Fairfax	√		
Inverness	√	√	√
Inverness Park	√	√	
Kentfield	√		√
Lagunitas-Forest Knolls	√	√	√
Larkspur	√	√	
Lucas Valley-Marinwood	√		
Marin City	√	√	√
Mill Valley	√	√	√
Novato	√		
Olema	√	√	√
Ross	√		
San Anselmo	√		
San Rafael	√		
Santa Venetia	√		
Sausalito	√	√	√
Stinson Beach	√	√	√
Strawberry	√		√
Tamalpais-Homestead	√	√	√

Valley			
Tiburon	√		
Woodacre	√		

Pre-Fire Management Strategies

Fire Prevention

The Fire Prevention Bureau in Marin County is staffed with three full-time personnel, the Fire Marshal, Forester, and Pre-Fire Engineer. The Fire Marshal/Battalion Chief is responsible for managing all of MCFD's fire prevention programs, which include MCFD's engine company residential defensible space and business inspection programs, land development plan reviews and construction inspections, all fire alarm and suppression system plan reviews, fire investigations, inspections of Hazardous and Assembly occupancies, as well as code and standard development.

The Forester and the Pre-Fire Engineer share joint responsibility for determining where and how to implement vegetation management projects. These projects are developed according to the Community Wildfire Protection Program (CWPP), which they also share responsibility for producing and periodically updating. MCFD uses a variety of methods to manage fire-prone vegetation, including construction of fuel breaks, and "shaded" fuel breaks (by clearing understory vegetation below the forest canopy), developing and writing prescriptions for controlled burns, and conducting fire prone forest/tree removal projects adjacent to assets-at-risk.

In addition to the Bureau's full-time personnel, the Bureau has retained the services of a contract Fire Inspector two-days per week. The Fire Inspector's primary duties are to respond to homeowner defensible space inspection requests and complaints. The Fire Inspector also reviews Vegetation Management Plans (a requirement for all new construction and substantial remodels in the WUI).

As part of their effort to identify assets-at-risk during the development of their CWPP, MCFD has identified its Wildland-Urban Interface Zone (WUI). In essence, this zone identifies communities adjacent to, and/or located in wildland areas intermingled with structures and homes. Based on this analysis, MCFD determined that in the WUI there are 68,599 living units on 64,063 parcels totaling 59,121 acres with an assessed value of $38.2 billion in Marin County.

MCFD has, for the past seven years, approached the mitigation of this threat on two main fronts. One approach utilizes public education (mailers, movie theater "trailers", newspaper opinion pieces, public events and workshops), engine company defensible space inspections, as well as complaint driven Company Officer and Fire Marshal/Fire Inspector inspections. The purpose of these activities is two-fold: to raise the level of public awareness of the wildland fire threat, and to increase and improve the defensible space around structures. Our goal is to reduce ignitions by 10% through public education, enforcement, and inspections.

The other approach is to construct fuel breaks. These fuel breaks are constructed by the Marin County Fire Department's Tamalpais Fire Crew and other local resources. The location and extent of the breaks are determined by conformance with MCFD's CWPP, and availability of grant and other types of funding. The budget for the Tamalpais Fire Crew is provided as a long term "pilot" project funded (from the Marin County General Fund) by the County Board of Supervisors.

The Fire Marshal also serves as a Fire Investigation Team Leader on the Marin County Fire Investigation Team. The Marin County Fire Investigation Team is a multi-agency fire investigation team offering assistance to those agencies requesting fire investigation support on large and/or complex fires, or where the respective agency does not have an investigator available. The team is also included in the Marin County Fire Agency Master Mutual Aid Agreement.

An analysis of MCFD's ignitions for the past several years (2003-2010) indicates that MCFD experiences on average approximately 25 structure fires per year. Similarly, MCFD responds to an average of approximately 60-65 vegetation fires per year. Of the vegetation fires, prevalent identifiable causes include tree branches contacting power lines (or some other power line associated failure), and fires caused by mechanical equipment (hot work, cutting, and agricultural equipment). However, the majority of MCFD's vegetation fires are small, roadside spots of less than a quarter-acre. Although the majority of these fires have been classified as undetermined due to the absence of identifiable ignition mechanisms, many are most probably caused by vehicle exhaust system debris.

Engineering & Structure Ignitability

What are the factors that lead to the ignition of homes during a wildfire event? Recent research indicates that wildland fires progress from a fire involving wildland vegetation only, to embers and wildland vegetation igniting domestic vegetation, which then ignites the adjacent structure. Subsequently, the fire morphs in to a series of structure fires, with involved structures igniting other structures.

As such, in addition to the defensible space available around structures, other factors that lead to structure ignition include the configuration of building elements and the type of construction materials used. For example, in CALFIRE Assistant Chief Ethan Foote's study of Santa Barbara's Paint Fire (1993) for his master's thesis, found that an 86% survival rate for homes with non-combustible roofs and 30 feet of defensible space.

Similarly, research indicates that home ignitibility, rather than wildland fuels is the main cause of home losses during WUI fire events. Recent research findings included the fact that, at the Witch and Guejito fires, two out of every three structures destroyed were ignited by embers. The research clearly shows that the key elements in preventing structure loss are as follows:

- Defensible space immediately adjacent to the subject structure such that adjacent ornamental and domestic vegetation is configured to reduce the possibility of the vegetation transferring the fire to the structure.
- Building and construction systems that reduce the accumulation of embers.
- Maintenance of the subject structure such that embers do not find a receptive fuel bed to propagate and support combustion.

The California Building Code (CBC), Chapter 7A specifically, addresses the wildland fire threat to structures by essentially requiring the fire hardening of structures located in state or locally designated WUI or Fire Hazard Severity Zones. However, these requirements only apply to new construction, and do not address existing structures or remodels and additions to existing structures.

To address home ignitibility in both new and existing construction, MCFD has extensively amended the 2003 International Urban-Wildland Interface Code. As part of these amendments, MCFD applies more stringent building standards, vegetation management (requiring the preparation of a Vegetation Management Plan, per MCFD's VMP Standard), fire apparatus access and water supply requirements to new structures and structures substantially remodeled, located in the WUI.

Included in the aforementioned amendments, MCFD requires structures in the WUI that are being remodeled or altered to comply with a standard specifically developed to require those specific building elements affected by the alterations to be "WUI" compliant. For example, if a window is replaced, the new window is required to be dual-paned with one pane tempered.

Furthermore, MCFD has amended the CFC Chapter 49 requirements for defensible space around existing homes (whose un-amended requirements are identical to the Public Resource Code and Government Code requirements). The MCFD amended version modifies the language of PRC 4291 such that the property line no longer limits the amount of defensible space required around structures.

Information & Education

The information and education programs administered by MCFD are coordinated efforts supported by our command staff, the Fire Prevention Bureau, each of our fire stations' personnel, and our cooperators. These cooperators include the Marin County Sheriff's Office, Marin County OES, FIRESafe Marin, and the Marin County Fire Chiefs' Association.

Information

During emergency events, the public information function is covered 24 hours per day by Incident Command System (ICS) qualified Public Information Officers (PIO's) and by the Emergency Command Center personnel. The overall goal of this function is to keep our constituents, the people of Marin County, informed by providing timely and accurate information to the varied media market in the northern Bay Area. In addition, MCFD is in constant contact with CalFire's Duty Chief regarding fire condition updates and ensures all local dignitaries are regularly briefed with changes or updates.

In addition, the Fire Marshal, EMS Battalion Chief, as well as MCFD's command staff regularly provide press releases, and interviews to media outlets on request. As an adjunct to these activities, the Fire Marshal and EMS Battalion Chief serve as MCFD's representatives on the county Public Information Team (PIT). This group meets once per month and provides a forum for each department to get their respective messages out to other departments and the public, enables the county government to have uniformity in the various departments' messages, training, and opportunities to craft department specific informational videos about their programs.

Education

Annually, thousands of Marin County residents attend community events, such as MCFD's Fire Station pancake breakfasts, community fairs where MCFD and/or FIRESafe Marin sponsor exhibits, CPR, CERT, Ready, Set, Go!, and "Get-Ready", and school programs. Presentations include disaster and wildfire event preparedness, home safety, fire safety, defensible space, and vegetation management.

MCFD, along with many of our cooperators and corporate sponsors recently produced a defensible space and wildland fire preparedness video. The video, "Marin on Fire" has several five minute chapters, covering access, defensible space, making your home ignition resistant, and tips on what to do if a wildfire is approaching your house. MCFD has also released a five minute video whose subject is the few simple things a homeowner can do to increase their home's survival during a wildfire event.

The Fire Chief and Fire Marshal are frequent contributors the local newspaper, as well. They have both written editorial columns on various aspects of fire safety and disaster preparedness, including such topics as winter/holiday home fire safety, and wildfire preparedness.

MCFD strives to make their wildfire and defensible space safety messages consistent with those promulgated by Cal Fire. As part of this effort, MCFD posts Cal-Fire's defensible space flyers

and handouts on their website, and has these brochures available at each of our fire stations' lobbies. MCFD also annually (prior to fire-season) sends out a mailer to every property owner in MCFD's WUI zone. The mailer contains a check-list of MCFD's defensible space and maintenance requirements (per PRC 4291), to be completed by the property owner by the start of fire season. The mailer also includes MCFD's modified Cal-Fire Defensible Space flyer, and offers the homeowner a free-of-charge consultation by fire personnel from their local fire station.

Vegetation Management

Marin County Resource Management Staff administers the following programs that support the Strategic Fire Plan.

- ✓ **Vegetation Management Program (VMP)** – The Vegetation Management Program (VMP) is a cost-share program that applies prescribed fire and mechanical treatments to reduce wildland fire fuel hazards and address other resource management issues within State Responsibility Area (SRA) lands. Use of prescribed fire models natural processes, restores fire to its historic role in wildland ecosystems, and provides significant fire-hazard-reduction benefits that improve public and firefighter safety.

- ✓ **Grant-Funded Fuel Treatments** – These projects generally involve the construction and maintenance of ridge top fuel breaks that are planned from Sausalito to Lagunitas. Removal of fire-prone stands of trees such as eucalyptus and pine are also used to mitigate fire hazards.

- ✓ **Tamalpais Fire Crew** – The Marin County Board of Supervisors funds a 13-person fire crew that is available for project fuel break construction and both initial attack and mop-up fire suppression activities.

- ✓ **Marin on Fire Video** - "Marin on Fire" has several five minute chapters, covering access, defensible space, making your home ignition resistant, and tips on what to do if a wildfire is approaching your house. MCFD has also prepared a five minute video whose subject is the few simple things a homeowner can do to increase their home's survival during a wildfire event.

- ✓ **Defensible Space Mailer**- MCFD sends its mailer with a PRC 4291 checklist to all residents within MCFD's WUI zone. The checklist consists of defensible space

requirements to be completed by the property owner by the start of fire season. The mailer also includes MCFD's modified Cal Fire Defensible Space flyer, and offers the homeowner a free-of-charge consultation by fire personnel from their local fire station.

- ✓ **Creekside Guide to Fire Safe and Fish Friendly Best Practices**- MCFD prepared and distributed a brochure to 600 creek side residents in the San Geronimo Valley. This brochure provided guidance to concerning methods for controlling flammable vegetation near homes while protecting Coho salmon habitat.

- ✓ **4291 Stand Down** – For the 2012 Fire Season, and in conjunction with MCFD's Defensible Space/4291 flyer mentioned above, MCFD assigned its seasonal firefighters to go door-to-door in each station's response zone's target hazard areas. While at each residence, the firefighters would make contact with the occupant/homeowner, conduct a vegetation management/defensible space inspection, and offer tips and suggestions on how to comply with the regulations. If the homeowner was not present or unavailable/unwilling to participate in the inspection, a door-hanger was left at the residence explaining the process and the areas where the residence fell short of the requirements. The inspections are also being followed up with subsequent re-inspections by station personnel. With this effort, MCFD inspected over 1,800 residences in one weekend.

Pre Fire Management Tactics

Division / Battalion / Program Plans

Wildland-Urban Interface Situation

Marin County includes densely populated urban cities and towns along the eastern Highway 101 corridor from the Golden Gate Bridge northward to Novato. Geographically, Marin is a large, southeast-trending peninsula, with the Pacific Ocean to the west, San Pablo Bay and San Francisco Bay to the east, and across the Golden Gate, the city of San Francisco to the south. Marin County borders Sonoma County to the north. Elevation ranges from sea level to the peak of Mount Tamalpais at 2,574 feet. Unincorporated rural villages within the County include coastal communities (Muir Beach, Stinson Beach, and Bolinas), communities near Tomales Bay (Olema, Point Reyes Station, Inverness, Inverness Park, Marshall, Tomales, and Dillon Beach), and rural villages in the interior valleys (Nicasio, Lagunitas, Forest Knolls, San Geronimo, and Woodacre). The communities above are primarily situated within or adjacent to the Wildland-Urban Interface, with dense to moderate concentrations of structures. Marin County has 200,000 acres of watershed with significant WUI problems. Response times present significant challenges to keeping fires from directly impacting communities and sub-divisions. Emergency fire access to most Marin communities (especially those within SRA) is limited by narrow, winding roads lined with dense vegetation. Evacuation maps have been developed by the Marin County Sheriff's Office of Emergency Services, the Marin County Fire Department and local police and fire agencies.

Fuels

Plant communities in Marin County are generally defined by the northwest-trending ridges that pass through the County, where non-native annual grasslands dominate south-facing aspects and mixed evergreen forest dominates the north-facing slopes and valleys. Grassland types include coastal prairie and valley grassland; shrubland types include chamise chaparral, Manzanita chaparral, mixed chaparral, serpentine chaparral, coyote brush scrub, and coastal sage-coyote bush shrub; forestland types include coast live oak-California bay-madrone forest, tanbark oak-madrone-live oak-Douglas fir forest, Douglas-Fir Forest, coast redwood forest, bishop pine forest, eucalyptus forest, Monterey pine forest and oak woodland/savannah. Livestock grazing in western Marin generally keeps grasslands short. Conversion of extensive, historically grazed lands in federal and state parkland areas has succeeded to shrubland and timberland. Most vegetation types in Marin present a fire-control problem owing to overgrown

conditions due to years of successful fire suppression. Sudden oak death and planted fire-prone forests have also added to the fire problem.

Weather and Fire History

The predominant summer weather pattern includes a strong coastal influence with coastal low clouds and fog in the evening and morning hours, clearing to sunshine and mild temperatures in the afternoon. The potential for large, wind driven fires is great in Marin, especially under Diablo (foen) wind conditions that occur in autumn. Under these conditions, fire operations are limited by high fire intensities that create extreme fire behavior conditions: long-range spotting, high rates of spread, and long flame lengths. Marin County also has an extensive history of significant wildfires. This history includes 1929's Mill Valley Fire, which destroyed 117 homes valued at over $1 million in 1929 dollars. A fire today with the same footprint would destroy approximately 1,000 structures with an assessed value of $713 million (Marin County Assessors' 2011 Parcel Data). The most recent significant wildfire in Marin County was 1995's Vision Fire. This fire destroyed approximately 50 structures, with a value of $23 million.

Indirect attack is the most likely control method under these conditions. Historically the largest and most destructive fires have occurred during these Diablo wind events. Most recently the Angel Island Fire (in October of 2008) consumed over 300 acres (although no structures were affected).

Battalion Priorities

- Compliance inspections (4291), the number of structures located within the department's sphere of influence make this a challenge. Significant staff and department resources devoted to this program have resulted in great progress both with numbers of inspections conducted and compliance.
- Community evacuation drills remain a department priority; the next is scheduled for October 2012 encompassing Throckmorton Fire Station's response zone.
- Continue to educate and prepare communities emphasizing READY SET GO.
- Continue implementation of countywide fuel break and fire plan implementation.
- Cut, pile and burn 1200 piles of volatile fuel in the prescribed project areas.

APPENDIX A: HIGH PRIORITY PRE-FIRE PROJECTS

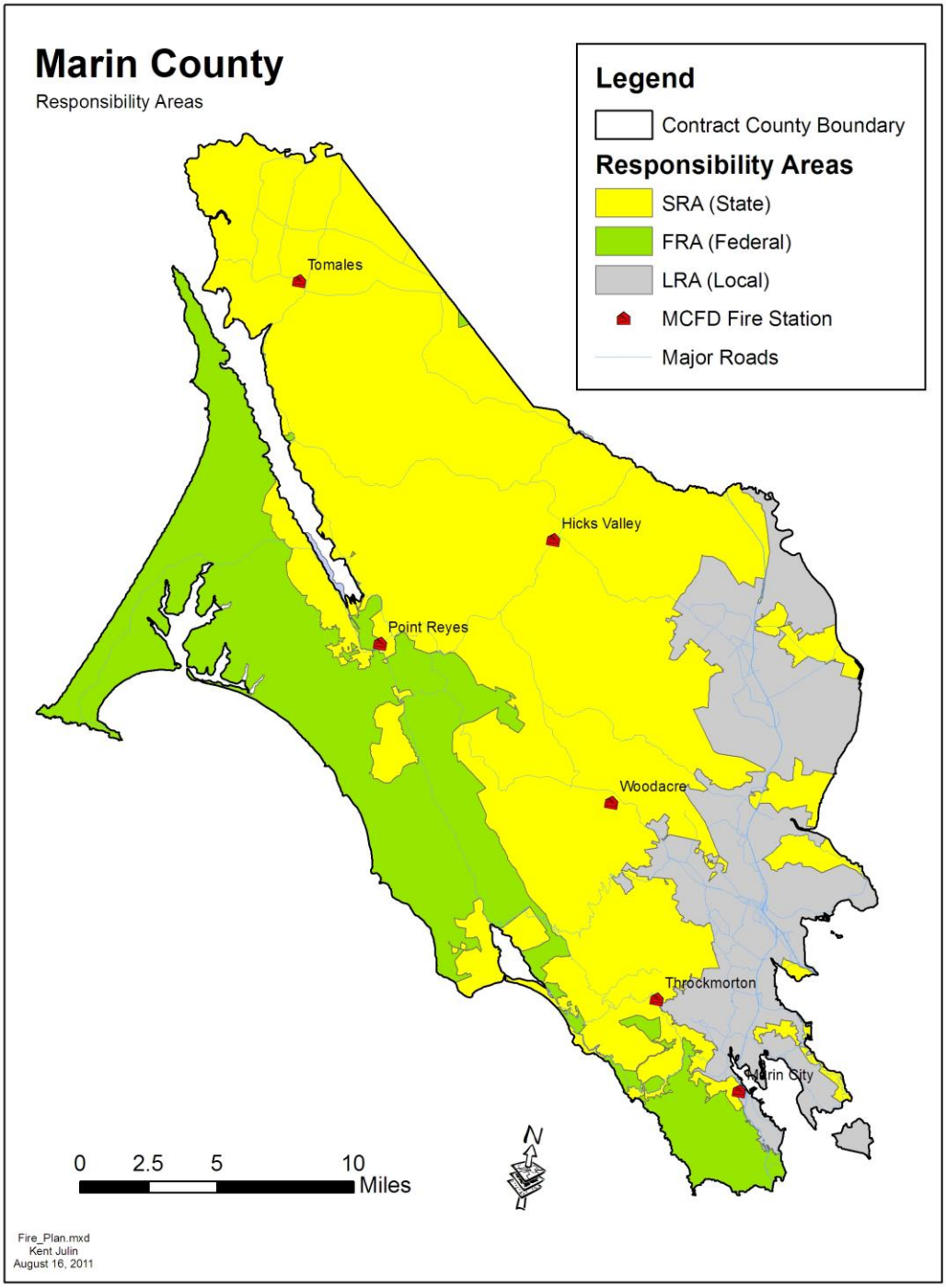
Batt	Project Number	Project Name	Status	Estimated Completion Year	Project Type	Net Acres
MRN	RX North-048-MRN	MMWD VMP	P	2014	VMP Burn	481
MRN	RX North-049-MRN	Throckmorton Ridge Fuelbreak	A	2012	Fuel Break	122
MRN	-	TCSD Fuels Management	A	2012	Fuel Break	49
MRN	-	Muir Beach Pine Removal	A	2011	Tree Removal	11
MRN	-	Smith Eucalyptus Removal	A	2011	Tree Removal	1
MRN	-	Sausalito Fuel Break	A	2015	Fuel Break	56
MRN	-	Marin City Fuel Break	A	2015	Fuel Break	32
MRN	-	Tam Valley Fuel Break	A	2015	Fuel Break	73
MRN	-	Homestead Valley Fuel Break	A	2015	Fuel Break	58
MRN	-	Mill Valley Fuel Break	A	2015	Fuel Break	61
MRN	-	Kent Woodlands Fuel Break	A	2015	Fuel Break	53
MRN	-	San Anselmo Fuel Break	A	2015	Fuel Break	36
MRN	-	Fairfax Fuel Break	A	2015	Fuel Break	63
MRN	-	Woodacre Fuel Break	P	2015	Fuel Break	75
MRN	-	San Geronimo Fuel Break	P	2020	Fuel Break	82
MRN	-	Blithdale Ridge Fuel Break	A	2015	Fuel Break	44
MRN	-	Bolinas Ridge Fuel Break	P	2015	Fuel Break	315
MRN	-	Cascade Canyon Fuel	A	2015	Fuel Break	41

Batt	Project Number	Project Name	Status	Estimated Completion Year	Project Type	Net Acres
		Break				
MRN	-	Corte Madera Ridge Fuel Break	A	2015	Fuel Break	32
MRN	-	Highway One Fuel Break	P	2020	Fuel Break	145
MRN	-	Inverness Ridge Fuel Break	P	2020	Fuel Break	65
MRN	-	Iron Spring Road Fuel Break	A	2015	Fuel Break	22
MRN	-	Kent Woodlands North Fuel Break	A	2015	Fuel Break	24
MRN	-	Kent Woodlands South Fuel Break	A	2015	Fuel Break	48
MRN	-	Mt. Vision Road Fuel Break	P	2020	Fuel Break	46
MRN	-	Limantour Fuel Break	P	2020	Fuel Break	102

Batt	Project Number	Project Name	Status	Estimated Completion Year	Project Type	Net Acres
Unit	---	MMWD VMP	P	2014	VMP Burn	481
Unit	RX North-048-MRN	Throckmorton Ridge Fuelbreak	C	2012	Fuel Break	122
Unit	---	TCSD Fuels Management	C	2012	Fuel Break	49
Unit	n/a	Muir Beach Pine Removal	C	2011	Tree Removal	11
Unit	---	Smith Eucalyptus Removal	C	2011	Tree Removal	1

Status Guide: A = Active, P = Planning, C = Completed, O = Ongoing, M = Maintenance.

EXHIBIT: CONTRACT COUNTY MAP



SUPPLEMENT: 2012

Annual Report of Unit Accomplishments

The Marin County Fire Department accomplished the following in 2011-2012 in support of our Strategic Fire Plan:

1. *Produced the video entitled: Protect Your Home from Wildfire. http://www.youtube.com/watch?v=DBYzq-0DveI;*

2. *Amended Chapter 49 of the 2010 California Fire Code by extending our defensible space requirements across property lines onto adjoining parcels including vacant properties;*

3. *Conducted 1,900 inspections during our 2012 §4291 Blitz in some of our highest hazard neighborhoods where 545 first-notice violations were issued;*

4. *Finished the Throckmorton Ridge Fuel break Project that cleared 122 acres of flammable brush;*

5. *Removed more than 300 diseased Monterey pines from the Muir Beach Community;*

6. *Created the Creekside Guide to Fire Safe and Fish Friendly Best Practices for the San Geronimo Valley to protect homes and the federally listed Coho salmon;*

7. *Mailed out more than 6,000 Green Card Notifications (§4291 requirements) to residents (with return correspondence required) concerning implementation of defensible space requirements;*

8. *As part of the National Fire Academy's Executive Fire Officer Program (Executive Analysis of Community Risk Reduction), analyzed the effectiveness of Marin County Fire Department's Vegetation Management and Defensible Space Programs* .Forms) .

Flood

Types of Flooding

- **Waterways**

Floods are generally classed as either slow-rise or flash floods. Slow-rise floods may be preceded by limited warning time. Evacuation, sandbagging and other preventative measures for a slow-rise flood may lessen flood-related damage. Conversely, flash floods are difficult to prepare for due to extremely short warning time. Flash flood warnings usually require immediate action within the hour. Flood waters can cause road closures and sweep away objects and people.

Areas that experience occasional flooding are found in various locations throughout Marin County mainly affecting roads. The county's floods historically have caused road closures, landslides, debris flows, erosion, and sewer problems. Creeks often overflow in low lying areas when heavy rainfall is combined with high tide conditions.

- **Debris Flow**

In Marin County, flash flooding is not as critical a threat as is the debris flow including landslides caused by excessive rainfall that can cause serious damage.

- **Coastal Flooding**

Winter storms can generate heavy wave action along the coastal areas of Marin which, combined with high tides, can initiate flooding along the ocean and bay coastlines. Utilities in flood damaged buildings can result in gas leaks and electrical hazards. Resulting sewage and water line damage from floods are critical sanitation and health hazards.

- **High Tides**

Large volumes of water move into and out of San Francisco Bay as the tidal level of the Pacific Ocean just outside the Golden Gate changes each day. High astronomical tides over 7 feet are known to occur during winter storm weather causing flooding along the coast and impacting lands adjacent to Bay and River fronts.

Marin County Flood History

In recent history, the winter storms of 1970, 1973, 1982, 1983, 1986, 1998, 2005 and 2006 caused significant damage. Novato Creek in the northern part of the county historically caused damage to large numbers of homes in the 1960's until the Novato Flood Control Project was completed in eight construction phases starting in the 1980's and continuing through 2006. Novato still experiences some damage during significant winter storms despite the completed Novato Creek Flood Control project.

Corte Madera Creek has had a history of flooding with the largest recorded flow in the winter of 1982 and more recently in December 2005 and January 2006, causing severe damage to the surrounding communities. Widespread localized flooding occurred in almost all areas of the County in the 2006 winter storm. San Anselmo, Ross, Fairfax, and Mill Valley were the most heavily impacted. Power outages peaked at 10,000 customers in January. Nine schools closed due to mud, water and road damages and over 20 major roads were closed during the early part of the storm. Two levies in the Novato area were damaged. Over a thousand homes, apartments and businesses were damaged or destroyed. Listed below is a summary of cost for infrastructure losses:

Losses from the 2006 Winter Storm (in 2006 dollars):

Public Sector:

Incorporated Areas & Special Districts	$ 15,291,500
Unincorporated Areas	$ 16,355,000
Public Sector Total	$ 31,646,500

Private Sector:

Homes, Business, etc - Incorporated Areas	$ 54,595,380
Homes, Business, etc - Unincorporated Areas	$ 8,595,000
Private Sector Total	$ 63,190,380
Total Calculated Loses	$94,836,880

Although the current Corte Madera Creek Flood Control project is nearly complete (Unit 4 in the Town of Ross is yet to be constructed), flooding will still occur for storms greater than a 5-year recurrence flood event. Potentially all nine southerly and some centrally located communities of Marin County on this creek are impacted by high tides and heavy rains in above average winter storms. The north-east part of the county, densely populated around the floodplain zones, is threatened every winter and still experiences some damage during winter storms despite the completed Novato Creek Flood Control project. (See Urban Marin Watershed Map Figure 2).

Figure 3 Flood of 1925: Ross business district. (Photo: Courtesy of Marin History Museum)

Figure 4 Flood of 1982: San Anselmo. (Photo: Courtesy of San Anselmo History Museum)

Figure 5 Flood of December 31, 2005: San Anselmo. (Photo: Marin County Department of Public Works)

Profiling Flood Hazard Events

- **FEMA Flood Zones**

The term “100-year flood” may be misleading. It is not the flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1- percent chance of being equaled or exceeded each year. The 100-year flood refers to the National Flood Insurance standard used by most Federal and State agencies. The various flood hazard zone designations are approximate methods that are based on base flood elevations or depths within each zone.

FEMA Flood Zones	Total Acres	100-yr Flood Plain (Q3 Zone A or V)	500-yr Flood Plain or Other Concern (Q3 Zone X500)
TOTAL RESIDENTIAL LAND (excluding mixed use):	30,229	2,032	1,069
1 unit/1-5 acre lot (Rural Residential)	11,148	292	63
1-3 units/acre (Not Mobile Home Parks)	8,719	573	179
3-8 units/acre (Not Mobile Home Parks)	8,213	845	514
>8 units/acre, Multifamily, Groups	1,953	271	279
Mobile Home Parks	196	51	33
TOTAL INDUSTRIAL [excluding mixed]:	592	190	114
Salvage/Recycling, Mixture or Unknown	592	190	114

TOTAL MAJOR INFRASTRUCTURE:	10,149	1,750	701
Roads, Highway and Related Facilities	9,644	1,514	674
Airports	113	113	0
Ports	9	1	4
Infrastructure--Other, Unknown	383	123	23
TOTAL MILITARY:	286	204	0
General Military	286	204	0
TOTAL COMMERCIAL/SERVICES	6,120	1,654	699
Subtotal-Commercial:	5,666	1,542	669
Retail/Wholesale	156	87	11
Research/Office	107	0	0
Other, Mixture or Unknown	5,402	1,454	658
Subtotal-Education:	54	19	8
Elementary/Secondary	3	3	0
Colleges/Universities	51	15	8
Subtotal-Hospitals/Health Care Facilities	256	21	0
Trauma Center Hospitals	49	6	0
State Prisons	207	16	0
Subtotal-Public Institutions:	144	72	21
Convention Centers	73	60	0
City Halls/County Administration	55	9	18
Local Jails	8	0	0
Other-Comm. Centers/Libraries	9	3	3
TOTAL URBAN OPEN:	5,409	627	310
Golf Courses	1,083	52	137
Cemeteries	225	42	0
Parks	360	103	17
Vacant--Undeveloped	3,559	363	144
Mixed Urban Open, Including Parks	182	65	11
TOTAL AGRICULTURE:	8,379	3,395	16
Cropland and Pasture	8,293	3,375	16
Orchards/Groves/Vineyards	9	9	0
Farmsteads and Inactive	77	11	0
TOTAL RANGELAND:	156,110	8,889	278
Herbaceous Range	141,325	8,108	150

Shrub and Brush	12,556	531	30
Mixed Range	2,229	250	97
TOTAL WETLANDS (USGS Mapping):	3,760	1,533	13
Forested	329	82	1
Non-Forested	3,431	1,451	12
TOTAL FOREST LAND:	106,231	1,283	49
Deciduous	5,508	192	2
Evergreen	67,893	588	32
Mixed Forest	32,830	503	14
TOTAL SPARSELY VEGETATED:	38	0	0
Mines/Quarries		0	0
	Total Acres	100-yr Flood Plain (Q3 Zone A or V)	500-yr Flood Plain or Other Concern (Q3 Zone X500)
TOTAL URBAN LAND:	52,784	6,457	2,893
TOTAL NON-URBAN LAND:	274,517	15,100	355
GRAND TOTAL:	327,302	21,558	3,248

- **Total Repetitive Flood Loss**

The Federal Emergency Management Agency (FEMA) insures properties against flooding losses in the Bay Area through the National Flood Insurance Program. Those properties that have had more than one insured flood loss are called repetitive loss properties.

City and County	Total Payment ($)	Average Payment ($)	Losses	Res. Prop.	Comm. Prop.	Total Prop.	Total Prop. (as of 2004)
Marin County (unincorporated)	3,922,078.96	17,052.52	230	75	12	87	55
Belvedere	71,271.84	17,817.96	4	2	0	2	1
Corte Madera	470,210.34	31,347.36	15	4	3	7	4
Fairfax	464,153.24	22,102.54	21	6	0	6	3
Larkspur	295,608.01	14,780.40	20	4	2	6	4
Mill Valley	404,816.78	13,058.61	31	5	6	11	8
Novato	1,204,606.78	12,291.91	98	36	1	37	29

Ross	1,582,514.94	37,678.93	42	13	0	13	4
San Anselmo	97,285.14	13,897.88	7	3	0	3	3
San Rafael	1,746,590.19	17,642.33	99	21	13	33	31
Sausalito	205,535.01	13,702.33	15	1	3	5	4
Tiburon	47,255.39	7,875.90	6	3	0	3	3

Figure 6 Repetitive Flood Loss Properties Last modified: June 30, 2011

- **FEMA Flood Insurance Rate Maps**

All printed panels of the FEMA Flood Insurance Rate Maps for the communities listed below are incorporated as part of the Marin County Local Hazard Mitigation Plan.

NFIP Community Numbers: Marin County

Community	Number
Belvedere	060429
Corte Madera	065023
Fairfax	060175
Larkspur	065040
Mill Valley	060177
Belvedere	060178
Ross	060179
San Anselmo	060180
San Rafael	065058
Sausalito	060182
Tiburon	060430
County of Marin	060173

Dam Failure Inundation

Dam inundation, or flooding which occurs as the result of structural failure of a dam, poses a serious threat to specific areas within the county. Although there is no history of major dam failure in the county, dams that could have serious impacts include: Alpine, Bone Tempe, Dolcini, Hagmaier North, Lagunitas, Lower Turney, Nicasio, Novato Creek, Peters, Phoenix Lake, Soulajule, Vonsen, and Walker Creek.

Dam Failure Inundation	Total Acres	Within Dam Inundation Area
TOTAL RESIDENTIAL LAND:	30,229	1,083
1 unit/1-5 acre lot (Rural Residential)	11,148	226
1-3 units/acre (Not Mobile Home Parks)	8,719	198
3-8 units/acre (Not Mobile Home Parks)	8,213	539
>8 units/acre, Multifamily, Group Quarters	1,953	119
Mobile Home Parks	196	2
TOTAL INDUSTRIAL:	592	5
Salvage/Recycling, Mixture or Unknown	592	5
TOTAL MAJOR INFRASTRUCTURE:	10,149	714
Roads, Highway and Related Facilities	9,644	671
Airports	113	0
Ports	9	8
Infrastructure--Other, Unknown	383	35
TOTAL MILITARY:	286	0
General Military	286	0
TOTAL COMMERCIAL/SERVICES:	6,120	503
Subtotal-Commercial:	5,666	457
Retail/Wholesale	156	0
Research/Office	107	0
Other, Mixture or Unknown	5,402	457
Subtotal-Education:	54	19
Elementary/Secondary	3	0
Colleges/Universities	51	19
Subtotal-Hospitals and Health Care Facilities	256	18
Trauma Center Hospitals	49	14
State Prisons	207	5
Subtotal-Public Institutions:	144	9
Convention Centers	73	0
City Halls/County Administration	55	0
Local Jails	8	0
Other-Comm. Centers/Libraries	9	9

TOTAL URBAN OPEN:	5,409	205
Golf Courses	1,083	10
Cemeteries	225	0
Parks	360	39
Vacant--Undeveloped	3,559	144
Mixed Urban Open, Including Parks	182	13
TOTAL AGRICULTURE:	8,379	391
Cropland and Pasture	8,293	386
Orchards/Groves/Vineyards	9	0
Farmsteads and Inactive	77	6
TOTAL RANGELAND:	156,110	1,683
Herbaceous Range	141,325	1,485
Shrub and Brush	12,556	121
Mixed Range	2,229	77
TOTAL WETLANDS [Based on USGS Mapping]:	3,760	372
Forested	329	16
Non-Forested	3,431	356
TOTAL FOREST LAND:	106,231	867
Deciduous	5,508	110
Evergreen	67,893	400
Mixed Forest	32,830	357
TOTAL SPARSELY VEGETATED:	38	0
Mines/Quarries	38	0
	=========	=========
	Total Acres	Within Dam Inundation Area
TOTAL URBAN LAND:	52,784	2,511
TOTAL NON-URBAN LAND:	274,517	3,314
GRAND TOTAL:	327,302	5,824

(APPENDICES Reference Section #4: Landslide, Dam Failure, County Storm Water Pump Stations)

Other Hazards - Minor

Agriculture

Agriculture related hazards are primary concerns affecting environmental quality and the health and welfare of the Marin County population. Approximately 167,000 acres in Marin County are farms or ranches; this amounts to about 50% of the total land in Marin. The average size of a

farm in Marin is approximately 588 acres. Agriculture in Marin contributes over $70 million annually to the local economy.

Drought is a known potential threat to agriculture and vegetation of the county. The Agriculture Department works closely with local growers and ranchers to ensure drought conditions are monitored, evaluated, and disaster aid is sought as needed from the United States Department of Agriculture (USDA).

Pesticide pollution is considered to be an ongoing hazard, primarily due to applications performed by pest control operators and homeowners in the urban and rural areas of the county. Pesticide applications are also made by ranchers and crop producers predominantly in the west part of the County. The Marin County Department of Agriculture/Weights oversees the use of pesticides in Marin County. The Department is committed to protecting our community and beautiful environment by ensuring pesticides are handled and stored properly, and commercial applicators are trained and licensed.

Each year the Department conducts several thousand incoming plant quarantine inspections. Plants are monitored at Federal Express, UPS, nurseries, ethnic markets, aquatic supply stores and marble/tile/slate stores. Inspections are done on foreign wooden crates and pallets for wood boring insects. Approximately 100 Gypsy Moth inspections are performed annually of household goods from eastern states, including hundreds of Glassy-winged Sharpshooter inspections on plant material from infested California counties. The county often rejects shipments of plant material due to invasive and exotic pest interceptions. For more information please visit http://maringovdev/depts/ag.

Terrorism

In addition to the natural and technological hazards we are most familiar with, people face threats of terrorism posed by extremist groups, individuals, and hostile governments. Terrorists can be domestic or foreign, and their threats to people, communities, and the nation range from isolated acts of terrorism to acts of war.

Terrorism is the use of force or violence against persons or property for the purpose of intimidation, coercion, or ransom. Terrorists often use violence and threats to create fear among the public, to try to convince people that their government is powerless to prevent acts of terrorism, and to get immediate publicity for their cause. Act of terrorism can range from threats to assassinations, kidnappings, airline hijackings, bombings, building explosions, mailing of dangerous materials, agro-terrorism, computer-based attacks, and the use of chemical, biological, and nuclear weapons – weapons of mass destruction (WMD)

Explosion, the most common type of terrorist attacks, has caused the most casualties and damage. Explosions cause building collapses and can cause fires, hazardous materials spills, and major communications breakdowns.

Weapons of Mass Destruction (WMD) events present different challenges than other incidents involving mass casualties. WMD events can include attacks involving chemical weapons, biological weapons, radiological, nuclear weapons, and high yield explosives.

Chemical Weapons attacks utilize chemical agents that are poisonous vapors, aerosols, liquids,

and solids and have toxic effects on people, animals, or plants. They can be released by bombs or sprayed from aircraft, boats, and vehicles. They can be used as a liquid to create a hazard to people and the environment. Some chemical agents may be odorless and tasteless. They can have immediate or delayed effects.

Persons involved in a Biological Weapons attack, for example, may take days to develop symptoms and are therefore difficult to identify and control.

A Radiological attack would involve terrorists using radioactive materials employed in medicine, science and industry to produce a "dirty bomb", which would not cause mass destruction, but could disperse radiation over a wide area.

Nuclear Weapons, although least likely, present the most serious threat due to their profound physical impacts on people, buildings, infrastructure, and social systems. Radiation is a primary concern for those exposed and for their descendants.

High-value terrorism targets include military and civilian government facilities, international airports, large cities, and high-profile landmarks. Terrorists might also target large public gatherings, water and food supplies, utilities, economic, and corporate centers.

Tsunami

Tsunamis consist of waves generated by large disturbances of the sea floor, which are caused by volcanic eruptions, landslides or earthquakes. Shallow earthquakes along dip slip faults are more likely to be sources of tsunami than those along strike slip faults. The West Coast/Alaska Tsunami Warning Center (WC/ATWC) is responsible for tsunami warnings.

Tsunamis are often incorrectly referred to as tidal waves. They are actually a series of waves that can travel at speeds averaging 450 (and up to 600) miles per hour with unusual wave heights. Tsunamis can reach the beach before warnings are issued. Associated risks include flooding, contamination of drinking water, ruptured tanks or gas lines, and the loss of vital community infrastructure.

Prior to the recent tsunami impacting Japan, tsunamis have caused loss of life and damaged property in Hawaii, Alaska and the West Coast over the last hundred years. The Alaskan earthquake of 1964 generated tsunami waves affecting the entire California coastline resulting in twelve lives lost and an estimated $17 Million in damages. *Marin County was not severely affected and there is no history of any significant damage caused by Tsunami.*

Some Marin County communities may be vulnerable to tsunamis because of the location and quality of the built environment. The principal exposure will be people, buildings, and infrastructure located in the low-lying potential inundation area. Especially at risk are visitors, hikers, campers, and non-residents who might be on the shore when the tsunami strikes.

Tsunami inundation maps and information specific to Tsunami run up scenarios in Marin were updated in 2012. As part of this project, signage indicating evacuation routes and safety zones is being installed along the coast and informational pamphlets specific to areas of the county are being distributed. Informational pamphlets covering the vulnerable areas of west Marin are available from the Marin County Sheriff's Office OES.

Landslides

Landslides encompass a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on a very steep slope is the primary reason for a landslide, there are other contributing factors:

- Erosion by rivers or ocean waves create over-steepened slopes
- Rock and soil slopes are weakened through saturation by heavy rains
- Earthquakes create stresses that make weak slopes fail
- Earthquakes of magnitude 4.0 and greater have been known to trigger landslides
- Excess weight from accumulation of moisture

In Marin County, landslide movement is a serious hazard threat to the community's infrastructure. Landslides often move slowly and thus may not threaten life directly. When they do move - in response to such changes as increased water content, earthquake shaking, addition of load, or removal of down slope support - they deform or tilt the ground surface. The result can be destruction of foundations, offset of roads, and breaking of underground pipes.

The best predictor of where movement of slides might occur is knowing where they have happened in the past. A small proportion of them may become active in any one year with movements concentrated within all or part of the landside masses or around their edges.

During heavy rainfalls, excessive water consistently triggers mudslides in the county and have caused significant infrastructure damage during the floods of 1970, 1973, 1982, 1983, 1986, 1998, and January of 2005). Additionally, the potential for a significant earthquake increases the probable impact of landslide hazard threat throughout the county. Landslide movement can be divided into four different types:

Lateral and Down-Slope movement of earth materials such as rock, soil, and/or artificial fill are a common type of slide. The term covers a broad category of events, including mudflows, mudslides, debris flows, rock falls, rock slides, debris slides, earth flows, and soil creep. Most losses from landslides occur in communities developed on sloping hillsides.

Lateral Spreads are usually associated with loose, sandy soils that involve lateral displacement of large, superficial blocks of soil as a result of liquefaction of a subsurface layer. Displacement occurs in response to the combination of gravitational forces generated by an earthquake. Lateral spreads commonly disrupt foundations of buildings, sever pipelines and other utilities.

Falls and Topples are movements in which masses of rock or other material fall from cliffs or other steep slopes. Earthquakes or saturated soil commonly trigger this type of movement.

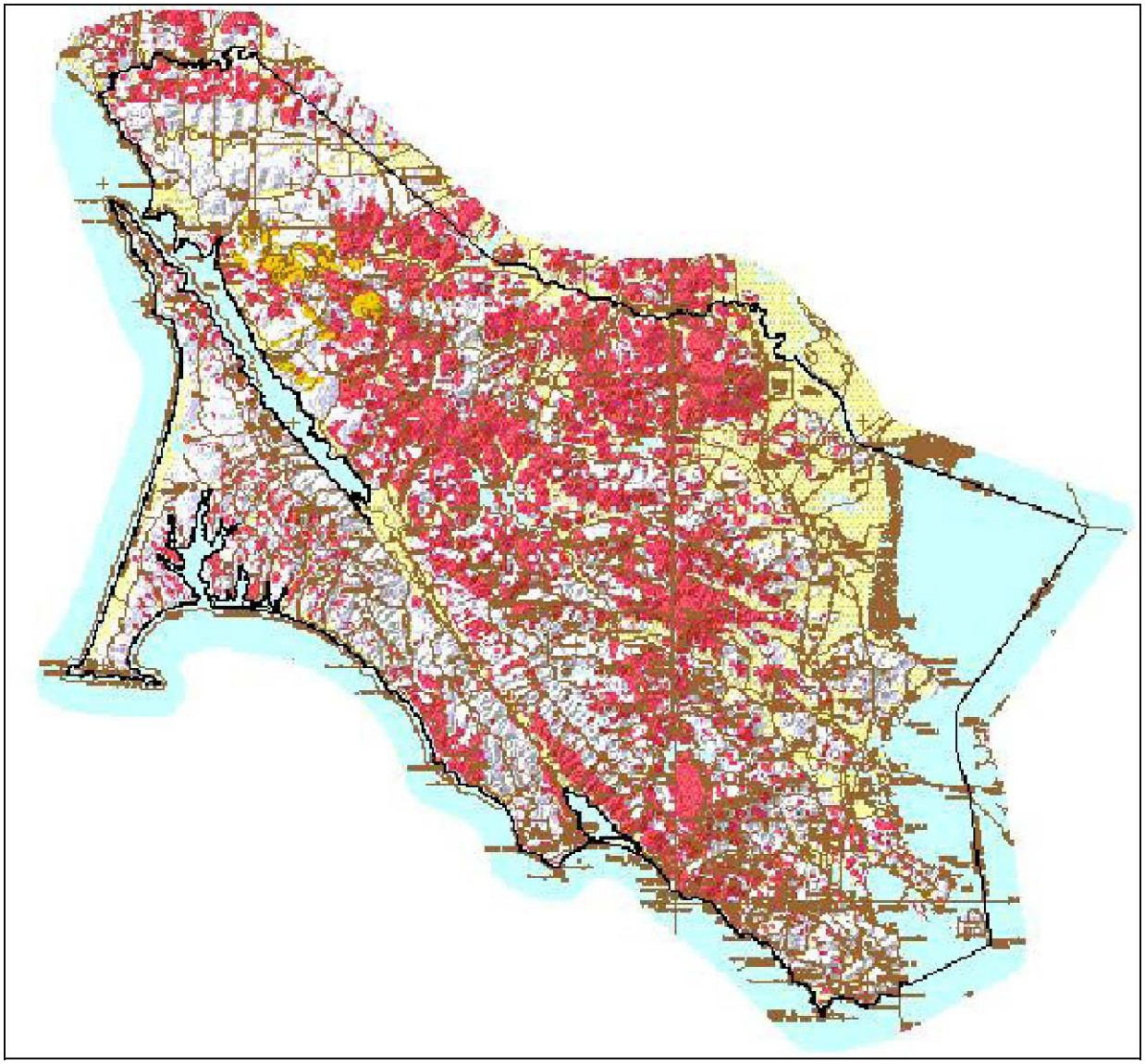
Debris Flows are similar to slides but differ in the fact they are characterized by high water content and move similar to fluids. They usually occur in small, steep channels and are often mistaken for floods. See Principal Debris Flow Sources Area Map on the next page.

During a severe winter storm such as the one which occurred in Marin County in 1982, thousands of debris avalanches and debris flows may be triggered in both rural and urban areas, smashing homes, blocking roads, severing utilities and water supply, and injuring or

killing people.

NOTE: The hazards of earthquake-induced landslides and liquefaction for Marin County have not yet been mapped by the California Geological Survey. Therefore these hazards have not been assessed as completely as in other areas of the Bay Area.

Summary Distribution of Slides and Earth Flows in Marin County Map



Slides and Earth Flows in Marin County

- Red Mostly Landslides – mapped landslides intervening areas typically narrower than 1500 feet and narrow borders around landslides.
- Orange Many Landslides – consists of mapped landslides and more extensive intervening areas – defined by excluding mapped landslides.
- Grey Few Landslides – contains few, if any, large mapped Landslides.
- Yellow Flat Land – areas of gentle slope at low elevation that have little or no potential for formation of slumps, translational slides or earth flows.

Section 2: Hazard Mitigation

Planning and Goals

Overall Goal

The overall goals considered for hazard mitigation for Marin County are to maintain and enhance disaster resistant communities by reducing the potential loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters.

Priority Goals

Mitigation programs and projects are ranked in priority based on evaluation by the Marin County planning team and the LHMP work group. Mitigation projects identified in this plan are based and ranked on the following priorities whereby the evaluation process included benefit/cost consideration:

1 Protect lives and property and the environment
2 Reduce future potential loss
3 Raise public awareness/education
4 Enhance emergency services including warning systems

Future goals and action items include:

1 Improve coordination within Marin County government
2 Revisit and re-evaluate risk assessments
3 Convene planning teams to review risk assessment
4 Convene working groups to review mitigation projects

Mitigation – General Considerations

Effective mitigation measures are based on an understanding of the risk faced by a community. Principal considerations included in this plan:

- Understand that natural hazards are ever-present, but catastrophic incidents are rare for individual localities.
- Use local vulnerability studies to design specific loss prevention measures and programs.
- Know that in the aftermath of major damaging events, people will frequently assign blame to those they believe are responsible for not taking precautionary actions.

Mitigation History of Success

Marin County has experienced success in past mitigation projects, two of which in recent years have significantly minimized the effects of disaster.

The White's Hill Slide Repair in 2001, a $5 million State and Federally funded project

administered by the County, corrected the troublesome and hazardous slide on Sir Francis Drake Boulevard, one of West Marin's main thoroughfares. In addition to reducing and avoiding losses from slide hazards, White's Hill Bridge took into consideration the environmental surroundings of that area.

The 2005 Fairfax Storm Drainage Bond Construction Project successfully removed and replaced deteriorated storm sewer system pipe of over 1,000 feet. During the next flood and the months of heavy rains to follow, this new drainage system avoided major damage to property and the environment.

Hazard Mitigation by Threat – Major

Earthquake, Fire and Flood projects are identified and numbered according to importance within each hazard. A ranking system for all projects within the Major threat categories have been assigned a priority ranking based on the following information:

1) Frequency/History of events – It is clear that emergencies and disasters continue in the sense that it is recognized as an urgent need for comprehensive planning to prevent extensive damage from occurring again in the future. Tracking noticeable frequencies of the same kind of event necessitates an accelerated approach implementing strategically thought out mitigation projects.

2) Cost of losses recorded – The increase of funding required with each new emergency to replace structures, infrastructure and maintain environmental quality is a critical indicator that mitigation planning and projects are implemented to reduce cost of future disasters

3) Cost and length of time for recovery - The importance of planning ahead, planning strategically for mitigation so the cost and length of the recovery will be less severe is a key element for improving the ability to recover after disaster with less money spent on repeatedly replacing existing hazardous situations.

4) Environmental sustainability – Disaster resistance needs to further environmental sustainability, reduce pollution, strengthen agriculture resiliency, and avoid hazardous material releases in Marin County.

Earthquake

- **General**

One of the critical assessment tools is the Inventory of Buildings and Building Codes and Types which is crucial for ensuring current and future mitigation progress. Structures in Marin County built before 1970, when major seismic design changes were made to the building code, are especially vulnerable to ground shaking and liquefaction. Wood and frame buildings have an excellent record because of their lightness and flexibility. Some smaller wood framed buildings, however, lack properly designed and connected foundations and/or sufficient lateral bracing.

The Marin Countywide Plan addresses the issue of safety from seismic and geological hazards

that will protect people and property from risks associated with seismic activity and geologic conditions. See Draft Marin Countywide Plan 2/04, Environmental Hazards 3-81 – 3-84 (Policies EH-2.1 – 2.2)

- **Mitigation Projects**

Currently, the Marin County-owned structures which are considered seismically safe and compliant with current building codes – either recently retrofitted or constructed to meet current code – are the Civic Center Complex (Administration Hall of Justice and Jail) and the Public Safety Building in Marin City. These types of projects are funded through tax and bond measures. The numerous structures not yet seismically safe will be retrofitting projects which are generally funded through tax and bond measures; hazard mitigation grant money is also a consideration.

MITIGATION PROJECT DETAILS

#1 Program/Project Description	**Seismic Retrofit of County-owned buildings not current to code (Civic Center Complex and Public Safety Building in Marin City are current code). (*See Building Log in Reference Section #2)***
Estimated Cost	**$10 Million**
Timeline/Schedule Years	**To be completed in the next 20 years Year 2035**
Responsible Department	**Capital Improvement/Building Administration**
Financing General Fund Grants Special	**Tax and Bond Measures General Funds Hazard Mitigation Grant Money**
Goal Addressed	**Comply with current seismic and retrofit codes/standards Public Safety**
Related Hazards Risks Addressed	**Fire, Landslide, Hazardous material**

Fire

- **General**

A serious danger created by a seismic event is the indirect fire hazard. Disruption of gas and power lines would most likely result in fires. In hill areas where access is already restricted and vegetative conditions constitute a major fire hazard under normal conditions, the destruction of roads and water lines poses a major threat to life and property. Wooden tank ruptures and water main fractures can be expected, reducing or eliminating water pressure for firefighting and consumption.

The Marin County Fire Department maintains and annually grades over 120 miles of fire roads. It also makes recommendations to key stakeholders, such as the Marin County Open Space District, the California State Parks Service, and the Marin Municipal Water District, where grading and other fuel reduction projects will benefit the most.

Controlled burns, fire thinning, fire and fuel breaks, and vegetation management generally reduce the intensity of the rate of spread of fire, thus reducing loss of life and property. National Fire Plan Grant Funding for Vegetation Management has been a source supporting these efforts over the last three years. The Marin County Fire Department also participates in all Homeland Security initiatives and was recently awarded grant funding for Community Outreach and Education projects. The Federal Bureau of Land Management grant funding has supported past projects such as the Pine Tree removal work in Mill Valley.

- **Codes**

The California Public Resources Code (PRC) is applicable to State Responsibility Areas (SRA). SRA is defined as “areas of the state in which the financial responsibility of preventing and suppressing fires has been determined by the board pursuant to Section 4125, to be primarily the responsibility of the state” (State of California, 2011). Furthermore, Sections 4125 and 4126 further define SRA as: “all of the following lands: (a) Lands covered wholly or in part by forests or by trees producing or capable of producing forest products. (b) Lands covered wholly or in part by timber, brush, undergrowth, or grass, whether of commercial value or not, which protect the soil from excessive erosion, retard runoff of water or accelerate water percolation, if such lands are sources of water which is available for irrigation or for domestic or industrial use. (c) Lands in areas which are principally used or useful for range or forage purposes, which are contiguous to the lands described in subdivisions (a) and (b). The board shall not include within state responsibility areas any of the following lands: (a) Lands owned or controlled by the federal government or any agency of the federal government. (b) Lands within the exterior boundaries of any city, except a city and county with a population of less than 25,000 if, at the time the city and county government is established, the county contains no municipal corporations. (c) Any other lands within the state which do not come within any of the classes which are described in Section 4126 (State of California, 2011). Finally, PRC Section 4291 specifies the requirements for defensible space around structures in SRA. Paraphrasing, this section requires 100 feet of defensible space, or to the property line (whichever is closer) around structures (State of California, 2011).

California Government Code Sections 51175 through 51189 allows the Authorities-Having-Jurisdiction (AHJ) in Local Responsibility Areas (LRA, essentially lands within the city-limits of incorporated cities) to require land-owners with structures on their property to provide 100 feet of defensible space or to the property line around their structures (similarly to PRC 4291). These requirements are for those areas declared by the Office of the State Fire Marshal to be in Very-High Fire Hazard Severity Zones, or in those areas designated by the local governing authority to be in a WUI zone. There is also language in Section 51182 (a) 2 that allows the AHJ to require defensible space around the structure to extend beyond the property line if "clearing is necessary to significantly reduce the risk of transmission of flame or heat sufficient to ignite the structure, and there is no other feasible mitigation measure possible to reduce the risk of ignition or spread of wildfire to the structure" (State of California, 2011).

The California Health & Safety Code (HSC) also has regulations related to wildland fire mitigation. Specifically, Sections 14875 through 14931 authorize the abatement of "weeds" as mitigation of a public nuisance (State of California, 2011). Additionally, HSC Section 18938.3 requires California to adopt a model building and fire code triennially. The current model fire and building code adopted by the State of California is the 2009 International Building and Fire Codes (promulgated by the International Code Council). Various agencies within the state, including the Office of the State Fire Marshal and the State Department of Housing and Community Development, amend the model codes. This results in California versions of the Building and Fire Codes (as well as the Plumbing and Mechanical Codes, etc), currently the 2010 California Building (CBC) and Fire Code (CFC), as Title 24, Part 2, and Title 24, Part 9, respectively (California Building Standards Commission, 2010).

Similarly, local fire and building agencies are permitted, per H&SC Sections 17958.5 and 17958.7, to further amend specific sections of the state's adopted codes. These amendments, based on local climatic, topographic, or geologic conditions, must be more restrictive than those adopted by the state agencies (State of California, 2011).

The current version of CBC, which regulates the built environment, and is only applicable to new construction, has specific regulations related to wildland fire mitigation. These regulations are contained in Chapter 7A, Section 701A.3.1, and are applicable in the following areas: In "Local Responsibility Areas" (LRA) where the state has designated the areas as a "Very-High Fire Hazard Severity Zone", or where the local authority-having-jurisdiction has designated and adopted a Wildland-Urban Interface (WUI) zone; and in SRA state-designated "Fire Hazard Severity Zones (Moderate, High, or Very-High), or (similarly to LRA) where the AHJ has designated and adopted a WUI zone (California Building Standards Commission, 2010).

The CBC Chapter 7A regulations detail the construction and material requirements for windows, doors, as well as other openings such as vents, and siding, roofing, eaves and decks. There are no requirements for the exterior of the structures, i.e., "defensible space".

The CFC, which, in general, regulates the activities occurring within buildings, as well as fire department access to structures and fire fighting water supplies, has one chapter devoted to wildfire mitigation regulations in the WUI. Specifically, this is Chapter 49, *Requirements for Wildland-Urban Interface Areas.* The requirements of the chapter mirror the aforementioned requirements of the PRC and Government Code sections cited above (California Building Standards Commission, 2010).

MCFD has amended the CFC, and specifically the aforementioned Chapter 49, and through the adoption and amending of the 2003 International Wildland-Urban Interface Code (IWUIC), the CBC. The CBC/building standards portion of the IWUIC as amended by MCFD is interchangeable with the Chapter 7A requirements of the CBC. MCFD has also amended several sections of the CFC related to wildland fire risk mitigation. These amendments were made to address not only new homes proposed to be built in the WUI, but also to positively affect homes that are undergoing remodeling or alterations, as well as substantially remodeled homes (which are required to meet the same requirements as new homes). In addition, MCFD amended Section 4907.2 of the CFC to read identically to PRC Section 4291, with the important distinction that the language has been modified to ignore the property line; i.e., defensible space is required 100 feet around the structure or to the property line, whichever is closer (PRC 4291), to simply 100-ft around the structure.

The National Fire Protection Association (NFPA) is a private organization made up of voting members representing government, academia, and private industry, and uses the consensus process to promulgate model codes and standards. Although these standards in and of themselves do not have the force of law, they are at a minimum "best practice" documents. It is common for state and local governments to adopt many standards developed by NFPA as part of their local adoption and amendment of the model codes. If a particular standard or code developed by NFPA is adopted as part of a government's code, then the standard adopted does have the force of law.

Two NFPA standards are applicable to wildfire risk mitigation: NFPA 1141, *Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas,* 2008 Edition, and NFPA 1144, *Reducing Structure Ignition Hazards from Wildland Fire*, 2008 Edition. Although the requirements of NFPA 1141 deal predominantly with the infrastructure requirements of the fire service in suburban and rural areas, there are also requirements applicable to preventing the spread of wildfire from structure to structure. Specifically, Section 6.2 requires a 30 foot setback between structures and property lines, unless both adjacent buildings are equipped with an automatic sprinkler system (NFPA, 2008).

NFPA 1144 is a comprehensive standard addressing wildfire exposure mitigation measures specific to individual structures. Chapter 4 provides guidance on the assessment of wildfire hazards in the structure ignition zone, and Chapter 5 details building citing, design and construction, including roof design, projections, openings etc, the requirements are very similar to those contained in Chapter 7A of the CBC, and to those in MCFD's amended version of the IWUIC (NFPA, 2008).

• **Mitigation Projects**

APPENDIX A: HIGH PRIORITY PRE-FIRE PROJECTS

Batt	Project Number	Project Name	Status	Estimated Completion Year	Project Type	Net Acres
MRN	RX North-048-MRN	MMWD VMP	P	2014	VMP Burn	481
MRN	RX North-049-MRN	Throckmorton Ridge Fuelbreak	A	2012	Fuel Break	122
MRN	-	TCSD Fuels Management	A	2012	Fuel Break	49
MRN	-	Muir Beach Pine Removal	A	2011	Tree Removal	11
MRN	-	Smith Eucalyptus Removal	A	2011	Tree Removal	1
MRN	-	Sausalito Fuel Break	A	2015	Fuel Break	56
MRN	-	Marin City Fuel Break	A	2015	Fuel Break	32
MRN	-	Tam Valley Fuel Break	A	2015	Fuel Break	73
MRN	-	Homestead Valley Fuel Break	A	2015	Fuel Break	58
MRN	-	Mill Valley Fuel Break	A	2015	Fuel Break	61
MRN	-	Kent Woodlands Fuel Break	A	2015	Fuel Break	53

Batt	Project Number	Project Name	Status	Estimated Completion Year	Project Type	Net Acres
MRN	-	San Anselmo Fuel Break	A	2015	Fuel Break	36
MRN	-	Fairfax Fuel Break	A	2015	Fuel Break	63
MRN	-	Woodacre Fuel Break	P	2015	Fuel Break	75
MRN	-	San Geronimo Fuel Break	P	2020	Fuel Break	82
MRN	-	Blithdale Ridge Fuel Break	A	2015	Fuel Break	44
MRN	-	Bolinas Ridge Fuel Break	P	2015	Fuel Break	315
MRN	-	Cascade Canyon Fuel Break	A	2015	Fuel Break	41
MRN	-	Corte Madera Ridge Fuel Break	A	2015	Fuel Break	32
MRN	-	Highway One Fuel Break	P	2020	Fuel Break	145
MRN	-	Inverness Ridge Fuel Break	P	2020	Fuel Break	65
MRN	-	Iron Spring Road Fuel Break	A	2015	Fuel Break	22
MRN	-	Kent Woodlands North Fuel Break	A	2015	Fuel Break	24

Batt	Project Number	Project Name	Status	Estimated Completion Year	Project Type	Net Acres
MRN	-	Kent Woodlands South Fuel Break	A	2015	Fuel Break	48
MRN	-	Mt. Vision Road Fuel Break	P	2020	Fuel Break	46
MRN	-	Limantour Fuel Break	P	2020	Fuel Break	102
Unit	---	MMWD VMP	P	2014	VMP Burn	481
Unit	RX North-048-MRN	Throckmorton Ridge Fuelbreak	C	2012	Fuel Break	122
Unit	---	TCSD Fuels Management	C	2012	Fuel Break	49
Unit	n/a	Muir Beach Pine Removal	C	2011	Tree Removal	11
Unit	---	Smith Eucalyptus Removal	C	2011	Tree Removal	1

Status Guide: A = Active, P = Planning, C = Completed, O = Ongoing, M = Maintenance

The Marin County Strategic Fire Plan, managed by County Fire Administration, designates Fire Management Zones which correspond to the County Supervisorial Districts. The fire plan has identified mitigation strategies and prioritized fire hazard reduction projects for each Fire Management Zone. The priorities of the latest version of the plan, updated July, 10, 2012, are as follows:

Goal 1: Identify and evaluate wildland fire hazards while recognizing life, property and natural resource assets at risk, including watershed, habitat, social, and other values of functioning

ecosystems. Objective: Collect, analyze, and maintain hazard and resource data, leveraging MCFD's GIS capabilities.

Goal 2: Articulate and promote the concept of land use planning as it relates to fire risk and individual landowner objectives and responsibilities. Objective: Identify the minimum key elements necessary to achieve a fire safe community, and incorporate these elements into community outreach.

Goal 3: Support and participate in the collaborative development and implementation of wildland fire protection plans and other local, county and regional plans that address fire protection and landowner objectives. Objectives: Develop a robust county fire plan by bringing together community-based groups, such as fire safe councils and affected fire and land management agencies; create and support venues in which individual community members can be actively involved in local fire safe councils, community emergency response teams, and other community-based efforts such as FIREWISE to develop readiness plans and educate landowners to mitigate the risks and effects of wildland fire.

Goal 4: Increase awareness, knowledge and actions implemented by individuals and communities to reduce human loss and property damage from wildland fires, such as defensible space and other fuels reduction activities, fire prevention, and fire safe building standards. Objective: Educate landowners, residents and business owners about the risks of living in the wildland, their incumbent responsibilities, applicable regulations, prevention measures and preplanning activities, which will emphasize personal responsibility.

Goal 5: Integrate fire and fuels management practices with landowner priorities and multiple jurisdictional efforts within local, state and federal responsibility areas. Objective: Work to remove regulatory barriers that limit hazardous fuels reduction activities.

Goal 6: Determine the level of fire suppression resources necessary to protect the values and identified assets at risk. Objective: Initiate and maintain cooperative fire protection agreements with local, state and federal partners that value the importance of an integrated, cooperative, regional fire protection system and deliver efficient and cost effective emergency response capabilities beneficial to all stakeholders.

Flood

• **General**

The County of Marin participates in ongoing mitigation actions and proposed activities for flood prevention. Storm drainage projects to protect vulnerable properties are a primary mitigation activity in Marin County. Hydraulic analysis of runoff and drainage systems that can predict areas of insufficient capacity in the storm drain system is done on an as-needed basis, usually in conjunction with a development proposal, when a flood event indicates a flaw in the system, or as part of master planning efforts.

The Marin County Flood Control and Water Conservation District (District), a special district under the Marin County Department of Public Works, recognizes that a multi-agency approach is needed to mitigate flooding. This is carried out through the design of various flood control zones which ignore jurisdictional boundaries to span areas affected by flood-prone reaches of creeks. Those zones (See Flood Control Zones Figure) that include cities have City Council members on the Zone Advisory Boards and they meet at least annually. The eight Flood Control Zones managed by the District include:

- Zone 1 - Novato
- Zone 3 - Mill Valley
- Zones 4 and 4A - Bel Aire/Tiburon/Strawberry
- Zone 5 - Stinson Beach
- Zone 6 - San Rafael Meadows
- Zone 7 - Santa Venetia
- Zone 9 - Ross Valley
- Zone 10 - Inverness

This concept of working across jurisdictional boundaries is being further developed through the countywide watershed programs, which span beyond flood control zones. The eventual product of the watershed programs will be identification of multi-benefit mitigation restoration that improves both habitat and flood protection. An example of a multi-benefit project would be wetlands in floodplains, as these wetlands absorb flood waters and toxins from runoff. These projects will be included in watershed master plans that are being developed amongst the various watersheds in the County. More details on these programs are described in the Flood Mitigation Projects section.

The District utilizes crews from the Conservation Corp North Bay (CCNB) overseen by the District staff members to carry out its annual Creek Maintenance Program in an effort to keep storm drains and creeks free of obstructions to allow for free flow of water while retaining as much vegetation in the channel as possible to preserve habitat. The County and CCNB also implement a fire fuel reduction program on flood control properties.

The Flood Control District owns and operates five gauging stations along our Eastern Urban Corridor; three in the south (Mill Valley), one in central Marin (Kentfield/Ross) and one in the north (Novato). Three are both rain and water surface elevation gauges and one gauge in

Mill Valley reports only precipitation and another gauge in Mill Valley reports only water surface elevation. There are two weather stations in West Marin (not water surface gauges) that provide an early indication of the intensity of winter storms as they typically approach from the Pacific. Additional gauges are being considered. For most effective mitigation, all stations are automated and accessible to the public via the Internet (marin.onerain.com).

The County enforces the grading, erosion, and sedimentation requirements by prohibiting the discharge of concentrated storm water flows to mitigate pollution – County Code Sections 23.18.093, 24.04.625 & 627. County Code Chapters 11.08 and 23.18 enforce mitigation activities under provisions for creek protection, storm water management, and discharge control ordinances designed to keep watercourses free of obstructions and to protect drainage facilities.

To mitigate flooding by increasing stream flow and maintaining critical access and egress routes, all new or reconstructed bridges in unincorporated Marin County must be constructed so that the soffit (lowest point) is at least two feet above the 100-year water surface elevation. All "critical bridges" meet the County Code, Section 24.04.520(d) standard.

The County Flood Control District provides an institutional mechanism to ensure that development proposals adjacent to floodways and in floodplains are referred to flood control districts for review and comment. The Department of Public Works' Land Use and Water Resources Division is directly linked to the District for plan review.

Floodplain management regulations for development in the floodplain and floodway areas are strictly enforced – County Code Chapter 23.09. New subdivisions are designed to reduce or eliminate flood damage by requiring that rights-of-way be laid out for the provision of approved sewer and drainage facilities, providing on-site detention facilities – Title 24 of the County Code. In areas of new development, utility systems are constructed so as to reduce or eliminate flood damage to the utility systems themselves due to the County Department of Public Works' assessments in the plan review stages.

Hazardous materials stored in flood zones are elevated or protected from flood waters using effective methods – County Code Section 23.18.072 & 090. The Marin County Fire District Inspectors routinely assess storage of hazardous materials and actively mitigate safe storage.

The District stockpiles sand and bags at various locations around the County of Marin for emergency use by residents and businesses during an event.

- **Mitigation Projects**

The lead agency for Flood Mitigation and related projects is Marin County Public Works. Funding sources include taxes, special tax and bond measures, hazard mitigation funds, and other grants.

The Flood Control Zones consist of taxing entities that receive a portion of the State's Special District Fund, providing a somewhat reliable funding stream to construct and maintain flood

control facilities. Marin County has sixteen pump stations and several miles of levees and channels. The District applies for grant funding for flood control projects that have a high cost to further mitigate threat of flooding. Hazard mitigation funding is considered for current projects under consideration.

Update on Previous LHMP Mitigation Projects

Ross Valley Integrated Watershed Management Program

The Ross Valley Flood Control and Watershed Program was initiated after the flood of December 31, 2005, partial funding for the program was authorized in an election by private property owners in the Ross Valley on June 25, 2007. A Capital Improvement Plan Study (CIP study) was carried out by a team of engineers and resulted in a proposal of over 180 measures to raise the level of flood protection from the current 5-Year-Flood level to an eventual 100-Year-Flood level when all of the proposed measures are completed.

From the CIP study the County created a 10-Year Work Plan designed to achieve a 25-Year-Flood level of protection once completed. It includes four detention basins, nine bridge replacements, creek widening and bank stabilization measures, floodwalls, and retrofitting or removing existing structures that impede flow in the creek. The estimated cost of this work plan is $66 million and $23.6 million in available outside funding has been identified. Dredging of the lower earthen channel is also planned for the 2015-2020 timeframe to maintain the 100-Year flood conveyance level. Costs for the dredging are estimated at between $3.5 million to $4.7 million depending on the per-cubic-yard removal cost.

The detention basins are included as a very high priority mitigation project in the current update to the County's local Hazard Mitigation Plan. This is due to their ability to attenuate flow during large events. This will provide a buffer so that creek projects can happen without causing deleterious effects downstream where other projects may be scheduled for later in the full program.

Las Gallinas Creek Levee Project

The Las Gallinas Creek Levee project is included in the current update to the Local Hazard Mitigation Plan as a mitigation project. A status update is included in the project description under the section titled Mitigation Projects.

Marin County Flood Control & Water Conservation District Public Education Project

One of the mitigation projects included in the current update to the LHMP is the Marin County Watershed Program, which is modeled after the Ross Valley Integrated Watershed Management Program. Through this program the public education project goal of public awareness will be furthered as public and stakeholder meetings are held on a regular basis to discuss areas of particular vulnerability to flooding and related concerns. More details are included in the Watershed Program project description in the pages following. In addition to the Watershed Program, the Flood Control District will work with County OES and other agencies that coordinate pre- and post-disaster planning.

Marin County Structure Elevation Program

This is a mitigation project in the current update to the LHMP. A status update is included in the project description under the section titled Mitigation Projects.

MITIGATION PROJECT DETAILS

Project	Target Date	Assets Protected	Ranking Explanation
1. Ross Valley 10 Year Work Plan	2012/2022	People, structures, utilities, transportation, environment	High This project will be initiated by the County in the next two years. Additional funding will be sought if available.
2. Marin County Watershed Program	2012/2017	People, structures, utilities, transportation, environment	High This program has been adopted by the County and additional funding will be sought.
3. Las Gallinas Creek Levee Evaluation	TBD	People, structures, utilities, transportation	Existing This evaluation project is underway and will continue if additional funding is secured.
4. Marin County structure elevation program	2013	Homes in special flood hazard zones	Existing This program will be completed upon receipt of Hazard Mitigation Grant funding.

Program/Project Description	Ross Valley 10 Year Work Plan - The proposed project includes four detention basins, nine bridge replacements, creek widening and bank stabilization measures, floodwalls, and retrofitting or removing existing structures that impede flow in the creek. Dredging of the lower earthen channel is also planned for the 2015-2020 timeframe to maintain the 100-Year flood conveyance level. Detention basins, the foundation measures for the Flood Zone 9/Ross Valley Flood Protection and Watershed Program (known as "Ross Valley Integrated Watershed Management Program" on the 2006 version of the LHMP), will decrease the peak flow in San Anselmo/Corte Madera Creek during the 1% Annual Chance Event commonly known as the 100-Year flood. The four sites being proposed to attenuate flood flows in Fairfax/San Anselmo/Corte Madera Creeks are: Phoenix Lake, Lefty Gomez Field (White Hill School, Fairfax), Loma Alta Open Space Area (Unincorporated Fairfax area), and Memorial Park (San Anselmo). Detention basins use existing, open fields adjacent to the creek to temporarily store water during extreme events. The existing functionality of the locations remains. In conjunction with planned creek improvements throughout the valley, tidal prism enlargement in the estuary area and periodic dredging of the lower creek, the detention basins will provide flood protection from an event of the magnitude of the December 31, 2005 flood.
Estimated Cost	The estimated cost of this work plan is $66 million, and $23.6 million in available outside funding has been identified. Dredging costs are estimated at between $3.5 million to $4.7 million depending on the per-cubic-yard removal

	cost.
Timeline/Schedule (Years)	Ten years (2012-2022)
Responsible Department	Public Works/Marin County Flood Control & Water Conservation District in cooperation with Marin Municipal Water District, Ross Valley School District, Marin County Parks, and Town of San Anselmo.
Financing	One of the goals of the Ross Valley Program is to leverage the local revenue from the watershed fee to obtain grant funding from state, federal or private sources. For the detention basins the targeted share ration is 35% local share and 65% from outside funding sources. CA Department of Water Resources is funding 50% of the estimated project cost for the basin at Phoenix Lake ($7.66 million) and the remainder of these projects will be funded through the Flood Control Zone 9 watershed fee if additional funding sources are not later identified.
Goal Addressed	Work towards preventing recurring major damage to private and public infrastructure, environment and economy in affected communities due to 25-year floods as part of a 10-year plan. When the 10-year plan is implemented, the District will continue with additional, identified measures to raise level of protection to 50-100-year flood events.
Related Hazards Addressed	Landslides, hazardous material
Reduction of Flood Risk	Potential to reduce cost of flood insurance to property owners; potential qualification for high rating under the Community Rating System of the National Flood Insurance Program

Program/Project Description	Marin County Watershed Program – The Board of Supervisors authorized the Watershed Program on May 13, 2008 and is staffed by the Marin County Flood Control & Water Conservation District. The Program focuses on watersheds within established County flood zones areas that have support and agreement from City councils and local agencies. Watershed planning efforts are also underway in Ross Valley and San Geronimo Valley. The goal of the Watershed Program is to develop a framework that integrates flood protection, creek and wetland restoration, fish passage and water quality improvements with public and private partners to protect and enhance Marin's watersheds. Currently the Program has been authorized to begin the development of a watershed master plan for Southern Marin (Arroyo Corte Madera del Presidio, Coyote Creek and East and West Creek watersheds in Mill Valley, Tamalpais Valley and Tiburon). Planning is also underway in the Easkoot Creek watershed (Stinson Beach), Novato, Gallinas and lower Miller Creek watersheds. The planning process will evaluate short and long term needs and recommend priorities for implementation including information regarding the timing and sequence of construction projects. This program will raise public awareness of flooding through presentations on the program and meetings with stakeholder agencies and volunteers serving on Policy Advisory Committees and Technical Working Groups which will meet several times per year to review the program.
Estimated Cost	$2 million
Timeline/Schedule	Planning/study phase 2-5 years

Years	2012-2017
Responsible Department	Public Works
Financing	$650,000 EPA grants, $168,210 DWR grant, and the remainder is funded through the Watershed Program (contributions from County of Marin, Flood Control Zones, cities and towns, and sanitary and water districts). Additional grant funds are being sought. It is anticipated that after individual master plans and technical studies are completed ballot measures would be considered for these communities within the next two years to generate funds to construct the identified improvements.
Goal Addressed	Work towards preventing recurring major damage to private and public infrastructure, environment and economy in affected communities due to 50-100 year floods. Plan for sea level rise. Reduce maintenance costs.
Related Hazards Addressed	Landslides, hazardous material
Reduction of Flood Risk	Potential to reduce cost of flood insurance to property owners; potential qualification for high rating under the Community Rating System of the National Flood Insurance Program

Program/Project Description	Las Gallinas Creek Levee Evaluation, Santa Venetia The Las Gallinas Creek and adjoining San Pablo Bay levees help protect the Santa Venetia Community from reoccurring flooding. These levees have deteriorated since being reconstructed/constructed in the 1980s and face challenges including deterioration, settlement, encroachments, and sea-level rise. Additionally, the levees are not FEMA accredited and many homeowners in Santa Venetia are required to purchase flood insurance. A joint-feasibility study with the U.S. Army Corps of Engineers (USACE) is underway and will provide an assessment of the current condition of the levee system, establish the cost/benefit for rehabilitating the levees, and provide a preliminary indication of cost for potential improvements. Additional funds would need to be secured to further develop alternatives and design and construct improvements.
Estimated Cost	$3-4 million (study, assessment, and design only)
Timeline/Schedule **Years**	TBD
Responsible Department	Public Works
Financing	Phase I of the levee evaluation has an estimated cost of $1,019,950 and is cost shared 50/50 with the USACE. The County share is funded by Flood Control Zone No. 7 and District 1 Community Services Fund. Tax and bond measures, hazard mitigation grant funds, etc. would need to be sought to continue to Phase II of the evaluation.
Goal Addressed	Public safety, structure safety, traffic safety
Related Hazards **Risks Addressed**	Sea-level rise

Reduction of Flood Risk	Potential to reduce risk and frequency of flooding and cost of flood insurance to property owners; potential qualification for high rating under the Community Rating System of the National Flood Insurance Program.

Program/Project Description	Marin County structure elevation program After the 2006 disasters were declared, areas of the County became eligible for FEMA's Hazard Mitigation Grant Program funding to raise certain structures in special flood hazard areas above the base flood (100-year flood) elevation. As the local agency administering this program, Flood Control staff sent out 1200 grant invitations to individual homeowners who suffered the greatest damage from the storms. The properties were located in the Ross Valley (Larkspur, San Anselmo, Ross and Fairfax), Mill Valley, Novato, and Stinson Beach. Staff received 132 replies and 41 owners met the minimum FEMA criteria for possible assistance. Six residences in Flood Control Zone 9 were approved as meeting FEMA's cost/benefit ratio, and 4 of those property owners withdrew their application. Two properties, both in Greenbrae, have been notified that they will be awarded grant funds to raise their home once this Local Hazard Mitigation Plan update is approved. This program will be complete once the final funding is paid out after construction of the home elevation(s). Additional funding sources may be sought if it is desired to extend the program.
Estimated Cost	$300,000
Timeline/Schedule **Years**	2013 and on-going as funding is available.
Responsible Department	Marin County Public Works is coordinating and administering the program
Financing	FEMA Hazard Mitigation Grant funding Property owner contributions Marin County Flood Control staff
Goal Addressed	Repetitive flood loss property protection and avoidance of future damages by aiding property owners in raising their structures above the base flood elevation. Health and safety of residents in Special Flood Hazard areas.
Related Hazards **Risks Addressed**	
Reduction of Flood Risk	Potential to reduce cost of flood insurance to property owners; potential qualification for high rating under the Community Rating System of the National Flood Insurance Program

Other Hazards - Minor

Agriculture

- **General**

Marin County's Department of Agriculture plays an important role in minimizing danger of contamination hazardous to the people who live and work in the area.

Integrated Pest Management (IPM) is an approach to pest control that is based on an understanding of a pest's life cycle and habits. IPM is a decision-making process for managing pests, which uses pest monitoring to determine if pest injury levels warrant treatment. If so, the treatment combines biological, cultural, mechanical, physical and/or chemical tools and other management practices to control pests in a safe, cost effective, and environmentally sound manner that contributes to the protection of public health. IPM uses extensive knowledge about pests, such as infestations, thresholds, life histories, environmental requirements and natural enemies to complement and facilitate biological and other natural control of pests. IPM involves the use of non-chemical pest control methods and the careful use of least-toxic chemical methods when non-chemical methods have been exhausted or are not feasible. When IPM is properly implemented, chemical controls are used only as a last resort. They are used as spot treatments and are chosen and timed to have the smallest negative impact on non-target organisms and the environment.

The Department promotes IPM principles in agriculture, and has established detection, management, and eradication programs for pests introduced into the County. IPM principles are used to contain and control the spread of pests. The Marin/Sonoma Weed Management Area is involved in managing and controlling pest weeds on various public and private lands through mechanical removal and the release of beneficial control agents that suppress weed populations through natural biological control.

IPM is not only promoted in the Agriculture areas, but is successfully implemented in County Parks and Buildings and Schools where liquid and aerosol pesticide has been eliminated and replaced with reduced-risk products such as baits and traps. Marin County Parks is responsible for managing and enforcing the County's IPM program. Visit Marin County Parks at: http://www.co.marin.ca.us/depts/PK/ParkRes/.

The Department also helps schools implement IPM programs and ensures they comply with the Healthy Schools Act of 2000. Visit the School IPM Program for more information at http://apps.cdpr.ca.gov/schoolipm/.

The Department oversees the use of pesticides in Marin County, and is committed to protecting our community and beautiful environment by ensuring pesticides are handled and stored properly, and commercial applicators are trained and licensed.

Drought, though a potential problem in Marin County that can significantly affect agriculture, is not fully assessed.

For more information please visit http://maringovdev/depts/ag.

Terrorism

- **General**

Responsibility for terrorism has been separated into two phases: 1) incident response and crises management; and 2) consequence management. The lead agency for terrorist incident response and crisis management is the Federal Bureau of Investigation (FBI).

The Northern California Regional Intelligence Center (NCRIC) and associated Fusion Centers are mechanisms for disseminating information about the current risk of terrorist acts to federal, state and local authorities.

- **Mitigation Strategies**

Because the primary mode for past terrorist incidents has been bombings, the primary focus of the State's s hazard mitigation strategy for terrorism is on mitigation measures that reduce risk from bomb blasts and nuclear, biological, and chemical attacks to critical facilities and populations. Examples of these strategies encouraged for implementation at local government levels include hardening of structures during construction and retrofitting, barriers and fencing around critical infrastructure, and adding redundant systems for fire protection, communications systems, information technology and utilities. Marin County participates in the Homeland Security and Urban Area Security Initiative Grant Programs which fund many mitigation activities.

The vague nature of the threat, the uncertainty regarding weapons, and the wide variety of potential targets make it difficult to identify specific mitigation projects. Marin County emphasizes, instead, the need to incorporate mitigation strategies in developing and refining operational procedures. The county participates in all Homeland Security initiatives including the Buffer Zone Protection Program. Marin County Office of Emergency Services provides coordination for the initiative for the operational area.

Mitigation Strategies

Explosions	- Evacuation Plan, supplies, training - Upgrade heating, ventilation and air conditioning system to filter contaminants - Shelter in Place supplies
Biological Weapons	- Installation of High Efficiency Particulate Air(HEPA) filters furnaces - Plan for quarantine
Chemical Weapons	- Chemical decontamination device supplies - Medical Screening Capacity
Nuclear Weapons	- Indoor Shelters - Underground Shelters - Shelter in Place supplies - Evacuation Plan, supplies, training

Tsunami

- **General**

The greatest threat associated with tsunami is the impact on coastal structure property and threat to human lives.

The State of California Coastal Management Program (CCMP) under the California Coastal Act requires cities and counties lying wholly or partly within the coastal zone to prepare a Local Coastal Plan (LC) that must be certified by the Coastal Commission as consistent with policies of the Coastal Act. (Public Resources Code, Division 20).

The U.S. National Tsunami Hazard Mitigation Program (NTHMP) is a State/Federal partnership created to reduce tsunami hazards along United States coastlines. NTHMP coordinates the efforts of five Pacific States including California. Focal points of future efforts include:

- The Tsunami Inundation Mapping Effort (TIME)
- Tsunami Warning Guidance for Tsunami Warning Centers
- Improve Seismic Networks
    - Installation of real-time broadband seismic stations
    - Telemetry upgrades to warning centers
    - Shortening information dissemination time to emergency services agencies
- Deploy Tsunami Detection Buoys
- Improve Statewide Coordination and Technical Support for Tsunami Warnings

The support of local populations for a variety of mitigation products and programs are essential for mitigation success. To that end, the National Oceanic and Atmospheric Administration (NOAA) has developed the TsunamiReady™ program. The strategic goal in developing TsunamReady communities must have the following characteristics:

To be recognized as TsunamiReady, here are some of the criteria that a community must meet:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive tsunami warnings and to alert the public
- Promote public readiness through community education and the distribution of information

- Develop a formal tsunami plan, which includes holding emergency exercises.
- Comply with TsunamiReady guidelines (which include Communications and Coordination, Warning Reception, Warning Dissemination, Community Preparedness, and Administrative guidance)

Mitigation Strategies

- Establish and maintain communication capability with the Pacific Tsunami Warning Center via the California Warning Center
- Identify Tsunami Hazard Zones
- Identify and ensure accessible evacuation routes
- Coastal Management, integrate
    - Planning policies – land use considering hazard zones
    - Zoning policies – prohibit building at high risk
- Monitor need for seawall
- Utilize tsunami inundation maps for Marin County when available

Landslides

• **General**

To mitigate landslides, specific planning and activities are designed to be ongoing. Evaluating the potential for earthquake induced landslides and identifying potential slope failures is critical. Long-term hazard reduction in Marin County focuses on reducing the frequency of landslides, reducing the likelihood that landslides will cause damage and minimizing damage when they do occur. Most of the ongoing landslide mitigation involves repair and reinforcement of failed slopes.

• **Mitigation Strategies**

For proposed projects, Marin County monitors and collects data for:

- Assessment of presence of existing landslides
- Quantitative evaluation of earthquake-induced landslide potential

- Engineering Geologic Investigations
- Stereoscopic aerial photographs made
- Topographic Maps collected and reviewed

Slope stability analysis by lead agency is performed. Basic considerations for any existing projects on proposed slopes that are determined to be unstable include appropriate mitigation methods, to be provided before the project is approved. In general this includes:

- Avoid the Failure Hazard
- Protect the site from the failure
- Reduce the hazard to an acceptable level

Efforts are being increased to reduce landslides and erosion in existing and future development by applying applicable State adopted Unified Building Codes and applicable standards found in the California Geological Survey Special Report – Guidelines for Evaluating and Mitigating Seismic Hazards in California.

PROJECT SUMMARY

Mitigation Programs and Projects

Action items identified as future mitigation programs and projects are evaluated and prioritized by Marin County planning team utilizing the Benefit Cost Analysis specific to each project. The mitigation projects identified are within the definition of “hazard mitigation”, that is, “any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards”.

Section 3: Planning Reference

ASSOCIATION OF BAY AREA GOVERNMENT (ABAG)

Regional Planning

The Association of Bay Area Governments (ABAG) is a multi-county governmental coordinating agency which includes the nine Bay Area counties. ABAG is a significant resource for mapping and risk assessment information on the key threats facing the Bay Area Region.

Marin County Hazard Mitigation Planning is conducted in coordination with ABAG planning efforts. For planning purposes, Marin County utilizes various ABAG tools for hazard identification analysis, and risk assessment for government and critical facilities. ABAG received a grant from FEMA through the California Governor's Office of Emergency Services to prepare a multi-jurisdictional plan that fulfills the requirements of the Disaster Mitigation Act of 2000.

Parallel to, and in coordination with this effort, Marin County is utilizing the Operational Area approach for the eleven incorporated cities, towns, and special districts, facilitating communication and coordination for individual local planning efforts and the Pre- Disaster Mitigation Grant Competitive (PDM-C) program.

MARIN COUNTY OPERATIONAL AREA

Operational Area Approach

Marin County's Operational Area approach emphasizes coordination of responsibilities that address common resources, mutual support and cooperation of all stakeholders and multi-agency commitment for some hazard mitigation projects will be required. However, jurisdictions' and special districts' risks, vulnerabilities and specific assessments require a plan tailored to each local authority. This method reflects the Standardized Emergency Management (SEMS) organizational framework and also supports the Marin Countywide Plan 2007, "Environmental Hazards" Section. Cities, Towns and Special Districts develop individual plans and/or Hazard Mitigation Annexes identifying specific risks and mitigation projects.

Marin County Operational Area Stakeholders

<u>Marin County Government</u>

- Marin Community Development Agency
- Marin County Fire Department
- Marin County Health and Human Services Department
- Marin County Public Works/Flood Control
- Marin County Sheriff
- Marin County Sheriff's Office of Emergency Services

Cities/Towns

- City of Belvedere
- Town of Corte Madera
- Town of Fairfax
- City of Larkspur
- City of Mill Valley
- City of Novato
- City of San Rafael
- Town of Ross
- Town of San Anselmo
- City of Sausalito
- Town of Tiburon

Many of the strategies for hazard mitigation exist as a part of the planning process through the Plan and Project Review actions, Building and Fire Code enforcement, and development of the Marin Countywide Plan. Newer potential projects, such as the proposed Marin County Public Safety Building, are included in this planning process.

The decision on priority was made based on a variety of criteria including technical and administrative feasibility, politically acceptability, socially appropriateness, legal conformity, economic soundness and not being harmful to the environment or our heritage.

Marin County will work to identify potential funding sources, including capital improvement budgets, bond issues, and federal or state grants.

Workshops/Public Involvement

The California Emergency Management Agency (CalEMA) notified all potential stakeholders in the initial effort that promoted Local Hazard Mitigation Planning (LHMP). All stakeholders, including the general public, have been encouraged to send periodic updates to the Marin County OES as circumstances create the need. Examples of these circumstances are changes to local ordinances impacting hazard mitigation, status reports on projects referred to in the LHMP, and local incidents that may have relation to the LHMP.

Marin County OES utilized the Operational Area approach in support of LHMP to help facilitate the county's special districts' planning efforts. The Marin County LHMP update team has coordinated Local Hazard Mitigation Workshops, Stakeholder and Working Group Sessions. The cooperative planning process has included public participation, posting of the Draft Plan on the Marin County OES public website for comment, press releases and public workshops.

Due to Marin County OES staff limitations during late 2010 and into 2011, limited work was done on the LHMP during that time.

Public Outreach Calendar of Events for Plan Update

September 21, 2010	Update report to Marin County Board of Supervisor's
September 22, 2010	Initial public participation period open
March 9, 2012	Initial public participation period closed

March 10, 2012	Director of Emergency Services presentation by Marin OES
July 3, 2012	Press Release announcing LHMP update and Workshops
July 3, 2012	Draft LHMP on Marin County Website inviting comment
July 16, 2012	Social Media outreach announcing LHMP update
July 3-19, 2012	Public comment and contribution period
July 20-25, 2012	Incorporation of public comments to Draft LHMP
July 26, 2012	Public Workshops
August 1, 2012	LHMP presentation for County departments
August 23, 2012	West Marin presentation by Marin OES
August 23,2012	Public outreach radio broadcast on KWMR
September 6, 2012	Public outreach "Open House" radio broadcast on KWMR
October 1, 2012	Submittal of LHMP to State OES/FEMA
October 16, 2012	Marin County Board of Supervisor's Resolution to adopt
March 10, 2012	Director of Emergency Services presentation by Marin OES
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Monitoring, Evaluating and Updating the Plan

Title 44 of the Code of Federal Regulations (CFR) Section 201.6(c)(4)(i) requires a hazard mitigation plan to include a plan maintenance process that includes the following:

- A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
- A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate.
- A discussion on how the community will continue public participation in the plan maintenance process.

This section of the document details the formal process that will ensure that the County of Marin local hazard mitigation plan (LHMP) remains an active and relevant document. The LHMP maintenance process includes a schedule for monitoring and evaluating the plan annually and

producing an updated plan every five years. This section also describes how the County will integrate public participation throughout the plan maintenance and implementation process. Finally, this chapter explains how the County intends to incorporate the mitigation strategies outlined in this LHMP into existing planning mechanisms and programs, such as the Countywide Plan and building code enforcement and implementation. The LHMP's format allows the County to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a plan that will remain current and relevant to the County of Marin.

Evaluation of the Plan

The minimum task of the ongoing annual hazard mitigation planning team meeting will be the evaluation of the progress of the LHMP and incorporating the actions into other plans. This review will include the following:

• Summary of any hazard events that occurred during the prior year and their impact on the community.

• Review of successful mitigation initiatives identified in the LHMP. Brief discussion about why targeted strategies were not completed.

• Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short- term project because of funding availability).

• Recommendations for new projects.

• Changes in or potential for new funding options (grant opportunities).

• Integration of new data such as GIS data and mapping used to inform the Plan.

• Impact of any other planning programs or initiatives within the County that involve hazard mitigation.

The planning team will create a template to guide the LHMP committee in preparing a progress report.

The planning team will prepare a formal annual report on the progress of the LHMP.

This report will be used as follows:

- Distributed to Department Heads for review.
- Posted on the County website on the page dedicated to the LHMP.
- Presented in the form of a report to the Marin County Disaster Council Citizen Corps.
- Presented in the form of a report to the Marin County Board of Supervisors.

- Provided to the local media through a press release.
- Provided as part of the Community Rating System (CRS) annual re-certification package. The CRS program requires an annual recertification to be submitted every year. To meet this recertification timeline, the planning team will strive to complete this progress report prior to the CRS recertification.

Method and Schedule for Updating the Plan within 5 years

Section 201.6.(d)(3) of Title 44 of the Code of Federal Regulations requires that local hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits awarded under the Disaster Mitigation Act (DMA). The County of Marin intends to update the LHMP on a five-year cycle from the date of initial plan adoption. This cycle may be accelerated to less than five years based on the following triggers:

• A Presidential Disaster Declaration that impacts the County of Marin.

• A hazard event that causes loss of life.

It will not be the intent of this update process to start from scratch and develop a new complete hazard mitigation plan for the County of Marin. Based on needs identified by the planning team, this update will, at a minimum, include the elements below:

• The update process will be convened through a committee appointed by the Planning Director and will consist of at least one member of the Countywide Plan Update committee or staff to insure consistency between plans.

• The hazard risk assessment will be reviewed and updated using best available information and technologies on an annual basis.

• The evaluation of critical structures and mapping will be updated and improved as funding becomes available.

The action plan will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new County policies identified under other planning mechanisms, as appropriate (such as the General Plan).

• The draft update will be sent to appropriate agencies for comment.

• The public will be given an opportunity to comment prior to adoption.

• The Marin County Board of Supervisors will adopt the updated plan.

Implementation Through Existing Programs

The Sheriff's Office of Emergency Services (OES) has taken on the responsibility for overseeing the plan's implementation and maintenance through the County's existing programs. The

Emergency Services Manager or designated appointee will assume lead responsibility for facilitating LHMP implementation and maintenance meetings. Although the OES will have primary responsibility for review, coordination, and promotion; plan implementation and evaluation will be a shared responsibility among all departments identified as lead departments in the mitigation planning process. The OES will continue to work closely with the lead departments to insure consistency in plans.

Incorporation into Existing Planning Mechanisms

A. Planning Mechanisms for Incorporating the Requirements of the Plan

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best information and technology available at the time the LHMP update was prepared. As previously stated, the County's Countywide Plan is considered to be an integral part of this plan. The County, through adoption of its 2007 Countywide Plan (safety element) goals, has planned for the impact of natural hazards. The LHMP process provided the County with the opportunity to review and expand on policies contained within the general plan. The County views the Countywide Plan and the LHMP as complementary planning documents that work together to achieve the ultimate goal of the reduction of risk exposure to the citizens of Marin. Many of the ongoing recommendations identified in the mitigation strategy are programs recommended by the Countywide Plan and other adopted plans.

The County will coordinate the recommendations of the LHMP with other planning processes and programs including the following:

• County Emergency Operations Plan

• Countywide Plan

• County of Marin Code

• Community design guidelines

• Water-conservation guidelines

• Marin County Stormwater Pollution Prevention Program

Most action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of educational programs, continued interdepartmental and interagency coordination, or improved public participation.

Continued Public Involvement

The public will continue to be apprised of LHMP actions through the County website and by providing copies of the annual progress reports to the media. Copies of the LHMP will be distributed to the Marin County Library System. Upon initiation of the LHMP update process, a

new public involvement strategy will be initiated based on guidance from the committee. This strategy will be based on the needs and capabilities of the County at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area and the County's website.

Ongoing Commitment

Marin County Sheriff's Office of Emergency Services (OES) assumed the lead role in drafting this Hazard Mitigation Plan and supporting the joint effort of participating cities, towns, and special districts in building a more disaster-resistant county. OES will continue to support stakeholder meetings that will move the identified mitigation projects forward. During this process, goals and objectives may be reviewed and adjusted based on improved data and/or changes of magnitude of risks. Additional risk assessment, refined benefit cost analysis, and resources required will be monitored by stakeholders. Stakeholders identified in this plan will evaluate the plan in response to technological and political changes or other significant events and monitor outcomes of projects as expected.

Departments and agencies responsible for projects will be asked to provide annual reports on the progress of action items for purpose of formal review and update of plan. Public review opportunities will be provided as the plan is modified at public forums and/or the county website.

After adoption of the plan update, major disasters affecting the community, legal changes, or notices from CalEMA will be identified in the next update of this plan.

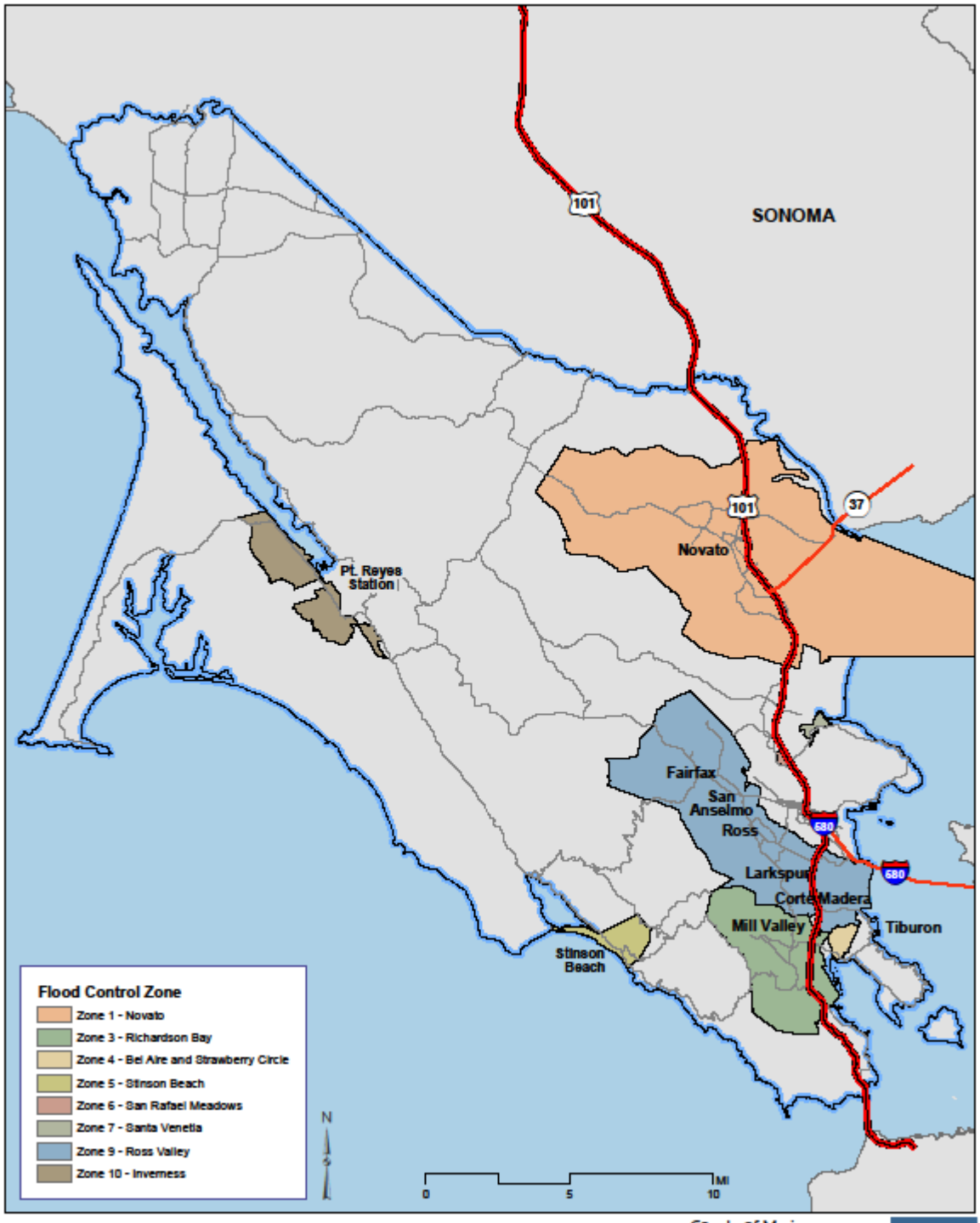
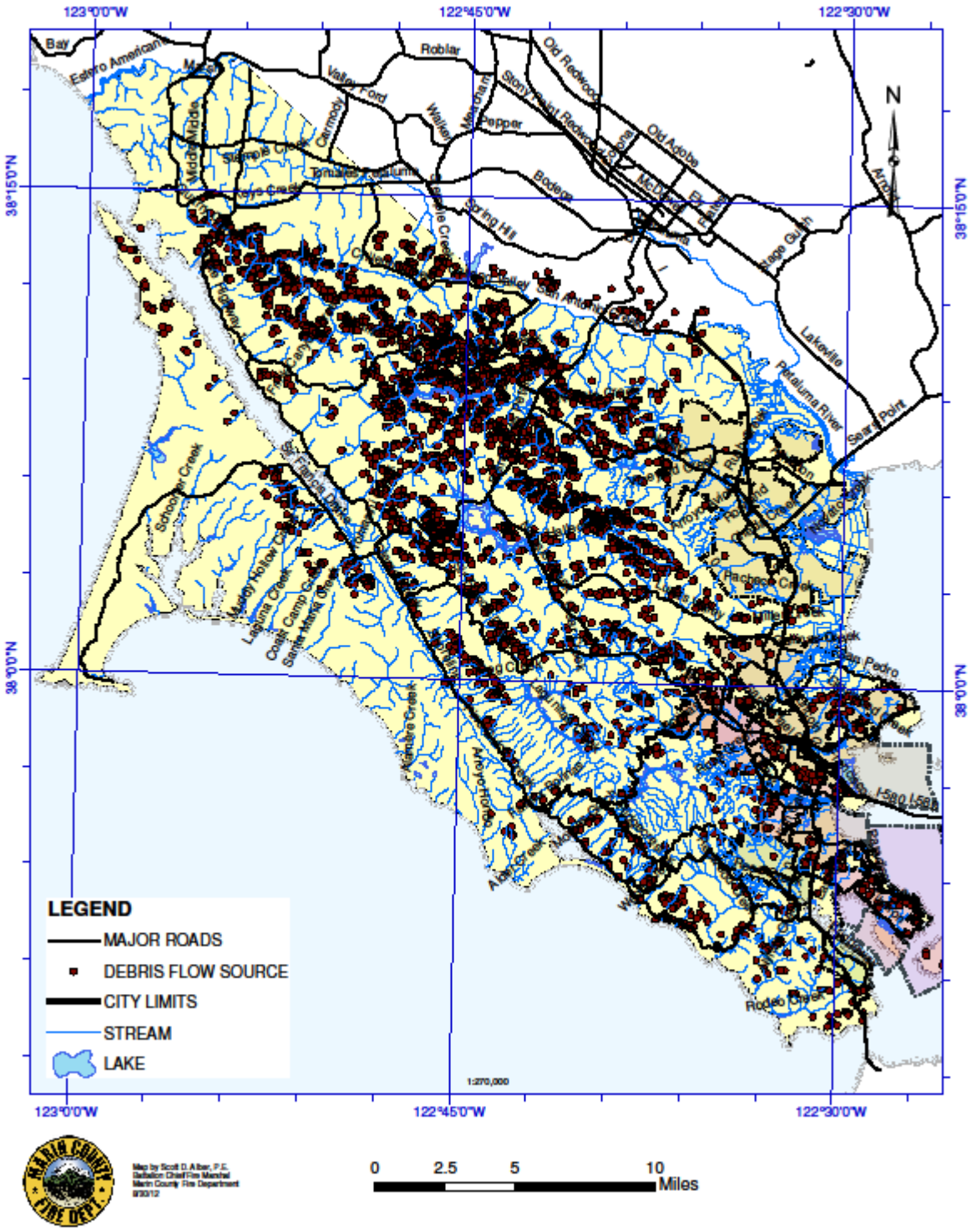
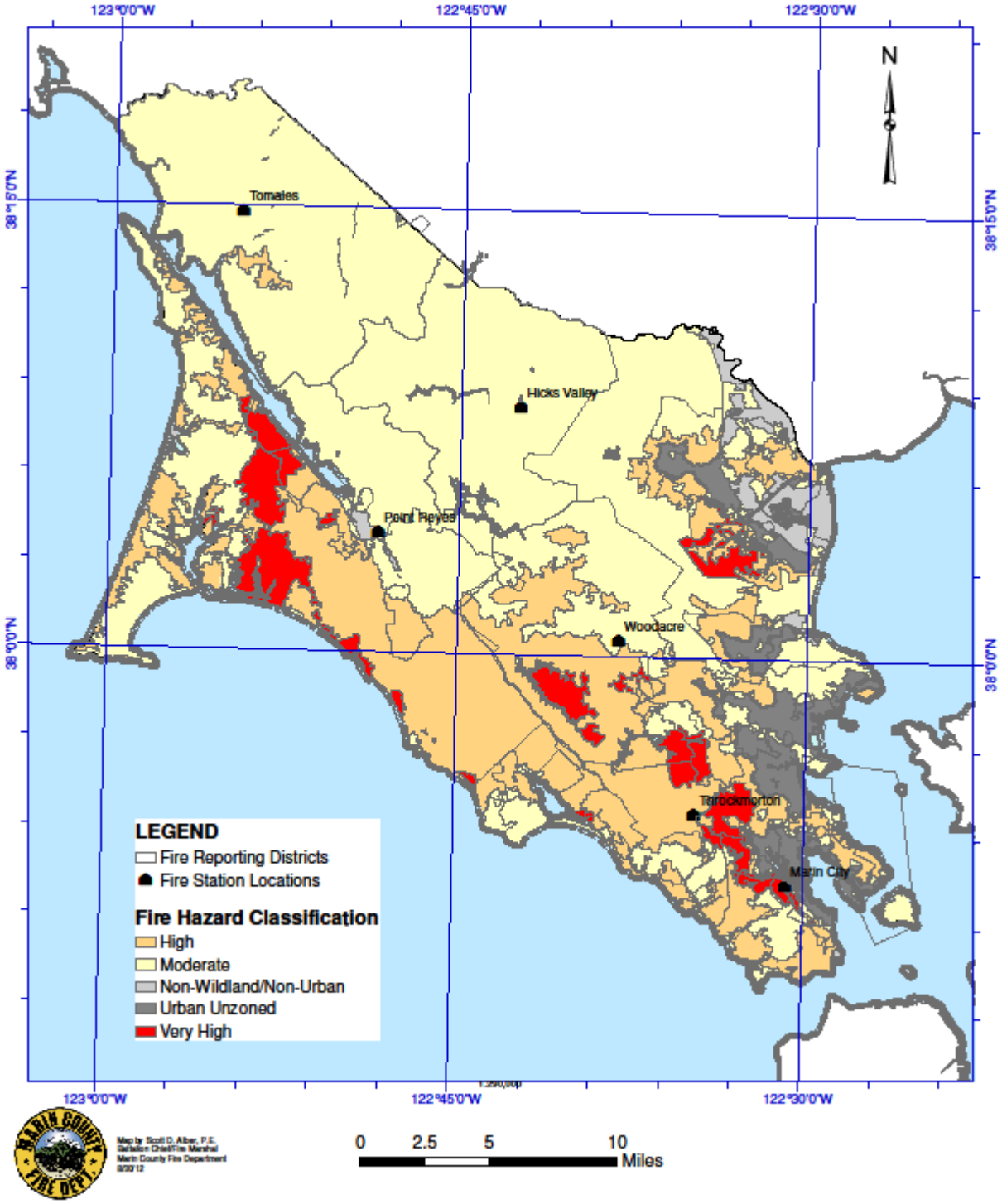


Figure 7 Flood Control Zones - Example shaking intensity maps (1906 San Francisco Earthquake Magnitude 7.9)

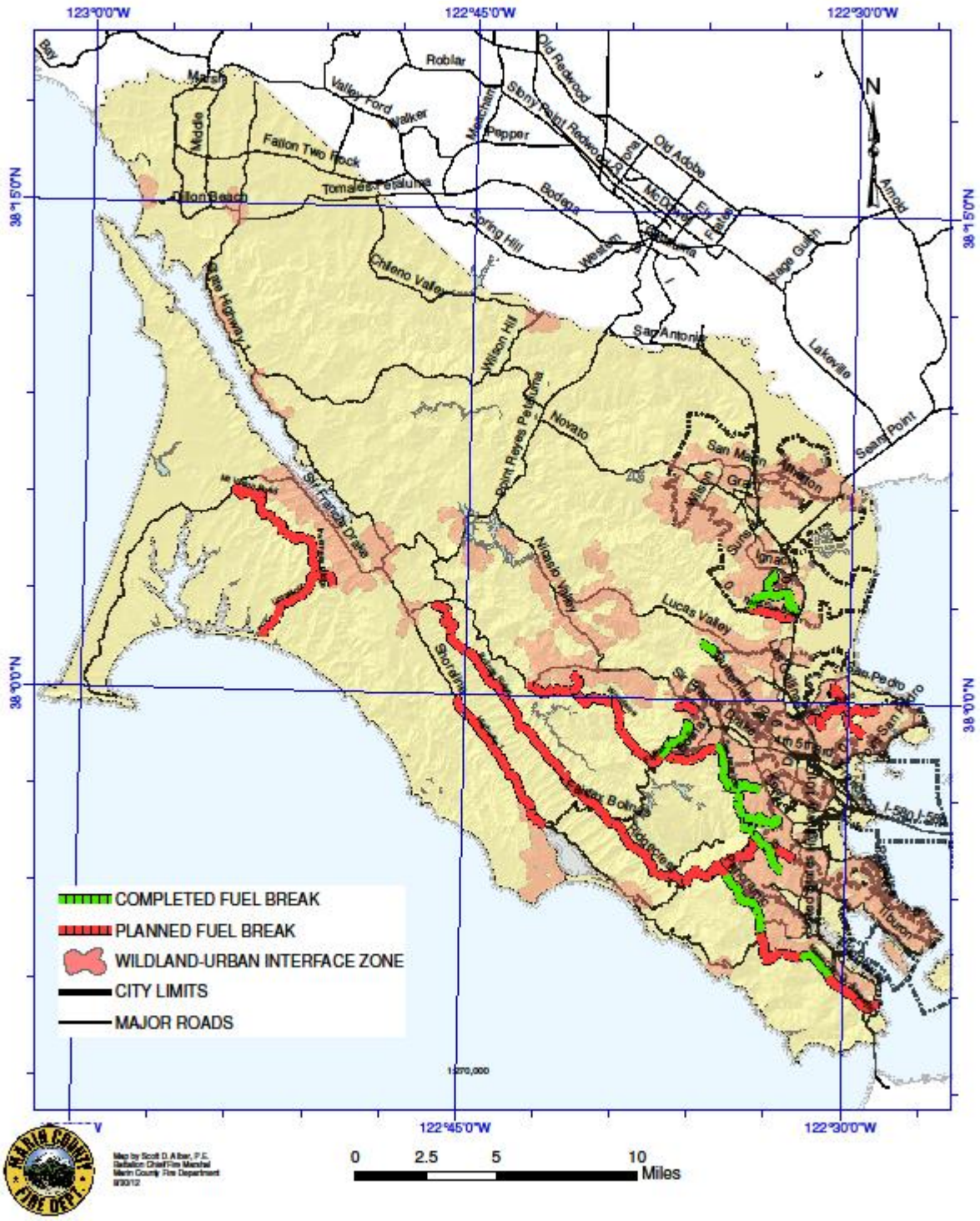
MARIN COUNTY DEBRIS FLOW SOURCES



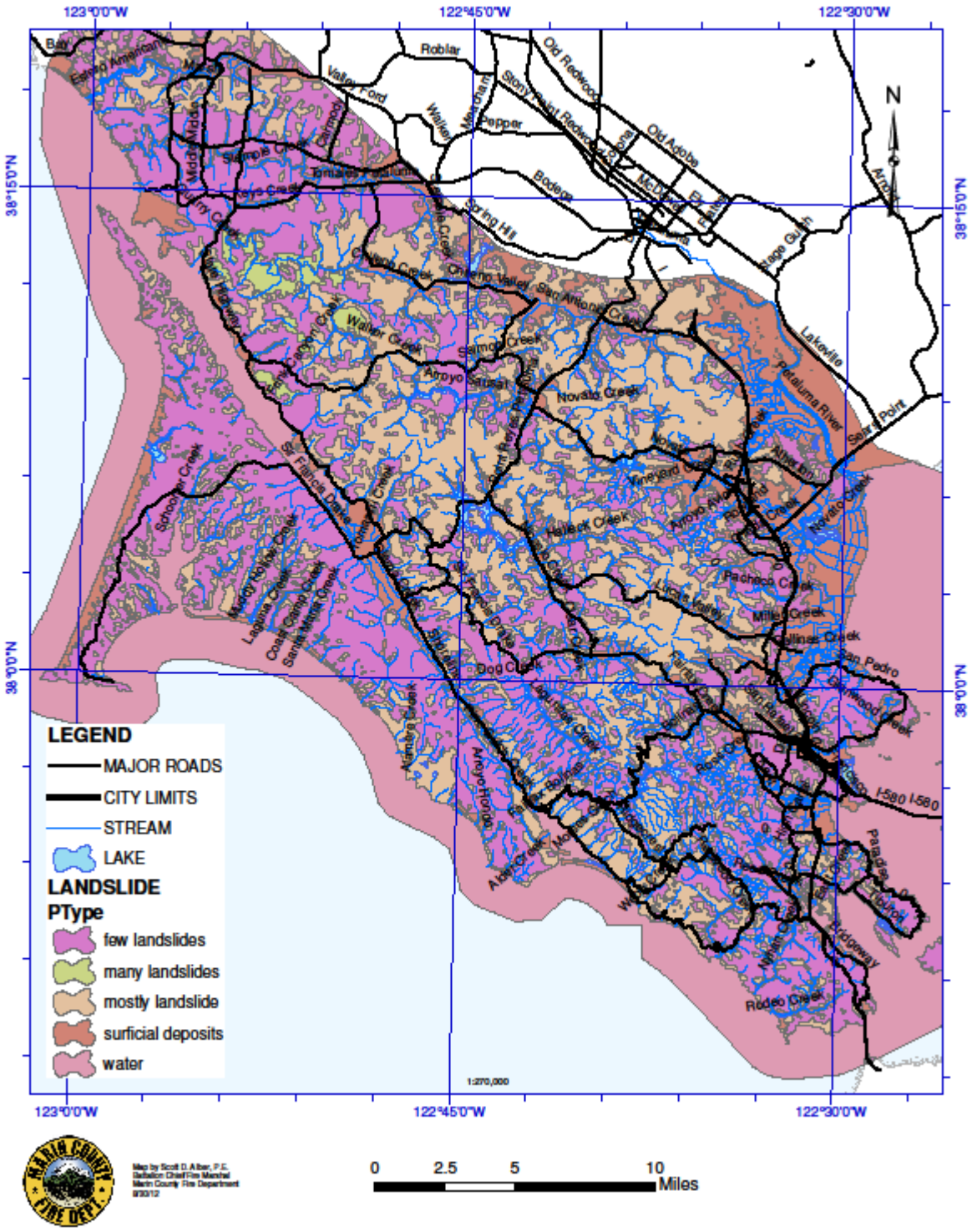
FIRE HAZARD SEVERITY ZONES



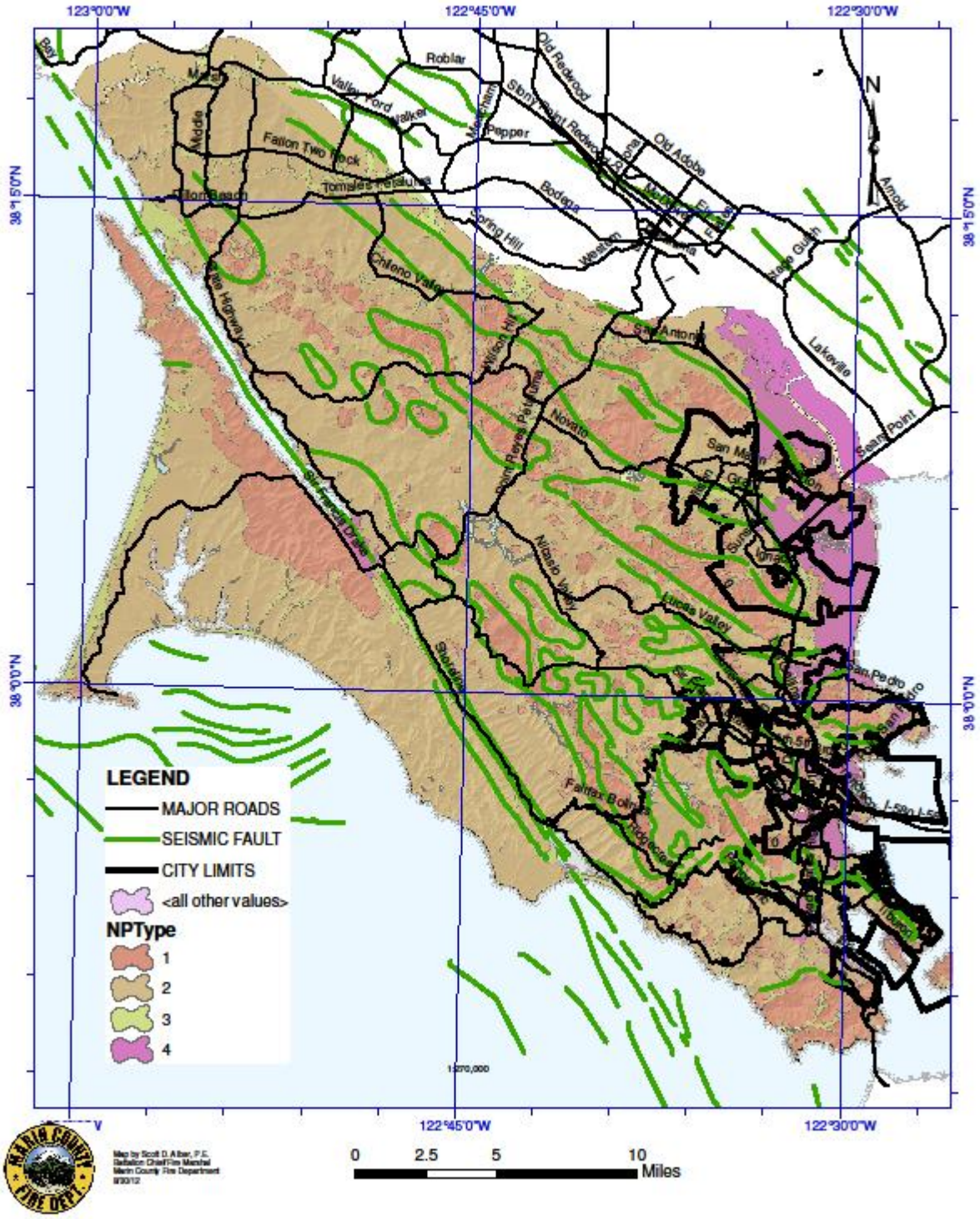
MARIN COUNTY FUEL BREAK NETWORK



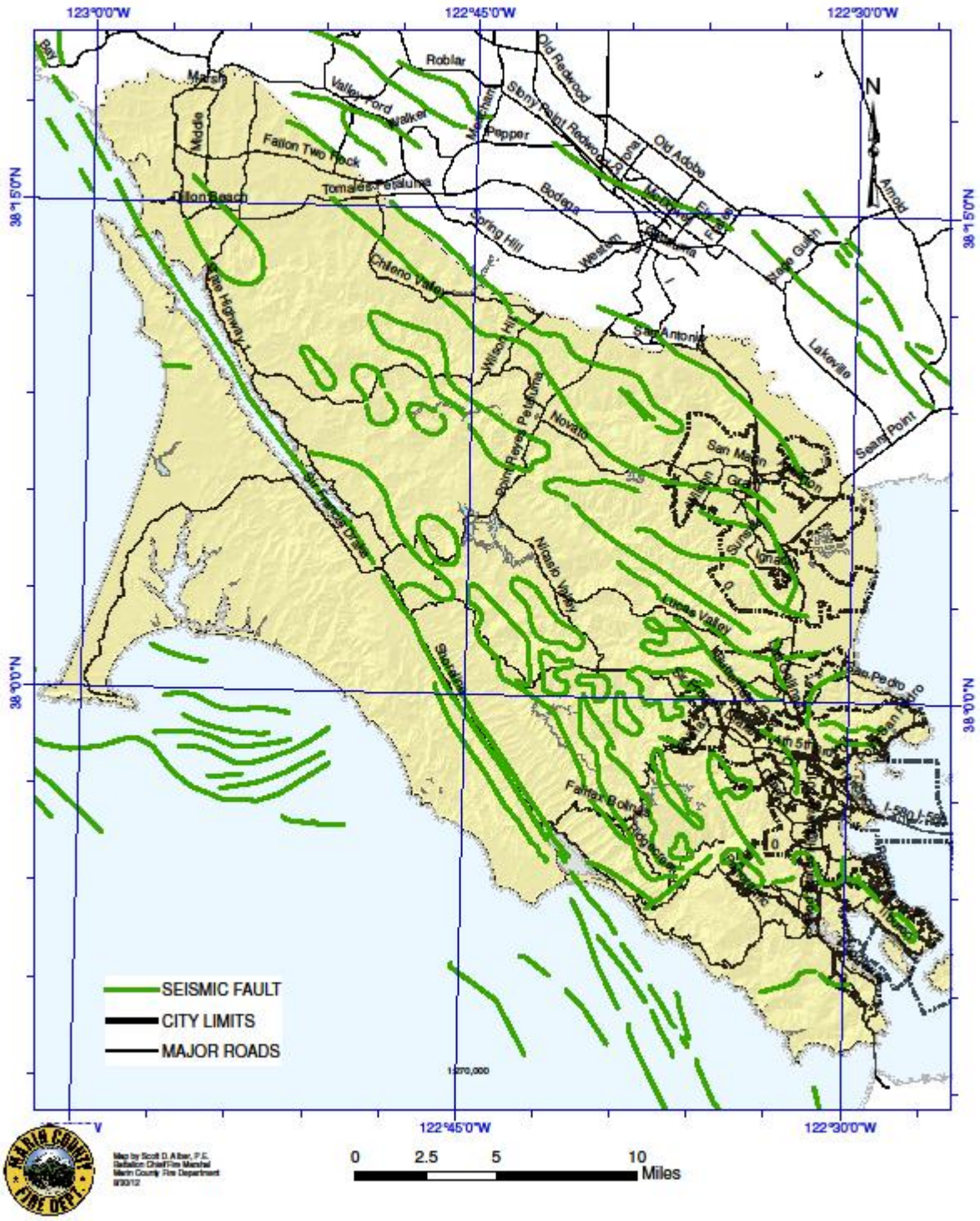
MARIN COUNTY LANDSLIDES



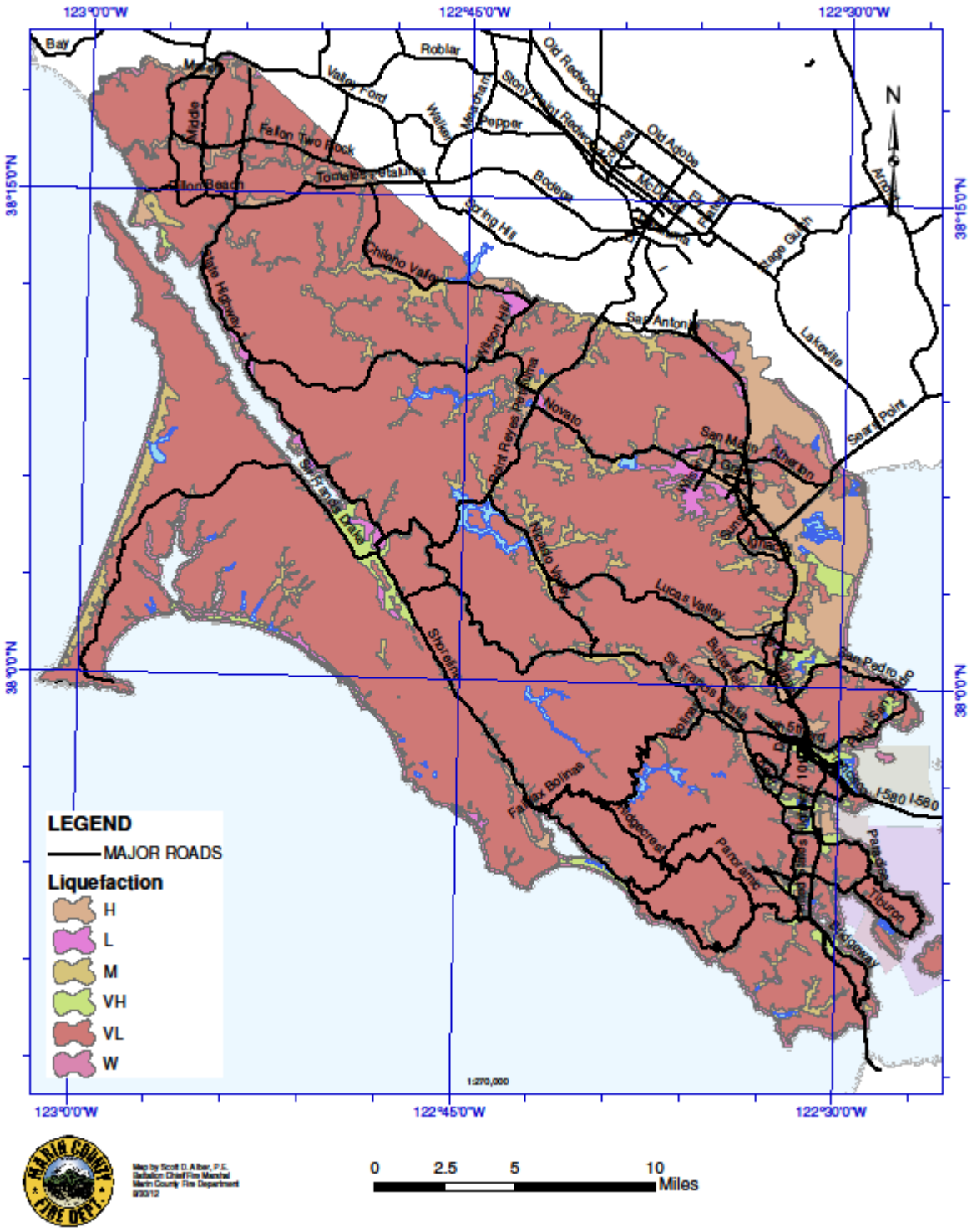
MARIN COUNTY SEISMIC SHAKING AMPLIFICATION



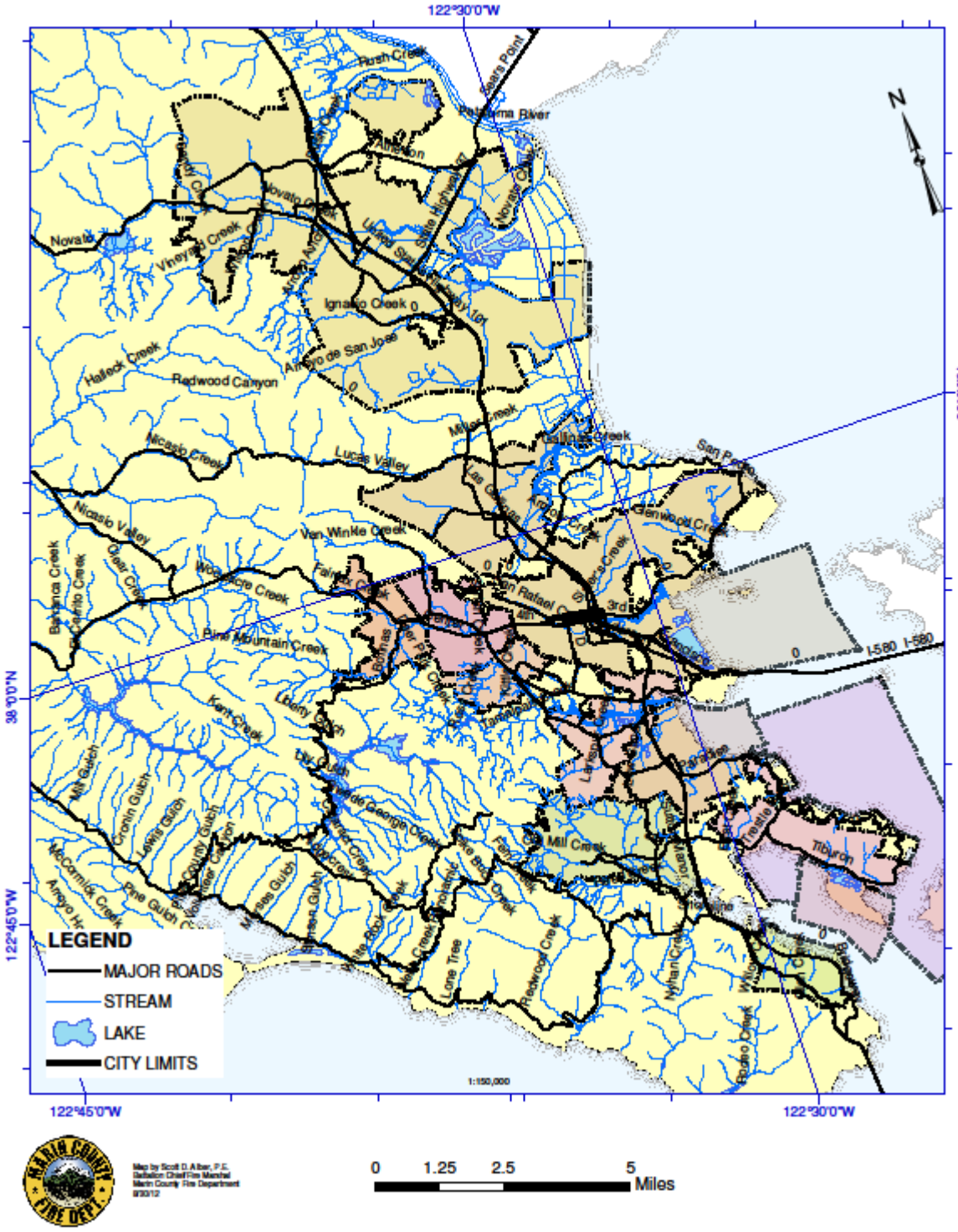
MARIN COUNTY SEISMIC FAULTS



MARIN COUNTY SOIL LIQUEFACTION



MARIN URBAN WATERSHED



MARIN COUNTY WILDLAND-URBAN INTERFACE