

Marin County Multi-Jurisdiction Local Hazard Mitigation Plan (MCM LHMP)

2018



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Acronyms and Abbreviations

2013 LHMP	Marin County 2013 Local Hazard Mitigation Plan
CalOES	California Governor's Office of Emergency Service
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
County	Marin County
CRS	Community Rating System
DC3	Marin Disaster and Citizen Corps Council
DFIRM	Digital Flood Insurance Rate Map
DMA 2000	Disaster Mitigation Act of 2000
DSOD	California Division of Safety of Dams
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HMGP	Hazard Mitigation Grant Program
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
OES	Office of Emergency Services
PDM	Pre-Disaster Mitigation (Program)
RFCP	Repetitive Flood Claims Program
RL	Repetitive Loss
SRL	Severe Repetitive Loss
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988
USC	United States Code
NMWD	North Marin Water District
VMP	Vegetation Management Plan

SECTION 1 INTRODUCTION

1.1 OVERVIEW

This section provides a brief overview of the topic, an introduction to hazard mitigation planning, and a brief description of the Disaster Mitigation Act of 2000, grant programs with mitigation plan requirements, local participants, and the 2018 Marin County Multi-Jurisdictional Local Hazard Mitigation Plan.

Marin County (the County) and its partners have developed this Multi-Jurisdictional Local Hazard Mitigation Plan (hereinafter referred to as the MCM LHMP) to assess risks posed by natural hazards and to develop a mitigation strategy for reducing the County's risks. The County has prepared the MCM LHMP in accordance with the requirements of the Disaster Mitigation Act of 2000 (DMA 2000). The Marin County Sheriff's Office of Emergency Services (OES), in conjunction with the Marin County Local Hazard Mitigation Team, has coordinated the preparation of the MCM LHMP in cooperation with municipalities and special district partners. The MCM LHMP replaces the County LHMP that was approved by FEMA on August 29, 2013 and will serve as the current LHMP for all participating jurisdictions. Some participating jurisdictions also have existing single-jurisdiction plans in place that are effective until their expiration date. All MCM LHMP partners will be included in an ongoing MCM LHMP plan review process to facilitate the 2023 plan update process.

This plan draws heavily, and with gratitude, on what the planning team was able to learn from other jurisdictions who have taken on hazard mitigation planning prior to this effort. In addition, the staff serving the Association of Bay Area Governments, the California Governor's Office of Emergency Services, and Region IX of the Federal Emergency Management Agency were of countless assistance to the planning team.

1.2 HAZARD MITIGATION PLANNING

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

1.3 DISASTER MITIGATION ACT OF 2000

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

To implement these planning requirements, FEMA published an Interim Final Rule in the Federal Register on February 26, 2002 (44 CFR Part 201). The local mitigation planning requirements are identified in their appropriate sections throughout this MCM LHMP and in the FEMA Local Mitigation Planning Crosswalk / Review Tool in Appendix A. In addition, this plan addresses the Community Rating System (CRS) 10-step planning process requirements.

1.4 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

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

Hazard Mitigation Grant Program. The Hazard Mitigation Grant Program (HMGP) provides grants to state, local, and tribal entities to implement long-term hazard mitigation measures after declaration of a major disaster. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem (for example, elevation of a home to reduce the risk of flood damage rather than buying sandbags and pumps to fight the flood). Also, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. Under the program, the Federal government may provide a state or tribe with up to 20 percent of the total disaster grants awarded by FEMA and may provide up to 75 percent of the cost of projects approved under the program, subject to a specified program cap. Between 2016 and 2018 several HMGP applications were submitted by participants in this MCM LHMP.

Pre-Disaster Mitigation Program. The Pre-Disaster Mitigation (PDM) Program provides funds to state, local, and tribal entities for hazard mitigation planning and the implementation of mitigation projects before a disaster. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, the potential savings of a PDM project must be more than the cost of implementing the project, and funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. The cost-sharing for this grant is 75 percent Federal and 25 percent non-Federal, although cost-sharing of 90 percent Federal and 10 percent non-Federal is available in certain situations.

1.5 LOCAL PARTICIPANTS

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

- ☐ Marin County
- ☐ City of Belvedere
- ☐ Town of Corte Madera
- ☐ City of Fairfax
- ☐ City of Larkspur
- ☐ City of Mill Valley
- ☐ City of Novato
- ☐ Town of Ross
- ☐ City of San Rafael
- ☐ Town of San Anselmo
- ☐ City of Sausalito
- ☐ City of Tiburon
- ☐ North Marin Water District
- ☐ Marin County Flood Control and Water Conservation District

1.6 COMMUNITY DESCRIPTION

1.6.1 County of Marin

Marin County, one of 58 counties in the state, is located on northern California's Pacific coast, just north of San Francisco. Marin County is bordered by Sonoma County to the north; the Pacific Ocean to the northwest and southwest; and the City and County of San Francisco to the south. Marin County spans 828 square miles, of which 520 square miles is land and 308 square miles is water. This footprint makes Marin County among the four smallest counties in the State; the only smaller counties being San Mateo County, Santa Cruz County, and the City and County of San Francisco. The following protected areas are within or contiguous to Marin:

National Protected Areas:

- ☐ Golden Gate National Recreation Area (U.S. National Park Service)
- ☐ Marin Islands National Wildlife Refuge

- ☐ Muir Woods National Monument
- ☐ Point Reyes National Seashore
- ☐ San Pablo Bay National Wildlife Refuge
- ☐ Greater Farallones National Marine Sanctuary

State Parks:

- ☐ Angel Island State Park
- ☐ China Camp State Park
- ☐ Mount Tamalpais State Park
- ☐ Olompali State Historic Park
- ☐ Samuel P. Taylor State Park
- ☐ Tomales Bay State Park

Marine Protected Areas:

- ☐ Duxbury Reef State Marine Conservation Area
- ☐ Estero Americano State Marine Recreational Management Area
- ☐ Estero de San Antonio State Marine Recreational Management Area
- ☐ Point Reyes State Marine Reserve & Drakes Estero State Marine Conservation Area

Marin County was incorporated in 1850 as one of the original 27 counties of California. Within its boundaries are 11 municipalities, 20 Census Designated Places, and 8 recognized unincorporated communities. The county seat is the City of San Rafael. According to the U.S. Census Bureau, and using the Population Estimates Program which produces July 1 estimates for years after the last published decennial census (2010), the 3.5% population increase to the 2015 estimate brings the population to 261,221. The county has 111,990 housing units, of a theoretical buildout amount of 120,755. The majority of the county's population resides within the municipalities along Highway 101.

Marin County's identity is largely shaped by its abundant natural resources and long history of open space preservation efforts to retain its rural character. A variety of factors have strictly limited development in the County over the last 5 years including large swaths of permanently protected federal and state parkland, large acreage of farm and ranch lands permanently protected through conservation easements, and Countywide Plan policies and development codes which restrain growth in sensitive habitat areas and/or flood hazard areas. Similarly future development is limited by these same constraints, as outlined in Section 3.5 Future Development.

1.6.2 Economy

Marin County has a strong economic base which has changed significantly over the last century. The county's economy was dominated by agriculture in the early part of its history. However, in recent years, Marin's economy has seen increasing job growth in technology-related fields such as biotechnology, computer software, and multimedia. With several attractions including beaches and parks in Marin, tourism is important to Marin County's economy.

Services, retail trade, government, and manufacturing account for the majority of employers in Marin. Some municipalities have also become closely aligned with particular industries. For example, Sausalito is known for its fishing fleet. Health care has a major presence in the City of San Rafael. The county also boasts one the state's highest certified organic and sustainable crop ratios.

1.6.3 Physical Features

Marin County is located along California's Pacific Coast (between San Francisco and Sonoma), including 72 miles of coastline. The highest point in the county, Mount Tamalpais, is 2,572 feet above sea level. The county has many microclimates with varying weather patterns, but the climate is generally Mediterranean with an average annual temperature of 79.7 degrees Fahrenheit. The County consists of areas of mountains/hills, valleys, forests, creeks, bayside wetlands and mud flats, and ocean coasts.

1.6.4 Infrastructure

Transportation

Marin County has an ever-developing transportation system, with most travel concentrated along key highways and arterial streets. There are 5 Highways passing through, terminating, or located wholly in Marin: Interstate 580, U.S. Route 101, State Route 1, State Route 37, and State Route 131. Marin 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 Route 37 is to the northeast (across filled bay land over San Pablo Bay); and Highway 101 is to the north (which narrows to a 4-lane uncontrolled road that traverses San Antonio Creek). One of the major problems Marin County faces during an emergency is the possibility of being isolated from the surrounding communities and any resources or help. Light rail service recently began supplementing existing transportation options along U.S. Route 101 between Marin and Sonoma Counties.

Utilities

Municipal utilities in Marin County include water (drinking water, stormwater, sanitary sewerage), power (electricity and natural gas), telecommunications, and solid waste. Several water management utilities supply treated water for domestic and fire suppression purposes. These distribution systems rely largely on the County's topography for collecting surface water, storing it in reservoirs, and distributing it with gravity-fed systems. As such, the water

management utilities are separated by both functional area and geography, but they are working more and more to coordinate within watersheds.

Marin Municipal Water District (MMWD) is the largest water district in Marin, serving central and southern portions of the county east of Mount Tamalpais and Bolinas Ridge. North Marin Water District (NMWD) serves Novato and communities along Tomales Bay including Olema, Point Reyes Station, Inverness, and Dillon Beach. Bolinas and Stinson Beach, two communities in West Marin, have separate water and sanitary districts. There are 23 agencies providing wastewater services in Marin County, including special districts, municipalities, JPAs and the Federal and State government.

(Citation: <https://www.marincounty.org/depts/gj/reports-and-responses/reports-responses/2013-14/~media/Files/Departments/GJ/Reports%20Responses/2013/SewerScoopI.pdf>)

Stormwater utilities such as open channels, catch basins and storm drains are managed by the cities, towns, and the county in unincorporated areas and are coordinated through the Marin County Stormwater Pollution Prevention Program (MCSTOPPP). Additionally, the Marin County Flood Control and Water Conservation District maintains some larger drainage infrastructure where zones have been designated. The District and some cities/towns such as San Rafael, Corte Madera, and Novato operate stormwater pump stations.

Natural gas and electricity distribution occurs through infrastructure owned and maintained by PG&E, a private utility corporation. Natural gas is piped into Marin from the central valley around the North Bay through Solano, Napa, and Sonoma Counties. The main transmission pipelines are underground along Highway 101 and flow south, branching into local distribution lines and private laterals. PG&E also brings power into Marin around the North Bay on overhead transmission lines that emanate from the Ignacio substation in Novato. Additional substations are located along Hwy 101 in Las Gallinas, San Rafael, Greenbrae, and Mill Valley to the South and in Novato, Stafford, Tocaloma, Olema, Bolinas and Woodacre to the North and East.

Telecommunications include telephone service, cable television and wireless services. AT&T maintains infrastructure for providing landlines, while Comcast provides cable television. A variety of cellular and wireless service companies operate in Marin and provide access points in the form of cellular towers, wireless antennas and equipment.

There are six solid waste haulers that operate within Marin County organized geographically and with agreements with cities and towns. All of this garbage, recycling, and greenwaste is brought to one of two processing centers; Redwood Landfill in Novato and Marin Resource Recovery Center in San Rafael.

1.6.5 Participating Municipalities

Marin County has 11 cities and towns, all of which participated in the preparation of this Plan. Using the most up-to-date information provided by the U.S. Census Bureau, these cities and key aspects of their socioeconomic and demographic qualities are described below.

City of Belvedere

The City of Belvedere had an estimated population of 2,068 in 2010, with 1,045 housing units in the City. The City has a total area of 2.406 square miles. The median income for a household in the City was \$130,796 and the per capita income for the City was \$113,595. Approximately 2.9 percent of families and 5.7 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Belvedere was incorporated as a city in 1896.

Town of Corte Madera

The Town of Corte Madera had an estimated population of 9,253 in 2010, with 4,026 housing units in the Town. The Town has a total area of 4.406 square miles. The median income for a household in the Town was \$79,839 and the per capita income for the Town was \$46,326. Approximately 2.7 percent of families and 4.5 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Corte Madera was incorporated in 1916.

Town of Fairfax

The Town of Fairfax had an estimated population of 7,441 in 2010, with 3,585 housing units in the Town. The Town has a total area of 2.204 square miles. The median income for a household in the Town is \$58,465 and the per capita income for the Town is \$34,080. Approximately 4.3 percent of families and 6.5 percent of the population is below the poverty line (2010 data, U.S. Census Bureau).

Fairfax was incorporated as a town in 1931.

City of Larkspur

The City of Larkspur had an estimated population of 11,926 in 2010, with 6,376 housing units in the City. The City has a total area of 3.243 square miles. The median income for a household in the City was \$66,710 and the per capita income for the City was \$56,983. Approximately 1.8 percent of families and 3.7 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Larkspur was incorporated as a city in 1908.

City of Mill Valley

Mill Valley had an estimated population of 13,903 in 2010, with 6,534 housing units in the City. The City has a total area of 4.847 square miles. The median income for a household in the City was \$90,794 and the per capita income for the City was \$64,179. Approximately 2.7 percent of families and 4.5 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Mill Valley was incorporated as a city in 1900.

City of Novato

The City of Novato had an estimated population of 51,904 in 2010, with 21,158 housing units in the City. The City has a total area of 27.440 square miles. The median income for a household in the City was \$63,453, and the per capita income for the City was \$32,402. Approximately 3.1 percent of families and 5.6 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Novato was incorporated as a city in 1960.

Town of Ross

The Town of Ross had an estimated population of 2,415 in 2010, with 884 housing units in the Town. The Town has a total area of 1.556 square miles. The median income for a household in the Town is \$102,015 and the per capita income for the Town is \$51,150. Approximately 5.6 percent of families and 8.5 percent of the population is below the poverty line (2010 data, U.S. Census Bureau).

Ross was incorporated as a town in 1908.

Town of San Anselmo

The Town of San Anselmo had an estimated population of 12,336 in 2010, with 5,538 housing units in the Town. The Town has a total area of 2.677 square miles. The median income for a household in the City is \$71,488 and the per capita income for the City is \$41,977. Approximately 2.5 percent of families and 5.1 percent of the population is below the poverty line (2010 data, U.S. Census Bureau).

San Anselmo was incorporated as a town in 1907.

City of San Rafael

The City of San Rafael (San Rafael) is the county seat of Marin County. San Rafael had an estimated population of 57,713 in 2010, with 24,011 housing units in the City. The City has a total area of 22.422 square miles. The median income for a household in the City was \$60,994 and the per capita income for the City was \$35,762. Approximately 5.6 percent of families and 10.2 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

San Rafael was incorporated as a city in 1874.

City of Sausalito

Sausalito had an estimated population of 7,061 in 2010, with 4,536 housing units in the City. The City has a total area of 2.257 square miles. The median income for a household in the City was \$87,469 and the per capita income for the City was \$81,040. Approximately 2.0 percent of

families and 5.1 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Sausalito was incorporated as a city in 1893.

Town of Tiburon

The Town of Tiburon had an estimated population of 8,962 in 2010, with 4,025 housing units in the Town. The Town has a total area of 13.182 square miles. The median income for a household in the Town was \$106,611 and the per capita income for the Town was \$85,966. Approximately 1.6 percent of families and 3.3 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Tiburon was incorporated in 1964.

1.6.6 Participating Special Districts

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

North Marin Water District

North Marin Water District (NMWD) was formed in April 1948 following voter approval under the California State law known as the County Water District Law (Division 12 of the California Water Code).

NMWD primarily serves the City of Novato and surrounding unincorporated areas in Marin County, encompassing approximately 75 square miles. The Novato Service Area has approximately 20,750 active service connections serving approximately 24,000 dwelling units, as well as commercial, industrial and institutional customers. The estimated Novato Service Area population is 61,000. NMWD also provides service to several small improvement districts in the West Marin Service Area near the Pacific Ocean, via approximately 800 service connections.

NMWD owns and operates Stafford Lake and the associated treatment plant, which provides approximately 20% of Novato's water. The lake lies four miles west of downtown Novato and collects runoff from 8.3 square miles of watershed property located upstream at the upper tributary reaches of Novato Creek. Water from Stafford Lake is drawn by the intake tower and fed by gravity or by pumping (depending on the lake level) into the treatment plant located just below the dam. In addition to providing water supply for domestic needs and firefighting purposes, Stafford dam provides flood protection for the greater Novato area. The Marin County Flood Control and Water Conservation District has partnered with NMWD to share in the cost of obtaining additional flood liability insurance.

Water from the Russian River via connection to the Sonoma County Water Agency's aqueduct provides the remaining 80% of the Novato Service Area supply of water. This water originates from both the Eel River and the Russian River watersheds. The water supply for the West Marin Service Area is derived from groundwater.

NMWD maintains and operates approximately 340 miles of pipeline, 42 tanks totaling over 37 million gallons of storage, and associated pump stations, hydropneumatic systems, and regulator valves. NMWD sizes its storage tanks to meet operational, firefighting and emergency requirements. Storage requirements for both the Novato and West Marin Service Areas are updated on a 5-year cycle, and are based in part on input provided by Novato Fire Protection District and Marin County Fire.

Ensuring water quality and protecting public health is one of NMWD's primary goals. Water quality data is routinely collected throughout the distribution systems and at water sources.

Marin County Flood Control and Water Conservation District

The District's geographical boundary is the same as the County's and, as a whole, it has no source of revenue. Instead, revenue is collected via ad valorem taxes and fees paid by property owners in one of eight zones covering distinct geographical areas within the District. All expenditures by the District require authorization by the Board of Supervisors of the District and the five members of the Marin County Board of Supervisors serve on the District's board.

Eight zones have been established within the District to address specific flooding problems in eight watersheds across Marin County.

1.7 DESCRIPTION OF THE Multi Jurisdictional Local Hazard Mitigation Plan

A multi-jurisdictional hazard mitigation plan is a plan jointly prepared by more than one jurisdiction. Jurisdictions can benefit in several ways when they choose to participate in a multi-jurisdictional planning process. Among such benefits, this process:

- ☐ Enables comprehensive approaches to mitigation of hazards that affect multiple jurisdictions;
- ☐ Allows economies of scale by:
 - o Leveraging individual capabilities; and
 - o Sharing costs and resources;
- ☐ Avoids duplication of efforts; and
- ☐ Imposes an external discipline on the process.

The remainder of this MCM LHMP consists of the sections described below.

Section 2: Planning Process

Section 2 describes the planning process. Specifically, this section describes the plan development process and identifies members of the Planning Committee and Plan Review Committee; including a description of the meetings held as part of the planning process (relevant

documents are attached in the Appendixes). This section also documents public outreach and stakeholder involvement activities and discusses the review and incorporation of relevant plans, reports, and other appropriate information.

Section 3: Hazard Analysis

Section 3 describes the process through which the Planning Committee identified, screened, and selected the hazards to be profiled in the MCM LHMP. The hazard analysis includes the nature, history, location, extent, probability of future events, impacts, and vulnerability for each hazard.

It also summarizes RL and SRL properties, future development, natural and beneficial functions of floodplains, and life safety/warning/evacuation systems.

Section 4: Mitigation Strategy

Section 4 provides a blueprint for reducing the potential losses identified in the vulnerability analysis. The Planning Committee reviewed mitigation projects identified in the prior LHMP of the eight participating jurisdictions with existing plans. Every participating jurisdiction with an existing LHMP assessed their progress on previously identified actions and revised their list to reflect updated priorities. Actions common to all jurisdictions were consolidated into a list of “common actions”.

Section 5: Plan Maintenance

Section 5 describes the formal plan maintenance process to ensure that the MCM LHMP remains an active and applicable document. The process includes monitoring, evaluating, and updating the plan (relevant documents are attached in Appendix F); monitoring mitigation projects and closeout procedures (relevant documents attached in Appendix F); implementing the plan through existing planning mechanisms; and achieving continued public involvement.

SECTION 2 PLANNING PROCESS**2.1 OVERVIEW**

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

The last full update of the Marin Countywide Plan (CWP) was in 2007, and the last Local Hazard Mitigation Plan (LHMP) update was completed in 2013. As the CWP update preceded the LHMP update, inclusion of the 2013 LHMP into the CWP was not possible. However, as Senate Bill 379 requires climate adaptation to be included in County general plans, the 2018 LHMP can serve as a valuable reference document for hazards assessments, potential policies, and implementing programs for the next CWP update

2.2 INITIAL PLANNING PROCESS, 2011–2013

As noted previously, the initial basis for this plan was 2013 Marin County LHMP and LHMPs of partner jurisdictions with current approved and adopted plans. This plan was prepared by the Marin County Local Hazard Mitigation Plan Team, which consisted of representatives from the County Office of Emergency Services, Department of Public Works, Fire Department, and Community Development Agency. The 2013 LHMP development occurred from December 2011 to July 2013. The 2012 LHMP was adopted by the Marin County Board of Supervisors on October 16, 2012 and approved by FEMA on August 29, 2013.

2.3 PLAN UPDATE PROCESS, 2013–2018

Pursuant to approval and adoption of the 2013 LHMP, the County LHMP Team established a schedule of team meetings to provide opportunity for review and documentation of any changes to LHMP relevant plans, projects, programs, as well as Notices of Intent (NOIs) submitted to CalOES by their respective groups. In April 2016 the Marin County Sheriff's OES kicked off the official update process. The 2018 plan process became a multi-jurisdictional process to include all municipalities and select Special Districts. The Marin County Sheriff's OES determined that the standing Marin Disaster and Citizen Corps Council (DC3) included almost all of the relevant stakeholders and therefore would make up the 2018 MCM-LHMP Plan Review Committee. The DC3 consists of local officials from the County, cities and towns, and special districts as well as non-governmental agencies, private sector, and special districts that have been delegated the authority of local government emergency services directors, City Managers, and the Director of Emergency Services (a member of the County Board of Supervisors) who serves as the DC3 Chairperson.

The MCM LHMP's Planning Committee is shown below in Table 2-1. The 2018 DC3, serving as the MCMLHMP Plan Review Committee, is shown below in Table 2-2.

Table 2-1. Planning Committee

Department, Agency, or Municipality	Name
Marin County Sheriff's Office	Thomas Jordan, Emergency Services Coordinator
Marin County Department of Public Works	Hannah Lee, Senior Civil Engineer Beb Skye, Engineering Technician Felix Meneau, Assistant Engineer Gerhard Epke, Senior Program Coordinator
Marin County Fire Department	Scott Alber, Fire Marshal
Marin County Community Development Agency	Kristen Drumm, Senior Planner Alex Westhoff, Planner
City of Belvedere	Irene Borba, Director of Planning & Building Laurie Nilsen, Emergency Services Coordinator
Town of Corte Madera	Kelly Crowe, Senior Civil Engineer Matt Cobb, Battalion Chief Hamid Khalili, Police Captain Adam Wolff, Planning and Building Director Peter Brown, Public Works Director
City of Fairfax	Mark Lockaby, Chief Building Official Michele Gardner, Deputy Town Clerk
City of Larkspur	Matt Cobb, Battalion Chief Bob Quinn, Public Works Superintendent Neal Toft, Planning Director Julian Skinner, Public Works Director .
City of Mill Valley	Tom Welch, Fire Chief Andrew Poster, Public Works Director Elisa Sarlatte, DPW Engineering Manager
Town of Ross	Richard Simonitch, Public Works Director Heidi Scoble, Planning Manager Erik Masterson, Police Chief
Town of San Anselmo	Sean Condry, Public Works Director Elise Semonian, Planning Director Dave Donery, Town Manager
City of San Rafael	Talia Smith, Senior Management Analyst Quin Gardner, Emergency Management Coord Robert Sinnott, Deputy Fire Chief

SECTION 2

Planning Process

	Kevin McGowan, Asst Public Works Director Bill Guerin, Public Works Director
City of Sausalito	Jonathon Goldman, Public Works Director Bill Frass, Police Captain Lilly Whalen, Clerk Mike McKinley, Emergency Services Coordinator
Town of Tiburon	Kyra O'Malley, Associate Planner Laurie Nilsen, Emergency Services Coordinator Scott Anderson, Community Development Director
City of Novato	Nancy Andrews, Senior Management Analyst Bob Brown, Community Development Director Bill Tyler, Fire Chief Jim Correa, Police Captain Dave Jeffries, Consultant
North Marin Water District	Drew McIntyre, General Manager Rocky Vogler, Chief Engineer Pippin Cavagnaro, Associate
Marin County Flood Control and Water Conservation District	Hannah Lee, Senior Civil Engineer Felix Meneau, Assistant Engineer Gerhard Epke, Senior Program Coordinator

Table 2-2. MCM LHMP Plan Review Committee

DC3 Position Title	Name
Chairperson	Judy Arnold
Marin Managers	Joe Chinn
Schools	Michael Grant
Emergency Medical Services	Miles Julihn
Access and Functional Needs	Peter Mendoza
MIDC	Denis O'Leary
Transit	Mohamed Osman
Health and Human Services	Lisa Santora
Police Chiefs	Tricia Seyler-Campbell
Public Works	Eric Steger

At Large Representative	Bill Tyler
MCCMC	Catherine Way
Fire Chiefs	Jason Weber
American Red Cross	Debbie Yee
Economic Forum	Garry Lion
District 1	Frank Cox
District 2	Michael McDermott
District 3	Keith Kennedy
District 4	Anne Sands
District 5	Ed Schulze

DC3 = Marin County Disaster and Citizen Corps Council

County LHMP Team members attended and facilitated meetings with the Planning Committee and coordinated numerous activities to create the 2018 MCM LHMP. Members of the Plan Review Committee were provided project updates at Marin County Disaster and Citizen Corps Council DC3) meetings and draft plans for review via email. Additional information regarding the meetings and public outreach efforts is provided in more detail in Appendix C, D and E.

Community Rating System Program Planning Process

Several participating jurisdictions in the MCM LHMP are also participants in FEMA's Community Rating System (CRS), including the County of Marin, City of Sausalito, Town of Fairfax, Town of San Anselmo, Town of Ross, Town of Corte Madera, and the City of Novato. The County of Marin hosts regular CRS coordination meetings and invites all jurisdictions, even those that aren't currently part of CRS. The Marin County Public Works Community Rating System representative who hosts those multi-jurisdictional meetings also participated on the MCM LHMP Planning Committee in order to address the CRS Floodplain Management Planning requirements.

2.4 REVIEW OF EXISTING PLANS, STUDIES, AND REPORTS

The following Table 2-3 reflects the existing plans, studies, and reports used during the planning process

Table 2-3. MCM LHMP Existing Plans, Studies, and Reports

Document Title and Date	Method of incorporation into the jurisdiction annex
All Jurisdictions	
Association of Bay Area Governments (ABAG) 2010 multi-jurisdictional Local Hazard Mitigation Plan for the San Francisco Bay Area, 2010 Update of 2005 Plan	Hazard Identification and Screening Mitigation Actions
Marin Map- online mapping tool includes hazard data, assets, zoning, current FEMA flood maps www.marinmap.org	Hazards Analysis
FEMA data via Flood Insurance Studies, BureauNet	Hazard Profiles, Risk Assessments, Repetitive Loss Lists
Marin County -California Wildfire Protection Plan (CWPP) www.firesafemarin.org/cwpp	Hazard Profiles & Mitigation Actions
Marin County Sea Level Rise Vulnerability Assessments (BayWAVE & C-SMART) and C-SMART Adaptation Report	Hazard Profiles & Mitigation Actions
DSOD dam safety information ABAG earthquake: http://resilience.abag.ca.gov/earthquakes/marin/	Hazard Profiles
2013 State of California Hazard Mitigation Plan	Plan Conformance
Marin Stormwater Resource Plan 2017	Mitigation Actions
The Scoop on Marin County Sewer Systems: Part I 2013/2014 Marin County Civil Grand Jury	Cited in 1.6.3 to describe sewer infrastructure
U.S. Census Bureau 2010 The studies detail flood depths and base flood elevations. Used in development of risk assessments and mitigation actions	For socioeconomic and demographic aspects of participating municipalities.
Marin Municipal Water District Urban Water Management Plan 2015 (approved June 7, 2016)	Referenced by several Jurisdictions
Countywide Watershed Stewardship Plan	Hazard Analysis
Plan Bay Area 2040	
Sonoma County Water Agency Local Hazard Mitigation Plan	Mitigation actions (regional radar project)
CAL FIRE & Marin County Fire Department Strategic Fire Plans	Hazard Profiles and Mitigation Actions
International Urban-Wildland Interface Code 2003	Hazard Profiles
Community Exposure to Tsunami Hazards in California report & National Geodetic Data Center database of tsunami occurrences	Hazard Profiles
Cliff and Erosion Technical Background Report, 2003 prepared for Marin County Local Coastal Program update	Hazard Profiles
Landslide Inventory, California Department of Conservation	Hazard Profiles

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Marin County Office of Emergency Services, News Release on storm damages, 12/29/2014	Hazard Profiles
California Building, Plumbing and Mechanical Codes	Hazard Profiles
Belvedere	
Belvedere's 2010 General Plan Environmental Hazards Element has thorough treatment of environmental hazards and references the City's 2005 LHMP and development of the 2011 update. The City's 2011 LHMP contained its Flood Mitigation Plan.	
2010 General Plan 'Belvedere 2030'	Hazard Profiles, Priority mitigation actions and programs
2011 ABAG LHMP Annex	Development of Mitigation Actions
Flood Management Plan	Development of Mitigation Actions
Capital Improvement Plan	Development of Mitigation Actions
Emergency Operations Plan (EOP)	Development of Mitigation Actions
Traffic Safety Study	Development of Mitigation Actions
Corte Madera	
Corte Madera's 2009 General Plan was written before the Town's development of its 2011 ABAG LHMP Annex. The General Plan's implementation measure F-1.4.b calls for implementation of a Hazard Plan, which was completed two years later. The Town's Capital Improvement Plan and building and municipal codes have been updated since 2011 and incorporate portions of the LHMP.	
Previous LHMPs: 2005 & 2010 ABAG Multi-Jurisdictional Local Hazard Mitigation Plan Annexes	Hazard Profiles & Development of Mitigation Actions
Capital Improvement Plan (CIP)	Development of Mitigation Actions
General Plan Safety Element	Development of Mitigation Actions
Fairfax	
The Town's 2010 General Plan and 2011 ABAG Hazard Mitigation Plan Annex were developed concurrently, so the General Plan Advisory Committee (GPAC) reviewed, refined, and incorporated selected mitigation strategies into the final draft 2010 General Plan Safety Element. The Safety Element states that it "is intended to complement and support not only the other General Plan Elements, but also other Town plans and documents, such as the Emergency Operations Plan (EOP), the Local Hazard Mitigation Plan (LHMP), and the Flood Mitigation Plan (FMP).	
2010 General Plan Safety Element	Priority mitigation actions and programs
2004 LHMP ABAG Multi-Jurisdictional Local Hazard Mitigation Plan Annex	Development of Mitigation Actions

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Capital Improvement Plan (CIP)	Development of Mitigation Actions
Emergency Response Plan	Development of Mitigation Actions
Community Preparedness Plan	Development of Mitigation Actions
Larkspur	
Larkspur is in process of updating its General Plan, which was last updated in 1990. The updated plan will comply with the Disaster Management Act 2000 by including a Safety Element that references this Hazard Mitigation Plan. In the meantime, Table K-7 demonstrates the City's continuing progress implementing mitigation measures.	
General Plan Safety Element	Hazard Profiles & Development of Mitigation Actions
Comprehensive Emergency Management Plan	Development of Mitigation Actions
City of Larkspur All-Hazard Mitigation Plan Version 2.0	Development of Mitigation Actions
Unincorporated Marin County	
Marin County's prior Hazard Mitigation Plan is referenced in the 2007 Marin Countywide Plan. Appreciable integration of the last LHMP has not yet happened but can be anticipated when the County begins an update on the Countywide plan in the next two years.	
2007 Marin Countywide Plan (2015 Update)	Hazard Profiles & Development of Mitigation Actions (its policies and development codes that restrain growth in sensitive habitats and/or flood hazard areas, as well as future development in general are outlined in Section 3.5)
Local Coastal Program	Hazard Profiles & Development of Mitigation Actions
Marin County 2013 Local Hazard Mitigation Plan	Development of Mitigation Actions
Mill Valley	
Mill Valley's Hazard Mitigation Plan was approved in 2009 and it has been incorporate it into other mechanisms such as the City's General Plan from 2013 which calls for maintenance, updates, and implementation of the All Hazard Mitigation Plan.	
City All Hazard Mitigation Plan v 4.0	Development of Mitigation Actions

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2013 General Plan Update '2040 General Plan' incl Climate Action Plan & Hazards & Public Safety Element	Development of Mitigation Actions
General Fund and Capital Improvement Plan	To be incorporated into actions when complete.
Sewerage Agency of Southern Marin (SASM) Master Plan	Identifies SASM facilities to replace in Mill Valley
City of Mill Valley Emergency Operations Plan	Hazard Profiles & Mitigation Actions
City of Mill Valley Bicycle and Pedestrian Master Plan Update 2015	Development of Mitigation Actions
North Marin Water District	
NMWD hasn't had a previous LHMP for incorporation into other mechanisms.	
Stafford Dam EAP 2017	Development of Mitigation Actions
2015 Master Plan Update for the Oceana Marin Wastewater System, NMWD Job File 8 4046.00	Development of Mitigation Actions
2018 Novato Water System Master Plan Update, NMWD Job File 1 7039.02	Development of Mitigation Actions
Novato	
Novato is currently updating its General Plan. The current draft Safety and Health strategy #7a is to "Periodically update the City's Emergency Operations Plan and Local Hazard Mitigation Plan to coordinate with emergency plans of other governmental agencies and respond to changing conditions". The new general plan also refers to the previous hazard mitigation plan for additional information on certain hazards such as wildfire.	
Hazard Mitigation Plans previous annual reviews	Development of Mitigation Actions
2035 General Plan Existing Conditions Report, April 2014	Development of Mitigation Actions
2008 City Flood Mitigation Plan	Development of Mitigation Actions
Emergency Preparedness Plan	Development of Mitigation Actions
Emergency Operations Plan	Development of Mitigation Actions
Stafford Dam Emergency Action Planning and Risk Awareness in 2015	Development of Mitigation Actions
Identified Site Emergency Planning Application, (ISEPA)	Development of Mitigation Actions
Novato Elected/Appointed Official Guide to Disaster Operations 2017	Development of Mitigation Actions
City of Novato Local Drainage Master Plan	Development of Mitigation Actions
City of Novato Repetitive Loss Plan	Development of Mitigation Actions

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Ross	
Ross's General Plan was completed and adopted in 2007, before its 2012 hazard mitigation plan. The 2012 LHMP was very good, but it hasn't been incorporated into other planning mechanisms.	
Town of Ross General Plan 2007 – 2025	Development of Mitigation Actions
2012 LHMP	Development of Mitigation Actions
Ross Valley Sanitary District Strategic Plan Ross Valley Sewer System Replacement Master Plan 2007 Ross Valley Sanitary District response to Grand Jury Report Dated June 16, 2011: "Ross Valley Sanitary District: Not Again!"	Cited in 1.6.3 to describe sewer infrastructure
San Anselmo	
San Anselmo's first stand-alone LHMP was adopted in 2017, so there hasn't been sufficient time for its incorporation into other planning mechanisms such as the General Plan, which was adopted in 1988. Prior to that, the ABAG annex was too general to impact local mitigation planning.	
2011 Climate Action Plan	The plan includes strategies for reducing government greenhouse gas emissions. Policies from the plan have been included as mitigation strategies, where appropriate.
2011 Capital Improvement Plan Study for Flood Damage Reduction and Creek Management in Flood Zone 9/Ross Valley	This study has information on projects that may reduce flooding in the San Anselmo watershed. The Town incorporated some of the projects within the Town jurisdiction as mitigation strategies.
Town of San Anselmo 2015 General Plan	The General Plan is the Town's long-term blueprint for the community's vision of future growth. This plan was reviewed for existing policies and programs to mitigate all hazards.
2008 Flood Mitigation Plan	The plan includes goals and strategies developed following the December 31, 2005 flood. Used in development of risk assessments and mitigation actions
Town of San Anselmo Municipal Code	This plan was reviewed for existing policies and programs to mitigate all hazards. It includes regulations for building standards, flood damage prevention, environmental review and restrictions on density in fire prone areas.
7-year Capital Improvement Plan 2015	This plan details the Town's priorities for capital improvement projects for years 2015-2021. Used in development of risk assessments and mitigation actions.

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Corte Madera Creek 2010 Flood Control Study Baseline Report Available through US Army Corps of Engineers and Ross Valley Flood Control Program website http://www.marinwatersheds.org/documents_and_reporys/documents/CorteMaderaCreekFinalBaselineReport-2010-12-08.pdf	Documents details efforts to reduce flooding in the Ross Valley and Corte Madera Creek. Study consulted for flood frequency of historic flood events.
San Rafael	
The City's "General Plan 2020" from 2004 calls for preparation and adoption of an LHMP. Since then, the City has prepared and adopted an LHMP. The General Plan is currently being updated.	
City of San Rafael 2020 General Plan	Development of Mitigation Actions
City of San Rafael 2020 General Plan Background Report	Development of Mitigation Actions
City of San Rafael Climate Change Action Plan	Development of Mitigation Actions
City of San Rafael Community Emergency Preparedness Plan	Development of Mitigation Actions
City of San Rafael Greenhouse Gas Reduction Strategy Report	Development of Mitigation Actions
Climate Adaptation – Sea Level Rise, San Rafael CA. White Paper	Development of Mitigation Actions
Marin Bay Shoreline Sea Level Rise Vulnerability Assessment	Development of Mitigation Actions
Sausalito	
Sausalito hasn't had a previous LHMP for incorporation into other mechanisms.	
2018-2020 Strategic Plan	Development of Mitigation Actions
Ongoing General Plan Update	Development of Mitigation Actions
Tiburon	
Tiburon's "General Plan 2020" from 2005 calls for the adoption of an LHMP to comply with DMA 2000. Since then the Town has adopted the ABAG LMHP Annex in 2012.	
ABAG Multijurisdictional Local Hazard Mitigation Plan 2010	Hazards Assessment Mitigation Strategies
Capital Improvement Plan	Mitigation Strategies
Emergency Operations Plan	Hazards Assessment Mitigation Strategies
General Plan Safety Element	Hazards Assessment Mitigation Strategies

2.5 PUBLIC OUTREACH AND STAKEHOLDER INVOLVEMENT

2.5.1 Meetings

During the planning process, Marin County Sheriff's OES staff made presentations at Marin County Disaster and Citizen Corps Council (DC3) and County Emergency Manager group meetings to discuss the MCM LHMP. The Marin County DC3 is an advisory body whose mission is to contribute to a unified effort in improving disaster preparedness, mitigation, response and recovery countywide. These efforts are achieved through a partnership of cooperation and collaboration with all levels of government, non-government and the private sector. Current DC3 members include representatives from Marin County Sheriff's OES, county Fire Chiefs, American Red Cross, Marin County Economic Forum, Public Works, and county Health and Human Services, to name a few. The Marin County DC3 meetings are open to the public and the details for each meeting (including time, date, location, and agenda) are posted on the Sheriff's Office website. At these meetings County staff gave presentations on the MCM LHMP and discussed progress to date, the plan adoption process and answered any general questions and comments about the update process.

Copies of the agenda and meeting minutes for DC3 / Plan Review Committee meeting and copies agendas for the Planning Committee meetings are provided in Appendix E.

In addition to meetings of the Planning Committee and the Plan Review Committee, the County LHMP Team conducted one-on-one plan finalization meetings with each participating municipality on the following dates:

- ☐ City of Belvedere - 7/12/18
- ☐ Town of Corte Madera - 7/19/18
- ☐ City of Fairfax - 7/23/18
- ☐ City of Larkspur - 7/18/18
- ☐ City of Mill Valley - 7/25/18
- ☐ City of Novato - 7/18/18
- ☐ Town of Ross - 7/7/18
- ☐ City of San Rafael - 7/24/18
- ☐ Town of San Anselmo - 7/23/18
- ☐ City of Sausalito - 7/30/18
- ☐ City of Tiburon - 7/12/18
- ☐ North Marin Water District - 7/25/18

2.5.2 Media Announcements

The County of Marin issued a media release announcing the kick-off of the MCM LHMP update process and sent the release to the Marin Independent Journal and the Point Reyes Light. The media release also provided the MCM LHMP Website link and contact information should further information be desired. A November 4, 2014 on-air interview with national news outlet The Weather Channel also highlighted the MCM LHMP effort and its benefit to the communities of Marin County.

A copy of the media release and an article on the MCM LHMP in a local newspaper is provided in Appendix E.

2.5.3 Public Workshops and Virtual Engagement Series

County staff working on the MCM LHMP hosted a total of 6 Public Workshops. These workshops were held in the North, South – Central, and West areas of the County and were conducted at each location during both working hours and in evenings to insure availability for residents from all areas of the County during business hours and in evening hours. All workshop announcement and outreach materials listed each of the participating jurisdictions so that residents would be aware that this was a countywide effort. Workshops consisted of a presentation on the basics of Hazard Mitigation Planning, the update and multi-jurisdictional planning process, and a review of resources for the public. Resources, such as MarinMap and the California Office of Emergency Services (CalOES) Hazard Mitigation activities and projects website, were available on-line so that attendees without internet access at home could view these resources.

In addition to in-person workshops, a Virtual Engagement Series (VES) was posted online so that members of the public unable to attend one of the 6 workshops could have access to the workshop contents and ability to comment on the planning process. Over 100 public comments were obtained via the VES process and as such were incorporated in the drafting of the MCM LHMP.

2.5.4 Website

As noted above, Marin County Sheriff's OES re-launched the County's HMP Website, which was first used during the development of the 2013 LHMP. For the MCM LHMP, the Website provided information about disasters in Marin County, the DMA 2000, HMP update requirements, and the planning process overview. In addition, Marin County Sheriff's OES posted hazard maps as they were completed and provided copy of the Final Draft online for review and comment. The MCM LHMP Website is located at:

<http://portal.countyofMarin.org/portal/page/portal/cov/emergencies/mitigation/plan>. A snapshot of the MCM LHMP Website is provided in Appendix E. The County has also developed and launched a Community Rating System website which includes the Final Draft MCM LHMP. The website is at: <https://www.marincounty.org/depts/pw/divisions/creeks-bay-and-flood/fema-flood-information>

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SECTION 3 HAZARD ANALYSIS**3.1 OVERVIEW**

A hazard analysis includes the identification and screening of each hazard and then the profiling of each hazard. Consistent with DMA 2000 and reasonable local capabilities this hazard analysis includes natural hazards (not human-caused, such as terrorism). Natural hazards result from unexpected or uncontrollable natural events of significant size and destructive power.

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

1. Hazard identification and screening
2. Hazard profiles

Methodology for assessing vulnerability in the hazard profiles and jurisdiction-specific appendices (G through S) was based upon GIS analysis using spatial asset and hazard data most of which are available to the public at MarinMap.org. MarinMap is a group of local governments, special districts and other public agencies that have joined together to create a Geographic Information System (GIS). Using ArcGIS, asset locations were overlain with maps of higher risk for each of six natural hazards. Where they overlap, they are considered vulnerable. This exercise is not expected to be a prediction of future incidents, nor is it able to be highly precise. This exercise is for assessing vulnerability at a broad scale and for the purpose of comparing the relative threat to assets and communities of each hazard.

Table 3-1

Asset		Data used	Notes
Structures	Single Family	MarinMap Parcel, developed	use code 11, 12, 61 with one living unit
	Multi Family	Parcel, developed	use code 11 (with 2 LU), 14, 21, 61
	Commercial	Parcel, developed	use code 51
	Industrial	Parcel, developed	use code 61
	Historic	National and State Register of Historic Resources	Cultural Resources
Transportation	Roads	MarinMap roads network	All functional classes minus dirt roads and trails
	Railroad	SMART track	Plus eastern spur along Hwy 37
	Ferry Terminals	Sausalito, Larkspur Landing, Belvedere, Angel Island	
Communication	Marin Emergency Radio Authority (MERA)	Locations of radio towers within County	Proposed system expansion, only currently used towers

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			were assessed
Power	Transmission Tower	Marin County GIS database	
	Substation	Marin County GIS database	
	Natural Gas Substation	Marin County GIS database	
	Electric Transmission Line	Marin County GIS database	
	Natural Gas Pipeline	Marin County GIS database	
Water /Sewage	Treatment Plants	MarinMap	
	Pump Stations	Marin County GIS database	
Critical Facilities	Schools	MarinMap	
	Law Enforcement/Fire	MarinMap	
	Medical Facilities	MarinMap	
	Airport	MarinMap	

Of the hazards profiled in the plan, spatial data for dam inundation, wildfire (wildland urban interface) tsunamis, landslides, and floods were available. Earthquakes were assumed to cover the entire County. Flood prone areas were profiled as the FEMA 100-year recurrence interval updated August 2017. The 100-year floodplain is also referred to as the Special Flood Hazard Area or base flood, which has a 1% chance of occurrence every year. This risk map is updated by FEMA's National Flood Insurance Program (NFIP). The landslide layer used was created by the US geological survey.

Table 3-2

Hazard	Data Used	Notes / metadata
Earthquake	All of Marin County	
Flood	MarinMap FEMA current 100-year floodplain	Flood Hazard Zone as of August 2017
Landslide/ Debris Flow	MarinMap using USGS layer 'Mostly & Many' ENTERPRISE.DBO.LANDSLIDE	www.marinmap.org/Publicrecords/OutputStyle.asp?DOC=vectordata/MarinCounty/Landslide.shp.xml
Tsunami	MarinMap Tsunami Inundation	
Wildfire	MarinMap Wildland Urban Interface (WUI)	
Dam Inundation	MarinMap Using data developed by dam owners as a CalOES requirement	http://www.marinmap.org/Publicrecords/OutputStyle.asp?DOC=vectordata/MarinCounty/dam_inundation.shp.xml

3.2 HAZARD IDENTIFICATION AND SCREENING

As the first step in the hazard analysis, the MCM LHMP Planning Committee reviewed the list of hazards presented in Table 3-3 and the following questions:

- ☐ Is the hazard included in the 2013 County of Marin (unincorporated) LHMP?
- ☐ Is the hazard included in any of the most recent LHMPs of non-County jurisdictions?
- ☐ Is the hazard included in the 2007 Marin Countywide Plan (2015 update)?
- ☐ Is the hazard included in the 2013 or draft 2018 State of California Multi-Hazard Mitigation Plan?
- ☐ Has the hazard occurred in Marin County and been declared a Presidential or State emergency or disaster in the past 40 years?

The results of the screening are presented in Table 3-3.

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Hazard Analysis

Table 3-3. Hazard Screening

Hazard	Profiled in prior LHMPs	Profiled in 2007 Marin Countywide Plan	Declared Emergencies and Disasters in Marin County, 1970 to Present		Profiled in this Plan
			State	Federal	
Agricultural	X		X		No. Human caused, not significant.
Snow Avalanche					No. Snow extremely rare in this climate.
Coastal erosion		X		X	Yes. See Severe Storm.
Dam failure	X	X			Yes. See Earthquake.
Drought	X	X	X		Yes. See Wildfire
Earthquake	X	X		X	Yes.
Sea Level Rise & Storm Surge & Subsidence		X			Yes. See Severe Storm.
Flood	X	X	X	X	Yes. See Severe Storm.
Fog					No.
Hailstorm					No. Hailstorms extremely rare in this climate.
Heat					Yes. See Wildfire.
Hurricane					No. Hurricanes do not occur in this climate.
Landslide/mudslide/"debris flow"	X	X		X	Yes. See Severe Storm and Wildfire.
Levee Failure		X			Yes. See Severe Storm.
Liquefaction	X	X			Yes. See Earthquake.
Severe wind & tornado					Yes. See Severe Storm.
Severe storm			X	X	Yes.
Volcano					None.
Tsunami/seiche	X	X			Yes.
Wildfire/fire	X	X	X	X	Yes.

After discussing and reviewing public input on each hazard identified as listed in Table 3-3, the Planning Committee determined that the following hazard groups pose the greatest threat to Marin County and should therefore be profiled or re-profiled in the main body of the MCM LHMP. Hazards specific to individual jurisdictions is profiled in that jurisdiction's annex to the main body of this plan. The Planning Committee's decisions were based on the likelihood of the hazard's occurrence and the feasibility of mitigation. Sections in which hazards are profiled are indicated in parentheses.

- ☐ Earthquakes and liquefaction (3.3.1)
 - o Dam failure (3.3.2)
- ☐ Severe storm (3.3.3)
 - o Debris flow (landslides) (3.3.4)
 - o Flooding (3.3.5)
 - o Wind (3.3.6)
- ☐ Tsunami (3.3.7)
- ☐ Wildfire (3.3.8)
 - o Post-fire debris flow (3.3.9)

All hazards included in the 2013 Marin County (single jurisdiction) LHMP are included in this multi-jurisdictional plan, except for terrorism and agricultural biological hazards as these are caused by human activities and not natural phenomena. Hazards new to the MCM LHMP are: post-fire debris flow and severe storm, which includes wind, in addition to flooding and debris flow which were in the 2013 LHMP (due to the local climate, freezing temperatures and snow are not considered major threats to Marin's infrastructure).

Hazards selected for inclusion in this MCM LHMP are those that pose the greatest threat to the County, based on the factors shown in Table 3-3, including the occurrence of a state or presidential disaster declaration for the hazard. Planning Committee members also used their collective knowledge of the hazards and each hazards' potential threat to determine whether or not to include the hazard in this MCM LHMP. This methodology places a focus on current hazards, in which the hazards' threats are easily identifiable, and for which there is a history of the hazards' occurrence.

A future hazard that poses a threat to the County is climate change. Climate change is not considered as a separate hazard in this MCM LHMP. Climate change is expected to cause or contribute to numerous other hazards that are already addressed in this and related documents, including wildfires, flooding, severe winter storms, and coastal erosion.

For example, two effects of climate change that are already occurring are sea level rise and an increase in the number, frequency, and size of wildfires. These effects have already been experienced in California over the last century. Wildfires have also increased substantially in frequency, duration, and size in recent years. The forested area burned in the western United States from 1987 to 2003 was 6.7 times the area burned from 1970 to 1986. Warmer

temperatures and longer dry seasons are the main causes of the increase in forest wildfire risk. Sea level in the San Francisco Bay Area has risen eight inches in the past century and could rise nearly 70 inches by the end of the century. Furthermore, as sea level rise submerges more low-lying areas, storm surge will reach further inland, impacting even more of the county's natural and built resources. Additionally, coastal erosion will be exacerbated by rising sea levels, including both beaches and bluff-tops.

Sea level rise and future storm effects and potential adaptation measures are being evaluated through County led planning efforts including Bay Adaptation and Waterfront Evaluation (BayWAVE) for bay-side communities and Collaboration Sea Level Marin Adaptation Response Team (C-SMART) for outer coast communities. C-SMART's "Marin Ocean Coast Sea Level Rise Vulnerability Assessment" evaluated West Marin vulnerabilities spanning near, medium, and long-term sea level rise and storm scenarios. Likewise, BayWAVE's "Marin Shoreline Sea Level Rise Vulnerability Assessment" analyzed potential physical, social and economic impacts to all of Marin's Bayside communities exposed to sea level rise, up to the end of the century. These two assessments estimate that by 2100 around 7,000 acres, 9,000 parcels, 10,000 buildings and 120 miles of roads throughout Marin County will be exposed to sea level rise and the 100-year storm.¹ Additionally, C-SMART's Adaptation Report outlined potential adaptation solutions for West Marin, including natural and built engineering methods, home retrofits, and relocation of vulnerable assets. Further site-specific evaluation and engineering is necessary to better understand feasibility, environmental impacts, and costs for project implementation. The county is seeking funding for such adaptation planning on Marin's Ocean Coast and Bayside.

3.3 HAZARD PROFILES

The hazards selected by the Planning Committee were profiled based on existing available information. The hazard profiling consisted of describing the individual hazard profile, disaster history, location, probability of future events, extent, impacts, and vulnerability.

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

¹ County of Marin, Marin Bay Waterfront Adaptation and Vulnerability Evaluation (BayWAVE), (June 20, 2017) at 25, <http://www.marincounty.org/main/baywave/vulnerability-assessment>; County of Marin, Marin Ocean Coast Sea Level Rise Vulnerability Report (CSMART), September 2015

3.3.1 Earthquakes and Liquefaction

Hazard Profile

According to the 2013 State of California Multi-Hazard Mitigation Plan (and consistent with the Draft 2018 State Hazard Mitigation Plan) earthquakes represent the most destructive source of hazards in terms of both recent history and probability of future destruction at magnitudes greater than previously recorded. Earthquakes can cause direct damage in several ways including fault rupture, earth shaking, landslides, liquefaction, and tsunamis. Indirect effects may include hazardous materials spills, water distribution failure, fires, dam failure, etc. Earth shaking, liquefaction, and dam failure are being described in section 3.3.1 and 3.3.2. Tsunamis (3.3.7) and fires (3.3.8) are addressed as separate disasters although they can be related. There is not a significant amount of infrastructure or homes located on faults, so their rupture does not represent a significant risk.

Given most of Marin's development occurred prior to modern building codes protecting structures against earthquake damage, severe property damage to public and private structures and infrastructure is likely to occur due to significant earthquakes. This is likely to include large numbers of uninhabitable housing units, and damage to older and not-yet-retrofitted county and city-owned structures, and infrastructure such as roads, electric distribution lines, telecommunications, water, and gas lines. Earthquake aftershocks often occur with additional and unforeseen damage to structures and infrastructure.

Disaster History

According to the Association of Bay Area Governments Resilience Program, "the San Andreas Fault was the source of the magnitude of 7.8 earthquake in 1906. Marin was sparsely inhabited at that time and experienced relatively moderate property loss and only two deaths. The epicenter was just two miles west of San Francisco and West Marin experienced some pronounced earthquake effects. 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 its calculated epicenter. The impact of the Loma Prieta Earthquake was most apparent in the northeast area of Santa Cruz. If the fault rupture location were closer, a strong shaking such as this could have caused 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).

Location

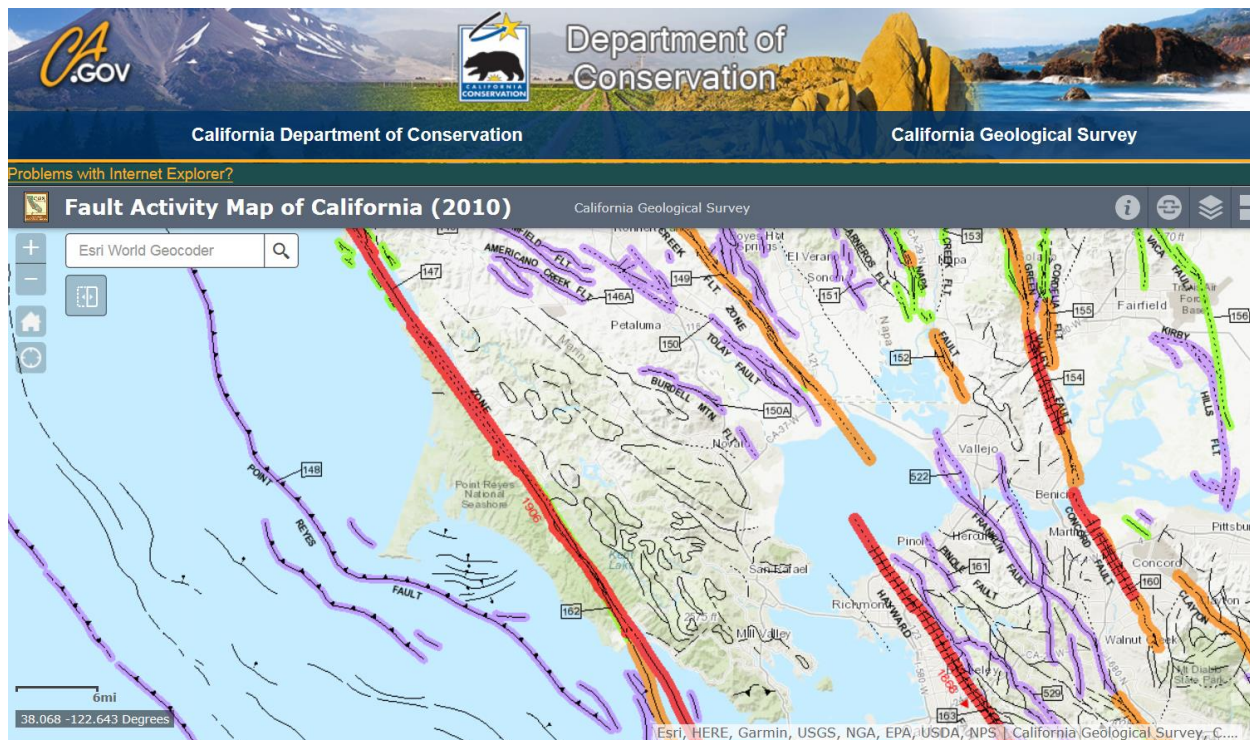
The potential for earthquake damage exists throughout Marin County because of a combination of the number of active faults within and near the County and the presence of soils vulnerable to liquefaction. These faults are shown on the California Geological Survey (CGS) Fault Activity Map of California (see Figure 3-1. Fault Activity Map below). Descriptions of the most significant active faults to Marin are provided below.

San Andreas fault: 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.

Hayward fault: the eastern, more heavily populated part of Marin is less than ten miles from the northern section of the Hayward fault.

Rodgers Creek fault: The northern part of Marin is less than ten miles from the Rodgers Creek fault.

Figure 3-1. Fault Activity Map



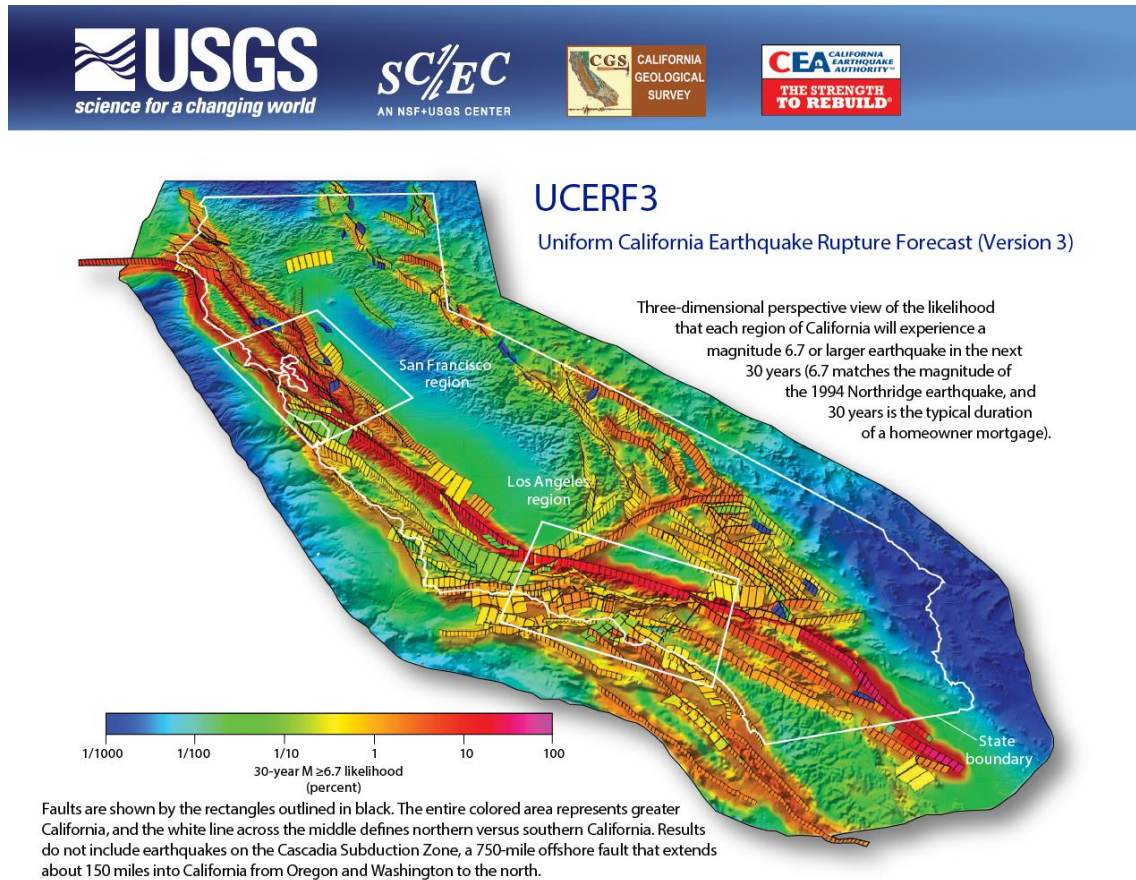
Probability of Future Events

According to a September 24, 2016 article in the Marin Independent Journal, “The Working Group on California Earthquake Probabilities has updated its earthquake forecast and determined there is a 72 percent probability - up from 63 percent - of at least one earthquake of magnitude 6.7 or greater striking somewhere in the Bay Area before 2043.” The Association of Bay Area Governments (ABAG) Resilience Program projects a 52% chance of a 6.7 or greater earthquake on one of the faults affecting Marin between now and 2036 (21% at San Andreas fault and 31% on Hayward/Rodgers Creek).

Supporting this article’s assertions is the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3), which provides authoritative estimates of the magnitude, location, and time-averaged frequency of potentially damaging earthquakes in California (see Figure 3-2. Uniform California Earthquake Rupture Forecast below. The primary achievements have been to

relax fault segmentation assumptions and to include multifault ruptures, both limitations of the previous model (UCERF2).²

Figure 3-2. Uniform California Earthquake Rupture Forecast



The September 24, 2016 article goes on to say “Marin sits smack dab (sic) in the middle of two major faults. To the east is the Rodgers Creek-Hayward fault just a few miles from Marin’s shores through San Pablo Bay, which the U.S. Geological Survey estimates has a 33 percent likelihood of a 6.7-magnitude quake or greater in the next 30 years — the highest probability of any Bay Area fault to slip. But movement on those faults could be worse than originally thought. The Rodgers Creek-Hayward fault, thought to be two separate faults, actually may be linked and have the potential to cause more damage than previously determined, according to USGS research...

“The Rodgers Creek Fault runs from Sonoma County into San Pablo Bay near Marin’s shore. The Hayward Fault runs through the western part of Alameda County into San Pablo Bay east of San Rafael and Novato. They were thought to be offset by about two miles under San Pablo Bay.

²

Field, E.H., Biasi, G.P., Bird, P., Dawson, T.E., Felzer, K.R., Jackson, D.D., Johnson, K.M., Jordan, T.H., Madden, C., Michael, A.J., Milner, K.R., Page, M.T., Parsons, T., Powers, P.M., Shaw, B.E., Thatcher, W.R., Weldon, R.J., II, and Zeng, Y., 2013, Uniform California earthquake rupture forecast, version 3 (UCERF3)—The time-independent model: U.S. Geological Survey Open-File Report 2013–1165, 97 p., California Geological Survey Special Report 228, and Southern California Earthquake Center Publication 1792, <http://pubs.usgs.gov/of/2013/1165/>

But underwater exploration done in 2014 seems to link them. More study will occur to confirm those initial findings...

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. Due to liquefaction, 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.

Liquefaction occurs when ground shaking causes loose, saturated soil to lose strength and act as a viscous fluid. When liquefaction occurs, it can result in the sidelong movement of large masses of soil, loss of strength in the soil supporting structures causing structures collapse, and/or consolidation due to soil settlement decreasing soil surface elevations.

Extent

The most vulnerable areas of Marin are on Bay Mud and current and former marshlands. Many of these areas have been artificially filled over the last century. Other areas with some risk of liquefaction include those along creeks due to fluvial and alluvial deposits. Unfortunately, much of Marin's residential areas and infrastructure are located on former marshes and along creeks. Tens of thousands of acres of residential areas, along with roads, airports, military facilities, retail centers, schools, hospitals, prisons, jails, government administration centers, convention centers, recreation areas, croplands/pasture are in areas vulnerable to liquefaction in Marin. The ABAG Resilience Program analysis shows risk of liquefaction in Corte Madera, Larkspur, Bel Marin Keys, Novato, Ross Valley along creeks (Ross, San Anselmo, Fairfax), San Geronimo, San Rafael, Santa Venetia, communities around Richardson Bay (Belvedere, Marin City, Mill Valley, Sausalito, Strawberry, Tam Valley, Tiburon), Stinson Beach, Tomales Bay-side communities, and the county-owned Gness Field Airport.

Impacts

Most structures in Marin were built before 1970, when major seismic design changes were made to the building code and are particularly vulnerable to earthquakes and liquefaction. Wood-framed homes, however, are light and flexible and can often survive earthquakes with minimal damage as long as the foundations are properly retrofitted (bolted and braced). The County of Marin and its political subdivisions have 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 these data continue to have limitations for assessing overall vulnerability in the county for all structures.

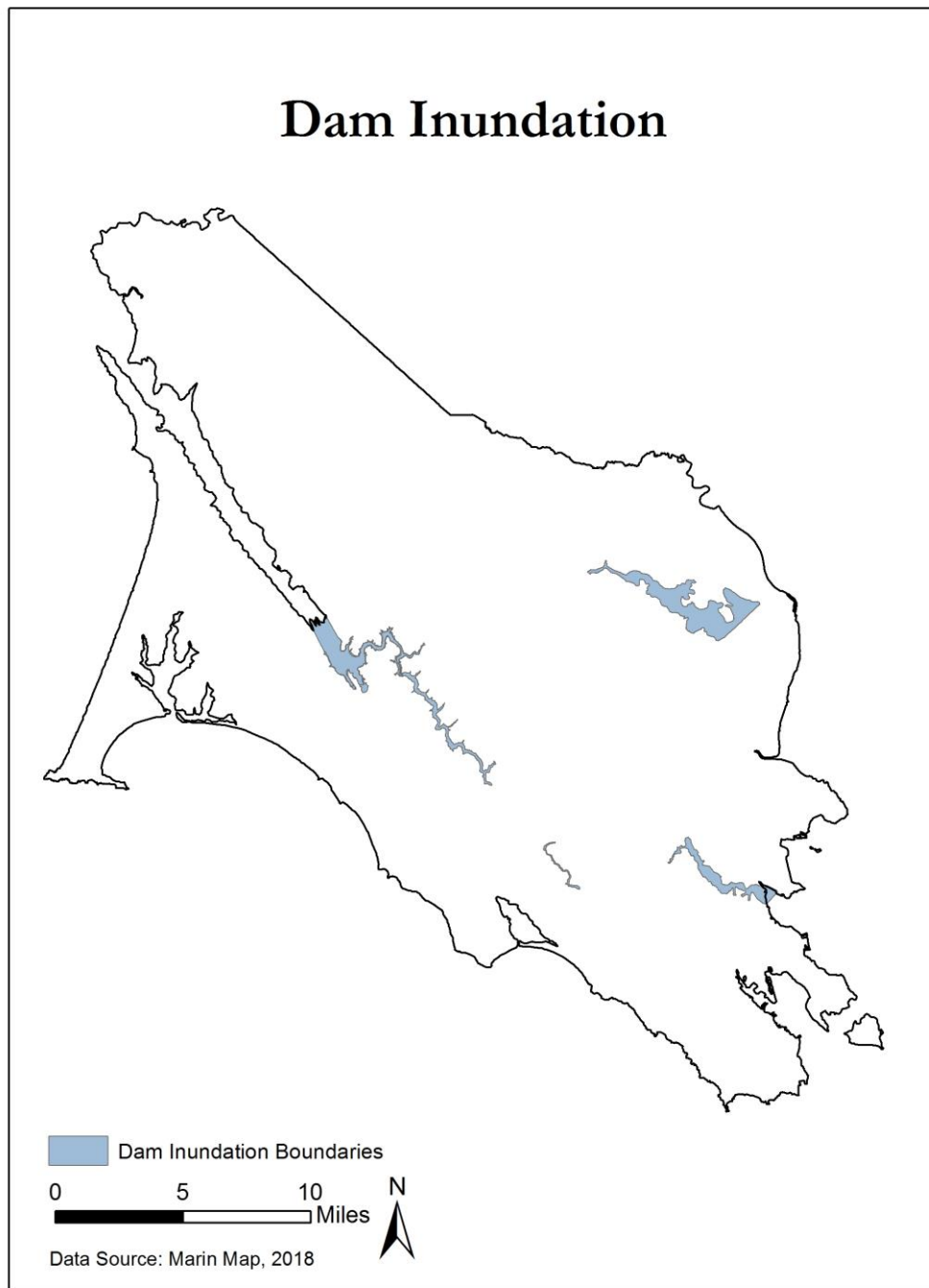
The county's topography includes large areas of steep slopes, adding to the vulnerability of earthquake induced disasters with the additional danger of Debris flow (landslides). Bluff erosion along the coastal areas also poses unique threats to coastal structures and roads during times of earthquake.

Vulnerability

For all three faults, many areas of the most severe vulnerability to earthquake coincide with the heavily populated Highway 101 corridor on the eastern side of the county. According to the ABAG Resilience Program, a 7.8 magnitude earthquake on the San Andreas fault would leave 3,100 homes in Marin uninhabitable, displace 6,200 households, and result in total building damage of \$1,260 billion dollars. Because many people in the region do not have earthquake insurance, many homeowners will not be able to afford to rebuild their homes. Figure 4-2 from the ABAG Resilience Program shows building damage estimates for different earthquake scenarios.

In addition to damaging buildings, the San Andreas earthquake could close 77 roads in Marin due to faulting, liquefaction, debris flow/ landslide, shaking damage to bridges and interchanges, threat of building collapse, structural damage to highway and rail structures, small hazardous material releases, water and gas pipe leaks, and other miscellaneous reasons for closure.

3.3.2 Dam Failure



Reservoirs for water supply and the dams that impound them are integral parts of the municipal infrastructure in Marin County. Unlike most other counties in California, Marin does not import or export water through the Central Valley State and Federal water projects. The Marin Municipal Water District (MMWD) and the North Marin Municipal Water District (NMWD) operate and maintain eight major dams for municipal water supplies within their jurisdictions (see Table 3-4) MMWD dams include Alpine Dam, Bon Tempe Dam, Lagunitas Dam, Phoenix Dam, Peters Dam (Kent Lake), Nicasio Dam, and Soulajule Dam. NMWD maintains and operates one dam at Stafford Lake on Novato Creek for its smaller service area. None of these reservoirs generate hydroelectricity nor are they actively managed for downstream flood control.

The California Water Code entrusts dam safety regulatory power to the California Department of Water Resources (DWR), Division of Safety of Dams (DSOD). Dams greater than 6-feet or holding 15 or more acre-feet are subject to DSOD jurisdiction. According to the California water code, owners of regulated dams are responsible for emergency preparedness with regard to potential loss of life or property. All regulated dams are inspected by DSOD annually. MMWD inspection reports are available on their website. As of 2017 DSOD classifies the public safety risk of all jurisdictional dams.

Table 3-4. Marin Dams

Dam Name (Reservoir)	Owner	Type	Reservoir Capacity (acre-feet)	DSOD Downstream Hazard
Alpine	MMWD	Gravity (concrete)	8,892	Extremely High
Bon Tempe	MMWD	Earthen	4,300	High
Lagunitas	MMWD	Earthen	341	Significant
Novato Creek (Stafford)	NMWD	Earthen	4,430	Extremely High
Peters (Kent)	MMWD	Earthen	32,900	High
Phoenix	MMWD	Earthen	612	Extremely High
Seeger (Nicasio)	MMWD	Earthen	22,400	High
Soulajule	MMWD	Earthen	10,700	High

Hazard Profile

Significant, even catastrophic flooding can occur in valley areas downstream of major dams in the event of a complete or partial dam failure. Such events are extremely rare due to the stringent design and permitting requirements for dam construction and operation. However, in the active tectonic environment of the San Francisco Bay Area, the risk of a dam failure during a major earthquake remains a possibility. Dam failures can occur in response to full or partial structural

collapse of the dam face (concrete arch dam) or embankment (earthfill dam) during a major earthquake. A dam could also partially rupture during an earthquake and fail completely sometime later due to leakage/seepage through the damaged embankment or dam face.

Given the design, construction, and maintenance protections in California, dam failure as a result of an earthquake is considered the most relevant.

Disaster History

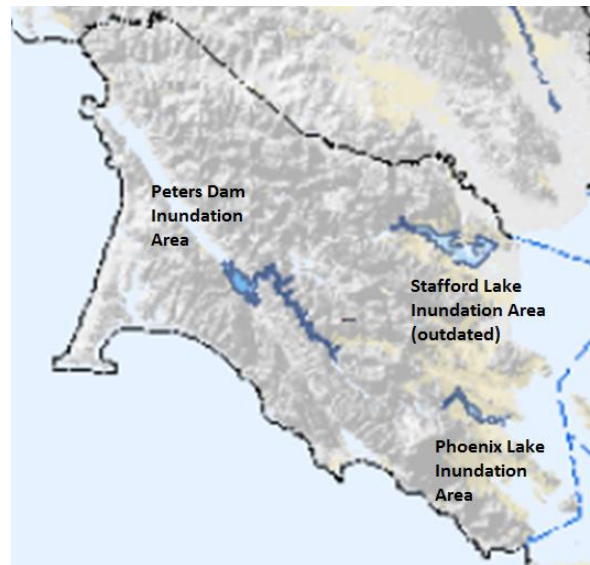
In February 2017 California witnessed the failure of the spillway and emergency spillway at Lake Oroville leading to the evacuation of 188,000 people from the downstream inundation area. Situations like this, overtopping and erosion of a dam's face as a result of flows exceeding the capacity of spillway is another mechanism of dam failure, however reservoir inflows in Marin County do not have to accommodate the volatility of melting snowpack that occurs in the Sierra Nevada foothills.

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

Location

In the 1970s, State law required dam owners to develop maps depicting areas that might be inundated by dam failure. The law required that each map be produced only once, without any requirements for updating. The maps were developed using engineering hydrology principals and represent the best estimate of where the water would flow if the dam completely failed with a full reservoir, ie a worst case scenario. The inundation pathway is based on completely emptying the reservoir and does not include runoff from storms. Dam inundation maps do not indicate the depth of inundation nor do they indicate or infer the probability of such an event occurring.

Major dam inundation areas from the ABAG Resilience Program are shown in Figure 3-3 below. This does not appear to reflect the more recent analysis on the Stafford Dam, however, so an inundation depth grid from that analysis follows.

Figure 3-3. County-wide Dam Failure Inundation Map from ABAG Resilience Program

Probability of Future Events

Inundation maps from dam owners aren't required to be updated and are not required to depict the depth of inundation, so they generally represent just a rough estimate of what areas will be affected with no estimate of magnitude. The recent Stafford Dam analysis is of course an exception to this, where we have a depth grid showing a large portion of the City of Novato, including several key facilities there, flooded under several feet of water within several hours of a dam breach. The extent of damage from a dam failure at Stafford or Phoenix Lakes would be massive, however both would likely withstand an earthquake at least magnitude 8.2 on the San Andreas Fault, which is a rare magnitude to encounter (8.0 or greater earthquakes are expected once every 494 years in California according to USGS).

Extent

According to the 1988 Town of Ross General Plan Safety Element, “in 1974, a seismic stability analysis of Phoenix Lake Dam was conducted for the Marin Municipal Water District. The purpose of this study was to assess the risk of seismically induced flooding associated with failure of Phoenix Lake Dam. The earth dam was constructed just prior to the 1906 earthquake, which created a landslide on the inside portion of the dam embankment. The slope stability analysis conducted in 1974 concluded that the dam spillway could settle from 4 – 6 feet during an earthquake with a Richter magnitude of 8.5 generated along the San Andreas fault. The 1906 San Francisco earthquake had a Richter magnitude of 8.3... In response to this assessment, the Marin Municipal Water District has widened the spillway by 5 to 6 feet and has lowered the spillway by 6 feet. Accordingly, these improvements to the dam have reduced the flood risk to one flood in 30,000 years.”

According to MMWD, “the dam has been modified several times in the last 100 years including increased height of fill, outlet works changes, an embankment buttress fill in the 1960s and a new spillway, designed for a spillway design flood with a recurrence interval of once in 10,000 years or so, and an increase in freeboard in the mid-1980s.”

The Town of Ross’s 2017 Local Hazard Mitigation Plan states “the dam is inspected yearly by the California Division of Safety of Dams and has been rated by that agency as acceptable for continued operation. Their rating for the facility is 3C, there is a potential for damage should the dam fail but that the dam is in good condition for its age...”

“MMWD has a comprehensive Dam Safety Program to ensure all of the MMWD dams and spillways are safe and functioning properly. This program includes three main components: monitoring, routine inspections and maintenance, and emergency preparedness and response planning. The district also works closely with state and federal regulators and local emergency response partners to ensure public safety. MMWD produced a February 13, 2017 inspection report documenting the current conditions...”

“The Phoenix Lake Dam is over 100 years old. According to ABAG, when a dam is known to have a failure potential, the water level is reduced to allow for partial collapse without loss of water as required by the State Division of Safety of Dams and by safety protocols established by dam owners. Thus, the probability of failure resulting in damage from the inundation is low.”

According to the City of Novato’s 2011 Local Hazard Mitigation Plan, a seismic stability analysis prepared for the North Marin Water District by Woodward-Clyde Consultants in 1992 confirmed the Stafford Dam was designed to withstand a magnitude 8.25 Richter earthquake on the San Andreas Fault, with a design epicenter located 10 miles from the dam.

Impacts

Failure of Phoenix dam would flood about 5 miles along Ross Creek down to the Town of Ross, part of San Anselmo where Ross Creek meets Corte Madera Creek, to unincorporated Kentfield and Greenbrae, and out into San Pablo Bay. The inundated portion of San Anselmo consists of small commercial buildings (some with housing units) and apartment buildings. Ross would be more severely affected with many homes and businesses, a couple major roads, and a fire station in the inundation zone. The unincorporated communities downstream also contain some major roads, many residences, a fire station, and a hospital in the inundation zone.

Lagunitas, Bon Tempe, Alpine and Peters dams are a series along Lagunitas Creek increasing in size going downstream.

Failure of the Peters or Alpine Dam could result in flooding in unincorporated areas in West Marin stretching about 10 miles from the reservoir down to Point Reyes Station at Highway 1 and into Tomales Bay. On its path it could flood around 5 miles of a major road, Sir Francis Drake Boulevard, which runs along Lagunitas Creek, and several dozen buildings along that road. It could flood Samuel P. Taylor State Park camping areas. The inundation area turns from Sir Francis Drake Boulevard down Platform Bridge Road towards Point Reyes Petaluma Road. Eventually the inundation area reaches Point Reyes Station, going right through the middle of this small town where there is a County fire station, elementary school, senior housing, and a healthcare facility.

The inundation area from Nicasio dam is largely coincident with the Peters Dam inundation area starting in the vicinity of Point Reyes Petaluma Road and Platform Bridge Road. The population that would be affected by a failure of the Peters or Nicasio dams are very small relative to the Phoenix and Stafford dams.

Failure of the Stafford dam would affect an area that extends approximately 5 miles through incorporated and unincorporated parts of Novato and ending in San Pablo Bay at Bel Marin Keys. Although the probability is remote, the North Marin Water District and City of Novato take this threat very seriously and recently updated the inundation modeling and mapping, developed an emergency action plan, and conducted a tabletop exercise. The new analysis showed the San Marin residential area inundated with 1 foot of water in about half an hour, rising to 9 feet in some areas. In 1-2 hours central Novato is flooded with 1 foot of water, later rising up to 7 feet in some areas, affecting medical facilities, educational facilities, shopping centers, law enforcement, fire stations, and City Hall. Highway 101 is affected within 2-4 hours, with depths reaching more than 9 feet in some locations. Beyond Highway 101, the Novato Sanitary District floods after 2 hours, up to 5 feet. From 4 to 9 hours flooding passes Highway 37 and reaches Bel Marin Keys.

Vulnerability

Because of the catastrophic nature of the threat of dam inundation, dams tend to be built conservatively and the actual likelihood of either dam overflow or dam failure are extremely low. As stated above, the Stafford and Phoenix Lake dams are expected to withstand an earthquake at least magnitude 8.2 on the San Andreas Fault, which is a rare magnitude to encounter (8.0 or greater earthquakes are expected once every 494 years in California according to USGS).

3.3.3 Severe Storm

Hazard Profile

The climate on California's central coast is Mediterranean, in which summers are warm and dry and winters are cool and damp. A dominating factor in the weather of California is the semi-permanent high-pressure area of the North Pacific Ocean, sometimes called the Pacific High. This pressure center moves northward in summer, holding storm tracks well to the north, and as a result California receives little or no precipitation during that period. The Pacific High decreases in intensity in winter and moves farther south, permitting storms to move into and across the state and producing strong winds, widespread rain at low elevations, and snow at high elevations. From mid-autumn to mid-spring is the rainy season. During these months, storms may occur. In addition to strong winds and flooding, storms on rare occasions can bring hail and/or lightning to all areas of the County.

Disaster History

Marin County was included in the Presidential Disaster Declarations for Severe Winter Storms, Flooding, Mudslides on April 1, 2017; February 14, 2017; June 5, 2006; and February 3, 2006; making severe storms the most frequent cause of major disasters affecting Marin in the last 20 years.

A review of the National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center (NCDC) database reveals that, although most not considered disasters, 113 major severe storm events occurred in Marin County between 1996 and 2010. Of these events, 12 caused deaths or injuries, and 65 damaged property. According to NOAA, total property damage estimates (including crops) during this period were \$278 million, with some of the most significant (over \$50,000 in damage) events listed below in Table 3-5.

Table 3-5. Severe Winter Storm Events from NOAA's NCDC

Location	Event Type(s)	Year	Damage Est.*
Tomales	Tornado	1996	\$205,000
Southern Marin	Flash Flood	1998	\$2,000,000
Corte Madera	Heavy Rain	2002	\$200,000
Coastal Marin	Coastal Flood	2005/2006	\$340,000
Countywide	Flood	2005/2006	\$219,000,000
Interior Valleys	Debris Flow	2006	\$45,900,000
Coastal Marin	Strong Wind	2006	\$500,000
Interior Valleys	Frost/Freeze	2007	\$3,000,000

SECTION 3

Hazard Analysis

Corte Madera	Flash Flood	2008	\$50,000
Interior Valleys and Mountains	Strong Wind	2009	\$140,000
Countywide (Santa Venetia)	Flood/Wind	2009	\$260,000
Interior Valleys	Strong Wind	2009	\$85,000
Coastal Marin	Coastal Flood, Strong Wind, Flood	2010	\$770,000
Countywide (Larkspur)	Heavy Rain/ Strong Wind	2010	\$100,000
Countywide	Strong Wind	2010	\$85,000
Coastal Marin	Strong Wind/Storm Surge	2011	\$325,000
Interior Valleys	Strong Wind	2011	\$50,000
Interior Valleys	Strong Wind	2011	\$200,000
Interior Valleys	Strong Wind	2012	\$60,000
Interior Valleys and Coast	Strong Wind	2012	\$501,500
Interior Valleys	Strong Wind	2012	\$150,000
Interior Valleys	Strong Wind	2012	\$50,100
Countywide	Flood/Strong Wind	2012	\$210,100
Mountains	Strong Wind	2013	\$80,000
Countywide (Greenbrae, Novato, Marin City, Tamalpais Valley, Olema)	Flash Flood/Debris Flow	2014	\$6,001,000
Interior Valleys/Coast	Strong Wind	2014	\$115,600
Interior Valleys and Mountains	Strong Wind	2015	\$23,500
Mill Valley AFS	Heavy Rain	2015	No data
Interior Valleys	Coastal Flood	2016	No data
Interior Valleys	Strong Wind	2016	No data
Alto	Flash Flood	2016	No data
San Rafael and	Flood	2017	No data

SECTION 3

Hazard Analysis

Corte Madera			
Kentfield	Flash Flood	2017	No data
Tomales	Flood	2017	No data
Corte Madera	Flood	2017	No data
Ignacio, Burdell, Marin City, Mountains	Strong Wind, Flash Flood, Flood	2017	No data
Interior Valleys	Strong Wind	2017	No data
Mountains	Strong Wind	2017	No data
Mountains and Coast	Strong Wind	2017	No data
Interior Valleys and Mountains	Strong Wind	2017	No data
Greenbrae and Mountains	Strong Wind, Flood	2017	No data
Interior Valleys and Coast	Strong Wind	2017	No data
Corte Madera	Flood	2018	No data

*Damages as listed on NOAA website are in some cases less than local estimates. For example, in 2014 it was estimated in a December 29, 2014 news release from the Marin County Office of Emergency Services that there was approximately \$13.3 million in damages countywide.

Not included in the available dataset is \$8,760,000 in damages reported to the Marin County Board of Supervisors on March 14, 2017 related to disasters declared in January and February of 2017. Damage consisted of 10 debris flows (landslides), 3 badly eroded levees, damage to various storm water pumps and generators, and many sites of downed trees and other debris.

Location

Many events in the NCDC database described above affected all of Marin County. Indeed, the entire county is susceptible to storms and damage from wind. The coastal and mountainous areas are particularly susceptible to wind, although wind has caused damages throughout the county. Coastal areas are susceptible to storm surge and high tides. Flash flood primarily affects interior valleys, although there are some flashy coastal streams. Localized stormwater ponding and clogged drainage occurs in countless areas throughout Marin during storms and although it can be hazardous, particularly to vehicles when the depth of water is greater than 6" in the road, it is not considered a major hazard for the purpose of this plan as there is not a significant threat to critical structures.

Probability of Future Events

Based on recent history, severe winter storms occur every year, but those leading to federally declared disasters seem to occur about every 10 years – often in clusters and associated with high tides and/or atmospheric rivers. More details on probability of hazards associated with storms are contained in the following sections detailing debris flows, flooding, and wind.

Extent

A storm can cause heavy rains, flash flooding, tidal flooding, and wind speeds of up to 70 miles per hour. More details on extent of hazards associated with storms are contained in the following sections detailing debris flows, flooding, and wind.

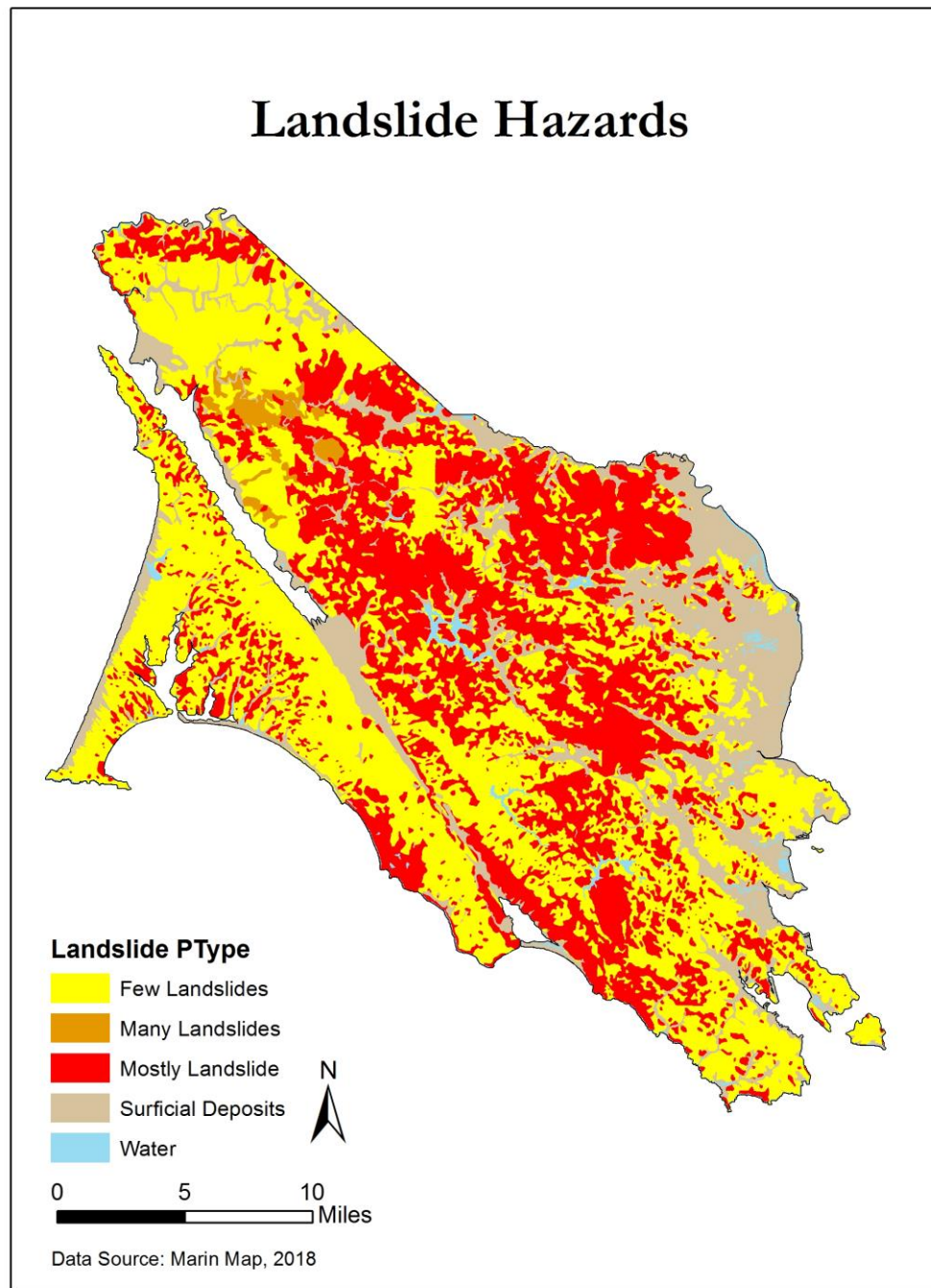
Impacts

Details on impacts on structures, infrastructure, and systems due debris flows, flooding, and wind are outlined in the following sections.

Vulnerability

Vulnerability to debris flows, flooding, and wind are outlined in the following sections.

3.3.4 Debris Flow (Landslides)



Hazard Profile

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

Landslides can be earthquake-induced or non-earthquake induced. Earthquake-induced landslides occur as a result of ground shaking. The most common earthquake-induced landslides include shallow rock falls, disrupted rock slides, and disrupted slides of earth and debris. Non-earthquake induced landslides may involve a wide range of combinations of natural rock, soil, or artificial fill. The susceptibility of hillside and mountainous areas to non-earthquake induced landslides depends on variations in geology, topography, vegetation, and weather. They may also occur due to indiscriminate development of sloping ground or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions. Non-earthquake-induced landslides can often occur as a result of intense or prolonged precipitation that can saturate slopes and cause failures. Another example of a non-earthquake-induced landslide is that which results from physical undermining of a slope. Most commonly this can occur as a result of high volume and/or high velocity water flows of a creek which lead to scour at the toe of a sloped creek bank. This phenomenon can also occur as a result of man-made excavations where a slope is destabilized as a result of improperly removing soil at the toe of a slope which over time leads to failure of that slope. Prolonged and/or heavy precipitation leads to increases in landslide events in Marin County more often than other natural phenomena referenced above; therefore, it is being addressed as a subset of Severe Storm hazards. There is more about debris flow in the wildfire section (3.3.9 Post-Fire Debris Flow).

Disaster History

Marin County has sustained significant damage as a result of several natural disasters in recent years. Most notable were the Winter and Spring storms of 2006 (DR-1628 and DR-1646) which resulted in hundreds of locations in Marin County where damage occurred; many of those being landslides, rock fall, or other infrastructure damage related to slope instability. Most recently, severe damage occurred during the January and February Winter storms of 2017 (DR-4305 and DR-4308) resulting in over 100 locations in Marin County where damage occurred.

Landslides are a part of natural geologic processes and have impacted both private and public property in various areas throughout Marin County since development began. Much of Marin County was developed in the early 20th century prior to the implementation of grading requirements and road design standards. During this time, many of the roads in Marin County were benched or cut into steep hillsides without sufficient compaction of the roadbed. Furthermore, the use of earth retaining structures was not common in roadway construction and/or retaining structures were built using wood materials that have since deteriorated.

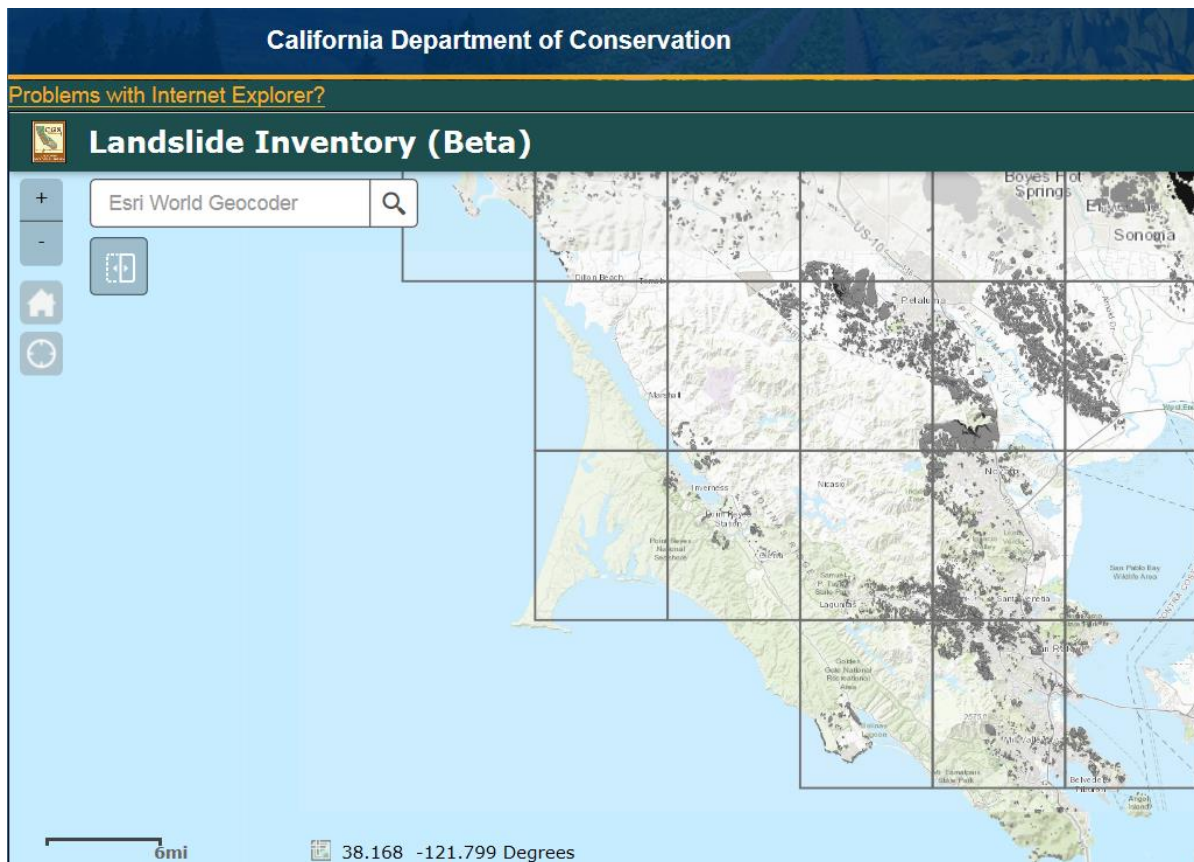
Marin County is largely undeveloped and has a widespread natural environment where creeks and rivers adjoin both private and public infrastructure. During times of intense rainfall, creeks rise and the resulting high flows can erode roadway supporting earthen embankments leading to landslides and sometimes property damage.

An example from the history of debris flow in the county is the bluff along the Bolinas Mesa in the unincorporated town of Bolinas has been associated with a variety of landslide activity. The major cause of earth movement in this area is the extensive presence of weak cohesion-less (sandy) soils combined with undermining wave action at the toe of the bluff. As wave action removes toe-supporting soils, the outer face of the bluff slumps or creeps downwards causing settlement and landslides at the top of the Mesa. In 2011, a \$1.5M emergency slide repair was constructed at the intersection of Terrace Avenue and Overlook Drive on the Bolinas Mesa to repair recent drastic settlement (up to 8-feet) such that access for emergency vehicles and resident egress could be maintained. As much as 20,000 cubic yards of material was excavated and re-compacted in lifts with earth reinforcing fabric to affect the repair.

Location

California Geological Survey has an interactive landslide inventory map available on their website (<http://maps.conservation.ca.gov/cgs/lsi/>) that shows records associated with past landslide events in Marin County. A snapshot is in Figure 3-4 below. The inventory shows extensive areas of prior landslides around the county particularly in developed areas. Affected areas notably include many landslides near Bolinas Lagoon, Inverness and Bolinas (Point Reyes Station) ridges on the west coast; throughout Ross Valley including Sleepy Hollow, Fairfax and San Anselmo; San Rafael just outside downtown at Lincoln, Lock Lomond affecting many residences, San Quentin potentially affecting a wastewater treatment plant, and Bret Harte potentially affecting Highway 101; Santa Venetia affecting N. San Pedro Rd; Novato at Little Mountain and Mount Burdell affecting major roads such as Center Road, San Marin Drive and Novato Blvd and their nearby residential areas; Paradise Cay and Reed residential areas near Tiburon; and Mill Valley at Homestead Valley. Smaller scale, and/or more isolated slides occur throughout the county where there are slopes. These are typically of concern if there are roads or structures affected.

Figure 3-4. California Department of Conservation Landslide Inventory



Probability of Future Events

Slope instability throughout much of Marin County is related to many factors, including, but not limited to; type(s) of soil involved and various geologic factors (presence of faults or other weakened soil planes), steepness of the slope and surrounding topography, intensity and duration of rainfall, presence of underground springs or groundwater, adequacy of surface water management, and proper erosion protection. While landslides occur in any given year, the frequency and number of landslides has been observed to be directly proportionate to the frequency and duration of rainfall events.

Landslides are less likely to occur during the fall months (October-November) when the ground is sufficiently dry and can absorb the moderate rain events typically observed during this time of year. Landslides are more often observed between December and May when rain events are usually more intense and/or frequent. Under these circumstances, the ground has been saturated, becomes heavier, and the presence of water within the soil increases the pore pressure thereby reducing the friction between soil particles – which leads to sliding. Proper drainage management to maintain existing sufficient drainage patterns (on both private and public lands) is essential to limiting potential future landslide events. In Marin County, renewed and

potentially widespread landslide activity will most likely occur during or after future periods of prolonged or intense rainfall.

Extent

The extent of typical landslides in Marin County, as estimated from previous occurrences, is on the order of 500 cubic yards of material displaced from an area 100 feet long and 30 feet deep.

According to County engineering staff, we seem to have bad slide years during heavy storms every five years. During these years, the County repairs a half dozen slides or more, so there might be a dozen bad slides across the County including incorporated areas. According to NOAA, the 5-year recurrence interval precipitation amount is 4 inches of rain in 12 hours, 5.8 inches of rain in 24 hours, or 7.6 inches of rain in 2 days.

Marin County is hilly and the distribution of the landslide hazard is varied across the county as indicated in figure 3.3.4. The combination of factors that cause landslides, including geology, vegetation, local drainage, and local grading make slope a poor proxy of landslide risk. However, parcels with an average slope above 20 are considered hillside lots and risks of slides are present slopes of 30 and above. Slopes as high as 60 or 65 are common on hillsides throughout the county.

Impacts

Historic development in Marin tends to be concentrated in small areas, with many homes located along creeks and on steep hillsides potentially impacted by precipitation-induced landslides. Thousands of existing structures have the potential to be impacted by landslides, including over ten thousand single family homes, in addition to multi-family, commercial structures, and structures on a few industrial parcels. Notably, hundreds of miles of roads are potentially impacted by landslides which can lead to their short-term closure during and after intense storm events. Some power utility facilities could also be affected. For most jurisdictions, at least 10% of its homes and roadways are potentially impacted by landslides.

Vulnerability

Landslides due to storms are a relatively frequent occurrence in many populated areas of the County, making the county quite vulnerable to landslides. The following tables summarize countywide vulnerability to debris flow (data from Marin County Department of Public Works sources).

Existing Structures

Commercial	Industrial	Single-Family	Multi-Family
96	3	10,346	1,897

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Transportation

Miles of Roads	Miles of Railroad	Number of Ferry Terminals
562	0	0

Communication

MERA Towers
1

Power

Transmission Tower	Substation	Natural Gas Substation	Miles of Electric Transmission Lines	Miles of Natural Gas Pipeline
4	2	0	25	5

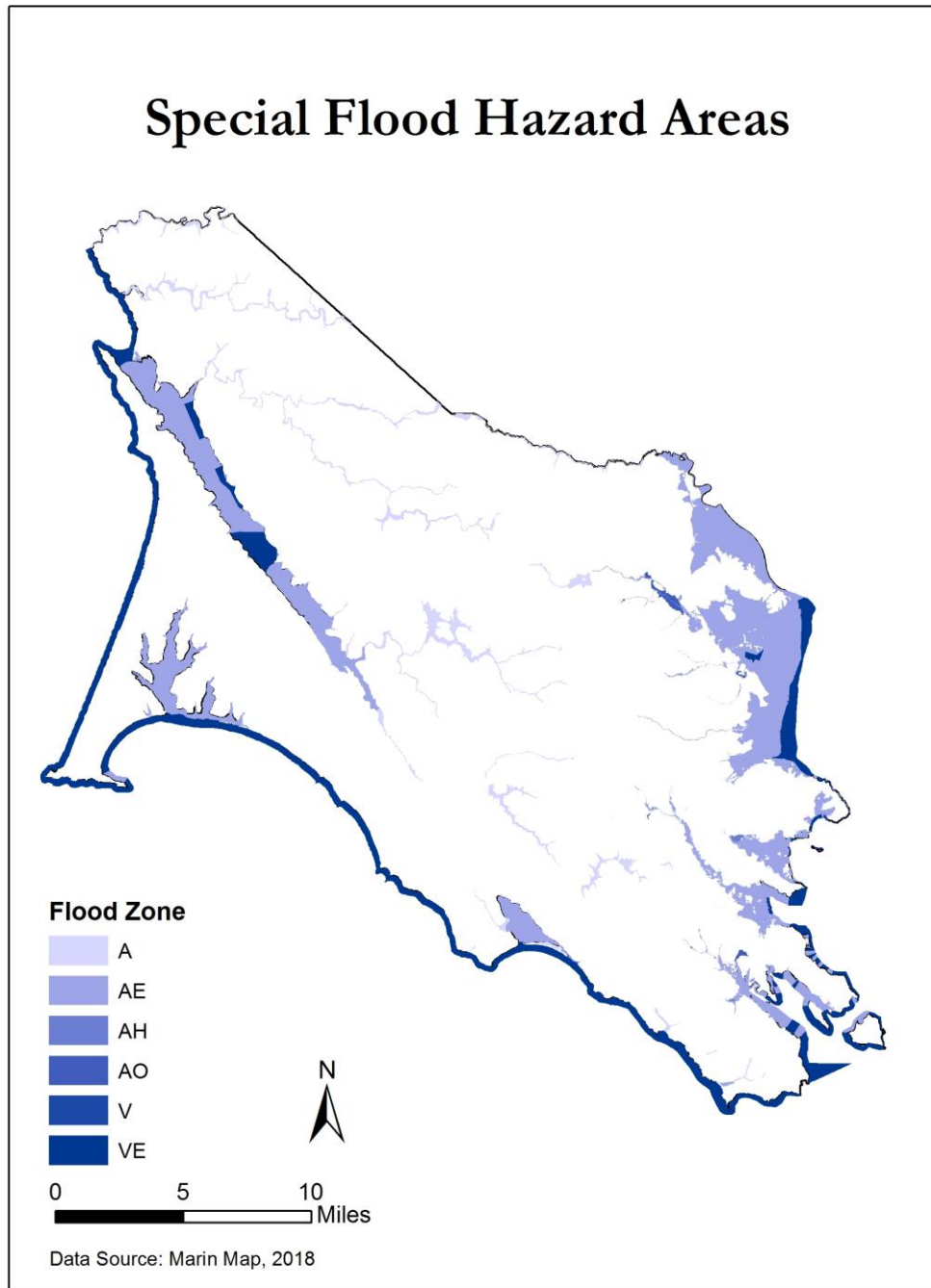
Water/Sewerage

Wastewater Treatment Plants	Pump Station
0	0

Critical Facilities

Schools	Police & Fire	Medical	Airports/Heli	Cultural Resources
2	6	0	0	4

3.3.5 Flooding



Hazard Profile

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

Other types of flooding in Marin include isolated ponding and stormwater overflow. Isolated ponding is when pools form on the ground and can occur in any area that doesn't drain effectively – for example, in a natural depression in the landscape. Stormwater overflow is when storm drains back up. Stormwater drainage systems quickly convey rainwater through underground pipes to creeks and the Bay. When the stormdrains are obstructed or broken or when the water-bodies to which they lead to are already full, water backs up onto the streets. Although stormwater overflow and isolated ponding also occur throughout the County, the effects are typically not widespread or significantly damaging.

A floodplain is the area adjacent to a watercourse or other body of water that is subject to recurring floods. Floodplains may change over time from natural processes, changes in the characteristics of a watershed, or human activity such as construction of bridges or channels. In areas where flow contains high sediment load, such as Easkoot Creek in Stinson Beach (due to an active landslide upstream), the flow carrying capacity of the channel may be reduced dramatically during a single flood event. Coastal floodplains may also change over time as waves and currents alter the coastline (especially wetlands) and sea levels rise.

Physical damage from floods includes the following:

- ☐ Inundation of structures, causing water damage to structural elements and contents.
- ☐ Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- ☐ Impact damage to structures, roads, bridges, culverts, and other features from high velocity flow
- ☐ Deposition of debris carried by floodwaters to roads, structures, crossings, etc. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects.
- ☐ Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands.
- ☐ Release of sewage and hazardous or toxic materials when wastewater treatment plants are inundated, storage tanks are damaged, and pipelines severed.

Floods also cause economic losses through permanent or temporary closures of businesses, homes, local/state roadways, and government facilities; disrupt communications; disrupt the provision of utilities such as water and sewer; result in excessive expenditures for emergency response and may limit the access of emergency responders; and generally disrupt the normal function of a community.

In areas such as Marin County that do not have extended periods of below-freezing temperatures or significant snowfall, floods usually occur during the season of highest precipitation or during heavy rainfalls after prolonged dry periods. Marin County is dry during the late spring, summer,

and early fall and receives most of its rain during the winter months. The rainfall season extends from November through April, with most rainfall occurring during this period. Due to varying microclimates within the County, rainfall in water year 2016-2017 where there are Marin County Flood Control & Water Conservation District-owned gages ranged inland from as low as 47 inches in Novato to over 82 inches in Kentfield. Along the coast, rainfall ranged from 36 inches at Oceana Marin to 45 inches at Point Reyes Station.

It should be noted winter 2016-2017 was an unusually wet year. An average of 56 inches of rain falls each year at the summit of Mount Tamalpais, at 2,572 feet elevation. The rain collects in several channels, flowing down steep slopes and onto broad, flat valleys, many of which are populated. The valleys usually only receive on average 32 inches of rain per year, thus flows from the uplands contribute greatly to flows on the valley floor. During most rainfall events, waterways remain within their channels or underground pipes until they reach a bay or the ocean.

Riverine flooding is caused by creek overflow when their banks spill. Naturally, waterways regularly overflowed onto an adjacent floodplain. Buildings are now often located on these flood plains. The size and slope of a channel, blockages, proximity to the bay, and constrictions obstructing flow such as bridges, utility pipes, or adjacent buildings influence riverine flooding.

Prior to development, Marin's flat lowlands flooded frequently. When rain fell on Marin, it infiltrated into the ground and moved slowly toward the creek channel. The ground acted like a sponge, storing water and releasing it slowly. While water moved underground, it was naturally cleansed by physical and biological processes. Annual floods brought life-giving water to parched floodplains, nourishing them with fresh sediment. They recharged aquifers and allowed fish to swim over normally dry land that was rich with food. Tides flooded biologically rich marshes along the bay perimeter twice a day. When humans began to develop the land, we created conflicts between what we built and the natural tendency of creeks to flood. Much of the development in Marin was built in flood-prone areas which put it at risk of inundation. Roads, parking lots, roofs, and other impervious surfaces prevent water from infiltrating the ground. Instead, it moves quickly across the landscape into pipes and creeks further increasing flood risk downstream. Homes, commercial areas, schools, hospitals, police and fire stations, roads and highways, sanitary sewers and waterlines, sewage treatment plants, pump stations are all located in floodplains in Marin.

All of Marin's watersheds are small and largely prone to flash flooding. Flash floods are particularly dangerous. The National Weather Service (NWS) defines a flash flood as one in which the peak flow travels the length of a watershed within a 6-hour period. These floods arise when storms produce a high volume of rainfall in a short period over a watershed where runoff collects quickly. They often affect populated areas of Marin's cities and towns. They often strike with little warning and are accompanied by high velocity flow.

Several Marin Communities, such as Tamalpais Valley, Santa Venetia, Corte Madera, Belvedere, and parts of Strawberry, Novato, and Ross Valley are protected by levees. Levees are typically earthen embankments designed to contain, control, or divert the flow of water to provide some level of protection from flooding. No levee system provides full protection from all flooding events to the people and structures located behind it. Some level of flood risk exists in the levee-affected areas. Except for one levee system in Novato-Hamilton, none of the County's levees are FEMA-accredited. Many were built many decades ago (non-engineered) by farmers or developers and material may have been added over the years.

Levee failure is the overtopping, breach or collapse of the levee. Levees can fail in the event of an earthquake, internal erosion, poor engineering/construction or landslides, but levees most commonly fail as a result of significant rainfall or very high tides. During a period of heavy rainfall, the water on the water-body side of the levee can build up and either flow over the top (“overtopping”) or put pressure on the structure causing quickening seepage and subsequent erosion of the earth. The overflow of water washes away the top portion of the levee, creating deep grooves. Eventually the levee weakens, resulting in a breach or collapse of the levee wall and the release of uncontrollable amounts of water.

Disaster History

Since the middle of the last century, the winter/spring storms of 1950, 1955*, 1958*, 1963, 1964*, 1969*, 1970*, 1973*, 1978, 1980, 1982*, 1983*, 1986*, 1995*, 1996, 1997*, 1998*, 2002, 2005/2006*, 2006*, 2008, 2014, and 2017* caused significant damage.

*Major Federal Disasters declared for flood.

Typically storms in which high tides coincide with peak stormwater flow are the most damaging. The New Year’s Eve 2005-2006 flood was the last major riverine flooding event that caused widespread damage in Marin. 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. Corte Madera Creek in San Anselmo, Ross and Fairfax; Novato Creek; Easkoot Creek in Stinson Beach; and Arroyo Corte Madera del Presidio in Mill Valley overflowed their banks. West Creek in Tiburon would also have overflowed its banks but was prevented by a water-inflated property protection bag. Per Table 4-3, at least \$219 million in damage was reported in Marin due to this storm, including \$94 million in the Ross Valley (Corte Madera Creek) Watershed alone. Over a thousand homes, apartments and businesses were damaged or destroyed. Prior to 2006, the last flood of similar magnitudes occurred in 1982 and 1983. Many improvements were made to flood facilities since then, particularly in Novato.

Novato Creek in the northern part of the county historically caused damage to large numbers of homes, particularly 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. For example, over a million dollars-worth of levee damage occurred in 2014 and 2017 and a heavy burden on stormwater pumping systems caused additional damage to pumping system components. Power outages are also a frequent problem for one of the major pump stations in the area.

Although the current Corte Madera Creek Flood Control project is partially complete (Unit 4 in the Town of Ross is yet to be constructed), flooding will still occur for storms greater than about 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.



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



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



Flood of 1983: Santa Venetia (Photo: Marin County Department of Public Works)



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

Location

Major county watersheds where significant numbers of structures are at risk from riverine flooding include Coyote Creek, Arroyo Corte Madera del Presidio, East and West Creek watersheds, Corte Madera Creek, Novato and Rush Creeks, Miller Creek, Easkoot Creek (Stinson Beach), Gallinas Creek. Additionally, many locations along Richardson Bay, Tomales Bay, lower Las Gallinas Creek, the San Rafael Canal, East San Rafael and Novato shores, and the outer Pacific coastline are vulnerable to coastal flooding.

In many cases, where there is a significant history of flooding there is a Marin County Flood Control & Water Conservation District “Flood Zone” established. There are 8 County Flood Zones located in the following areas as described in Table 3-6 and mapped in Figure 3-5.

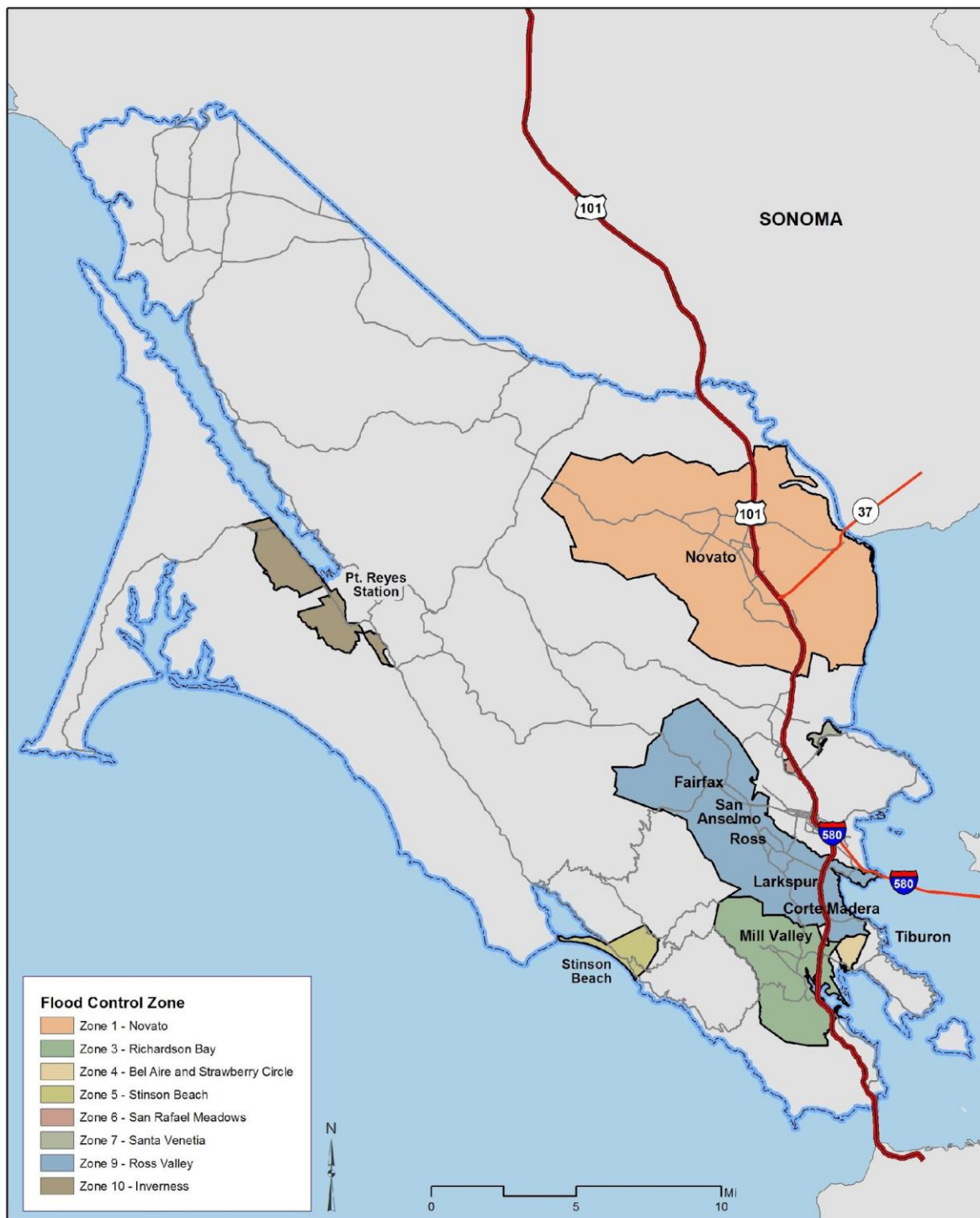
Table 3-6. Marin County Flood Control & Water Conservation District “Flood Zones”

Zone No.	Name	Location
1	Novato	Northern Marin: Most of City of Novato and some surrounding areas within the Novato Creek watershed.
3	Richardson Bay	Southern Marin: Marin City watershed, Coyote Creek watershed (includes Tamalpais Valley and Almonte); Arroyo Corte Madera del Presidio watershed and Ryan Creek watershed (both include much of the City of Mill Valley), a watershed including Sutton Manor/Alto/part of Strawberry.
4	Bel Aire	Southern Marin: East and West Creek watersheds which run through the Bel Aire neighborhood of the Town of Tiburon and part of (unincorporated) Strawberry.
5	Stinson Beach	West Marin: Part of the lower Easkoot Creek watershed

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		at Stinson Beach.
6	San Rafael Meadows	Central Marin: A part of the Las Gallinas Creek watershed in the City of San Rafael across from the County Civic Center.
7	Santa Venetia	Central Marin: The unincorporated community of Santa Venetia along Las Gallinas Creek.
9	Ross Valley	Central Marin: The Corte Madera Creek watershed, including the towns of Fairfax, San Anselmo, Ross, and Larkspur, as well as unincorporated parts of San Anselmo, Fairfax, Kentfield and Greenbrae.
10	Inverness	West Marin: Inverness, along the west shore of Tomales Bay and the East flank of Inverness Ridge.

Figure 3-5. Marin County Flood Control & Water Conservation District “Zones”

Flood Control Zones

County of Marin
Department of Public Works
www.marinwatersheds.org



All incorporated cities and towns in Marin have flood risk – and are in fact participants in the National Flood Insurance Program. Even those that are not in a Marin County Flood Control & Water Conservation District “Flood Zone,” have robust maintenance and capital improvement programs that help manage and mitigate flood risk. These cities without District Flood Zones include most of San Rafael and Tiburon, and all of Corte Madera, Sausalito, and Belvedere. Additionally, San Anselmo, Ross, Larkspur, Fairfax, Mill Valley and Novato have flood mitigation programs that operate largely independently of the Flood District, although extensive coordination of activities and collaboration with the Flood District is facilitated through the Marin County Watershed Program (part of the County Department of Public Works).

Every city and town, and many unincorporated communities in Marin contain FEMA Special Flood Hazard Areas (SFHA), meaning they have at least a 1% chance of flooding in a given year. They all participate in the National Flood Insurance Program and many of the structures in the SFHA carry FEMA flood insurance or private flood insurance.

Marin County and its cities participate in the National Flood Insurance Program (NFIP). The NFIP makes Federally-backed flood insurance available to homeowners, renters, and business owners in communities that adopt and enforce floodplain management ordinances to reduce future flood damage. Table 3-7 lists the date of the initially mapped FIRM, the emergency/regular program entrance date into the NFIP, and the number of policies in force.

Table 3-7. Date of Initially Mapped FIRM and Emergency/Regular Program Entrance Date into NFIP for Marin County and Cities

County/Community Name	Date of Initially Mapped FIRM	Emergency/Regular Program Entrance Date into NFIP	Number of Policies in Force
Marin County	3/1/82	3/1/82	2040
City of Sausalito	9/30/80	9/30/82	78
Town of Tiburon	5/16/77	5/16/77	142
City of Belvedere	5/2/77	5/2/77	283
City of Mill Valley	1/3/79	1/3/79	725
City of Novato	1/19/78	1/19/78	1472
City of San Rafael	5/1/84	5/1/84	1565
Town of San Anselmo	12/1/77	12/1/77	558
Town of Ross	2/4/81	2/4/81	194
City of Larkspur	3/15/84	3/15/84	580
Town of Fairfax	1/5/78	1/5/78	204
Town of Corte Madera	12/15/77	12/15/77	588

Source: FEMA NFIP, effective 11/30/17

Probability of Future Events

The County of Marin has several major 100-year and 500-year floodplains which are mapped by FEMA in the most recent Flood Insurance Rate Maps (FIRM), several of which were recently updated in 2016 and 2017. These floodplains can be viewed for whatever your area of interest on MarinMap.org, where you can also overlay the floodplains with the locations of critical facilities like Fire Stations, Medical Facilities, and Law Enforcement. While they may look small relative to the size of the County as a whole, the bulk of the floodplains are located in some of the County's most heavily populated areas along the eastern shoreline: notably portions of Novato, San Rafael, and Mill Valley.

These floodplains vary in size, probability and severity of inundation, underlying causes (riverine, tidal, etc.), and potential impacts to the communities in them. The areas of most concern are located in what is designated by FEMA as a 100-year flood zone or Special Flood Hazard Area (SFHA). Due to the increased probabilities of flooding (1% chance in any given year), these properties face high insurance premiums and major restrictions on further development.

Along the Pacific Ocean there are a number of homes in Stinson Beach which are mapped as being in a VE zone. A VE zone is a 100-year flood zone where tsunamis or other forms of wave action threaten low lying coastal areas.

For some of the developments along the San Francisco Bay, such as Santa Venetia and Tamalpais Valley, the main issues concern poor drainage due to flat terrain and/or differential settlement, low elevation relative to the tides, and the reliance on a system of pumps and levees to keep floodwaters from inundating homes. Runoff collecting in this area can be especially difficult to remove during high tides.

Other more inland areas, such as areas along Corte Madera Creek and its tributaries, have higher elevations yet still contain properties located in 100-year flood zones. This is mainly due to threats caused by local creeks which have a tendency to overflow their banks when rainfall reaches critical levels. Properties along Novato Creek and its tributaries face similar threats. The main stems of these creeks and many of their tributaries are constrained by development on the banks.

Extent

When flooding occurs in Marin County, depths are commonly on the order of 0-2 feet in streets and sidewalks. This level occurs when storm drains are overwhelmed and/or during king tides. Flood depths on the order of 2- 4 feet have occurred in recent memory and represent significant flood events that caused damage to structures and property. 1982 was the flood of record along Corte Madera Creek in Central Marin County and probably had some inundations depths as high as 5 feet. Also in 1982 a levee in Santa Venetia in unincorporated San Rafael was breached by tidal elevations and flooded the neighborhood with 2-3 feet of water.

In 2016 the FEMA San Francisco Bay Coastal Study became effective and raised the static Base Flood Elevation of the Bay to an elevation of 10-feet NAVD88. This level of flooding has not been observed but is feasible in any given year. If this level of tidal flooding was to occur along

the bay shoreline there would be inundation depths as much as 6-8 feet in neighborhoods such as Santa Venetia.

On Marin's outer coast V zones have BFEs of up to 22 feet according to FIRMs updated August 2017. In the unincorporated community of Stinson Beach this corresponds to a maximum inundation depth of 8-10 feet. Although some houses were destroyed by wave action and storm surge during the 1982 event, nothing approaching this level of inundation has occurred in recorded history here.

The other index for extent is the speed of onset of flooding or the rainfall-runoff lag time, which doesn't apply to tidal flooding. The riverine flooding comes directly from rainfall runoff of adjacent uplands in the County's series of relatively small, short watersheds. While antecedent moisture is a big factor, this flash flooding is typically short duration and directly associated with the magnitude of the passing storm system. These storms, often in the form of atmospheric rivers coming off the Pacific Ocean, can last anywhere from a few hours to a day or two. The speed of onset of flooding ranges from minutes to about 2 hours after the precipitation exceeds the drainage capacity.

The diversity and dispersion of Marin County's flood hazards, in addition to the tendency for floods to be flashy in nature, make response to emergencies more difficult and increase the need for planning and community awareness in areas of increased flood risk. While property damage to structures within 100-year flood zones is a major concern, damage to roads, utilities, and other supporting infrastructure located in these zones can potentially impact areas of the community outside of the flood zones as well.

Dealing with flooding from rain and upstream runoff is already complicated. Sea level rise will make it even more complicated by increasing the frequency and duration of flooding. When water temperature increases, water expands and takes up more space than cold water. As the planet warms, the water in the ocean warms, expands, and elevates sea levels. The changing climate has also melted parts of the ice caps at the North and South Poles. As this ice melts and flows into the ocean, it increases the amount of water in the ocean and raises sea levels even more. Sea levels in San Francisco Bay have risen seven inches over the past century. Predictions of future sea level rise vary from 12 inches by 2030 to 60 inches by 2100. The Bay Conservation and Development Commission (BCDC) recommends using 36 inches of sea level rise for planning purposes. Rising sea levels increase the upstream extent of tidal flooding, worsen creek overflow due to backwater effects of elevated high tides, and create larger, stronger waves which erode the shoreline and destroy sensitive marshes. Coastal flooding will have a large impact on cities and habitat.

A 36-inch increase in sea levels will greatly impact people's lives throughout Marin. Daily high tides will inundate major thoroughfares, schools, retirement communities, private homes, shopping areas, bike paths, and stormwater detention ponds. Valuable marsh and mudflat habitat will be permanently flooded. Infrastructure will need to be armored, abandoned, or relocated. Shorelines will be eroded by increased wave erosion, threatening even more infrastructure.

With sea level rise it is projected that more land along Marin's coastline and bayside will be permanently inundated or subject to more regular flooding, while the frequency and intensity of storm events are anticipated to increase with climate change. Greater riparian flooding may also occur with sea level rise and future storm events, though modeling is necessary to better understand the extent of such hazards. As previously discussed best available sea level rise and

future flood models indicate that by 2100 around 7,000 acres, 9,000 parcels, 10,000 buildings and 120 miles of roads throughout Marin County may be exposed flooding due to future sea level rise and 100-year storm events.³

Arroyo Corte Madera del Presidio is at risk of overtopping due to less than a 5-year flow. On average Corte Madera Creek and Easkoot Creek are at risk of overflowing their banks due to 5-10 year flow events. Novato Creek overflows in some locations due to 10-year flow. Coyote Creek and Gallinas Creek are more vulnerable to overtopping due to tidal elevations and may be able to carry 100-year riverine flows at low tides.

The probability of future levee failures in Marin County is largely unknown but may result from a large winter storm or seismic event. Where more is known about the risks associated with levee failure, we have generally completed Local Levee Evaluations in partnership with the CA Department of Water Resources (DWR). Areas where these studies have been completed include Santa Venetia/Gallinas Creek (further studied in partnership with the U.S. Army Corps of Engineers or “USACE”) and Coyote Creek. Levee Evaluations are underway for levees along lower Novato Creek and Corte Madera Creek (also in partnership with USACE).

Impacts

Thousands of residential and commercial structures, and hundreds of industrial structures are potentially impacted by 100-year floods. Transportation is also heavily impacted (even during smaller storms), with hundreds of miles of roadways potentially flooded, and 19 miles of railroad, during and after flood events. Because of this, access issues during and after major storms can be widespread. Critical water and wastewater facilities may also be affected by flooding, which can have devastating secondary effects on health of residents. Because of the diverse microclimates and small and varying watersheds of Marin, it is not common that all areas in designated FEMA 100-year floodplains would severely flood during the same storm system. However, given extensive historical development within the floodplain, impacts of a single powerful storm system to people and infrastructure can be extreme. For most jurisdictions, at least 10% of its homes and roadways are potentially impacted by flooding.

Vulnerability

Flooding is a relatively frequent occurrence in many populated areas of the county, making the county quite vulnerable to floods. The following tables represent summarize countywide vulnerability to flooding (data from Marin County Department of Public Works sources). Jurisdiction-specific data is included in the appendices for each jurisdiction.

³ County of Marin, Marin Bay Waterfront Adaptation and Vulnerability Evaluation (BayWAVE), (June 20, 2017) at 25, <http://www.marincounty.org/main/baywave/vulnerability-assessment>; County of Marin, Marin Coast Sea Level Rise Vulnerability Report (CSMART), (September 2015)

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Existing Structures

Commercial	Industrial	Single-Family	Multi-Family
1,309	288	9,562	3,625

Transportation

Miles of Roads	Miles of Railroad	Number of Ferry Terminals
374	19	4

Communication

MERA Towers
0

Power

Transmission Tower	Substation	Natural Gas Substation	Miles of Electric Transmission Lines	Miles of Natural Gas Pipeline
37	5	1	27	8

Water/Sewerage

Wastewater Treatment Plants	Pump Station
3	22

Critical Facilities

Schools	Police & Fire	Medical	Airports/Heli	Cultural Resources
14	13	3	2	9

3.3.6 Wind**Description**

Based on the NOAA data presented in Table 3-3, most severe winter storms in Marin come with strong winds and many of them cause damage. This can lead to power outages and/or road closures, clogged creeks and culverts, damage to structures and cars due to fallen trees, and damage resulting from wind-driven wave erosion.

Previous Occurrences

Based on Table 3-3, winds were reported as high as 72 knots. Storms with strong winds knock down trees and power lines nearly every year and continue to slowly erode vulnerable coastal areas and critical inland ponds (i.e. reservoirs/dams, berms/levees around stormwater detention ponds, wastewater treatment/storage ponds). One event was characterized as a tornado, in Tomales in west Marin, but this weather phenomenon is extremely rare in this part of California.

Location

Table 3-3 shows significant damage due to strong winds affecting all areas of Marin – coastal, mountainous, inland valleys, and southern Marin. Locations where there are power lines, roads, and creeks/bridges, and ponded water for infrastructure (stormwater, wastewater, drinking water purposes) are particularly vulnerable to disruption due to wind damage, as are private structures with nearby trees.

Probability of Future Events

Wind events and associated damages are expected to continue to occur several times per year. County, city and town public works staff and their contractors remove dead, sick or fallen trees in their right-of-way as needed and as funding allows, but there is no feasible way to prevent this hazard.

Extent

Marin's damaging wind events tend to range between 7 and 11 on the Beaufort scale, or 30 to 60 knots. These wind strengths are characterized as high wind to violent storm. Thus, most years

whole trees are put in motion and the ocean heaps up and white foam and spindrift form. Slight structural damage and uprooted trees can result occasionally.

Impacts

Although the entire county is affected by wind, coastal areas tend to be impacted more frequently by the strongest winds (9+ on the Beaufort scale) than inland areas. Marin's coastal areas have small resident populations but large visiting populations, such as Muir Beach, Stinson Beach, and Bolinas that can be impacted by strong winds. Beachgoers and boaters would be particularly impacted by wind hazards. Tourism is a key part of the economy in Marin, particularly in coastal communities, and thus there are potentially significant economic impacts of wind events. Some communities, such as Oceana Marin and Olema, rely on water and wastewater infrastructure that has potential to be impacted by coastal erosion, wind driving up wave elevations, and erosion from waves forming due to wind over treatment and storage ponds. Inland critical ponds are also impacted by wind-driven wave erosion such as dams on drinking water reservoirs, and levees/berms containing stormwater retention and detention ponds. Across the county powerlines are potentially impacted by wind, potentially affecting commercial, industrial, and residential areas, and most years downed trees lead to temporary road closures.

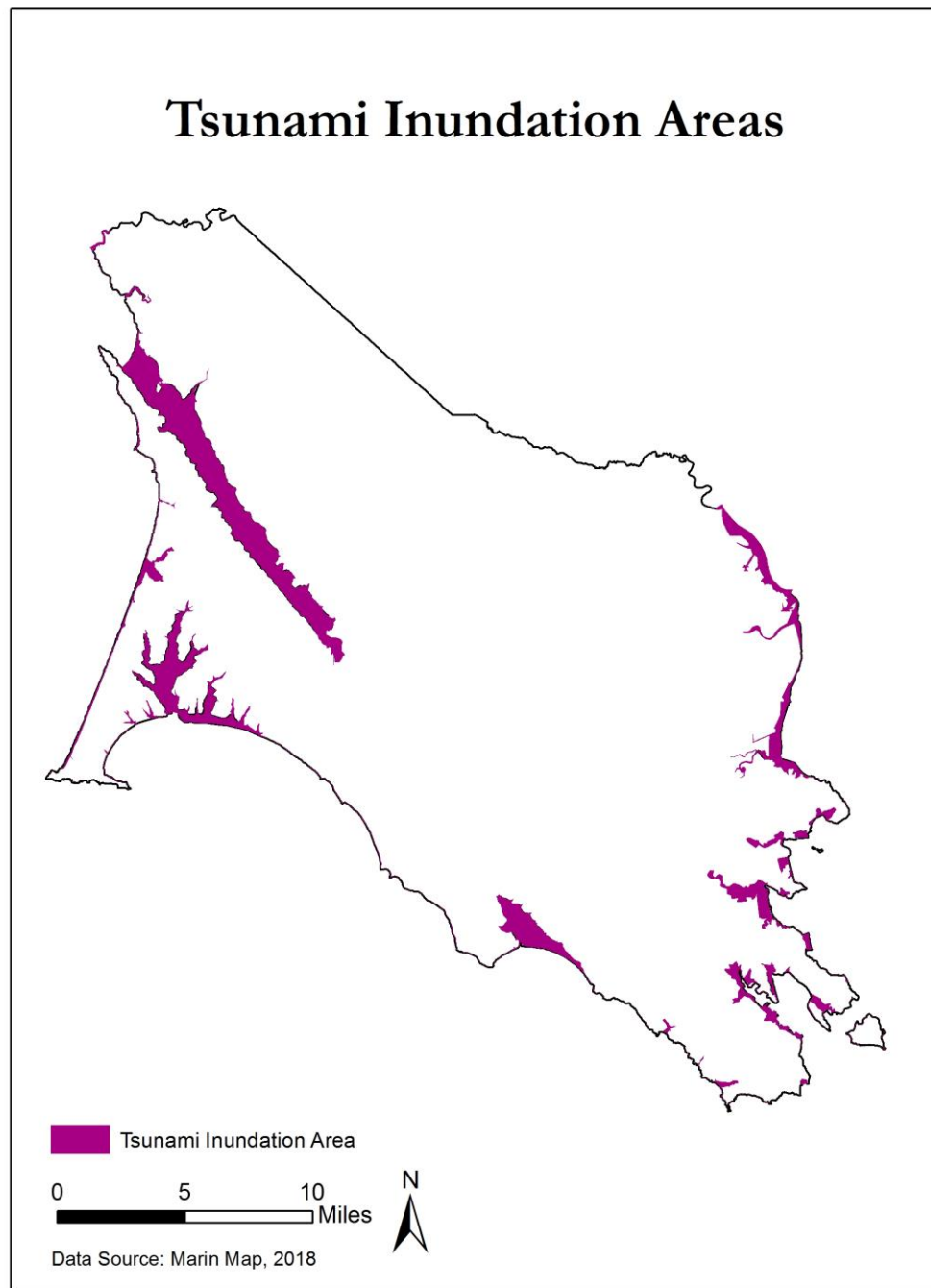
Vulnerability

Impacts of wind events may be frequent but the results of those frequent events tend to be short-lived, such as downed trees and powerlines. The systems that are most vulnerable are those that wouldn't be able to be fully repaired quickly should there be a catastrophic failure during an extreme wind event, such as a breach of a levee or dam due to wave erosion. Some examples of vulnerable facilities include:

- ❑ Bridgeway Promenade in Sausalito, an economically significant lifeline route, a portion of which runs along the San Francisco Bay shoreline and is vulnerable to wind-driven waves. The route is frequented by visiting tourists and shoppers that are a key part of Sausalito's economy. The impacts are expected to increase with climate change and sea level rise.
- ❑ Oceana Marin Force Main Pump Station is 60 feet from the edge of a coastal bluff. Coastal erosion rates up to 4.4 feet/year were anticipated in the Dillon Beach area (where Oceana Marin is located) according to a 2003 Cliff and Erosion Technical Background report prepared to support a Marin County Local Coastal Program update. Although only a small community would be affected by the failure, it would be a long time before the critical water supply facility could be replaced. Additionally, the community has a sewer line potentially vulnerable to coastal erosion.
- ❑ Wind driven waves could flood the Olema Domestic Water Pump Station which would cause electrical and water supply failure to 43 residents, 3 hotels, a church, and a campground.
- ❑ Stafford Dam's (earthen) upstream face is subject to wind and wave action which has been eroding the gunite and welded wire reinforcement. A catastrophic failure could lead

to inundation of the City of Novato (see the subsection on Dam Failure for vulnerability analysis).

3.3.7 Tsunami



Hazard Profile

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.

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.

Disaster History

Prior to the 2011 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.

Over 80 tsunamis have been observed or recorded along the coast of California in the past 150 years. Since 1946, there have been seven tsunamis known to have caused damage to ports and harbors in California. In 1964, a tsunami caused by a M9.2 earthquake offshore from Alaska resulted in 12 deaths in California and destroyed portions of downtown Crescent City. More recently, a 2006 tsunami (originating in the Kurile Islands region) caused approximately \$20 million in damage to Crescent City harbor. A 2010 tsunami (originating offshore from Chile) caused several million dollars in damage to ports and harbors in the state. A tsunami in 2011 (caused by a M9.0 earthquake offshore of Japan) killed one person at the mouth of the Klamath River and caused up to \$100 million damage to 27 ports, harbors, and marinas throughout the state. The most damage occurred in Crescent City, Santa Cruz and Moss Landing harbors and a federal disaster was declared in Del Norte, Santa Cruz, and Monterey Counties.

Location

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 has been installed along the coast and informational pamphlets specific to areas of the county have been distributed. Informational pamphlets covering the vulnerable areas of west Marin are available from the Marin County Sheriff's Office OES.

The following is a list of tsunami inundation areas for various communities in Marin (please see MarinMap for details on these locations).

- ☐ Almonte Tsunami Inundation Area. Highways 1 and 101 and residential and commercial areas potentially impacted.
- ☐ Belvedere and Tiburon Tsunami Inundation Area. Residential and commercial areas near Belvedere Lagoon potentially impacted in Belvedere. Tiburon Boulevard, Tiburon City Hall, a fire station and commercial areas potentially impacted in Tiburon.
- ☐ Black Point Tsunami Inundation Area. Residential areas potentially impacted.
- ☐ Dillon Beach Tsunami Inundation Area.
- ☐ Kentfield Tsunami Inundation Area. Some residential and educational areas potentially impacted. Bridge to hospital potentially impacted.
- ☐ Mill Valley Tsunami Inundation Area. Some residential, commercial, and educational areas potentially impacted.
- ☐ Muir Beach Tsunami Inundation Area.
- ☐ Paradise Cay Tsunami Inundation Area. Residential area and marina potentially affected.
- ☐ Point San Pedro Tsunami Inundation Area.
- ☐ San Quentin Tsunami Inundation Area. Potentially affects State Prison and nearby facilities.
- ☐ San Rafael Tsunami Inundation Area. Potentially affects marinas, commercial areas, and medical clinic.
- ☐ Sausalito Tsunami Inundation Area. Potentially affects marinas, commercial areas, schools, and the primary road through town.
- ☐ Stinson Beach Tsunami Inundation Area. Potentially affects fire stations, residential areas, commercial areas, and a National Park
- ☐ Strawberry Tsunami Inundation Area. Potentially affects marinas, commercial areas, schools, and the primary road through town.

Probability of Future Events

The frequency of tsunamis is related to the frequency of the events that cause them, so it is similar to the frequency of seismic or volcanic activities or landslides. Generally four or five tsunamis occur every year in the Pacific Basin, and those that are most damaging have historically been generated in the Pacific waters off South America rather than in the northern Pacific.

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 (LCP) 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. 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)

Marin County, and the communities of Dillon Beach, Belvedere and Tiburon, are now recognized by the NOAA as TsunamiReady, significantly improving public safety before, during, and after tsunami emergencies.

Extent

Tsunamis can travel at speeds of over 600 miles per hour in the open ocean and can grow to over 50 feet in height when they approach a shallow shoreline, causing severe damage to coastal development. Recent studies of the continental shelf off the California coast indicate a potential for underwater landslides capable of generating damaging tsunamis that could threaten coastal communities.

The National Geodetic Data Center (NGDC) provides a database cataloging all tsunami occurrences. The database can be used to evaluate past tsunami events at a particular site.

Impacts

Community exposure to tsunamis in California varies considerably—some communities may experience great losses that reflect only a small part of their community and others may experience relatively small losses that devastate them. Among the incorporated communities and the unincorporated areas of the county are communities that have the highest number of people and businesses in the tsunami-inundation zone. The communities of Belvedere and Sausalito have the highest percentages of people and businesses in this zone. To download the Community Exposure to Tsunami Hazards in California report visit the USGS website:

<http://pubs.usgs.gov/sir/2012/5222/>

Vulnerability

Tsunamis are a relatively infrequent occurrence in the County, making Tsunami one of the disasters to which Marin is less vulnerable. The following tables summarize countywide vulnerability to tsunami (data from Marin County Department of Public Works sources).

Existing Structures

Commercial	Industrial	Single-Family	Multi-Family
360	75	2,890	1,070

Transportation

Miles of Roads	Miles of Railroad	Number of Ferry Terminals
124	2	4

Communication

MERA Towers
0

Power

Transmission Tower	Substation	Natural Gas Substation	Miles of Electric Transmission Lines	Miles of Natural Gas Pipeline
2	1	1	8	1

SECTION 3

Hazard Analysis

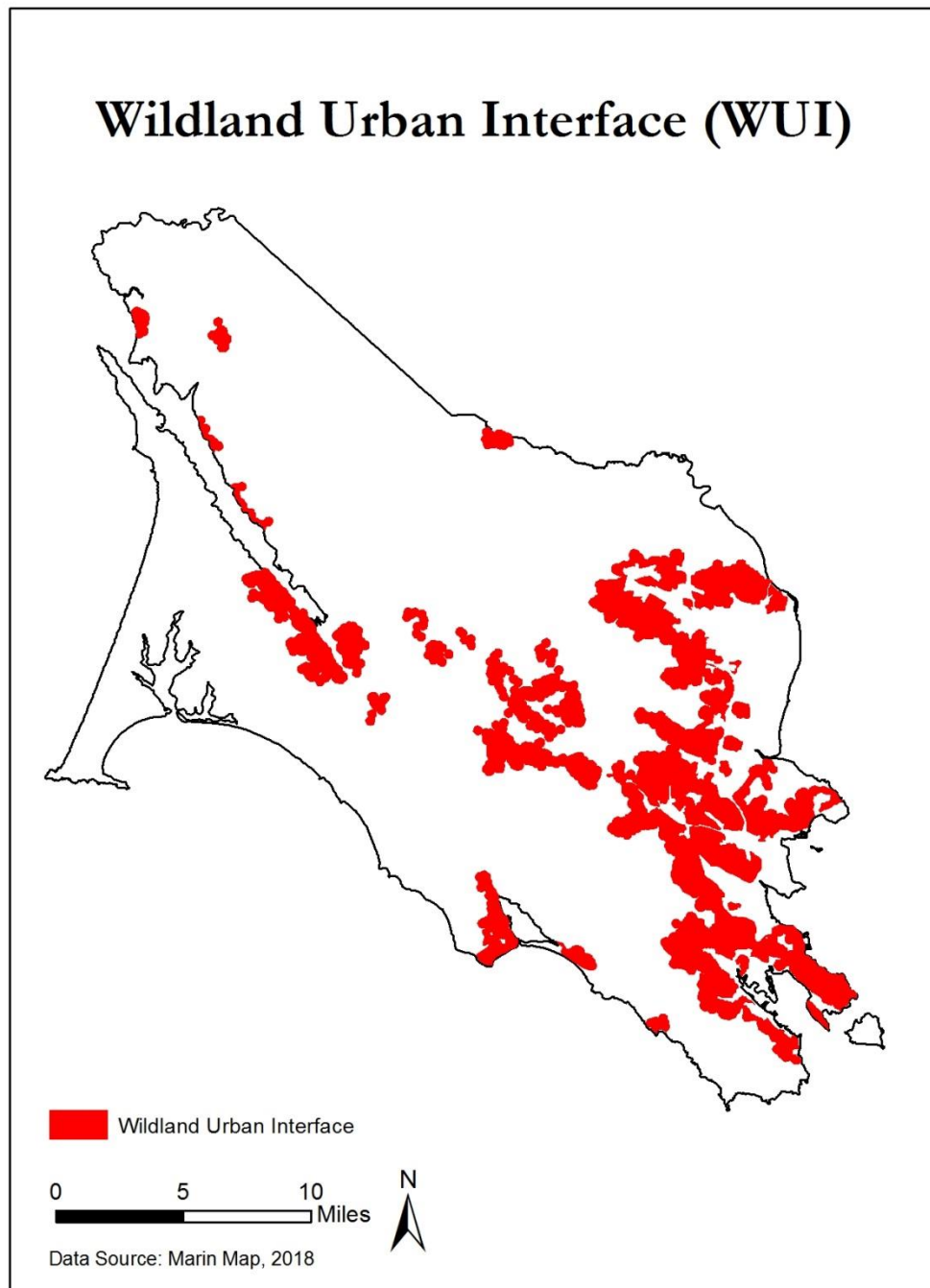
Water/Sewerage

Wastewater Treatment Plants	Pump Station
2	12

Critical Facilities

Schools	Police & Fire	Medical	Airports/Heli	Cultural Resources
8	6	1	0	3

3.3.8 Wildfire



The Marin County Fire Department in collaboration with FIRESafe Marin finalized the Community Wildfire Protection Plan (CWPP) in July 2016. The full CWPP is incorporated by reference into this multi-jurisdictional LHMP and most of the information that follows comes directly from the CWPP.

The Community Wildfire Protection Plan (CWPP) provides a scientifically based assessment of wildfire threat in the wildland urban interface (WUI) of Marin County, California. This CWPP was developed through a collaborative process involving Marin County fire agencies, county officials, county, state, and federal land management agencies, and community members. It meets the CWPP requirements set forth in the federal Healthy Forests Restoration Act which include:

- Stakeholder collaboration (see Section 3 of the CWPP).
- Identifying and prioritizing areas for fuel reduction activities (see Sections 4 and 5 of the CWPP).
- Addressing structural ignitability (see Section 7 of the CWPP).

Wildfire poses the greatest risk to human life and property in Marin County's densely populated WUI, which holds an estimated 69,000 living units. Marin County is home to 23 communities listed on CAL FIRE's Communities at Risk list, with approximately 80% of the total land area in the county designated as having moderate to very high fire hazard severity ratings. The county has a long fire history with many large fires over the past decades, several of which have occurred in the WUI. To compound the issue, national fire suppression policies and practices have contributed to the continuous growth (and overgrowth) of vegetation resulting in dangerous fuel loads (see Section 1.6 of the CWPP).

A science-based hazard, asset, risk assessment was performed using up-to-date, high resolution topography and fuels information combined with local fuel moisture and weather data. The assessment was focused on identifying areas of concern throughout the county and beginning to prioritize areas where wildfire threat is greatest. Hazard mitigation efforts can then be focused to address specific issues in the areas of greatest concern (see Sections 4 and 5 of the CWPP). Marin County will reduce wildland fire hazard using a collaborative and integrated approach that includes the following strategies (see Section 8 of the CWPP):

- Pre-fire planning.
- Public education and outreach to promote and implement fire adapted community practices.
- Vegetation management and fuel reduction at the county and community levels.
- Reducing structure ignitability by promoting and enforcing building codes, ordinances, and statutes.

The CWPP provides a framework for future collaboration that can be used to identify, prioritize, implement, and monitor hazard reduction activities throughout the county. It is intended to be a living document that will be updated periodically by FIRESafe MARIN and the Marin County Fire Department (MCFD) in collaboration with a broader group of county stakeholders. The CWPP is also intended to support the California Fire Plan and CAL FIRE's Unit Strategic Fire

Plan. While the CWPP broadly covers the entire county, it supports and encourages more focused plans for wildfire protection at the city, community, and neighborhood scales.

Fire protection in California is the responsibility of either the federal, state, or local government. On federally owned land, or federal responsibility areas (FRA), fire protection is provided by the federal government, and or in partnership with local agreements. In state responsibility areas (SRA), CAL FIRE typically provides fire protection. However, in some counties CAL FIRE contracts with county fire departments to provide protection of the SRA – this is the case in Marin County, where CAL FIRE contracts with MCFD. Local responsibility areas (LRA) include incorporated cities and cultivated agriculture lands, and fire protection is typically provided by city fire departments, fire protection districts, counties, and by CAL FIRE under contract to local government.

CAL FIRE contracts with MCFD to provide wildland fire protection and associated fire prevention activities for lands designated by the State Board of Forestry as SRA. Marin is one of six counties in the state who contract with CAL FIRE to protect SRA. The MCFD is responsible for the protection of approximately 200,000 acres of SRA within the county and is the primary agency that handles wildland fires. MCFD also provides similar protection services to approximately 100,000 acres of FRA in the Golden Gate National Recreation Area (GGNRA), the Muir Woods National Monument, and the Point Reyes National Seashore.

See page 5 of the CWPP for a summary of the 13 fire departments and districts within Marin County. Figure 3-6 indicates their jurisdictional areas.

Figure 3-6. Map of the federal responsibility areas, state responsibility areas and local responsibility areas in Marin County

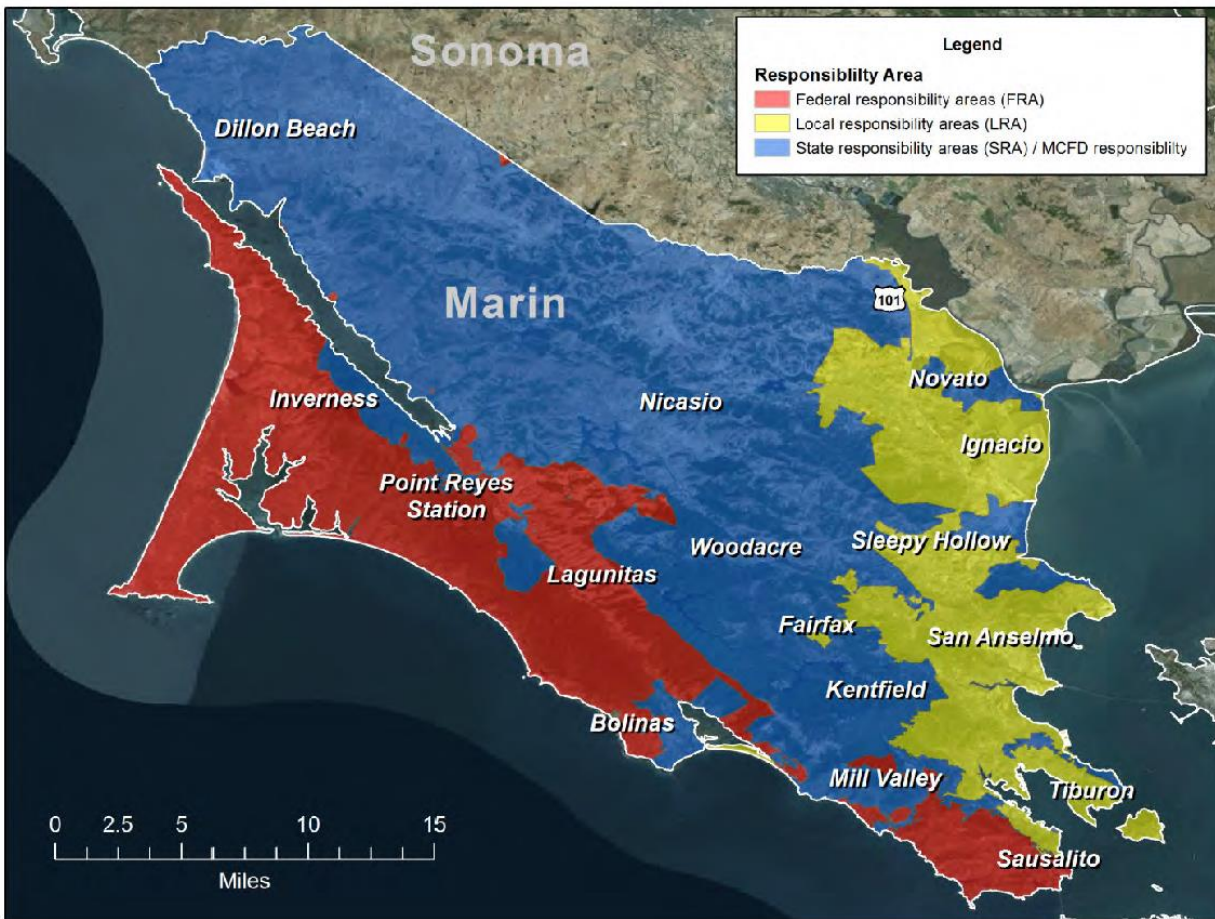
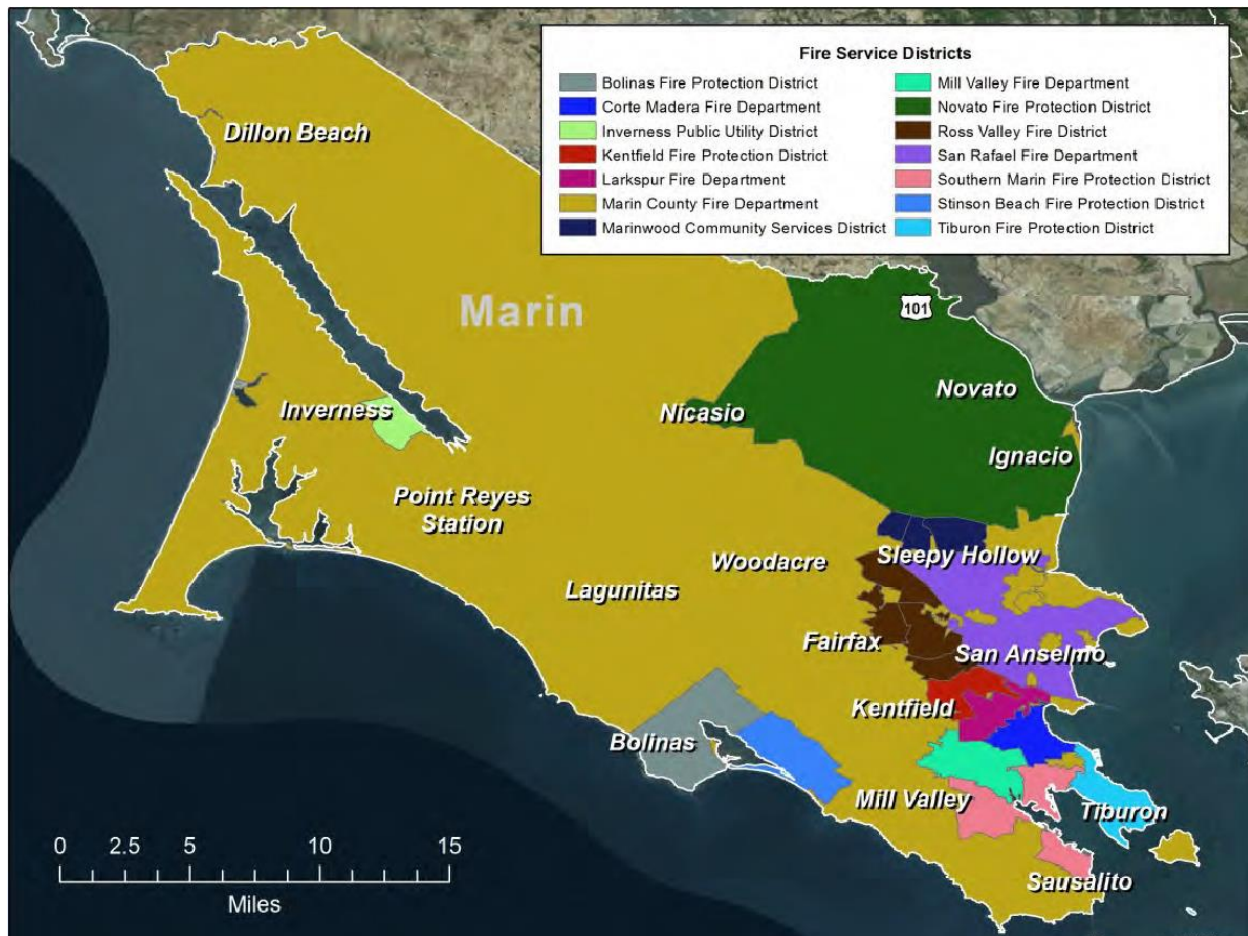


Figure 3-7. Map of Marin County professional fire service agency jurisdictions

Hazard Profile

The mix of weather, diverse vegetation and fuel characteristics, complex topography, and land use and development patterns in Marin County are important contributors to the fire environment. The MCFD Woodacre ECC currently manages the data from four Remote Automated Weather Stations (RAWS) for predicting fire danger utilizing the National Fire Danger Rating System (NFDRS) during the fire season. The RAWS are located in Woodacre, Middle Peak, Barnabe, Big Rock and a new station will be coming online in Novato.

Marin County is bounded by the cool waters of the Pacific Ocean to the west, the San Francisco and Richardson Bays to the southeast, the San Pablo Bay to the east, and Sonoma County agricultural lands to the north. The combination of these large bodies of water, location in the mid-latitudes, and the persistent high pressure over the eastern Pacific Ocean results in several micro-climates. Weather in the county consists of warm, dry summers and cool, wet winters. The climate in early fall and late spring is generally similar to the summer, and late fall is similar to winter. Spring is generally cool, but not as wet as the winter. While these general weather conditions are fairly representative of the typical Marin County weather, complex topography, annual variability of weather patterns, and less frequent and transient weather patterns are important to fire conditions.

In the late spring through early fall, the combination of frequent and strong high-pressure systems (known as the Pacific High) over California combined with the cool waters of the ocean/bays results in persistent fog and low clouds along the coast (including over southern Marin County near the San Francisco Bay). The fog often penetrates into the inland valleys of northern and central Marin County, especially during overnight hours. At the coastline, mist from fog can keep the land surfaces modestly moist while inland land surfaces above the fog or inversion are often very dry.

The Pacific High that persists from late spring through early fall over the eastern Pacific, combined with a thermal low pressure over the Central Valley of California, results in an almost continuous sea breeze. These winds usher in cool and moist air and can be strong (15 to 25 mph), especially over the ridge tops and through northwest to southeast lying valleys, including San Geronimo/Ross, Hicks, and Lucas Valleys. These westerly winds are usually highest in the afternoon, decrease in the evening, and are light overnight before increasing again in the late morning/early afternoon.

Occasionally in the summer and more often in the fall, the Pacific High moves inland and centers over Oregon and Idaho, while low pressure moves from the Central Valley of California to southern California and Arizona. The resulting north-to-south pressure gradient can be strong enough to retard the typical sea breeze and can even result in winds blowing from the land to the ocean (offshore winds). As the offshore winds move air from the Great Basin to the coastal areas of California, the air descends and compresses, which greatly warms and dries the air. Under these “Diablo” wind conditions, temperatures in Marin County can reach 100°F in the inland areas and even 80°F at the coast, and relative humidity can be very low. In addition, wind speeds can be high (20 to 40 mph) and gusty and are often much faster over the mountains and ridge tops such as Mt. Tamalpais, Loma Alta, and Mt. Burdell compared to low-lying areas. Wind speeds can be high over the ridges and mountains at all times of day under this “offshore” wind pattern and are often much slower or even calm at night in low-lying areas because nighttime cooling decouples the aloft winds from the surface winds. It is during these Diablo wind events that there is a high potential for large, wind-driven fires should there be an ignition. Historically, the largest and most destructive fires have occurred during these offshore (also known as Foehn) wind events including the Angel Island and the Vision fires.

A few times per year in the summer and early fall, monsoonal flow from Mexico brings in moist and unstable air over central and northern California, which can result in thunderstorms with or without precipitation. With the otherwise dry summer conditions, the lightning can ignite fires. These monsoonal flow patterns are usually only one to two-day events.

Beginning in late November and lasting through the end of March, the Pacific High moves south and weakens, allowing storms that originate in the Gulf of Alaska to move over California. These storms bring precipitation and, at times, strong winds out of the south. Each storm usually results in one fourth inch to several inches of rain over a day or so. Near Mt. Tamalpais, rainfall amounts are enhanced by orographic lifting, resulting in higher rain amounts in the Kentfield and Fairfax areas compared to the rest of the county. Typically, after the first rain in November, the cool weather and occasional storm keeps the ground wet through late Spring. However, in some years, significant rain does not occur until later in the year (e.g., early-to-late December) and there can be several weeks without any storms and rain. During storms, temperatures are usually mild.

When there are no storms over California, a land-breeze typically forms (i.e., winds blowing from the Central Valley to the Pacific Ocean). These winds can reach 30 mph, and travel through the southeast to northwest lying valleys, over low-lying ridges such as the Marin Headlands, and through the Golden Gate. These winds are usually highest in the mid-morning hours and decrease in the afternoon as the Central Valley warms during the day. The winds are associated with cold and modestly moist air.

In late February/early March through late April, the Pacific High strengthens and moves north, and storms impacting the county become less frequent. During this time of year there is often a low-pressure area over the desert in southwest California. The combination of the Pacific High to the north and low-pressure to the southwest results in strong winds blowing from the northwest to the southeast. Like the sea breeze, these winds bring in cool, moist air and are usually highest in the afternoon hours. Because of winter and spring rains, the land is wet and there is little danger of wildland fire despite the strong winds and only occasional precipitation. There is often little coastal fog this time of year.

Vegetation, which is also known as fuel, plays a major role in fire behavior and potential fire hazards. A fuel's composition, including moisture level, chemical make-up, and density, determines its degree of flammability. Of these, fuel moisture level is the most important consideration. Generally, live trees contain a great deal of moisture while dead logs contain very little. The moisture content and distribution of fuels define how quickly a fire can spread and how intense or hot it may become. High moisture content will slow the burning process since heat from the fire must first eliminate moisture.

In addition to moisture, a fuel's chemical makeup determines how readily it will burn. Some plants, shrubs, and trees such as chamise and eucalyptus (both present in Marin County) contain oils or resins that promote combustion, causing them to burn more easily, quickly, and intensely.

Finally, the density of a fuel influences its flammability; when fuels are close together but not too dense, they will ignite each other, causing the fuel to spread readily. However, if fuels are so close that air cannot circulate easily, the fuel will not burn freely.

Marin County has extensive topographic diversity that supports a variety of vegetation types.

Environmental factors, such as temperature, precipitation, soil type, aspect, slope, and land use history, all help determine the existing vegetation at any given location. In the central and eastern parts of the county, north facing slopes are usually densely wooded from lower elevations to ridge peaks with a mixture of mostly hardwood tree species such as coast live oak, California bay, Pacific madrone, and other oak species. Marshlands are also present throughout the county; once ignited marsh fires can be difficult to contain and extinguish.

Grasslands with a mixture of native and nonnative annual and perennial plant species occur most often in the northern and western parts of the county due to a combination of soil type, lower rainfall, and a long history of ranching. The southern and western facing slopes tend to have a higher percentage of grasslands, which in turn have the potential to experience higher rates of fire spread. Grassland fires are dangerous even without extreme fire weather scenarios due to the rapid rate of fire spread; in some cases, fires spread so quickly that large areas can burn before response resources are able to arrive.

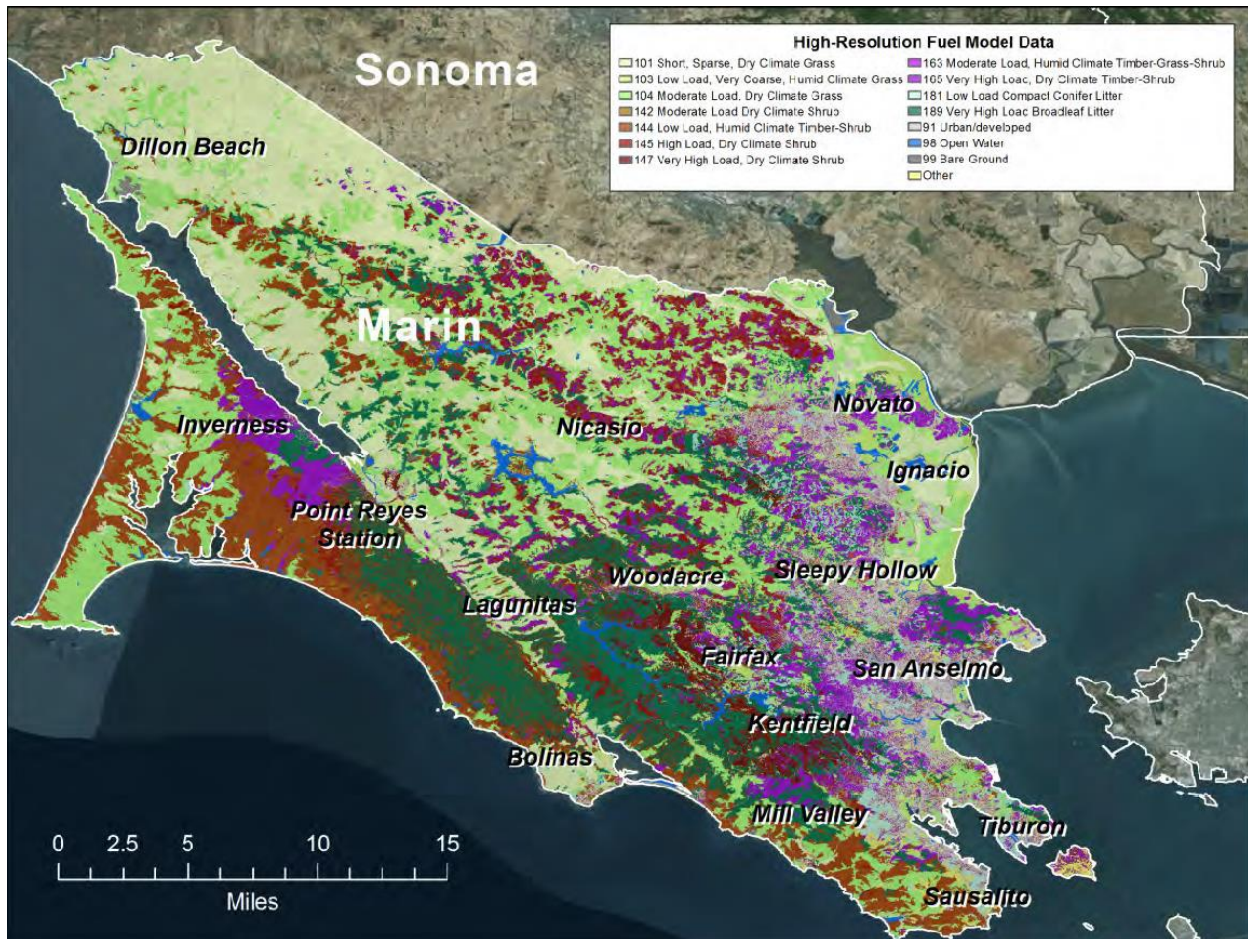
In the west portion of the county closer to the coast, where precipitation is higher and marine influence is greater, most areas are densely forested with conifer species (i.e., Bishop pine, Douglas-fir, and coast redwood) and associated hardwood species. Chaparral vegetation also occurs in parts of the county, especially on steeper south and west facing slopes. This mix of densely forested areas mixed with chaparral results in higher fuel loads and potentially higher fire intensity. Expansion of the residential community into areas of heavier vegetation has resulted in homes existing in close proximity to dense natural foliage; these homes are often completely surrounded by highly combustible or tall vegetation, increasing the potential that wildland fires could impact them.

As part of the development of the CWPP, an updated vegetation map layer was created using the most recent vegetation information available from a variety of state and local data sources. Vegetation distribution in Marin County is characterized by approximately 20 different types of vegetation which have been classified into 15 fire behavior fuel models. Table 7 on page 21 of the CWPP lists the fuel model types for Marin County, while Figure 5 shows a fuel model map; the data shown were developed to support this CWPP and represent the most up-to-date and highest-resolution vegetation coverage information for the county. The methods used to develop the data set are described in Appendix A of the CWPP.

Insect infestations and plant diseases, such as California oak mortality syndrome (sudden oak death), are increasing and threaten to change the structure and overall health of native plant communities in Marin County. Sudden oak death has no known cure and is the biggest concern; this syndrome is caused by the fungus-like *Phytophthora ramorum*, which has led to widespread mortality of several tree species in California since the mid-1990s; the tanoak (*Lithocarpus densiflorus*) in particular appears to have little or no resistance to the disease. Sudden oak death has resulted in stands of essentially dead trees with very low fuel moistures.

Studies examining the impacts of sudden oak death on fire behavior indicate that while predicted surface fire behavior in sudden oak death stands seems to conform to a common fuel model already in use for hardwood stands, the very low moisture content of dead tanoak leaves may lead to crown ignitions more often during fires of “normal” intensity.

Two other plant diseases prevalent in Marin County are pitch canker (which affects conifers such as Bishop pine and other pine species), and madrone twig dieback (which affects Pacific madrones). Pitch canker is caused by the fungus *Fusarium circinatum* (*F. subglutinans*, *F. sp. pini*), which enters the tree through wounds caused by insects. While some trees do recover, most infected trees are eventually killed by the fungus. Management of this disease largely focuses on containment to reduce the fungus spreading to other trees. Pitch canker is a particular issue in the NPS lands of Pt. Reyes National Seashore, where many acres of young Bishop Pines that were seeded on the Inverness Ridge by the Mount Vision Fire of 1995 have been infected.

Figure 3-8. Fuel model map for Marin County

These dead and dying trees have created large swaths of land with dense and dry fuel loads.

Madrone twig dieback is caused by the native fungus *Botryosphaeria dothidea* and appears to be getting worse throughout the county due to drought effects on Pacific madrones. Three additional threats to trees common to Marin County include:

- Bark and ambrosia beetles (*Monarthrum dentiger* and *monarthrum scutellare*), which target oak and tanoak trees. Sudden oak death may be exacerbating the effects of beetle infestations which prey on trees already weakened by this disease.
- Root rot, caused by oak root fungus (*Armillaria mellea*), is primarily associated with oaks and other hardwoods but also attacks conifers. These fungal infestations cause canopy thinning and branch dieback and can kill mature trees. As with the beetle infestations, sudden oak death may be exacerbating the effects of root rot fungus in the county forests.
- Velvet-top fungus (*Phaeolus schweinitzii*) is a root rot fungus affecting Douglas-fir and other conifers, with the infection typically occurring through a wound.

Topography characterizes the land surface features of an area in terms of elevation, aspect, and slope. Aspect is the compass direction that a slope faces, which can have a strong influence on surface temperature, and more importantly on fuel moistures. Both elevation and aspect play an important role in the type of vegetation present, the length of the growing season, and the amount of sunlight absorbed by vegetation. Generally, southern aspects receive more solar radiation than northern aspects; the result is that soil and vegetation on southern aspects is warmer and dryer than soil and vegetation on northern aspects. Slope is a measure of land steepness and can significantly influence fire behavior as fire tends to spread more rapidly on steeper slopes. For example, as slope increases from 20 – 40%, flame heights can double and rates of fire spread can increase fourfold; from 40 – 60%, flame heights can become three times higher and rates of spread can increase eightfold.

Marin County is topographically diverse, with rolling hills, valleys and ridges that trend from northwest to southeast. Elevation throughout the county varies considerably, with Mt. Tamalpais' peak resting at 2,574 feet above sea level and many communities at or near sea level. Correspondingly, there is considerable diversity in slope percentages. The San Geronimo Valley slopes run from level (in the valley itself) to near 70%. Mt. Barnabe has slopes that run from 20 to 70%, and Throckmorton ridge has slopes that range in steepness from 40 – 100%. These slope changes can make fighting fires extremely difficult.

In the WUI where natural fuels and structure fuels are intermixed, fire behavior is complex and difficult to predict. Research based on modeling, observations, and case studies in the WUI indicates that structure ignitability during wildland fires depends largely on the characteristics and building materials of the home and its immediate surroundings.

The dispersion of burning embers from wildfires is the most likely cause of home ignitions. When embers land near or on a structure, they can ignite near-by vegetation or accumulated debris on the roof or in the gutter. Embers can also enter the structure through openings such as an open window or vent and could ignite the interior of the structure or debris in the attic. Wildfire can further ignite structures through direct flame contact and/or radiant heat. For this reason, it is important that structures and property in the WUI are less prone to ignition by ember dispersion, direct flame contact, and radiant heat.

Marin County's approach to mitigating structure ignitability is based on findings from the National Institute of Standards and Technology that defensive actions by homeowners can significantly affect fire behavior and structure loss, and that effective fire prevention practices are essential in increasing structure survivability.

The California Building Code (CBC)—Chapter 7A specifically—addresses the wildland fire threat to structures by requiring that structures located in state or locally designated WUI areas be built of fire resistant materials. However, the requirements promulgated by the state only apply to new construction, and do not address existing structures and additions and remodels to existing structures.

Since most of the towns and cities in Marin County are “built-out”, most fire departments have applied the Chapter 7A standards to address home ignitability for both new and existing construction. Specifically, Marin County has extensively amended the 2003 International Urban-Wildland Interface Code. As part of these amendments, MCFD applies more stringent building standards and requires the preparation of a Vegetation Management Plan (VMP) as defined in

MCFD's VMP Standard. MCFD also imposes requirements for fire apparatus and water supply access to new and remodeled structures located in the WUI.

In addition to the amendments, the county requires that alterations or remodels to structures located in the WUI use specific building elements that comply with WUI-specific standards. For example, if a window is replaced, the new window is required to be dual-paned with one pane tempered.

The county has amended the 2013 California Fire Code (CFC) Chapter 49 requirements for defensible space around existing homes (note that the 2013 CFC Chapter 49 requirements are identical to the Public Resource Code and Government Code requirements). The MCFD amendment modifies the language of PRC 4291 such that the property line no longer limits the amount of defensible space required around structures. If the 100-foot defensible space/fuel modification zone extends from private to public lands, the defensible space stops at the property boundary. However, fuel modification/clearance may be permitted after an evaluation and issuance of approval from the public land management agency.

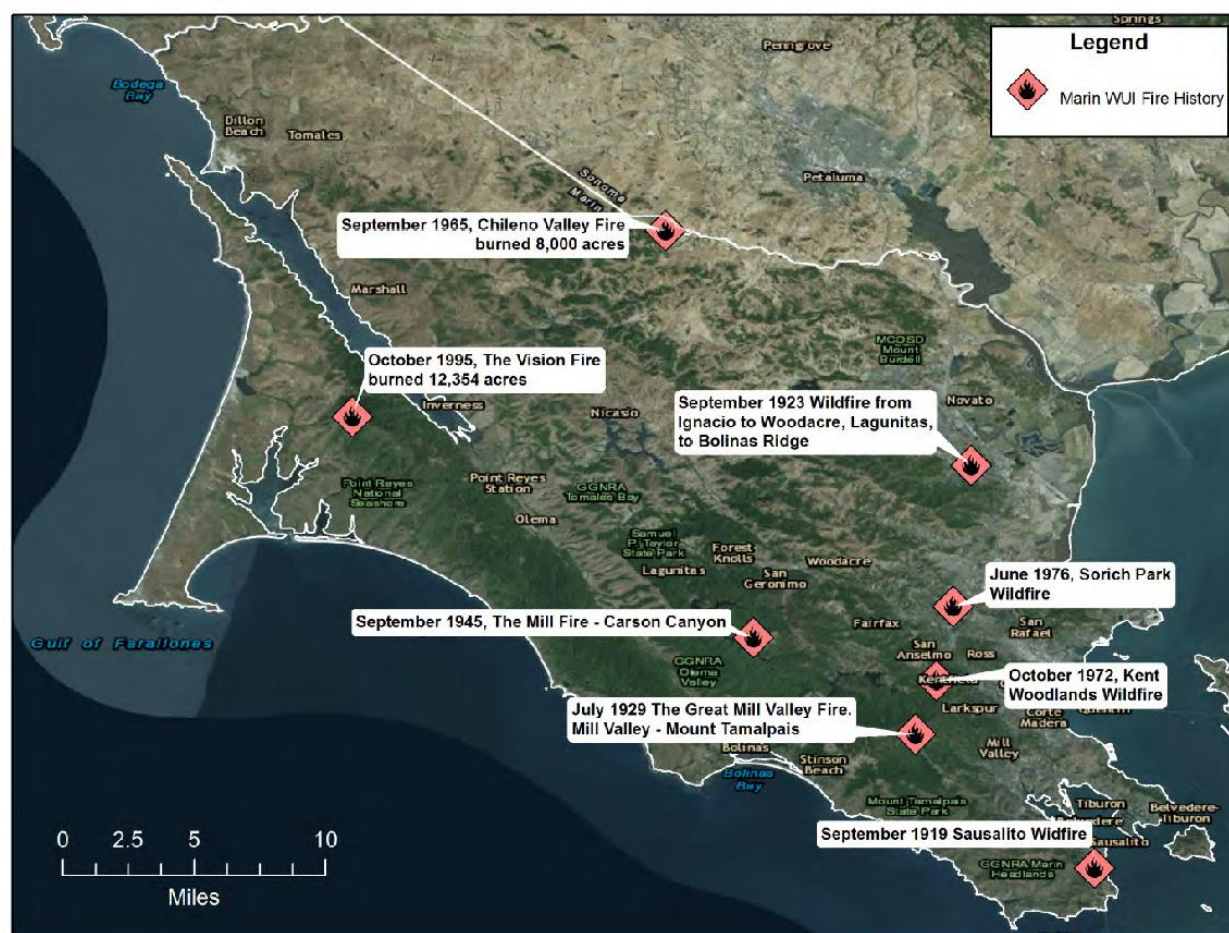
Disaster History

In the time before the county was settled, fire was a natural part of the ecosystem. Much of the vegetation in what is now the wildlands of Marin County depended on fire to renew itself by removing old, dead fuel in order to make room for healthy new vegetation and promote the growth of native plant species. Once the land was settled, business operators, landowners, and homeowners had an interest in protecting the natural assets of Marin County and their own investments. Uncontrolled fires had already burned large tracts in the past and valuable lumber, structures, and field crops had been destroyed. A series of fires that occurred in the late 1800s prompted the organization of the first fire departments in Marin County around the turn of the century.

Since then, national fire suppression policies and practices (among other factors) have contributed to the continuous growth (and overgrowth) of vegetation resulting in dangerous fuel density, or fuel loads. Combined with this fuel accumulation, the public have been building homes closer and closer to wildlands, which is creating the WUI fire issues that are now present in many parts of Marin County and the country.

Throughout its history, Marin County has experienced many wildland fires. Figure 3-9 shows a map of large fires that have occurred in Marin's WUI.

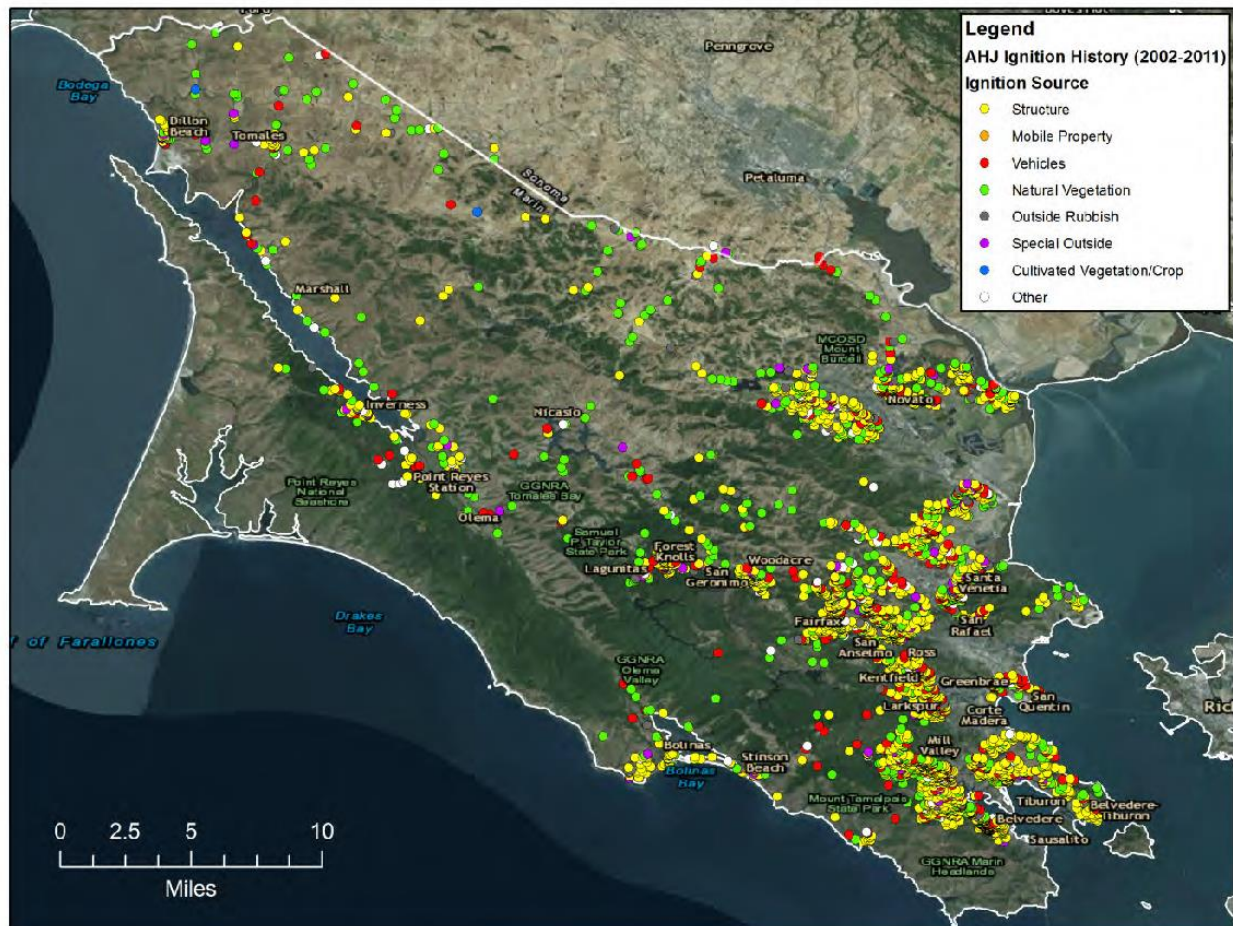
Figure 3-9. Map of large fires that have occurred in Marin County's WUI



The most recent Marin County fire that resulted in significant structure loss was the Vision Fire in 1995, which destroyed 48 structures in the community of Inverness. In 1929, the base of Mt. Tamalpais—specifically the community of Mill Valley—experienced a significant fire known as the Great Mill Valley Fire. That fire’s footprint is now developed with more than 1,100 homes (valued at \$1.3 billion) which have significantly altered the natural vegetation through urban and suburban development.

As part of the CWPP, Ignition data for all authorities having jurisdiction (AHJ) were acquired and analyzed for 2002 through 2011 to evaluate ignition trends within the county. Table 8 of the CWPP presents the ignition history for all AHJs classified by ignition category. Figure 3-10 below shows a map of the ignition history for all AHJs classified by ignition category.

Figure 3-10. Map of ignition history data for all authorities having jurisdiction in Marin County from 2002 to 2011.



Location

The WUI zone map used throughout this CWPP was assembled using geographic information system (GIS) data layers acquired from the Marin County GIS web portal, MarinMap. The WUI zone helps inform decisions on where to focus vegetation management and fuel reduction projects. The WUI zone determination is also a major component of MCFD's Strategic Fire Plan (Marin County Fire Department, 2015), which in turn is part of CAL FIRE's Strategic Fire Plan.

Homes and structures located anywhere in and around the WUI are at a higher risk for exposure to wildland fire. Fire can spread rapidly throughout WUI areas through adjacent structures and/or vegetation, or by ember dispersion. Property owners in the WUI have a responsibility to prepare their property for structure defense by providing adequate defensible space and complying with WUI building codes and ordinances (see Section 7 of the CWPP). The WUI boundaries for Marin County were determined based on areas with high structure density and proximity to areas with a high density of burnable fuels.

Approximately 60,000 acres—18% of the county’s land area—falls within the wildland urban interface (WUI) where residences (i.e., homes and structures) are intermixed with open space and wildland vegetation. Within Marin County, there are 96,195 parcels and 106,679 living units; of these living units, an estimated 69,000 units are located in the WUI. A recent assessment by the Marin County Fire Department (MCFD) revealed that these living units within the WUI are valued at \$59 billion (Marin County Fire Department, 2015). Because of the mix and density of structure and natural fuels combined with limited access and egress routes, fire management becomes more complex in WUI environments. In Marin County specifically, many of the access roads within the WUI are narrow and winding and are often on hillsides with overgrown vegetation, making it even more difficult and costly to reduce fire hazards, fight wildfires, and protect homes and lives in these areas.

Figure 3-11. Map of Marin County and the wildland urban interface (colored red)

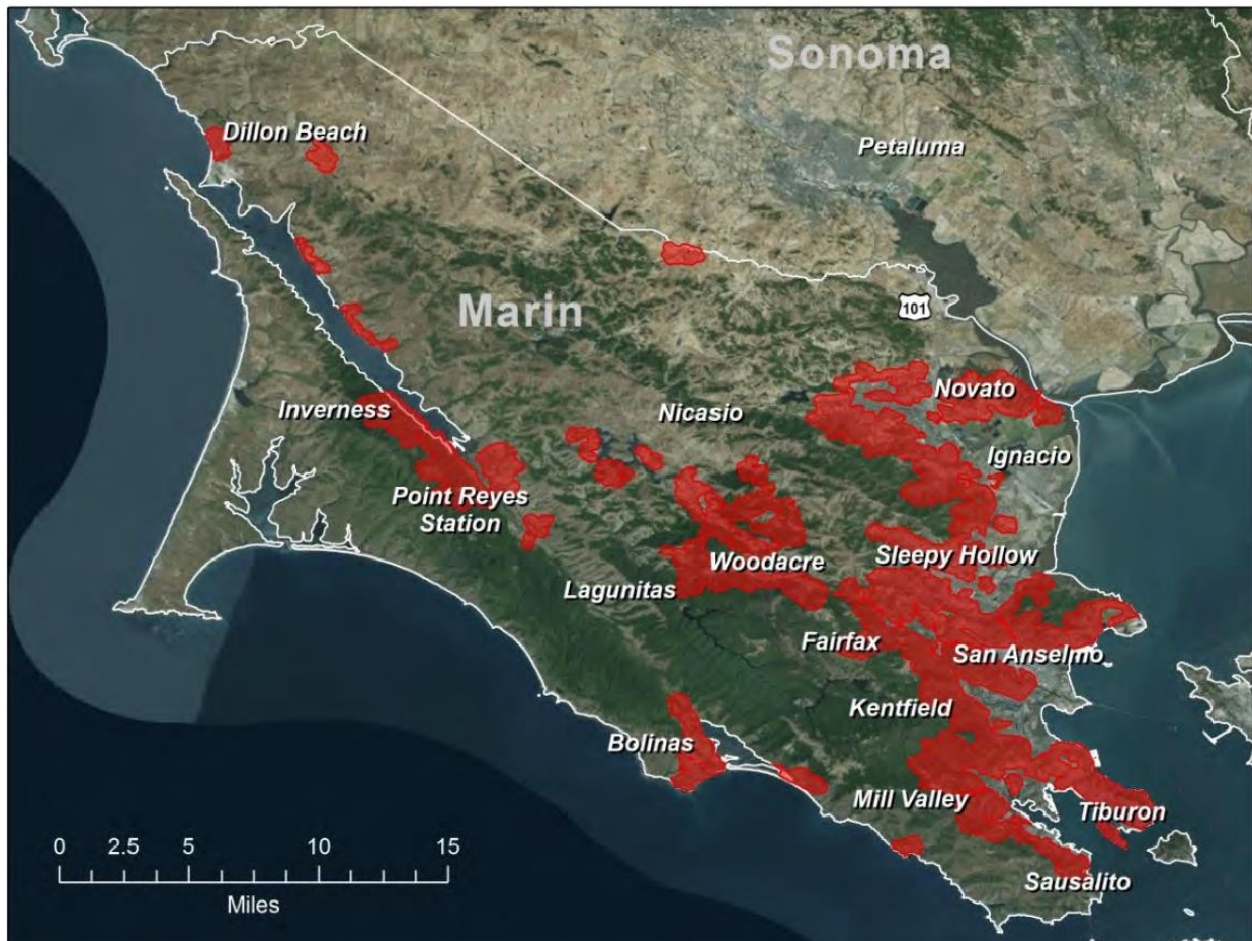


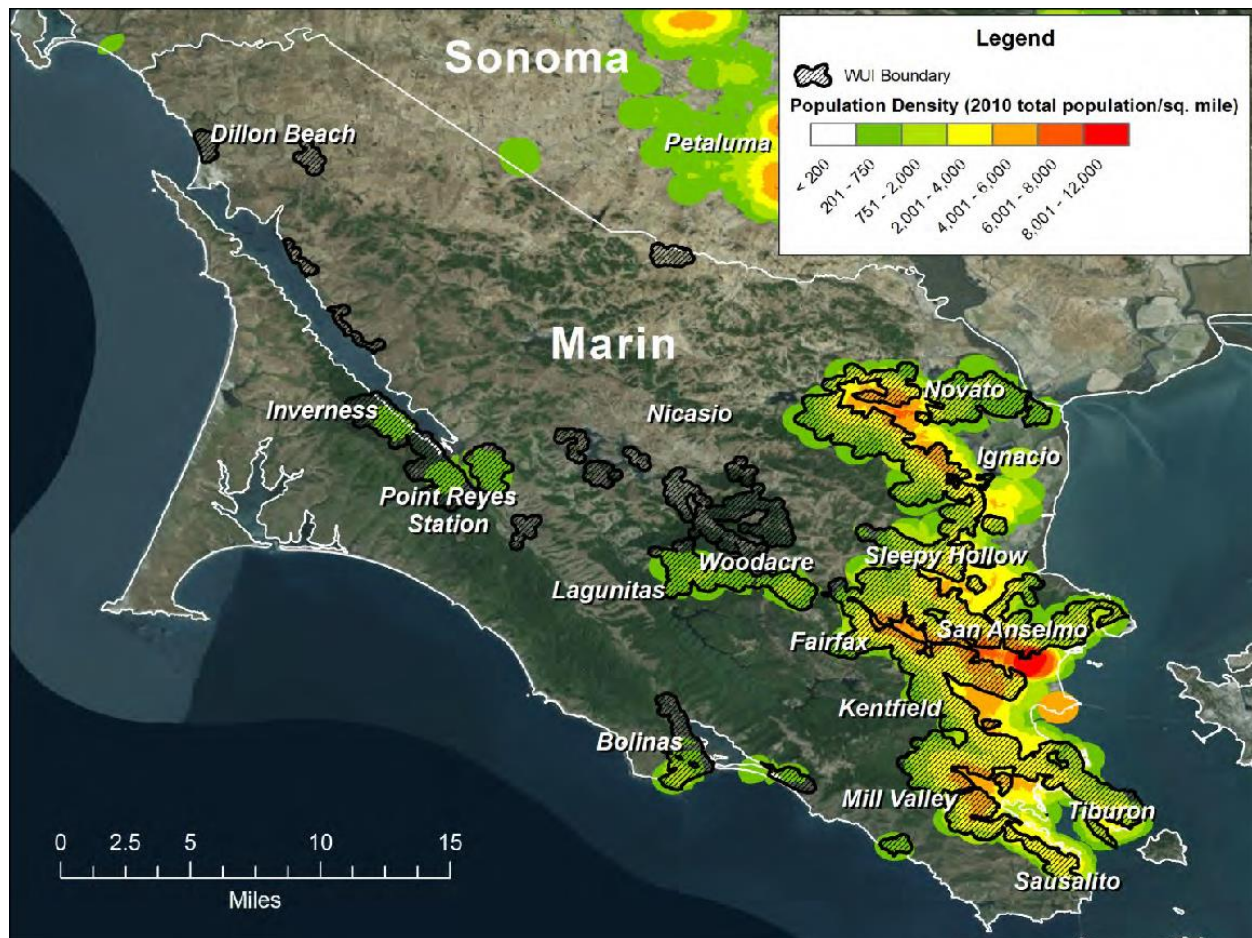
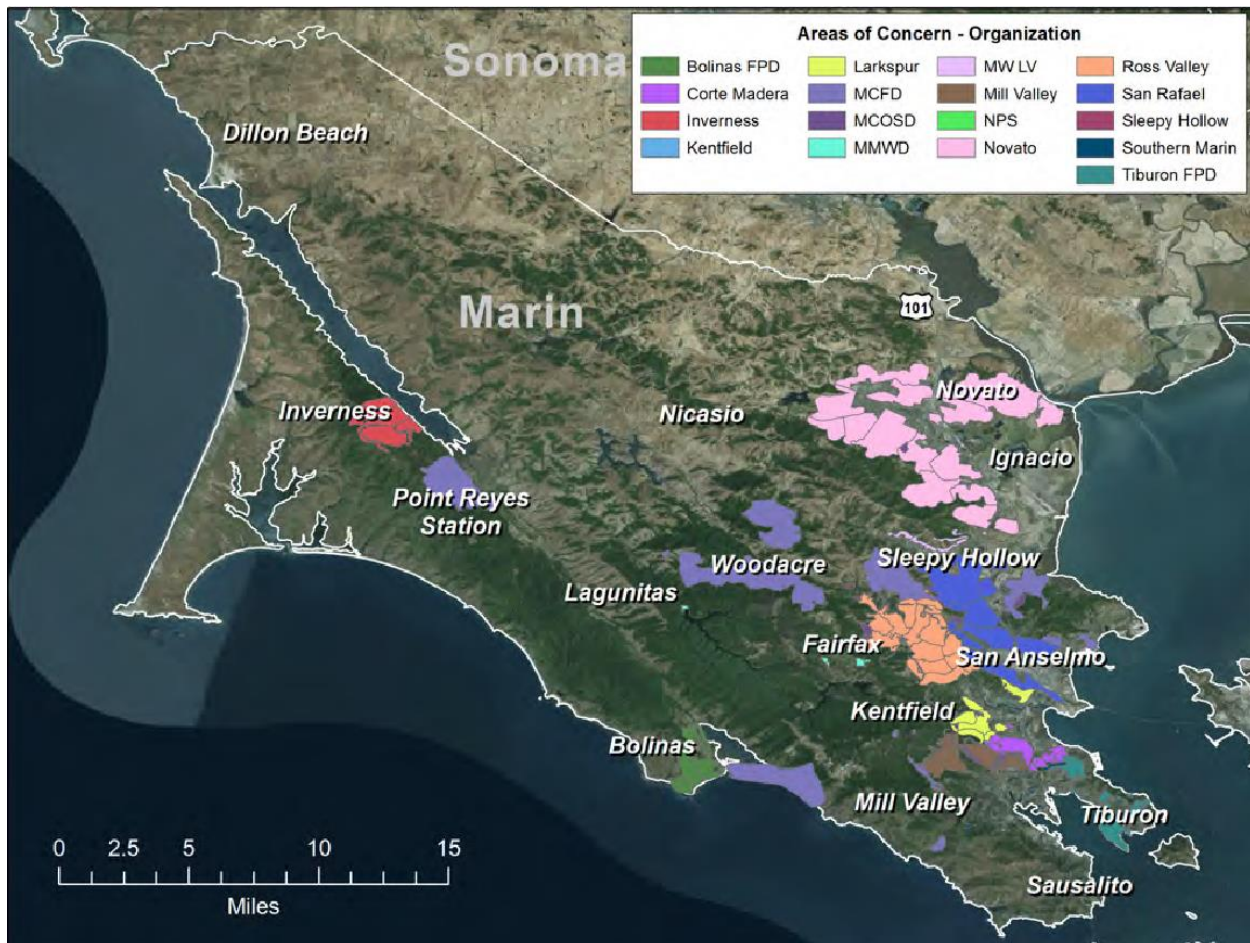
Figure 3-12. Marin County's WUI boundaries overlaid with population density

Table 3-8. Marin County communities at risk and fire district jurisdiction

Community	Fire Department/District
Bolinas	Bolinas Fire Protection District
Corte Madera	Central Marin Fire Department
Fairfax	Ross Valley Fire Department
Inverness	Inverness Fire Department
Inverness Park	Inverness Public Utility District
Kentfield	Kentfield Fire Protection District
Lagunitas-Forest Knolls	Marin County Fire Department
Larkspur	Central Marin Fire Department
Lucas Valley-Marinwood	Marinwood Fire Department
Marin City	Marin County Fire Department
Mill Valley	Mill Valley Fire Department
Novato	Novato Fire Protection District
Olema	Marin County Fire Department
Ross	Ross Valley Fire Department
San Anselmo	Ross Valley Fire Department
San Rafael	San Rafael Fire Department
Santa Venetia	San Rafael Fire Department
Sausalito	Southern Marin Fire Protection District
Stinson Beach	Stinson Beach Fire Protection District
Strawberry	Southern Marin Fire Protection District
Tamalpais-Homestead Valley	Southern Marin Fire Protection District
Tiburon	Tiburon Fire Protection District
Woodacre	Marin County Fire Department

Figure 3-13. Map of areas of concern identified by CWPP stakeholder agencies in Marin

Extent and Probability Future Events

Wildfire threat can be defined as the result of an analysis of potential fire behavior and the likelihood of fire to occur relative to the assets (or communities) at risk. CAL FIRE is required by law to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as Fire Hazard Severity Zones (FHSZ), influence how people construct buildings and protect property to reduce risk associated with wildland fires. The maps were last updated in the mid-1980s and early 1990s and are currently being updated by CAL FIRE to incorporate improved fire science, data, and mapping techniques (California Department of Forestry and Fire Protection, 2007).

While the CAL FIRE FHSZ maps are useful in examining potential fire hazard severity at the state level, the underlying data and methods used to develop the FHSZ maps can be improved upon by using local (and more recent) fuel characteristics and improved fire modeling methods. The CAL FIRE FHSZ maps also do not take into account local perspectives and priorities regarding communities at risk and areas of concern.

To improve upon the currently available state-level fire hazard assessment information, an

independent hazard, asset, risk assessment was performed to help identify and prioritize areas within the county that are potentially at a high threat from wildfire based on more recent fuels data, advanced modeling techniques, and local input. The assessment was performed by modeling potential fire behavior and the probability or likelihood that an area will burn given an ignition. Next, the fire modeling output was combined with areas of concern and assets at risk. Composite maps were generated indicating relative potential fire hazards throughout the county.

Assets at risk are defined as structures and resources that can be damaged or destroyed by wildland fire. Assets in Marin County include real estate (homes and businesses), emergency communication facilities, transportation and utility infrastructure, watersheds, protected wildlands, tourist and recreation areas, and agricultural lands. In addition to providing a framework for protecting citizens and providing for 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; infrastructure; and air quality.

There are approximately 111,000 living units in Marin County with a median home value of approximately \$1 million (Mara, 2015). As many homes in the county are located in the WUI, if a major wildland fire were to result in the loss of many homes, it could have a short-term negative impact on Marin County's property tax base.

The Mt. Tamalpais watershed 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 quantity and quality in the watershed. This watershed—as well as the lands managed by MCOSD, state parks, and NPS—are largely contiguous. They harbor several endangered, threatened, and special-status species, including the 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. Major parks within Marin County include California State Parks (Mt. Tamalpais, Samuel P. Taylor, and China Camp), NPS's GGNRA, Muir Woods National Monument, and Point Reyes National Seashore. The Point Reyes National Seashore and Muir Woods National Monument together attract 3.5 million visitors annually. The GGNRA, a majority of which resides within Marin County, attracts an additional 14.9 million visitors per year and contributes an estimated \$365.2 million annually to the economy (Prado, 2016). A major wildfire affecting any of these parks could have negative impacts on the local economy for years after the event.

Finally, 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. Agricultural operations include livestock and livestock products; aquaculture; field crops; fruit, vegetable, and nursery crops. The gross value of all agricultural production was approximately \$101 million in 2014 (Marin County Department of Agriculture, 2014). To help protect people and property from potential catastrophic wildfire, the National Fire Plan identifies communities that are at high risk of damage from wildfire. These high-risk communities identified within the WUI were published in the Federal Register in 2001. In California, CAL FIRE has the responsibility for managing the list. With California's extensive WUI situation, the list of communities extends beyond just those adjacent to Federal lands; there are 1,329 communities currently on the California Communities at Risk List. Marin County has 23 of these

at-risk communities, as shown in Table 12 in the CWPP. A countywide assessment of the wildland fire threat undertaken by CAL FIRE revealed that nearly 313,000 acres (approximately 82% of the total land area of the county) are ranked as having moderate to very high fire hazard severity zone ratings.

Using the methodology described in Section 4.2 of the CWPP, a series of models of the hazards, assets, and risks were completed. One model was the average fire season flame length, with lengths above 8 feet possibly exhibiting the more extreme fire behavior and be relatively more hazardous from a fire suppression perspective. Rate of spread is defined as the rate of forward spread of the fire head expressed in feet per minute. The higher the rate of spread, the more difficult a fire is to suppress. A composite map of the flame length, rate of spread, and population density for the average fire season scenario is shown in Figure 3-14; orange and red show areas where more extreme fire behavior is likely given an ignition.

To help prioritize areas of the county where fuel reduction and hazard mitigation efforts might be focused, Figure 13 of the CWPP was overlaid with the areas of concern boundaries (Figure 8 in Section 4.1.1 of the CWPP), and GIS processing methods were used to calculate spatial statistics within these areas of concern (see Section 4.2.7 of the CWPP). This information was used to rank the areas of concern.

Figure 3-14. Composite map of population density, flame length, and rate of spread for the average fire season model scenario



Figure 3-15. Composite map of population density, flame length, and rate of spread for the average fire season model scenario

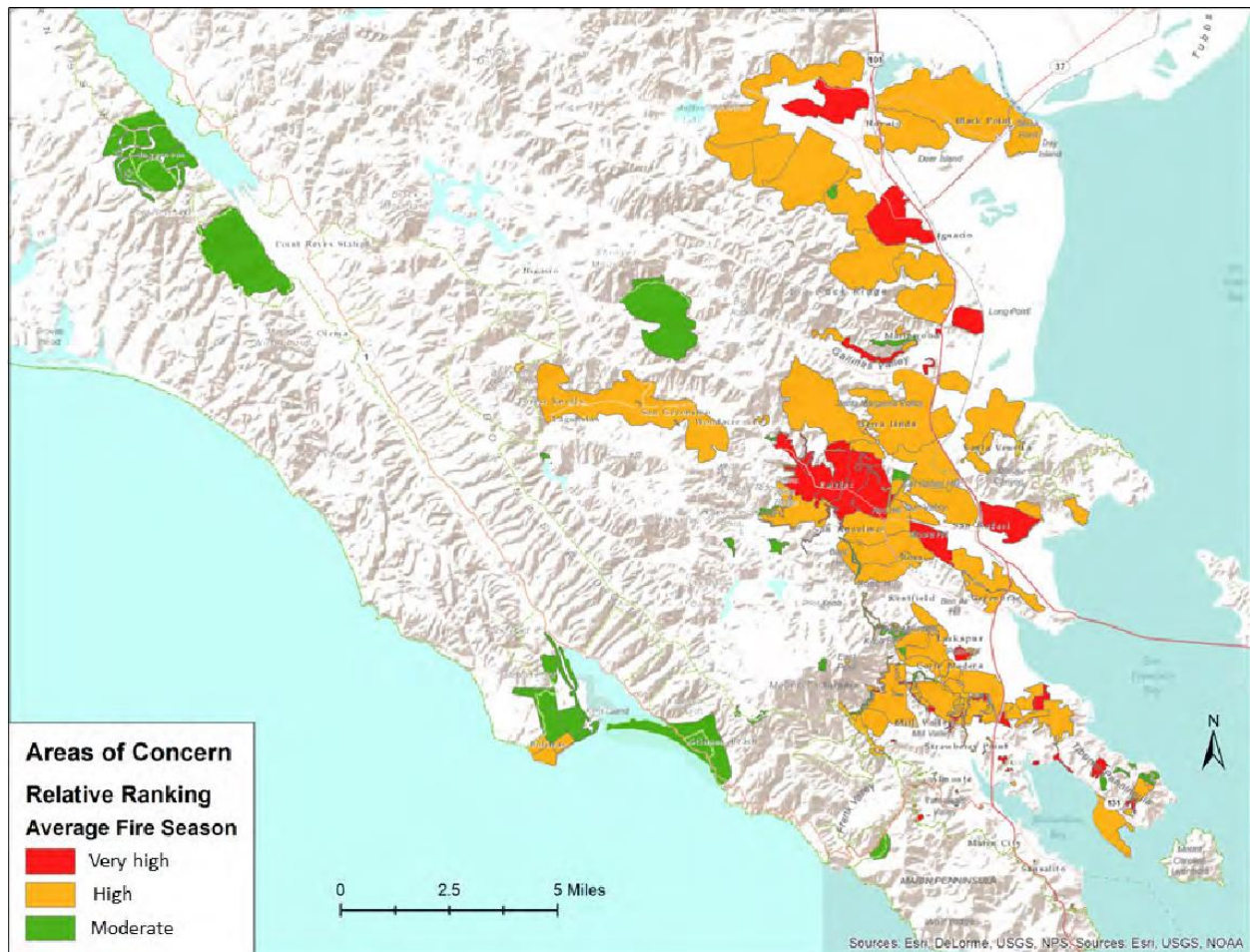


Figure 3-16. Composite map of population density, flame length, and rate of spread for the extreme fire conditions model scenario

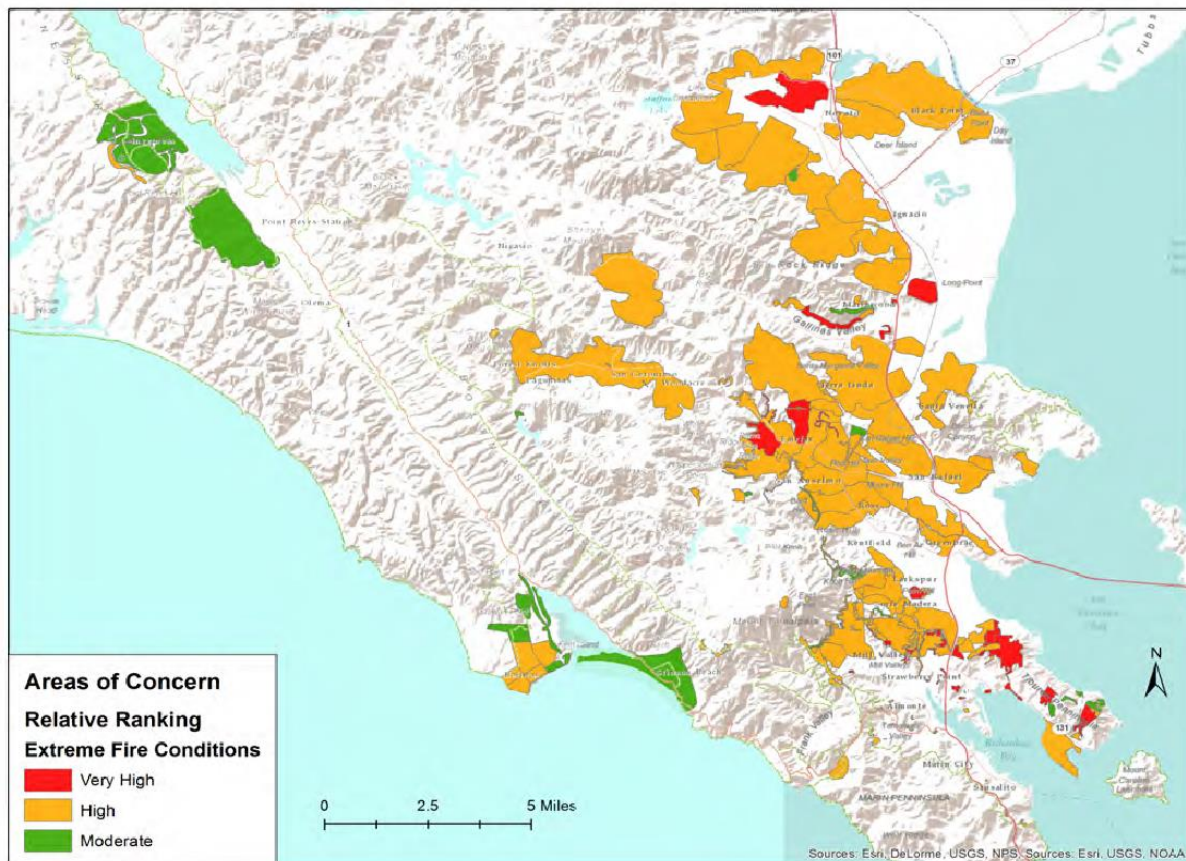


Table 3-9. Marin County communities at risk and relative ranking

Communities at Risk and Areas of Concern	Relative Ranking
Bolinas (water system expansion/improvement)	Very High/High
Corte Madera and Larkspur (Tiburon Ridge, Ring Mountain, Palm Hill WUI)	Very High
Corte Madera (Marin Estates, Madrono-Pleasant [Town], Madera del Presidio Phase II, Chapman, Park/Meadowsweet, Christmas Tree Hill, Blithdale Ridge, Palm Hill/Blue Rock, Madera del Presidio Phase I)	High
Inverness (watershed and residential areas)	High/Moderate
Kentfield (Evergreen Fire Trail; Rancheria Road; Crown Road from 123 Crown Road to Phoenix Road and continuing on Indian Fire Road to the Blithedale Ridge/Eldridge Grade intersection; King Mountain Loop project (Larkspur) to 76 Ridgecrest Road; 12 Ridgecrest Road to 76 Ridgecrest Road, including all of BlueRidge Road southwest facing slope;	High

SECTION 3

Hazard Analysis

the area of Goodhill Road and Crown Road, including the area of Harry Allen Trail; 351 Evergreen Road to 414 Crown Road to 12 Ridgecrest Road, south and southeast facing slope)	
Larkspur (North Magnolia WUI; Greenbrae Hills WUI; Marina Vista Area WUI; Baltimore Canyon WUI; Marina Vista/SE Baltimore Canyon; King Mountain/NW Baltimore Canyon)	High
Mill Valley (MMWD land and open space areas)	Very High
Mill Valley (Scott Valley, Cascade, PG&E property, Summit, City property, open space, City right-of-way, private property, Warner Canyon/Scott Highlands, MMWD/private/City right-of-way)	High
Marin County Fire Department (Hill Ranch, Los Ranchitos, Summit, Bay View, San Pedro, Mount Tam Lookout, Sleepy Hollow WUI, Throckmorton/Panoramic WUI, Dickson Lookout, Woodacre/Lagunitas/Forest Knolls WUI, Mount Tam Middle Peak infrastructure, Rancho Santa Margarita WUI, Inverness WUI, Green Gulch, Stinson Beach WUI)	High
Marin County Open Space District Lands (areas in and adjacent to neighborhoods)	Very High/High
Marin Municipal Water District (Rock Spring, Pine Mountain south gate, Sky Oaks Meadow, Deer Park Road, Sky Oaks Headquarters, Peters Dam)	High/Moderate
Marinwood/Lucas Valley (Limestone Hill area, CSA 13, Horse Hill area, Berry area, Miller Creek Road Area, Valleystone Project, Lucas Valley Estates)	Very High/High
Novato (Marin Valley, Novato North, Anderson Rowe)	Very High
Novato (San Marin, Hilltop, Loma Verde, Wilson West, Cherry Hill, Pacheco Valley, Little Mountain, Indian Valley, Wildhorse Valley, Wilson East, Ignacio Valley, Atherton, Blackpoint)	High
Ross Valley (Fairfax, Hawthorne Hills, San Francisco Boulevard, Alameda, Morningside, upper San Anselmo Avenue)	Very High
Ross Valley (Ross [east/central/south], San Anselmo [downtown], Cascade Canyon, Sleepy Hollow)	High
San Rafael (San Pedro Ridge, Dominican, Glenwood, Peacock Gap, Gerstle Park and Cal Park neighborhoods)	Very High
San Rafael (Smith Ranch areas, West End from San Rafael Hill to Ridgewood Avenue Bret Harte, Los Ranchitos areas, Terra Linda neighborhoods)	High
Sleepy Hollow (Loma Alta area)	High

Southern Marin (Meda project, Milland, Ricardo open space, So. Morning Sun/Tennessee, Hawkhill, Autumn Lane)	Very High
Southern Marin (Rodeo water tank, U.S. Route 101/Wolfback Ridge, Seminary, Edwards/Marion, Lattie Lane/Highway 1, Blackfield, Laguna/Forest, Cabin Drive, Homestead Valley, Fairview Ring Mountain Area, Aqua Hotel Hill, Highway 1 to Erica/Friars)	High
Tiburon (Middle Ridge, South Knoll Playground, Blackie's Pasture, Greenwood Beach)	Very High
Tiburon (Ring Mountain, Old St. Hilary's Open Space Preserve, Tiburon Marsh, Belvedere Lane and right of ways, Tom Price Park, Sugarloaf Drive to Paradise Drive, Middle Ridge open space, Romberg Tiburon Center, Paradise State Park)	High

Unincorporated rural areas within the county include the coastal communities of Muir Beach, Stinson Beach, and Bolinas; communities near Tomales Bay including Olema, Point Reyes Station, Inverness, Inverness Park, Marshall, Tomales, and Dillon Beach; and rural areas in the interior valleys including Nicasio, Lagunitas, Forest Knolls, San Geronimo, and Woodacre. These communities are primarily situated within or adjacent to the WUI, with moderate to dense concentrations of structures. Marin County has approximately 60,000 acres of WUI adjacent to 200,000 acres of watershed. Response times in these communities present significant challenges to keeping fires from directly impacting the communities and sub divisions (especially those within the SRA) as emergency fire access and evacuation egress is limited by narrow, winding roads lined with dense vegetation.

In Marin County, cul-de-sacs generally service new housing developments and most of the smaller canyons, valleys, and hillsides. Some planned unit developments are served by privately-maintained roads, which create access issues (i.e., narrow paved widths and limited on-street parking). According to California Fire Code specifications, roadways that are considered hazardous in terms of fire access and protection are those with

- less than 20 feet of unobstructed paved surface and 13.6 vertical feet;
- dead-ends longer than 800 feet, and;
- cul-de-sac diameter less than 68 feet.

Driveways that are less than 16 feet wide or that do not have adequate turnaround space are also considered hazardous. A large number of roadways and driveways in many of Marin County's communities fall into one or more of the above categories.

3.3.9 Post-Fire Debris Flow

Hazard Profile

According to the U.S. Geological Service (USGS), “Wildfire can significantly alter the hydrologic response of a watershed to the extent that even modest rainstorms can produce dangerous flash floods and debris flows. The USGS conducts post-fire debris-flow hazard assessments for select fires in the Western U.S. We use geospatial data related to basin morphometry, burn severity, soil properties, and rainfall characteristics to estimate the probability and volume of debris flows that may occur in response to a design storm.” There have been no major wildfires in the County since 2013, although nearby Sonoma and Napa counties currently face a significant threat of post-fire debris flow due to the October 2017 wildfires.

Disaster History

The MCM LHMP team has not found examples in recent history of post-fire debris flow in Marin.

Location

USGS analysis does not show any existing significant post-fire debris flow threats in Marin. However, any summer or fall wildfires that occur in the next 5 years could lead to post-fire debris flows originating from the burn areas during the following rainy season. Thus, the location of this hazard coincides with watershed locations with the greatest wildfire and flood threats.

Extent and Probability of Future Events

Without recently burned watersheds the extent and probability of future events can’t be analyzed. However, precautions should always be taken after a burn to ensure that soil stability is maintained to the extent feasible.

3.4 REPETITIVE LOSS PROPERTIES

According to FEMA BureauNet 2018 there are 216 Repetitive Loss (RL) properties in Marin County, including all the jurisdictions. Ten of those properties are considered to have suffered severe repetitive loss. The vast majority, 183, are residential properties. There are also 28 commercial properties and 5 industrial that are RL.

Information about RL properties by jurisdiction is located in Table 3-10. Most RL properties are located within Unincorporated Marin, incorporated cities of Novato and San Rafael. For privacy reasons, we are not including maps or addresses of the RLs.

Table 3-10. Repetitive Loss and Severe Repetitive Loss Properties

Jurisdiction	# Repetitive Loss Properties	# Severe Repetitive Loss Properties	Residential	Commercial	Industrial
Belvedere	2	0	2	0	0
Corte Madera	10	1	7	2	1
Fairfax	6	0	6	0	0
Larkspur	7	1	4	2	1
Marin County	87	4	81	6	0
Mill Valley	5	0	3	2	0
Novato	38		38	0	0
Ross	14	2	13	1	0
San Anselmo	1	0	1	0	0
San Rafael	37	1	24	12	1
Sausalito	5	1	1	2	2
Tiburon	4	0	3	1	0

Source: FEMA BureauNet 2018

3.5 FUTURE DEVELOPMENT

Marin County's abundance of natural, recreational, and scenic resources has supported a long history of open space preservation. Its rolling hills, expansive ranchlands, beaches, coastlines, and more are appreciated by both visitors and locals alike. This quote, from the Marin Independent Journal 1934 Editorial captures this sentiment:

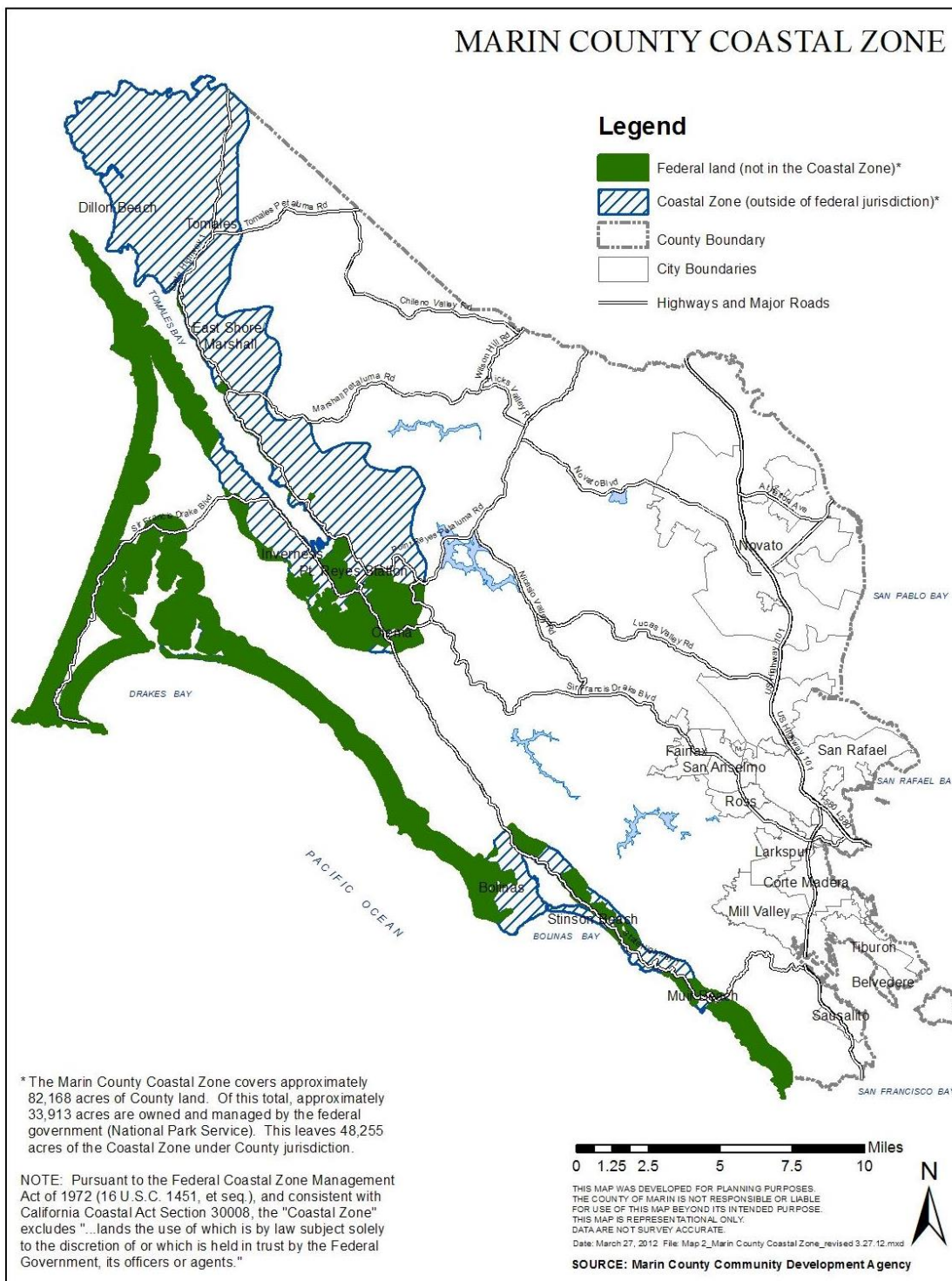
"No community on earth is more favored than Marin with the wealth and beauty of potential playgrounds. If we don't acquire some of these lands, the opportunity will surely slip away from us."

In the 1960s, housing/transportation development proposals were underway throughout Marin County including for the Marin Headlands, outer coast, Tomales Bay area and more. Such proposals threatened Marin's rural character and long heritage of family farming, sparking citizen activism which drew national attention. These efforts led to the employment of land use planning tools to ensure the County's natural and agricultural areas remain protected in perpetuity. Establishment of the Point Reyes National Seashore in 1962, and a handful of other Federal/State Park units, ensured the protection of a large amount of the County's most cherished lands as publicly accessible open space. Additionally, the Marin Agricultural Land Trust, established in 1980, has placed agricultural conservation easements on over 60,000 acres of farmland, to ensure protection from development in perpetuity.

Furthermore in 1972 the California Coastal Commission was established as a regulatory agency whose mission is "To protect, conserve, restore, and enhance the environment of the California coastline". Pursuant to the California Coastal Act of 1976, the agency is tasked with the protection of a variety of resources including public access, habitat, water quality and visual. The Commission issues Coastal Development Permits, until a local agency has a certified Local Coastal Program (LCP), with a land use plan and implementation plan.

West Marin's coastal zone covers approximately 82,168 acres. Of this approximately 33,913 acres are owned and managed by the National Park Service, leaving 48,255 acres under County Jurisdiction subject to the LCP. This encompasses a handful of small communities along the Pacific Coast and Tomales Bay shorelines including Muir Beach, Stinson Beach, Bolinas, Inverness, Point Reyes Station, East Shore and Dillon Beach. New growth in these communities is limited by a variety of factors including few remaining undeveloped parcels; land use policies and plans which protect public access and natural resources; and environmental features such as the coast itself, Tomales Bay, and steep bluffs which naturally restrain development.

Development in the County over the last 5 years has been limited due to build out, and similarly future development is limited by these same constraints. For this reason development related considerations to plan updates were not applicable to the planning process. Instead, the plan was revised to consider regional development trends and incorporation of new science such as potential climate change impacts.



Marin County has focused on sea level rise planning and climate action for several years. Currently, the LCP is being updated to reflect the changing risks to coastal areas and develop appropriate policies and actions to avoid and minimize the risk of disaster and harm to its residents, infrastructure and coastal resources. Coastal Act policies Sections 30210, 30240, and 30251 dictate that new development shall be safe from hazards and recognize that shoreline

protective devices such as seawalls may be appropriate in certain instances to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion. However, shoreline protective devices must be designed to eliminate or mitigate the adverse impacts on the sand supply of surrounding natural shorelines. Other development-limiting Coastal Act policies include:

Section: 30210: Development shall not interfere with the public's right of access to the sea including the use of beaches

Section 30240: Environmentally Sensitive Habitat Areas (ESHA) shall be protected

Section 30251: The scenic and visual qualities of coastal areas shall be considered and protected as resources of public importance.

The 2040 population projection for Marin County is 277,087 (Department of Finance). In order to accommodate population growth over the next several years, Marin County and its incorporated cities have implemented a number of land use plans and development policies to direct growth away from hazardous conditions. For example, as required by state law, the County and each incorporated city have a general plan with a safety element that identifies hazards affecting the County and incorporated cities. Likewise, the County and the incorporated cities have a number of planning policies, such as floodplain ordinances and building codes, restricting new development in hazard areas and/or increasing construction requirements in hazard areas.

In addition to steering away growth from hazard areas, Marin County and its incorporated cities have a history of aggressive growth management that seeks to limit growth overall and to direct it within the incorporated cities and urban areas of the unincorporated County.

The 2007 Marin Countywide Plan was last updated in 2015 to reflect the theme of planning for sustainable communities. Twelve principles support this theme including the preservation of natural assets and the protection of agricultural assets in order to minimize development in open space. The plan is divided into specific elements, each with goals, policies, and implementation programs. The Plan's land use pattern reflects existing development potential shifted to a degree from environmentally constrained sites to more appropriate locations. Specific Countywide Plan policies which limit urban development through the protection of open space resources include:

- ☐ Biological Resources 1.1 Protect Wetland, Habitats for Special-Status Species, Sensitive Natural Communities, and Important Wildlife Nursery Areas and Movement Corridors.
- ☐ Biological Resources 1.2 Acquire Habitat
- ☐ Biological Resources 2.1 Include Resource Preservation in Environmental Review
- ☐ Biological Resources 2.2 Limit Development Impacts
- ☐ Biological Resources 3.1 Protect Wetlands
- ☐ Biological Resources 4.1 Restrict Land Use in Stream Conservation Areas
- ☐ Biological resources 5.1 Protect the Baylands Corridor
- ☐ Biological Resources 5.2 Limit Development and Access
- ☐ Biological Resources 5.3 Leave Tidelands in Their Natural State

- ☐ Air 4.m Focus Development in Urban Corridors
- ☐ Open Space 2.2 Continue to Acquire or Otherwise Preserve Open Space Countywide
- ☐ Open Space 2.4 Support Open Space Efforts Along Streams
- ☐ Open Space 2.5 Support Open Space Efforts in the Inland Rural Corridor
- ☐ Open Space 2.6 Support Open Space Efforts in the Coastal Corridor
- ☐ Agriculture 1.1 Limit Residential Use
- ☐ Agriculture 1.2 Encourage Contractual Protection
- ☐ Agriculture 1.3 Preserve Agricultural Zoning
- ☐ Agriculture 1.4 Limit Non-Agricultural Zoning
- ☐ Agriculture 1.5 Restrict Subdivision of Agricultural Lands Within the Coastal, Inland Rural and Baylands Corridors
- ☐ Agriculture 1.6 Limit Non-Agricultural Development
- ☐ Additionally, the Plan includes policies to limit development in hazardous areas, including:
 - ☐ Environmental Hazards 3.a Regulate Development in Flood and inundation Areas
 - ☐ Environmental Hazards 3.e Restrict Development in Flood Prone Areas
 - ☐ Environmental Hazards 4.1 Limit Fire Risks to Structures

Implementation tools such as the County Development Code are used to carry out Countywide Plan goals. Some of the policies and programs in the Countywide Plan will require rezoning of individual properties for consistency with land use designations and policies. Furthermore, many unincorporated communities are guided by community plans with may include customized building and site design standards, ridgeline and view corridor protection mechanisms, home size regulations and more.

3.6 NATURAL AND BENEFICIAL FUNCTIONS

Marin's Watersheds and Wetlands are some of its most valuable assets and can provide protective functions that reduce the magnitude of hazard events. Bounded by ridges, Marin's watersheds carry water, sediments, nutrients, and more, downstream into large water bodies including the Pacific Ocean, San Francisco Bay, and Tomales Bay. Wetlands can be found in the lower watersheds, with habitat types including fresh-, salt-, and brackish-water marshes which provide food and shelter for a variety of flora and fauna, including special status plants, fish, birds, amphibians, and mammals. These ecosystems can also buffer flood impacts by reducing wave attenuation from storm surge or serve as detention basins during large rainfall events. Sea level rise threats have led to heightened interest in the use wetlands and other living shorelines such as oyster beds, eelgrass, and sand dunes as adaptation strategies to protect lives and properties while providing habitat, recreation, carbon sequestration, and other co-benefits. Several living shoreline pilot projects are currently underway throughout Marin County to demonstrate their effectiveness.

The Marin County Watershed Program identifies fourteen watersheds throughout the County as follows:

- **Bolinas Lagoon**

With a 16.7 mi² watershed, Bolinas Lagoon consists of mudflats, marshes, tidal channels and a flood shoal island. Other watershed habitats include coastal scrub, Douglas fir, redwood forests, and grasslands as well as small patches of eucalyptus, oak and oak-bay woodland, and pine cypress forest. Noteworthy species include ridgeway and black rails, salt marsh common yellowthroat, California red-legged frog, California brown pelican, American peregrine falcon, Point Reyes mountain beaver, Point Reyes jumping mouse, Coho salmon, steelhead trout, northern spotted owl, black swift, and Marin manzanita.

In 2008 the “Bolinas Lagoon Ecosystem Restoration Project: Recommendations for Restoration and Management” was completed by a working group of community representatives and scientists, with recommended actions including restoring natural sediment transport and ecological functions of the lagoon, identifying and managing non-native species, and protecting water quality.

- **Estero Americano**

The County’s northernmost watershed, the 49 mi² Estero Americano watershed straddles the Marin and Sonoma County boundaries. Americano Creek draining into Bodega Bay, is the watershed’s only tributary, and is ephemeral, generally drying up for 4-6 months between late spring and fall. The Estero Americano contains 301 acres of open water, and 412 acres of wetland habitat with mudflats, seasonal brackish marsh and freshwater marsh. With streamside habitat of grazed pastures with few trees interspersed with dense willow thickets, and coastal oak woodland in the upper watershed, Estero Americano has been identified by the California Department of Fish and Game as among the most significant habitat areas in the State. The watershed’s special status species include the Northwestern pond turtle, steelhead trout, California red-legged frog, Myrtle’s silverspot butterfly, tidewater goby, and tricolored blackbird.

A 1987 enhancement plan led to repair of many of the watershed’s eroded areas, which was undertaken by the Gold Ridge Resource Conservation District (RCD) with funding from the State Coastal Conservancy. In 2007 the RCD developed the Estero Americano Watershed Management Plan.

- **Gallinas Creek**

Located in Eastern Marin, the 5.6 mi² watershed has two main drainage areas; the north fork and South Gallinas Slough. The watershed is highly urbanized with fragmented native plant communities. Upper watershed habitats include annual grasslands interspersed with mixed evergreen forest, coastal scrub and small outcroppings of serpentine habitat. Continuous with China Camp State Park is a large tract of oak-bay woodland along the southern watershed boundary. Lower marsh habitats represent some of the largest remaining tidally influenced habitats in the Bay Area with noteworthy

special status species including the San Pablo song sparrow, California black rail, salt marsh harvest mouse and the ridgeway rail.

A three-acre tidal marsh restoration effort by the Marin Audubon Society and Marin Community Foundation was completed in 1977. The Friends of Gallinas Creek, San Pablo Watershed Restoration Program Partners, the Bay Institute and Marin County Stormwater Pollution Prevention Program are planning extensive restoration in the upper and lower watershed to improve riparian cover, provide habitat, reduce erosion, and restore wetlands.

- **Tomales Bay**

The Tomales Bay Watershed encompasses the subwatersheds of Lagunitas Creek, Walker Creek, Inverness Creek, and east shore drainages including Millerton Gulch, Grand Canyon, and Tomasini Canyon. Resource rich, nearly 500 species of birds and the most robust population of native coho salmon remaining in the Central Coast region are supported by the Bay. Tomales Bay is a Ramsar Wetland of International Importance with intertidal, subtidal, and benthic habitats, as well as dunes, mud flats, salt marshes and freshwater marshes. Eelgrass beds are also found throughout Tomales Bay, and provide important habitat for fish, birds, and other species, while combatting shoreline erosion by dampening wave energy and storms.

The Tomales Bay Watershed Stewardship Plan was completed in 2003. Restoration projects are underway in the Walker and Lagunitas Creek areas.

- **Miller Creek**

With a watershed covering 12 mi², Miller creek uniquely has a relatively intact riparian area with very high widths and depths relative to its drainage area. While relatively urbanized, the watershed still supports a small population of steelhead. Its lower marsh habitats include some of the Bay Area's largest remaining tidally-influenced habitats that support abundant waterfowl. The watershed is dominated by annual grasslands interspersed with oak-bay woodland and oak savanna in the upper watershed with patches of chaparral. Middle reaches are primarily urbanized. The watershed's lower reaches east of Highway 101 support saltwater and brackish-water marshes subject to tidal action. Noteworthy special status species include the San Pablo Song Sparrow, California black rail, saltmarsh harvest mouse, ridgeway rail and steelhead trout.

- **Novato Creek**

As Eastern Marin's largest watershed, Novato Creek Watershed's creeks flow eastward through oak and bay forests, grasslands, unincorporated Marin County, and the City of Novato, and into San Pablo Bay near the mouth of the Petaluma River. The basin is 45 mi² and its main drainage is the 17 mile Novato Creek, which has 6 major tributaries. Diverse habitat types include saltwater marsh, brackish marsh, freshwater wetlands, oak woodlands, annual grasslands and oak savanna. Special status species include the San Pablo Song Sparrow, California black rail, saltmarsh common yellowthroat, ridgeway rail

and Western pond turtle. Salmonids including steelhead and Chinook salmon are also found within the watershed.

- **Point Reyes National Seashore Creeks**

This watershed is comprised of almost 100 mi² of land and nearly 80 miles of undeveloped coastline, with subwatersheds that drain into Drake's Estero, Abbotts Lagoon, Estero de Limanotour, the Pacific Ocean, portions of the Bolinas Lagoon and the Tomales Bay. Habitat types include estuaries, mud flats, sandy shores, intertidal communities and a variety of upland habitats. Special-status species include the endemic Mountain Beaver, Point Reyes jumping mouse, California freshwater shrimp, Myrtle's silverspot, Point Reyes blue butterfly, San Francisco forktail damselfly and steelhead trout.

- **Richardson Bay**

With San Francisco Bay's second largest eelgrass bed, Richardson Bay supports genetically diverse and extensive intertidal habitat. As an Important Bird Area along the Pacific Flyway, the Bay supports hundreds of thousands of migrating waterbirds during the winter months. Noteworthy special-status species include the California black rail, San Pablo song sparrow, salt marsh harvest mouse, and Point Reyes bird's-beak. Salmonids including steelhead trout are also supported.

- **Ross Valley**

Receiving over 50 inches of rain annually, the 28 mi² Ross Valley watershed is one of Marin County's wettest areas. With 28 miles of stream channels, the watershed supports a great diversity of habitats including redwood forests, serpentine outcrops, chaparral, oak woodlands, grasslands and tidal wetlands. Special status wildlife include steelhead trout, spotted owls, San Pablo song sparrow, ridgeway and black rails, and salt marsh harvest mouse.

Led by the Marin County Flood Control and Water Conservation District, the Ross Valley Flood Protection & Watershed Program's objective is to reduce flooding throughout the watershed. Creek improvements being considered include debris clearance, invasive vegetation removal, creek bank stabilization, and habitat enhancement.

- **Rush Creek**

At the Northern edge of Novato, Rush Creek's wetland habitats includes coastal saltwater and coastal brackish water marsh habitats. The wetlands provide suitable habitat for San Pablo song sparrow, California black rail, saltmarsh common yellowthroat, California brackishwater snail, and ridgeway rail. Restoration efforts include the Rush Creek and Bahia restoration projects.

- **San Antonio Creek**

Covering around 25% of the Petaluma River watershed, the San Antonio Creek

watershed extends from Antonio Mountain and Chileno Valley in the northwest to Petaluma Marsh and the Petaluma River to the southeast. The upper San Antonio Creek watershed is dominated by annual grassland and mixed evergreen forest with patches of oak and bay woodland. The lower watershed includes extensive coastal salt marsh and brackish marsh. Special status species include the California black rail, ridgeway rail, salt marsh common yellowthroat, San Pablo song sparrow, Townsend's big-eared bat, California red-legged frog, northwestern pond turtle, and salt marsh harvest mouse. Limited salmonids have also been recorded in the watershed.

The Petaluma River Watershed Enhancement Plan was completed by the Southern Sonoma County RCD in 1999 with information on riparian and fisheries enhancement. In 2008 the Southern Sonoma County RCD completed the San Antonio Creek Watershed Plan in tandem with local landowners and residents.

- **San Rafael Creek**

The 11 mi² San Rafael watershed is densely developed from its hills to filled wetlands. A small marsh at Pickleweed Park provides habitat for native species, and the watershed's northern edge include intact woodland, grassland and lagoon areas.

- **Southern Coastal Creeks**

Several smaller watersheds along over 10 miles of southern Marin's rugged coastlines are protected within National and State Park boundaries. These include Webb Creek, Lone Tree Creek, Cold Stream, Redwood Creek, Alder Creek, Rodeo Lagoon and Tennessee Valley. A variety of habitat types exist amongst these watersheds including seasonal wetlands, riparian woodlands, and freshwater marsh. Special status species include Coho salmon, steelhead trout, California red-legged frog, monarch butterflies, northwestern pond turtle, northern spotted owl and more.

- **Stemple Creek**

Bisected by the Sonoma-Marin County boundary, this 50 mi² watershed begins just west of Petaluma and empties into the Pacific Ocean through the Estero de San Antonio. Like Estero Americano, the Estero de San Antonio was identified by the California Department of Fish and Game as among the most significant habitat areas in California with densely wooded riparian ravines, saltgrass areas, mudflats, eelgrass beds and freshwater ponds. Special-state species include the California freshwater shrimp, northwestern Pond Turtle, tidewater goby, Myrtle's silverspot butterfly, and the California red-legged frog.

In 1994 an enhancement plan was completed, leading to local landowner gully stabilization projects to reduce erosion. The Marin and Sonoma County RCDs, along with the Natural Resources Conservation Service have brought funding into the watershed to improve water quality.

Marin County's abundance of natural resources and progressive environmental leadership have supported a long legacy of open space preservation to help protect and restore wetlands and other ecosystems for both habitat and flood control, amongst other co-benefits. The Marin Countywide Plan, last updated in 2007, includes goals, policies, and implementing programs for the acquisition, conservation, and restoration of wetlands, riparian areas, and other habitats. The full Plan can be viewed at <http://www.marincounty.org/depts/cd/divisions/planning/2007-marin-countywide-plan> and pertinent policies include:

- **Biological Resources 1.1**
Protect Wetlands, Habitat for Special-Status Species, Sensitive Natural Communities, and Important Wildlife Nursery Areas and Movement Corridors.
- **Biological Resources 1.2**
Acquire Habitat.
- **Biological Resources 2.1**
Include Resource Preservation in Environmental Review.
- **Biological Resources 2.2**
Limit Development Impacts.
- **Biological Resources 2.3**
Preserve Ecotones.
- **Biological Resources 2.7**
Protect Coastal Sensitive Habitat.
- **Biological Resources 2.9**
Promote Early Consultation with Other Agencies.
- **Biological Resources 3.1**
Protect Wetlands.
- **Biological Resources 3.2**
Require Thorough Mitigation.
- **Biological Resources 4.1**
Restrict Land Use in Stream Conservation Areas.
- **Biological Resources 4.4**
Promote Natural Stream Channel Function.
- **Biological Resources 4.5**
Restore and Stabilize Stream Channels.
- **Biological Resources 4.9**
Restore Culverted Streams.
- **Biological Resources 4.11**
Promote Riparian Protection.
- **Biological Resources 5.1**
Protect the Baylands Corridor.
- **Biological Resources 5.3**
Leave Tidelands in Their Natural State.
- **Biological Resources 5.4**
Restore Marshlands.
- **Biological Resources 5.5**
Protect Freshwater Habitats.

- **Biological Resources 5.10**
Encourage Acquisition of Essential Baylands.
- **Water Resources 1.2**
Restore and Enhance Wetlands.
- **Open Space 2.4**
Support Open Space Efforts Along Streams
- **Open Space 2.6**
Support Open Space Efforts in the Coastal Corridor

3.7 LIFE/SAFETY WARNING/EVACUATION SYSTEMS

There are several life/safety warning/evacuation systems in Marin County, including the Emergency Alert System, AlertMarin “Reverse 911” System, Nixle, Tsunami Watch and Warning Messages, various local warning sirens and horns, and law enforcement/fire agency evacuation procedures. A description of each of these systems and a discussion of the impact of hazards on each system is discussed below.

Emergency Alert System: The Emergency Alert System is a network of all radio, TV broadcast stations, and cable TV networks in the county. Messages normally “enter” the system at two points: (1) Marin’s Emergency Operations Center (EOC), and (2) the NWS headquarters in Monterey, CA. Messages are received by local radio broadcast stations and then relayed to all other radio, TV broadcast stations, and cable companies within the county. Any message transmitted from either the EOC or NWS will be broadcast countywide via all of the stations and cable companies within the county. Messages transmitted through the Emergency Alert System utilize power lines and telephone lines. Thus, the Emergency Alert System could be impacted by an earthquake, landslide, debris flow, or wildfire. An earthquake could cause the power lines or telephone lines to go down and lose functionality. A landslide or debris flow could cause the poles supporting the power lines and telephone lines to collapse, and a wildfire could cause the poles supporting the power lines and telephone lines to burn down. Once the poles are down, the lines could go down and lose functionality.

AlertMarin “Reverse 911” System: Emergency officials use the AlertMarin Emergency Notification System to deliver incident-specific information or potentially life-saving instruction to the precise geographic area(s) affected. Messages are sent to recipients’ cell phone or VoIP (voice over internet protocol) phone to receive emergency alerts sent by call, text, email, or smartphone application from the County of Marin.

Nixle: Nixle is a Community Information Service dedicated to helping you stay connected to the information that matters most to you, depending on your physical location. You stay connected to your local police department ensuring that you receive trusted and immediate, geographically relevant information. Information is immediately available over your cell phone by text message, by email, and over the web. Members of the public may self-register by texting their zip code to 888777. The system typically alerts via SMS / text, though email & smartphone app. Alerting can be geographically focused from a single zip code to entire county. There are multiple agencies in Marin County that use Nixle including the Marin County Sheriff’s Office.

There are four types of messages; Alerts (many would refer to this as an emergency type alert), Advisories (less urgent need-to-know information), Community Information (day-to-day neighborhood to community-level information), Traffic (very localized traffic information).

Tsunami Watch and Warning Messages: Tsunami “Watch” (a tsunami may have been generated) and “Warning” (a tsunami has been generated) messages are issued for Marin County by the West Coast and Alaska Tsunami Warning Center located in Alaska, with the Pacific Tsunami Warning Center, located in Hawaii, serving as a backup. Both centers also transmit “Information” messages when significant seismic events occur under the sea floor, even when the seismic events do not have the potential to generate a tsunami. Watch and Warning messages are transmitted by the respective Warning Centers over the NOAA Weather Wire system directly to each other, Coastal NWS Forecast Offices and their Area of Responsibility’s State Warning Centers. The local NWS Office is located in Monterey serves Marin County. CalOES operates California’s State Warning Center in Sacramento. Some messages are transmitted automatically based upon seismic event magnitude and location, and followed shortly by amplifying information (after review by scientists at the Tsunami Warning Centers). Generally, a message is generated within five minutes of the seismic event. Messages are recorded for transmission of the Emergency Alert System and local National Weather Radio Sites. There is no fixed, audible warning system that covers the entire 42 miles of the County’s coastline. Emergency vehicle (and helicopter) public address systems and sirens may be used to alert residents of the need to evacuate. Warnings may not be possible in the event of a tsunami generated by a local seismic event, and will not be available if a tsunami is generated by a local nonseismic event (subaerial or subsea landslide).

Local Warning Sirens and Horns: Various entities within the county utilize local, short range sirens and horns for the purpose of alerting small segments of the population to impending hazards. These systems are currently under review and more information will be provided on them in future iterations of this plan.

Law Enforcement/Fire Agency Evacuation Procedures: Law Enforcement Officers and Firefighters may drive through neighborhoods with sirens activated announcing evacuations and/or emergency directions over their loud speakers. Sheriff’s Air Patrol may also fly overhead announcing the same information

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SECTION 4 MITIGATION STRATEGY**4.1 OVERVIEW**

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

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

1. Local hazard mitigation goals
2. Identification and analysis of mitigation actions
3. Implementation of mitigation actions
4. Identification and analysis of mitigation actions for NFIP compliance

4.2 MITIGATION GOALS

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide vision. For the MCM LHMP, the Planning Committee developed one goal for each identified hazard. As shown in Table 4-1, these goals are 1) earthquake and liquefaction, 2) dam failure, 3) severe storm (wind, flooding, and debris flow), 4) tsunami, 5) wildfire, and 6) post-fire debris flow.

Table 4-1. Mitigation Goals

Goal Number	Goal Description
1	Reduce the possibility of damages and losses due to earthquakes and liquefaction.
2	Reduce the possibility of damages and losses due to dam failure.
3	Reduce the possibility of damages and losses due to severe storms, including wind, flooding, and debris flow.
4	Reduce the possibility of damages and losses due to tsunami.
5	Reduce the possibility of damages and losses due to wildfire and post-fire debris flow.

4.3 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

Mitigation actions are activities, measures, and/or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into six broad categories: prevention,

property protection, public education and awareness, natural resource protection, emergency services, and structural projects.

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

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

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

- ☐ Mitigation action must be mitigation-focused (as opposed to response, recovery, and preparedness-driven)
- ☐ Mitigation action must meet the 2015 HMA Guidance project criteria eligibility
- ☐ Mitigation action must address the DMA 2000 requirements for the identification and analysis of mitigation actions
- ☐ Mitigation actions must address the MCM LHMP vulnerability analysis results

In addition to the potential mitigation actions developed for the local participants, local agencies have their own specific actions in Appendix G – S.

Many of the individual jurisdiction’s prior mitigation actions were derived from the ABAG 2010 planning process which contained an extensive list of over 250 actions. Many of these actions were not mitigation specific (e.g. preparedness, response, or recovery), or were not specific to individual jurisdictions but rather were regional in scope.

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Additionally, recent declared disasters have provided information that may lead to potential changes in priorities that will be identified in the next iteration of this plan

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

Table 4-2. Potential Common Mitigation Actions

No.	Description	Hazard and Goal Addressed	Existing Local Mechanism to Implement	HMA Eligible Activity Type	Potential Funding Source	Responsible Agencies
DAM-1	Encourage property owners in dam inundation areas to purchase insurance	Dam inundation		Public awareness or education campaigns about mitigation	5 Percent Initiative	Planning and public works departments, Special districts (water districts)
DAM-2	Consider/implement improvements to armoring of dams or other improvements.	Dam inundation (related: flood, earthquake and wind)				
DAM-3	Install accelerometers on and adjacent to dams to provide information on structural impacts of seismic events.	Dam inundation (earthquake and flood)				
EQ-1	Use incentives for mitigation of privately owned at-risk or seismically deficient structures (soft story / unreinforced masonry/old bridges).	Earthquake	Grants for property owners, guidance materials, workshops, events or other public engagement initiatives	Structural Retrofitting of Existing Buildings	HUD CDBG, HMGP, PDM	Planning or Building departments

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EQ-2	Adopt applicable standards and identification/assessment protocols for voluntary or mandatory retrofits of seismically vulnerable buildings (such as soft story buildings).	Earthquake		Hazard Mitigation Planning Related Activity	HMGP	Planning departments
EQ-3	Upgrade deficient ramps and bridges.	Earthquake		Infrastructure Retrofit	HMGP, PDM	Public Works departments
EQ-4	Require engineered plan sets for seismic retrofits of homes on steep hillsides, soft-story homes, and other split-level or vulnerable homes not covered by standard plan set A	Earthquake and Debris Flow		Hazard Mitigation Planning Related Activity	HMGP	Planning or Building departments
FIR-1	Develop a plan for appropriate access and evacuation in hillside wildland-urban interface areas. For example creation of no parking areas, signage, and early warning and evacuation.	Wildfire		Hazard Mitigation Planning Related Activity	HMGP and other federal, state and local sources	Fire and Emergency Services departments
FIR-2	Develop a method and technologies for regulating and/or enforcing defensible spaces.	Wildfire		Hazard Mitigation Planning Activity	HMGP and other federal, state and local sources	Planning and Fire departments
FIR-3	Encourage Fire Departments to expand vegetation management programs in wildland-urban-interface areas to more effectively manage the fuel load through various methods including, but not limited to, roadside collection and chipping, mechanical	Wildfire		Wildfire Mitigation (Creation of Defensible Space, Hazardous Fuels Reduction)	HMGP and other federal, state and local sources	Fire departments

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	fuel reduction equipment, selected harvesting, use of goats or other organic methods of fuel reduction.					
FIR-4	Fuel reduction program for publicly owned or open spaces. May include targeting invasive and exotic plants that contribute to fire (and flooding) hazards such as eucalyptus, broom, and cordgrass.	Wildfire		Wildfire Mitigation (Hazardous Fuels Reduction)	HMGP and other federal, state and local sources	Fire departments
FIR-5	Promote residential fuel modification program. May include special programs for elderly/disabled.	Wildfire		Wildfire Mitigation (Creation of Defensible Space, Hazardous Fuels Reduction)	HMGP and other federal, state and local sources	Fire and Planning departments?
FIR-6	Post-fire soil stabilization such as planting heat and drought tolerant vegetation. May include re-routing water channels to prevent landslides from affecting local roadways.	Post-fire debris flow		Soil stabilization	HMGP	Fire, Planning, and Public Works departments
FIR-7	Develop and implement early warning systems that monitor surface water movement and alert citizens of possible post-fire flash floods and debris flows.	Post-fire debris flow		Early warning systems that monitor and alert of possible post-fire debris flows	HMGP 5% Post Fire Funding	Fire and Emergency Services departments
FLD-1	Maintain participation in the National Flood Insurance Program and manage beyond minimum requirements as appropriate for local conditions. Consider improving Community Rating System (CRS) score if benefit exceeds cost for a given jurisdiction.	Flood	CRS staff	Hazard Mitigation Planning Related Activity	HMGP, PDM, FMA, other federal, state and local funds	Public Works and Planning departments
FLD-2	Incorporate flood	Flood	Capital	Hazard	HMGP and	Planning and

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	planning into local permitting and planning.		improvement plans, zoning, codes, development codes.	Mitigation Planning Related Activity (as part of plan update)	other federal, state and local funds	Public Works departments.
FLD-4	Conduct education & outreach for homeowners regarding flood mitigation as part of hazard mitigation plan update.	Flood	Annual flood preparedness fair, CRS annual outreach, sea level rise guide for homeowners.	Hazard Mitigation Planning Related Activity (as part of plan update)	HMGP	Public Works, Planning, Emergency Services, Fire, special districts.
FLD-5	Inspect, assess, maintain, improve, and expand flood management systems, such as berms, levees, seawalls, drainage basins, catch basins, pipes, pump stations, channels or other flood and stormwater infrastructure. Includes stabilization of grades and banks in creeks, especially where critical facilities are nearby or crossing.	Flood and erosion due to flood flows	Capital improvement programs and maintenance programs	Localized Flood Risk Reduction Projects	HMGP	Public Works departments
FLD-6	Identify structures, collect and assess information to support policy decisions regarding pre- or post-disaster acquisition, relocation, elevation, or wet/dry floodproofing of flood-prone structures, particularly Repetitive Loss. Consider views and aesthetic impacts early in planning.	Flood	Post-disaster community planning, CRS, Local Coastal Program, building codes, BayWAVE/C-SMART	Property Acquisition and Structure Demolition/Relocation and Structure Elevation	FMA, HMGP, Flood Control & Water Conservation District	Planning and Public Works departments
FLD-7	Continue to support the San Francisco Bay Area Advanced Quantitative Precipitation Information System project to provide both improved observing capabilities and a suite of numerical forecast models to produce	Flooding		Non-localized Flood Risk Reduction Project Miscellaneous/Other project that addresses climate change adaptation and encourages	Partially funded by California Department of Water Resources Integrated Water Management and the Sonoma	Sonoma County Water Agency is the lead agency. Marin County partners may include special districts (water and sanitary) and Public Works

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	accurate and timely information for a variety of user needs, including improved precipitation and hydrologic information to assist the region in mitigating flood hazards, maximize water supply, and enhance ecosystem services. The primary emphasis will be to improve short-term (48 hour) monitoring and prediction of high-impact rainfall events. The secondary emphasis will focus on improved medium-range precipitation forecasts (out to 10 days) for water supply.			resiliency. Mitigation project adapts to new challenges posed by more powerful storms, frequent heavy precipitation, prolonged droughts, extreme flooding, and other weather events.	County Water Agency. Potential future funding sources include FEMA and additional partner agencies (flood, water, sanitary agencies in the region, particularly in the north San Francisco Bay areas).	departments.
FLD-8	Conduct multi-jurisdictional repetitive loss area analysis for full county as part of multi-jurisdictional local hazard mitigation planning	Flood	CRS program 5-year update	Hazard Mitigation Planning Related Activity	HMGP, County general fund	Public Works departments
FLD-9	Encourage at least one member of City/Town to be a Certified Floodplain Manager.	Severe Storm/ Flood	CRS program points, Floodplain Managers Association Conferences, professional development, consider hosting a local workshop	Hazard Mitigation Planning Related Activity (as part of plan update)	HMGP, professional development funds	Planning, Building, and Public Works departments
FLD-10	Participate in C-SMART and BayWAVE adaptation planning and implement strategies stemming from these programs.	Flood	C-SMART and BayWAVE programs, capital improvement planning	Hazard Mitigation Planning Related Activities	HMGP, other federal, state and local funding	Planning and Public Works departments
FLD-11	Encourage integration of SLR and climate change into planning documents, systems, operations, and maintenance	Flood		Hazard Mitigation Planning Related Activities	HMGP, other federal, state and local funding	Planning, Emergency Services, and Public Works departments

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LS-1	Increase efforts to reduce landslides and erosion in existing and future development by improving appropriate code enforcement and use of applicable standards for private property, such as those appearing in the California Building Code, California Geological Survey Special Report 117 – Guidelines for Evaluating and Mitigating Seismic Hazards in California, American Society of Civil Engineers (ASCE) report Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California, and the California Board for Geologists and Geophysicists Guidelines for Engineering Geologic Reports. Such standards should cover excavation, fill placement, cut-fill transitions, slope stability, drainage and erosion control, slope setbacks, expansive soils, collapsible soils, environmental issues, geological and geotechnical investigations, grading plans and specifications, protection of adjacent properties, and review and permit issuance.	Landslide		Hazard Mitigation Planning Related Activity		Planning and Public Works departments
LS-2	Develop and implement projects	Landslide	Emergency response	Soil Stabilization	HMGP and other	Public Works

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	that prevent landslide impacts to roadways.		stabilization and capital improvement projects	and Infrastructure Retrofit	federal, state and local sources	departments
MLT-1	Integrate the MCM LHMP into all jurisdictions general plan safety elements.	All	General Plan updates	Hazard Mitigation Planning Related Activity	Jurisdiction general funds (soft match), HMGP	Planning or Public Works departments.
MLT-2	Assess vulnerability of critical facilities and public buildings to damage in natural disaster. Make recommendations to staff and governing board on priorities for mitigation, identify funding mechanisms, conduct improvements.	All	Needed	Hazard Mitigation Planning Related Activity	HMGP, PDM	Building and Public Works departments and special districts with critical facilities.
MLT-3	Adopt, amend as needed, and enforce updated versions of state and federal regulations for Building and Fire Codes so that optimal standards are used in construction and renovation projects of public and private buildings and infrastructure.	Earthquake, Severe Storm, Wildfire, Tsunami	Existing construction codes	Hazard Mitigation Planning Related Activity	Building permit fees	Planning, Building, and Fire departments.
MLT-4	Develop/ enforce regulations requiring replacement of above-ground utilities with underground utilities. Require underground utilities be effectively sealed to prevent backflow of floodwaters into buildings.	All	Varies by jurisdiction	Hazard Mitigation Planning Related Activity	HMGP	Planning departments.
MLT-5	Prepare, study, and or provide hazard information to residents, property owners and merchants, such as hazard maps (e.g. MarinMap and MyHazard) and private mitigation resources.	All	Through existing public outreach methods, newsletters, social media	Hazard Mitigation Planning Related Activity (information dissemination as part of plan update)	HMGP, PDM	Emergency Services, Planning, Fire, and Public Works departments

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	Do this as part of Hazard Mitigation Planning to be eligible for HMA funding.					
MLT-6	Partner with utility system providers and other lifeline infrastructure and municipal partners to develop strong and effective mitigation strategies as part of multi-jurisdictional hazard mitigation planning.	All	Biannual Marin County Utilities and Public Works Meetings	Hazard Mitigation Planning Related Activity (as part of plan update)	HMGP, PDM	Emergency Services departments?
MLT-7	Train staff in emergency response and hazard mitigation by hosting trainings and by encouraging attendance at conferences and workshops as part of multi-jurisdictional hazard mitigation planning.	All	Professional Development. County host Cal OES CSTI for training offered to participating jurisdictions.	Hazard Mitigation Planning Related Activity (as part of plan update)	HMGP, PDM, EMPG	Emergency Services, Planning, Building, Public Works, and Fire Departments.
MLT-8	Use partnerships to protect as open space or parks, wetlands and those areas susceptible to extreme hazards (such as through land acquisition, zoning, and designation as Priority Conservation Areas).	All	General plan land use/open space elements, easements and conservation easements	Hazard Mitigation Planning Related Activity; Property Acquisition and Structure Demolition/Relocation	HMGP, PDM, FMA (if protect RL); other federal, state and local funds	Parks and Planning Departments, County Open Space and Flood Control
MLT-9	Develop and implement energy assurance plans. May include backup generators, energy storage (e.g. diesel fuel tanks), and microgrids for critical facilities.	All	As part of capital improvement projects.	Generators	HMGP (5 percent initiative), PDM	Emergency Services, Public Works, Fire, and special districts
MLT-10	Reinforce and/or elevate ramps, bridges, and roads as needed.	Flood, Debris flow, and Earthquake	Capital improvement plans	Infrastructure Retrofit	HMGP, other federal, state and local funding sources	Public Works and Planning departments
MLT-11	Conduct two new fire-related assessments taking into account lessons learned from the 2017 North-Bay	Wildfire, Post-fire Debris Flow	Part of the 5-year update to the LHMP	Hazard Mitigation Planning Related Activity	HMGP	Planning, Fire, and Public Works departments

	wildfires. The new data points needed in order to support improved fire hazard mitigation include 1) assessing vulnerability of public and private structures in the wildland-urban interface zones based on building material and roof type, and 2) identifying areas with aging population and/or access and functional needs. This analysis could support new mitigation strategies that would make Marin more resilient to the type of disaster that occurred in our northern neighboring county.					
MLT-12	Prepare powerful graphics for the 2023 MCM LHMP that show how one or both of fire and/or flood hazards affects the vast majority of populated areas. The goal is to encourage communities to work together towards a common goal of minimizing hazard risk for all.	Flood/SLR and Wildfire	Part of the 5-year update to the LHMP	Hazard identification or mapping for the implementation of mitigation activities Public awareness or education campaigns about mitigation	HMGP	Emergency Services, Planning, Fire, and Public Works departments
MLT-13	Update landslide or wildfire hazard considerations, including roads leading to development, when new construction or major remodels are proposed in hillside areas discourage construction or add mitigation measures as appropriate.	Debris flow and wildfire	Building and fire code updates. Local Coastal Program.	Hazard Mitigation Planning Related Activity	HMGP	Planning and Public Works departments
MLT-14	Work to ensure a reliable source of water for fire suppression and	Wildfire		Hazard Mitigation Planning Related	HMGP and other federal, state and local	Fire departments and special districts (water

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	general use during/after hazards through the cooperative efforts of water districts, sanitary districts, fire districts, residents and commercial property owners.			Activity	sources	districts)
MLT-15	Mitigate against wind-induced wave erosion on the coast and in critical ponds (drinking, water treatment, or stormwater storage/detention) through relocation of facilities or improving (such as armoring) banks/berms/levees/shorelines. Secondary benefits include protection against earthquake-induced damage to critical facilities and flooding that may result due to their damage.	Wind, Flood, Earthquake				
MLT-16	Assessment of properties countywide to facilitate rapid damage assessment post-disaster, and pre-disaster vulnerability analysis for hazard mitigation planning update.	All		Hazard Mitigation Planning Related Activity	HMGP, PDM	Planning departments
MLT-17	Follow all four phases of FEMA's How-to-Guide: "Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning" to develop and implement a mitigation plan for at risk cultural resources.	All				
MLT-18	Design and implement projects that protect and expand natural flood mitigation functions. Example projects include	Flood, Tsunami, Wind	Capital improvement projects, zoning and setbacks, partnership	Hazard Mitigation Planning Related Activity	HMGP, PDM, FMA, other federal, state and local funds	Planning and Public Works departments

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	nature-based sea level rise adaptation projects that attenuate waves utilizing a living shoreline.		based efforts, stream conservation ordinances, local coastal plans, building codes.			
MLT-19	Prevent infrastructure expansion in high-risk areas	Flood, Tsunami		Hazard Mitigation Planning Related Activities		Planning and Public Works departments
MLT-20	Protect buildings and infrastructure from flood damage, such as by moving sewers and roads upland.	Flood, Tsunami	Capital improvement projects, multi-benefit restoration projects	Localized flood risk reduction projects	HMGP, other federal, state and local funding	Planning and Public Works departments
TSU-1	Continue participation in NOAA TsunamiReady program, in communities with significant tsunami risk.	Tsunami		Hazard Mitigation Planning Related Activities		Emergency Services departments

4.4 IMPLEMENTATION OF MITIGATION ACTIONS

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

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

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

Criteria for prioritizing actions are evaluated by individual jurisdiction's boards and councils. Cost Benefit may not be a primary consideration in all cases, and the STAPLE(E) criteria developed by FEMA is a commonly applied decision making instrument.

The acronym STAPLE(E) is defined as follows:

Social – Is the hazard mitigation strategy socially acceptable?

Technical – Is the proposed action technically feasible, and cost effective, and does it provide the appropriate level of protection?

Administrative – Does the community have the capability to implement the action, and is the lead agency capable of carrying out oversight of the project?

Political – Is the hazard mitigation action politically acceptable?

Legal – Does the community have the authority to implement the proposed action?

Economic – Do the economic base, projected growth, and opportunity costs justify the hazard mitigation project? Benefit cost-analysis is a mathematical method for comparing costs to the benefits to the community of a hazard mitigation action. If the benefits are greater than the costs, the project is cost effective. Comparing the ratios of benefits to costs for several hazard mitigation projects helps to identify those that offer the “greatest bang for the community’s buck.” Benefit-cost analysis gives decision makers an understandable way to explain and defend

their decisions. For many grant programs, FEMA and the State will use benefit-cost analysis to determine whether a project is eligible. The community can save time and energy by limiting planning activities to projects that will be more likely to receive funding.

Environmental – Does the proposed action meet statutory considerations and public desire for sustainable and environmentally healthy communities?

The jurisdictions represented in this plan (County, cities, towns and special districts) are authorized by state law and qualify as separate governments. With the exception of the special districts, the jurisdictions all have a general plan that regulates current and future development through zoning based on described hazards. State law requires all California Cities and Counties to adopt general plans which include seven mandatory chapters: Land Use, Circulation, Housing, Conservation, Open Space, Noise and Safety. In addition to General Plans, each jurisdiction has an Emergency Action (or Operations) Plan and a Climate Action Plan. An example matrix outlining legal and regulatory resources for hazard mitigation in Marin County is contained in Appendix G, Table G-9.

The jurisdictions each have a municipal code of ordinances to establish the minimum requirements to safeguard the public health, safety, and general welfare through structural strength, means of egress facilities, stability, access to persons with disabilities, sanitation, adequate lighting and ventilation and energy conservation, and safety to life and property from fire and other hazards attributed to the built environment; to regulate and control the demolition of all buildings and structures, and for related purposes.

The jurisdictions all have planning departments that review proposed developments and new uses for conformance with policies plans and regulations and are served by law enforcement and fire departments.

Resources vary greatly between jurisdictions according to general funds and staff, which are roughly proportionate to population size and commercial activity. Regardless of size, mitigation actions tend to leverage federal, state, and regional financial resources heavily in the form of matching grants. Example matrices outlining human, technical and financial resources for hazard mitigation in Marin County are contained in Appendix G, Tables G-7 and G-8.

With the protection of plans and codes secured through statute, the expansion and improvement of policies and programs are dependent on the allocation of limited financial resources towards staff administration and implementation. An efficient means of improving and expanding programs is through shared resources. The many small jurisdictions in the County often do not have the resources to successfully accomplish the many requirements placed upon them, but through economies of scale they can provide better public service. One example of that is this Multi-Jurisdictional Local Hazard Mitigation Plan, which for most jurisdictions represents a much-needed update. For two of these jurisdictions this will be a new plan.

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SECTION 5 PLAN MAINTENANCE

5.1 OVERVIEW

This section describes a formal plan maintenance process to ensure that the MCM LHMP remains an active and applicable document. It includes an explanation of how the Marin County Sheriff's OES and the MCM LHMP Planning Committee intends to organize their efforts to ensure that improvements and revisions to the MCM LHMP occur in a well-managed, efficient, and coordinated manner.

The following process steps are addressed in detail below:

- ☐ Monitoring, evaluating, and updating the MCM LHMP
- ☐ Implementation through existing planning mechanisms
- ☐ Continued public involvement

5.2 MONITORING, EVALUATING AND UPDATING THE PLAN

The MCM LHMP was prepared as a collaborative effort between the Planning Committee and other representatives of participating jurisdictions. To maintain momentum and build on previous hazard mitigation planning efforts and successes, Marin County Sheriff's OES will make use of the Planning Committee to monitor, evaluate, and update the MCM LHMP. The Marin County Sheriff's OES will continue to serve as the POC and will coordinate all local efforts to monitor, evaluate, and update this document.

Similar to the plan maintenance procedures outlined in the 2013 Marin County LHMP, the Planning Committee will meet quarterly to review related activities and have the opportunity to evaluate the plan annually. As such, the Marin County Sheriff's OES and the Planning Committee have developed the following revised approach to the MCM LHMP plan maintenance. In addition to hosting quarterly review meetings, every 12 months from plan adoption the Marin County Sheriff's OES will email each member of the Planning Committee an Annual Review Questionnaire to complete. The Annual Review Questionnaire will include the following requests:

- 1) Provide a summary of any hazard events that occurred during the prior year and their impact on your community.
- 2) Provide a review of successful mitigation initiatives identified in your jurisdictions existing/prior LHMP (if applicable). Provide comment on why targeted strategies were not completed.
- 3) 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).
- 4) Provide recommendations for new projects.
- 5) Provide recommended changes in, or potential for, new funding options (e.g. grant opportunities).

- 6) Provide recommendation on integration of new data such as GIS data and mapping used to inform the Plan.
- 7) Identify the impact of any other planning programs or initiatives within the community that involve hazard mitigation.
- 8) Attach any additional important notes on vulnerability analysis and hazard mitigation planning for your community (e.g. attach annual reports regarding plan implementation).

The Marin County Sheriff's OES will collect all completed questionnaires and determine if the MCM LHMP needs to be updated to address new or more threatening hazards, new technical reports or findings, and new or better-defined mitigation projects. The Marin County Sheriff's OES will summarize these findings and email them out to the Planning Committee. If the Marin County Sheriff's OES believes that the MCM LHMP needs to be updated based on the findings, then department will request that the Planning Committee attend a MCM LHMP update meeting.

In addition, the implementation strategy will be monitored and updated through the use of the Mitigation Project Progress Report or a FEMA annual report. During each annual review, each department or agency currently administering a FEMA mitigation project will submit a progress report or quarterly reports to the Marin County Sheriff's OES to review and evaluate. As shown in Appendix F, the progress report will discuss the current status of the mitigation project, including any changes made to the project, identify implementation problems, and describe appropriate strategies to overcome them. After considering the findings of the submitted progress reports, the Marin County Sheriff's OES may request that the implementing department or agency meet to discuss project conditions.

In addition to quarterly meetings, the Annual Review Questionnaire, the Mitigation Project Progress Report or FEMA annual report, and any other meetings, the Planning Committee will reinitiate the plan update process MCM LHMP every 4 years to meet the 5 year planning cycle. To ensure that this update occurs, within the first six months of the fourth year following plan adoption, the Planning Committee will undertake the following update process activities:

- ☐ Research funding available to assist in MCM LHMP update (and apply for funds that may take up to one year to obtain)
- ☐ Thoroughly analyze and update the risk of natural hazards in the communities of Marin County
- ☐ Complete a new Annual Review Questionnaire and review previous questionnaires
- ☐ Provide a detailed review and revision of the mitigation strategy
- ☐ Prepare a new implementation strategy
- ☐ Prepare a new draft MCM LHMP and submit it to the local participants governing bodies for adoption
- ☐ Submit an updated MCM LHMP to CalOES and FEMA for approval
- ☐ Submit approved MCM LHMP to governing bodies of each jurisdiction participating in the plan

5.3 IMPLEMENTATION THROUGH EXISTING PLANNING MECHANISMS

After the adoption of the MCM LHMP, the Marin County Sheriff's OES and the Planning Committee will ensure that elements of the MCM LHMP are incorporated into other existing planning mechanisms. The processes for incorporating the MCM LHMP into various planning documents will occur as (1) other plans are updated and (2) new plans are developed.

Therefore, the MCM LHMP participants will undertake the some or all of the following activities:

Activity 1: The County, cities and towns will use information from the hazard analysis and mitigation strategy sections in the MCM LHMP to update the safety element in their respective general plans.

Activity 2: The County, cities/towns, and special districts will use information from the hazard analysis and vulnerability analysis sections in the MCM LHMP to update their respective Emergency Operation Plans.

Activity 3: The County, cities/towns, and special districts will use information from the vulnerability analysis section in the MCM LHMP to develop emergency preparedness public information and related outreach efforts.

Activity 4: CRS program participants will use information from the vulnerability analysis (specifically the RL properties analysis) in the MCM LHMP to develop CRS-eligible mitigation activities and reduce the number of RL properties within the county.

Activity 5: The County, cities, and special districts will refer to the mitigation strategy section in the MCM LHMP when updating their respective capital improvement plans.

The responsibility for carrying out these activities is the City/Town Managers, District General Managers, or County Administrators, who may delegate implementation or administration to their staff.

5.4 CONTINUED PUBLIC INVOLVEMENT

The Marin County Sheriff's OES and the MCM LHMP Planning Committee are dedicated to involving the public directly in the continual reshaping and updating of this plan. Similar to the 2013 Marin County LHMP, a downloadable copy of the MCM LHMP will be available on the Marin County Sheriff's Office Website. Also, any proposed changes or updates will be posted on this Website. The Marin County's Sheriff's Website will also contain an e-mail address and phone number to which people can direct their comments or concerns. Additionally, copies of the plan will continue to be kept with all of the local participants. The existence and location of these copies will also be posted on the County Website as well as websites maintained by participating jurisdictions.

Finally, a press release was issued prior to finalization of the 2018 Marin County Multi-Jurisdictional LHMP. This provided the public an outlet for which they can express their concerns, opinions, or ideas about any updates/changes that are proposed to the plan. The Marin County Sheriff's OES will be responsible for using county resources to publicize the press

releases and maintain public involvement through public access channels, web pages, and newspapers as deemed appropriate.

During the 5-Year plan cycle, the Planning Team will continue to include the general public in notices on the planning process. The Planning Team will solicit feedback from the public on perceived impacts of projects identified in the plan, as well as shifting perceptions of hazards that are identified in the plan. An example of a shift in perception of a hazard is the public view of wildfire as a threat in light of the devastating North Bay fires of 2017 which occurred in neighboring counties.

Appendix A

FEMA Compliance Documents

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

Jurisdiction: County of Marin and political subdivisions	Title of Plan: 2018 Marin County Multi-Jurisdictional Local Hazard Mitigation Plan	Date of Plan: August 2018
Local Point of Contact: Thomas Jordan	Address: 1600 Los Gamos Drive Suite 200 San Rafael, CA 94903	
Title: Emergency Services Coordinator		
Agency: Marin County Sheriff - Office of Emergency Services		
Phone Number: 415 473 6584	E-Mail: T_Jordan@MarinSheriff.org	

State Reviewer:	Title:	Date:

FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region <i>(insert #)</i>		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

APPENDIX A

FEMA Compliance Documents

SECTION 1:

REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been ‘Met’ or ‘Not Met.’ The ‘Required Revisions’ summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is ‘Not Met.’ Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST		Location in Plan	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)		(section and/or		
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Sections 1.6.5, 1.6.6, 2.2, 2.3 Table 2-1			
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 2.4 Appendix E			
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Sections 2.41, 2.42, 2.44			
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Sections 2.3, 3.2 Appendices G - S			
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Sections 5.3, 5.4			
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 5.2			

1. REGULATION CHECKLIST		Location in Plan	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)		(section and/or		
<u>ELEMENT A: REQUIRED REVISIONS</u>				
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Sections 3.2, 3.3 Table 3-3			
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 3.3			
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 3.3, Appendices G - S			
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 3.4 Table 3-7			
<u>ELEMENT B: REQUIRED REVISIONS</u>				
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 4.4 Appendices G - S			
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 3.3.5 Table 3-7			
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 4.2 Table 4-1			
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 4.3 Table 4-2 Appendices G - S			

APPENDIX A

FEMA Compliance Documents

1. REGULATION CHECKLIST		Location in Plan	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)		(section and/or		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Sections 4.3, 4.4			
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 5.3			
ELEMENT C: REQUIRED REVISIONS				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Sections 1.6.1, 3.5			
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Appendices G - S			
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 4.3			
ELEMENT D: REQUIRED REVISIONS				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))				
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))				
ELEMENT E: REQUIRED REVISIONS				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.				
F2.				
ELEMENT F: REQUIRED REVISIONS				

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Appendix B
Adoption Resolutions

To be inserted at time of adoption

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Appendix C

Planning Committee

Department, Agency, or Municipality	Name
Marin County Sheriff's Office	Thomas Jordan, Emergency Services Coordinator
Marin County Department of Public Works	Hannah Lee, Senior Civil Engineer Beb Skye, Engineering Technician Felix Meneau, Assistant Engineer Gerhard Epke, Senior Program Coordinator
Marin County Fire Department	Scott Alber, Fire Marshal
Marin County Community Development Agency	Kristen Drumm, Senior Planner Alex Westhoff, Planner
City of Belvedere	Irene Borba, Director of Planning & Building Laurie Nilsen, Emergency Services Coordinator
Town of Corte Madera	Kelly Crowe, Senior Civil Engineer Matt Cobb, Battalion Chief Hamid Khalili, Police Captain Adam Wolff, Planning and Building Director Peter Brown, Public Works Director
City of Fairfax	Mark Lockaby, Chief Building Official Michele Gardner, Deputy Town Clerk
City of Larkspur	Matt Cobb, Battalion Chief Bob Quinn, Public Works Superintendent Neal Toft, Planning Director Julian Skinner, Public Works Director .
City of Mill Valley	Tom Welch, Fire Chief Andrew Poster, Public Works Director Elisa Sarlatte, DPW Engineering Manager
Town of Ross	Richard Simonitch, Public Works Director Heidi Scoble, Planning Manager Erik Masterson, Police Chief
Town of San Anselmo	Sean Condry, Public Works Director Elise Semonian, Planning Director

APPENDIX C

Planning Committee

	Dave Donery, Town Manager
City of San Rafael	Talia Smith, Senior Management Analyst Quin Gardner, Emergency Management Coord Robert Sinnott, Deputy Fire Chief Kevin McGowan, Asst Public Works Director Bill Guerin, Public Works Director
City of Sausalito	Jonathon Goldman, Public Works Director Bill Frass, Police Captain Lilly Whalen, Clerk Mike McKinley, Emergency Services Coordinator
Town of Tiburon	Kyra O'Malley, Associate Planner Laurie Nilsen, Emergency Services Coordinator Scott Anderson, Community Development Director
City of Novato	Nancy Andrews, Senior Management Analyst Bob Brown, Community Development Director Bill Tyler, Fire Chief Jim Correa, Police Captain Dave Jeffries, Consultant
North Marin Water District	Drew McIntyre, General Manager Rocky Vogler, Chief Engineer Pippin Cavagnaro, Associate
Marin County Flood Control and Water Conservation District	Hannah Lee, Senior Civil Engineer Felix Meneau, Assistant Engineer Gerhard Epke, Senior Program Coordinator

5/13/2016







MARIN MULTI JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN KICK-OFF MEETING

KICK-OFF MEETING - 3/24/2016		
NAME (PRINT CLEARLY)	AGENCY	PHONE NUMBER
1. TOM JORDAN	MCSO OES	415 250 0267
2. Kristin Drumm	CDA	415 473 6290
3. Mike McKimley	SAUSALITO PD	415-244-5220
4. Kyra O'Malley	Tiburon Planning	415.435.7397
5. LAURIE NILSEN	Tiburon Peninsula OES	415 789-2805
6. Irene Borba	Belvedere Planning	iborba@cityofbelvedere.org 415 435 8907
7. John Boushman	San Rafael OES	415 458 5002
8. MAT COBB	LARKSPUR PD	415 323 5238
9. Nancy Andrews	NOVATO POLICE	415-899-7006
10. DAVE JEFFRIES	NOVATO EMPLOYMENT MANAGER	707-485-1098
11. Bev Skye	Marin Co	415 473-4284
12. Hannah Lee	Marin co	415-473-2671
13. Stephanie Lapine	MCPW	415-473-6074
14. Michele Gardner KELLY CROWE	Fairfax TCM	415-453-1584

MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING #2

Agenda

4/26/2016

10:30 – 12:30

Marin County Emergency Operations Center

1. Sign in sheet
2. BayWave presentation recap
3. Project LOI Check-ins
4. Project Roadmap – review of changes
5. LHMP Element Work: Community Profile & Asset Inventory
6. LHMP related activity Check-ins
7. Schedule next meeting for May
8. Discuss planning and logistics for Community Meetings
9. Final Thoughts

MARIN MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN KICK-OFF MEETING

MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING - 4/26/2016		
NAME (PRINT CLEARLY)	AGENCY	PHONE NUMBER
1. MICHAEL McKINLEY	SAUSALITO PD	415 244-5224
2. Bill Tish	NFD	415-310-6120
3. Dave Jervais	NWATO	707-488-1098
4. Kyla O'Malley	Tiburon	415 435-7397
5. Tom Welch	Bill Valley	415-389-4130
6. Tom JORDAN	MCSC OES	415 250 0267
7. Hannah Lee	Marin DPW	415 473 2671
8. Stephanie Lapine	Marin Coastal DPW	415-473-6074
9.		
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MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING #3

Agenda

6/9/2016

10:00 – 12:00

Marin County Emergency Operations Center

1. Sign in sheet
2. Project LOI Check-ins
3. Marin County Council of Mayors & Councilmembers (MCCMC)
meeting discussion
4. Project Roadmap – review of changes
5. LHMP Element Work: Risk Assessment
6. LHMP related activity Check-ins
7. Schedule next meeting for August
8. Discuss planning and logistics for Community Meetings
9. Final Thoughts

MARIN MULTI JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN KICK-OFF MEETING

MARIN COUNTY MULTI JURISDICTIONAL LHMP MEETING #3 - 6/9/2016		
NAME (PRINT CLEARLY)	AGENCY	PHONE NUMBER
1. MARK LOCKABY	FAIRFAX	415-458-2370
2. Mike McKinley	Sausalito	(415) 244-5442
3. LARIE NILSEN	TIBURON PD	415 789-2805
4. NANCY ANDREWS	NOVATO PD	415-899-7066
5. DAVID JENNINGS	NOVATO	707-483-1098
6. Kelly Crowe	TCM	415-927-5118
7. Alex Westhoff	CDA	415 473-7874
8. Bob Brown	Novato	415 899-8538
9. Bob Skye	Marin County	415 473-4281
10. Kristin Drumm	CDA	x6290
11. Felix Meneau	Marin County Flood Control Dist	x 3223
12. Kyra O'Malley	TIBURON	415-4357397
13. Hannah Lee	DFW	x 8611
14. MATT COBB	LAKEVIEW PD	415 328 5233
Tom Welch	MLV	415-384-4120
Scott Adams	MCAD	415-473-6166

MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING #4

Agenda

8/30/2016

12:00 – 2:00

Marin County Emergency Operations Center

1. Sign in sheet
2. Project Roadmap – review of Final Draft
3. LHMP Element Work: Activity Sheet discussion
4. Discuss planning and logistics for Community Meetings
5. Discuss planning and logistics for Public Virtual Engagement
6. CRS Overview / Discussion
7. LHMP related activity Check-ins (Projects, Plans, NOIs)
8. Schedule next meeting
9. Final Thoughts

MARIN MULTI JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN KICK-OFF MEETING

MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING #4 - 8/30/2016		
NAME (PRINT CLARLY)	AGENCY	PHONE NUMBER
1. Tom Johnson	MCSO DES	758 977 67
2. Spencer Robert	MCSO DES	942 3605
3. Mike McKinn	SPD	415 36-8806
4. Ben Borge	Bay Area LEO	916 471 4287
5. Hannah Lee	Marin SOU	714 2671
6. Alex Westmore	Marin SOA	478 7874
7. Felix Moreno	Marin SOU	478 3223
8. Kym O'Malley	Tiburon	478 7397
9. Michele Goldner	San Francisco	478 2342
10. Kristin Drennon	CDA	
11. Phil Soto	CLM, SOU	927 8067
12. Geoff Russo	MCLD	973 6500
13.		
14.		

MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING #5

Agenda

2/9/2017

10:00 – 12:00

Marin County Emergency Operations Center

- I. Sign in sheet
- II. Project Roadmap – review
- III. Presentation on the public engagement series and workshops
- IV. Review of the draft plan
- V. Update on the SHMP effort and new FEMA R IX HMP Staff.
- VI. Check in on progress on activity sheets.
- VII. Q & A
- VIII. CRS Overview / Discussion
- IX. LHMP related activity Check-ins (Projects, Plans, NOIs)
- X. Schedule next meeting
- XI. Final Thoughts

MARIN MULTI JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN ~~KICK-OFF~~ MEETING

MARIN COUNTY, MULTI-JURISDICTIONAL LHMP MEETING #5 - 2/9/2017		
NAME (PRINT CLEARLY)	AGENCY	PHONE NUMBER
1. Hannah Lee	Marin CO DPO	415-473-2671
2. THOMAS JORDAN	MARIN SO	415 253 0267
3. Tom. Welch	MLV	415-320-3852
4. DAVE JEFFRIES	NOVATO	707-483-1098
5. LAURIE K. NILSEN	BELLEVILLE TIBURON	415 871-6526
6. Kyrá O'Malley	Tiburon	415. 485 7397
7. Alex Westhoff	Marin Co CDA	415 473-7874
8. Kristin Drumm	CDA-	415 473 6290
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MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING

Agenda

6/1/2017

1:00 – 3:00

Marin County Emergency Operations Center

1. Sign in sheet
2. Project Roadmap – review of activities to date
3. “Across the line” game plan
4. LHMP Element Work: Activity Sheet discussion
5. CRS Overview / Discussion
6. LHMP related activity Check-ins (Projects, Plans, NOIs)
7. Schedule next meeting
8. Final Thoughts

MARIN MULTI JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN KICK-OFF MEETING

MARIN COUNTY MULTI-JURISDICTIONAL LHMP 8/1/2017		
NAME (PRINT CLEARLY)	AGENCY	PHONE NUMBER
1. Robert (Bob) Quinn	CITY OF MARKSPE	415-927-5028
2. Pippin Capagnano	(NAMES)	(415) 847-0282
3. Mike McKinley	SPD	(415) 867-8306
4. Bill Faggos	SAN VICENTE PD	415-285-4171
5. MARK LOCKMAY	FAIRFAX	415-458-2370
6. DAVE JEFFRIES	NOVATO	707-483-1098
7. Hannah Lee	DPW - MARI	415-473-2671
8. Alex Westhoff	CDA	415-473-7874
9. Kyr O'Malley	Tiburon	415-435-7397
10. Kelly Crowie	Corte Madera	415-927-5118
11. DREW MCINTYRE	NMWD	415-877-4133
12. R. Kogler	NMWD	415-261-8945
13.		
14.		

MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING

Agenda

2/20/2018

10:00 – 12:00

Marin County Emergency Operations Center

1. Sign in sheet
2. Round table introductions
3. Review of County BOS Report citing CRS activity credit
4. Confirm receipt of activity sheets from all MCM LHMP partners
5. Round table any open issues
6. Schedule next meeting
7. Final Thoughts

MARIN MULTI JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN KICK-OFF MEETING

MARIN COUNTY MULTI-JURISDICTIONAL LHMP MEETING - 2/20/2018		
NAME (PRINT CLEARLY)	AGENCY	PHONE NUMBER
1. Bob Slaye	Marin County	415-435-4224
2. [unclear]	[unclear]	[unclear]
3. [unclear]	Marin County	415-435-4224
4. Lynn O'Halley	Tiburon	415-435-3317
5. [unclear]	Tiburon	[unclear]
6. Rachel [unclear]	Marin County	415-435-4224
7. [unclear]	Marin County	415-435-4224
8. [unclear]	Marin County	415-435-4224
9. [unclear]	Marin County	415-435-4224
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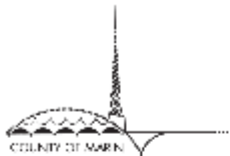
Appendix D

Plan Review Committee

DC3 Position Title	Name
Chairperson	Judy Arnold
Marin Managers	Joe Chinn
Schools	Michael Grant
Emergency Medical Services	Miles Julihn
Access and Functional Needs	Peter Mendoza
MIDC	Denis O’Leary
Transit	Mohamed Osman
Health and Human Services	Lisa Santora
Police Chiefs	Tricia Seyler-Campbell
Public Works	Eric Steger
At Large Representative	Bill Tyler
MCCMC	Catherine Way
Fire Chiefs	Jason Weber
American Red Cross	Debbie Yee
Economic Forum	Garry Lion
District 1	Frank Cox
District 2	Michael McDermott
District 3	Keith Kennedy
District 4	Anne Sands
District 5	Ed Schulze

DC3 = Marin County Disaster and Citizen Corps Council

These Minutes were reviewed and approved by the Disaster Council on June 9, 2016.



**MARIN OPERATIONAL AREA
DISASTER & CITIZEN CORPS COUNCIL**

1600 Los Gatos Drive, Suite 200, San Rafael, CA 94903-4189
(415) 473-6584 FAX (415) 473-7450

Minutes of the March 10, 2016 Meeting

The Regular meeting of the Marin Operational Area Disaster and Citizen Corps Council (DC3) was held Thursday, March 10, 2016.

Council Members Present: Judy Arnold, Frank Cox, Steve Tulsy, Keith Kennedy, Jr., Anne Sands, Ed Schulze, Bill Tyler, Eric Steger, Catherine Way, Jason Weber, Angel Bernal, Denis O'Leary, Mike Grant, and Amy Van Doren. **Council Members Excused:** Katie Rice, Heather Ravani, Joe Chinn, Miles Julihn, Gary Lion, Crystal Silva, and Henry LaRoche.

1. CALL TO ORDER

Marin County Supervisor Judy Arnold ("Chair") called the meeting to order at 3:03 p.m. The meeting was held in the Community Room located at the Central Marin Police Authority, 250 Doherty Drive, Larkspur, California. A quorum was present. The Chair welcomed new members to the council, Catherine Way, representing the Marin County Council of Mayors & Councilmembers, and Denis O'Leary, Marin Interagency Disaster Coalition.

2. APPROVAL OF December 10, 2015 MINUTES

The Chair asked for a Motion to Approve the December 10, 2015 minutes. As submitted to the Council, with no corrections or additions, the Minutes were adopted.

Motion: Schulze / Second: Sands

AYES: ALL

3. CHANGES TO AGENDA: Ursula Hanks will give an update on the Marin Interagency Disaster Coalition (MIDC) during Old Business.

4. PRESENTATIONS: None submitted.

5. NEW BUSINESS

Tsunami Preparedness Week

OES' Ursula Hanks told the council that the Marin County Board of Supervisors passed a Resolution to observe the week of March 20th as Tsunami Preparedness Week. This is in connection with a promotion by the National Tsunami Hazard Mitigation Program. This nationwide event ("know your zone") hopes to raise awareness about tsunami safety, especially for those coastal communities in the tsunami zone, particularly in the Pacific. Ursula said that the State and National Weather Service are planning communications exercises. Also Marin OES has partnered with Marin Public Works, Cal OES, the National Weather Service, and California Geological Survey to host a community workshop in Stinson Beach to be held on Tuesday, March 29, 2016. Presenters will speak about tsunami hazards, alerts &

These Minutes were approved by the Disaster Council on September 8, 2016.



**MARIN OPERATIONAL AREA
DISASTER & CITIZEN CORPS COUNCIL**

1600 Los Gatos Drive, Suite 200, San Rafael, CA 94903-4189
(415) 473-6584 FAX (415) 473-7450

Minutes of the June 9, 2016 Meeting

The Regular meeting of the Marin Operational Area Disaster and Citizen Corps Council (DC3) was held Thursday, June 9, 2016.

Council Members Present: Judy Arnold, Frank Cox, Steve Tulsy, Keith Kennedy, Jr., Ed Schulze, Bill Tyler, Joe Chinn, Heather Ravani, Eric Steger, Catherine Way, Angel Bernal, Denis O'Leary, Mike Grant, Miles Julihn, Garry Lion, and Crystal Silva. **Council Members Excused:** Katie Rice, Jason Weber, Amy Van Doren, and Anne Sands.

1. CALL TO ORDER

Marin County Supervisor Judy Arnold ("Chair") called the meeting to order at 3:03 p.m. The meeting was held in the Assembly Room of the Marin County Sheriff's Department, located at the County's Emergency Operations Facility, 1600 Los Gatos Drive, San Rafael, California. A quorum was present.

2. APPROVAL OF March 10, 2016 MINUTES

The Chair asked for a Motion to Approve the December 10, 2015 minutes. As submitted to the Council, with no corrections or additions, the Minutes were adopted.

Motion: Schulze / **Second:** Kennedy

AYES: ALL

3. CHANGES TO AGENDA: None submitted.

4. PRESENTATIONS: Mill Valley Community Evacuation Drill

Fire Chief Tom Welch told the council about the City of Mill Valley's annual emergency evacuation drill that took place on Saturday, May 21, 2016 and was designed for the residents of Warner Canyon. This area is home to the Mill Valley Golf Course and adjoined by the Camino Alto Open Space Preserve to the east. Previous to the drill, residents received a letter with instructions on how to participate. At 10:00am on drill day, the emergency sirens activated to alert residents to evacuate to the designated check-in location at the parking lot of Park School. OES activated an emergency notification/alert through AlertMarin, which was sent to all who signed up for AlertMarin. At the check-in after the drill, participants were asked to complete an evacuation survey form. At the Park School, demonstrations and emergency information was provided to the residents by Mill Valley's community emergency partners, FIRESafe Marin, Boy Scouts, PG&E, Salvation Army, American Red Cross, Marin Humane Society, Whistlestop Wheels, Marin Medical Reserve Corps, and the Mill Valley Emergency Preparedness Commission. Some metrics from the drill: 87 Households participated; 155 Residents; 69% received AlertMarin notification the week of the drill; 74% received AlertMarin notification the day of the drill; Only 38% heard the siren.

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Appendix E

Public Outreach and Stakeholder Involvement

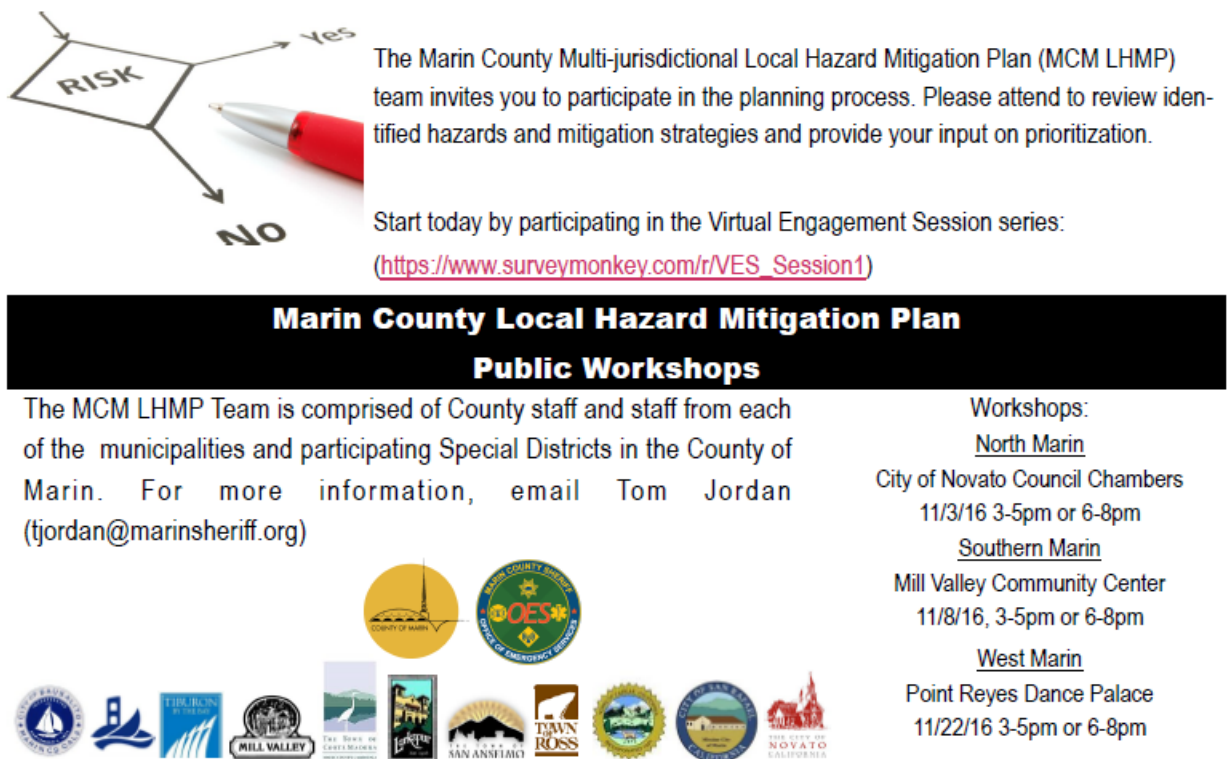
As described in Section 2.5 of this plan, Public Outreach and Stakeholder Involvement, over 100 public comments were received in the initial phase of public outreach. These comments were used by the Planning Committee to identify community concerns about specific hazards and ideas about how to mitigate those hazards as well as input on social vulnerabilities.

This information was used in the development of the plan as an insight for County and Municipal planners on the perceptions held by community members.

The following Figures represent Public Outreach effort collateral material:

1. Outreach Flyer for the Public Workshops
2. Public Workshop Agenda
3. Media Release to solicit feedback on the Draft Plan
4. News Article example from the Pt. Reyes Light

Figure 1 - Workshop Flyer



The Marin County Multi-jurisdictional Local Hazard Mitigation Plan (MCM LHMP) team invites you to participate in the planning process. Please attend to review identified hazards and mitigation strategies and provide your input on prioritization.

Start today by participating in the Virtual Engagement Session series:
https://www.surveymonkey.com/r/VES_Session1

Marin County Local Hazard Mitigation Plan Public Workshops

The MCM LHMP Team is comprised of County staff and staff from each of the municipalities and participating Special Districts in the County of Marin. For more information, email Tom Jordan (tjordan@marinsheriff.org)

Workshops:

North Marin
 City of Novato Council Chambers
 11/3/16 3-5pm or 6-8pm

Southern Marin
 Mill Valley Community Center
 11/8/16, 3-5pm or 6-8pm

West Marin
 Point Reyes Dance Palace
 11/22/16 3-5pm or 6-8pm




Figure 2 - Workshop Agenda

11/29/2016



Agenda

- Welcome and Introductions
- Project Overview
- MCM LHMP Update Process and Components
- Planning Process
- Plan Components
- Overview of Existing LHMPs in the County
- Project Timeline
- Next Steps
- Question and (hopefully) Answer Session
- Wrap Up

Welcome and Introductions

- Housekeeping
 - Phones = quiet
 - Restrooms through foyer
 - In the event of emergency
 - Question and Answer session

Figure 3 - Media Release Plan Review

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You are here: Home > County News Releases > Local Hazard Mitigation Plan

County of Marin - News Releases - Local Hazard Mitigation Plan

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COUNTY OF MARIN

NEWS RELEASE

www.marincounty.org/news

For Immediate Release
August 10, 2018

Contact:
Thomas Jordan
Program Coordinator
Marin County Sheriff's Office of
Emergency Services

Emergency Operations Facility
1600 Los Gatos Drive
San Rafael, CA 94903
(415) 473-6584
Email: Thomas.Jordan@marinsheriff.org
Sheriff-Coroner website

County Seeks Feedback on Hazard Mitigation Plan

Process to prepare for natural disasters needs updating

San Rafael, CA – Marin County is updating its [Local Hazard Mitigation Plan](#) (LHMP), a document that helps the County government mitigate the impacts of natural disasters, and the invitation is open for public feedback before the document is finalized.

The County last updated its LHMP in 2013. The plan lays out a process to prepare for, and lessen the impacts of, specified natural hazards such as earthquakes, wildfires, and floods. This latest planning effort was broadened to include local towns, cities, and special districts as planning partners.

Staff from the [Marin County Sheriff's Office of Emergency Services](#), the [Marin County Fire Department](#), the [Marin County Community Development Agency](#), and the [Marin County Department of Public Works](#) contributed fresh content to an updated draft of the plan following a series of public meetings. All of Marin's towns and cities are participating in the plan's update along with the North Marin Water District and the Marin County Flood Control and Water Conservation District. The multijurisdictional partnership was formed to pool resources and create a uniform hazard mitigation strategy that can be applied consistently to the defined planning area and used to ensure eligibility for specified grant funding success.

The comment period is open from August 10 through August 24. Comments may be directed to Thomas Jordan, Emergency Services Coordinator, at tjordan@marinsheriff.org.



The Local Hazard Mitigation Plans helps government agencies lessen the impact of natural disasters such as flooding.

Figure 4 - Plan Review Article Pt Reyes Light



County seeks feedback for disaster plan update

By Silas Valentino
12/01/2016

Imagine that you are building a sandcastle near a rising tide. To counteract the risk of destruction from incoming waves, you dig a moat to combat disaster if and when it occurs. This is the visual Tom Jordan, emergency services coordinator for the Marin County Sheriff's Office, used to describe emergency mitigation planning during a public workshop in Point Reyes Station last week. "It's us considering the risks and strategy" so that when a catastrophe hits, Marin will be better prepared to receive aide, he said. And, he added, "rich uncle FEMA wants to know of our effort." The Federal Emergency Management Agency requires that state, local and tribal governments update their disaster mitigation plans every five years, and the Marin County Multi-Jurisdiction Local Hazard Mitigation Plan is on track for its spring 2017 deadline. The plan is a partnership between the Marin County Sheriff's Office, the Marin County Fire Department, the Marin County Department of Public Works and the Marin County Community Development Agency. As part of the update, Mr. Jordan wrapped up a series of outreach workshops that described the update process, and solicited public comment through an online survey. He said he expects to receive more than 200 individual responses to the survey, which is available at surveymonkey.com/r/VES_Session1. The short survey asks participants to define which hazard they believe is the greatest threat in their area—earthquake, tsunami, flood or fire—and it provides information about how to prepare for those disasters. "The mood on the [update] process and eventual plan is positive," Mr. Jordan said.

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Appendix F

Plan Maintenance

The Planning Committee has developed the following revised approach to the MCM LHMP plan maintenance. In addition to hosting quarterly review meetings, every 12 months from plan adoption the Marin County Sheriff's OES will email each member of the Planning Committee an Annual Review Questionnaire to complete. The Annual Review Questionnaire will include the following requests:

- 1) Provide a summary of any hazard events that occurred during the prior year and their impact on your community.
- 2) Provide a review of successful mitigation initiatives identified in your jurisdictions existing/prior LHMP (if applicable). Provide comment on why targeted strategies were not completed.
- 3) 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).
- 4) Provide recommendations for new projects.
- 5) Provide recommended changes in, or potential for, new funding options (e.g. grant opportunities).
- 6) Provide recommendation on integration of new data such as GIS data and mapping used to inform the Plan.
- 7) Identify the impact of any other planning programs or initiatives within the community that involve hazard mitigation.
- 8) Attach any additional important notes on vulnerability analysis and hazard mitigation planning for your community (e.g. attach annual reports regarding plan implementation).

The Marin County Sheriff's OES will collect all completed questionnaires and determine if the MCM LHMP needs to be updated to address new or more threatening hazards, new technical reports or findings, and new or better-defined mitigation projects. The Marin County Sheriff's OES will summarize these findings and email them out to the Planning Committee. If the Marin County Sheriff's OES believes that the MCM LHMP needs to be updated based on the findings, then department will request that the Planning Committee attend a MCM LHMP update meeting.

In addition, the implementation strategy will be monitored and updated through the use of the Mitigation Project Progress Report or a FEMA annual report. During each annual review, each department or agency currently administering a FEMA mitigation project will submit a progress report or quarterly reports to the Marin County Sheriff's OES to review and evaluate. The

progress report will discuss the current status of the mitigation project, including any changes made to the project, identify implementation problems, and describe appropriate strategies to overcome them. After considering the findings of the submitted progress reports, the Marin County Sheriff's OES may request that the implementing department or agency meet to discuss project conditions.

In addition to quarterly meetings, the Annual Review Questionnaire, the Mitigation Project Progress Report or FEMA annual report, and any other meetings, the Planning Committee will reinitiate the plan update process MCM LHMP every 4 years to meet the 5 year planning cycle. To ensure that this update occurs, within the first six months of the fourth year following plan adoption, the Planning Committee will undertake the following update process activities:

- ☐ Research funding available to assist in MCM LHMP update (and apply for funds that may take up to one year to obtain)
- ☐ Thoroughly analyze and update the risk of natural hazards in the communities of Marin County
- ☐ Complete a new Annual Review Questionnaire and review previous questionnaires
- ☐ Provide a detailed review and revision of the mitigation strategy
- ☐ Prepare a new implementation strategy
- ☐ Prepare a new draft MCM LHMP and submit it to the local participants governing bodies for adoption
- ☐ Submit an updated MCM LHMP to CalOES and FEMA for approval
- ☐ Submit approved MCM LHMP to governing bodies of each jurisdiction participating in the plan

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Table G-1. Vulnerability of Structures in Unincorporated Marin

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	19,441	100%	3057	100%	368	100%	12	100%	17	100%
Flood	3350	17%	353	12%	142	39%	12	100%	4	23.5%
Fire	15022	77%	2180	71%	240	65%	1	8%	4	23.5%
Tsunami	1485	8%	247	8%	96	26%	11	92%	2	11.8%
Landslide	3432	18%	545	18%	36	10%	0	0%	2	11.8%
Dam Inundation	524	3%	86	3%	61	17%	0	0%	0	0%

Table G-2. Vulnerability of Transportation in Unincorporated Marin

	Roads		Railroads	
	Miles	% of Total	Miles	% of Total
Earthquake	945	100%	8	100%
Flood	175	19%	8	100%
Fire	450	48%	1	13%
Tsunami	68	7%	1.2	15%
Landslide	392	41%	0	0%
Dam Inundation	48	5%	0	0%

Table G-3. Vulnerability of Communication in Unincorporated Marin

	MERA	
	Number	% of Total
Earthquake	6	100%
Flood	0	0%
Fire	1	16%
Tsunami	0	0%
Landslide	4	67%
Dam Inundation	0	0%

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Table G-4. Vulnerability of Power in Unincorporated Marin

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Miles	% of Total	Miles	% of Total
Earthquake	14	100%	6	100%	2	100%	65	100%	22.2	100%
Flood	8	57.1%	2	33.3%	0	0%	7.5	11.5%	1.4	6.3%
Fire	7	50%	3	50%	2	100%	9.5	14.6%	3.3	14.9%
Tsunami	2	14.3%	0	0%	0	0%	4	6.2%	0	0%
Landslide	3	21.4%	1	16.7%	0	0%	20.6	31.7%	1.7	7.7%
Dam Inundation	1	7.1%	1	16.7%	0	0%	1.6	2.5%	0	0%

Table G-5. Vulnerability of Water/Sewage in Unincorporated Marin

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	3	100%		
Flood	1	33.3%		
Fire	2	66.7%		
Tsunami	0	0%		
Landslide	0	0%		
Dam Inundation	0	0%		

Table G-6. Vulnerability of Critical Facilities in Unincorporated Marin

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	21	100%	26	100%	12	100%	2	100%
Flood	3	14.3%	1	3.8%	0	0%	2	100%
Fire	9	42.9%	16	61.5%	3	25%	0	0%
Tsunami	1	4.8%	1	3.8%	0	0%	0	0%
Landslide	1	4.8%	3	11.5%	0	0%	0	0%
Dam Inundation	1	4.8%	3	11.5%	2	16.7%	0	0%

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Table G-7. Unincorporated Marin County Human and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department or Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s) and technical staff with knowledge of land development, land management practices, and natural hazards.	Community Development Agency, Department of Public Works	<p>Develops and maintains the General Plan, including the Safety Element.</p> <p>Develops area plans based on the General Plan, to provide more specific guidance for the development of more specific areas.</p> <p>Reviews private development projects and proposed capital improvements projects and other physical projects involving property for consistency and conformity with the General Plan.</p> <p>Anticipates and acts on the need for new plans, policies, and Code changes.</p> <p>Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.</p>
Engineer(s), Building Inspectors/Code Enforcement Officers or other professional(s) and technical staff trained in construction requirements and practices related to existing and new buildings.	Community Development Agency, Department of Public Works	Oversees the effective, efficient, fair, and safe enforcement of the California Building Code
Engineers, construction project managers, and supporting technical staff.	Community Development Agency, Department of Public Works	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff.	Department of Public Works	Maintains and operates of a wide range of local equipment and facilities as well as providing assistance to members of the public. These include providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights and traffic signals.
Floodplain Administrator	Department of Public Works	Reviews and ensures that new development proposals do not increase flood risk, and that new developments are not located below the 100 year flood level. In addition, the Floodplain Administrator is responsible for planning and managing flood risk reduction projects throughout the local jurisdiction.
Emergency Management	Sheriff Office of Emergency Services	Maintains and updates the Emergency Operations Plan for the local jurisdiction. In addition, coordinates local response and relief activities within the Emergency Operation Center, and works closely with local, state, and federal partners to support planning and training and to provide information and coordinate assistance.
Procurement Services Manager	GSA	Provides a full range of municipal financial services, administers several licensing measures, and functions as the local jurisdiction's Procurement Services Manager.

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Table G-8. Marin County Financial Resources for Hazard Mitigation

Type	Subtype	Administrator	Purpose	Amount
Local	General Fund	WPD Director	Program operations and specific projects.	Variable.
	WPD/Property Tax, Land Development fees		IWPP/CIP	
Federal	Hazard Mitigation Grant Program (HMGP)	Federal Emergency Management Agency (FEMA)	Supports pre- and post-disaster mitigation plans and projects.	Available to California communities after a Presidentially declared disaster has occurred in California. Grant award based on specific projects as they are identified by eligible applicants.
	Pre-Disaster Mitigation (PDM) grant program	FEMA	Supports pre-disaster mitigation plans and projects.	Available on an annual basis as a nationally competitive grant. Grant award based on specific projects as they are identified (no more than \$3M federal share for projects).
	Flood Mitigation Assistance (FMA) grant program	FEMA	Mitigates repetitively flooded structures and infrastructure.	Available on an annual basis, distributed to California communities by the California Office of Emergency Services (Cal OES). Grant award based on specific projects as they are identified.
	Assistance to Firefighters Grant (AFG) Program	FEMA/USFA (U.S. Fire Administration)	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards.	Available to fire departments and nonaffiliated emergency medical services providers. Grant awards based on specific projects as they are identified.
	Community Block Grant Program Entitlement Communities Grants	U.S. HUD (U.S. Department of Housing and Urban Development)	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.	Available to entitled cities. Grant award based on specific projects as they are identified.

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

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Table G-9. Marin County, Legal and Regulatory Resources for Hazard Mitigation

Regulatory Tool	Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Mitigation, Preparedness, Response, or Recovery	Affects Development in Hazard Areas?
Plans	Countywide Plan: Water Resources, Environmental Hazards, and Public Safety Sections (2007, updated 2015)	Describes hazard areas and regulates current and future development based on known hazard areas.	Earthquake, landslides, fires, flooding	Mitigation & Preparedness	Yes
	Local Coastal Program (last updated 1981)	Pursuant to the California Coastal Act, Marin County's Local Coastal Program guides land use and development to ensure protection of public access and other coastal resources along Marin County's Pacific coastline. Included is a hazards section with policies that guide development standards and project review for areas subject to hazards including flooding, bluff retreat, earthquakes, and coastal erosion.	Earthquake, flooding, coastal erosion, landslides	Mitigation & Preparedness	Yes
	City/District Emergency Response Plan or Emergency Operations Plan	Describes what the local jurisdiction's actions will be during a response to an emergency. Includes annexes that describe in more detail the actions required of the local jurisdiction's departments/agencies. Further, this plan describes the role of the Emergency Operation Center (EOC) and the coordination that occurs between the EOC and the local jurisdiction's departments and other response agencies. Finally, this plan describes how the EOC serves as the focal point among local, state, and federal governments in times of disaster.	Varied	Response	No
Plans (cont)	Area Housing Authority Organizational Emergency Response Plan	Enhances the Area Housing Authority's ability to effectively respond to emergencies by establishing procedures and assigning responsibilities	Seismic events, wildfire, floods and mudslides, train derailment, dam failure, hazardous spills, terrorism, transportation accidents, plan crashes	Preparedness, Response and Recovery	No
	Marin Stormwater Resource Plan (SWRP)	SWRP is a watershed-level resource planning document covering the County and Marin's 11 cities that describes watershed issues, identifies project opportunities with multiple benefits, and creates a prioritized list of project opportunities	Stormwater	Mitigation & Preparedness	Yes

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		based on quantifying multiple benefits.			
Policies	Code of Ordinances	The purpose of this code is to establish the minimum requirements to safeguard the public health, safety, and general welfare through structural strength, means of egress facilities, stability, access to persons with disabilities, sanitation, adequate lighting and ventilation and energy conservation, and safety to life and property from fire and other hazards attributed to the built environment; to regulate and control the demolition of all buildings and structures, and for related purposes.	Flooding, Wildfire, Earthquake	Mitigation, Preparedness, and Response	Yes

The following actions were included in the County of Marin's prior local hazard mitigation plan. Many of these actions are being implemented by the Marin County Flood Control & Water Conservation District which is staffed by the County of Marin. Table G-10. Evaluation of Existing County of Marin and Marin County Flood Control & Water Conservation District Current and Potential Hazard Mitigation Projects and Programs indicates the status of these actions. Table G-11. Current and Potential Hazard Mitigation Projects and Programs to be carried out by or in partnership with County of Marin and/or Marin County Flood Control & Water Conservation District includes details and actions being considered in addition to those in Table 4-2. Potential Common Mitigation Actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables G-1 through G-6).

Table G-10. Evaluation of Existing County of Marin and Marin County Flood Control & Water Conservation District Current and Potential Hazard Mitigation Projects and Programs

Status	Project or Program Name and Description	Timeline
Ongoing	<p>Seismic Retrofit of County-owned buildings not current to code.</p> <p>Goal is for all County-owned buildings to comply with current codes and standards for public safety.</p> <p>The specific work plan for implementation of the project will be informed by the seismic data assessment and asset management database creation underway over the next 3-5 years.</p> <p>Next steps for County-owned buildings include working on the jail and Hall of Justice at the Civic Center, and the Fire and Sheriff station at Point Reyes Station. The next MCM LHMP should include a project for input of the seismic assessment data into a database. Individual building projects are being identified through the seismic assessment.</p> <p>Public Works is currently working on several facility renovations and design projects on County facilities:</p> <p>(1) West Marin Service Center, Point Reyes Station: Expansion of existing facility that includes additional office areas, interview rooms, a community room,</p>	2012-2025

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	<p>and other utility upgrades. Upon completion in mid-2018, the facility will comply with the 2013 California Building Code.</p> <p>(2) Civic Center Roof Replacement: The complete removal of all adhered roofing systems, repair of the concrete domes, and installation of a new roofing system. Inspection of the existing structural concrete of the roof domes will be undertaken during the project.</p> <p>(3) Tomales Fire Station- Replacement: Project is currently under design and consists of the complete replacement of the current 3,500 sf facility with a new, 8,600 sf state-of-the art fire station. All design will comply with the existing CA Building Code.</p> <p>(4) 120 N. Redwood- Seismic Assessment: DPW coordinated a seismic assessment of the facility in late 2017 for a required Employment Development Department (EDD) certification.</p> <p>(5) Marin Center- Seismic Assessment of the Veteran's Memorial Auditorium & Exhibit Hall: Seismic Assessments of these two facilities, which are part of the County's Marin Center campus (i.e., cultural events center, fairgrounds, and conference/convention facility). The assessment will guide future strategic planning for improvements within the campus. Currently seeking HMGP funding for implementation of seismic retrofits.</p> <p>Additionally, the Marin County Flood Control and Water Conservation District is preparing to implement seismic upgrades (bolting and anchoring pumps and roof) to the Cove Pump Station building in Tiburon. Staff also continue gathering available seismic assessment data on County-owned (and possibly leased sites in the future) facilities. This information will be brought into an asset management database, which is in the early stages of development, and will support risk assessment and work plan development</p>	
Ongoing	<p>Ross Valley 10 Year Work Plan</p> <p>Initiated environmental review for the overall program as well as several projects, and made progress on feasibility studies for key flood risk reduction projects. Due to high level of public outreach and inter-agency coordination required, work plan will be reduced in scope and timeline will extend beyond 2022, to at least 2027.</p>	2012 to 2027 and likely beyond
Ongoing	<p>Marin County Watershed Program</p> <p>1st phase complete. Completed 16 studies as part of 1st phase and identified potential projects in Novato, Gallinas, Richardson's Bay, and Stinson Beach watersheds. Second phase is yet to be funded.</p>	<p>Phase 1 – 2008 to 2017</p> <p>Phase 2 - TBD</p>
Ongoing	<p>Las Gallinas Levee Evaluation</p> <p>Completed Phase 1 of Evaluation and prepared preliminary design for system improvements (funding shortfall identified). Next phase of evaluation on hold indefinitely due to U.S. Army Corps of Engineers program limitations. With grant funding from other sources, would proceed with smaller-scale system improvements. A 2016 request for FEMA HMGP funding for "spot improvements" of the system was denied, and the request was resubmitted in 2017 for system-wide improvements (pending review). If FEMA funding is approved, levee system improvements could be made as early as 2020.</p>	<p>Phase 1 – 2008 to 2014</p> <p>Phase 2 - TBD</p>
Ongoing	<p>Marin County Structure Elevation Program</p> <p>For individual homeowners to elevate their homes above the base flood elevation with FEMA HMA funding.</p> <p>Advertised program and submitted funding applications to CalOES/FEMA for homes across the County (both incorporated and unincorporated).</p> <p>If FEMA funding is approved, could proceed with home elevation projects at up to 16 homes as early as 2019. Program may be ongoing.</p>	2016 to TBD

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Table G-11. Current and Potential Hazard Mitigation Projects and Programs to be carried out by or in partnership with County of Marin and/or Marin County Flood Control & Water Conservation District

No.	Description	Hazard Addressed	New or Existing Construction	Responsible Agency	Potential Funding Source	Timeline
1	Acquire electric bikes and safety equipment for official use during major disasters such as earthquakes to facilitate transportation and response.	All	New	Any and All Departments	State and Federal Grants, local matching funds potential	0-5 years
2	Marin Center Facilities Seismic Retrofits - two significant structures of the Marin Center, the Veterans' Memorial Auditorium and the Marin Exhibit Center, do not meet the Basic Performance Objective for Existing Buildings (BPOE), defined in the ASCE 41 standard for Seismic Evaluation and Retrofit of Existing Buildings, and the performance objective required by the California Building Code. The proposed intervention will correct the identified seismic deficiencies and improve the seismic performance to meet the performance objective for State-owned buildings of the California Building Code.	Earthquake	Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5 years
3	San Anselmo Flood Risk Reduction Project (formerly Memorial Park - includes Building Bridge #2 and the Former Sunnyside Nursery flood diversion and storage basin)	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
4	Corte Madera Creek Flood Risk Management Project, Phase I (Formerly Phoenix Lake detention basin)	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
5	Azalea Ave Bridge Replacement	Flood	Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
6	Nokomis Ave Bridge Replacement	Flood	Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
7	Madrone Ave Bridge Replacement	Flood	Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
8	Winship Bridge Replacement	Flood	Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
9	Sycamore Ave Bridge Replacement	Flood	Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds	0-5 years

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					potential	
10	Lower Corte Madera Creek Improvements- Hillview Drainage	Flood	New	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
11	Continue supporting the Sonoma County Water Agency led Advanced Quantitative Precipitation Information effort. DWR and potentially FEMA grant funding will be used to place new X-band radar units throughout the Bay Area to provide more precise rainfall forecasting for atmospheric rivers.	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
12	Restore Pacheco Pond and peak flood flow diversion to wetlands to improve water quality and habitat. Upgrade tide gates.	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5+ years
13	Restore Deer Island Basin to Full Tidal Conditions.	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	3-5 years
14	Rush Creek Drainage Improvements	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	2-3 years
15	Novato Levee Evaluation, Improvements, and Repairs	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	Ongoing, 0-5 years
16	Upgrade stormwater pump stations: Farmers, Cheda, and Lynwood.	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	Varies, 0-5 years
17	Simmons Slough Water Management System – Flood risk Reduction Project	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	2-3 years
18	City of Novato Drainage Improvements per Storm Drain Masterplan	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
19	Encourage property owners located in the dam or levee inundation hazard areas to purchase voluntary flood insurance.	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	Ongoing,
20	Build Flood Flow Bypass from Easkoot Creek. Likely to include wetland and riparian habitat restoration.	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds	5-10 years

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					potential	
21	Santa Venetia Timber-Reinforced Berm Improvement Project	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
22	Meadow Drive Interceptor and Ditch Upgrades	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
23	Santa Venetia Pump Station No. 4 Upgrades	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	~5 years
24	Pump Station No. 2 Upgrade, Outfall Rehabilitation, and interconnection to Pump Station No. 1	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5+ years
25	Pump Station No. 5 Upgrade (including address leaking tide gate adjacent)	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
26	Corrillo Drive Pipe Rehabilitation and Gate	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	1-2 years
27	Santa Venetia and Rafael Meadows Street Drain Upgrades	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
28	Gallinas Creek Geomorphic Dredge to support navigation and storm drain outfall.	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5 years
29	McInnis Park Wetland Restoration	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5 years
30	Levee Setback and Upgrade Project, Wetland Restoration on County property near San Rafael Airport.	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	unknown
31	Pump Station No. 1 Upgrade (SCADA)	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5 years
32	Estancia Ditch and Pump Station Upgrades	Flood	New and Existing	Public Works/ Flood	State and Federal Grants, local matching funds	0-5 years

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				Control	potential	
33	Cove Pump Station Improvements, including generator installation	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-1 year
34	Tiburon Street Drainage Improvements	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	unknown
35	Karen Way Ditch Improvements	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5-years
36	Strawberry Levee Improvements	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5-years
37	West Creek Flood Wall	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5+ years
38	East Creek Outfall Modifications (tidal)	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	3 years
39	Mill Valley Comprehensive Flood Control & Drainage Master Plan	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	3 years
40	Coyote Creek Levee Improvements	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5 years
41	Marin City Drainage Improvements	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
42	Richardson Bay Shoreline Protection	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5+ years
43	Bothin Marsh Restoration and Beneficial Reuse of Coyote Creek sediments (removed for flood control)	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5+ years
44	Manzanita Modifications (Caltrans)	Flood	New and Existing	Public Works/ Flood	State and Federal Grants, local matching funds	ongoing

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				Control	potential	
45	Lower Ryan Creek Pump Station Study and Upgrades	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5+ years
46	Crest Marin, Cardinal, and Shoreline Pump Station Upgrades	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	3-5 years
47	Arroyo Corte Madera del Presidio Riverine Flood Risk Reduction	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5 years
48	Flood Preparedness Pilot Program	Flood	New and Existing	Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
49	Consider sea level rise adaptation findings and recommendations from CSMART	Flood	New and Existing	Community Development/ Public Works/ Flood Control	State and Federal Grants, local matching funds potential	Ongoing
50	Initiate Community Plans for Adapting to Coastal Hazards in conjunction with community members and asset managers for site scale planning around vulnerable assets of community wide importance (roadways, utilities, etc.). Specific tasks may include identifying subarea boundaries for prioritization based on flood frequency, impacts and more; and conduct engineering studies with cost estimates to evaluate alternatives which may include armoring, elevation, realignment, etc.	Flooding (coastal)	Existing – focus should be on existing infrastructure.	Community Development/ Public Works/ Flood Control	State and Federal Grants, local matching funds potential	Ongoing
51	Develop a "Homeowners Guide to Flood Preparedness" to help property owners navigate regulatory system and funding opportunities to retrofit homes to accommodate sea level rise and storms. Topics could cover the County Permitting process, permit development requirements, agency compliance (FEMA, CA Coastal Commission) and technical information and guidance on home retrofitting options including elevation and floodproofing. The Guide could be mailed to homeowners, available in libraries, posted online and presented in public workshops.	Flooding (coastal and riverine)	Existing – residential and commercial buildings subject to current and/or future flooding.	Community Development/ Public Works/ Flood Control	State and Federal Grants, local matching funds potential	0-5 years
52	Follow all four phases of FEMA's How-to-Guide: "Integrating Historic Property and Cultural Resource Considerations into	All	Existing – historic buildings and other	Community Development/ Public Works/ Flood	State and Federal Grants, local matching funds	0-5 years

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	Hazard Mitigation Planning" to develop and implement a mitigation plan for at risk cultural resources.		cultural resources exposed to hazards	Control	potential	
53	Conduct a comprehensive finished floor-elevation inventory to fully assess West Marin building flood vulnerabilities.	Flooding (coastal and riverine)	Existing	Community Development/ Public Works/ Flood Control	State and Federal Grants, local matching funds potential	5 years?
54	Protect and restore natural buffers which may include wetland and beach/dune habitat.	Flooding (coastal and riverine)	Existing	Community Development/ Marin County Parks and OpenSpace District/ Public Works	State and Federal Grants, local matching funds potential	Ongoing
55	Assess bulkheads surrounding Tomales Bay to determine their structural integrity and continued capability to protect surrounding homes, roadways and other assets from flooding.	Flooding (coastal)	Existing	Community Development	State and Federal Grants, local matching funds potential	Ongoing
56	Establish additional local funding mechanisms for increased flood and fire mitigation.	Fire	Existing	Marin County Fire/ Community Development/ Marin County Parks and OpenSpace District/ Public Works	State and Federal Grants, local matching funds potential	Ongoing

APPENDIX H

City of Belvedere

Appendix H

City of Belvedere

City of Belvedere

The City of Belvedere had an estimated population of 2,068 in 2010, with 1,045 housing units in the City. The City has a total area of 2.406 square miles. The median income for a household in the City was \$130,796 and the per capita income for the City was \$113,595. Approximately 2.9 percent of families and 5.7 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Belvedere was incorporated as a city in 1896.

Table H-1. Vulnerability of Structures in Belvedere

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	773	100%	87	100%	11	100%	0	N/A	1	100%
Flood	334	43%	41	47%	9	82%	0	N/A	0	0%
Fire	493	64%	51	59%	5	45%	0	N/A	1	100%
Tsunami	339	44%	42	48%	9	82%	0	N/A	0	0%
Landslide	93	12%	14	16%	0	0%	0	N/A	0	0%
Dam Inundation	0	0%	0	0%	0	0%	0	N/A	1	100%

Table H-2. Vulnerability of Transportation in Belvedere

	Roads		Ferry Landing		Railroad	
	Miles	% of Total	Number	% of Total	Miles	% of Total
Earthquake	13	100%	1	100%	0	N/A
Flood	4	31%	1	100%	0	N/A
Fire	10	77%	0	0%	0	N/A
Tsunami	5	38%	1	100%	0	N/A
Landslide	3	23%	0	0%	0	N/A
Dam Inundation	0	0%	0	0%	0	N/A

Table H-3. Vulnerability of Communication in Belvedere

	MERA	
	Number	% of Total
Earthquake	0	N/A
Flood	0	N/A
Fire	0	N/A
Tsunami	0	N/A
Landslide	0	N/A
Dam Inundation	0	N/A

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Table H-4. Vulnerability of Power in Belvedere

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Flood	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Fire	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Landslide	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A

Table H-5. Vulnerability of Water / Sewage in Belvedere

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A
Flood	0	N/A	0	N/A
Fire	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A
Landslide	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A

Table H-6. Vulnerability of Critical Facilities in Belvedere

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	0	0	1	100%	1	100%	0	N/A
Flood	0	0	0	0%	0	0%	0	N/A

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Fire	0	0	0	0%	0	0%	0	N/A
Tsunami	0	0	1	100%	0	0%	0	N/A
Landslide	0	0	0	0%	0	0%	0	N/A
Dam Inundation	0	0	0	0%	0	0%	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table H-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables H-1 through H-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table H-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table H-7. Evaluation of Prior Mitigation Actions in Belvedere

Action Number / Name	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan
2011 ABAG Plan Annex Strategy Priorities					
Implement the goals and objectives set forth in the Flood Mitigation Plan		X		X	X
Fund study and possible repair to elevation of rip rap at Bay, adjacent to San Rafael Avenue		X		X	X
Update Tiburon Peninsula Joint Disaster Plan		X		X	X
Educational and training outreach to community regarding disaster preparedness, personal awareness, and flood insurance		X		X	X
Update staff training under SEMS & other applicable disaster response training programs		X		X	X
Develop recommendations based on future California or US Geological landslide & tsunami mapping & studies		X		X	X
Implement recommendations based on future California or US Geological landslide & tsunami mapping & studies		X		X	X

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City of Belvedere

2011 Flood Mitigation Plan Objectives					
Objective 1: Obtain FEMA Accreditation of the Beach Road and San Rafael Avenue Levees and Revision of the FEMA Flood Insurance Rate Map					
Feasibility Study for Beach Road and San Rafael Avenue Levees		X		X	X
Hydrology/Hydraulic Study of Interior Drainage System		X		X	X
Permit, Design, and Construct Modifications to Levees and Improvements to Interior Drainage System		X		X	X
FEMA Accreditation of Levees		X		X	X
Objective 2: FEMA's Community Rating System					
Implement System		X		X	X
Objective 3: Update and Enforce City Codes and Ordinances to Minimize the Flood Hazard Risk					
Continue to enforce the City Flood Ordinance		X		X	X
Continue to comply with all requirements of the NFIP		X		X	X
Explore potential for enhancing current building codes or design standards that will result in reduced surface runoff to interior drainage system		X		X	X
Objective 4: Increase the mitigation capability of residents, business owners, and others who could be affected by floods					
Continue to use the TENS flood warning system		X		X	X
Continue Get Ready		X		X	X
Explore use of Belvedere Lagoon for flood protection		X		X	X
Objective 5: Increase the City's Capabilities to Respond and Recover from Emergencies and Disasters Caused by Flood Hazards					
Develop/Disseminate Warning Protocols/Procedures		X		X	X

Table H-8. Current and Potential Hazard Mitigation Projects and Programs

Ongoing Mitigation Activities	Responsible Department or Agency	Timeframe	Funding
Fund study and possible repair to elevation of rip rap at Bay, adjacent to San Rafael Avenue	City Engineer	5-year	Not Identified
Update Tiburon Peninsula Joint Disaster Plan	City Manager, Joint Disaster Council & Town of Tiburon	5-year	Not Identified
Educational and training outreach to community regarding disaster preparedness, personal awareness, and flood insurance	City Manager &	5-year	Not Identified

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	Joint Disaster Council		
Update staff training under SEMS & other applicable disaster response training programs	City Manager	Ongoing	Not Identified
Develop recommendations based on future California or US Geological landslide & tsunami mapping & studies	City Engineer	Unknown	Unknown
Implement recommendations based on future California or US Geological landslide & tsunami mapping & studies	City Engineer	Unknown	Unknown
Feasibility Study for Beach Road and San Rafael Avenue Levees	City Engineer/Public Works	5-year	General Fund
Hydrology/Hydraulic Study of Interior Drainage System	City Engineer/Public Works	5-year	General Fund
Permit, Design, and Construct Modifications to Levees and Improvements to Interior Drainage System	City Engineer/Public Work	5-year	T.B.D.
FEMA Accreditation of Levees	City Engineer/Public Work	5-year	N/A
Implement FEMA Community Rating System	Planning/Building	5-year	General Fund
Explore potential for enhancing current building codes or design standards that will result in reduced surface runoff to interior drainage system	Planning/Building, Public Works	Ongoing	General Fund
Continue to use the AlertMarin flood warning system	Police, Marin County Office of Emergency Services	Ongoing	General Fund
Continue Get Ready	Police, Tiburon Fire Protection District	Ongoing	General Fund
Explore use of Belvedere Lagoon for flood protection	City Engineer/Public Works, BLPOA	5-year	General Fund
Develop/Disseminate Warning Protocols/Procedures	Police	5-year	General Fund
Continue Disaster Preparedness Website	City Website Manager, Tiburon Fire Protection District	Ongoing	General Fund
Continue Joint Disaster Advisory Council	City Councils of Belvedere and Tiburon	Ongoing	General Fund
Disaster Preparedness Education	City Manager & Joint Disaster Council	Ongoing	General Fund
Block Captain Program	City Manager & Joint Disaster Council	Ongoing	General Fund
Sand Bag Program	City Manager & Joint Disaster Council	Ongoing	General Fund
Dead Tree Removal	Public Works	Ongoing	General Fund
Sea Wall Repair Renovation (two projects)	Public Works	Ongoing	General Fund
New Mitigation Activities	Responsible Department or Agency	Timeframe	Funding
Evacuation decal project with Tiburon	City Manager & Joint Disaster Council	5-year	General Fund

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City of Belvedere

Culvert repair/replacement on San Rafael Ave at Lagoon where flooding occurred. (Belvedere-Tiburon joint project)	Public Works	5-year	General Fund
Beach Road sea wall repair renovation phase 1	Public Works	5-year	General Fund
Phase 2 sea wall long-term sustainability project. Identify and implement flood and sea level rise protection for island residents and lagoon properties	Public Works	5-year	Unknown
Sidewalk repairs	Public Works	Ongoing	General Fund
Hillside stability database/rating system	Public Works	Unknown	Unknown
Program or protection against damage from loose boats in Richardson Bay	Public Works	Unknown	Unknown

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City of Belvedere

Table H-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	2010 General Plan 'Belvedere 2030'	The General Plan outlines long-term direction for development and policy. It describes hazard areas and regulates current and future development based on known hazard areas. As this plan gets updated there is potential to improve it with updated risk information and strategies.
Plan	Hazard Mitigation Plan 2011 ABAG Annex	This Hazard Mitigation Plan and its predecessors identify risks from natural hazards present in the City/Town and includes strategies to reduce these risks.
Plan	Capital Improvement Plan	The Capital Improvement Plan (CIP) directs construction activities for City owned facilities and infrastructure for the next five years. Mitigation actions may involve construction of new or upgraded facilities and infrastructure. As this plan gets updated there is potential to improve it with updated strategies.
Plan	2011 Flood Mitigation Plan	This plan includes more specific information on Flood Mitigation, including listing additional resources, goals, strategies, and actions.
Policy	Zoning Ordinance	The Zoning Ordinance implements the General Plan by establishing specific regulations for development. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the Zoning Ordinance.
Policy	Municipal Code	<p>The Muni Code includes several sections that address hazard mitigation.</p> <p>Title 2: Administration and Personnel; Chapter 2.32 Disaster Council and Emergency Services</p> <p>This Chapter provides for the preparation and carrying out of plans for the protection of persons and property within this City in the event of an emergency; the direction of the emergency organization; and the coordination of the emergency functions of this City with all other public agencies, corporations, organizations and affected private persons.</p> <p>Title 8: Health and Safety; Chapter 8.36 Urban Runoff and Pollution Prevention; Section 8.36.100 Watercourse Protection</p> <p>This Section requires property owners to keep watercourse that pass through private properties free of obstructions that could retard the flow of water through the watercourse and not modify the natural flow of water in a watercourse.</p> <p>Title 16: Building and Construction; Chapter 16.20 Flood Damage Prevention</p> <p>This Chapter prevents or minimizes flood damage in flood hazard areas by regulating construction and other land use activities.</p>
Administrative	Administrative Services Department	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	City Planning, Building, and Public Works Departments	These departments are responsible for planning and building related activities including issuing permits, conducting environmental review, preparing planning documents, and addressing housing issues. Mitigation activities related to planning and building can be implemented by this department. Public Works Department is responsible for City-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Personnel	City Police Department	The Belvedere Police Department conducts emergency preparedness activities for the community. Mitigation activities related to emergency preparedness can be implemented by the Police Department.

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Personnel	Tiburon Fire Protection District	The Tiburon Fire District protects the town of Tiburon, the city of Belvedere, and the surrounding area. The Fire District's boundaries represent a diverse community with responsibility for commercial, residential, wildland / urban interface, and parts of the San Francisco Bay. The Fire Protection District supports implementation of mitigation actions that reduce the risk of wildfire.
Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and fund the personnel resources above as well as capital improvement projects.
Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that are being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	City Block Captain Program	The block-captain program trains volunteers throughout the community to act as a conduit between neighbors and emergency services in the case of a disaster
Training and Outreach	Community Rating System Working Group	The Community Rating System (CRS) is a voluntary program for communities participating in the National Flood Insurance Program (NFIP) to earn flood insurance premium reductions for property owners. A Countywide collaboration of CRS community staff has been started in recent years and has led to shared resources including outreach materials and floodplain management training. This collaboration has the potential to expand and lead to a wide variety of flood mitigation activities.
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)

APPENDIX I

Town of Corte Madera

Appendix I

Town of Corte Madera

Town of Corte Madera

The Town of Corte Madera had an estimated population of 9,253 in 2010, with 4,026 housing units in the Town. The Town has a total area of 4.406 square miles. The median income for a household in the Town was \$79,839 and the per capita income for the Town was \$46,326. Approximately 2.7 percent of families and 4.5 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Corte Madera was incorporated in 1916.

Table I-1. Vulnerability of Structures in Corte Madera

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	2,538	100%	716	100%	106	100%	5	100%	0	N/A
Flood	975	38%	114	16%	81	76%	5	100%	0	N/A
Fire	1253	49%	204	28%	18	17%	0	0%	0	N/A
Tsunami	191	8%	40	6%	13	12%	1	20%	0	N/A
Landslide	479	19%	141	20%	4	4%	0	0%	0	N/A
Dam Inundation	0	0%	37	5%	7	7%	0	0%	0	N/A

Table I-2. Vulnerability of Transportation in Corte Madera

	Roads		Railroads		Ferry	
	Number	% of Total	Miles	% of Total	Number	% of Total
Earthquake	50	100%	0	0%	0	N/A

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Flood	24	48%	0	0%	0	N/A
Fire	25	50%	0	0%	0	N/A
Tsunami	4	8%	0	0%	0	N/A
Landslide	12	24%	0	0%	0	N/A
Dam Inundation	2	4%	0	0%	0	N/A

Table I-3. Vulnerability of Communication in Corte Madera

	MERA	
	Number	% of Total
Earthquake	0	N/A
Flood	0	N/A
Fire	0	N/A
Tsunami	0	N/A
Landslide	0	N/A
Dam Inundation	0	N/A

Table I-4. Vulnerability of Power in Corte Madera

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Miles	% of Total	Miles	% of Total
Earthquake	0	N/A	0	N/A	0	N/A	3.9	100%	2.9	100%
Flood	0	N/A	0	N/A	0	N/A	2.5	64.1%	1.5	51.7%
Fire	0	N/A	0	N/A	0	N/A	1.3	33.3%	1.2	41.4%

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Tsunami	0	N/A	0	N/A	0	N/A	1.2	30.8%	0	0%
Landslide	0	N/A	0	N/A	0	N/A	.6	15.4%	.6	20.7%
Dam Inundation	0	N/A	0	N/A	0	N/A	.5	12.8%	0	0%

Table I-5. Vulnerability of Water / Sewage in Corte Madera

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	0	N/A	10	100%
Flood	0	N/A	10	100%
Fire	0	N/A	0	N/A
Tsunami	0	N/A	5	50%
Landslide	0	N/A	2	20%
Dam Inundation	0	N/A	0	N/A

Table I-6. Vulnerability of Critical Facilities in Corte Madera

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	4	100%	4	100%	2	100%	0	N/A
Flood	2	50%	2	50%	0	0%	0	N/A
Fire	2	50%	0	0%	0	0%	0	N/A
Tsunami	1	25%	1	25%	0	0%	0	N/A
Landslide	0	0%	0	0%	0	0%	0	N/A
Dam Inundation	0	0%	0	0%	0	0%	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table I-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will

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continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables I-1 through I-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table I-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table I-7. Evaluation of Prior Mitigation Actions in Corte Madera

Action Number / Name	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
Mitigation Activities and Priorities from 2012					
Government Mitigation Strategies: As a member of the Marin Emergency Radio Authority (MERA), the Town participates in the decisions on management of the current county-wide, interagency emergency radio system. MERA, with the Town as participant, is also studying the replacement for the system as it reaches the end of its service life. Town employees have been offered CERT, Get Ready, and appropriate EOC training for their duties as disaster service workers. An updated General Plan was adopted which includes significant public safety components.		X		X	MLT-14
Education Mitigation Strategies: Education facilities in town are either under the Larkspur-Corte Madera School District, or are private. The Town has a close working relationship with the schools to facilitate disaster planning, exercises, and facility upgrades.		X			discard
Health Mitigation Strategies: The Town of Corte Madera is not responsible for health care facilities within the Town's boundaries. The Marin County Health Department would be the responsible agency, along with the State of California. We are in close cooperation with those entities to pre-stage disaster-related resources in town.		X			discard

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Economy Mitigation Strategies: The Town continues to review and adopt current California Building and Fire codes. The town also provides public disaster preparedness education to the business community to reduce the impact and aid the recovery of their economically-vital functions. We also work closely with the Chamber of Commerce in these endeavors.		X			Remove: response and recovery
Environmental Mitigation Strategies: The Town now requires Vegetation Management Plans (VMP) for development in the Wildland-Urban Interface (WUI) areas. This reduces the chance of a wildland fire igniting the structure(s) and reciprocally, wildland ignition from a structure fire. The Town also has been removing exotic, invasive, and hazardous species and replacing with native, safer vegetation.		X		X	For CM Annex
Housing Mitigation Strategies: The Town continues to review and adopt current California Building codes. A new 79 unit, multi-building, multi-story apartment building (affordable and green building components) was constructed. It meets or exceeds codes for seismic, flood, fire and other disaster scenarios. The Town has adopted the International Wildland Urban Interface Code and applied it to new construction and substantial remodel work.	X	X			CWPP standard supercedes
Earthquake natural gas valves are required in new construction or during substantial remodel work		X		X	For CM Annex
Infrastructure Mitigation Strategies: As new development occurs, roadways and driveways are required to be of minimal 12 to 20 foot width and with approved turnarounds and/or turnouts. The Town demolished a seismically unsafe sanitary district structure and constructed a new facility. Countywide GIS emergency response mapping was completed. A Mutual Threat Zone (wildland mutual aid) plan was developed. The water district has continued replacement and upsizing of water mains, tanks, and hydrants using funds from a district-wide bond. Utility undergrounding has been completed in the historic "Town Square" district. Completed public works improvement projects include replacement of aging sewer and storm drain pipes, pump stations, and facilities.	X	X		X	Carry road width forward, completed other, carry forward

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Land Use Mitigation Strategies: The Town continues to keep local ordinances compliant with the FEMA model ordinance, and applies flood ordinance provisions diligently. In addition to using FEMA maps to regulate flood hazard areas, the Town may require elevation certificates at the building permit stage to verify compliance with NFIP requirements.		X			Discard: following NFIP is implicit
Future Mitigation Activities and Priorities' from 2012					
The Town is developing a joint Emergency Operations Center (EOC) with the City of Larkspur. It will be located in a new Twin Cities Police Authority building (serving Corte Madera and Larkspur). The state of the art facility is scheduled for completion in January 2012. It will meet or exceed requirements for disaster resistance. The existing EOC will be retained as a back-up. A new internet-based mass notification/ information/education platform will be launched with the opening of the new facility.	X				EOC is shared with County
In 2014, the Town Council will adopt the 2013 California Building, Fire, Residential and other model codes which apply to all construction activity within the Town boundaries. The Codes incorporate public health, safety, energy, green building and access standards used in the design and construction of all buildings. The new code provisions will allow the Town to utilize the latest technologies, advances in construction standards and seismic design for use in new residential and commercial construction and in remodels.		X			Adopting current state building codes is implicit
The Town has historically been very focused on flood control mitigation. Capital improvement projects, as well as maintenance and upgrading of flood control and sewer facilities have been of very high priority. Currently however, the economic realities faced by government and private entities alike have delayed scheduled projects. It is anticipated that these projects will resume when funding is available.		X		X	Carry CIP forward to CM Annex
Ongoing Mitigation Strategy Programs' from 2012					
Continue to enforce and/or comply with State-mandated requirements, such as the California Environmental Quality Act		X			Implicit
Incorporate FEMA guidelines and suggested activities into local government plans and procedures for managing flood hazards		X		X	FLD-2

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Continue to participate in FEMA's National Flood Insurance Program and Community Rating System (CRS)		X		X	FLD-1
Continue to comply with all applicable building and fire codes as well as other regulations when constructing or significantly remodeling infrastructure facilities		X			Implicit
Continue to facilitate the distribution of emergency preparedness materials and trainings through the Corte Madera Fire Department. Evacuation shelter identification and management, CERT classes, Get Ready classes.		X			Discard- preparedness
Conduct periodic tests of the emergency sirens, AM radio station, and CERT emergency warning systems	X				Tech-nology has changed, see MLT 14
Continue to maintain the existing emergency operations center as a back-up		X			Discard, not mitigation specific-ally
Development of interoperable communications for first responders from cities, counties, special districts, state, and federal agencies.		X		X	MLT-14
Participation in general mutual-aid agreements and agreements with adjoining jurisdictions for cooperative response to fires, floods, earthquakes, and other disasters.		X			Discard, not mitigation specific-ally
Continue to repair and make structural improvements to storm drains, pipelines, and/or channels to enable them to perform to their design capacity in handling water flows as part of regular maintenance activities.		X		X	FLD-5
Programs to reduce the amount of flammable vegetation. Including weed wrench loaning, voluntary inspections and recommendations to property owners, free "chipper days" program, annual inspections and mandatory abatement program. Active participation in the local Fire Safe Marin council.		X		X	FIR-3
Fire code amendments to reduce the damage to structures from earthquake, landslide and fire. Including automatic natural gas shut-off valves and fire sprinklers for new and substantially remodeled structures.		X		X	Carry CIP forward to CM Annex

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Table I-8. Current and Potential Hazard Mitigation Projects and Programs

Action Number / Name	Responsible Agency	Potential Funding Source	Timeline
Corte Madera Mitigation Activities and Priorities from 2012			
Require Vegetation Management Plans (VMP) for development in the Wildland-Urban Interface (WUI) areas. This reduces the chance of a wildland fire igniting the structure(s) and reciprocally, wildland ignition from a structure fire. The Town also has been removing exotic, invasive, and hazardous species and replacing with native, safer vegetation.	Fire Department	Unknown	5-year
Earthquake natural gas valves are required in new construction or during substantial remodel work	Building Department	Unknown	5-year
As new development occurs, roadways and driveways are required to be of minimal 12 to 20 foot width and with approved turnarounds and/or turnouts.	Fire Department	Unknown	5-year
Implement projects identified in Capital Improvement Plan, such as maintaining & upgrading of flood control and sewer facilities.	Public Works	Unknown	5-year
Fire code amendments to reduce the damage to structures from earthquake, landslide and fire. Including automatic natural gas shut-off valves and fire sprinklers for new and substantially remodeled structures.	Fire Department	Unknown	5-year

Table I-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	2009 General Plan	The General Plan outlines long-term direction for development and policy. The Town has a Safety Element in its General Plan that includes a discussion of fire, earthquake, flooding, and landslide hazards. This plan was adopted as an implementation appendix to the Safety Element. In addition, the Town enforces the requirements of the California Environmental Quality Act (CEQA), which, since 1988, requires mitigation for identified natural hazards. The Town has used these pre-existing programs as a basis for identifying gaps that may lead to disaster vulnerabilities in order to work on ways to address these risks through mitigation. As this plan gets updated there is potential to improve it with updated risk information and strategies.
Plan	Hazard Mitigation Plan 2011 ABAG Annex	This Hazard Mitigation Plan and its predecessors identify risks from natural hazards present in the Town and includes strategies to reduce these risks.
Plan	Capital Improvement Plan	The Capital Improvement Plan (CIP) directs construction activities for Town owned facilities and infrastructure for the next five years. Mitigation actions may involve construction of new or upgraded facilities and infrastructure. As this plan gets updated there is potential to improve it with updated strategies.
Policy	Zoning Ordinance	The Zoning Ordinance implements the General Plan by establishing specific regulations for development. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the Zoning Ordinance.
Policy	Municipal Code	The Muni Code includes several sections that address hazard mitigation including Title 6 Health and Sanitation, Title 15 Buildings and Construction, and Title 16 Protection of Flood Hazard Areas
Administrative	Administrative Services	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and

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	Department	business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	Town Planning, Building, and Public Works Departments	These departments are responsible for planning and building related activities including issuing permits, conducting environmental review, preparing planning documents, and addressing housing issues. Mitigation activities related to planning and building can be implemented by this department. Public Works Department is responsible for Town-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Personnel	Central Marin Police Authority	The Central Marin Police Authority conducts emergency preparedness activities for the community. Mitigation activities related to emergency preparedness can be implemented by the Police Department.
Personnel	Corte Madera Fire Department	The Corte Madera Fire Department protects the town from the effects of fire and other hazardous conditions and supports implementation of mitigation actions that reduce the risk of wildfire.
Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and fund the personnel resources above as well as capital improvement projects.
Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that are being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	Weekly Newsletter website	The Town produces a weekly digest of local issues in Town, which is an effective outreach tool. Additionally the Town website contains links to a wide variety of mitigation information and training opportunities.
Training and Outreach	Community Rating System Working Group	The Community Rating System (CRS) is a voluntary program for communities participating in the National Flood Insurance Program (NFIP) to earn flood insurance premium reductions for property owners. A Countywide collaboration of CRS community staff has been started in recent years and has led to shared resources including outreach materials and floodplain management training. This collaboration has the potential to expand and lead to a wide variety of flood mitigation activities.
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)

APPENDIX J

Town of Fairfax

Appendix J

Town of Fairfax

Town of Fairfax

The Town of Fairfax had an estimated population of 7,441 in 2010, with 3,585 housing units in the Town. The Town has a total area of 2.204 square miles. The median income for a household in the Town is \$58,465 and the per capita income for the Town is \$34,080. Approximately 4.3 percent of families and 6.5 percent of the population is below the poverty line (2010 data, U.S. Census Bureau).

Fairfax was incorporated as a town in 1931.

Table J-1. Vulnerability of Structures in Fairfax

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	2,104	100%	532	100%	87	100%	0	N/A	1	100%
Flood	212	10%	78	15%	32	37%	0	N/A	0	0%
Fire	1849	88%	447	84%	27	31%	0	N/A	1	100%
Tsunami	0	0%	0	0%	0	0%	0	N/A	0	0%
Landslide	412	20%	41	8%	1	1%	0	N/A	0	0%
Dam Inundation	0	0%	0	0%	0	0%	0	N/A	0	0%

Table J-2. Vulnerability of Transportation in Fairfax

	Roads		Railroad	Ferry
	Miles	% of Total	Miles	% of Total
Earthquake	33	100%	0	0
Flood	4	12%	0	0
Fire	28	85%	0	0
Tsunami	0	0%	0	0
Landslide	11	33%	0	0
Dam Inundation	0	0%	0	0

Table J-3. Vulnerability of Communication in Fairfax

	MERA	
	Number	% of Total
Earthquake	0	N/A
Flood	0	N/A
Fire	0	N/A
Tsunami	0	N/A
Landslide	0	N/A
Dam Inundation	0	N/A

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Table J-4. Vulnerability of Power in Fairfax

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Flood	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Fire	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Landslide	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A

Table J-5. Vulnerability of Water / Sewage in Fairfax

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A
Flood	0	N/A	0	N/A
Fire	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A
Landslide	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A

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Town of Fairfax

Table J-6. Vulnerability of Critical Facilities in Fairfax

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	4	100%	2	100%	0	N/A	0	N/A
Flood	0	0%	1	50%	0	N/A	0	N/A
Fire	4	100%	0	0%	0	N/A	0	N/A
Tsunami	0	0%	0	0%	0	N/A	0	N/A
Landslide	0	0%	0	0%	0	N/A	0	N/A
Dam Inundation	0	0%	0	0%	0	N/A	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table J-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables J-1 through J-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table J-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table J-7 – Evaluation of Prior Mitigation Actions in Fairfax

Action Number / Name	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
'Future Mitigation Actions and Priorities' from 2012					
In January 2011, the Town Council adopted the 2010 California Building Code which applies to all construction activity within the Town boundaries. The California Building Code is comprised of 11 parts that incorporate public health, safety, energy, green building and access standards used in the design and construction of all buildings. The new code provisions will allow the Town to utilize the latest technologies, advances in construction standards and seismic design for the use in new residential and commercial construction and in remodels.		X		X	MLT-3

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Town of Fairfax

The Town has determined that the combination of construction type, age, and shaking exposure to the Fairfax Pavilion which is the only facility suitable as a shelter, are significant. The Town has applied for and received a Pre-Disaster Mitigation grant to seismically retrofit this building. The Pavilion renovation will qualify as a principal disaster shelter by Red Cross standards.		X		X	For Fairfax Annex
No determination has been made at this time for the Town-owned Women's Club (Council Chambers). It is anticipated this building will need seismic retrofiting.			X	X	For Fairfax Annex
The Town will establish a General Plan Implementation Committee (GPIC) to guide and assist in the implementation of the Town's new 2010 General Plan; including the implementation of the new Safety Element section titled "Community Preparedness."	X			no	
'Ongoing Mitigation Strategies' from 2012					
Continue to comply with all applicable building and fire codes as well as other regulations when constructing or significantly remodeling infrastructure facilities		X		X	MLT-3
Continue to enforce and/or comply with State-mandated requirements, such as the California Environmental Quality Act		X		X	Implicit
Incorporate FEMA guidelines and suggested activities into local government plans and procedures for managing flood hazards		X		X	FLD-2
Continue to participate in FEMA's National Flood Insurance Program		X		X	Implicit
Continue to facilitate the distribution of emergency preparedness materials and trainings through the General Plan Implementation Committee		X		X	Preparedness
Conduct periodic tests of the emergency sirens and emergency warning systems		X			
Continue to maintain the emergency operations center		X		X	Response

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Town of Fairfax

The Town will participate in the Ross Valley Watershed group, which is how priorities were set for flooding hazard mitigation. A successful local election has created a flood fee generating revenues to fund watershed wide flood mitigation projects through the local flood control district. A hydrologic study has been completed that encompasses the entire Ross Valley watershed in order to determine the effects of potential flood mitigation projects.		X		X	Fairfax Annex- update language
As new flood-control projects are completed, request that FEMA revise its flood insurance rate maps and digital Geographic Information System (GIS) data to reflect flood risks as accurately as possible – ongoing project, Planning and Building Dept.		X		X	Fairfax Annex and MLT 5
Enforce and/or comply with the hazardous materials requirements of the State of California Certified Unified Program Agency (CUPA) – Ross Valley Fire Department, ongoing project.		X		X	Implicit- requirement
Seek grant funding for vegetation removal along roadways and roadside collection/chipping of hazardous vegetation within the Wildland-Urban Interface.		X		X	FIR-3, FIR-5, FIR-6
Ross Valley Fire to work with other Marin County Fire agencies and Marin Municipal Water District to review and update MMWD Fireflow Master Plan to improve the water distribution system.		X		X	FIR-4

Table J-8. Current and Potential Hazard Mitigation Projects and Programs in Fairfax

	Hazard(s) addressed	Responsible Agency	Potential Funding Source	Timeline
Fairfax Mitigation Activities and Priorities from 2012				
Seismically retrofit and/or renovate the Town Pavilion	Earthquake	Town Administration, DPW, Building	HMGP, PDM grants	1-5 years
Seismically retrofit / renovate Town-owned Women's Club (Council Chambers)	Earthquake, Flood	Town Administration, DPW, Building	HMGP, PDM grants	5-10 years
Conduct periodic tests of the emergency sirens & emergency warning systems	Flood	Police, Fire, Town Administration	general funds	Ongoing
Continue to maintain the emergency operations center	All	Police, Fire, Town Administration	general funds	Ongoing
Continue to participate in the Ross Valley Flood Protection & Watershed Program, which establishes priorities for flooding hazard mitigation projects.	Flood	Town Administration, DPW	Special flood fee, state and federal grants	Ongoing
As new flood-control projects are completed, request that FEMA revise its flood insurance rate maps and digital Geographic Information System (GIS) data to reflect	Flood	Planning Department	general funds	As constructed

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Town of Fairfax

flood risks as accurately as possible – ongoing project, Planning and Building Dept.				
New Fairfax Mitigation Activities				
Continue to use Town Nixle for public outreach	All	Police, Fire, Town Administration	general funds	Ongoing
Mitigate flooding impacts at Town facilities such as Town Hall	Flood	Town Administration, DPW	Special flood fee, state and federal grants	5+ years

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Table J-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	2010 General Plan	The General Plan outlines long-term direction for development and policy. The new Safety Element includes a discussion of fire, earthquake, flooding, and landslide hazards; and importantly includes a section on Community Preparedness. Consistent with the Plan Maintenance and Update Process section of the 2004 Local Hazard Mitigation Plan (LHMP) Annex, the General Plan Advisory Committee (GPAC) reviewed, refined, and incorporated selected mitigation strategies into the final draft 2010 General Plan Safety Element. As this plan gets updated there is potential to improve it with updated risk information and strategies.
Plan	Hazard Mitigation Plan 2011 ABAG Annex	This Hazard Mitigation Plan and its predecessors identify risks from natural hazards present in the Town and includes strategies to reduce these risks.
Plan	Capital Improvement Plan	The Capital Improvement Plan (CIP) directs construction activities for Town owned facilities and infrastructure for the next five years. Mitigation actions may involve construction of new or upgraded facilities and infrastructure. As this plan gets updated there is potential to improve it with updated strategies.
Plan	Emergency Response Plan & Community Preparedness Plan	These plans inform priority mitigation actions and programs.
Policy	Zoning Ordinance	The Zoning Ordinance implements the General Plan by establishing specific regulations for development. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the Zoning Ordinance.
Policy	Municipal Code	The Muni Code includes several sections that address hazard mitigation. The Town adopts the current California Building Code which applies to all construction activity within the Town boundaries. The California Building Code is comprised of 11 parts that incorporate public health, safety, energy, green building and access standards used in the design and construction of all buildings. The new code provisions will allow the Town to utilize the latest technologies, advances in construction standards and seismic design for the use in new residential and commercial construction and in remodels.
Administrative	Administrative Services Department	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	Town Planning, Building, and Public Works Departments	These departments are responsible for planning and building related activities including issuing permits, conducting environmental review, preparing planning documents, and addressing housing issues. Mitigation activities related to planning and building can be implemented by this department. Public Works Department is responsible for Town-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Personnel	Fairfax Police	The Town Police Department conducts emergency preparedness activities for the community. Mitigation activities related to emergency preparedness can be implemented by the Police Department.
Personnel	Ross Valley Fire Department	The Ross Valley Fire Department protects the town from the effects of fire and other hazardous conditions and supports implementation of mitigation actions that reduce the risk of wildfire.

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Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and fund the personnel resources above as well as capital improvement projects.
Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that are being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	Fairfax Volunteers	Fairfax Volunteers supplement town staff in a variety of outreach and community activities related to hazard mitigation. This includes organizing neighborhood groups, creek and path stewardship and emergency preparedness coordination.
Training and Outreach	Community Rating System Working Group	The Community Rating System (CRS) is a voluntary program for communities participating in the National Flood Insurance Program (NFIP) to earn flood insurance premium reductions for property owners. A Countywide collaboration of CRS community staff has been started in recent years and has led to shared resources including outreach materials and floodplain management training. This collaboration has the potential to expand and lead to a wide variety of flood mitigation activities.
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)

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City of Larkspur

Appendix K

City of Larkspur

City of Larkspur

The City of Larkspur had an estimated population of 11,926 in 2010, with 6,376 housing units in the City. The City has a total area of 3.243 square miles. The median income for a household in the City was \$66,710 and the per capita income for the City was \$56,983. Approximately 1.8 percent of families and 3.7 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Larkspur was incorporated as a city in 1908.

Table K-1. Vulnerability of Structures in Larkspur

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	2,478	100%	1482	100%	134	100%	10	100%	4	100%
Flood	485	20%	282	19%	42	31%	10	100%	0	0%
Fire	1535	62%	164	11%	22	16%	0	0%	1	25%
Tsunami	353	14%	191	13%	41	31%	10	100%	1	25%
Landslide	411	17%	205	14%	6	4%	0	0%	0	0%
Dam Inundation	511	21%	465	31%	55	41%	5	50%	0	0%

Table K-2. Vulnerability of Transportation in Larkspur

	Roads		Railroads		Ferry Stations	
	Miles	Number	Miles	Percent	Number	Percent
Earthquake	51	100%	1	100%	1	100%
Flood	12	24%	0	0%	1	100%
Fire	25	49%	0	0%	0	0%
Tsunami	11	22%	0.1	10%	1	100%
Landslide	10	20%	0	0%	0	0%
Dam Inundation	12	24%	0	0%	1	100%

Table K-3. Vulnerability of Communication in Larkspur

	MERA	
	Number	% of Total
Earthquake	0	N/A
Flood	0	N/A
Fire	0	N/A
Tsunami	0	N/A
Landslide	0	N/A
Dam Inundation	0	N/A

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City of Larkspur

Table K-4. Vulnerability of Power in Larkspur

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Miles	% of Total	Miles	% of Total
Earthquake	0	N/A	0	N/A	0	N/A	0	N/A	0.7	100%
Flood	0	N/A	0	N/A	0	N/A	0	N/A	0	0%
Fire	0	N/A	0	N/A	0	N/A	0	N/A	0.3	42%
Tsunami	0	N/A	0	N/A	0	N/A	0	N/A	0	0%
Landslide	0	N/A	0	N/A	0	N/A	0	N/A	0	0%
Dam Inundation	0	N/A	0	N/A	0	N/A	0	N/A	0	0%

Table K-5. Vulnerability of Water / Sewage in Larkspur

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A
Flood	0	N/A	0	N/A
Fire	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A
Landslide	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A

Table K-6. Vulnerability of Critical Facilities in Larkspur

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	6	100%	3	100%	0	N/A	0	N/A
Flood	2	33%	3	100%	0	N/A	0	N/A
Fire	1	18%	3	100%	0	N/A	0	N/A
Tsunami	0	0%	0	0%	0	N/A	0	N/A
Landslide	0	0%	0	0%	0	N/A	0	N/A
Dam Inundation	0	0%	0	0%	0	N/A	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table K-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables K-1 through K-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table K-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table K-7 – Evaluation of Prior Mitigation Actions in Larkspur

Number	Name	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
AH-1	Backup Generators		X		X	MLT-9
AH-2	Public Works Corporation Yard Office Seismic Tie Down	X				
AH-3	Engineering Public Works Office	X				

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City of Larkspur

AH-4	Public Works Office	X				
AH-5	Public Works Corporate Shop Generator		X		X	MLT-9
AH-6	50KW Mobile Generator with trailer		X		X	MLT-9
AH-7	80KW Backup Generator		X		X	MLT-9
AH-8	Public Outreach Program		X		X	prevention- for EOP
AH-9	Partnerships with local jurisdictions and mutual stakeholders to prevent collaborative disaster damage		X		X	MLT-6, MLT-8
AH-10	Information Technology System Upgrade			X		not mitigation- for EOP
AH-11	Cache of Emergency Supplies and Container			X		preparedness- for EOP
AH-12	Mobile Disaster Command Center			X		response- for EOP
AH-13	Larkspur Disaster Council		X			not mitigation- for EOP
AH-14	Community Emergency Response Team (C.E.R.T) Cache and Storage Unit		X			for EOP
AH-15	Community Training Room Expansion			X		preparedness- for EOP
AH-16	Upgrade 9-1-1 Telephone System	X				
AH-17	Telephone System Upgrade	X				new building
AH-18	LCD w/DLP Capability Televisions	X				
AH-19	Wireless Computers (Wireless I.T. System	X				
AH-20	Electrical upgrade for remodeled EOC	X				Now part of County EOC
AH-21	Emergency Operations Center Remodel	X				Now part of County EOC
EQ-1	City Hall Seismic Upgrade		X	X	X	for Larkspur Annex
EQ-2, WF-1	Fire Station Seismic Upgrade		X	X	X	for Larkspur Annex
EQ-3, WF-2	Fire Station Expansion		X	X	X	for Larkspur Annex
FL-1, SW-1	Upgrade Storm Drain System		X			For Larkspur Annex-storm drain master plan
FL-2	Buy Out Program		X		X	FLD-6
FL-3	Property Development Program		X		X	FLD-2
FL-4	Elevate Home Program		X		X	FLD-6

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FL-5	Trash Pumps (two 6 inch)			X	X	for Larkspur Annex (combine)
FL-6	Five (5) Discharge Suction Hoses			X	X	for Larkspur Annex (combine)
FL-7	Two 4 inch Trash Pumps w/ suction hoses			X	X	for Larkspur Annex (combine)
FL-8	Future Flood Elevation Feasibility Study for Coastal Buildings		X		X	FLD-10, FLD-11
FL-9	Flood Mitigation Plan		X		X	for Larkspur Annex
WF-2	High Fire Zone Assessment Program		X		X	for Larkspur Annex
WF-3	Contract Service for Vegetation Debris Bins		X		X	FIR-3
WF-4	Chipper Program		X		X	FIR-3
WF-5	Fuel Management Program		X		X	FIR-9, FIR-5, FIR-3

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Table K-8 - Current and Potential Hazard Mitigation Projects and Programs in Larkspur

Action Name	Former Action Number, if applicable	Description	Responsible Agency	Potential Funding Source	Timeline
City Hall Seismic Upgrade	EQ-1	A complete seismic upgrade of City Hall, to interior & exterior walls, floors & footings. Removal of second floor storage room and reconstruction of the rear wall. A preliminary structural analysis was prepared in 1994. A partial seismic upgrade based on that study was completed when the roof was replaced in 1997.	Public Works	Federal/State Grants (PDM)	5-years
Fire Station Seismic Upgrade	EQ-2, WF-1	A complete seismic upgrade of the Fire Station attached to City Hall. Including improvements to interior & exterior walls, floors, roof structure & footing. Included are improvements to bring the building up to current ADA requirements. Repair and patch interior and exterior finishes.	Public Works, Fire Department	Federal/State Grants (PDM)	5-years
Fire Station Expansion	EQ-3, WF-2	Construction of a new second floor, Area of construction 4000 sq.ft at the City Hall Fire Station w/parking below. The addition links Fire Station & City Hall. The second floor allows for the expansion of the City Offices, and additional room for a Incident Command EOC.	Public Works, Fire Department	Federal/State Grants (PDM)	5-years
Upgrade Storm Drain System	FL-1, SW-1	Upgrade current storm drainage system to accommodate increased water flow from excessive rains. Which entails: 1. Replacing & enlarging current drain pipe (8 crossings x 40 ft) approximately 2 miles of the existing 15. 2. Replacing two (2) dozen gates/valves at critical discharge points. 3. Install two (2) new pump stations at; A) Hillview B). Larkspur Marine 4. Upgrade existing pump stations at A) Heathergarden B) Larkspur Plaza C) Industrial Way 5. Install back flow check valve at 4 ft culvert under A) Hwy 101 at Redwood B) Hwy 101 at Industrial Way 6. Install 1000 ft of new culvert under public streets 7. Replace 250 catch basins/drain inlets 8. Install 20 new catch basins/drain inlets	Public Works	Federal/State Grants; Flood Mitigation Hazard Program	ASAP
Trash Pumps	FL-5, FL-6, FL-7	Purchase 6 inch trailer mounted Trash Pumps & discharge suction hoses	Public Works	Federal/State Grants; Flood Mitigation Hazard Program	5-year
Flood Mitigation Plan	FL-9	Develop a Comprehensive Flood Mitigation Plan. The Plan will identify repetitive flood areas and develop short and long term flood mitigation strategies	Public Works	Federal/State Grants; Flood Mitigation Hazard Program	5-year

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High Fire Zone Assessment Program	WF-2	Fire dept staff goes door-to-door and assess fire treat potential to business and private home owners. The staffs make suggestions/enforce defensible space according to city fire codes and ordinances.	Fire Department	General Budget	Ongoing
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Table K-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	1990 General Plan update	Larkspur is in process of finalizing an update to its General Plan, which is scheduled for adoption in 2019. The General Plan outlines the City's long-term strategic goals, policies and programs that affect the City's growth and development such as land use, transportation, streets and sidewalks, utilities & infrastructure, parks, housing and neighborhoods, recreation and community facilities, commercial services and products, the environment, public health and safety, and flooding. Chapter 7, Community Health and Safety, addresses many of the hazards addressed in this plan.
Plan	Hazard Mitigation Plan	Larkspur's previous Hazard Mitigation Plan identified risks from natural hazards present in the City and informed strategies to reduce these risks presented in this plan.
Plan	Capital Improvement Program	Every year, City staff develops a Five-Year Capital Improvement Program (CIP) for council consideration, which serves as a multi-year planning tool to coordinate the financing and scheduling of major projects to improve and maintain its infrastructure. The CIP directs construction activities for City owned facilities and infrastructure for the next five years. Mitigation actions may involve construction of new or upgraded facilities and infrastructure.
Policy	Subdivision Regulations; Municipal Code Chapter 17	The city's subdivision ordinance, establishes standards to regulate the division of land and also establishes standards to restrict the creation of building sites in areas where flooding, lack of adequate access or services, or other conditions may create hazards to life or property. The regulations promote public health, safety and general welfare and minimize public and private losses due to hazardous conditions in specific areas and insure that reasonable caution is taken to preclude loss or damage to life and property.
Policy	Zoning Ordinance; Municipal Code Chapter 18	The zoning ordinance implements the general plan by establishing specific regulations for development. The zoning ordinance defines minimum lot sizes, densities and development standards, and regulates land use in hazardous areas. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the zoning ordinance.
Policy	Slope & Hillside Ordinance; Municipal Code Chapter 18.34	The slope and hillside ordinance reduces densities and impervious construction in steep hillside areas. The ordinance provides a higher standard of review at the planning phase to address potential for hazards and environmental degradation related to slope failure, increased erosion, sedimentation, storm water run-off, fire hazards, loss of vegetation, excessive grading, visual intrusion of structures, and potential for traffic hazards. The ordinance serves to protect public health, safety and general welfare and minimize public expense for long-term maintenance of slope areas resulting from over-development in hillside areas.
Policy	Fire Prevention: Municipal Code Chapter 15	
Policy	Building Regulations; Municipal Code Chapter 15	The City also adopted the most recent State of California approved Uniform Building Code, including the Residential Building Code and Wildland-Urban Interface (WUI) standards to safeguard life, health, property, and public welfare by providing enhanced fire resistance for exterior treatments and new roof coverings in high fire hazard zones. The Seismic Safety Code contains structural requirements to insure structural integrity during seismic and other hazardous events and prevent personal injury, loss of life and substantial structural damage. The City requires the undergrounding of utilities in the case of new construction and major remodels. The City has also adopted the International Property Maintenance Code to provide for the abatement of unsafe

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City of Larkspur

		and/or uninhabitable buildings.
Policy	Floodplain Management; Municipal Code Chapter 15.18	The city of Larkspur enforces floodplain management regulations in special flood hazards identified by the Federal Insurance Administration, through the Federal Emergency Management Agency. These regulations address the construction, location, extension, conversion or alteration of structures or land in special flood hazard zones, including both new development and modifications to existing uses and structures. The ordinance regulates and restricts development in flood-prone areas to promote the public health, safety and general welfare, to minimize public and private losses due to flood conditions in specific areas, and to minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
Policy	Stormwater Management; Municipal Code Chapter 9.11 and 9.12	The City enforces regulations for best management practices during development as well as permanent and ongoing erosion control measures to minimize off-site stormwater flow and buildup of sedimentation and other obstacles in drainage ways. The city identifies drainage ways and watercourses as public easements and provides standards for the protection, maintenance, enhancement and restoration of streams and waterways in a manner which preserves the conveyance of stormwater run-off and enhances their ecological integrity and resource functions and value.
Administrative	Administrative Services Department	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	Planning & Building Department	<ul style="list-style-type: none"> • Conducts comprehensive planning activities, including preparation of the General Plan. • Develops and enforces zoning regulations. • Prepares CEQA documents. • Verifies compliance with Uniform Building Code through checking plans, issuing permits, and inspections. • Oversee flood plain management program, including flood elevation determinations and flood-proof construction. • Coordinates development review with public works, fire, polices, and outside agencies. • Conducts site inspections to enforce permit and code compliance. • Leads damage assessments and documentation during emergency.
Administrative and Personnel	Public Works Department	Public Works Department is responsible for City-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Personnel	Central Marin Police Authority	The Central Marin Police Authority conducts emergency preparedness activities for the community. Mitigation activities related to emergency preparedness can be implemented by the Police Department.
Personnel	Larkspur Fire Department	Larkspur Fire Department protects the city and portions of unincorporated Greenbrae from the effects of fire and other hazardous conditions and supports implementation of mitigation actions that reduce the risk of wildfire. Larkspur also has a volunteer fire department and manages its vegetation management program

Appendix L

City of Mill Valley

City of Mill Valley

Mill Valley had an estimated population of 13,903 in 2010, with 6,534 housing units in the City. The City has a total area of 4.847 square miles. The median income for a household in the City was \$90,794 and the per capita income for the City was \$64,179. Approximately 2.7 percent of families and 4.5 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Mill Valley was incorporated as a city in 1900.

Mill Valley completed a single-jurisdiction All Hazards Mitigation Plan in 2017 which is hereby incorporated by reference into this appendix and includes much more jurisdiction-specific information about Mill Valley. Below are summary tables updating Mill Valley's vulnerability analysis and mitigation strategies.

Table L-1. Vulnerability of Structures in Mill Valley

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	3,556	100%	1439	100%	220	100%	0	N/A	2	100%
Flood	585	16%	316	22%	137	62%	0	N/A	0	0%
Fire	2683	75%	927	64%	61	28%	0	N/A	2	100%
Tsunami	97	3%	259	18%	41	19%	0	N/A	0	0%
Landslide	662	19%	149	10%	12	5%	0	N/A	0	0%
Dam Inundation	0	0%	0	0%	0	0%	0	N/A	0	0%

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Table L-2. Vulnerability of Transportation in Mill Valley

	Roads		Railroad	Ferry
	Miles	% of Total	Miles	Number
Earthquake	75	100%	0	0
Flood	13	17%	0	0
Fire	64	85%	0	0
Tsunami	4	5%	0	0
Landslide	19	25%	0	0
Dam Inundation	0	0%	0	0

Table L-3. Vulnerability of Communication in Mill Valley

	MERA	
	Number	% of Total
Earthquake	2	100 %
Flood	0	0
Fire	2	100 %
Tsunami	0	0
Landslide	1	50 %
Dam Inundation	0	0

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Table L-4. Vulnerability of Power in Mill Valley

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Miles	% of Total	Miles	% of Total
Earthquake	0	N/A	1	100%	1	100%	3.1	100%	.9	100
Flood	0	N/A	0	0%	0	N/A	.5	16%	0	0
Fire	0	N/A	1	100%	0	N/A	2.2	71%	.8	88.9%
Tsunami	0	N/A	0	0%	0	N/A	.4	13%	0	0
Landslide	0	N/A	1	100%	0	N/A	1.0	32%	.5	55.6%
Dam Inundation	0	N/A	0	0%	0	N/A	.5	16%	0	0%

Table L-5. Vulnerability of Water / Sewage in Mill Valley

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	1	100%	6	100%
Flood	0	0%	5	83.3%
Fire	0	0%	0	0%
Tsunami	1	100%	0	0%
Landslide	0	0%	0	0%
Dam Inundation	0	0%	0	0%

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City of Mill Valley

Table L-6. Vulnerability of Critical Facilities in Mill Valley

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	12	100%	3	100%	0	N/A	0	N/A
Flood	0	0%	0	0%	0	N/A	0	N/A
Fire	7	58.3%	3	100%	0	N/A	0	N/A
Tsunami	2	16.7%	0	0%	0	N/A	0	N/A
Landslide	1	8.3%	2	66.7%	0	N/A	0	N/A
Dam Inundation	0	0%	0	0%	0	N/A	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table L-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables L-1 through L-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table L-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table L-7 – Evaluation of Prior Mitigation Actions in Mill Valley

Action Number / Name		Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
'Future Mitigation Actions' from Single-Jurisdiction Plan						
Building Assessment	Perform appropriate seismic and fire safety analysis based on current and future use for all City-owned facilities and structures.		X			MLT-2
Strengthen and/or Replace City Buildings	Strengthen and/or replace City-owned buildings in the identified prioritized order as funding is available.		X			MLT-2

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Soft Story	Assessment of Soft-Story Buildings (non-City owned) for Potential Mandated Retrofit Program.		X			EQ-2
Non-City Buildings	Reduce hazard vulnerabilities for non-City-owned buildings throughout Mill Valley.		X			MLT-3
Fire Code	Reduce fire risk in existing and new development through fire code updates and enforcement.		X			MLT-3
Vegetation Management	Reduce fire risk in existing and new development (non-City owned) through vegetation management.		X			FIR-2,3,4,5
Hazard Information	Collect, analyze and share information with the Mill Valley community about Mill Valley hazards and associated risk reduction activities.		X			MLT-5
Partnerships	Ensure that the City provides leadership and coordinate with the private sector, public institutions, and other public agencies in disaster mitigation.		X			MLT-6 and annex
MMWD	Work with MMWD to ensure an adequate water supply during emergencies and for disaster recovery		X			MLT-14
Streamline Rebuild	Streamline the zoning and permitting process to rebuild residential and commercial structures following disasters.		X			annex
Energy Assurance	Develop an Energy Assurance Plan for City Operations		X			MLT-9
Gas Safety	Improve the disaster-resistance of the natural gas delivery system to increase public safety and to minimize damage and service disruption during and after a disaster.		X			MLT-6 and annex

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City of Mill Valley

Storm Water System	Rehabilitate and improve the capacity of the City's storm water system to reduce local flooding caused by inadequate storm drainage.		X			Fld-5 and annex
Extreme Heat	Reduce Mill Valley's vulnerability to extreme heat events and associated hazards.		X			annex
Severe Storms	Reduce Mill Valley's vulnerability to severe storms and associated hazards.		X			annex
Water Security	Collaborate with local, state, regional and federal partners to increase the security and capacity of Mill Valley's water supply from climate change impacts		X			annex
NFIP	Maintain City participation in the National Flood Insurance Program.		X			Fld-1
Sea-Level Rise	Mitigate the impacts of sea-level rise in Mill Valley.		X			Fld-10,11,13

Table L-8. Current and Potential Hazard Mitigation Projects and Programs in Mill Valley

Action		Responsible Agency	Potential Funding Source	Timeline
Partnerships	Ensure that the City provides leadership and coordinate with the private sector, public institutions, and other public agencies in disaster mitigation.	Administration/ Public Works/ Planning/ Building Departments	General Fund	Ongoing
Streamline Rebuild	Streamline the zoning and permitting process to rebuild residential and commercial structures following disasters.	Public Works/ Planning/ Building Departments	General Fund	Ongoing
Gas Safety	Improve the disaster-resistance of the natural gas delivery system to increase public safety and to minimize damage and service disruption during and after a disaster.	Public Works/ Planning	General Fund	Ongoing
Storm Water System	Rehabilitate and improve the capacity of the City's storm water system to reduce local flooding caused by inadequate storm drainage.	Public Works/ partnerships	General Fund	Ongoing

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Extreme Heat	Reduce Mill Valley's vulnerability to extreme heat events and associated hazards.	Public Works/ Planning/ Building Departments	General Fund	Ongoing
Severe Storms	Reduce Mill Valley's vulnerability to severe storms and associated hazards.	Public Works/ Planning/ Building Departments	General Fund	Ongoing
Water Security	Collaborate with local, state, regional and federal partners to increase the security and capacity of Mill Valley's water supply from climate change impacts	Public Works/ Planning/ Building Departments	General Fund	Ongoing

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City of Mill Valley

Table L-9 Planning Mechanisms, Regulatory Tools, and Resources		
Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	2013 General Plan Update '2040 General Plan'	Mill Valley's General Plan outlines long-term direction for development and policy. The General Plan is currently being updated.
Plan	City All Hazard Mitigation Plan v 4.0	Mill Valley's previous Hazard Mitigation Plan identified risks from natural hazards present in the City and informed strategies to reduce these risks presented in this plan.
Plan	Capital Improvement Program	Every year, City staff develops a Five-Year Capital Improvement Program (CIP) for council consideration, which serves as a multi-year planning tool to coordinate the financing and scheduling of major projects to improve and maintain its infrastructure. The CIP directs construction activities for City owned facilities and infrastructure for the next five years. Mitigation actions may involve construction of new or upgraded facilities and infrastructure.
Policy	Zoning Ordinance	The Zoning Ordinance implements the General Plan by establishing specific regulations for development. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the Zoning Ordinance.
Policy	Municipal Code	The Muni Code includes several sections that address hazard mitigation.
Administrative	Administrative Services Department	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	City Planning, Building, and Public Works Departments	These departments are responsible for planning and building related activities including issuing permits, conducting environmental review, preparing planning documents, and addressing housing issues. Mitigation activities related to planning and building can be implemented by this department. Public Works Department is responsible for City-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Personnel	Mill Valley Police	The Police Department conducts emergency preparedness activities for the community. Mitigation activities related to emergency preparedness can be implemented by the Police Department.
Personnel	Mill Valley Fire Department	Mill Valley Fire Department protects the city from the effects of fire and other hazardous conditions and supports implementation of mitigation actions that reduce the risk of wildfire.
Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and fund the personnel resources above as well as capital improvement projects.
Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that are being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	Website	The City website contains links to a wide variety of mitigation information and training opportunities.
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)

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The City of Novato had an estimated population of 51,904 in 2010, with 21,158 housing units in the City. The City has a total area of 27.440 square miles. The median income for a household in the City was \$63,453, and the per capita income for the City was \$32,402. Approximately 3.1 percent of families and 5.6 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Novato was incorporated as a city in 1960.

Table M-1. Vulnerability of Structures in Novato

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	11,815	100%	4909	100%	516	100%	218	100%	3	100%
Flood	1606	14%	605	12%	128	25%	41	19%	1	33.3%
Fire	7029	59%	2550	52%	106	21%	72	33%	0	0%
Tsunami	86	1%	0	0%	0	0%	0	0%	0	0%
Landslide	1885	16%	293	6%	25	5%	3	1%	0	0%
Dam Inundation	2682	23%	1061	22%	287	56%	13	6%	0	0%

Table M-2. Vulnerability of Transportation in Novato

	Roads		Railroads		Ferry
	Miles	% of Total	Miles	% of Total	Number
Earthquake	237	100%	9	100%	0
Flood	53	22%	7	78%	0
Fire	117	49%	4	44%	0
Tsunami	2	1%	0	0%	0
Landslide	34	14%	0	0%	0
Dam Inundation	66	28%	3	33%	0

Table M-3. Vulnerability of Communication in Novato

	MERA	
	Number	% of Total
Earthquake	0	N/A
Flood	0	N/A
Fire	0	N/A
Tsunami	0	N/A
Landslide	0	N/A
Dam Inundation	0	N/A

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Table M-4. Vulnerability of Power in Novato

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	36	100%	3	100%	2	100%	26.5	100%	2	100%
Flood	29	80.6%	1	33.3%	0	0%	8.2	30.9%	0	0%
Fire	6	16.7%	1	33.3%	2	100%	8.5	32.1%	2	100%
Tsunami	0	0%	0	0%	0	0%	.1	.4%	0	0%
Landslide	1	2.8%	0	0%	0	0%	1.8	6.8%	0	0%
Dam Inundation	11	30.6%	1	33.3%	0	0%	7.4	27.9%	0	0%

Table M-5. Vulnerability of Water / Sewage in Novato

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	2	100%	4	100%
Flood	0	0%	4	100%
Fire	0	0%	0	0%
Tsunami	0	0%	0	0%
Landslide	0	0%	0	0%
Dam Inundation	0	0%	0	0%

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Table M-6. Vulnerability of Critical Facilities in Novato

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	21	100%	5	100%	10	100%	0	0%
Flood	2	9.5%	0	0%	0	0%	0	0%
Fire	4	19.0%	0	0%	2	20%	0	0%
Tsunami	0	0%	0	0%	0	0%	0	0%
Landslide	0	0%	1	20.0%	0	0%	0	0%
Dam Inundation	7	33.3%	1	20.0%	4	40%	0	0%

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table M-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables M-1 through M-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table M-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table M-7 – Evaluation of Prior Mitigation Actions in Novato

Action Number / Name		Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
1.1.3	Update the City of Novato's Local Flood Hazard Mitigation Plan every five years.				no	
1.2.1	Repair water leak in the Police Building, (designated as an alternate EOC facility), to avoid any disruption to using the facility as an alternate EOC during an emergency.		CIP project to be completed this year		x	
1.2.2	Install an above ground diesel tank at the Corporation Yard to have diesel fuel readily available during an emergency.		x		x	MLT-9
1.3.2	Compile and inventory City-owned buildings at risk.	Completed 2013			x	MLT-2

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1.3.3	Continue the code enforcement inspection program for apartments of 3 or more units in the City to find seismic safety, flood and health and safety compliance issues and to identify buildings at risk to specific hazards.		x		x	MLT-3 and annex
1.3.4	Continue to conduct annual inspection and maintenance of storm sewer drainage systems and utilize new vacuum truck with additional capacity and enhanced storm drain clearing technology.		X		x	Fld-5
1.5.1	Identify appropriate staffing levels of public safety personnel to address vulnerabilities identified within the capabilities of the City.		x		not mitigation	
1.5.2	Purchase and install an emergency generator at the City's Todd Senior Center, (a designated emergency shelter) to provide power if electrical service is disabled during an emergency.	x			x	MLT-9
1.5.3	Conduct training biannually on response and recovery exercises for city staff and volunteers.		x		not mitigation	
1.5.5	Implement and maintain the telephone emergency response system to broadcast emergency information and warnings to designated first responders, the public, individuals, pre-designated telephone listing and selected geographical areas.	x - see County contract for ALERT Marin			referenced in plan under the Warnings section rather than mitigation actions for CRS purposes	
1.5.6	Prepare a site-specific vulnerability assessment of City-owned critical facilities that use the best available science and technology with regards human-caused hazards.				human-caused not relevant to DMA 2000	
1.5.7	Protect the city's data, technology infrastructure and staff against cyber attacks such as but not limited to:				human-caused not relevant to DMA 2000	
	· Identity Theft					
	· Virus/Malware/Spyware/Spam					
	· Network and system attacks					
	· Web site hacking					
2.1	Encourage the public to prepare and maintain a 3- day preparedness kit for home and work useable for all hazards.				Prepared-ness, not mitigation	
2.2	Continue the City's outreach program to flood-prone property owners and the citizens of Novato to help them mitigate their flood risks.		x		x	FLD-4
2.3	Update City websites to provide convenient public access to earthquake hazard maps, and educational mitigation materials and distribute printed publications to the community concerning hazards		x - as part of multi-jurisdictional LHMP virtual engagement		x	MLT-5
3.1.	Update the City's Emergency Preparedness Plan, as needed and update the plan when the State of California and the County of Marin update their Emergency Preparedness plans.	x	x - update ongoing language to EOP		not mitigation	Preparedness replaced with Operations in column 2 -

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						Still Valid
3.4	Identify projects for pre-disaster mitigation funding and assure adequate funding where feasible to restore damaged facilities.		x - discuss projects with DPW		x	Fld-5, EQ-3, LS-2
4.1.3	Request Caltrans to seismic retro-fit US-101 bridge sections located within the City of Novato.		x		x	EQ-3
4.1.5	Annually inspect the Hamilton levees and associated flood control pump stations.		x - update ongoing language to include assessment, maintaining accreditation, and making necessary improvements to levee/pump stations		x	Fld-5
4.1.6	Repair and resurface Atherton US 101 bridge crossing for safe vehicle traffic and protect rebar that is beginning to be exposed, this bridge crossing is a major evacuation route for the Novato area.	x - verify with DPW			x - as a retrofit, not simple repair	EQ-3
4.2.1	Participate in the completion of the County's Watershed Stewardship Plan. The plan's projects will address preventative measures to mitigate flood impacts.				x	Fld-5 and annex Storm Drain Master Plan projects
4.2.4	Require all development in the 100 year flood zone to comply with the Floodplain Zoning requirements in the Novato Municipal Code and ensure projects comply with the California Environmental Quality Act and refer any development proposal that has a direct or indirect impact on flood protection to Public Works for comment and other agencies as necessary.		x		x	Fld-2
4.2.6	Maintain Novato's compliance and good standing under the National Flood Insurance program (NFIP) and the Community Rating System (CRS).		x		x	Fld-1
4.2.7	Create a comprehensive computerized model of the Novato's basins and produce maps to aid the Clean Storm Water program by completing the Storm Drainage Master Plan. The GIS database will work to monitor flow throughout the City's network of storm drains.	x	x		x	annex - does DPW have specific projects that came out of this?
4.2.8	Meet annually with all agencies involved in Marin County Flood Control projects to ensure that structural projects are considered and continue to cooperate with Marin jurisdictions in pursuing all available sources of funding to finance improvements to storm drainage facilities.	x	x		x	annex
4.2.9	Train Public Works and Police personnel in emergency flood response techniques.		x		Prepared-ness, not mitigation as is, but MLT-7 broadens to mitigation training	MLT-7

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4.2.10	Reduce flooding in northeasterly area of downtown Novato by providing enhancements to the existing ditch on the west side of the railroad tracks.		x		x	FId-5
4.2.11	Participate with FEMA to update and maintain the Flood FIRM/DFIRM maps.		x		delete ongoing	
4.2.12	Provide emergency flood control resources such as plastic sheeting and sand bags to businesses and citizens in emergencies.		x		preparedness, not mitigation	
4.2.13	Manage seepage at the Hamilton Levee to minimize impacts and inundation risks to private property.		x - verify with DPW		x	FId-5
4.2.14	Install pollution prevention devices at outfalls throughout the city to mitigate storm water discharges into the creeks.				pollution not part of this plan, refer to Stormwater Resources Plan (SWRP)	
4.3.1	Expand the GIS system to identify properties located within the Wildland-Urban Interface (WUI).	x			x	MLT-11
4.3.2	Promote defensible space on City land behind homes in Novato.		x		x	FIR-3, FIR-5
NFD-1	Complete a Novato Specific Community Wildfire Protection Plan			new proposal		annex
NFD-2	Develop an inventory of structures with shake and shingle roofing material to identify and target education efforts and the need for roof conversions.			new proposal		MLT-11
NFD-3	Consider ways to use drone technology for disaster response, recovery, including fire protection.			new proposal	not really mitigation oriented	annex
NFD-4	Articulate and promote the concept of land use planning related to fire risk and individual landowner objectives and responsibilities.			new proposal		annex
NFD-5	Coordinate with county and local government staff to integrate Firewise approaches into planning documents and ordinances.			new proposal		annex - or consider adding multi-jurisdictional action
NFD-6	Continue to support community vegetation reduction grants and chipper programs to encourage compliance with defensible space and vegetation management requirements.			new proposal		FIR-3, FIR-5
NFD-7	Consider the creation of transition zones (areas between developed residential areas and open space areas) where additional defensible space clearance is needed.			new proposal		annex - or consider adding multi-jurisdictional action
NFD-8	Continue inter-agency coordination with Marin's fire service community and other partners to maintain a community presence and to develop and distribute public information regarding fuel reduction efforts throughout the county.			new proposal		annex - or consider adding multi-jurisdictional action
NFD-9	Continue efforts to partner with neighborhoods located in WUI areas to educate them on becoming fire adapted or Firewise communities.			new proposal		annex - or consider adding multi-jurisdictional action
NFD-10	Continue implementation of the countywide fuel break and fire plan implementation			new proposal		annex - or consider adding multi-jurisdictional action
NFD-11	Prioritize evacuation routes for fuel reduction programs			new proposal		FIR-1
NFD-12	Encourage community-level drills for evacuation preparedness			new proposal	not mitigation	annex

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NFD-13	Work to reduce regulatory barriers that limit hazardous fuels reduction activities (e.g., tree removal process).			new proposal		annex - or consider adding multi-jurisdictional action
NFD-14	EOC Display upgrade: Design and budget also includes power requirements, programming and integration of existing AV equipment for the new Video Wall location as well as removal of the existing front projection system.			new proposal		annex
NFD-15	Map all City owned open space			new proposal		annex
NFD-16	Develop a Vegetation Management Plan (VMP) for all City owned open space			new proposal		FIR-4
NFD-17	Annual weed abatement on City owned land			new proposal		FIR-4
NFD-18	Creation of shaded fuel breaks on City owned land near residential & commercial structures			new proposal		FIR-4

Table M-8 - Current and Potential Hazard Mitigation Projects and Programs in Novato

#	Description	Hazard(s) addressed	Responsible Agency	Potential Funding Source	Timeline	Notes
Mitigation Activities and Priorities from Prior LHMP						
N-1	Continue the code enforcement inspection program for apartments of 3 or more units in the City to find seismic safety, flood and health and safety compliance issues and to identify buildings at risk to specific hazards.	All	Novato Community Development	City General Fund	On-going	
N-2	Update the City's Emergency Preparedness Plan, as needed and update the plan when the State of California and the County of Marin update their Emergency Preparedness plans.	All	Novato Emergency Management	City General Fund and Fire General Fund	Phase 1 - 2018 Phase 2 - 2020	reference Novato EOP in annex
N-3	Participate in the completion of the County's Watershed Stewardship Plan. The plan's projects will address preventative measures to mitigate flood impacts.	Storm / Flood	Novato Public Works	City General Fund	On-going	Fid-5 and annex Storm Drain Master Plan projects. does DPW want to add specific projects?
N-4	Create a comprehensive computerized model of the Novato's basins and produce maps to aid the Clean Storm Water program by completing the Storm Drainage Master Plan. The GIS database will work to monitor flow throughout the City's network of storm drains.	Storm / Flood	Novato Public Works	City General Fund	2019	annex - does DPW have specific projects that came out of this?
N-5	Meet annually with all agencies involved in Marin County Flood Control projects to ensure that structural projects are considered and continue to cooperate with Marin jurisdictions in pursuing all available sources of funding to finance improvements to storm drainage facilities.	Dam / Storm / Flood	Novato Public Works	City General Fund	On-going	x - check with DPW

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New Mitigation Activities and Priorities						
NFD-1	Complete a Novato Specific Community Wildfire Protection Plan	Fire	Novato Fire District	Fire General Fund	On-going	annex
NFD-2	Consider ways to use drone technology for disaster response, recovery, including fire protection.	Fire	Novato Community Development	City General Fund	On-going	not mitigation oriented
NFD-3	Articulate and promote the concept of land use planning related to fire risk and individual landowner objectives and responsibilities.	Fire	Novato Fire District & Novato Community Development	Fire General Fund and City General Fund	On-going	annex
NFD-4	Coordinate with county and local government staff to integrate Firewise approaches into planning documents and ordinances.	Fire	Novato Public Works and Novato Fire District	City General Fund and Fire General Fund	2020	annex - or consider adding multi-jurisdictional action
NFD-5	Consider the creation of transition zones (areas between developed residential areas and open space areas) where additional defensible space clearance is needed.	Fire	Novato Fire District	Fire General Fund	On-going	annex - or consider adding multi-jurisdictional action
NFD-6	Continue inter-agency coordination with Marin's fire service community and other partners to maintain a community presence and to develop and distribute public information regarding fuel reduction efforts throughout the county.	Fire	Novato Fire District	Fire General Fund	On-going	annex - or consider adding multi-jurisdictional action
NFD-7	Continue efforts to partner with neighborhoods located in WUI areas to educate them on becoming fire adapted or Firewise communities.	Fire	Novato Fire District	Fire General Fund	On-going	annex - or consider adding multi-jurisdictional action
NFD-8	Continue implementation of the countywide fuel break and fire plan implementation	Fire	Novato Community Development	City General Fund	On-going	annex - or consider adding multi-jurisdictional action
NFD-9	Encourage community-level drills for evacuation preparedness	All	Novato Public Works & Community Development	City General Fund	2019	not mitigation
NFD-10	Work to reduce regulatory barriers that limit hazardous fuels reduction activities (e.g., tree removal process).	Fire	Novato Fire District	Fire General Fund	On-going	annex - or consider adding multi-jurisdictional action
NFD-11	EOC Display upgrade: Design and budget also includes power requirements, programming and integration of existing AV equipment for the new Video Wall location as well as removal of the existing front projection system.	Fire	Novato Community Development	City General Fund	On-going	annex
NFD-11	Map all City owned open space	Fire	Novato Fire District & Novato Community Development	Fire General Fund and City General Fund	On-going	annex

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Table M-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	2016 General Plan Update 'General Plan 2035'	The City is currently finalizing an update to its General Plan, which serves as a basis for decisions that affect the City's growth and development such as transportation, land use, streets and infrastructure, parks, housing and neighborhoods, recreation and community facilities, downtown, the environment, public health and safety, and flooding. The General Plan is a strategic and long-term document identifying goals and policies that guides and directs the City in terms of implementing policies, programs and resources. As required by State law, the City of Novato's General Plan includes seven chapters, or "elements": land use, circulation, housing, conservation, open space, noise and safety.
Plan	2011 Hazard Mitigation Plan & 2008 Flood Mitigation Plan	Novato's previous Hazard Mitigation Plan identified risks from natural hazards present in the City and informed strategies to reduce these risks presented in this plan. The 2008 Flood Mitigation Plan was developed in conjunction with the Hazard Mitigation Plan and contains more details specific to the local flood hazards. The Flood Mitigation Plan is now incorporated into this Hazard Mitigation Plan.
Policy	Subdivision Regulations	The City's subdivision ordinance, Chapter 9 of the City of Novato Municipal Code establishes standards to regulate the division of land, defines minimum lot sizes, densities and development standards, and regulates land use in hazardous areas. Subdivision regulations also establish standards to regulate the division of land and eliminate the creation of building sites in areas where flooding may create hazards to life or property. The regulations promote public health, safety and general welfare and minimize public and private losses due to flood conditions in specific areas and insure that reasonable caution is taken to preclude loss or damage to life and property.
Policy	Zoning Regulations	The City's Zoning Ordinance establishes various zoning districts and implements the goals and policies of the Novato general plan by classifying and regulating the uses of land and structures within the City of Novato. In addition, it protects and promotes the public health, safety, and general welfare of residents, and preserve and enhance the aesthetic quality of the city. When lots are subdivided, the developer is required to provide adequate access for firefighters, flowrates and storage of water for firefighting.
Policy	Clean Storm Drain Regulation	This regulation ensures the future health, safety, and general welfare of the citizens of the City of Novato by establishing a funding source to provide enforcement of the city's Urban Runoff Pollution Prevention Ordinance, to provide maintenance and repair of the city's stormwater drainage facilities, to provide capital improvements to the city's storm drainage system, and to provide other clean stormwater activities. It also protects and enhances the water quality of the State's, and the Nation's watercourses, water bodies, and wetlands in a manner pursuant to and consistent with the Clean Water Act.
Policy	Development Standards	The development standards in Chapter 5 of the Municipal Code are authorized by the California Government Code which allows local government controls in building, planning and subdivision. The City development standards enforce disaster-resistant development to minimize risk from natural hazards.
Policy	Adequate Water Supply	Each permit or approval application affected by this requirement shall indicate the way water is to be supplied. The degree of specificity shall relate to the type of permit or approval requested. All affected permit or approval processes shall include provisions for adequate water supply. This insures that the North Marin Water District will provide water to serve the use and/or development upon the establishment of the use or the completion of the development. Each use or development proposal which involves or requires water service (domestic, commercial, industrial, agricultural) either for sanitary use, consumption, production, irrigation or visual amenity, shall provide for such water by agreement with the North Marin Water District.
Policy	Flood Damage Prevention Requirements	Chapter 5-31 of the Municipal Code is titled Flood Damage Prevention Requirements. It was adopted to reduce flood hazards in the special flood hazard areas within the City of Novato. It addresses the construction, location, extension, conversion or alteration of structures or land in special flood hazard zones. These regulations apply to both new development and construction and existing 105 structures. By regulating and restricting development in such areas will minimize risks of public and private losses due to flood hazards in

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		these specific areas. The areas of special flood hazards are identified by the Federal Insurance Administration, through the Federal Emergency Management Agency. It is the purpose of this section to promote the public health, safety and general welfare, and to minimize public and private losses due to flood conditions in specific areas, and to minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
Policy	Waterway and Riparian Protection	This ordinance provides standards for the protection, maintenance, enhancement and restoration of streams and waterways in a manner which preserves and enhances their ecological integrity and resource functions and value. This ordinance establishes adequate buffer areas along watercourses to avoid flood hazards and maintain or expand storage capacity for flood waters; protect water quality and in-stream habitat; preserve, enhance and restore riparian habitat and adjacent wetlands and upland buffers; and, provide for continuous wildlife migration corridors connecting habitat areas. This regulation allows development, which is compatible with the important physical, habitat, aesthetic, and recreational functions of waterways, while ensuring that these functions and values are protected in perpetuity.
Policy	Hillside and Ridgeline Protection	This ordinance reduces the potential for hazards and environmental degradation related to slope failure, increased erosion, sedimentation, storm water run-off, fire hazards, loss of vegetation, excessive grading, visual intrusion of structures, and potential for traffic hazards. It also provides for proper maintenance and fire management and minimizes public expense for long-term maintenance of slope areas and public improvements in hillside areas.
Policy	Drainage Development Requirements	In Section 5-15 of the Municipal Code standards for drainage are defined and are necessary to insure that underground and surface waters are conducted through and away from developments in such a manner as to not detrimentally affect other properties; insure that underground and surface water is not a problem within the completed development; and further, to correct or improve existing underground or surface water problems within the boundaries of the development and within the immediately affected surrounding area.

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Policy	Fire Safety	<p>The City of Novato recognizes the Novato Fire Protection District as the agency responsible for providing fire prevention and firefighting services to the incorporated area of the City of Novato.</p> <p>Therefore, Chapter 5-21 of the Municipal Code requires all applications for permits or approvals affected by this chapter shall be referred to the Novato Fire Protection District for its review and comment.</p> <p>Fire regulations are adopted to minimize the hazard to life and property due to fire. All affected permit or request for approval applications shall include fire safety provisions. Such as:</p> <ul style="list-style-type: none"> • Emergency Vehicle Access including but not limited to: Minimum street widths, grades, horizontal and vertical clearances are defined so certain major equipment can properly function on such streets to provide access and egress that is optimal for emergency response vehicles. • Certain developments that include proposed open space dedications or where developments abut existing open space, access for fire equipment to that open space shall be provided. • New developments, and certain types of remodels, proposed in identified fire hazard severity zones or in the defined Wildland Urban Interface (WUI) areas shall use ignition resistant building construction materials and methods to reduce structural ignitability. • Any new development or substantial remodel construction to occur in areas defined by the Novato Fire District Board, and adopted by resolution of the City Council, as Wildland Urban Interface areas shall, prior to final clearance occupancy or use, eliminate certain types of fire prone vegetation, except single specimen shrubs or trees, within 30 feet (or up to 100 feet for extra hazardous conditions upon direction of the fire chief) of all structures.
Policy	Building and Housing	<p>The purpose of the Building and Housing code is to establish rules and regulations governing building activity in the city and to safeguard life, health, property, and public welfare by providing minimum fire retardancy requirements for new roof coverings. This information is also needed to assist the city in compiling information on the use, location, and condition of properties within the jurisdiction of the City of Novato and provides for the abatement of unsafe buildings. By agreement, for health and safety reasons, the city may share this information or resultant vital statistics with other governmental agencies.</p> <p>The City has also adopted the most recent State of California approved Building Code, Mechanical Code, Seismic Safety Code, and National Electrical Code which contain structural requirements for existing and new buildings. The codes are designed to insure structural integrity during seismic and other hazardous events and prevent personal injury, loss of life and substantial structural damage. The City is prepared to adopt new codes and standards as passed by the State of California.</p>

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Administrative	Administrative Services Department	<ul style="list-style-type: none"> • Maintains insurance on City facilities • Operates the City Redevelopment Agency and manages Housing activities • Manages internal City communications and computer systems • Designated a grant analyst position to develop additional funding opportunities for various projects and programs.
Administrative	Disaster Council	<ul style="list-style-type: none"> • Established by City Municipal Code, 2-13 • Develops and recommends emergency and mutual aid plans and agreements
Administrative and Personnel	Public Works Departments	<ul style="list-style-type: none"> • Provides road construction and maintenance services • Conducts emergency repair services to transportation and public works infrastructure systems • Maintains drainage infrastructure • Oversees floodplain management and flood mitigation programs • Makes flood elevation determinations • Works with water and sewer agencies to maintain surviving utilities, and services and evaluates the safety of public structures and infrastructure during emergency response • Designs constructs and maintains city owned buildings • Manages the Repetitive Loss Program
Administrative and Personnel	Community Development	<ul style="list-style-type: none"> • Verifies compliance with Building Code through checking plans, issuing permits, and conduction field inspections. • Conducts comprehensive planning activities, including leading preparation of the General Plan • Develops zoning regulations • Prepares CEQA documents • Leads situation analysis, damage assessments and documentation during emergency response • Conducts site inspections to enforce permit and code requirements
Personnel	Novato Police	<ul style="list-style-type: none"> • Plans and coordinates response, recovery and mitigation activities • Develops emergency operation plans for the City • Leads emergency response and coordinates with fire for rescues and hazardous materials response • Communicates with federal, state, and other local agencies • Coordinates with the County to utilize the Marin Medical Reserve Corps (MMRC), Radio Amateur Civil Emergency Service (RACES) and other volunteer organizations. • Oversees disaster volunteers • Performs emergency response activities, including evacuation and security • Utilizes the emergency warning systems through telephone notification utilizing reverse 911 and the EAS system as their primary warning capability.
Personnel	Novato Fire Protection District	<p>The City of Novato recognizes the Novato Fire Protection District as the agency responsible for providing fire prevention, firefighting services and emergency medical services to the incorporated area of the City of Novato. The district also responds to hazardous material incidents.</p> <ul style="list-style-type: none"> • Coordinates emergency response, including rescues, fire suppression and hazardous materials response. • Plans and coordinates response, recovery, and mitigation activities • Conducts emergency management and preparedness trainings • Provides plan check and inspection services for fire related code compliance • Enforces the Vegetation Management Plan which sets clearance distances, type of vegetation for fire fuel breaks around structures
Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and typically fund the majority of personnel resources above as well as capital improvement projects.

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Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that have being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	Novato Fire Foundation	A non-profit organization supported by the Novato Fire Protection District provides enhanced fire and life safety programs, services and education to the Novato community. (https://www.novatofirefoundation.org/)
Training and Outreach	CERT	The CERT program, or Community Emergency Response Team is a national program to train citizens to help fill the gap between a disaster or emergency and the arrival of professional services. Novato participates in providing CERT training in coordination with other Marin County agencies. (https://readymarin.org/cert/)
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)
Training and Outreach	Firewise USA™	Firewise Neighborhoods: The Firewise USA™ program has empowered neighbors to work together in reducing their wildfire risk. Using a five-step process, communities develop an action plan that guides their residential risk reduction activities, while engaging and encouraging their neighbors to become active participants in building a safer place to live.

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The Town of Ross had an estimated population of 2,415 in 2010, with 884 housing units in the Town. The Town has a total area of 1.556 square miles. The median income for a household in the Town is \$102,015 and the per capita income for the Town is \$51,150. Approximately 5.6 percent of families and 8.5 percent of the population is below the poverty line (2010 data, U.S. Census Bureau).

Ross was incorporated as a town in 1908.

Table N-1. Vulnerability of Structures in Ross

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	750	100%	64	100%	12	100%	0	N/A	5	100%
Flood	218	29%	11	17%	10	83%	0	N/A	3	60%
Fire	764	100%	64	100%	12	100%	0	N/A	5	100%
Tsunami	0	0%	0	0%	0	0%	0	N/A	0	0%
Landslide	43	6%	1	2%	1	8%	0	N/A	0	0%
Dam Inundation	276	37%	20	31%	11	92%	0	N/A	5	100%

Table N-2. Vulnerability of Transportation in Ross

	Roads		Railroad	Ferry Terminals
	Number	% of Total	Miles	Number
Earthquake	20	100%	0	0
Flood	3	15%	0	0
Fire	20	100%	0	0
Tsunami	0	0%	0	0
Landslide	2	10%	0	0
Dam Inundation	7	35%	0	0

Table N-3. Vulnerability of Communication in Ross

	MERA	
	Number	% of Total
Earthquake	0	N/A
Flood	0	N/A
Fire	0	N/A
Tsunami	0	N/A
Landslide	0	N/A
Dam Inundation	0	N/A

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Table N-4. Vulnerability of Power in Ross

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Miles	% of Total	Miles	% of Total
Earthquake	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Flood	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Fire	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Landslide	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A

Table N-5. Vulnerability of Water / Sewage in Ross

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A
Flood	0	N/A	0	N/A
Fire	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A
Landslide	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A

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Table N-6. Vulnerability of Critical Facilities in Ross

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	2	100%	2	100%	0	N/A	0	N/A
Flood	1	50%	2	100%	0	N/A	0	N/A
Fire	2	100%	2	100%	0	N/A	0	N/A
Tsunami	0	0%	0	0%	0	N/A	0	N/A
Landslide	0	0%	0	0%	0	N/A	0	N/A
Dam Inundation	2	100%	2	100%	0	N/A	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table N-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables N-1 through N-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table N-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table N-7 – Evaluation of Prior Mitigation Actions in Ross

Action Number / Name		Complete	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
AH-1	Train homeowners to locate and shut off gas valves if they smell or hear gas leaking.				discard	No, not a hazard mitigation action
AH-2	Conduct periodic tests of the alerting and warning system.		X		X	Annex
AH-3	Implement Ross Valley Emergency Preparedness. Initiate discussions with other Ross Valley jurisdictions to consider opportunities to jointly respond to emergencies such as flood, fire, earthquake or other emergency situations. Cost savings and coordination opportunities could include the creation of a Town staff disaster planning coordinator, formation of a disaster preparedness committee reporting to Town staff (resident volunteers, Town official), sharing of resources and development of outreach programs to residents and businesses to provide training and		X		X	MLT-6

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	information about disaster preparedness. (General Plan Program 5.B)					
AH-4	Encourage the formation of a community- and neighborhood-based approach to wildfire education and action through local Fire Safe Councils and the Fire Wise Program to take advantage of grant funds currently available to offset costs of specific		X		X	Annex
AH-5	Promote attendance at local or regional hazard conferences and workshops for elected officials and staff to educate them on the critical need for programs in mitigating earthquake, wildfire, flood, and landslide hazards.		X		X	MLT-7
AH-6	Facilitate the distribution of emergency preparedness or mitigation materials that are prepared by others, such as by posting links at the Town web site, emails and placing materials at the Ross Post Office. Conduct workshops, and/or provide outreach encouraging residents, school employees, and private businesses' employees to have family disaster plans that include drop-cover-hold earthquake drills, fire and storm evacuation procedures, and shelter-in place emergency guidelines.		X		X	FLD-4
AH-7	Review and, if necessary, update evacuation plans. Consider organizing evacuation drills		X		X	FIR-1
AH-8	Consider expanding residential building reports to include hazard disclosure for known natural hazards in Ross: 1) Special Flood Hazards Areas (designated by FEMA), 2) Areas of Potential Flooding from dam failure inundation, 3) Very High Fire Hazards Severity Zones, 4) Wildland Fire Zones, and 5) Liquefaction and Landslide Hazards Zones (designated under the Seismic Hazards Mapping Act).			X	X	Annex
AH-9	Establish preservation-sensitive measures for the repair and re-occupancy of historically significant privately-owned structures, including requirements for temporary shoring or stabilization where needed, arrangements for consulting with preservationists and expedited permit procedures for suitable repair or rebuilding of historically or architecturally valuable structures.			X	X	MLT-17
AH-10	Create incentives for private owners of historic or architecturally significant buildings to undertake mitigation to levels that will minimize the likelihood that these buildings will need to be demolished after a disaster, particularly if those alterations conform to the federal Secretary of the Interior's Guidelines for Rehabilitation.				X	MLT-17
AH-11	Continue development and maintenance of the Local Hazard Mitigation Plan. Consider coordination with the ABAG Regional Hazard Mitigation Plan in the future.					discard, no longer using ABAG plan. See MLT-1
AH-12	Create and update hazard mitigation page on the Town website that provides a copy of the hazard plan, progress reports, information on hazards and mitigation with an emphasis on what residents may undertake to mitigate for their own sites, emergency response and warning information.		X		X	Remove. This is a good action, but not relevant to mitigation funding

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AH-13	Continue to regulate and enforce the location and design of street-address numbers on buildings.		X		X	Remove. This is a good action, but not relevant to mitigation funding
AH-14	Encourage replacing above ground electric and phone wires and other structures with underground facilities, and use the planning-approval process to ensure that all new phone and electrical utility lines are installed underground.		X		X	MLT-4
AH-15	Support and encourage efforts of lifeline infrastructure/utility system providers (PG&E, MMWD and Marin Sanitary Service) as they plan for and arrange financing for seismic retrofits and other disaster mitigation strategies. (For example, by passing resolutions in support of retrofit programs.)		X		X	MLT-6
AH-16	Assist residents and businesses in the development of defensible space through roadside collection and/or chipping services (for brush, weeds, and tree branches).		X		X	FIR-3
AH-17	Consider establishing a hazard mitigation fee for building permits to create a hazard mitigation funding source for initiatives or grant cost-share requirements			X	X	Annex (?)
AH-18	Consider hazard abatement districts as a funding mechanism to ensure that mitigation strategies are implemented and enforced over time.			X	X	Remove. This is a good action, but not relevant to mitigation funding
AH-19	Consider improvement of currently unused pedestrian rights-of-way/paths as walkways to serve as additional evacuation routes.		X		X	Annex
AH-20	Map areas of vulnerable roads and develop action plan to assist residents to repair private roads, driveways and slide hazard areas.				X	LS-1, LS-2
AH-21	Identify and work with non-profits and through other mechanisms to protect as open space those areas susceptible to extreme hazards (such as through land acquisition, zoning, and designation as priority conservation areas).		X		X	MLT-8
AH-22	Develop a continuity of operations plan for the Town that includes back-up storage of plans and essential electronic files as well as procedures to continue normal Town operations after a disaster. Identify and mitigate problems with architectural components and equipment that will prevent critical buildings from being functional after major natural disasters, such as computers and servers, phones, files, and other space those areas susceptible to extreme hazards (such as through land acquisition, zoning, and designation as priority conservation areas).			X	X	Remove. This is a good action, but not relevant to mitigation funding
AH-23	Prepare a basic Recovery Plan that outlines the major issues and tasks that are likely to be the key elements of community recovery, as well as integrate this planning into response planning (such as with continuity of operations plans).			X	X	Remove. This is a good action, but not relevant to mitigation funding

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AH-24	Elevate Public Safety building and Town Hall above the base flood elevation and upgrade to meet current fire and seismic safety standards.			X	X	MLT-2
AH-25	Consider retrofit or replacement of critical facilities that are shown to be vulnerable to damage in natural disasters, considering any issues of historical significance.		X		X	MLT-2
AH-26	Comply with all applicable building and fire codes, as well as other regulations (such as state requirements for fault, landslide, and liquefaction investigations in particular mapped areas) when constructing or significantly remodeling Town-owned facilities.		X			Remove. This is a good action, but not relevant to mitigation funding
AH-27	Establish plans for ensuring fuel will be available for police, fire and vehicles		X		X	MLT-9
AH-28	Train on call public works staff in emergency response.		X			Remove. This is a good action, but not relevant to mitigation funding. See MLT-7
AH-29	If necessary, when remodeling Town-owned buildings and facilities, remove asbestos to speed up clean up of buildings so that they can be reoccupied more quickly.				X	Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-30	Develop and enforce a repair and reconstruction ordinance to ensure that damaged buildings are repaired in an appropriate and timely manner and retrofitted concurrently.			X	X	Annex- combine with AH-31
AH-31	Develop post-disaster development and recovery ordinance to facilitate recovery.			X	X	Annex- combine with AH-30
AH-32	Consider a program to encourage owners of private buildings and educational facilities to participate in a program similar to San Francisco's Building Occupancy Resumption Program (BORG). This program permits owners of private buildings to hire qualified structural engineers to create building-specific post-disaster inspection plans and allows these engineers to become automatically deputized as City/County inspectors for these buildings in the event of an earthquake or other disaster.			X		Discard, not practical for small town
AH-33	Continue to maintain a list of property owners that may need assistance during or after a hazard event and their contact information, such as seniors and the disabled.		X			Remove, not hazard mitigation per say
AH-34	Continue the neighborhood watch block captain and team programs.		X			Remove, not hazard mitigation per say
AH-35	Continue to sponsor the formation and training of Get Ready Ross / Community Emergency Response Teams (CERT) for residents in the community.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-36	Continue to work with other local agencies to offer the 20-hour basic CERT training course.		X			Remove. This is a good action, but not relevant to

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						natural hazard mitigation funding
AH-37	Consider relocating or setting up backup Town Emergency Operations Center out of the floodplain and train employees on how to access the area and on the EOC plan.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-38	Provide information to encourage residents to maintain at least 72 hours and up to one week of emergency supplies in the event of isolation during an emergency for work and home.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-39	In the event that lights are needed for rapid evacuation after a disaster, consider installing battery back-ups, emergency generators, or lights powered by alternative energy sources to ensure that intersection traffic lights function following loss of power.		X		X	MLT-9
AH-40	Consider relaxing development standards for installation of emergency generators (such as exceptions to setbacks).			X		Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-41	Obtain at least three laptop computers for use outside of Police Department should the public safety building be uninhabitable due to hazards.		X		X	Annex
AH-42	Obtain propane heaters, stoves and lanterns for emergency use for employees.		X			
AH-43	Encourage employees to have a family disaster plan so that they are prepared to assist the Town in the event of a disaster.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-44	Ensure that fire, police, and other emergency personnel have adequate radios, breathing apparatuses, protective gear, and other equipment to respond to a major disaster.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-45	Maintain the Town's emergency operations center in a fully functional state of readiness.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-46	Update and maintain the Town's Standardized Emergency Management System (SEMS) Plan and the National Incident Management System (NIMS) Plan, and submit NIMSCAST report.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-47	Work cooperatively with the American Red Cross, Town schools, churches, MA&GC and non-profits to set up memoranda of understanding for use of education facilities an appropriate as emergency shelters following disasters.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding

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AH-48	Minimize the likelihood that power interruptions will adversely impact critical facilities by ensuring that they have adequate back-up power. Obtain small gasoline powered generator for emergency power for public safety to charge flashlight, portable batteries, etc.		X		X	MLT-9
AH-49	Develop a program to provide at-cost NOAA weather radios to residents of flood hazard areas.			X		Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-50	Offer CERT training to employees.			X		Remove. This is a good action, but not relevant to natural hazard mitigation funding
AH-51	Continue to implement activities in the Town of Ross Climate Action Plan (November 2010).		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
DAM-1	Improve coordination among the Marin Municipal Water District and the Town so that the Town can better plan for evacuation of areas that could be inundated if the Phoenix Lake Dam fails.		X		X	Annex
DR-1	Continue to require projects to comply with MMWD water conservation ordinances.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
EQ-1	Obtain a current initial earthquake performance evaluation of Town owned buildings (public safety, Town Hall, post office). Inform staff, Town Council and the public, regarding the extent to which the Town buildings may be affected by an earthquake and if they will only perform at a life safety level (allowing for the safe evacuation of personnel) or are expected to remain functional following an earthquake.			X		MLT-2
EQ-2	If necessary, research to determine seismic stability of Town-owned bridges. If work is necessary, expedite the funding and retrofit of seismically-deficient Town-owned bridges by working with Caltrans and other appropriate governmental agencies.		X		X	EQ-1, EQ-3
EQ-3	Continue to require preparation of site-specific geologic or geotechnical reports for development and redevelopment proposals in areas subject to earthquake-induced landslides or liquefaction and condition project approval on the incorporation of necessary mitigation measures related to site remediation, structure and foundation considering they are historic structures.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding

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EQ-4	Require that local government reviews of geologic and engineering studies are conducted by appropriately trained and credentialed staff or contractors.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
EQ-5	Investigate and adopt appropriate financial, procedural, and land use incentives for property owners to retrofit vulnerable structures (see http://quake.abag.ca.gov/fixit). Inform residents that retrofits are exempt from increases in property taxes.		X		X	EQ-1
EQ-6	Create a mechanism to require the bracing of water heaters and flexible couplings on gas appliances, and/or the bolting of homes to their foundations and strengthening of cripple walls to reduce fire ignitions due to earthquakes.		X		X	Partially relevant to mitigation funding, see EQ-1
EQ-7	Continue to require engineered plan sets for seismic retrofitting of heavy two-story homes with living areas over garages, split level homes, soft-story seismic retrofits, and hillside homes, until standard plan sets and construction details become available.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
EQ-8	Continue to require that all new privately-owned buildings be constructed in compliance with requirements of the most recently adopted version of the California Building Code.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
EQ-9	Ensure that building department staff and contract building inspectors are appropriately trained and certified and support continued education to ensure enforcement of building codes and construction standards, as well as to identify typical design inadequacies of housing and recommended improvements.		X		X	MLT-6
EQ-10	Promote regional retrofit classes or workshops for homeowners.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
EQ-11	Require geologic reports in areas mapped by others as having significant liquefaction or landslide hazards.		X		X	LS-1, EQ-4
EQ-12	Encourage contract building inspector and building staff to take classes on a periodic basis (such as the FEMA- developed training classes offered by ABAG) on retrofitting of single-family homes, including application of Plan Set A.		X		X	MLT-7
EQ-13	Expedite the funding and retrofit of road structures by working with Caltrans and other appropriate governmental agencies.		X		X	EQ-3
EQ-14	Consider modification to Town building code to initiate a lower threshold for seismic improvement.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
EQ-15	Utilize or consider adoption of a retrofit standard that includes standard plan sets and construction details for voluntary bolting of homes to their	X ?				

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	foundations and bracing of outside walls of crawl spaces ("cripple" walls), such as Plan Set A developed by a committee representing the East Bay-Peninsula-Monterey Chapters of the International Code Council (ICC), California Building Officials (CALBO), the Structural Engineers Association of Northern California (SEAONC), the Northern California Chapter of the Earthquake Engineering Research Institute (EERI-NC), and ABAG's Earthquake Program.					
EQ-16	Install earthquake-resistant connections when pipes enter and exit bridges and work to retrofit of these structures.		X		X	EQ-3
EQ-17	Prepare an inventory of private facilities that are potentially hazardous, including, but not limited to, multiunit, soft story, concrete tilt-up, and concrete frame buildings.		X		X	EQ-2
FL-1	As new flood-control projects are completed, request that FEMA revise its flood- insurance rate maps and digital Geographic Information System (GIS) data to reflect flood risks as accurately as possible.				X	
FL-2	Document and install plaques to inform property owners of historic flood levels.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-3	Work with San Anselmo to improve their drainage system and add new culverts at seven sites along upper Oak Avenue in San Anselmo, as identified as Measure 1 in the "Final Draft Report: Planning-Level Hydrology and Hydraulics Study for Reducing Street Inundation and Overflow by Stormwater; Bolinas Avenue in Ross and San Anselmo, California," January 25, 2011.	X				
FL-4	Consider amending the Town floodplain management ordinance to create cumulative substantial improvement rules.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-5	Prepare articles to educate /remind homeowners of actions they can take before/after California," January 25, 2011.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-6	Annually inspect and clean Town creeks of debris. Use public outreach to inform the Town's residents of the annual creek clean-up work. Maintain a log of debris removed annually.		X		X	FLD-5
FL-7	Continue to provide information on locations for obtaining sandbags deliver those materials to vulnerable populations upon request.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-8	Continue to provide link to web enabled and publicly-accessible County automated system of flood gauges.		X		X	Annex
FL-9	Assist, support, and/or encourage the U.S. Army Corp of Engineers,		X			Remove. This is a good

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	various Flood Control and Water Conservation Districts, and other responsible agencies to locate and maintain funding for the development of flood control projects that have high cost- benefit ratios (such as through the writing of letters of support and/or passing resolutions in support of these efforts).					action, but not relevant to natural hazard mitigation funding as written
FL-10	Continue to encourage new development near floodways to incorporate a setback from watercourses to allow for changes in stormwater flows in the watershed over time.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-11	Continue to have Town staff inspect creek areas after each storm.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-12	Continue to inspect creek areas in response to citizen complaints.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-13	Encourage residents and business owners to elevate structures within flood hazard areas.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-14	Enforce provisions under creek protection, stormwater management, and discharge control ordinances designed to keep watercourses free of obstructions and to protect drainage facilities to conform to the Regional Water Quality Control Board's Best Management Practices.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-15	Continue to enforce regulations concerning new construction (and major improvements to existing structures) within flood zones in order to be in compliance with federal requirements and become a participant in the Community Rating System of the National Flood Insurance Program.		X		X	FLD-1
FL-16	Install grates to catch debris.					Annex? or discard. This might have been included regarding Phase II stormwater permit
FL-17	Participate in Ross Valley Flood Protection and Watershed Program. Work with other Ross Valley jurisdictions to address a watershed-wide approach to drainage, warning systems, emergency response, and flood insurance programs. (General Plan Program 6.A)		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-18	Perform annual creek dredging to remove accumulated sediments from Lagunitas Road to the fish ladder.	X			New bridge doesn't necessitate dredging	
FL-19	Continue to repair and make structural improvements to storm drains, pipelines, and/or channels to enable them to perform to their design capacity in handling water flows as part of regular maintenance activities.		X		X	MLT-1, FLD-5

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	Continue to request private property owners to do the same, as necessary.					
FL-20	Work with other Ross Valley jurisdictions to explore and adopt land use regulations to minimize additional runoff, or reduce runoff, within the Ross Valley watershed. (General Plan Program 6.C)		X		X	Annex?
FL-21	Prepare GIS storm water map of the watershed to determine the water flow and design a culvert system appropriate to the volume and flow of peak runoff. Complete the identification of existing culverts and the need for new ones.		X		X	Annex. Partially completed, reword as stormdrain master plan?
FL-22	Reconstruct and enlarge bridge openings and culverts.		X		X	MLT-10
FL-23	Construct a new 1,400 ft. long, 42-48" diameter reinforced concrete pipe culvert network running under the south gutter line on lower Bolinas Avenue. The culvert would originate with inlets at the Richmond Avenue intersection and outfall to Corte Madera Creek at the Sir Francis Drake Boulevard Bridge, as identified as Measure 4 in the "Final Draft Report: Planning-Level Hydrology and Hydraulics Study for Reducing Street Inundation and Overflow by Stormwater; Bolinas Avenue in Ross and San Anselmo, California," January 25, 2011.		X		X	Annex
FL-24	Construct an approximately 300,000 gallon subsurface stormwater detention vault beneath Richmond Avenue as identified as Measure 8b in the "Final Draft Report: Planning-Level Hydrology and Hydraulics Study for Reducing Street Inundation and Overflow by Stormwater; Bolinas Avenue in Ross and San Anselmo, California," January 25, 2011.					Remove? This isn't even in the Town of Ross
FL-25	Create bioretention areas at the St. Anselm Church overflow parking lot and the Town's adjacent right of way as identified as Measure 4b in the "Final Draft Report: Planning-Level Hydrology and Hydraulics Study for Reducing Street Inundation and Overflow by Stormwater; Bolinas Avenue in Ross and San Anselmo, California,"			X	X	Annex
FL-26	Ensure staff are knowledgeable regarding floodplain management regulations to improve enforcement of current standards for all development within flood hazard areas. Ensure that contract building inspectors have appropriate training and expertise in floodplain management regulations to monitor construction projects.		X		X	FLD-9
FL-27	Secure a one-way flap gate at the existing Corte Madera Creek outfall at the Winship Avenue Bridge section as identified as Measure 2j in the "Final Draft Report: Planning- Level Hydrology and Hydraulics Study for Reducing Street Inundation and Overflow by Stormwater; Bolinas Avenue in Ross and San Anselmo, California," January 25, 2011.			X	X	Annex
FL-28	Create and update a photo record of the Town creeks to document condition and structures linked with GPS.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-29	Continue maintenance efforts to keep storm drains and creeks free of			X		Remove. This is a good

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	obstructions, while retaining vegetation in the channel (as appropriate) to allow for the free flow of water. Develop a "Maintain-a-Drain" campaign, similar to that of the City of Oakland, encouraging private businesses and residents to keep storm drains in their neighborhood free of debris.					action, but not relevant to natural hazard mitigation funding
FL-30	Support creation of detention basins at Phoenix Lake and locations in the Ross Valley and other flood control projects as recommended in the Ross Valley Flood Damage Reduction Feasibility Study.					No longer being considered as part of the flood control program
FL-31	Continue to develop guidelines that limit the coverage of impervious surfaces, that require the use of permeable surfaces, that implement other regulations to effectively channel and minimize site runoff, and that allow water to percolate into the ground. (General Plan Program 6.B)		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-32	Assist neighborhoods to develop regular program of inspecting and clearing private road culverts.		X			FLD-5
FL-33	To reduce flood risk, thereby reducing the cost of flood insurance to private property owners, apply for participation in the Community Rating System of the National Flood Insurance Program and work to qualify for the highest-feasible rating.	X				FLD-1
FL-34	When properties that may provide opportunities for drainage improvements are for sale, acquire easements to install drainage improvements, such as between Bolinas Avenue and Fernhill.		X		X	Annex
FL-35	Amend Town floodplain management regulations to review thresholds for "substantial improvement" to take into account the depreciated cost value of structures, rather than the market value.			X		Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-36	Create a building and elevation inventory of structures in the floodplain		X		X	Annex
FL-37	Adopt regulations or design guidelines to limit basement and understory storage and mechanical areas below the base flood elevation, particularly for repetitive damaged properties.			X		Remove. This is a good action, but not relevant to natural hazard mitigation funding
FL-38	Amend Town floodplain management regulations to adopt freeboard regulation to require finished floor to be 18" above the base flood elevation, rather than at the base flood elevation, to protect joists and vents from flood damage. Develop base flood elevation map using historical flood data.			X		Annex, Reword
FL-39	Purchase three pair hip-wader pants, for use by on-duty personnel to reach flooded areas.			X		Annex
FL-40	Purchase one SUV for use in flooding situations where patrol cars may not be able to operate due to high water.			X		Annex
FL-41	Continue the Town of Ross participation in the National Flood Insurance Program (NFIP) and require projects that result in substantial improvements to comply with the Town floodplain development regulations and provide elevation certificates to the Town.		X			partially addressed with FLD-1 Elevation Certificates is good strategy but not nec

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						applicable to HMGP funding
LS-1	Establish and enforce provisions under the creek protection, grading, storm water management, and discharge control ordinances designed to control erosion and Town.	X				?
LS-2	Continue to enforce requirements in zoning ordinance to address hillside development Town.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
LS-3	Increase efforts to reduce landslides and erosion in existing and future development by improving appropriate code enforcement and use of applicable standards for private property, such as those appearing in the California Building Code, California Geological Survey Special Report 117 – Guidelines for Evaluating and Mitigating Seismic Hazards in California, American Society of Civil Engineers (ASCE) report Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California, and the California Board for Geologists and Geophysicists Guidelines for Engineering Geologic Reports. Such standards should cover excavation, fill placement, cut-fill transitions, slope stability, drainage and erosion control, slope setbacks, expansive soils, collapsible soils, environmental issues, geological and geotechnical investigations, grading plans and specifications, protection of adjacent properties, and review and permit issuance.		X		X	LS-1
LS-4	Require geotechnical and soil-hazard investigations be conducted and filed to prevent grading from creating unstable slopes, and that any necessary corrective actions be taken prior to development approval.		X			Annex?
LS-5	Require that staff and consultants reviewing these investigations are appropriately trained and credentialed.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
WF-1	Ensure that Town-initiated fire-preventive vegetation-management techniques and practices for creek sides and high-slope areas do not contribute to the landslide and erosion hazard. For example, vegetation in these sensitive areas could be thinned, rather than removed, or replanted with less flammable materials. When thinning, the non-native species should be removed first. Other options would be to use structural mitigation, rather than vegetation management in the most sensitive areas.		X		X	FIR-6, FIR-5
WF-2	Work with Marin Municipal Water District to identify needed improvements to the water supply for fire suppression		X		X	MLT-14
WF-3	Continue to adopt and amend as needed updated versions of the California Building and Fire Codes so that optimal fire-protection standards are used in construction and renovation projects.		X			This is implicit

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WF-4	Increase local patrolling during periods of high fire weather.		X		X	Annex or discard? Probably not HMGP fundable
WF-5	Monitor weather during times of high fire risk using, for example, weather stations tied into police and fire dispatch centers.		X		X	Annex
WF-6	Participate in multi-agency efforts to mitigate fire threat, such as the Hills Emergency Forum (in the East Bay), various FireSafe Council programs, and town/city-utility task forces. Such participation increases a jurisdiction's competitiveness in obtaining grants.		X		X	Annex
WF-7	Increase efforts to reduce hazards in areas exposed to high to-extreme fire threat through improving engineering design and vegetation management for mitigation, appropriate code enforcement, and public education on defensible space mitigation strategies.		X		X	FIR-2, FIR-3, FIR-5
WF-8	Expand vegetation management program to more effectively manage the fuel load through roadside collection and chipping, mechanical fuel reduction equipment, use of goats or other organic methods of fuel reduction.		X		X	FIR-5
WF-9	Continue the defensible space vegetation program.		X		X	FIR-2
WF-10	Maintain fire roads and/or public right-of-way roads and keep them passable at all through roadside collection and chipping, mechanical fuel reduction equipment, use of goats or other organic methods of fuel reduction. Plan for any additional tanks the Town may need to ensure enough capacity for fire fighting.		X		X	FIR-2, FIR-5
WF-11	Prepare an accurate database of water tanks owned by Marin Municipal Water District and privately owned tanks and swimming pools that are available for fire fighting.			?		Annex
WF-12	Conduct periodic fire-safety inspections of all multi-family buildings, as required by State law. Conduct periodic fire-safety inspections of all privately-owned commercial and buildings.		X			Discard. This is an ongoing program
WF-13	For new development, ensure all dead-end segments of roads and/or long driveways include turn-around sufficient for fire equipment.		X			Remove. This is a good action, but not relevant to natural hazard mitigation funding
WF-14	Consider fire safety, evacuation, and emergency vehicle access when reviewing proposals to add secondary units or additional residential units in wildland-urban- interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.		X		X	FIR-1
WF-15	Create a mechanism to enforce provisions of the California Building and Fire Codes and other local codes that require the installation of smoke detectors and fire- extinguishing systems on existing residential buildings by making installation a condition of finalizing a permit for any work valued at over a fixed amount and/or as a condition for the transfer of property.		X			Annex or discard? Probably not HMGP fundable

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WF-16	Require fire sprinklers in all new or substantially remodeled structures.	X				Annex or discard? Probably not HMGP fundable
WF-17	Require that new homes in wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat be constructed of fire-resistant building materials (including roofing and exterior walls) and incorporate fire-resistant design features (such as minimal use of eaves, internal corners, and open first floors) to increase structural survivability and reduce ignitability.		X			Isn't this already a policy?
WF-18	Work with Marin Municipal Water District and homeowners to upgrade fire hydrants and water lines as necessary.		X		X	MLT-14
WF-19	Require that development in hillside areas provide adequate access roads (with width and vertical clearance that meet the minimum standards of the Fire Code or relevant local ordinance), onsite fire protection systems, and fire breaks.		X		X	FIR-1
WF-20	Prepare Water System (Pressure) Master Plan. Coordinate with the Marin Municipal Water District (MMWD) to evaluate water pressure and water lines to ensure adequate fire protection. Identify locations where improvements are needed and adopt requirements and funding mechanisms in coordination with MMWD to implement these improvements. (General Plan Program 5.A)			X		Annex? or MLT 14
WF-21	Continue to ensure existing and new development have a reliable source of water for fire suppression (meeting acceptable standards for minimum volume and duration of flow).		X			See MLT-14. Remove. This is a good action, but not relevant to natural hazard mitigation funding
WF-22	Develop plans for evacuation or sheltering in place of Ross and Branson school children in the event of a wildfire emergency so that streets are not overloaded near schools by students evacuating and parents attempting to pick up their children, which may restrict access by emergency vehicles.			X		Remove. This is a good action, but not relevant to natural hazard mitigation funding

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Table N-8 - Current and Potential Hazard Mitigation Projects and Programs in Ross

Action Number / Name		Estimated Cost	Potential Funding Sources	Timeline	Responsible Agency
AH-17	Consider establishing a hazard mitigation fee for building permits to create a hazard mitigation funding source for initiatives or grant cost-share requirements	Low	Revenue generating	1-3 years	Administration, Planning and/or Building
AH-19	Consider improvement of currently unused pedestrian rights-of-way/paths as walkways to serve as additional evacuation routes.	High	General Fund	2-5 years	Public Works and/or Planning
AH-2	Conduct periodic tests of the alerting and warning system.	Low	General Fund	Continuous	Fire
AH-30	Develop and enforce a repair and reconstruction ordinance to ensure that damaged buildings are repaired in an appropriate and timely manner and retrofitted concurrently.	Low	General Fund	6-12 months	Planning
AH-31	Develop post-disaster development and recovery ordinance to facilitate recovery.	Low	General Fund	6-12 months	Planning
AH-4	Encourage the formation of a community- and neighborhood-based approach to wildfire education and action through local Fire Safe Councils and the Fire Wise Program to take advantage of grant funds currently available to offset costs of specific	TBD	General Fund and State fire grants	1-2 years	Fire
AH-41	Obtain at least three laptop computers for use outside of Police Department should the public safety building be uninhabitable due to hazards.	\$3,000	General Fund and/or State/Federal Grants	1 Year	Police
AH-42	Obtain propane heaters, stoves and lanterns for emergency use for employees.	Low	General Fund and/or State/Federal Grants	1 Year	Police
AH-8	Consider expanding residential building reports to include hazard disclosure for known natural hazards in Ross: 1) Special Flood Hazards Areas (designated by FEMA), 2) Areas of Potential Flooding from dam failure inundation, 3) Very High Fire Hazards Severity Zones, 4) Wildland Fire Zones, and 5) Liquefaction and Landslide Hazards Zones (designated under the Seismic Hazards Mapping Act).	Low	General Fund	1-3 years	Building and/or Planning
DAM-1	Improve coordination among the Marin Municipal Water District and the Town so that the Town can better plan for evacuation of areas that could be inundated if the Phoenix Lake Dam fails.	Low	General Fund/staff time	1-3 years	Fire
FL-16	Install grates to catch debris.	Medium	General Funds, DPW	Continuous	Public Works
FL-20	Work with other Ross Valley jurisdictions to explore and adopt land use regulations to minimize additional runoff, or reduce runoff, within the Ross Valley watershed. (General Plan Program 6.C)	Low	General Funds	Ongoing	Public Works, Planning and/or Administration
FL-21	Prepare GIS storm water map of the watershed to determine the water flow and design a culvert system appropriate to the volume and flow of peak runoff. Complete the identification of existing culverts and the need for new ones.	\$80,000	General Funds and County Partnerships	Two to Five months	Public Works
FL-23	Construct a new 1,400 ft. long, 42-48" diameter reinforced concrete pipe culvert network running under the south gutter line on lower Bolinas Avenue. The culvert would originate with inlets at the Richmond Avenue intersection and outfall to Corte Madera Creek at the Sir Francis Drake Boulevard Bridge, as identified as Measure 4 in the "Final Draft Report: Planning-Level Hydrology and Hydraulics Study for Reducing Street Inundation and Overflow by Stormwater; Bolinas Avenue in Ross and San Anselmo, California," January 25, 2011.	\$780,000	State Federal Grants	1-2 years	Public Works

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FL-25	Create bioretention areas at the St. Anselm Church overflow parking lot and the Town's adjacent right of way as identified as Measure 4b in the "Final Draft Report: Planning-Level Hydrology and Hydraulics Study for Reducing Street Inundation and Overflow by Stormwater; Bolinas Avenue in Ross and San Anselmo, California,"	\$220,000	State Federal Grants/ drainage fees, Partnership with San Anselmo	1-2 years	Public Works
FL-27	Secure a one-way flap gate at the existing Corte Madera Creek outfall at the Winship Avenue Bridge section as identified as Measure 2j in the "Final Draft Report: Planning- Level Hydrology and Hydraulics Study for Reducing Street Inundation and Overflow by Stormwater; Bolinas Avenue in Ross and San Anselmo, California," January 25, 2011.	\$20,000	State Federal Grants/ drainage fees, Partnership with San Anselmo	1-2 years	Public Works; County of Marin agencies responsible for implementing the Ross Valley Flood Reduction and Creek Management Strategy.
FL-34	When properties that may provide opportunities for drainage improvements are for sale, acquire easements to install drainage improvements, such as between Bolinas Avenue and Fernhill.	High	unknown	Ongoing	Public Works
FL-36	Create a building and elevation inventory of structures in the floodplain	Medium	General Fund	1-3 years	Building and/or Planning
FL-38	Amend Town floodplain management regulations to adopt freeboard regulation to require finished floor to be 18" above the base flood elevation, rather than at the base flood elevation, to protect joists and vents from flood damage. Develop base flood elevation map using historical flood data.	Low	General Fund	1-5 years	Building and/or Planning
FL-39	Purchase three pair hip-wader pants, for use by on-duty personnel to reach flooded areas.	\$1,500	General Fund	1 Year	Police
FL-40	Purchase one SUV for use in flooding situations where patrol cars may not be able to operate due to high water.	\$45,000	General Fund, state/federal grants	1 Year	Police
FL-8	Continue to provide link to web enabled and publicly-accessible County automated system of flood gauges.	0	General Fund	Completed	Administration
LS-1	Establish and enforce provisions under the creek protection, grading, storm water management, and discharge control ordinances designed to control erosion and Town.	Low	General Fund	Ongoing	Building
LS-4	Require geotechnical and soil-hazard investigations be conducted and filed to prevent grading from creating unstable slopes, and that any necessary corrective actions be taken prior to development approval.	Low	General Fund	Ongoing	Building and/or Planning
WF-11	Prepare an accurate database of water tanks owned by Marin Municipal Water District and privately owned tanks and swimming pools that are available for fire fighting.	TBD	General Fund, staff time, partnerships	1 to 5 years	Fire and/or Planning
WF-15	Create a mechanism to enforce provisions of the California Building and Fire Codes and other local codes that require the installation of smoke detectors and fire- extinguishing systems on existing residential buildings by making installation a condition of finalizing a permit for any work valued at over a fixed amount and/or as a condition for the transfer of property.	Low	General Fund	Continuous	Building and Fire
WF-16	Require fire sprinklers in all new or substantially remodeled structures.	Low	General Fund, Fire Department staff time	Continuous	Fire
WF-20	Prepare Water System (Pressure) Master Plan. Coordinate with the Marin Municipal Water District (MMWD) to evaluate water pressure and water lines to ensure adequate fire protection. Identify locations where improvements are needed and adopt requirements and funding mechanisms in coordination with MMWD to implement these improvements. (General Plan Program 5.A)	TBD	General Fund, Fire Department staff time	Ongoing	Fire
WF-4	Increase local patrolling during periods of high fire weather.	Low	General Fund, Fire Department	Continuous	Fire

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			staff time		
WF-5	Monitor weather during times of high fire risk using, for example, weather stations tied into police and fire dispatch centers.	Low	General Fund, Fire Department staff time	Continuous	Fire
WF-6	Participate in multi-agency efforts to mitigate fire threat, such as the Hills Emergency Forum (in the East Bay), various FireSafe Council programs, and town/city-utility task forces. Such participation increases a jurisdiction's competitiveness in obtaining grants.	Low	General Fund, partnerships & Fire Department staff time	Continuous	Fire

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Table N-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	2007 General Plan	<p>The General Plan outlines long-term direction for development and policy. Portions of the plan that support mitigation include:</p> <ul style="list-style-type: none"> • Location of Future Development. (General Plan Policy 5.1) • Geologic Review Procedures. (GPP 5.2) • Fire Resistant Design. (GPP 5.3) • Maintenance and Landscaping for Fire Safety. (GPP 5.4) • Fire Safety in New Development. (GPP 5.5) • Hazardous Materials Storage and Disposal. (GPP 5.11) • Access for Emergency Vehicles. (GPP 5.12) • Town Responsibilities for Emergency Preparation and Response. (GPP 5.13) • Flood Protection in New Development. (GPP 6.1) • Flood Control Improvements. (GPP 6.2) • Ross Valley Flood and Watershed Protection. (GPP 6.3) • Runoff and Drainage. (GPP 6.4) • Permeable Surfaces. (GPP 6.5) • Creek and Drainageway Setbacks, Maintenance and Restoration. (GPP 6.6) • Riparian Vegetation. (GPP 6.7)
Plan	Town of Ross 2012 Local Hazard Mitigation Plan	The Town's prior Hazard Mitigation Plan is a stand-alone document which identifies risks from natural hazards present in the Town and includes strategies to reduce these risks. Many of the strategies identified in 2012 were carried forward to the multi-jurisdictional plan.
Policy	Zoning Ordinance	The Zoning Ordinance implements the General Plan by establishing specific regulations for development. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the Zoning Ordinance.
Policy	Municipal Code	The Muni Code includes several sections that address hazard mitigation. The Town adopts the current California Building Code which applies to all construction activity within the Town boundaries. The California Building Code is comprised of 11 parts that incorporate public health, safety, energy, green building and access standards used in the design and construction of all buildings. The new code provisions will allow the Town to utilize the latest technologies, advances in construction standards and seismic design for the use in new residential and commercial construction and in remodels.
Administrative	Administrative Services Department	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	Town Planning, Building, and Public Works Departments	These departments are responsible for planning and building related activities including issuing permits, conducting environmental review, preparing planning documents, and addressing housing issues. Mitigation activities related to planning and building can be implemented by this department. Public Works Department is responsible for Town-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Personnel	Ross Police	The Town Police Department conducts emergency preparedness activities for the community. Mitigation activities related to

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		emergency preparedness can be implemented by the Police Department.
Personnel	Ross Valley Fire Department	The Ross Valley Fire Department protects the town from the effects of fire and other hazardous conditions and supports implementation of mitigation actions that reduce the risk of wildfire.
Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and fund the personnel resources above as well as capital improvement projects.
Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that are being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	Town Newsletter	Much of what happens in Town happens at each month's regular Town Council meeting. But since most Town residents don't regularly attend Council meetings, The Morning After, our monthly e-newsletter, was created to fill that void by delivering up-to-the-minute news highlights delivered by email the day following the Council meeting. The Morning After is the flagship publication of the Town's email list designed to keep residents, business owners, Ross organizations and interested parties up-to-date on Town news and information.
Training and Outreach	Community Rating System Working Group	The Community Rating System (CRS) is a voluntary program for communities participating in the National Flood Insurance Program (NFIP) to earn flood insurance premium reductions for property owners. A Countywide collaboration of CRS community staff has been started in recent years and has led to shared resources including outreach materials and floodplain management training. This collaboration has the potential to expand and lead to a wide variety of flood mitigation activities.
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)

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Town of San Anselmo

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Town of San Anselmo

Town of San Anselmo

The Town of San Anselmo had an estimated population of 12,336 in 2010, with 5,538 housing units in the Town. The Town has a total area of 2.677 square miles. The median income for a household in the City is \$71,488 and the per capita income for the City is \$ \$41,977. Approximately 2.5 percent of families and 5.1 percent of the population is below the poverty line (2010 data, U.S. Census Bureau).

San Anselmo was incorporated as a town in 1907.

The Town of San Anselmo completed a single-jurisdiction Local Hazard Mitigation and Climate Adaptation Plan in 2017 which is hereby incorporated by reference. The referenced plan has much more information in addition to the update on San Anselmo vulnerability and mitigation actions below.

Table O-1. Vulnerability of Structures in San Anselmo

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	3,768	100%	536	100%	176	100%	1	100%	0	N/A
Flood	587	16%	219	41%	92	52%	1	100%	0	N/A
Fire	2678	71%	288	54%	55	31%	0	0%	0	N/A
Tsunami	0	0%	0	0%	0	0%	0	0%	0	N/A
Landslide	662	18%	33	6%	0	0%	0	0%	0	N/A
Dam Inundation	21	1%	7	1%	5	3%	0	0%	0	N/A

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Table O-2. Vulnerability of Transportation in San Anselmo

	Roads	
	Miles	% of Total
Earthquake	56	100%
Flood	9	16%
Fire	42	75%
Tsunami	0	0%
Landslide	14	25%
Dam Inundation	0.5	1%

Table O-3. Vulnerability of Communication in San Anselmo

	MERA	
	Number	% of Total
Earthquake	0	N/A
Flood	0	N/A
Fire	0	N/A
Tsunami	0	N/A
Landslide	0	N/A
Dam Inundation	0	N/A

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Table O-4. Vulnerability of Power in San Anselmo

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A	0	N/A	0	N/A	Check data	
Flood	0	N/A	0	N/A	0	N/A	0	N/A		
Fire	0	N/A	0	N/A	0	N/A	0	N/A		
Tsunami	0	N/A	0	N/A	0	N/A	0	N/A		
Landslide	0	N/A	0	N/A	0	N/A	0	N/A		
Dam Inundation	0	N/A	0	N/A	0	N/A	0	N/A		

Table O-5. Vulnerability of Water / Sewage in San Anselmo

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A
Flood	0	N/A	0	N/A
Fire	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A
Landslide	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A

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Table O-6. Vulnerability of Critical Facilities in San Anselmo

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	30	100%	3	100%	4	100%	0	N/A
Flood	2	6.7%	3	100%	0	0%	0	N/A
Fire	16	53.3%	1	33.3%	1	25%	0	N/A
Tsunami	0	0%	0	0%	0	0%	0	N/A
Landslide	0	0%	0	0%	0	0%	0	N/A
Dam Inundation	0	0%	0	0%	0	0%	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table O-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables O-1 through O-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table O-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table O-7 – Evaluation of Prior Mitigation Actions in San Anselmo

Action #	Description	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
AH-01	Expedite the funding and retrofit of seismically-deficient Town-owned bridges and road structures by working with Caltrans and other appropriate governmental agencies. Identify those that affect or are affected by flooding and either elevate them to increase stream flow and maintain critical ingress and egress routes or modify the channel to achieve equivalent objectives.		X		X	EQ-3
AH-02	Assess the vulnerability of critical facilities (Town Hall, fire stations, corporation yard buildings) to damage in natural disasters (earthquake, wildfire, flood) based on occupancy and structural type, make recommendations on priorities for structural improvements, mitigation, replacement or occupancy reductions, and identify potential funding mechanisms. Inform staff, Town Council and the public, regarding the extent to which the		X		X	MLT-2

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	Town buildings may be affected by a natural disaster and if they will only perform at a life safety level (allowing for the safe evacuation of personnel) or are expected to remain functional following a disaster.					
AH-03	Assess the vulnerability of non-critical facilities (ICC, Robson House, Library) to damage in natural disasters based on occupancy and structural type, make recommendations on priorities for structural improvements, mitigation or occupancy reductions, and identify potential funding mechanisms. Clarify to workers in public facilities and emergency personnel, as well as to elected officials and the public, the extent to which public facilities are expected to perform only at a life safety level (allowing for the safe evacuation of personnel) or are expected to remain functional following a natural disaster.		X		X	MLT-2
AH-05	Adopt, amend as needed, and enforce updated versions of the California Building and Fire Codes as well as other regulations (such as state requirements for fault, landslide, and liquefaction investigations in particular mapped areas) so that optimal standards are used in construction and renovation projects of private and public buildings and infrastructure.		X		X	MLT-3
AH-06	Continue to enforce existing regulations requiring replacement of above ground electric and phone wires and other structures with underground facilities. Require underground utilities to be effectively sealed to prevent backflow of floodwaters into the building and electrical utilities below the flood protection level to be protected against floodwaters.		X		X	MLT-4
AH-07	Provide information to residents and private business owners and their employees on the availability of interactive hazard maps on MarinMap's web site.		X		X	MLT-5
AH-08						
AH-09	Consider landslide or wildfire hazard concerns, including roads leading to the development, when new construction or major remodels are proposed in hillside areas discourage construction or add mitigation measures, as appropriate.		X		X	MLT-13
AH-10	For new development, require a buffer zone between residential properties and landslide areas or other appropriate mitigation to avoid hazards to persons or property.		X		X	MLT-13, LS-1
AH-11	Work with Town Open Space and Recreation Committees, non-profits and through other mechanisms to protect as open space or parks those areas susceptible to extreme hazards (such as through land acquisition, zoning, and designation as priority conservation areas).		X		X	MLT-8
AH-12	Develop evacuation plans for Town, which are necessary in order to include Local Hazard Mitigation Plan into the General Plan Safety Element.			X		Discard - send to General Plan Safety Element
AH-13	Inform residents and businesses through publications and media announcements of actions they can take to mitigate hazards, including elevation of appliances above expected flood levels, use of fire-resistant roofing and defensible space in high wildfire threat and wildfire-urban-interface areas, structural retrofitting techniques for older homes, and use of intelligent grading practices.		x		x	MLT-5, FLD-4
AH-14	Use disaster anniversaries, such as April (the 1906 earthquake) and October (Loma Prieta earthquake and Oakland Hills fire) and December (local New Years Flood) to remind the public of safety mitigation activities.			x		Discard
AH-15	Conduct and/or promote attendance at local or regional hazard conferences and workshops for elected officials and staff to educate them on the critical need for programs in		X		X	MLT-7

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	mitigating earthquake, wildfire, flood, landslide hazards, and climate adaptation.					
AH-16	Create incentives for private owners of historic or architecturally significant buildings to undertake mitigation to levels that will minimize the likelihood that these buildings will need to be demolished after a disaster, particularly if those alterations conform to the federal Secretary of the Interior's Guidelines for Rehabilitation.			X	X	Combine with AH-17 for Town Annex
AH-17	Develop list of locally historic resources. Continue to require discretionary review and review under the California Environmental Quality Act for the demolition of historically significant privately- owned structures in order to encourage their preservation. Establish preservation-sensitive measures for the repair and re-occupancy of historically significant privately-owned structures, including requirements for temporary shoring or stabilization where needed, arrangements for consulting with preservationists, and expedited permit procedures for suitable repair or rebuilding of historically or architecturally valuable structures.			X	X	Combine with AH-16 for Town Annex
AH-18	Continue to work with utility system providers and other lifeline infrastructure (including natural gas, electricity, water, wastewater system, transportation and communications) and other municipal partners to develop strong and effective mitigation strategies for infrastructure systems and facilities.		X		X	MLT-6
AH-19	Increase recycling rates in local government operations and in the community.		X		X	Discard- send to climate action plan
AH-20	Help educate the public, schools, professional associations and businesses about climate action and Greenhouse Gas reduction.		X		X	Discard- send to climate action plan
AH-21	Update and continue to implement Climate Action Plan which inventories global warming emissions of operations and in the community & sets reduction targets.		X		X	Discard- send to climate action plan
AH-22	Increase the use of clean, alternative energy by advocating for the development of renewable energy resources and supporting the use of waste to energy technology.		X		X	Discard- send to climate action plan
AH-23	Purchase Energy Star equipment and appliances for local government use.		X		X	Discard- send to climate action plan
AH-24	Increase the average fuel efficiency of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program including anti-idling messages; convert diesel vehicles to bio-diesel.		X		X	Discard- send to climate action plan
AH-25	Promote transportation options such as walking, bicycling, commute trip reduction programs, incentives for carpooling and public transit.		X		X	Discard- send to climate action plan
AH-26	Make energy efficiency a priority through building code improvements, retrofitting Town facilities with energy efficient lighting and urging employees to conserve energy and save money.		X		X	Discard- send to climate action plan
AH-27	Maintain healthy urban forests; promote tree planting to increase shading and to absorb		X		X	Discard- send to

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	CO2.					climate action plan
AH-28	Consider if establishing special funding mechanisms (such as Fire Hazard Abatement Districts or regional bond funding) to ensure mitigation strategies are enforced over time.			X		Discard as a funding measure
AH-29	Develop unused or new pedestrian rights-of-way as walkways to serve as additional evacuation routes.		X		X	For Town Annex
AH-30	Review existing regulations and, if necessary, develop and enforce a repair and reconstruction ordinance to ensure that damaged buildings are repaired in an appropriate and timely manner and retrofitted concurrently. This repair and reconstruction ordinance should apply to all public and private buildings, and also apply to repair of all damage, regardless of cause.			X		Discard
AH-31	Continue to enforce State-mandated requirements, such as the California Environmental Quality Act, to ensure that mitigation activities for hazards, such as seismic retrofits and vegetation clearance programs for fire threat, are conducted in a way that reduces environmental degradation such as air quality impacts, noise during construction, and loss of sensitive habitats and species, while respecting the community value of historic preservation.		X		X	Discard - following state regulations is considered implicit
AH-32	Develop a public education campaign on the cost, risk, and benefits of earthquake, flood, and other hazard insurance as compared to mitigation.			X	X	Discard
AH-33	Periodically assess the need for new or relocated fire or police stations and other emergency facilities.			X	X	Discard - covered by MLT-2
AH-34	Support and/or facilitate efforts by the California Geological Survey to complete the earthquake-induced landslide and liquefaction mapping for the Bay Area.		X			Discard
AH-35	Encourage staff to participate in efforts by professional organizations to mitigate earthquake and landslide disaster losses, such as the efforts of the Northern California Chapter of the Earthquake Engineering Research Institute, the East Bay-Peninsula Chapter of the International Code Council, the Structural Engineers Association of Northern California, and the American Society of Grading Officials			X	X	Discard - covered by MLT-7
AH-36	Increase efforts to reduce landslides and erosion in existing and future private development through continuing education of design professionals on mitigation strategies.			X		Discard, see EQ-4. Town won't realistically train design professionals
AH-37	Adopt and enforce land-use policies that reduce sprawl, preserve open space, and create compact, walkable urban communities.		X		X	Discard - Covered by existing General Plan
AH-38	Work with the State Fire Marshall, the California Seismic Safety Commission, Pacific Earthquake Engineering Research Center (PEER), and other experts to identify and manage gas-related fire risks of privately-owned soft-story mixed use buildings that are prone to collapse and occupant entrapment consistent with the natural gas safety recommendations of Seismic Safety Commission Report SSC-02-03. Note - See http://www.seismic.ca.gov/pub/CSSC_2002-03_Natural%20Gas%20Safety.pdf . Also note -					Discard - covered by EQ-1

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	any values that are installed may need to have both excess flow and seismic triggers ("hybrid" valves).					
AH-39	Inventory global warming emissions in your own local government's operations and in the community, set reduction targets and create an action plan.		X		X	Discard- send to climate action plan
AH-40	Balance the need for the smooth flow of storm waters versus the need to maintain wildlife habitat by developing and implementing a comprehensive Streambed Vegetation Management Plan that ensures the efficacy of flood control efforts, mitigates wildfires and maintains the viability of living rivers.		X		X	Discard - not a mitigation measure
DAM-01	Encourage Marin Municipal Water District to review and update mapped inundation area for Phoenix Dam and coordinate with the Town on procedures for the emergency evacuation of areas that would be inundated by a failure of Phoenix Dam.			X		For Town Annex
DR-01	Enhance Town Landscaping and Design Measures: ▪ Incorporate drought tolerant or xeriscape practices into new Town landscape designs to reduce dependence on irrigation. ▪ Use permeable surfaces where feasible to reduce runoff and promote groundwater recharge.		X		X	Discard - Drought not a covered hazard
EQ-01	Investigate and adopt appropriate financial, procedural, and land use incentives (such as parking waivers) as incentives to encourage retrofitting of privately- owned seismically vulnerable residential buildings, such as: (a) waivers or reductions of permit fees, (b) below-market loans, (c) local tax breaks, (d) grants to cover the cost of retrofitting or of a structural analysis, (e) land use (such as parking requirement waivers) and procedural incentives, or (f) technical assistance.		X		X	EQ-1
EQ-02	Adopt the latest applicable standard for the design of voluntary or mandatory soft-story or seismically vulnerable building retrofits.		X		X	EQ-2
EQ-03	Encourage building inspectors to take classes on a periodic basis on retrofitting of single-family homes, including application of Plan Set A.		X		X	MLT-7
EQ-04	Conduct appropriate employee training and support continued education to ensure enforcement of building codes and construction standards, as well as identification of typical design inadequacies and recommended improvements.		X		X	MLT-7
EQ-05	Conduct an inventory of privately-owned existing or suspected soft-story structures as a first step in establishing voluntary or mandatory programs for retrofitting these buildings.			X	X	Town Annex
EQ-06	Use the soft-story inventory to require private owners to inform all existing and prospective tenants that they live or work in this type of building and may need to be prepared to live or work elsewhere following an earthquake if the building has not been retrofitted.			X	X	Town Annex
EQ-07	Require private owners to inform all existing tenants (and prospective tenants prior to signing a lease agreement) that they live in an unreinforced masonry building and the standard to which it may have been retrofitted. Require private owners to inform all existing tenants that they may need to be prepared to work elsewhere following an earthquake even if the building has been retrofitted, because it has probably been retrofitted to a life-safety standard, not to a standard that will allow occupancy following major earthquakes.			X	X	Town Annex
EQ-08	Recognizing that the California Geological Survey has not completed earthquake-induced landslide and liquefaction mapping for much of the Bay Area, identify and require geologic reports in areas mapped by others as having significant		X		X	EQ-4

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	liquefaction or landslide hazards.					
EQ-09	Promote regional retrofit classes or workshops to property owners, contractors and inspectors.			X		Discard - covered by MLT-7
EQ-10	Require preparation of site-specific geologic or geotechnical reports for development and redevelopment proposals in areas subject to earthquake-induced landslides or liquefaction as mandated by the State Seismic Hazard Mapping Act in selected portions of the Bay Area where these maps have been completed, and condition project approval on the incorporation of necessary mitigation measures related to site remediation, structure and foundation design and/or avoidance		X		X	EQ-4
EQ-11	Require engineered plan sets for seismic retrofitting of heavy two-story homes with living areas over garages, as well as for split level homes (that is, homes not covered by Plan Set A), until standard plan sets and construction details become available.		X		X	EQ-4
EQ-12	Require engineered plan sets for seismic retrofitting of homes on steep hillsides (because these homes are not covered by Plan Set A).		X		X	EQ-4
EQ-13	Require engineered plan sets for voluntary or mandatory soft-story seismic retrofits by private owners until a standard plan set and construction details become available.		X		X	EQ-4
EQ-14	Install earthquake-resistant connections when pipes enter and exit bridges and work to retrofit these structures.		X		X	MLT-4, MLT-10
EQ-15						
EQ-16	Inventory non-ductile concrete, tilt-up concrete, and other privately-owned potentially structurally vulnerable buildings.					?
FL-01	Work for better cooperation among the patchwork of agencies managing flood control issues.		X		X	MLT-6
FL-02	Conduct annual outreach to property susceptible to flooding as part of Town's participation on Community Rating System.		X		X	FLD-1
FL-03	Ensure one member of Town staff is a Certified Floodplain Manager.		X		X	FLD-9
FL-04	Continue Mapping of the creeks to further evaluate, design, and implement additional flood control projects.		X		X	Town Annex
FL-05	Pursue funding for the design and construction of storm drainage projects to protect vulnerable properties, including property acquisitions, upstream storage such as detention and retention basins (excluding Memorial Park), and channel widening with the associated right-of-way acquisitions, relocations, and environmental mitigations.		X		X	Town Annex
FL-06	Develop an approach and locations for various watercourse bank protection strategies, including for example, (1) an assessment of banks to inventory areas that appear prone to failure, (2) bank stabilization, including installation of rip rap, or whatever regulatory agencies allow (3) stream bed depth management using dredging, and (4) removal of out-of-date coffer dams in rivers and tributary streams		X		X	Town Annex
FL-07	Working with stakeholders and the community, consider feasibility (including cost, funding, environmental and downstream impacts) and options for purchasing and removal of Building Bridge 2; the structure at 634-636 San Anselmo Avenue which is a major flow constriction at flood levels and within the floodway. As funding becomes available, encourage private business owners to participate in acquisition and relocation programs.	X	X			FLD-6

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FL-08	Working with stakeholders and the community, consider feasibility (including cost, funding, environmental and downstream impacts) and options for removal of Morningside Avenue Bridge and potential construction of upstream and downstream extended wing walls.		X		X	Town Annex
FL-09	Recognize that a multi-agency approach is needed to mitigate flooding by having flood control districts, cities, counties, and utilities meet at least annually to jointly discuss their capital improvement programs for most effectively reducing the threat of flooding. Work toward making this process more formal to insure that flooding is considered at existing joint-agency meetings.			X		Town Annex
FL-10	Improve upon existing hydrologic analysis of runoff and drainage systems to predict areas of insufficient capacity in the storm drain and natural creek system.		X		X	Town Annex
FL-11	Continue and expand the "Village Volunteers" campaign encouraging private businesses and residents to keep storm drains in their neighborhood free of debris.		X		X	Preparedness instead of mitigation so discard
FL-12	Continue to develop guidelines that limit the coverage of impervious surfaces, that require the use of permeable surfaces, that implement other regulations to effectively channel and minimize site runoff, and that allow water to percolate into the ground.		X		X	Town Annex
FL-13	As funding opportunities become available, encourage home and apartment owners and private business owners to participate in elevation and flood proofing programs for areas within flood hazard areas.		X		X	FLD-6
FL-14	For public infrastructure projects, perform a watershed analysis to examine the impact of project development on flooding potential downstream, including communities outside of the jurisdiction of proposed projects.		X			Discard- this is required as part of CEQA/EIR of proposed flood control projects
FL-15	Ensure that new private development pays its fair share of improvements to the storm drainage system necessary to accommodate increased flows from the development, or does not increase runoff by Low Impact Development techniques such as pervious areas or detention facilities.		X		X	Discard already codified as a building permit requirement and per Phase 2 water board NPDES permit
FL-16	Encourage owners of properties in the floodplain to consider purchasing flood insurance. For example, point out that most homeowners' insurance policies do not cover a property for flood damage.		X		X	DAM-1
FL-17	Encourage home and apartment owners to get elevation certificates.		X		X	Town Annex
FL-18	Continue to apply floodplain management regulations for private development in the floodplain and floodway.		X		X	Discard- this is current MFIP regulation
FL-19	Enforce provisions under creek protection, stormwater management, and discharge control ordinances designed to keep watercourses free of obstructions, protect drainage facilities, conform with the Regional Water Quality Control Board's Best Management Practices and comply with applicable performance standards of the National Pollutant Discharge		X		X	MLT-3 enforcing existing regulations is considered

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	Elimination System Phase II municipal stormwater permit that seeks to manage increases in stormwater run-off flows from new development and redevelopment construction projects. Enforce and comply with the grading, erosion, and sedimentation requirements by prohibiting the discharge of concentrated stormwater flows by other than approved methods that seek to minimize					implicit
FL-21	Assist, support, and/or encourage the U.S. Army Corp of Engineers, various Flood Control and Water Conservation Districts, and other responsible agencies to locate and maintain funding for the development of flood control projects that have high cost-benefit ratios (such as through the writing of letters of support and/or passing resolutions in support of these efforts).		X		x	Discard. Good action, not fundable through FEMA hazard mitigation grants
FL-21	Seek funding for, and continue to repair and make structural improvements to, storm drains, pipelines, and/or channels to enable them to perform to their design capacity in handling water flows as part of regular maintenance activities.		X		X	FLD-5
FL-22	Continue maintenance efforts to keep storm drains and creeks free of obstructions, while retaining vegetation in the channel (as appropriate) to allow for the free flow of water.		X		X	FLD-5
FL-23	Continue to encourage new development near floodways to incorporate a setback from watercourses to allow for changes in stormwater flows in the watershed over time.		X		X	Town Annex
FL-24	Continue to have Town staff inspect creek areas after each storm.		X		X	Town Annex
FL-25	Continue to investigate and seek funding for flood control ideas and projects throughout Town		X		X	Discard. Good action, not fundable through FEMA hazard mitigation grants
FL-26	Work with other Ross Valley jurisdictions to explore and adopt land use regulations to minimize additional runoff, or reduce runoff, within the Ross Valley watershed.		X		X	Town Annex
FL-27	Working with stakeholders and the community, consider feasibility (including cost, funding, environmental and downstream impacts) and options for reconstructing and enlarging bridge openings and culverts.		X		X	MLT-10
FL-28	Create and update a photo record of the Town creeks to document condition and structures linked with GPS.		X		X	Discard as not mitigation measure
FL-29	Working with stakeholders and the community, consider feasibility (including cost, funding, environmental and downstream impacts) and options for flow bypass accommodation for downtown constrictions		X		X	Town Annex
FL-30	Establish and enforce requirements for new development so that site-specific designs and source-control techniques are used to manage peak stormwater runoff flows and impacts from increased runoff volumes.		X		X	Discard - covered by existing policies and regulations
FL-31	Provide an institutional mechanism to ensure that development proposals adjacent to floodways and in floodplains are referred to flood control districts and wastewater agencies for review and comment (consistent with the NPDES program).		X		X	Discard - covered by existing building permit process
FL-32	Continue to enforce regulations concerning new construction and substantial improvements		X		X	FLD-1

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	to existing structures within flood zones in order to be in compliance with federal requirements and to continue participation in the Community Rating System (CRS) of the National Flood Insurance Program.					
FL-33	As new flood-control projects are completed, request that FEMA revise its flood- insurance rate maps and digital Geographic Information System (GIS) data to reflect flood risks as accurately as possible.		X		X	Town Annex
FL-34	Consider adopting cumulative substantial improvement requirement of 3 to 5 years under Municipal Code Protection of Flood Hazard Areas.		X		X	Town Annex
FL-35	Conduct a watershed analysis at least once every ten years, or more frequently if there is a major development in the watershed or a major change in the Land Use Element of the General Plan of the cities or counties within the watershed.		X		X	Reword to update existing hydraulic model
FL-36	To reduce flood risk, thereby reducing the cost of flood insurance to private property owners, work to maintain participation in the Community Rating System of the National Flood Insurance Program and to qualify for the highest-feasible rating.		X		X	FLD-1
FL-37	Participate in FEMA's National Flood Insurance Program & Community Rating System		X		X	FLD-1
FL-38	Require an annual inspection of approved flood-proofed privately-owned buildings to ensure that (a) all flood-proofing components will operate properly under flood conditions and (b) all responsible personnel are aware of their duties and responsibilities as described in their building's Flood Emergency Operation Plan and Inspection & Maintenance Plan.		X		X	Town Annex
FL-39	Balance the housing needs of residents against the risk from potential flood- related hazards.		X		X	Discard - housing will be required to comply with flood protection ordinance
LS-01	Increase efforts to reduce landslides and erosion in existing and future development by improving appropriate code enforcement and use of applicable standards for private property, such as those appearing in the California Building Code, California Geological Survey Special Report 117 – Guidelines for Evaluating and Mitigating Seismic Hazards in California, American Society of Civil Engineers (ASCE) report Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California, and the California Board for Geologists and Geophysicists Guidelines for Engineering Geologic Reports. Such standards should cover excavation, fill placement, cut-fill transitions, slope stability, drainage and erosion control, slope setbacks, expansive soils, collapsible soils, environmental issues, geological and geotechnical investigations, grading plans and specifications, protection of adjacent properties, and review and permit issuance.		X		X	LS-1
LS-03	Continue to enforce design review requirements in zoning code and review under the California Environmental Quality Act to address hillside development constraints, especially in areas of existing landslides.		X		X	Discard - as ongoing program and covered by existing regulations
LS-04	Establish and enforce provisions (under Building Code, subdivision ordinances or other means) that geotechnical and soil-hazard investigations be conducted and filed to prevent		X		X	Discard as covered by

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	grading from creating unstable slopes, and that any necessary corrective actions be taken.					adopted building codes
LS-06	Establish and enforce grading, erosion, and sedimentation ordinances by requiring, under certain conditions, grading permits and plans to control erosion and sedimentation prior to building permit approval.		X		X	Discard - already have grading permit requirements in place
LS-07	Establish and enforce provisions under the creek protection, storm water management, and discharge control ordinances designed to control erosion and sedimentation.		X		X	Discard - already have permit requirements in place
LS-1	Ensure that Town and Ross Valley Fire Department-initiated fire-preventive vegetation-management techniques and practices for creek sides and high-slope areas do not contribute to the landslide and erosion hazard. For example, vegetation in these sensitive areas could be thinned, rather than removed, or replanted with less flammable materials. When thinning, the non-native species should be removed first. Other options would be to use structural mitigation, rather than vegetation management in the most sensitive areas.		X		X	Town Annex
LS-2	The Director of Public Works and Building should require that local government reviews of geotechnical and soil-hazard investigations and geologic and engineering studies are conducted by appropriately trained and credentialed staff or outside consultants.		X		X	Discard as existing practice
WF-01	Develop a plan for appropriate access and evacuation in hillside wildland-urban- interface areas. For example, creation of no parking areas for emergency vehicle access and resident evacuation, signage, and early warning and evacuation.		X		X	FIR-1
WF-02	Tie public education on defensible space and a comprehensive Fire Wise and defensible space ordinance to a field program of enforcement.		X		X	Town Annex
WF-03	Encourage Ross Valley Fire Department to expand vegetation management programs in wildland-urban- interface areas to more effectively manage the fuel load through various methods including, but not limited to, roadside collection and chipping, mechanical fuel reduction equipment, selected harvesting, use of goats or other organic methods of fuel reduction.		X		X	FIR-3
WF-04	Encourage the formation of a community- and neighborhood-based approach to wildfire education and action through local Fire Safe Councils and the Fire Wise Program .		X		X	Town Annex
WF-05	Review existing General Plan policies, Municipal Code regulations and Ross Valley Fire Department standards for roads to develop policies and regulations that ensure public safety in wildfire hazard areas and protect the environment.		X		X	FIR-1
WF-06	Encourage Ross Valley Fire Department to participate in multi-agency efforts to mitigate fire threat, such as the Hills Emergency Forum (in the East Bay), various FireSafe Council programs, and city-utility task forces. Such participation increases a jurisdiction's competitiveness in obtaining grants.		X		X	Discard as not mitigation measure
WF-07	Assist private businesses and residents in the development of defensible space through the use of, for example, "tool libraries" for weed abatement tools, roadside collection and/or chipping services (for brush, weeds, and tree branches) in wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.		X		X	FIR-1, FIR-2, FIR-3, FIR-5, FIR-6

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WF-08	Encourage Ross Valley Fire Department to increase local patrolling during periods of high fire weather.		X		X	Combine with WF-09
WF-09	Encourage Ross Valley Fire Department to monitor weather during times of high fire.		X		X	Combine with WF-08
WF-10	Work to ensure a reliable source of water for fire suppression through the cooperative efforts of water districts, fire districts, residents and commercial property owners.		X		X	FIR-4
WF-11	Seek funding to develop and implement a program to control invasive and exotic species that contribute to fire and flooding hazards (such as eucalyptus, non-native broom and cordgrass). This program could include vegetation removal, thinning, or replacement in hazard areas where there is a direct threat to structures.		X		X	FIR-5
WF-12	Seek funding to prepare a Biodiversity, Fire, and Fuels Integrated Plan (BFFIP) that describes action that the Town will take to minimize fire hazards and maximize ecological health in its open space areas.		X		X	Town Annex
WF-13	Work with insurance companies to create a public/private partnership to give a discount on fire insurance premiums to "Forester Certified" Fire Wise landscaping and fire-resistant building materials on private property.		X		X	Discard as not mitigation measure
WF-14	Consider fire safety, evacuation, and emergency vehicle access when reviewing proposals to add secondary units or additional residential units in wildland- urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.		X		X	FIR-1
WF-15	Improve engineering design and vegetation management for mitigation, appropriate code enforcement, and public education on defensible space mitigation strategies.		X		X	Town Annex
WF-16	Ensure adequate fire department access to developed and open space areas and keep fire roads and public rights-of-way passable at all times.		X		X	Town Annex

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Table O-8. Current and Potential Hazard Mitigation Projects and Programs in San Anselmo

Action Number	Revised or New Mitigation Strategy	Responsible Agency/ How will action be implemented and administered?	What is the process by which the Town will incorporate the requirement of the mitigation plan into other planning mechanisms (such as General Plan)	Funding Source & Cost/Benefit	New Priority	Timeline	Type of mitigation action:
AH-16 & 17	Develop list of locally historic resources and create incentives for private owners of historic or architecturally significant buildings to undertake mitigation to levels that will minimize the likelihood that these buildings will need to be demolished after a disaster and/or establish preservation-sensitive measures for the repair and re-occupancy of historically significant privately-owned structures.	Town Manager or their designee will draft incentives for Town Council consideration.	Not determined, may be in annual budget or in building or zoning regulations.	General Fund, Staff time and resources and may result in improvement of few buildings.	Moderate	Long Term, 5-10 years	Local Planning and Regulations
AH-29	Develop unused or new pedestrian rights-of-way as walkways to serve as additional evacuation routes.	Town Council to consider incorporating requirement in Town General Plan	To be incorporated into Safety Element of General Plan and, if conducted by Town, in Capital Improvement Plan	General Fund, Unknown cost, potential life savings for improved evacuation routes	Moderate	Long Term, 5-10 years	Structures and Infrastructure Projects
DAM-01	Encourage Marin Municipal Water District to review and update mapped inundation area for Phoenix Dam and coordinate with the Town on procedures for the emergency evacuation of areas that would be inundated by a failure of Phoenix Dam.	Director of Building and Public Works to draft letter for Town Council to consider sending to Water District.	To be incorporated into Town Safety Element	General Fund, Unknown cost. Chance of dam failure is unlikely. Inundation area within Town may be shallow and lower than Base Flood Elevation	Moderate	Long Term, 5-10 years	Local Planning and Regulations
EQ-05	Conduct an inventory of privately-owned existing or suspected soft-story structures as a first step in establishing voluntary or mandatory programs for retrofitting these buildings.	Town Manager or Town Council to direct Public Works and Building Department Staff to conduct inventory.	To be incorporated into Safety Element of General Plan	General Fund, Staff time, potential for high life and property savings	Very High - Actively Looking for Funding	Short Term, 0-5 years	Local Planning and Regulations

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EQ-06	Use the soft-story inventory to require private owners to inform all existing and prospective tenants that they live or work in this type of building and may need to be prepared to live or work elsewhere following an earthquake if the building has not been retrofitted.	Public Works and Building Director to implement	To be incorporated into Safety Element of General Plan	General Fund, Low cost, does not result in mitigation	Very High - Actively Looking for Funding	Short Term, 0-5 years	Education and Awareness
EQ-07	Require private owners to inform all existing tenants (and prospective tenants prior to signing a lease agreement) that they live in an unreinforced masonry building and the standard to which it may have been retrofitted. Require private owners to inform all existing tenants that they may need to be prepared to work elsewhere following an earthquake even if the building has been retrofitted, because it has probably been retrofitted to a life-safety standard, not to a standard that will allow occupancy following major earthquakes.	Town Public Works and Building Official to incorporate new requirements into local regulations and notify property owners of required disclosures.	Adopted by ordinance into Town Municipal Code	General Fund, Low cost, residents more prepared for hazard	Very High - Actively Looking for Funding	Short Term, 0-5 years	Education and Awareness
FL-04	Continue Mapping of the creeks to further evaluate, design, and implement additional flood control projects.	Public Works and Building Department Director to ensure Ross Valley Flood Protection and Watershed Program conducts project, or seek funding for Town to conduct project	To be incorporated into Safety Element of General Plan	General Fund or potentially state federal grants. Unknown cost, assists in evaluating flood control projects	Very High - Looking for Funding	On Going	Local Planning and Regulation
FL-05	Pursue funding for the design and construction of storm drainage projects to protect vulnerable properties, including property acquisitions, upstream storage such as detention and retention basins (excluding Memorial Park), and channel widening with the associated right-of-way acquisitions, relocations, and environmental mitigations.	Public Works and Building Department Director to ensure Ross Valley Flood Protection and Watershed Program conducts project, or seek funding for Town to conduct project and include on Capital Improvement Plan	To be incorporated into Safety Element of General Plan and Capital Improvement Plan	State or Federal Grants. Cost varies and benefit varies. Certain projects (such as detention basins and property acquisitions) unpopular with public	Very High - Looking for Funding	On Going	Structure and Infrastructure Project

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FL-06	Develop an approach and locations for various watercourse bank protection strategies, including for example, (1) an assessment of banks to inventory areas that appear prone to failure, (2) bank stabilization, including installation of rip rap, or whatever regulatory agencies allow (3) stream bed depth management using dredging, and (4) removal of out-of-date coffer dams in rivers and tributary streams	Public Works and Building Department Director to ensure Ross Valley Flood Protection and Watershed Program conducts project, or seek funding for Town to conduct project	To be incorporated into Safety Element of General Plan and Capital Improvement Plan	State, regional, or local funds. Cost varies and benefit varies.	Very High - Looking for Funding	On Going	Structure and Infrastructure Project
FL-08	Working with stakeholders and the community, consider feasibility (including cost, funding, environmental and downstream impacts) and options for removal of Morningside Avenue Bridge and potential construction of upstream and downstream extended wing walls.	Public Works and Building Department Director to ensure Ross Valley Flood Protection and Watershed Program conducts project, or seek funding for Town to conduct project	To be incorporated into Safety Element of General Plan and, if conducted by Town, in Capital Improvement Plan	State or Federal Grants. High cost, large number of buildings protected	Very High - Looking for Funding	Short Term, 0-5 years	Structure and Infrastructure Project
FL-09	Recognize that a multi-agency approach is needed to mitigate flooding by having flood control districts, cities, counties, and utilities meet at least annually to jointly discuss their capital improvement programs for most effectively reducing the threat of flooding. Work toward making this process more formal to insure that flooding is considered at existing joint-agency meetings.	Public Works and Building Department Director to seek agencies to consider flooding at least annually.	To be incorporated into Safety Element of General Plan	Staff time	Very High - Looking for Funding	Short Term, 0-5 years	Local Planning and Regulation
FL-10	Improve upon existing hydrologic analysis of runoff and drainage systems to predict areas of insufficient capacity in the storm drain and natural creek system.	Public Works and Building Department Director to ensure Ross Valley Flood Protection and Watershed Program conducts project, or seek funding for Town to conduct project and include on Capital Improvement Plan	To be incorporated into Safety Element of General Plan	State or regional funding. Unknown cost, assists in evaluating flood control projects	Very High - Looking for Funding	On Going	Local Planning and Regulation

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FL-12	Continue to develop guidelines that limit the coverage of impervious surfaces, that require the use of permeable surfaces, that implement other regulations to effectively channel and minimize site runoff, and that allow water to percolate into the ground.	Public Works and Building Department Director to draft regulations for consideration by Town Council	To be incorporated into Safety Element of General Plan and Town Zoning Regulations	General Fund, Staff time	Very High - Looking for Funding	On Going	Natural Systems Protection
FL-17	Encourage home and apartment owners to get elevation certificates.	Public Works and Building Department Planning Department	To be incorporated into Safety Element of General Plan	General Fund, Staff time	Existing Program	On Going	Education and Awareness Program
FL-23	Continue to encourage new development near floodways to incorporate a setback from watercourses to allow for changes in stormwater flows in the watershed over time.	Town Public Works and Building Department staff to review development projects for conformance with Town Municipal Code	Incorporate Policy into General Plan	General Fund, Staff time	Existing Program	On Going	Natural Systems Protection
FL-24	Continue to have Town staff inspect creek areas after each storm.	Public Works Director to implement with Public Works staff.	To be incorporated into Safety Element of General Plan	General Fund, Staff time	Existing Program	On Going	Natural Systems Protection
FL-26	Work with other Ross Valley jurisdictions to explore and adopt land use regulations to minimize additional runoff, or reduce runoff, within the Ross Valley watershed.	Public Works and Building Department Director to ensure Ross Valley Flood Protection and Watershed Program conducts project, or propose regulations for Town Council to consider and encourage other jurisdictions to adopt	To be incorporated into Safety Element of General Plan	General Fund, Staff time	Existing Program	Short Term, 0-5 years	Local Planning and Regulation

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FL-29	Working with stakeholders and the community, consider feasibility (including cost, funding, environmental and downstream impacts) and options for flow bypass accommodation for downtown constrictions	Public Works and Building Department Director to ensure Ross Valley Flood Protection and Watershed Program conducts project, or seek funding for Town to conduct project	To be incorporated into Safety Element of General Plan and, if conducted by Town, in Capital Improvement Plan	General Fund, Unknown cost	Existing Program	Short Term, 0-5 years	Structure and Infrastructure Project
FL-33	As new flood-control projects are completed, request that FEMA revise its flood- insurance rate maps and digital Geographic Information System (GIS) data to reflect flood risks as accurately as possible.	Public Works and Building Department Director to request FEMA to revise FIRMS when necessary	To be incorporated into Safety Element of General Plan	General Fund, Staff time	Existing Program	Long Term	Local Planning and Regulation
FL-34	Consider adopting cumulative substantial improvement requirement of 3 to 5 years under Municipal Code Protection of Flood Hazard Areas.	Public Works and Building Department Director to draft regulations for consideration by Town Council	To be incorporated into Safety Element of General Plan and Town Zoning Regulations	General Fund, Staff time, Low cost and results in increase in elevated structures	Existing Program	Short Term, 0-5 years	Local Planning and Regulation
FL-35	Update hydraulic model at least once every ten years, or more frequently if there is a major development in the watershed or a major change in the Land Use Element of the General Plan of the cities or counties within the watershed.	Public Works and Building Department Director to ensure Ross Valley Flood Protection and Watershed Program conducts project, or seek funding for Town to conduct project	To be incorporated into Safety Element of General Plan	General Fund, Staff time or regional partners. Unknown cost	Moderate	Long Term, 5-10 years	Local Planning and Regulation
FL-38	Require an annual inspection of approved flood-proofed privately-owned buildings to ensure that (a) all flood-proofing components will operate properly under flood conditions and (b) all responsible personnel are aware of their duties and responsibilities as described in their building's Flood Emergency Operation Plan and Inspection & Maintenance Plan .	Public Works and Building Director to implement		General Fund, Staff time	Moderate	Long Term, 5-10 years	

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LS-1	Ensure that Town and Ross Valley Fire Department-initiated fire-preventive vegetation-management techniques and practices for creek sides and high-slope areas do not contribute to the landslide and erosion hazard. For example, vegetation in these sensitive areas could be thinned, rather than removed, or replanted with less flammable materials. When thinning, the non-native species should be removed first. Other options would be to use structural mitigation, rather than vegetation management in the most sensitive areas.	Grading permit is required from the Director of Public Works prior to any grading over 25 cubic yards.	San Anselmo Municipal Code 3-18 will be amended to specify applicable standards for review.	General Fund. Cost: Town attorney time to prepare ordinance and standards for adoption by Town Council. Cost of appropriate review can be charged to permit applicant. Benefits: Increased review of grading plans.	Very High - Actively Looking for Funding	Short Term, 0-5 years	Local Planning and Regulations
WF-02	Tie public education on defensible space and a comprehensive Fire Wise and defensible space ordinance to a field program of enforcement.	Town Manager to consult with personnel at Ross Valley Fire Department and, if necessary, RVFD Board.	To be incorporated into Safety Element of General Plan	State or Federal Grants and Fire Department funds. Unknown cost. High benefit to reducing wildfire risk.	Very High - Actively Looking for Funding	Short Term, 0-5 years	Local Planning and Regulations
WF-04	Encourage the formation of a community- and neighborhood-based approach to wildfire education and action through local Fire Safe Councils and the Fire Wise Program .	Town Manager to consult with personnel at Ross Valley Fire Department and, if necessary, RVFD Board.	To be incorporated into Safety Element of General Plan	State or Federal Grants and Fire Department funds. Cost of staff time and benefit of more educated residents that take mitigation actions.	Moderate	Short Term, 0-5 years	Education and Awareness
WF-08	Encourage Ross Valley Fire Department to increase local patrolling during periods of high fire weather.	Town Manager to consult with personnel at Ross Valley Fire Department and, if necessary, RVFD Board.	To be incorporated into Safety Element of General Plan	Fire Department general fund for staff time. Unknown cost. Local residents likely to report any visible fires.	Existing Program	On Going	Natural Systems Protection
WF-09	Encourage Ross Valley Fire Department to monitor weather during times of high fire.	Town Manager to consult with personnel at Ross Valley Fire Department and, if necessary, RVFD Board.	To be incorporated into Safety Element of General Plan	Fire Department general fund for staff time. Unknown cost.	Existing Program	On Going	Natural Systems Protection

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WF-12	Seek funding to prepare a Biodiversity, Fire, and Fuels Integrated Plan (BFFIP) that describes action that the Town will take to minimize fire hazards and maximize ecological health in its open space areas.	Town Manager to work with Ross Valley Fire Department	To be incorporated into Safety Element of General Plan	State and Federal grant Funding. Unknown cost, eventually results in plan to reduce fire risk.	Moderate	Short Term, 0-5 years	Natural Systems Protection
WF-15	Improve engineering design and vegetation management for mitigation, appropriate code enforcement, and public education on defensible space mitigation strategies.	Town Manager to ensure that Ross Valley Fire Department continues existing efforts to reduce hazards.	To be incorporated into Safety Element of General Plan	Fire Department general fund for staff time.	Existing Program	On Going	Local Planning and Regulations
WF-16	Ensure adequate fire department access to developed and open space areas and keep fire roads and public rights-of-way passable at all times.	Town Council to consider incorporating requirement in Town General Plan	To be incorporated into Safety Element of General Plan and, if conducted by Town, in Capital Improvement Plan	Fire Department general fund for staff time. Unknown cost, potential life savings with adequate fire and evacuation routes	Existing Program	On Going	Structures and Infrastructure Projects

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Table O-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	Town of San Anselmo General Plan	The Town's General Plan outlines long-term direction for development and policy. It describes hazard areas and regulates current and future development based on known hazard areas. The General Plan has been amended every few years since 1975 and as this plan gets updated there is potential to improve it with updated risk information and strategies.
Plan	Town of San Anselmo 2017 Local Hazard Mitigation Plan	The Town's prior Hazard Mitigation Plan is a stand-alone document which identifies risks from natural hazards present in the Town and includes strategies to reduce these risks. Many of the strategies identified in 2017 were carried forward to the multi-jurisdictional plan. Prior to this document the Town LHMP was an annex to the 2011 ABAG multi-jurisdictional plan.
Plan	Town of San Anselmo 2008 Flood Mitigation Plan	San Anselmo's 2008 Flood Mitigation Plan provides a glimpse of the Town's response to the 2005/06 flood and the mitigation options that were considered before the 2011 Capital Improvement Plan Study for Flood Damage Reduction and Creek Management
Plan	2011 Capital Improvement Plan Study for Flood Damage Reduction and Creek Management	This study describes plans and technical rationale for a suite of projects along the watershed that work together as a system to reduce flooding and seeks to restore the ecological health and function of Corte Madera Creek and its tributaries.
Policy	Zoning Ordinance	The Zoning Ordinance implements the General Plan by establishing specific regulations for development. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the Zoning Ordinance.
Policy	Municipal Code	The Muni Code includes several sections that address hazard mitigation. The Town adopts the current California Building Code which applies to all construction activity within the Town boundaries and supports earthquake and fire mitigation. Watercourse Protection and Floodplain Development are sections that protect against worsening flood situations. The Muni code is updated periodically to improve mitigation efforts.
Administrative	Administrative Services Department	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	Town Planning, Building, and Public Works Departments	These departments are responsible for planning and building related activities including issuing permits, conducting environmental review, preparing planning documents, and addressing housing issues. Mitigation activities related to planning and building can be implemented by this department. Public Works Department is responsible for Town-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Personnel	Ross Police	The Town Police Department conducts emergency preparedness activities for the community. Mitigation activities related to emergency preparedness can be implemented by the Police Department.
Personnel	Ross Valley Fire Department	The Ross Valley Fire Department protects the town from the effects of fire and other hazardous conditions and supports implementation of mitigation actions that reduce the risk of wildfire.
Personnel	Marin County Flood Control District	The Marin County Flood Control and Water Conservation District supports flood mitigation efforts by partnering with Cities and Towns to design, construct and maintain flood control infrastructure and channel improvements.
Personnel	Volunteer Boards and Commissions	The Town has several volunteer groups that can help hazard mitigation efforts including the Town Council, Planning Commission, Flood Committee and the Quality of Life Committee. These groups are both personnel resources and can make recommendations to the Town Council, the governing body, which can update municipal and zoning codes.

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Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and fund the personnel resources above as well as capital improvement projects.
Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that are being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	Town Managers Newsletter	The Town Manager's newsletter was initiated after the 2005-06 floods and became a regular method of communication between the Town and its residents.
Training and Outreach	Community Rating System Working Group	The Community Rating System (CRS) is a voluntary program for communities participating in the National Flood Insurance Program (NFIP) to earn flood insurance premium reductions for property owners. A Countywide collaboration of CRS community staff has been started in recent years and has led to shared resources including outreach materials and floodplain management training. This collaboration has the potential to expand and lead to a wide variety of flood mitigation activities.
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)

Appendix P

City of San Rafael

City of San Rafael

The City of San Rafael (San Rafael) is the county seat of Marin County. San Rafael had an estimated population of 57,713 in 2010, with 24,011 housing units in the City. The City has a total area of 22.422 square miles. The median income for a household in the City was \$60,994 and the per capita income for the City was \$35,762. Approximately 5.6 percent of families and 10.2 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

San Rafael was incorporated as a city in 1874.

The City of San Rafael completed a single-jurisdiction Local Hazard Mitigation Plan in 2017 which is hereby incorporated in its entirety by reference into this appendix. It includes much more jurisdiction-specific information to supplement the vulnerability and mitigation updates below.

Table P-1. Vulnerability of Structures in San Rafael

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	10,310	100%	4809	100%	1062	100%	250	100%	9	100%
Flood	1125	11%	1508	31%	556	52%	174	70%	0	0%
Fire	7502	73%	2599	54%	118	11%	5	2%	6	66.7%
Tsunami	270	3%	136	3%	61	6%	5	2%	0	0%
Landslide	1685	16%	387	8%	11	1%	0	0%	1	11.1%
Dam Inundation	0	0%	0	0%	0	0%	0	0%	0	0%

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Table P-2. Vulnerability of Transportation in San Rafael

	Roads		Railroads		Ferry
	Miles	% of Total	Miles	% of Total	Number
Earthquake	327	100%	6	100%	0
Flood	67	20%	2	33%	0
Fire	213	65%	2	33%	0
Tsunami	17	5%	0.1	2%	0
Landslide	55	17%	0	0%	0
Dam Inundation	0	0%	0	0%	0

Table P-3. Vulnerability of Communication in San Rafael

	MERA	
	Number	% of Total
Earthquake	4	100%
Flood	0	0%
Fire	2	50%
Tsunami	0	0%
Landslide	1	25%
Dam Inundation	0	0%

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Table P-4. Vulnerability of Power in San Rafael

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Miles	% of Total	Miles	% of Total
Earthquake	0	N/A	2	100%	4	100%	15.9	100%	14.5	100%
Flood	0	N/A	1	50%	1	25%	7.6	47.8%	2	13.8%
Fire	0	N/A	1	50%	1	25%	2.1	13.2%	5.6	38.6%
Tsunami	0	N/A	0	0%	1	25%	1.5	9.4%	.1	.7%
Landslide	0	N/A	0	0%	0	0%	.2	1.3%	0	0%
Dam Inundation	0	N/A	0	0%	0	0%	0	0%	0	0%

Table P-5. Vulnerability of Water / Sewage in San Rafael

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	2	100%	7	100%
Flood	1	50%	7	100%
Fire	0	0%	0	0%
Tsunami	0	0%	0	0%
Landslide	0	0%	0	0%
Dam Inundation	0	0%	0	0%

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Table P-6. Vulnerability of Critical Facilities in San Rafael

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	30	100%	9	100%	16	100%	0	N/A
Flood	2	6.7%	3	33.3%	3	18.8%	0	N/A
Fire	16	53.3%	3	33.3%	3	18.8%	0	N/A
Tsunami	0	0%	0	0%	1	6.3%	0	N/A
Landslide	0	0%	0	0%	0	0%	0	N/A
Dam Inundation	0	0%	0	0%	0	0%	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table P-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables P-1 through P-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table P-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

Table P-7. Evaluation of Prior Mitigation Actions in San Rafael

Action Number / Name	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
'Future Mitigation Actions' from 2017					
1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan		X		X	MLT-1
2. Identify the locations then subsequently equip, stock and train staff in order to establish emergency evacuation shelters used to temporary house people during major emergencies.		X			Annex
3. Update the San Rafael Emergency Operations Center (EOC) Handbook		X			Annex
4. Outfit and equip the City's new Emergency Operation's Center (EOC) scheduled for operation in Calendar Year 2019		X			Annex - but tweak to refer to improvements in disaster

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					resistance of this critical facility
5. Plan, prepare, conduct community outreach and deploy emergency evacuation exercises in neighborhoods prone to wildfire or tidal flooding during extreme wet weather periods.		X			Annex
6. Bayside Acres Beach Sewer Relocation/Replacement		X		X	Annex
7. Beach Drive (Fiberglass) Pump Station and Sewer Rehabilitation		X		X	Annex
8. Recruit and ultimate appoint a new Emergency Management Coordinator (EMC) to fill vacant post.	X				N/A
9. Evaluate and Implement signal timing for first responders		X		?	Annex
10. Tree Safety Maintenance Program		X		X	Annex
11. Purchase and installation of EMTRAC signal control equipment into 17 San Rafael Fire Vehicles and 25 intersections.		X		?	Annex
12. Develop an Energy Storage Plan		X		?	MLT-9
13. San Rafael Capital Improvement Program (CIP) Implementation		X		X	Annex
14. San Rafael Corrugated Metal Pipe Replacement Program		X		X	FId-5
15. Elevate/Raise Low Lying Roadways		X		X	MLT-10, MLT-20
16. Elevate Critical Infrastructure		X		X	MLT19, FId-6
17. Improvements to Existing Berms, Levees and Flood Control Systems		X		X	FId-5

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18. Continued involvement in the BayWAVE county-wide vulnerability assessment (Phase 1 and 2); Implement resulting strategies from Phase 2 of the program.		X		X	Fld-10
19. Develop a climate adaptation plan, and implement resulting strategies		X		X	Annex and/or consider Fld-11
20. Freitas Ditch Riparian and Flood Improvement Project		X		X	Fld-5
21. Spinnaker Point Levee Assessment Study		X		X	Annex
22. Water Storage Facility Study		X		?	Annex
23. Leaky Pipe Replacement Program		X		?	Annex
24. Marin Municipal Water District exploration of desalination plants		X		?	Annex
25. Evaluate the use of reclaimed water/increase purple pipes		X		?	Annex
26. Evaluate and enhance conservation measures to reduce water consumption		X		?	Annex or MLT-2
27. Retrofit/upgrade four remaining URM's		X		X	MLT-2 (if these URMs are City-owned buildings)
28. Earthquake Hazard Study		X		X	Annex or MLT-2
29. Public Facility Vulnerability Assessment and Improvements		X		X	MLT-2
30. Structural Soft Story Identification and Mitigation Plan		X		X	EQ-1 and/or annex
31. Develop and Maintain a Community Rating System (CRS)		X		X	Fld-1
32. Beach Drive Structural Flood Protection		X		X	Fld-5
33. Adopt a Drain Program		X		X	annex or Fld-5
34. City Pump Station Analysis and Improvements		X		X	Fld-5
35. City Storm Drain System Analysis and Improvements		X		X	Fld-5 or annex
36. City Flood Alert System		X			annex
37. Gallinas Creek Dredging		X		X	Fld-5
38. San Rafael Canal Dredging		X		X	Fld-5
39. 70-96 Bret Harte Sewer Easement Repair		X		X	annex

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40. Landslide Identification and Management Program		X		X	LS-2/ annex
41. Fairhills Slide Repair		X		X	LS-2/ Annex
42. Funding for Vegetation Management Coordinator Position		X		X	FIR-3? FIR-9? Public or Private lands?
43. Create a City of San Rafael specific Community Wildfire Protection Plan (CWPP).		X		X	Annex or FIR-1
44. Create new strategic fuel interruption zones in WUI areas and maintain and expand existing fuel interruption zones already in place.		X		X	Annex or FIR-3
45. Juniper and Bamboo Clearing Program from Residential Properties within WUI.		X		X	FIR-5, FIR-9
46. Create new point specific wildfire prevention programs specifically targeting areas where homeless encampments are known to exist.		X		X	annex
47. San Rafael Measure A Project Implementation		X		X	annex
48. East San Rafael Shore Project: Plan		X		X	annex
49. East San Rafael Shore Project: Permitting and Construction		X		X	annex

Table P-8. Current and Potential Hazard Mitigation Projects and Programs in San Rafael

Action # and Name	Hazard(s) addressed	Responsible Agency	Potential Funding Source	Timeline
2. Identify the locations then subsequently equip, stock and train staff in order to establish emergency evacuation shelters used to temporary house people during major emergencies.	All Hazards	City of San Rafael Fire Department, Emergency Management Coordinator, American Red Cross, Salvation Army	Grant Funding, General Funding Possible	Immediate
3. Update the San Rafael Emergency Operations Center (EOC) Handbook	All Hazards	City of San Rafael Fire Department, Emergency Management Coordinator	Grant Funding, General Funding Possible	To be prepared during late 2017 and 2018 calendar years.
4. Outfit and equip the City's new Emergency Operation's Center (EOC) scheduled for operation in Calendar Year 2019	All Hazards	City of San Rafael Fire Department, Emergency Management Coordinator	Grant Funding, General Funding Possible	Planning in 2018 with purchase and installation in 2019.

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5. Plan, prepare, conduct community outreach and deploy emergency evacuation exercises in neighborhoods prone to wildfire or tidal flooding during extreme wet weather periods.	All Hazards	City of San Rafael Fire Department, Emergency Management Coordinator	Grant Funding, General Funding Possible	Planning in 2018 into 2019.
6. Bayside Acres Beach Sewer Relocation/Replacement	Severe Storms, Sea level Rise	San Rafael Sanitation District	Capital Improvement Program	FY 16/17 to FY 18/19
7. Beach Drive (Fiberglass) Pump Station and Sewer Rehabilitation	Severe Storms, Sea level Rise	San Rafael Sanitation District	Capital Improvement Program	FY 18/19 to FY 19/20
8. Recruit and ultimate appoint a new Emergency Management Coordinator (EMC) to fill vacant post.	All Hazards, Disaster Management	City of San Rafael Fire Department	Seeking grant funding opportunities.	Immediate.
9. Evaluate and Implement signal timing for first responders	All Hazards	Public Works – Traffic Operations	City General Fund	Immediate.
10. Tree Safety Maintenance Program	Minimize public safety impacts from trees falling in the road right of way.	Public Works – Traffic Operations	City General Fund	FY 2019/20
11. Purchase and installation of EMTRAC signal control equipment into 17 San Rafael Fire Vehicles and 25 intersections.	Emergency Response	City of San Rafael Fire Department City of San Rafael Public Works Department	Grant Funding. General Funding.	Immediate.
13. San Rafael Capital Improvement Program (CIP) Implementation	Multi-Hazard	All City departments as identified in the CIP	CIP	Current year - 19/20
19. Develop a climate adaptation plan, and implement resulting strategies	Climate Change, SLR, coastal flooding	Sustainability Coordinator, Community Development, Public Works Department, PIO, City Manager's Office	Grants, general fund, permit fees, public-private partnerships	Short term, 0-5 years

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22. Water Storage Facility Study	Drought and Water Shortage, Wildfire. Minimize dependency on outside water sources for irrigation	Public Works – Parks	City General Fund	FY 2020 Study –
23. Leaky Pipe Replacement Program	Drought and Water Shortage	Public Works – Parks	City General Fund	FY 2020
24. Marin Municipal Water District exploration of desalination plants	Drought and water supply	Public Works Department, Sustainability Coordinator, Community Development, PIO	Rate mechanisms, grants	Mid term, 3-7 years
25. Evaluate the use of reclaimed water/increase purple pipes	Drought and water supply	Public Works Department, Sustainability Coordinator, Community Development, PIO	Rate mechanisms, planning fees, grants	Near term, 1-5 years
26. Evaluate and enhance conservation measures to reduce water consumption	Drought and water supply	Sustainability Coordinator, City Manager's Office, Community Development, PIO	Rate mechanisms, planning fees, grants	Near term, 1-5 years
28. Earthquake Hazard Study	Earthquake Hazards	Community Development/Building Inspection/Public Works	Grants	Within 5 years
30. Structural Soft Story Identification and Mitigation Plan	Earthquake Hazards	Community Development/Building Inspection/Public Works	Grants	Within 5 years
33. Adopt a Drain Program	100/500-year and Storm	Public Works/Volunteer	Existing budgets, staff time.	FY19/20

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	Flooding	Coordinator		
35. City Storm Drain System Analysis and Improvements	100/500-year and Storm Flooding	Public Works	Grants, Capital Improvement Program	FY19/20
36. City Flood Alert System	100/500-year and Storm Flooding	Public Works/Emergency Services	Grants	Study – FY18/19
39. 70-96 Bret Harte Sewer Easement Repair	Landslide	San Rafael Sanitation District	Capital Improvement Program	FY 18/19
40. Landslide Identification and Management Program	Landslides	Public Works/Community Development	Grants	FY20/21
41. Fairhills Slide Repair	Landslides	Public Works/Community Development	Grants or General Fund	1-5 years
43. Create a City of San Rafael specific Community Wildfire Protection Plan (CWPP).	Wildfire	City of San Rafael Fire Department	FEMA PDM and HMGP grants.	Immediate.
44. Create new strategic fuel interruption zones in WUI areas and maintain and expand existing fuel interruption zones already in place.	Wildfire	City of San Rafael Fire Department Marin County Open Space District Marin County Fire Department – Tamalpais Fire Crew	Grant Funding. General Funding unlikely. FEMA PDM and HMGP grants.	Immediate.
46. Create new point specific wildfire prevention programs specifically targeting areas where homeless encampments are known to exist.	Wildfire	<ul style="list-style-type: none"> ➤ City of San Rafael Fire Department ➤ City of San Rafael Homeless Outreach Coordinator ➤ City of San Rafael Police Department – Open Space 	Grant Funding. General Funding unlikely. FEMA PDM and HMGP grants.	Immediate.

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		<ul style="list-style-type: none"> Ranger ➤ City of San Rafael Public Works Department ➤ Marin County Open Space District ➤ Marin County Fire Department – Tamalpais Fire Crew 		
47. San Rafael Measure A Project Implementation	Wildfire, other hazards depending on current Measure A priorities	City departments as identified in the Measure A Workplan	Measure A funding	Current Measure A workplan 2017 to 2018 and annually thereafter
48. East San Rafael Shore Project: Plan	Maritime and fluvial flooding in the Central and East San Rafael valley, adaptation for sea level rise	TBD May include City of San Rafael/Resilient Shore/Shore Up Marin	Proposition AA, RbD Competition, other sources to be determined	24 months from project initiation
49. East San Rafael Shore Project: Permitting and Construction	Maritime and fluvial flooding in the Central and East San Rafael valley, adaptation for sea level rise	TBD May include the city of San Rafael and /or a special district such as a GHAD	Proposition AA, district assessments, redirected flood insurance premiums, and other sources to be determined	5-10 years

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Table P-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	City General Plans	City General Plan '2020' was adopted in 2004 and been amended several times since. The City is currently undergoing its next General Plan update '2040' and community workshops are being held.
Plan	Hazard Mitigation Plan	City recently completed a stand-alone Hazard Mitigation Plan: https://www.cityofsanrafael.org/hazard-mitigation-plan/
Plan	City of San Rafael Community Emergency Preparedness Plan (2009)	
Policy	City Ordinances	Yes, subdivision ordinance, floodplain ordinance, stormwater ordinance Chapter 4.12 – Wildland Urban Interface Title 7 – Emergency Services Title 12 – Building Regulations Title 14 – Building Code and Zoning Title 15 – Subdivisions Title 17 – Waters and Waterways Title 18 – Protection of Flood Hazard Areas Title 19 – Open Space
Policy	Zoning	The Zoning Ordinance sets forth regulations and standards for development to ensure that the policies, goals, and objectives of the General Plan are carried out. Rezoning can be initiated by the City Council, Planning Commission, or by an individual property owner.
Administrative	Administrative Services Department	Provide support with plan maintenance and update process.
Administrative	Disaster Council	Provide support with plan maintenance and update process.
Administrative and Personnel	Public Works Departments	Provide support with plan maintenance and update process.
Administrative and Personnel	Community Development	Provide support with plan maintenance and update process.
Personnel	Police	Provide support with plan maintenance and update process.
Personnel	Fire Protection District	Provide support with plan maintenance and update process.
Financial	General Fund	Provide primary or supplemental project funds.
Financial	State and Federal Grants	Provide primary or supplemental project funds.
Financial	Capital improvements project funding	Provide primary or supplemental project funds.
Financial	Authority to levy taxes for specific purposes	Provide primary or supplemental project funds.
Financial	Incur debt through general obligation bonds and/or special	Provide primary or supplemental project funds.

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	tax bonds	
Training and Outreach	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Community Emergency Response Team, Marin Conservation League, City of San Rafael Climate Action Team
Training and Outreach	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	County Household Hazardous Waste Program, MCSTOPP, Marin County Environmental Health Services, The Bay Institute
Training and Outreach	Natural disaster or safety related school programs	Get Ready:

APPENDIX Q

City of Sausalito

Appendix Q

City of Sausalito

City of Sausalito

Sausalito had an estimated population of 7,061 in 2010, with 4,536 housing units in the City. The City has a total area of 2.257 square miles. The median income for a household in the City was \$87,469 and the per capita income for the City was \$81,040. Approximately 2.0 percent of families and 5.1 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Sausalito was incorporated as a city in 1893.

Below is a summary of vulnerability and potential jurisdiction-specific mitigation actions in Sausalito. This is the City of Sausalito's first Local Hazard Mitigation Plan, therefore there are no prior mitigation actions to evaluate.

Table Q-1. Vulnerability of Structures in Sausalito

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	1,293	100%	1548	100%	170	100%	49	100%	9	100%
Flood	24	2%	57	4%	37	22%	45	92%	0	0%
Fire	1158	90%	1174	76%	63	37%	0	0%	3	33.3%
Tsunami	16	1%	83	5%	54	32%	48	98%	0	0%
Landslide	0	0%	39	3%	0	0%	0	0%	1	11.1%
Dam Inundation	0	0%	0	0%	0	0%	0	0%	0	0%

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City of Sausalito

Table Q-2. Vulnerability of Transportation in Sausalito

	Roads		Ferry Landing	
	Miles	% of Total	Number	% of Total
Earthquake	44	100%	1	100%
Flood	7	16%	1	100%
Fire	30	68%	0	0%
Tsunami	10	23%	1	100%
Landslide	0	0%	0	0%
Dam Inundation	0	0%	0	0%

Table Q-3. Vulnerability of Communication in Sausalito

	MERA	
	Number	% of Total
Earthquake	0	N/A
Flood	0	N/A
Fire	0	N/A
Tsunami	0	N/A
Landslide	0	N/A
Dam Inundation	0	N/A

APPENDIX Q

City of Sausalito

Table Q-4. Vulnerability of Power in Sausalito

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	0	N/A	1	100%	0	N/A	1.9	100%	0	N/A
Flood	0	N/A	0	0	0	N/A	0	0	0	N/A
Fire	0	N/A	1	100%	0	N/A	1.18	62%	0	N/A
Tsunami	0	N/A	0	0	0	N/A	0	0	0	N/A
Landslide	0	N/A	0	0	0	N/A	0	0	0	N/A
Dam Inundation	0	N/A	0	0	0	N/A	0	0	0	N/A

Table Q-5. Vulnerability of Water / Sewage in Sausalito

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A
Flood	0	N/A	0	N/A
Fire	0	N/A	0	N/A
Tsunami	0	N/A	0	N/A
Landslide	0	N/A	0	N/A
Dam Inundation	0	N/A	0	N/A

APPENDIX Q

City of Sausalito

Table Q-6. Vulnerability of Critical Facilities in Sausalito

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	3	100%	4	100%	0	N/A	0	N/A
Flood	2	66.7%	0	0%	0	N/A	0	N/A
Fire	0	0%	2	50%	0	N/A	0	N/A
Tsunami	0	0%	0	0%	0	N/A	0	N/A
Landslide	0	0%	1	25%	0	N/A	0	N/A
Dam Inundation	0	0%	0	0%	0	N/A	0	N/A

Table 4-2. Potential Common Mitigation Actions includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables Q-1 through Q-6), which is all except dam inundation. Table Q-7. Current and Potential Hazard Mitigation Projects and Programs represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions, or for which that they wanted to include additional details).

Table Q-7. Current and Potential Hazard Mitigation Projects and Programs in Sausalito

Action Description	Hazard(s) addressed	Responsible Agency	Potential Funding Source	Timeline
Develop and maintain an improvements and property value database as a hazard mitigation planning activity	All	Public Works/Building Departments	Unknown	5-years
Design and construct nature-based living shorelines and breakwaters to attenuate wave amplitude	Flood/Tsunami	Public Works, partner agencies	State/Federal Grants	Long term, 5-10 years
Develop tools and policies for adapting to subsidence	Flood	Public Works/Planning	Unknown	5-years
Incorporate historic preservation into adaptation, mitigation and recovery activities	All	Public Works, Planning, Building Departments	Unknown	Long term, 5-10 years

APPENDIX Q

City of Sausalito

Table Q-8 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	General Plan	The General Plan outlines long-term direction for development and policy. It describes hazard areas and regulates current and future development based on known hazard areas. As this plan gets updated there is potential to improve it with updated risk information and strategies. The City of Sausalito General Plan last received a comprehensive update in September 1995. The Circulation Element was last updated in 1999. The Housing Element was last updated in 2015. A General Plan Update process began in 2016 and is expected to continue for three years.
Plan	Hazard Mitigation Plan	The City has not previously had a Hazard Mitigation Plan. This multijurisdictional plan is the first plan to focus on the mitigation of natural hazards.
Policy	Municipal Code	The Muni Code includes several sections that address hazard mitigation including Title IV Land Improvement and Use, Title V Public Works, and Title VI Public Health, Safety and Welfare.
Policy	Zoning Ordinance	The Zoning Ordinance implements the General Plan by establishing specific regulations for development. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the Zoning Ordinance.
Administrative	Administrative Services Department	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	Public Works Departments	Public Works Department is responsible for City-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Administrative and Personnel	Community Development Department	This department is responsible for planning and building related activities including issuing permits, conducting environmental review, preparing planning documents, and addressing housing issues. Mitigation activities related to planning and building can be implemented by this department.
Personnel	City Police Department	The Sausalito Police Department conducts emergency preparedness activities for the community. Mitigation activities related to emergency preparedness can be implemented by the Police Department.
Personnel	Southern Marin Fire Protection District	The District has responsibility for fire suppression and emergency response in commercial, residential, wildland / urban interface, and parts of the San Francisco Bay. The Fire Protection District supports implementation of mitigation actions that reduce the risk of wildfire.
Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and fund the personnel resources above as well as capital improvement projects.
Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that are being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)
Training and Outreach	Newsletter	The Tiburon Talk newsletter gets emailed every other month and often contains articles about hazard preparedness and mitigation, including how to sign up for Get Ready classes.

APPENDIX R

Town of Tiburon

Appendix R

Town of Tiburon

Town of Tiburon

The Town of Tiburon had an estimated population of 8,962 in 2010, with 4,025 housing units in the Town. The Town has a total area of 13.182 square miles. The median income for a household in the Town was \$106,611 and the per capita income for the Town was \$85,966. Approximately 1.6 percent of families and 3.3 percent of the population were below the poverty line (2010 data, U.S. Census Bureau).

Tiburon was incorporated in 1964.

Table R-1. Vulnerability of Structures in Tiburon

	Single-Family		Multi-Family		Commercial		Industrial		Historic Sites	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	2,402	100%	870	100%	49	100%	0	N/A	4	100%
Flood	61	3%	41	5%	43	88%	0	N/A	1	25%
Fire	2191	91%	729	84%	9	18%	0	N/A	0	0%
Tsunami	53	2%	72	8%	45	92%	0	N/A	0	0%
Landslide	582	24%	49	6%	0	0%	0	N/A	1	25%
Dam Inundation	0	0%	0	0%	0	0%	0	N/A	0	0%

Table R-2. Vulnerability of Transportation in Tiburon

	Roads		Ferry Landing		Railroad
	Number	% of Total	Number	% of Total	Miles
Earthquake	45	100%	1	100%	0
Flood	3	7%	1	100%	0
Fire	39	87%	0	0%	0
Tsunami	4	9%	1	100%	0
Landslide	11	24%	0	0%	0
Dam Inundation	0	0%	0	0%	0

Table R-3. Vulnerability of Communication in Tiburon

	MERA	
	Number	% of Total
Earthquake	1	100%
Flood	0	0%
Fire	1	100%
Tsunami	0	0%
Landslide	0	0%
Dam Inundation	0	0%

APPENDIX R

Town of Tiburon

Table R-4. Vulnerability of Power in Tiburon

	Transmission Tower		Substation		Natural Gas Substation		Electric Trans. Line		Natural Gas Pipeline	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	0	N/A	0	N/A	0	N/A	0	N/A	.4	100%
Flood	0	N/A	0	N/A	0	N/A	0	N/A	0	0%
Fire	0	N/A	0	N/A	0	N/A	0	N/A	.3	75%
Tsunami	0	N/A	0	N/A	0	N/A	0	N/A	0	0%
Landslide	0	N/A	0	N/A	0	N/A	0	N/A	.2	50%
Dam Inundation	0	N/A	0	N/A	0	N/A	0	N/A	0	0%

Table R-5. Vulnerability of Water / Sewage in Tiburon

	Wastewater Treatment Plants		Pump Stations	
	Number	% of Total	Number	% of Total
Earthquake	3	100%	2	100%
Flood	1	33.3%	0	0%
Fire	0	0%	0	0%
Tsunami	1	33.3%	0	0%
Landslide	0	0%	0	0%
Dam Inundation	0	0%	0	0%

APPENDIX R

Town of Tiburon

Table R-6. Vulnerability of Critical Facilities in Tiburon

	Schools		Law Enforcement & Fire		Medical Facilities		Airports	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Earthquake	4	100%	3	100%	0	N/A	0	N/A
Flood	4	100%	1	33.3%	0	N/A	0	N/A
Fire	0	0%	2	66.7%	0	N/A	0	N/A
Tsunami	0	0%	1	33.3%	0	N/A	0	N/A
Landslide	0	0%	0	0%	0	N/A	0	N/A
Dam Inundation	0	0%	0	0%	0	N/A	0	N/A

The following actions were included in this jurisdiction's prior local hazard mitigation plan. Table R-7 Evaluation of Prior Mitigation Actions indicates the status of these actions and also refers to related actions from Table 4-2. Potential Common Mitigation Actions through which this jurisdiction will continue implementation or consideration of these actions. Table 4-2 includes activities that address all hazards and this jurisdiction will select from those associated with hazards to which they were found to be vulnerable (in Tables R-1 through R-6). Actions that aren't related to specific actions in Table 4.2 are either discarded because they are not considered "mitigation" (they may rather be preparedness, recovery, response etc.), or are carried forward in Table R-8. Current and Potential Hazard Mitigation Projects and Programs which represents this jurisdiction's jurisdiction-specific actions (i.e. actions they want to implement that are not part of the Table 4-2 of common activities that was prepared for use by all jurisdictions).

APPENDIX R

Town of Tiburon

Table R-7. Evaluation of Prior Mitigation Actions in Tiburon

Action Name	Completed	Ongoing	Not Started	Still Relevant	Included in Updated Action Plan (New #)
'Future Mitigation Actions' from 2012					
In January 2011, the Town Council adopted the 2010 California Building Code which applies to all construction activity within the Town boundaries. The California Building Code is comprised of 11 parts that incorporate public health, safety, energy, green building and access standards used in the design and construction of all buildings. The new code provisions will allow the Town to utilize the latest technologies~ advances in construction standards and seismic design for use in new residential and commercial construction and in remodels.		X		X	MLT-3
As part-of the Capital Improvement Program, the Town will implement a Shoreline Park rip rap restoration, in order to shore up all the larger rocks at Shoreline Park and help prevent erosion into the San Francisco Bay. Shoreline Park is fully exposed to the Bay which is susceptible to sea level rise, tsunamis and possible tidal flooding.	X				
Also as part of the Capital Improvement Program, the Town will implement a foundation repair to a section of Paradise Drive in order to shore up the embankment by constructing a "soil nail" wall. This would help stabilize the exposed earthen bank that holds up Paradise Dr. just past the Caprice restaurant, which street segment could be susceptible to landslide as a result of earthquakes or storms.			X	X	For Tiburon Annex
The Town will continue to research the possibility of construction of a new LEED certified Public Works Corp Yard, as this is the Town's primary critical facility in need of repair/updating. Seismic retrofit work would be done simultaneously in order to ensure this critical facility could withstand the next major earthquake in the Bay Area. This project is largely dependent on funding.			X	X	For Tiburon Annex
In order to assist with the prevention of wildfires, the Town will work with Conservation Corps North Bay to obtain a matching Cal Fire Grant in order to implement the fire related items within the Town's Open Space Management Plan. The Town's Public Works Department will also begin working on a "zone approach" to remedy the highest priority areas in the open space to clear out invasive species and heavy brush. In addition, the Town will begin implementation of a program designed for residents living adjacent to open space, which outlines the guidelines for mowing grasses and vegetation clearing on open space lands.		X		X	X
'On-Going Mitigation Strategies' from 2012					
F. Continue to comply with all applicable building and fire codes as well as other regulations		X		X	MLT-3

APPENDIX R

Town of Tiburon

when constructing or significantly remodeling infrastructure facilities (INFR, HOUS, ECON, GOVT)					
Continue to enforce and/or comply with State-mandated requirements, such as the California Environmental Quality Act (ENVR a-1)		X		X	Complying with State and Federal regulations is considered implicit in this plan
Incorporate FEMA guidelines and suggested activities into local government plans and procedures for managing flood hazards (LAND, GOVT, HOUS, INFR)		X		X	FLD-2
Continue to participate in FEMA's National Flood Insurance Program (GOVT d-5)		X		X	Complying with State and Federal regulations is considered implicit in this plan
Continue to facilitate the distribution of emergency preparedness materials and trainings through the Tiburon Office of Emergency Services (INFR, HOUS, ECON, GOVT)		X		X	For Tiburon Annex
Conduct periodic tests of the emergency sirens and BEARS emergency warning systems (GOVT c-15)		X		X	For Tiburon Annex
Continue to maintain the emergency operations center (GOVT c-1 0)		X		X	For Tiburon Annex

Table R-8 - Current and Potential Hazard Mitigation Projects and Programs in Tiburon

Activity	Responsible Agency	Potential Funding Source	Timeline
Mitigation Activities and Priorities from Prior LHMP			
Also as part of the Capital Improvement Program, the Town will implement a foundation repair to a section of Paradise Drive in order to shore up the embankment by constructing a "soil nail" wall. This would help stabilize the exposed earthen bank that holds up Paradise Dr. just past the Caprice restaurant, which street segment could be susceptible to landslide as a result of earthquakes or storms.	City Engineer/ Public Works	General Fund, Federal Grants	0-5 years
The Town will continue to research the possibility of construction of a new LEED certified Public Works Corp Yard, as this is the Town's primary critical facility in need of repair/updating. Seismic retrofit work would be done simultaneously in order to ensure this critical facility could withstand the next major earthquake in the Bay Area. This project is largely dependent on funding.	City Engineer/ Public Works	General Fund, Federal Grants	0-5 years
In order to assist with the prevention of wildfires, the Town will work with Conservation Corps North Bay to obtain a matching Cal Fire Grant in order to implement the fire related items within the Town's Open Space Management Plan. The Town's Public Works Department will also begin working on a "zone approach" to remedy the highest priority areas in the open space to clear out invasive species and heavy brush. In addition, the Town will begin implementation of a program designed for residents living adjacent to open space, which outlines the guidelines for mowing grasses and vegetation clearing on open space lands.	Fire Department	General Fund, Federal Grants	0-5 years
Continue to facilitate the distribution of emergency preparedness materials and trainings through the Tiburon Office of Emergency Services	Tiburon Office of Emergency Services	General Fund, Federal Grants	0-5 years

APPENDIX R

Town of Tiburon

Conduct periodic tests of the emergency sirens and BEARS emergency warning systems	Tiburon Office of Emergency Services	General Fund, Federal Grants	0-5 years
Continue to maintain the emergency operations center	Tiburon Office of Emergency Services	General Fund, Federal Grants	0-5 years
New Mitigation Activities and Priorities			
Address coastal erosion along Main Street seawall	City Engineer/ Public Works	General Fund, Federal Grants	0-5 years
Use existing hydraulic analysis to design and implement improvements to Beach Road area drainage.	City Engineer/ Public Works	General Fund, Federal Grants	0-5 years
Culvert repair/replacement on San Rafael Ave at Lagoon where flooding occurred. (Belvedere- Tiburon joint project)	City Engineer/ Public Works	General Fund, Federal Grants	0-5 years

APPENDIX R

Town of Tiburon

Table R-9 Planning Mechanisms, Regulatory Tools, and Resources		
Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	General Plan (Tiburon 2020)	The General Plan outlines long-term direction for development and policy. It describes hazard areas and regulates current and future development based on known hazard areas. As this plan gets updated there is potential to improve it with updated risk information and strategies.
Plan	Hazard Mitigation Plan 2012 ABAG Annex	This Hazard Mitigation Plan and its predecessors identify risks from natural hazards present in the Town and includes strategies to reduce these risks.
Plan	Capital Improvement Plan	The Capital Improvement Plan (CIP) directs construction activities for Town owned facilities and infrastructure for the next five years. Mitigation actions may involve construction of new or upgraded facilities and infrastructure. As this plan gets updated there is potential to improve it with updated strategies.
Plan	Open Space Management Plan	Open Space management influences risk of landslides, wildfire, and in some cases flooding. The Town manages 250 acres of open space. Fire hazard and fuel loading is the primary concern driving management of non-native species in this pan.
Policy	Municipal Code	The Muni Code includes several sections that address hazard mitigation including Title IV Land Improvement and Use, Title V Public Works, and Title VI Public Health, Safety and Welfare.
Policy	Zoning Ordinance (Chapter 16 of Municipal Code)	The Zoning Ordinance implements the General Plan by establishing specific regulations for development. It includes standards for where development can be located, how buildings must be sized, shaped, and positioned, and what types of activities can occur in an area. Mitigation actions that pertain to new or substantially redeveloped buildings can be adopted into the Zoning Ordinance.
Administrative	Administrative Services Department	Administrative Services Department handles finance and purchasing, budgeting, risk management, information technology, and business licensing for the community. The department may be responsible for implementing mitigation actions related to the department's scope.
Administrative and Personnel	Town Planning, Building, and Public Works Departments	These departments are responsible for planning and building related activities including issuing permits, conducting environmental review, preparing planning documents, and addressing housing issues. Mitigation activities related to planning and building can be implemented by this department. Public Works Department is responsible for Town-owned infrastructure, including streets, bike lanes and sidewalks, storm drains, traffic signals, and streetlights. Mitigation actions involving new or retrofitted public infrastructure, as well as those related to water conservation, fall within the purview of the Public Works Department
Personnel	Town Police Department	The Tiburon Police Department conducts emergency preparedness activities for the community. Mitigation activities related to emergency preparedness can be implemented by the Police Department.
Personnel	Tiburon Fire Protection District	The Tiburon Fire District protects the town of Tiburon, the Town of Belvedere, and the surrounding area. The Fire District's boundaries represent a diverse community with responsibility for commercial, residential, wildland / urban interface, and parts of the San Francisco Bay. The Fire Protection District supports implementation of mitigation actions that reduce the risk of wildfire.
Financial	General Fund	General Fund monies come primarily through property taxes and sales taxes and fund the personnel resources above as well as capital improvement projects.
Financial	State and Federal Grants	Matching grant programs are one of the largest sources of funding dedicated to hazard mitigation and risk reduction. These include State flood control grants that have been awarded and FEMA grants that are being pursued. These FEMA grant programs include Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA)
Training and Outreach	Get Ready	The Get Ready program, developed in Marin County, is a free 2-hour course provided to the community. The course is designed to help residents plan for an emergency with a family plan, evacuation checklist, and strategies to keep residents and their families safe. (https://readymarin.org/get-ready/)
Training and Outreach	Newsletter	The Tiburon Talk newsletter gets emailed every other month and often contains articles about hazard preparedness and mitigation

APPENDIX S

North Marin Water District

Appendix S

North Marin Water District

North Marin Water District

North Marin Water District (NMWD) was formed in April 1948 following voter approval under the California State law known as the County Water District Law (Division 12 of the California Water Code).

NMWD primarily serves the City of Novato and surrounding unincorporated areas in Marin County, encompassing approximately 75 square miles. The Novato Service Area has approximately 20,750 active service connections serving approximately 24,000 dwelling units, as well as commercial, industrial and institutional customers. The estimated Novato Service Area population is 61,000. NMWD also provides service to several small improvement districts in the West Marin Service Area near the Pacific Ocean, via approximately 800 service connections.

NMWD owns and operates Stafford Lake and the associated treatment plant, which provides approximately 20% of Novato's water. The lake lies four miles west of downtown Novato and collects runoff from 8.3 square miles of watershed property located upstream at the upper tributary reaches of Novato Creek. Water from Stafford Lake is drawn by the intake tower and fed by gravity or by pumping (depending on the lake level) into the treatment plant located just below the dam. In addition to providing water supply for domestic needs and firefighting purposes, Stafford dam provides flood protection for the greater Novato area. The Marin County Flood Control and Water Conservation District has partnered with NMWD to share in the cost of obtaining additional flood liability insurance.

Water from the Russian River via connection to the Sonoma County Water Agency's aqueduct provides the remaining 80% of the Novato Service Area supply of water. This water originates from both the Eel River and the Russian River watersheds. The water supply for the West Marin Service Area is derived from groundwater.

NMWD maintains and operates approximately 340 miles of pipeline, 42 tanks totaling over 37 million gallons of storage, and associated pump stations, hydropneumatic systems, and regulator valves. NMWD sizes its storage tanks to meet operational, firefighting and emergency requirements. Storage requirements for both the Novato and West Marin Service Areas are updated on a 5-year cycle, and are based in part on input provided by Novato Fire Protection District and Marin County Fire.

Ensuring water quality and protecting public health is one of NMWD's primary goals. Water quality data is routinely collected throughout the distribution systems and at water sources.

APPENDIX S

North Marin Water District

As NMWD's service area includes the City of Novato, the Vulnerability Analysis tables (M-1 through M-6) in Appendix M apply to NMWD as well. With some of unincorporated Marin County also part of their service area, some of the vulnerabilities summarized in

Table S-9 Planning Mechanisms, Regulatory Tools, and Resources

tables G-1 through G-6 also apply to NMWD. Because both the City of Novato and unincorporated Marin are vulnerable to all hazards outlined in the main body of this MCM LHMP, NMWD is also considered to be vulnerable to all hazards: i.e. earthquake, flood, fire, tsunami, landslide, and dam inundation. Table 4-2. Potential Common Mitigation Actions lists actions that NMWD and other participating agencies may employ, with the most likely actions including DAM-2, DAM-3, FLD-5, MLT-6, MLT-14, MLT-15, MLT-20, and TSU-1 (NMWD does not have a direct role in TSU-1, but Dillon Beach and other unincorporated Marin communities it serves are working to maintain TsunamiReady status). Additional details and jurisdiction-specific actions to be considered by NMWD are included in Table S-1 – Current and Potential Hazard Mitigation Projects and Programs. This is NMWD's first Local Hazard Mitigation Plan and therefore there are no prior mitigation actions to evaluate.

Table S-1 - Current and Potential Hazard Mitigation Projects and Programs

Name	Hazard(s) addressed	Potential Funding Source	Timeline
Oceana Marin Treatment and Storage Pond Repair	Storm (wind)	Federal Grants	0-5 years
Oceana Marin Force Main Replacement and Main Pump Station Upgrade/Relocation	Storm (Flood/wind)	Federal Grants	0-5 years
Oceana Marin Cliff-side Sewer Lining	Storm (wind/coastal erosion)	Federal Grants	0-5 years
Olema Domestic Water Pump Station Flood Protection	Storm (flood)	Federal Grants	0-5 years
Creek Crossing Upgrades (Rush, Novato, Leveroni)	Storm (flood)	Federal Grants	0-5 years
Stafford Dam Upgrades - Upstream Face Armoring, Accelerometers	Storm (wind), earthquake	Federal Grants	0-5 years

APPENDIX S

North Marin Water District

Table S-9 Planning Mechanisms, Regulatory Tools, and Resources

Type of Resource	Resource Name	Ability to Support Mitigation and Potential for Improvement
Plan	Strategic Plan 2018	<p>The Strategic Plan is the District's highest-level planning document. It represents the Board's direction for the future and the staff's work plan for implementing it. It identifies the agency's mission, vision, and values, while providing a set of goals and objectives that becomes a framework for all decision-making.</p> <p>The Plan is also a practical working tool that provides clear direction to the staff about the Board's goals and objectives, and includes a work plan developed by the staff to meet those goals and objectives. As such, it is referred to regularly as a guide to District actions during the period covered.</p> <p>To keep it fresh and provide opportunities for improvement, it should be updated every five years and rolled forward so that there is always a five-year guide to the future.</p>
Plan	5-year Master Plans	NMWD uses Master Plans or Capital Improvement Plans for guiding infrastructure maintenance and upgrades of its systems grouped by service district such as Novato, West Marin and Oceana Marin.
Policy	Board of Directors	North Marin Water District is an independent special district governed by a five-member Board of Directors elected at large for four-year terms.
Policy	Policies & Regulations	North Marin Water District is a public agency of the State of California established under the County Water District Law (Division 12 of the California Water Code). Policies and regulations have been adopted by the Board of Directors of the District pursuant to Water Code Section 31024 and establish the procedures under which the District operates, including the terms and conditions under which facilities will be installed and water will be supplied to users and the charges and rates for such service.
Administrative and Personnel	Administration / Finance Department	The Administrative Department is comprised of the Administrative Services, Consumer Services, Finance and Information System. Consumer Services is responsible for reading water meters, responding to customer calls for service and assistance with their water service, creation and mailing of water bills, and answering customer questions regarding their bill or water use. Finance is responsible for general accounting and budgeting, payroll, purchasing, financial investments, risk management and information systems.
Administrative and Personnel	Engineering	The Engineering Department consists of a small professional and technical staff that oversees the planning, permitting, design, construction and project management of water supply, treatment, transmission and distribution facilities necessary to serve NMWD's customers. Engineering functions for wastewater-related facilities are also provided by the Engineering Department to support the NMWD wastewater collection, treatment and disposal system in Oceana Marin (Dillon Beach area).
Administrative and Personnel	Construction / Maintenance	The Construction/Maintenance Department has a variety of duties, principally related to the installation, repair and replacement of water main pipelines, their appurtenances and performs all "underground" maintenance for the District. The Construction/Maintenance Department also assists other departments to upkeep structures, grounds, storage tanks and pumping facilities.
Administrative and Personnel	Operations / Maintenance	The Operations/Maintenance Department manages the supply, distribution and water quality for the City of Novato and the West Marin communities, and performs all "above-ground" maintenance for the District.
Financial	Combined Budget	The budget of combined service areas pays for the District's operating expenses and comes from the revenue from water.

APPENDIX S

North Marin Water District

		sales.
Financial	Grants	Federal, State, and local grants offer opportunities to invest in mitigation improvements that would otherwise not be feasible or prioritized.
Training and Outreach	Social Media	NMWD is endeavoring to increase the use of social media for public outreach materials.
Training and Outreach	Staff Training and Professional Development	NMWD supports staff involvement in local, regional, and national water industry organizations including payment of subscription dues and attendance at conferences.