MARIN COUNTY
COUNTY WIDE PLAN

PUBLIC DRAFT
SAFETY ELEMENT UPDATE

June 1, 2022

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Reader Introduction

The Safety Element of a General Plan contains the policies and implementation programs to prepare for and protect the public from the harmful impacts of environmental hazards that could occur in that community. In the Marin County Wide Plan, the Safety Element goals and policies are presented as Section 2.6 Environmental Hazards and Safety of the Natural Systems and Agriculture Element. Currently the Safety Element covers three types of environmental hazards:

- Geologic and Seismic Hazards
- Flooding and Sea Level Rise
- Wildfire

New State law requires the Safety Element be updated every eight years along with the Housing Element which is why the Safety Element is being updated now. The update process will focus on new state requirements to plan for climate change impacts, primarily focusing on wildfire hazard, sea level rise, and resiliency planning.

The Safety Element will also have a new focus on planning for the most vulnerable populations to ensure the County's resiliency planning efforts reach all populations in Marin. There will be a new goal for achieving Equitable Community Safety Planning with supporting policies and implementation programs.

This Public Draft Safety Element is presented for public review and comment and will be finalized once the following steps are completed: Cal Fire has reviewed the Wildfire section; the public comment period for the Environmental Impact Report (EIR) on the project closes; and the County responds to comments.

To submit comments on the Public Draft Safety Element please email comments to: safetyelement@marincounty.org .

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2.6 Environmental Hazards and Safety

Background

[Note to Reader: Revisions to the existing Environmental Hazards and Safety text in the current County Wide Plan is shown with ~~strikeout~~ to indicate existing text and underline to show new text.

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Marin County places the highest priority on the well-being and safety of its community members. Our policies and implementing programs focus on preparation for potential natural and human-caused hazards and emergencies. Effective emergency management, increased preparation for disasters, and incorporation of resilience in County activities and the development process supports the protection of life and property. This section of the Natural Systems and Agricultural Element of the Countywide Plan is considered the County's Safety Element and provides the context to identify and understand the hazards that could threaten unincorporated Marin County. Based on this understanding, proactive practices and policies enable the continued prosperity and resilience of Marin County.

What is a Safety Element?

Section 2.6 of the Countywide Plan contains Marin County's Safety Element, one of the State-mandated elements of the Plan. It presents the County's overall goals, policies, and implementing programs to facilitate community resilience and reduce future loss of life and property, injuries, environmental damage, and social and economic disruption resulting from environmental hazards. This section meets the requirements of California Government Code Section 65302.6, 65302(g), and 8685.9. Under State planning law, this section of the Plan identifies and discusses the following hazards and topic areas of concern for the County.

- Equitable Community Safety Planning
- Disaster Preparedness, Response & Recovery
- Geology & Seismicity
- Flooding
- Wildfire
- Climate Change & Resiliency Planning

Other Documents Incorporated by Reference

Incorporated by Reference

Consistent with Government Code Section (65302(g)(4)(D)(ii)) the CWP summarizes the Local Hazard Mitigation Plan and Vulnerability Assessment by reference.

Marin County Multi-Jurisdictional Local Hazard Mitigation Plan. The Marin County Multi-Jurisdictional Local Hazard Mitigation Plan (MCM LHMP) complies with all requirements set forth under Disaster Mitigation Act (DMA) 2000 and includes information also relevant to the

Safety Element. Sections of the Safety Element are supplemented by the most recently adopted MCM LHMP, which is incorporated by reference, as allowed by California Government Code Section 65302(g). The MCM LHMP presents environmental hazard analysis, describes important transportation and utility infrastructure at risk from environmental hazards, describes emergency evacuation systems, and mitigation actions to protect Marin County populations and infrastructure from environmental hazards.

Safety Element Vulnerability Assessment. The Safety Element is based, in part, on the findings of a Vulnerability Assessment that evaluates how the effects of climate change could be harmful to the people, infrastructure, buildings, key services, natural and managed resources, and economic drivers in the unincorporated areas of Marin County. It identifies the environmental hazards in Marin County that climate change may affect, the damage that these hazards may cause to people and community assets, and the ability of people and assets to effectively anticipate and recover from these hazards. Preparing the Vulnerability Assessment was the first step in updating the Safety Element to include climate adaptation and resiliency planning. Hazards discussed include extreme heat, flooding, landslides and debris flows, sea level rise, severe weather, subsidence, and wildfire.

Additional Reference Documents

Informational Documents

Other documents containing information and policies relevant to the Safety Element include:

- **Marin Community Wildfire Protection Plan (2020)** which is a county-wide plan with 35 agency and group participants that addresses wildfire hazard and threats to economic assets, including homes and infrastructure, and ecological resources in the wildland urban interface (WUI), documenting factors of wildfire risk and the ability of the relevant fire agencies to respond to these wildfire hazards.
- **Marin Ocean Coast Sea Level Rise Adaptation Report (2018)** which presents potential actions to accommodate, protect against, or retreat from the threats of sea level rise and coastal hazards along the Marin Pacific Ocean coastline that can be considered by communities, homeowners, and asset managers.
- **Adaptation Land Use Planning: Guidance for Marin County Local Governments (2019)** presents adaptation measures and planning methods that can be particularly valuable in Marin County, including recommendations for the Countywide Plan.

Marin County Hazards

Much of the existing and planned development in the County is or would be located in an at-risk area for at least one climate change hazard type. The County does not restrict development in areas at-risk due to climate change hazards, but will require new development to take into account projected climate change hazards through design and adaptation strategies.

MarinMap, hosted by a group of local governments, special districts, and other public agencies, is a source of Geographic Information System maps showing environmental hazards in the County on a parcel scale. MarinMap can be accessed here: MarinMap. MarinMap can be used to view existing infrastructure and land uses in the context of different environmental hazards discussed in the Safety Element.

Geology and Seismicity

Earthquakes can produce surface rupture and displacement, but ground shaking is a more likely threat, especially on loose soils (see Map 2-9, Seismic Shaking Amplification Hazards). The San Andreas Fault is the only local fault subject to the Alquist-Priolo Act (see Map 2-10, Fault Hazards), which prohibits specified types of habitable structures within 50 feet of an active trace. Shaking of water saturated soil can result in liquefaction, another potential source of damage (see Map 2-11, Liquefaction Susceptibility Hazards). The Seismic Hazards Mapping Act requires mapping of Seismic Hazard Zones that encompass areas prone to liquefaction and earthquake-induced landslides; the County contains liquefaction and landslide Seismic Hazard Zones, which are subject to State requirements for development planning and construction.

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 two deaths. In 1989, the 7.1-magnitude Loma Prieta earthquake occurred on the San Andreas Fault and was the largest earthquake to occur in the San Francisco Bay Area since 1906. If the fault rupture location were closer, a strong shaking such as this could have caused severe damage within Marin County.

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. A debris flow occurs when water begins to wash material from a slope or when water runs off a newly burned stretch of land, picking up speed and debris as it descends the slope. Communities in areas with steep slopes, including coastal bluffs, are generally susceptible to landslides, post-fire debris flows, and other forms of debris flows triggered by earthquakes or water (see Map 2-12: Landslide Hazard Areas).

Land subsidence is a gradual settling or sudden sinking of the Earth's surface due to removal or displacement of subsurface earth materials. Buildings and roads may suffer damage from subsidence of Bay mud and other weak soils, or differential settlement due to placement on multiple soil types.

A tsunami is a series of waves or surges most commonly caused by an earthquake, landslide, or volcanic eruption at the sea floor. Although tsunamis in California are rare, the entire California

coastline is vulnerable to these events. Current tsunami inundation maps from the California Department of Conservation show inundation areas along much of the Marin County coastline and Richardson Bay shoreline. The tsunami annex of the Marin Emergency Operations Plan serves as the tsunami evacuation plan for the County and provides information on tsunami scenario modeling results, tsunami watch/advisory/warning protocols, and immediate actions to be undertaken by agencies within the County. Seiches are related to tsunamis and are triggered by the same sources, but occur in enclosed and semi-enclosed bodies of water, such as bays, inlets, lakes, and reservoirs. Seiches could occur in any reservoir located in the County and in Richardson, San Pablo, and San Francisco Bays, but are less likely than tsunami in Marin County.

MAP 2-9
SEISMIC SHAKING AMPLIFICATION HAZARDS

SOURCE: 2000, Seekins, Linda C.,Boatwright, Jack, and Fumal, Tom,
Soil Type and Shaking Hazard in the San Francisco Bay Area,
http://quake.wr.usgs.gov/prepare/soil_type/index.html,
Earthquake Hazards Program-Northern California,
U.S. Geological Survey, 2000.

Legend

- County Boundary
- City Boundary
- Highways and Major Roads

Water Bodies

- Lakes
- Lagoons

Soil Type

Soil Types A and B (Vs* > 1500 m/sec and 1500 m/sec > Vs > 750 m/sec, respectively).
Soil types A and B do not contribute greatly to shaking amplification.
Soil type A occurs infrequently in the bay areas and includes unweathered intrusive igneous rock.
Soil type B includes volcanics, most Mesozoic bedrock, and some Franciscan Bedrock.

Soil Type C (750 m/sec > Vs > 350 m/sec). **The shaking amplification for soil type C would likely be not as significant as for soil types D and E.** Soil type C includes some Quaternary sands, sandstones and mudstones, some Upper Tertiary sandstones, mudstones and limestones, some Lower Tertiary mudstones and sandstones, and Franciscan melange and serpentinite.

Soil Type D (350 m/sec > Vs> 200 m/sec). **Significant amplification of shaking by these soils is generally expected.** Soil type D includes some Quaternary muds, sands, gravels, silts and muds.

Soil Type E (200 m/sec > Vs). **The strongest amplification of shaking is expected for this soil type.**
Soil type E includes water-saturated mud and artificial fill.

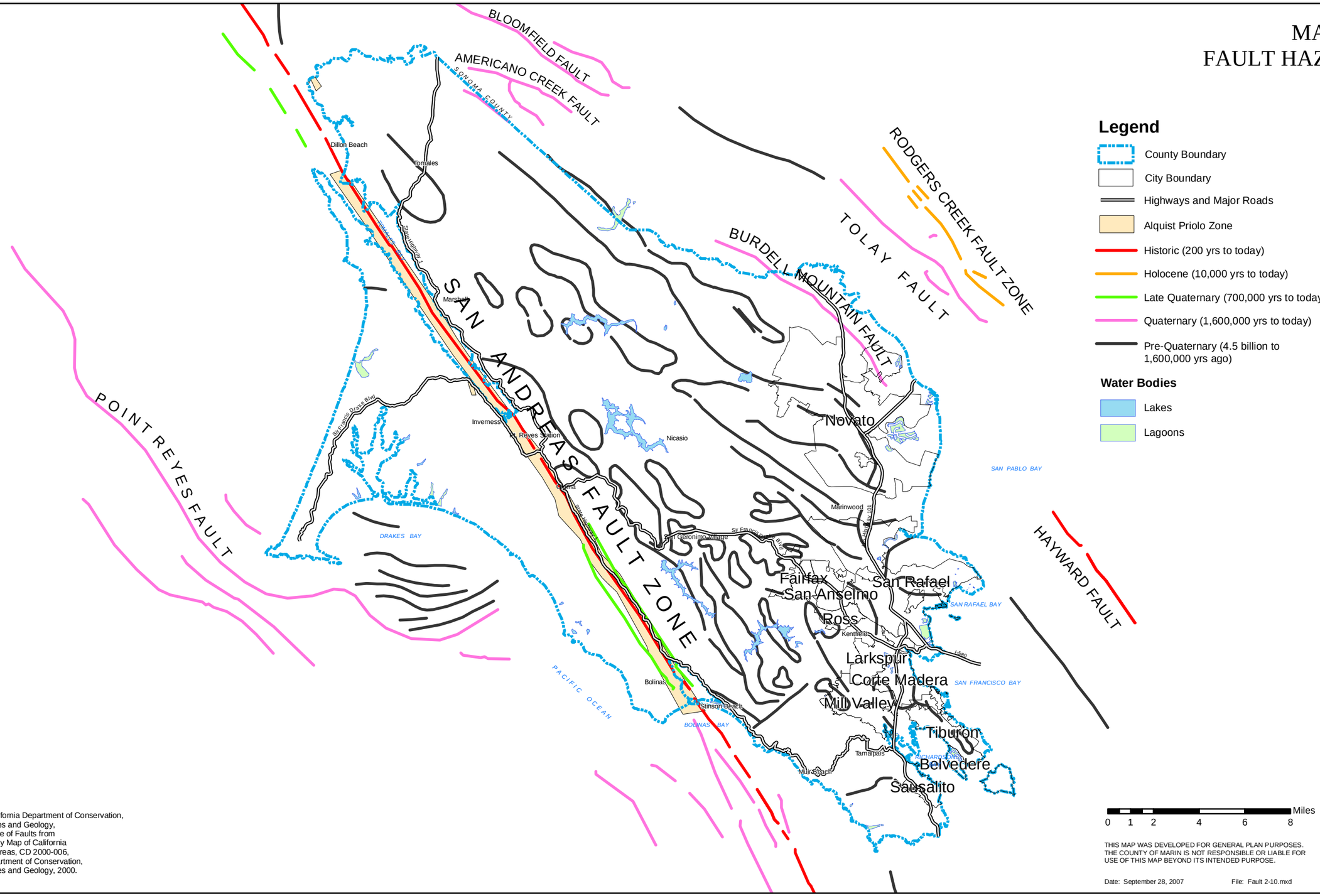
* Site amplification is the velocity at which the rock or soil transmit shear waves (Vs). Shaking is stronger where the shear wave velocity is lower.
Source: (Seekins et al., 2000)

N

0 1 2 4 6 8 Miles

Date: September 28, 2007 File: Shake 2-9.mxd

MAP 2-10
FAULT HAZARDS



Legend

- County Boundary
- City Boundary
- Highways and Major Roads
- Alquist Priolo Zone
- Historic (200 yrs to today)
- Holocene (10,000 yrs to today)
- Late Quaternary (700,000 yrs to today)
- Quaternary (1,600,000 yrs to today)
- Pre-Quaternary (4.5 billion to 1,600,000 yrs ago)

Water Bodies

- Lakes
- Lagoons

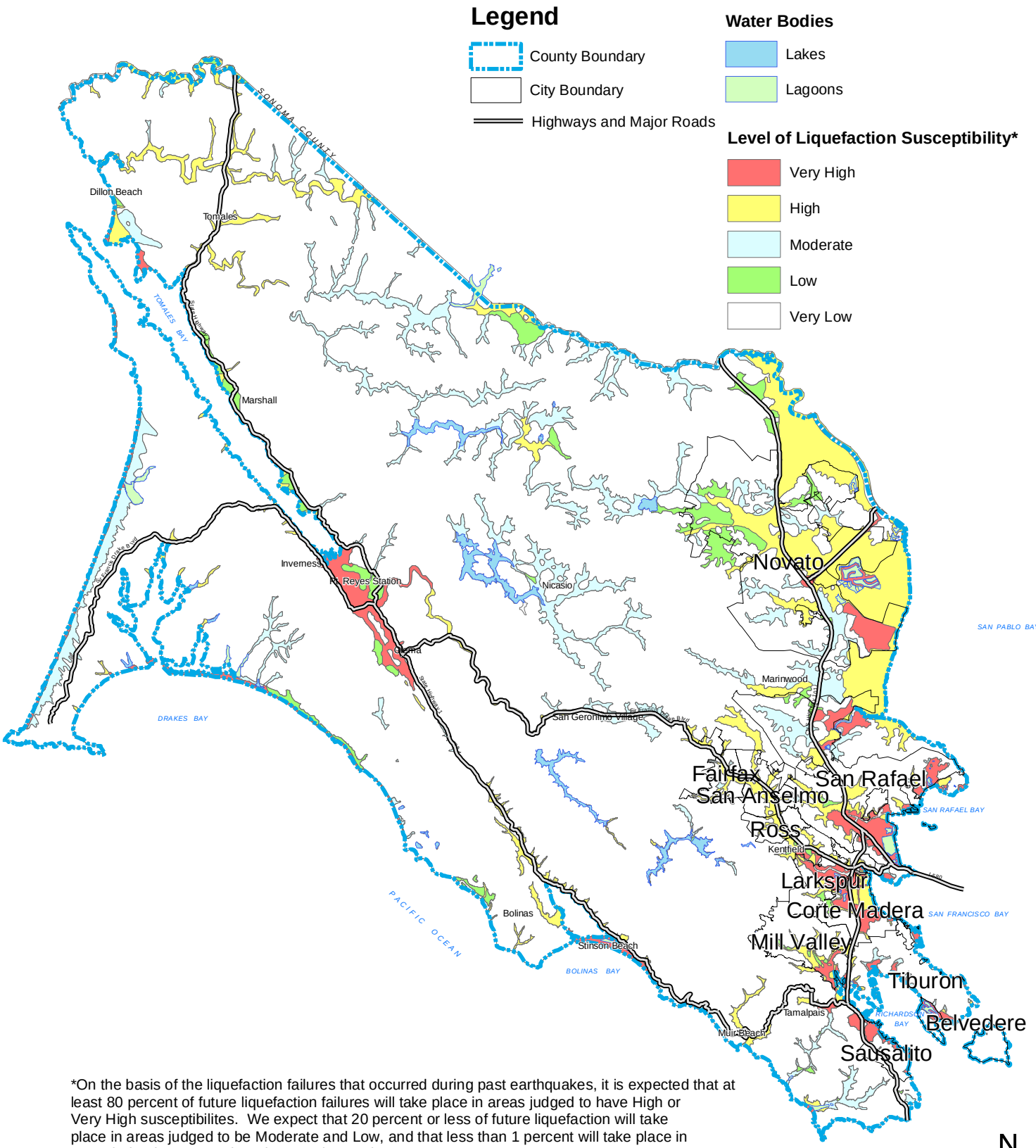
N

0 1 2 4 6 8 Miles

SOURCE: California Department of Conservation, Division of Mines and Geology, Digital Database of Faults from the Fault Activity Map of California and Adjacent Areas, CD 2000-006, California Department of Conservation, Division of Mines and Geology, 2000.

Date: September 28, 2007 File: Fault 2-10.mxd

MAP 2-11
LIQUEFACTION SUSCEPTIBILITY HAZARDS

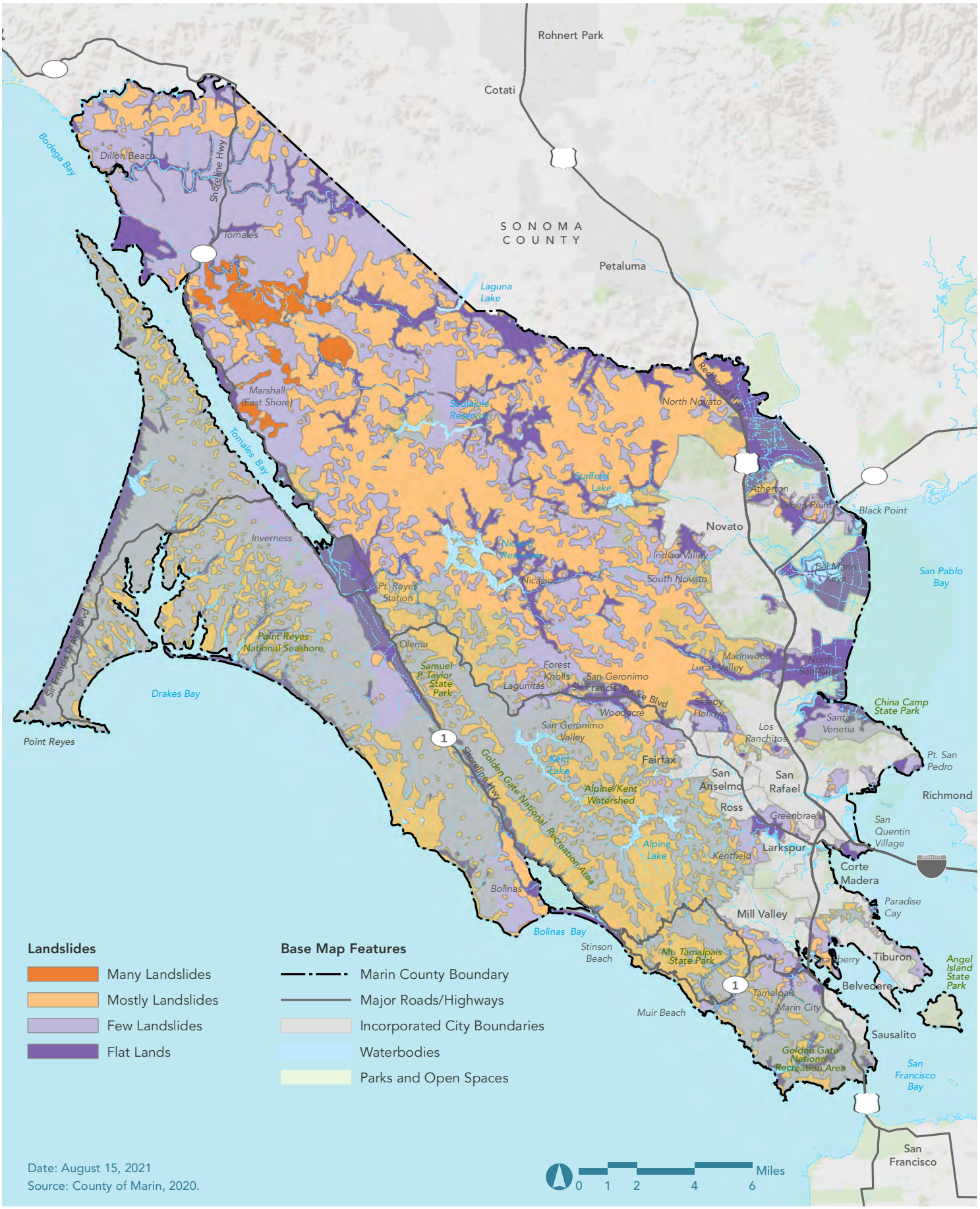


*On the basis of the liquefaction failures that occurred during past earthquakes, it is expected that at least 80 percent of future liquefaction failures will take place in areas judged to have High or Very High susceptibilites. We expect that 20 percent or less of future liquefaction will take place in areas judged to be Moderate and Low, and that less than 1 percent will take place in areas judged Very Low (Knudson et al., 2000).

SOURCE: Knudson, K. L., Sowers, J. M., Witter, R. C., Wentworth, C. M., and Helley, E. J., Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California: A Digital Database, Open-File Report 00-44, Online Version 1.0, U.S. Geological Survey, 2000.

Date: September 28, 2007 File: Liqu 2-11.mxd

Map 2-12
Landslide Hazard Areas



Flooding

A flood occurs when there is too much water on the ground to be held within local bodies of water, drain into soils, or to be carried away by rivers or urban drainage systems, causing the water to flow into normally dry areas. Two forms of flooding primarily occur in Marin: 1) tidal flooding and 2) river or watershed flooding. All of Marin's watersheds are largely prone to flash flooding.

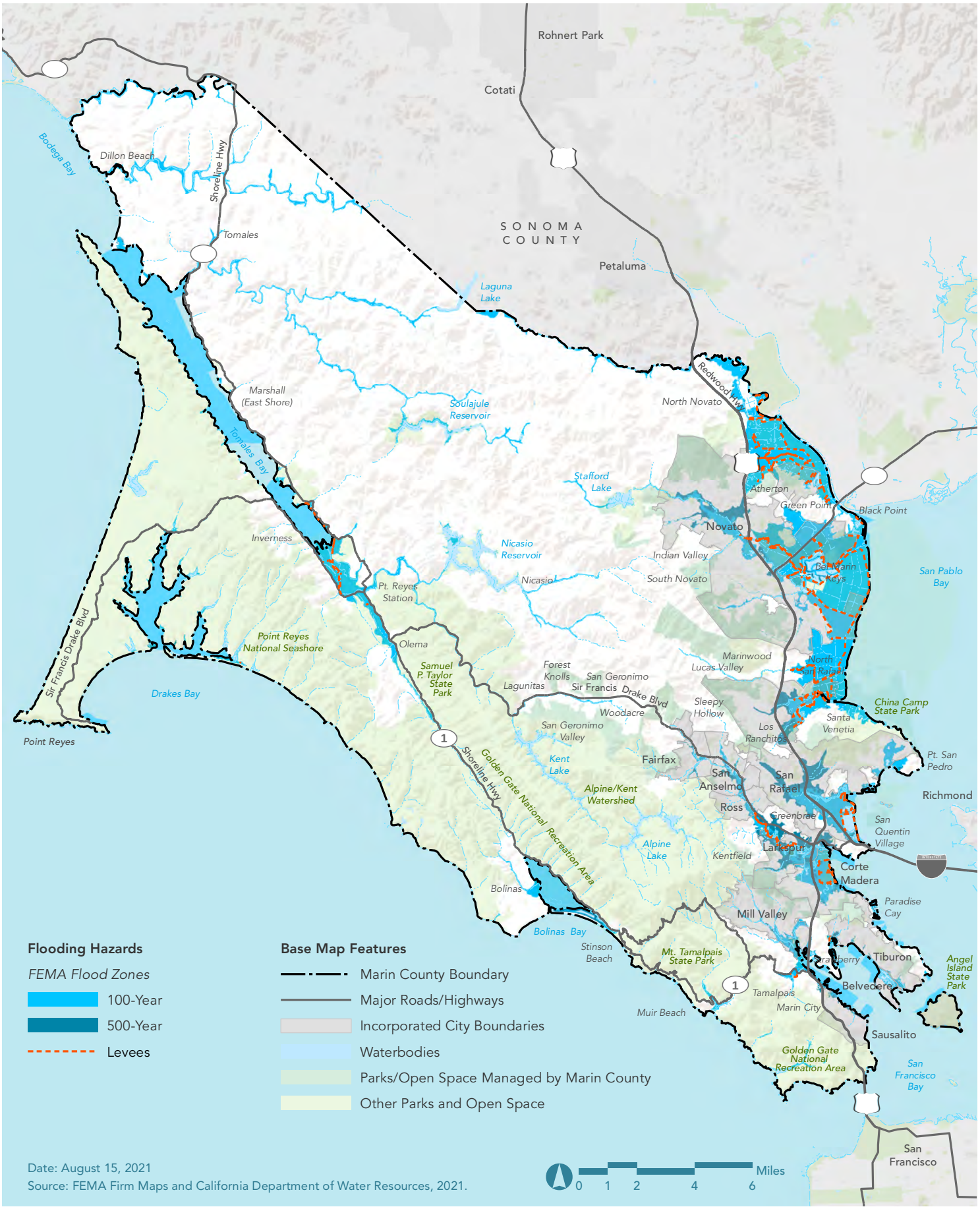
Many unincorporated communities in Marin contain Federal Emergency Management Agency (FEMA) Special Flood Hazard Areas (SFHA), meaning they have at least a 1% chance of flooding in a given year (see Map 2-13: Flood Hazard Areas). Dam failure from seismic activity or other forms of dam failure can result in flooding downstream of the dam is also shown on Map 2-13.

Since the middle of the twentieth century, the winter/spring storms of 1955, 1958, 1964, 1969, 1970, 1973, 1982, 1983, 1986, 1995, 1997, 1998, 2005/2006, 2006, and 2017 caused significant damage and were declared Major Federal Disasters for flooding. The Richardson Bay watersheds (e.g., Marin City, Tamalpais Valley, Almonte, and Mill Valley), the Bel Aire neighborhood, Stinson Beach, San Rafael Meadows, Santa Venetia, Ross Valley, and Inverness have a significant history of flooding. Existing development in these communities continue to be at risk of flooding. The unincorporated communities of Bel Marin Keys, Santa Venetia, Strawberry, and Inverness are located in levee-protection zones and may become inundated in the event of levee failure (see Map 2-13: Flood Hazard Areas). Flood hazard areas are shown in MarinMap (MarinMap) and can be mapped along with key infrastructure and land use designations.

Development in flood hazard areas in the County is not restricted, but rather municipal code requirements and other regulations consider existing and projected flood zones and extents when reviewing the design and adaptation measures of proposed development.

The Marin County Flood Control & Water Conservation District conducts the County's Flood Control Program, which seeks to reduce the risk of flooding and protect life and property while utilizing sustainable practices.

Map 2-13
Flood Hazard Areas



Wildfire

A wildfire is any uncontrolled fire occurring in an area of combustible vegetation that requires fire suppression. Wildfires can occur naturally, such as those ignited by lightning, and are important to many ecosystem processes; however, most are started by human activity such as smoking, campfires, powerlines, equipment use, and arson.

A regional approach to wildfire planning and response is addressed in the Marin County Multi-Jurisdictional Local Hazard Mitigation Plan and the Marin Community Wildfire Protection Plan (CWPP). The Marin Wildfire Protection Authority (MWPA), established in 2020, coordinates and funds 17 local member agencies to create more fire adapted communities based on the priorities outlined in the CWPP. Additional information detailing wildfire hazard in the County and detailed descriptions of the CWPP and the MWPA are provided in a technical memo supporting this Safety Element.

Approximately 60,000 acres or 18 percent of the County's land area falls within the Wildland Urban Interface (WUI) where residences and other structures are adjacent to or intermixed with open space and wildland vegetation (see Map 2-14: Wildland Urban Interface). The term WUI is not a designation of potential wildfire severity, but rather a somewhat loosely defined description of an area where urban development meets undeveloped lands at risk of wildfires. The size and location of the WUI will change over time with development patterns.

Fire hazard severity zones (FHSZ) are CAL FIRE-designated areas of significant fire hazard that influence how people construct buildings and protect property to reduce risk associated with wildland fires. A CAL FIRE countywide assessment of wildland fire threat revealed that approximately 82 percent of the total land area of the County is ranked as having moderate to very high fire hazard severity zone ratings (see Map 2-15: Fire Hazard Severity Zones).

Historical records show that many large wildfires (greater than 500 acres) have occurred in Marin since 1850. CAL FIRE incident information identifies eight wildfires in the County since 2008. The most recent fire in Marin was the Woodward Fire which started on August 17, 2020 by lightning from a rare dry lightning weather event.

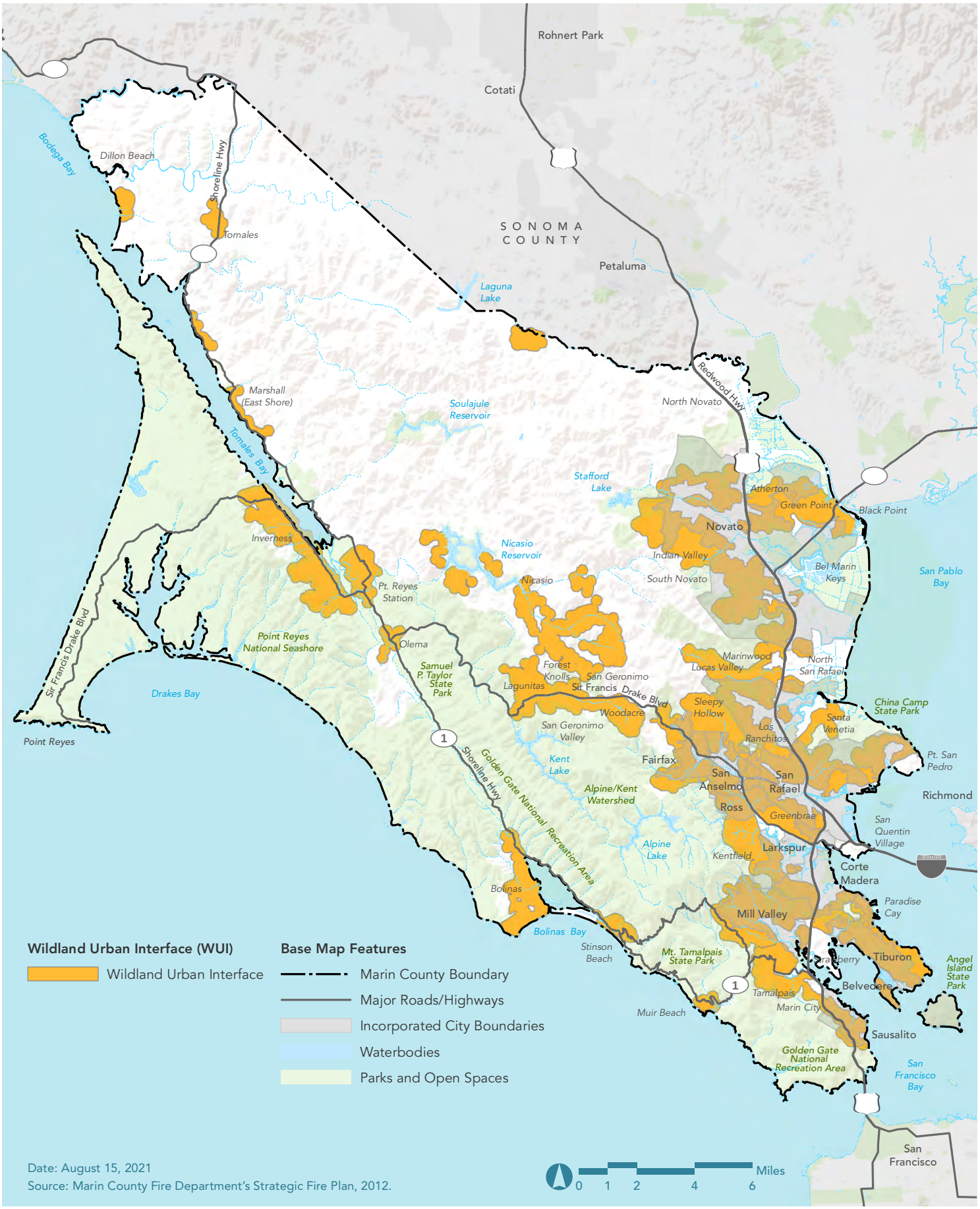
Fire protection in Marin is the responsibility of either the federal, state, or local government (see Map 2-16): Wildfire Responsibility Areas). On federally owned land, or federal responsibility areas (FRA), fire protection is provided by the federal government, often in partnership with local grants and contracts. In state responsibility areas (SRA), which are defined according to land ownership, population density, and land use, CAL FIRE has a legal responsibility to provide fire protection. Local responsibility areas (LRA) include incorporated cities and cultivated agriculture lands. In LRAs, fire protection is provided by city fire departments, fire protection districts, or counties, or by CAL FIRE under contract to local government.

CAL FIRE contracts with the Marin County Fire Department (MCFD), the primary agency that handles wildfires, to provide wildland fire protection and associated fire prevention activities for SRAs. MCFD also provides similar protection services to FRA in the Golden Gate National Recreation Area (GGNRA), Muir Woods National Monument, and Point Reyes National Seashore. In addition to MCFD, there are twelve fire service agencies and one volunteer

department—Tomales Volunteer Fire Company (TVFC)—that provide fire services in Marin County.

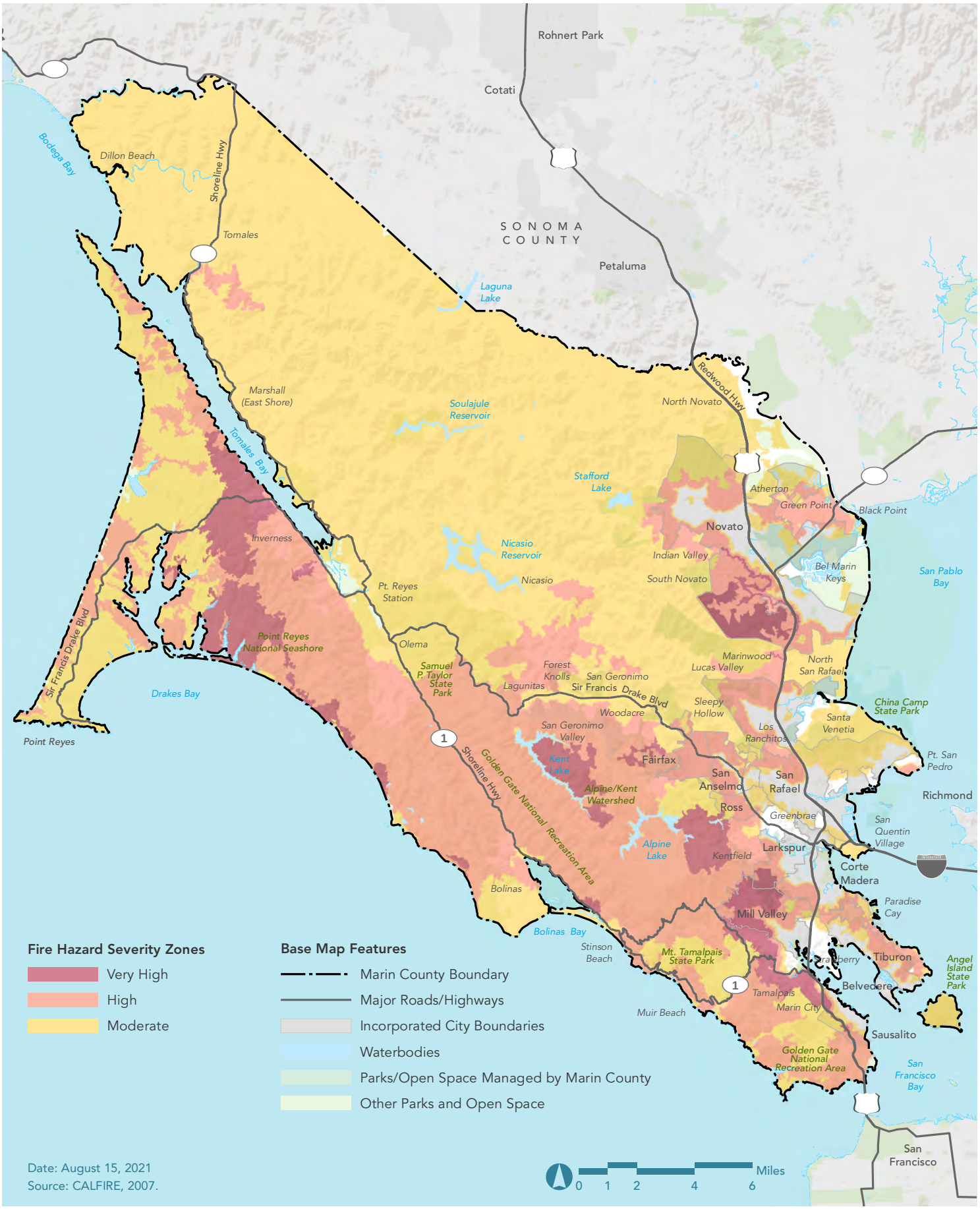
CAL FIRE has the responsibility for managing a list of communities in the County that are at high risk of damage from wildfire. These communities include: Bolinas, Inverness, Inverness Park, Kentfield, Lagunitas-Forest Knolls, Lucas Valley-Marinwood, Marin City, Olema, Point Reyes, Ross, San Anselmo, Santa Venetia, and Stinson Beach.

Map 2-14
Wildland Urban Interface

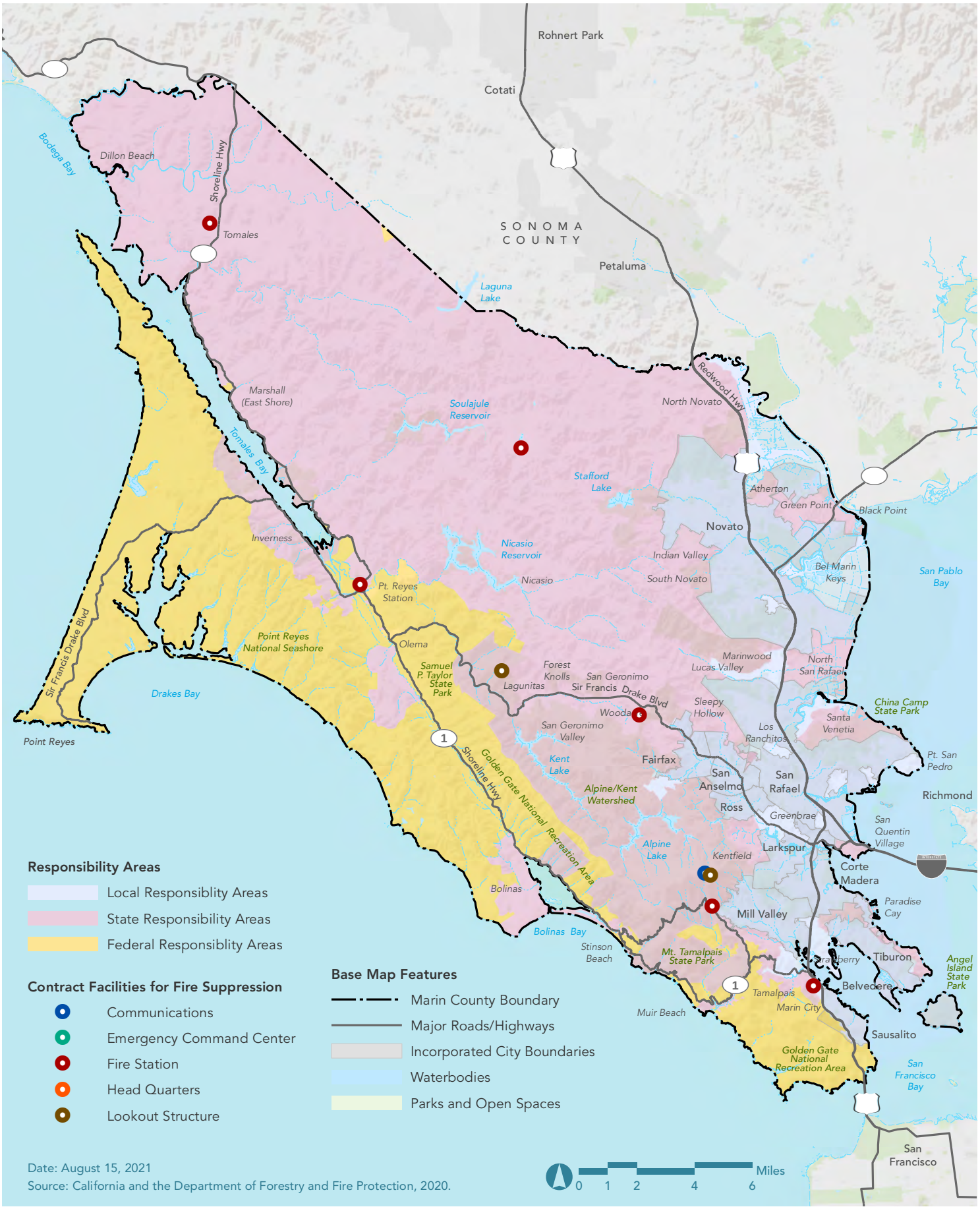


Date: August 15, 2021
Source: Marin County Fire Department's Strategic Fire Plan, 2012.

Map 2-15
Fire Hazard Severity Zones



Map 2-16
Wildfire Responsibility Areas



Date: August 15, 2021

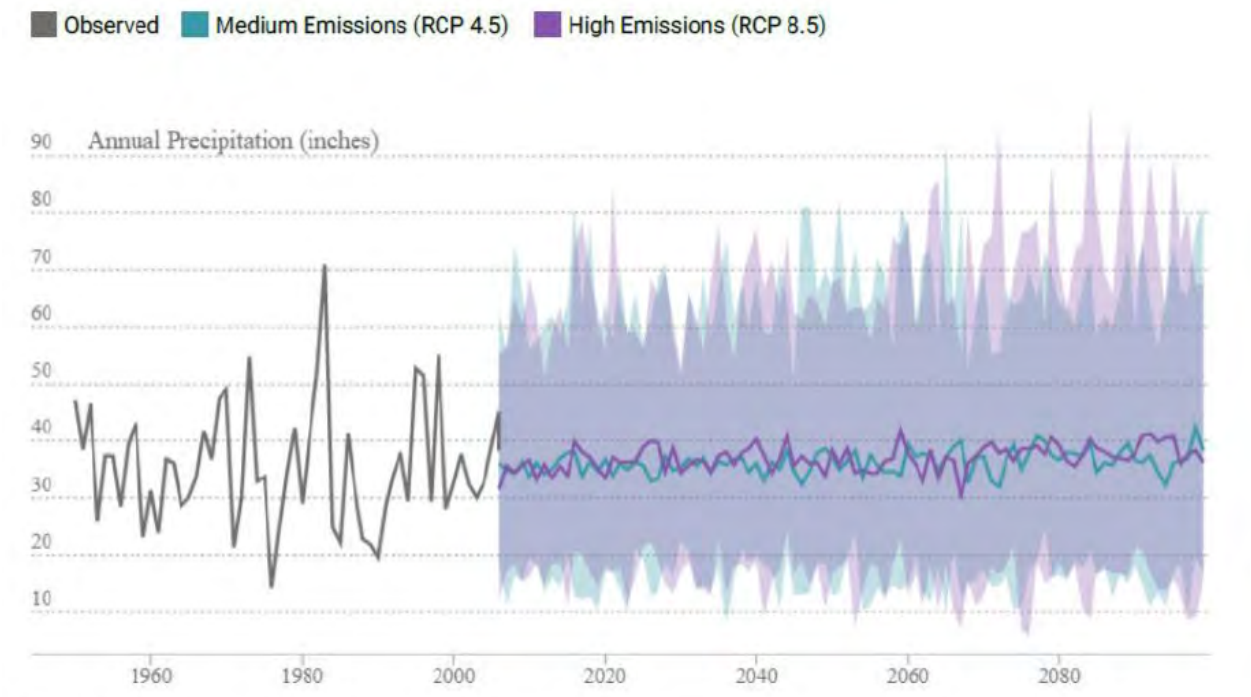
Source: California and the Department of Forestry and Fire Protection, 2020.

Climate Change and Resiliency Planning

All hazards will be examined for the purpose of reducing vulnerability to Climate Change related hazards. Climate change is a long-term change in the average meteorological conditions in an area. Currently, the global climate is changing due to natural causes and primarily a human-induced increase in greenhouse gas (GHG) emissions that trap heat near the Earth's surface. Four climate scenarios, also called Representative Concentration Pathways (RCPs), are used by climate scientists to project future climate conditions. The four RCPs (RCP 2.6, 4.5, 6, and 8.5) represent various global GHG emissions scenarios through the end of the twenty-first century. In the County, climate change is expected to intensify existing hazards, such as sea level rise, wildfire, and drought, and create new hazards, such as severe weather events and extreme heat events.

Changes in precipitation and weather. The effects of climate change include changes in precipitation patterns. Precipitation levels in the County are expected to remain similar or increase (see Figure 2-17: Projected Annual Precipitation in Marin County), but there will be more years with extreme levels of precipitation, both high and low, and more frequent and more intense droughts.

Figure 2-17 Projected Annual Precipitation in Marin County

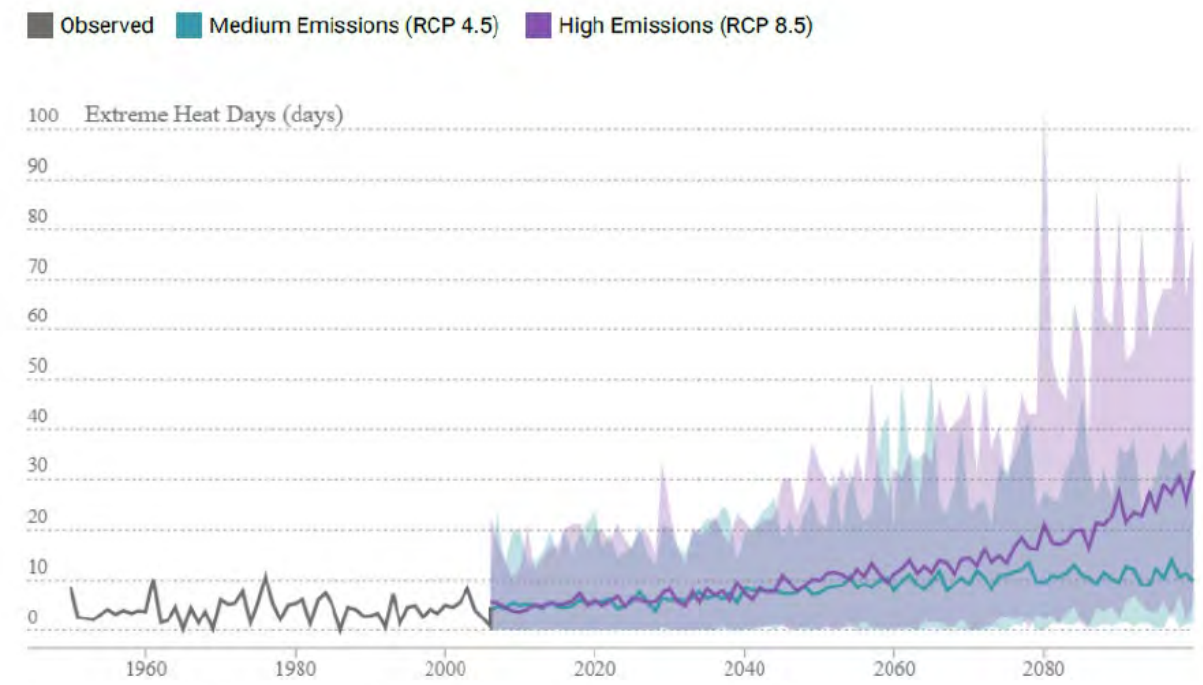


Source: Cal Adapt, Local Climate Change Snapshot for Marin County (2021)

Severe weather includes strong winds, hail, precipitation, and lightning. Climate change will likely increase the frequency, intensity, and duration of storm events in the County, which in turn would increase the potential for hazards related to severe weather.

Rising temperatures. Extreme heat is any time period when the air temperature is well above usual levels. Under a scenario in which GHG emissions peak around 2040, then decline, the average annual number of extreme heat days and warm nights in Marin County could increase to 19 and 27 by 2050, and 18 and 28 by 2099 (see Figure 2-18: Projected Extreme Heat Days in Marin County).

Figure 2-18: Projected Extreme Heat Days in Marin County

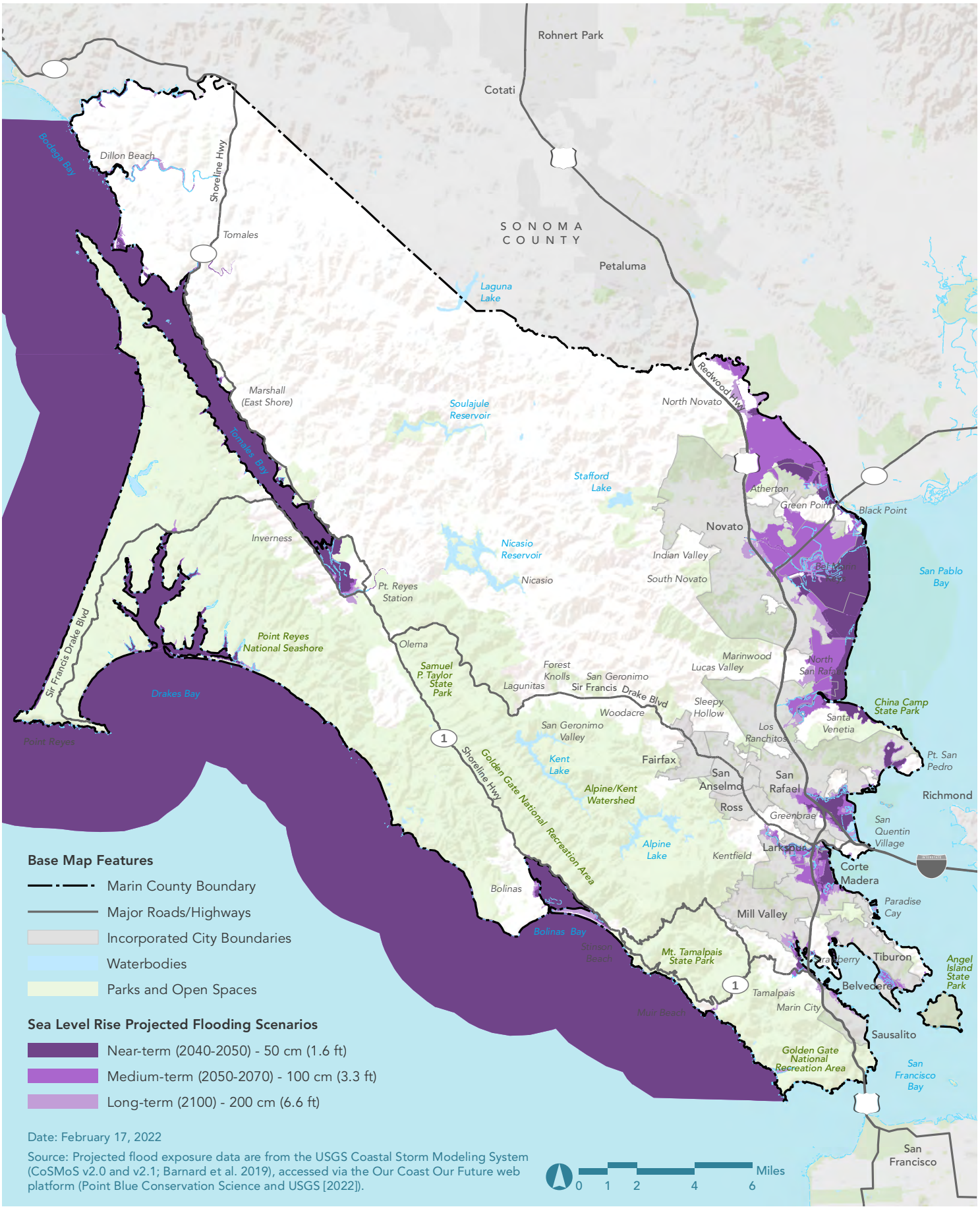


Source: Cal-Adapt, Local Climate Change Snapshot for Marin County (2021)

Changes in Sea Level Rise. Rising sea levels are considered a secondary effect of climate change due to warming ocean temperatures and melting glacial ice sheets into the ocean. The California coast has already seen a rise in sea level of four to eight inches over the 20th century due to climate change. 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 100-year storm events (see Figure 2-19: Sea Level Rise). Given the uncertainty in the magnitude and timing of future sea level rise, planning documents use a scenario-based approach to assess a range of potential sea level rise impacts derived from the U.S. Geologic Survey (USGS) Coastal Storm Modeling System (CoSMoS) which identifies various sea level rise scenarios based on global and regional climate and wave models to produce local hazard projections. Generally consistent with the State Agency Sea-Level Rise Action Plan for California which uses CoSMoS projections, published in 2022 by the Ocean Protection Council, Marin County has chosen to plan for the following Sea Level Rise scenarios, which go beyond the minimums set out by the state:

- 1.6 feet of Sea Level Rise Near-term (2040-2050)
- 3.3 feet of Sea Level Rise Medium-term (2050-2070)
- 6.6 feet of Sea Level Rise Long-term (2100)

Map 2-19
Sea Level Rise



Date: February 17, 2022

Source: Projected flood exposure data are from the USGS Coastal Storm Modeling System (CoSMoS v2.0 and v2.1; Barnard et al. 2019), accessed via the Our Coast Our Future web platform (Point Blue Conservation Science and USGS [2022]).

Disaster Preparedness, Response, and Recovery

The Sheriff's Office of Emergency Services (OES) provides emergency management services for the entire County, including coordinating emergency operations activities among all the various local jurisdictions and developing written guidelines for emergency preparedness, response, recovery, and mitigation to natural/man-made disasters, and technological disasters. OES maintains the Marin Operational Area Emergency Operations Plan (EOP), which establishes the emergency management organization required to mitigate any significant emergency or disaster affecting Marin, and establishes the overall operational concepts associated with Marin County's Emergency Operations Center (EOC) activities.

The Marin County Sheriff's Office, the MWPA, and all Marin municipalities are launching ZoneHaven, a community evacuation interface that allows the public access to real-time status updates and instructions for their evacuation zone and provides County municipalities and fire responders with an evacuation planning application. Agencies in Marin will be able to use ZoneHaven to send evacuation warnings to evacuation zones in Novato, San Rafael, Ross Valley, Southern Marin, and West Marin. Fire Safe Marin and Marin fire agencies, cities and towns, and other partners are working together to develop improved wildfire evacuation maps and messaging for residents of Marin's WUI communities. These FireClear maps show both evacuation zones and evacuation routes by community and are found on the MWPA website: Fire Safe Marin Evacuation Maps.

The MWPA is conducting an Evacuation Ingress-Egress Risk Assessment to create a rating system of roads, presenting a visual risk assessment of the County's roadways at various levels of aggregation (geographic areas, evacuation zones, or other). In addition to the software platform, a report will also present an initial list of risk factors for improvement by area, by risk category, and by responsible agency.

The County curates on its main website a collection of links to sources containing disaster preparedness materials. Ready Marin, a County emergency preparedness website, contains emergency planning checklists, a collection of links to disaster preparedness resources, and registration links for the Marin Community Emergency Response Team (CERT), a community disaster training program, and Get Ready, a one-hour recurring disaster training program facilitated by community volunteers. The Marin County Sheriff's Office provides disaster preparedness materials for families, functional needs populations, organizations, schools, County employees, and pet owners on its Preparedness & Recovery web portal. The Marin County Public Emergency Portal provides information on critical alerts systems, including AlertMarin and Nixle, severe weather alerts and weather radios, disaster preparedness social media feeds, and emergency and evacuation preparedness.

Key Trends and Issues

[Note to Reader: This section is all new text and is not shown with underline.]

Are the rules related to hazards changing?

Changing Regulatory Environment and Approach to Climate Planning

Since California's First Climate Change Assessment in 2005, the state has released several documents and tools to support adaptation planning including the 2020 Adaptation Planning Guide, 2021 California Climate Adaptation Strategy, 2021 Wildfire and Forest Resilience Action Plan, Strategic Plan to Protect California's Coast and Ocean, and Cal-Adapt Tool.

Marin County has incorporated climate adaptation and resilience considerations into the Safety Element as directed by California Government Code § 65302(g) (SB 379). In Marin County, focused steps have been taken to identify threats from, prepare for, and address impacts from hazards, particularly wildfire and sea level rise. While Marin County has made forward progress in planning for climate hazards, continued planning for adaptation and climate change resiliency will require the County to provide appropriate staffing with the necessary skill sets.

Many issues straddle the built environment and natural and managed resources, such as drinking water and flood management infrastructure, and require increased partnership between public and private organizations. Collaboration between outside governments, agencies, and other organizations is essential. Additionally, a new focus has included identifying who and what is affected by climate-related disruptions to determine the vulnerability and adaptive capacity of the people, places, and resources affected. This step is critical in reducing risks from climate impacts, strengthening protections and increasing the resilience of communities and people to respond, recover, and adjust. Already certain parts of the County experience damage and loss on a repetitive basis for hazards such as flooding, storm surges and king tides, and landslides. These hazards will likely occur more frequently in the future. In order to effectively plan for climate hazards and adaptation planning, Marin County should continue collecting, organizing, sharing, and maintaining climate change data for the regular Safety Element updates. Marin County may want to consider a program to consistently map and document repetitive damage from environmental and climate change hazards to inform the public and as a basis for future planning efforts.

How are hazards addressed in a changing climate?

Resiliency Planning

Resilience is the capacity of an individual, community, organization, or natural system to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience. Increasingly, Marin County is viewing land use policies and tools through the lens of climate resilience in order to protect public health and safety.

Achieving a resilient community demands proactive planning. This approach requires systemic solutions involving local and regional agencies and stakeholders, bridging the practice gaps between social justice, urban planning and design, sustainability, disaster recovery, and other areas.

Increasing climate resilience has two important components: planning and investment to address changing climate conditions and building adaptability and flexibility into systems and infrastructure to withstand increasing environmental hazards. Planning, investment, and implementation actions must not only reflect climate resilience as a core goal, but should also result in greater adaptative capacity for the people, communities, economic conditions, and natural systems affected – all of which work together to build resilience.

Resiliency planning differs from disaster recovery by creating a foundation to withstand or prevent loss of life, buildings and infrastructure, or services, while disaster recovery focuses on the restoration of operations after a hazard event. To understand the performance of plans and projects, it is important to develop a set of metrics linked to the management objectives of a plan or investment under current and changing climate conditions. These resilience metrics should align with management objectives for a given plan or project, as well as the overall resilience of that plan or project.

Two examples of planning for resilient communities are the County's desire to establish resiliency hubs and investigating whether the use of microgrids will help communities maintain electricity during Public Safety Power Shutoffs (PSPS).

Community Resilience Hubs

Resilience hubs are community-serving facilities augmented to support residents and coordinate information and resource distribution and services before, during, or after a natural hazard event. They provide the physical space and social safety net for a community in the event of a hazard and its secondary impacts, such as heat waves, wildfire smoke, floods, and earthquakes. Resilience hubs can be designed to operate independent of the electrical grid by relying on solar power and battery storage as a backup source of electricity. These alternative sources of power allow the hubs to provide support to residents who are impacted by the hazards. Resilience hubs can also be used as a space to promote meaningful engagement and programming that empower communities to build resilience to climate hazards, especially for frontline communities that are directly impacted by climate hazards and/or their secondary impacts. Resilience hubs leverage established, trusted, and community-managed facilities that are used year-round as neighborhood centers for community-building activities. Recognized as one tool for neighborhoods and residents, in 2021 the California

state legislature approved millions in funding for community resilience hubs and different agencies and organizations can provide other funding sources.

If set up in this manner, hubs can also help residents respond to extreme weather events through material assistance. For instance, Hubs can provide phone charging during a power outage, provide air conditioning during a heatwave, organize welfare checks on vulnerable neighbors, or deliver other services.

As climate change makes extreme weather worse and less predictable, emergency services are increasingly overstretched. Resilience Hubs are an opportunity to partner with communities from the very beginning to design a space that meets their needs and addresses their priorities.

Microgrids

Microgrids are smaller distributed energy sources that have localized grids that can disconnect from the traditional grid to operate autonomously. Microgrids can become a more flexible and efficient electric grid by integrating renewable energy resources, such as solar. Microgrids can strengthen grid resilience and help mitigate grid disturbances during Public Safety Power Shutoffs (PSPS) due to dangerous wind conditions that may exacerbate wildland fire ignition potential. A microgrid can provide life-saving reprieve in the event of a hazard, especially for sensitive populations that are dependent on electricity for survival.

Are threats from environmental hazards increasing?

Climate Change in Marin

In Marin County, climate change is expected to result in increased temperatures and changes in precipitation patterns. These factors, either individually or in combination, could contribute to an increase in the frequency and intensity of secondary climate effects such as extreme heat events, extreme precipitation and flooding, landslides, wildfires, and sea-level rise. The level of impact from these climate change-related events will vary across the unincorporated county due to physical, social, and economic characteristics.

Climate hazards will also impact Marin's physical assets. Many infrastructure networks (roads, water systems, wastewater systems, electricity grid) in Marin County are vulnerable to climate change hazards, and require expensive and complex improvements to reduce exposure to hazards, and often lack alternative solutions. Key infrastructure, including roads, electrical lines, and communication facilities, traverse areas at risk for hazards, increasing the chance of disruption or impact. Few feasible alternatives exist to adapt key services to climate hazards due to their complexity and the coordination and cost necessary to redesign or relocate the infrastructure. Structures can be retrofitted, upgraded, or elevated to prevent damage from climate hazards, but these solutions can be expensive or infeasible for property owners to complete. Marin's natural and managed resources face threats from extreme heat, drought, sea level rise, and wildfire. The intersection of these hazards, such as heightened fire risk combined with drought, exacerbate the impacts and Marin natural and managed resources have little adaptive capacity to become resilient to heightened impacts from hazards.

Sea Level Rise

Climate change is expected to continue to exacerbate sea level rise in Marin County and across the California coastline. One consequence of rising sea levels is the increased extent, depth, and frequency of coastal flooding as increased base sea levels lessen the distance between sea level and land elevations. Map 2-19 shows the State of California's current sea level rise projections, with which Marin County strives to be consistent: 1.6 feet for the near-term (2040-2050); 3.3 feet for the medium-term (2050-2070); and up to 6.6 feet for the long-term (2100).

Jurisdictions across California have developed local sea level rise projections based on a variety of models and assumptions. In 2022 the Ocean Protection Council published the "State Agency Sea-Level Rise Action Plan for California", which establishes the sea level projections all state agencies will use in their planning and permitting. This document is intended to bring consistency across state agencies for sea level planning and permitting and provide the public with one set of sea level rise projections to incorporate into project plans. Marin County's adopted sea level rise projections are generally consistent with those published by the Ocean Protection Council.

In addition to contributing to increased overland flooding, sea level rise can lead to the intrusion of salt water into groundwater aquifers, causing shallow groundwater tables to rise. This phenomenon can in turn cause ponding of water or flooding in low lying areas with little to no past flooding occurrences; infiltrate underground water, sanitary sewer, water, and storm drain pipelines; increase soil liquefaction risk during seismic events; and remobilize old soil contaminants. This effect of sea level rise has been studied less in coastal communities compared to increased overland flooding.

Marin County has already prepared several reports and plans focusing on coastal and Bayshore line sea level rise and has received grant funding to carry out small, localized sea level rise mitigation projects. An example of these planning efforts is the "Marin Ocean Coast Sea Level Rise Adaptation Report" which presents potential actions to accommodate, protect against, or retreat from the threats of sea level rise and coastal hazards. The objective of this report is to present options for increasing resiliency in existing natural and built assets and systems in the face of increased sea level rise and coastal storms. The County has also prepared the "Adaptation Land Use Planning Guide for Marin County and Local Governments which explores appropriate adaptation land use planning for Marin County's bay shoreline and identifies plans, policies, and projects for adapting to new situations brough on by climate change.

Building on these efforts, Marin County can play a lead role in organizing a county-wide approach to sea level rise planning and identification and funding of projects to protect infrastructure and property from the effects of rising sea levels. Future sea level rise projections show significant disruptions to key infrastructure such as Highways 101, 37, and 1, all owned and operated by Caltrans. Other essential roads will be impacted, along with utility infrastructure, cell phone towers, and many developed communities. Marin County must look toward regional solutions for sea level rise impacts and will likely need to coordinate with other jurisdictions and agencies to establish a regional coalition of stakeholders that can work jointly on solving sea level rise impacts. Some new form of regional governance may need to be established and sources of funding for large mitigation

project must be secured. Long-term regional solutions will require working closely with regional and state agencies and enlisting the assistance of state level elected officials.

How can hazards be avoided?

Wildfire Risk and Regulations

Wildfires across the state have been expanding and become more destructive since 2017, reaching further into suburban and urban areas. The 2020 fire season broke numerous records: five of California's six largest fires in modern history burned at the same time, destroying thousands of buildings, forcing hundreds of thousands of people to flee their homes, and exposing millions of residents to dangerously unhealthy air.

Fire protection responsibilities in Marin County are split across multiple agencies and levels of government, requiring coordination and consistency in management and prevention to achieve wildfire resiliency. The Marin County Fire Department provides structural fire protection to most unincorporated areas of the County, while some rural and all urbanized areas are served by local fire protection districts, volunteer protection, and fire departments. State and local fire protection is provided to wildland areas.

The absence of large fires in Marin in recent history has resulted in open space lands and undeveloped private property with high fuel loading. 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. Marin's unincorporated rural communities are primarily situated within or adjacent to the wildland urban interface, with moderate to dense concentrations of structures. Response times in these communities can present significant challenges to firefighting as emergency fire access and evacuation egress is sometimes limited by narrow, winding roads lined with dense vegetation.

In March 2020, the voters authorized Marin County to levy and assess a special parcel tax for fire protection and prevention services for 10 years. Marin County joined 16 agencies to form the new joint powers authority, the Marin Wildfire Prevention Authority (MWPA). The formation of the MWPA allowed for the expansion of policies and programs identified in the Marin County Multi-Jurisdictional Local Hazard Mitigation Plan and Marin Community Wildfire Protection Plan and considers the Integrated Climate Adaptation and Resilience Program (ICAP), designed to develop a cohesive and coordinated response to the impacts of climate change across the state.

Changing state legislation and regulations, the increasing number and intensity of California wildfires, and new emerging management practices are shaping Marin County's approach to wildfire prevention planning. New focus areas for wildfire safety include:

- Supporting steps communities can take to reduce and manage risk to become better fire-adapted including reducing vegetation around homes and on properties, using fire-resistant materials in building construction, and coordinating alerts, evacuation, and recovery efforts with neighbors.

- Considering equity in wildfire planning, including what communities are most at risk, who needs evacuation assistance, and what resources are available to help communities before, during, and after a wildfire.
- Incorporating climate change tools and adaptations, recognizing that warming temperatures and drought, combined with the expansion of the wildland-urban interface are projected to increase risk.
- Continuing the work to understand the importance of land use patterns relative to changes in climate given that local human development is under direct control and may be the most effective tool for managing future fire risk to human life and infrastructure.
- Increasing safety and resiliency for nonconforming developments that may not meet state and local standards for emergency access, water supply, fire flow, signage, or vegetation clearance.
- Establishing proper evacuation plans, taking into consideration fire and traffic modeling, communications capabilities, and safety of evacuation routes to ensure communities are able to mobilize.
- Updating building code requirements in the WUI and in high and very high fire hazard severity zones to reflect the most current state requirements, including Cal Fire's Fire Safe Regulations for development in the very high hazard severity zones.
- Ensuring post-fire recovery planning is not left out in the development of wildland fire management approaches or planning.

Addressing wildland fire hazard in Marin County is a multi-agency effort that requires community participation and collaboration to ensure Marin's people, structures, and natural resources can be resilient in the face of wildfire.

Are all communities afforded protection from environmental hazards?

Equitable Community Safety Planning and Vulnerable Populations

All residents of Marin County will be impacted by climate change, but the intensity of effects will vary depending on the individual's physical location or proximity to the hazard, available financial resources, and mobility, health, or dependency on other individuals or services. Differences in exposure, sensitivity, and/or adaptive capacity affect an individual's or community's vulnerability to climate change. Common factors that contribute to vulnerability of people and communities include existing inequities, exclusion, or institutionalized racism; poor environmental conditions, lack of access to services, or poor living conditions; individual or surrounding physical states or conditions that increase vulnerability; and lack of investment opportunities. Resilience requires community capacity to plan for, respond to, and recover from stressors and shocks.

Many populations in Marin County are vulnerable to one or more climate change impacts. A Vulnerability Assessment was prepared to support the development of the Safety Element which identifies vulnerable populations in Marin and details how climate change impacts will increase their vulnerability. A scoring system was used to provide a relative indication of each vulnerable

population's degree of impact from a particular climate change hazard and an adaptative capacity score to identify the most at risk populations. The Vulnerability Assessment described that extreme heat, flooding, and wildfire can severely endanger exposed populations, especially those with less capacity to adapt. People who have limited financial resources or who do not own their home are more limited in their emergency response capacity and therefore vulnerable to climate hazards. Language barriers and lower levels of social capital, or the network of relationships an individual or population has, can increase vulnerability. Some communities in Marin may be unable to receive emergency notifications, may not be able to evacuate because of local road conditions, or not able to evacuate quickly due to financial, social, or infrastructure limitations. People with disabilities, seniors, and others who may have mobility challenges face obstacles in preparing for an event and evacuating and thus are considered highly vulnerable to climate hazards. Marin's outdoor workers and houseless populations are highly vulnerable to many different climate hazards due to the extent of their outdoor exposure and lack of alternative options that would reduce exposure to climate hazards.

A resilient community is one where all members community are able to effectively prepare for and recover from acute and chronic climate impacts. Ideally, all community members are equally resilient regardless of income, health, identity, education, or other socioeconomic factors. Removing all disparities is an aspirational goal and may be beyond what a community can achieve, but a resilient community should work together to advocate for the resources they need to prepare for and recover from climate change impacts. This will require sustained relationships with local governments and agencies involved in disaster planning.

New partnerships and on-going cooperation are necessary to support vulnerable communities' resilience to climate impacts. Equitable community safety planning requires increased coordination between jurisdictions, state agencies, and local community groups. It also requires consideration of historic and current inequities and barriers that prevent communities from addressing community resilience and building local capacity to deal with climate change impacts. From avoiding unintended negative impacts from adaptation actions to acknowledging systemic barriers to local capacity, a comprehensive approach to climate justice will require coordinating and sharing best practices across policy areas, jurisdictions, state agencies, and with local community groups. Building a resilient Marin requires increasing the capacity of communities and people to be able to withstand and recover from climate-related disruptions and learning to adapt in the face of this change.

How else can Marin County respond to hazards?

Hazard Recovery Planning

Climate change projections suggest that environmental hazards like drought, extreme heat and weather, and wildfire will likely become more frequent and stronger in Marin County and the broader region. In light of these trends, local jurisdictions want to learn from recent wildfire disaster recovery efforts in Northern California to improve disaster recovery and adopt a framework to support efficient short-term, and sensible long-term recovery after a hazard event.

Emergency planning includes the key areas involved in addressing any threat or hazard: prevention, protection, response, recovery, and mitigation. Integrating the key areas as part of the overall planning effort allows jurisdictions to produce an effective plan and advance overall preparedness. Marin County has several plans addressing the threat of individual hazards including, a local hazard mitigation plan, an emergency operations plan, Municipal Code Chapter 22.124 - Post Disaster Response and Recovery, and a Post Disaster Housing Annex Plan, In the event of a major disaster, the Marin Operational Area would form a Recovery Committee to direct the long-term recovery efforts in accordance with the Marin Operational Area Emergency Operations Plan. A Post-Disaster Housing Task Force would be formed to work in support of the Recovery Committee on all housing issues.

To supplement Marin's existing disaster recovery planning, a comprehensive disaster recovery plan reflecting the most current approaches to recovery planning could provide an overarching, coordinated approach to disaster response planning. Additionally, Chapter 22.124 Post Disaster Response and Recovery of the Municipal code could be updated with prewritten emergency ordinances that facilitate recovery operations, such as those dealing with receipt and dispersal of disaster recovery funds, road closures, debris removal, assistance in securing damaged properties, and plans to work with utility and service providers to reestablish services as quickly as possible, and expedited permitting as well as strategies for including civic leaders and the public in the recovery decision-making process.

Long-term recovery planning should include developing a framework for permitting redevelopment in hazard or sensitive environmental areas, permitting redevelopment of what was existing non-conforming uses, requiring redevelopment to meet all current building and fire code standards, construction of facilities and infrastructure including the systems and services necessary for restoration of all operations functions, and documentation of eligible disaster related costs for reimbursement through aid programs. The recovery plan should recognize that incidents start at the local level and can likely exceed resources and capabilities, federal, state, tribal, regional, and private sector programs and assistance should be identified and integrated into a hazard response.

What Are the Desired Outcomes?

GOAL EHS-1: Equitable Community Safety Planning

Equitable Community Safety Planning. Create equitable processes for executing climate resilience and community safety policies, where justice is central to policy design and implementation.

Policies

EHS-1.1 Safety Planning for Everyone. Prioritize involvement of the vulnerable communities identified in the Marin County Climate Change Vulnerability Assessment in community safety planning. Reduce the exposure to, increase preparedness for, and reduce recovery times from natural and human-caused safety risks for vulnerable communities as well as all populations and communities in Marin County.

EHS-1.2 Community-Led Safety Programs. Put community organizations and civic leaders at the forefront of the community safety planning process.

Why is this important?

Environment: Equity and environmental protection go hand-in-hand. Making environments healthier for people often involves preserving and restoring native habitat and ecosystem elements.

Economy: Community-led safety planning can reach a greater number of residents and help small business owners prepare for and recover quickly after disasters, creating resilient local economies.

Equity: Structuring community safety programs around a social equity and environmental justice framework ensures the most vulnerable communities in Marin are leaders in their own disaster planning and recovery.

How will results be achieved?

Implementing Programs

EHS-1.1.a Develop a Vulnerable Communities Database. Using the County Climate Change Vulnerability Assessment as a starting point, develop a database of the County's vulnerable communities including their economic, gender, age, linguistic, ethnic, and racial characteristics; geographic locations; hazard impact; and adaptive capacity. The vulnerable communities database should include a mapping component. Reference the database when planning and developing resiliency outreach materials, financial assistance programs, and long-range planning initiatives. Update the database periodically and share with emergency response providers.

EHS-1.1.b Develop an Outreach Program for Vulnerable Populations. Develop a climate change preparedness outreach program focused on vulnerable populations that provides information on staying healthy and safe before, during, and after hazardous events. Programming can include educational events, workshops for

school aged children, and providing emergency kits to community members. To ensure success, the County should do the following: (1) account for all of the different factors that can deter people from being included in planning processes, and use approaches appropriate for each community; (2) partner with local community organizations to reach all populations and reduce health inequities; (3) provide materials in multiple languages; (4) provide staff fluent or proficient in the communities' predominant language(s); (5) address lack of access to technology that may prevent or delay emergency notifications; (6) make community engagement and participation easy and available to all residents through multiple media, such as social media, virtual meeting platforms, and in-person events; and (7) make public notices and other important document available in print at local libraries, community centers, or other gathering places. (See also EH-2.1.b)

EHS-1.1.c **Prevent Displacement of Vulnerable People.** Work with community-based organizations to develop and support temporary housing solutions for lower-income immigrants, older adults, and other vulnerable groups during and after an emergency. Provide priority access to housing developed for community residents and those who have been displaced following disasters.

EHS-1.1.d **Provide Financial Assistance.** Establish and fund an ongoing disaster preparedness and recovery financial aid program to ease the financial burden of response and recovery on vulnerable communities. Explore regional, state, and federal funding mechanisms to support the financial aid program.

EHS-1.1.e **Assist with Physical Evacuation.** Improve notification and tracking systems to ensure all known individuals who have difficulty physically evacuating are accounted for during and following disasters.

EHS-1.2.a **Partner with Local Leaders.** Identify, initiate, and formalize partnerships with community organizations and leaders in vulnerable communities to ensure that local residents can make significant contributions to planning processes. Build relationships with community-based organizations to improve trust and communication between local agencies and vulnerable communities, which may experience distrust of government authorities.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[1] will be dependent upon the availability of adequate funding and staff resources.

[Note to Reader: Program Implementation Tables were moved from the end of Section 2.6 Environmental Hazards in the CWP to be included at the end of each goal. Table text is all new and is not shown with underline.]

Figure 2-20: Goal EHS-1. Equitable Community Safety Planning, Program Implementation Table

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-1.1.a Develop a Vulnerable Communities Database	CDA	Existing Budget	High	Short-term
EHS-1.1.b Develop an Outreach Program for Vulnerable Populations.	CDA, OES, Fire Agencies	Existing Budget	High	Ongoing
EHS-1.1.c Prevent Displacement of Vulnerable People	County partnerships	Existing Budget & Grants	High	Ongoing
EHS-1.1.d Provide Financial Assistance	County Partnerships	Grants	Medium	Ongoing
EHS-1.1.e Assist with Physical Evacuation	OES, Fire Agencies	Existing Budget & Grants	Medium	Ongoing
EHS-1.2.a Partner with Local Leaders	CDA, OES, Fire Agencies	Existing Budget	High	Ongoing

[1] Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (~~existing~~ programs ~~already in progress~~ whose implementation is expected to continue into the foreseeable future).

~~**Goal EHS-1: Hazard Awareness**~~

What Are the Desired Outcomes?

GOAL EHS-2: Disaster Preparedness, Response, and Recovery

[Note to Reader: This Goal incorporates Goal 1: Hazard Awareness from the existing CWP Section 2.6 Environmental Hazards. New hazard awareness policies and language are shown in underline while the existing Hazard Awareness policies in the CWP moved here are not.]

Disaster Preparedness, Response, and Recovery. Support continuing public awareness of hazards, including avoidance, disaster preparedness, and emergency response procedures. Ensure readiness in and after emergency situations and create an effective evacuation route network.

Policies

EHS 2.1 **Enhance Public Awareness.** Make hazard studies, data, maps, services, and related information more accessible to residents and include more robust and targeted outreach in vulnerable communities.

EHS 2.2 **Improve Information Base.** Support scientific studies and other technical planning efforts that increase and refine the body of knowledge regarding hazardous conditions in Marin County.

EHS 2.3 **Disaster Readiness.** Maintain a level of preparedness to respond to emergency situations that will save lives, protect property, and facilitate recovery with minimal disruption.

EHS 2.4 **Effective Emergency Access and Evacuation.** Ensure that first responders have adequate emergency access routes and that County residents, businesses, workers, and visitors can effectively evacuate during or after a disaster.

EHS 2.5 **Adequate Services.** Improve existing and increase future capacity of critical services and infrastructure.

Why is this important?

Environment: Expanded knowledge about hazards can protect the local environment ~~and can improve~~ improving the way in which environmental resources are managed as climate change stressors exacerbate hazards and damage environmental resources and require a greater allocation of resources for conservation activities. Considering environmental ramifications in the disaster preparedness and evacuation planning process contributes to ecologically sound practices that are compliant with relevant environmental regulations.

Economy: Effective disaster preparedness and recovery planning helps institutions, communities, and local economies "bounce back" from disaster events. Clearly understanding hazard risks, projected impacts, and potential mitigating steps is necessary for community members to adapt their businesses, investments, and policy decisions.

Equity: Hazard events have disproportionate effects on vulnerable individuals and communities. Community members, especially those within a vulnerable population group, may be unaware of the climate-related effects that may be harmful to their community, or how to stay safe during hazardous events. Community and civic leaders should have leading roles in disaster preparedness and recovery planning and programs to ensure vulnerable populations are not left behind during or after disasters.

How will results be achieved?

Implementing Programs

EHS-2.1.a **Distribute Maps.** ~~Prepare~~ Update regularly and make available to the public maps depicting evacuation routes and areas prone to environmental hazards.

EHS-2.1.b **Develop an Inclusive Public Outreach and Engagement Strategy.** Collaborate with local, regional, state, and federal partners to develop a community-wide outreach program to educate a diverse community on how to prepare and recover from climate change effects Sponsor and support education programs pertaining to emergency/disaster preparedness and response protocols and procedures. Work to fill gaps in local information to ensure information is useful and able to be implemented. Materials should be developed in multiple languages and in several formats to reach all residents. Distribute information about emergency preparedness to residents, community groups, schools, religious institutions, transient occupancy establishments, and business associations. Include instruction on ZoneHaven and evacuation zones in educational materials. (See also EH-1.1b)

EHS-2.1.c **Promote Awareness of Risks to Historic Resources.** Educate community members about the climate risks to historic, cultural, and tribal cultural resources, and the need to safeguard these cultural resources in partnership with tribal nations and community-based organizations.

EHS-2.2.a **Improve Hazard Information.** Continue to improve available hazard information and knowledge base. Track changing hazard risk and impacts and identify gaps in hazard information and mapping. Support scientific study of hazard potential in Marin, including by providing investigators with access to public land and facilitating access to other areas.

EHS-2.2.b **Document Areas Experiencing Repeated Damage from Hazards** For all types of environmental and climate change hazards, consistently map and track areas experiencing repeated damage from hazard events as a basis of informing the public and for future planning efforts

EHS 2.3.a **Update the Emergency Recovery Plan.** Update the County's emergency recovery plan, which addresses the steps that will be taken when an emergency situation occurs and during the immediate aftermath. Incorporate a framework for short-term immediate assistance for residents who have lost housing and access to resources and long-term housing re-construction plans, re-construction of facilities

and infrastructure, including those essential for critical medical services and utility services, and aid-based reimbursement for eligible disaster-related costs. Identify federal, state, tribal, regional, and private sector programs and assistance to supplement local disaster response efforts. Integrate the MCM LHMP mitigation actions and EOP, where relevant, into the Emergency Recovery Plan.

EHS-2.3.b **Plan for Recovery Permitting.** Plan for a recovery permit center that will be established following a large-scale disaster. The plan or framework will identify which department and/or staff will lead the recovery permitting process, what types of permit applications would be streamlined, and anticipated staffing levels (including contracted services), funds, and time frames for review. Identify zones, overlays, and specific or community plan areas where rebuilding could be subject to restrictive or subjective requirements and identify preliminary strategies for evaluating applications.

EHS-2.3.c **Support Post-Disaster Housing Affordability.** Develop a community planning process to support rebuilding of affordable housing after a disaster, adopt policies to support the replacement of affordable housing units that have been damaged or demolished, and prioritize the deployment of interim housing in vulnerable communities. Work to develop several funding sources to support implementation of the process.

EHS-2.3.d **Support Community-Led Response and Neighborhood Preparedness.** Improve strategies to identify and include civic leaders and the public in the disaster recovery decision-making process and implementation of post-disaster recovery programs. Identify a county designee to collaborate with the community and assist in developing the community preparedness and response strategies. Support community and neighborhood efforts in developing localized emergency response and preparedness plans by providing guidance and hazard data.

EHS-2.3.e **Provide and Support Emergency Preparedness Training.** ~~Support the activities of Local Disaster Councils and fire departments in offering community emergency response training courses.~~ Provide and support on-going disaster preparedness and hazard awareness training to all County employees, other responding agencies, and Local Disaster Councils. Ensure training occurs regularly, such as every three years, and includes emergency response approaches to vulnerable populations that cannot respond to a disaster without assistance.

EHS-2.3.f **Encourage Road Improvements.** Reduce regulatory impediments to road construction, widening, and other improvements by amending relevant sections of Marin County Code Titles 22, 23, and 24 to eliminate discretionary permit requirements and replace them with ministerial review to ensure that both public and private roads comply with codified engineering standards.

EHS-2.4.a **Maintain and Improve Disaster and Emergency Response Notification System.** Continue to maintain and refine the existing Alert Marin system for disaster and

emergency response notifications. Work to identify and close gaps in the ability of all residents to receive disaster and emergency response notifications and information, such as those without telecommunication devices or internet access.

EHS-2.4.b **Adopt Proactive Preparedness.** Update disaster preparedness and response plans, regulations, and programs periodically to respond to new hazard data and changing hazard conditions.

EHS-2.4.c **Identify and Improve Deficient Evacuation Routes.** Implement findings of the Marin Wildfire Protection Authority Evacuation Ingress-Egress Risk Assessment. Use the visual risk assessment and risk factors to identify and prioritize existing deficient evacuation routes. Improve evacuation routes based on the prioritization ranking, but also in consideration of improvements required for a transportation network which is resilient to flooding and inundation from sea level rise.

EHS-2.4.d **Create New Evacuation Routes.** Identify and construct additional local evacuation routes in areas of high hazard concern or limited mobility.

EHS-2.4.e **Ensure Access to New Development.** Require new development to include adequate roadway ingress/egress for emergency access and evacuation routes.

EHS-2.5.a **Assess Critical Services Capacity.** Conduct an assessment of existing critical services for adequate capacity considering the projected scale of new development and climate change-induced increases in the severity of hazards. Use the service capacity assessment to create or update minimum standards for existing and future development to meet current and future anticipated demands for infrastructure (e.g., water, sewer, roads), privately provided services (e.g., telecommunications, gas, electricity), and County provided services (e.g., police, fire). Purchase permanent and/or portable generators for critical facilities, infrastructure, and services that lack adequate backup power.

EHS-2.5.b **Explore Creation of New Evacuation Centers.** Assess the potential for existing community facilities, including but not limited to libraries, churches/places of worship, schools, community and recreation centers, nonprofits, and local businesses, to serve as evacuation centers. Evacuation centers should be outfitted to provide material assistance, phone charging during a power outage, air conditioning during a heatwave, organize welfare checks on vulnerable neighbors, or deliver other services. Consider leveraging potential community resiliency hubs to provide evacuation center services and equipment when standalone evacuation centers are infeasible.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[2] will be dependent upon the availability of adequate funding and staff resources.

[Note to Reader: Program Implementation Tables were moved from the end of Section 2.6 Environmental Hazards in the CWP to be included at the end of each goal. Table text is all new and is not shown with underline.]

Figure 2-21: Goal EHS-2. Disaster Preparedness, Response, & Recovery Program Implementation Table

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-2.1.a Distribute Maps	Fire Agencies, IST, OES, CDA	Existing Budget	Medium	Ongoing
EHS-2.1.b Develop an Inclusive Public Outreach and Engagement Strategy	CDA, OES, Fire Agencies	Existing Budget	High	Ongoing
EHS-2.1.c Promote Awareness of Risks to Historic Resources	CDA	Existing	Low	Med-Term
EHS-2.2.a Improve Hazard Information	CDA	Existing	Med	Ongoing
EHS-2.2.b Document Areas Experiencing Repeated Damage from Hazards	CDA, DPW, OES	Will require additional funding	Med	Ongoing
EHS-2.3.a Update the Emergency Recovery Plan	OES	Will require additional funding	High	Short-term
EHS-2.3.b Plan for Recovery Permitting	CDA, DPW	Existing and may require additional funding	Med	Med-term
EHS-2.3.c Support Post-Disaster Housing Affordability	CDA, OES, HHS	Will require additional funding	High	Med-Term
EHS-2.3.d Support Community-Led Response and Neighborhood Preparedness	Fire Agencies, OES	Existing	High	Ongoing
EHS 2.3.e Provide and Support Emergency Preparedness Training	OES	Existing	High	Ongoing
EHS-2.3.f Encourage Road Improvements	CDA, DPW	Existing	High	Short-Term

[2] Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (~~existing~~ programs ~~already in progress~~ whose implementation is expected to continue into the foreseeable future).

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-2.4.a Maintain and Improve Disaster and Emergency Response Notifications System(s)	OES, Utilities	Existing	High	Med-Term
EHS-2.4.b Identify and Improve Deficient Evacuation Routes	Fire Agencies, DPW	Requires additional funding	High	Long-Term
EHS-2.4.c Create New Evacuation Routes	Fire Agencies, DPW	Requires additional funding	High	Long-Term
EHS-2.4.d Ensure Access to New Development	CDA, DPW	Existing	High	Ongoing
EHS-2.5.a Assess Critical Services Capacity	OES, Fire Agencies	Existing and may require additional funding	Med	Long-Term
EHS-2.5.b Explore Creation of New Evacuation Centers	OES, Fire Agencies, DPW	Existing	Med	Med-Term

What Are the Desired Outcomes?

Goal EHS-~~2~~3: Safety from Geologic and Seismic Hazards

[Note to Reader: This section largely remains the same from the current CWP with minor modifications. The Implementing Programs have been reorganized to correspond better to the organization of the Policies.]

Safety from Seismic and Geologic Hazards. ~~Protect people and property from risks associated with seismic activity and geologic conditions.~~ Minimize the loss of life, injury, and property damage due to seismic and related geological hazards.

Policies

EH-~~2~~3.1 **Avoid Geologic Hazards ~~Areas~~.** Require development to avoid or minimize potential geologic hazards from earthquakes and unstable ground conditions.

EH-~~2~~3.2 **Comply with the Alquist-Priolo Act.** Continue to implement and enforce the Alquist-Priolo Earthquake Fault Zoning Act.

EH-~~2~~3.3 **Ensure Seismic Safety of New and Existing Structures.** Design and construct all new buildings and substantial remodeling projects to be earthquake resistant. The minimum level of design necessary would be in accordance with seismic provisions and criteria contained in the most recent version of the State and County Codes. Construction would require effective oversight and enforcement to ensure adherence to the earthquake design criteria.

EH-~~2~~3.4 **Protect Coastal Areas from Tsunamis.** Refer to tsunami wave run-up and inundation maps when reviewing proposed development along coastal areas of Marin County.

Why is this important?

~~Lives can be saved and property protected when buildings are located safely.~~

Environment: Well-planned development protects the environment and minimizes impacts to natural systems when structures or facilities designed to protect against the anticipated hazard.

Economy: Careful planning in the placement and construction of ~~buildings~~ development can help ensure safety during a hazardous event and provide for a faster recovery. This lessens the severity and duration of the economic impact caused by a seismic event and/or unpredictable geologic conditions.

Equity: The future health and resiliency ~~prosperity~~ of the community depend on our ability to cope with a major hazardous event. Ensuring that all community members reside in buildings resistant to seismic and geologic hazards is of the utmost importance. ~~Earthquakes on the San Andreas and Hayward-Rodgers Creek fault systems could significantly affect Marin.~~

How will results be achieved?

Implementing Programs

EHS-~~2~~3.1.a **Map Geologic Hazard Areas.** Update Geologic Hazard Area maps as updated information becomes available. These maps should be used to determine the need for geologic and geotechnical reports for proposed development or redevelopment.

EHS-~~2~~3.1.b **Require Geotechnical Reports.** Continue to require any applicant for land division, master plan, development approval, grading, or new construction in a geologic hazard area to submit a geotechnical report prepared by a State-certified Engineering Geologist or a Registered Geotechnical Engineer that: evaluates soil, slope, and other geologic hazard conditions; commits to appropriate and comprehensive mitigation measures sufficient to reduce risks to acceptable levels, including post-construction site monitoring, if applicable; addresses the impact of the project on adjacent lands, and potential impacts of offsite conditions; and meets the requirements of other agency regulations with jurisdiction in the hazard area, such as BCDC requirements for the safety of fills consistent with the Bay Plan.

EHS-~~2~~3.2.a **Prohibit Structures in Active Fault Traces.** Prohibit placement of specified types of structures intended for human occupancy within 50 feet of an active fault trace in compliance with the Alquist-Priolo Earthquake Fault Zoning Act.

EHS-~~2~~3.2.b **Limit Building Sites in Alquist-Priolo Zones.** Prohibit new building sites in any Alquist-Priolo Earthquake Fault Zone, unless a geotechnical report prepared by a professional geologist establishes that the development will comply with all applicable State and County earthquake standards and regulations.

EHS-~~2~~3.3.a **Avoid Known Landslides Areas.** Continue to prohibit development in landslide areas and on landslide-prone deposits on steep slopes, except where the required geotechnical report indicates that appropriate mitigation measures can stabilize the site for construction.

EH-~~2~~3.3.b **Protect Development from Increased Geologic Hazards.** Plan for and protect development from increased risk of landslide, debris flows, post-fire debris flows, and subsidence resulting from climate change impacts by implementing Stability Report requirements and subsidence evaluation guidelines.

EHS-~~1e~~3.3.c **Improve Soils Information.** Compile and make available drilling log data from geotechnical reports that helps define the hazard potential due to specific soil conditions, such as areas with expansive soils, artificial fill, or bay mud. [Moved from Hazard Awareness, is an existing policy in CWP]

EHS-~~2~~3.3.d **Explore New Guidelines for Rising Groundwater Levels.** Based on sea level rise mapping, explore creating new guidelines requiring geotechnical evaluations for new development within areas subject to sea level rise, to assess and anticipate rising groundwater levels.

EHS-~~2~~3.3.e **Identify Compressible Soil Potential.** Require that geotechnical reports for projects on land underlain by compressible materials (such as fill, bay mud, and marsh or slough areas) delineate locations where settlement will be greatest and subsidence may occur, and recommend site preparation and construction techniques necessary to reduce risk and public liability to an acceptable level.

EHS-~~2~~3.3.f **Require Construction Observation and Certification.** Require any work or construction undertaken to correct slope instability or mitigate other geologic hazard conditions to be supervised and certified by a geotechnical engineer and/or an engineering geologist.

EHS-~~2~~3.3.g **Reliability of Lifelines and Access (Evacuation) Routes.** In cooperation with utility system providers, emergency management agencies, and others, assist in the development of strategies to reduce adverse effects of geologic hazards, especially fault surface rupture and landslides to critical public lifelines, and access (i.e., evacuation) routes in an emergency.

EHS-~~2~~3.3.h **Retrofit County Buildings and Critical Facilities.** Identify and remedy any County-owned structures and critical facilities in need of seismic retrofit or other geotechnical/structural improvement, including eliminating any potentially hazardous features, and/or relocating services if necessary.

EHS-~~2~~3.3.i **Post-Earthquake Damage Assessment.** Undertake immediate damage assessment of essential service buildings and facilities and then other buildings as part of the emergency response planning in response to a damaging earthquake.

EHS-~~2~~3.4.a **Address Tsunami Potential.** Review tsunami wave run-up and inundation maps, ~~when available,~~ along with other applicable information to be considered in coastal planning and development.

EHS-~~2~~3.4.b **~~Make~~ Keep Marin County Tsunami-Ready.** ~~Become a~~ Continue to maintain Marin's status as a National Weather Service TsunamiReady community in order to promote public awareness and community preparedness and facilitate quick recovery in the event of a tsunami.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[3] will be dependent upon the availability of adequate funding and staff resources.

[Note to Reader: Program Implementation Tables were moved from the end of Section 2.6 Environmental Hazards in the CWP to be included at the end of each goal. Table text is all new and is not shown with underline.]

Figure 2-22: Goal EHS-3. Safety from Geologic and Seismic Hazards, Program Implementation Table

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-3.1.a Map Geologic Hazard Areas	CDA	Existing	High	Ongoing
EHS-3.1.b Require Geotechnical Reports	CDA	Existing	High	Ongoing
EHS-3.2.a Prohibit Structures in Active Fault Traces	CDA	Existing	High	Ongoing
EHS-3.2.b Limit Building Sites in Alquist-Priolo Zones	CDA	Existing	High	Ongoing
EHS-3.3.a Avoid Known Landslides Areas	CDA	Existing	High	Ongoing
EHS-3.3.b Protect Development from Increased Geologic Hazards	CDA	Existing	Med	Long-Term
EHS-3.3.c Improve Soils Information	CDA, USGS[4]	Existing & may require additional grants and revenue	Med	Med-Term
EHS-3.3.d Explore New Guidelines for Rising Groundwater Levels	CDA, USGS	Existing & may require additional grants and revenue	Med	Med-Term
EHS-3.3.e Identify Compressible Soil Potential	CDA / USGS	Existing	Med	Long-Term
EHS-3.3.f Require Construction Observation and Certification	CDA	Existing	High	Ongoing
EHS-3.3.g Reliability of Lifelines and Access (Evacuation) Routes.	Fire Agencies & OES	Will require additional funding	High	Ongoing
EHS-3.3.h Retrofit County Buildings and Critical Facilities.	DPW	Will require additional funding	Med	Ongoing
EHS-3.3.i Post-Earthquake Damage Assessment	OES	Will require additional funding	Low	Long-Term

[3] Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (~~existing~~ programs ~~already in progress~~ whose implementation is expected to continue into the foreseeable future).

[4] United States Geologic Survey (USGS)

EHS-3.4.a Address Tsunami Potential	CDA / CNRA[5] / USGS	Existing	Med	Long-Term
EHS-3.4.b Keep Marin County TsunamiReady	OES	Existing	Med	Ongoing

[5] California Natural Resources Agency (CNRA)

What Are the Desired Outcomes?

Goal EHS-~~3~~4 Safety from Flooding. ~~and Inundation~~

Safety from Flooding. Protect people, and property from risks associated with flooding. (Also see the Public Facilities and Water Resources sections.) Minimize the loss of life, injury, and property damage due to flooding hazards.

Policies

EHS-~~3~~4.1 **Follow a Regulatory Approach.** Utilize regulations instead of flood ~~control~~ infrastructure projects whenever possible to minimize losses in areas where flooding is inevitable.

EHS-~~3~~4.2 **Retain Natural Conditions.** Ensure that flow capacity is maintained in stream channels and flood plains, and achieve flood ~~control~~ management using flood plain restoration and biotechnical techniques instead of storm drains, culverts, riprap, and other forms of structural stabilization.

EHS-~~3~~4.3 **Monitor Environmental Change.** Consider cumulative impacts to hydrological conditions, including alterations in drainage patterns and the potential for a rise in sea level, when processing development applications in watersheds with flooding or inundation potential.

EHS-~~3~~4.4 **Consider Flooding from Dam Failure ~~Inundation~~.** Consider flood inundation resulting from upstream dam failures when assessing flood hazards for environmental review and implementing associated programs within the County.

EHS-4.5 **Encourage Modifications or Relocation of Existing Development.** Support and encourage private property owners to either modify, elevate, reinforce, or relocate development in flood-prone areas to account for increased flood extents and depths.

EHS-4.6 **Protect Public Facilities.** Minimize potential damage to essential public facilities due to flooding.

Why is this important?

With increases in sea level due to global warming, flooding is predicted to increase in the future. Locating development in flood-prone areas can expose structures to damage and create risks for inhabitants in the immediate and surrounding areas.

Environment: ~~Prohibiting~~ Approving adaptive, environmentally sensitive development in the floodplain helps preserve valuable habitat, vital groundwater recharge capacity, and other natural systems. Using nature-based flood management solutions restores valuable habitat and protects communities at the same time.

Economy: Significant flooding with associated economic impacts has occurred in portions of Corte Madera, Larkspur, Greenbrae, Ross, San Anselmo, San Rafael, and Novato over the last 50 years.

Flooding has also occurred in Mill Valley, Fairfax, Stinson Beach, Inverness, and Muir Beach. Extensive property damage could be expected in inundated valleys, especially those downstream from major dam/reservoir complexes. Protecting property from future flooding risks contributes to economic stability.

Equity: Limiting development in floodplain and coastal areas contributes to the protection of residents and their property. Ensuring vulnerable communities receive financial assistance to strengthen homes and properties against flood damage is important in an equitable approach to flood risk reduction.

How will results be achieved?

Implementing Programs

EHS-34.1.a Regulate Development in Flood and Inundation Areas. Continue to require all improvements in Bayfront, Floodplain, Tidelands, and Coastal High Hazard Zones to be designed to be more resistant to damage from flooding, tsunamis, seiches, and related water-borne debris, and to be located so that buildings and features such as docks, decking, floats, and vessels would be more resistant to damage.

EHS-34.1.b Update Maps. ~~Annually~~ Periodically review those areas covered by the Countywide Plan that are subject to flooding, identified by floodplain mapping prepared by the Federal Emergency Management Agency (FEMA) or Department of Water Resources, and update Figure 2-13 and other General Plan maps accordingly. Map the combined effects of the FEMA 100-year storm event with sea level rise projections. Periodically review and overlay County zoning maps to show flood, tsunami, and inundation hazard areas along the San Francisco Bay, San Pablo Bay, Tomales Bay, and the Pacific Ocean, the Bayfront Conservation Zone, and the Coastal Zone.

EHS-34.1.c Revise Regulations. Consider expanding the F-1 and F-2 Floodway Districts to include areas of the unincorporated county that lie within primary and secondary floodways, and/or establishing an ordinance that will ensure that land use activities in flood hazard areas will be allowed only in compliance with federal standards.

EHS-34.1.d ~~Maintain Flood Controls~~ Maintain Flood Management Measures. Continue to implement adopted flood ~~control~~ management programs within designated flood zones, including limitations on land use activities in flood hazard areas and through the funding for repair and maintenance of necessary flood ~~control~~ management structures in partnership with local flood zones.

EHS-34.1.e Restrict ~~Design~~ Development in Flood Prone Areas to ~~Avoid~~ Minimize Inundation. Continue to regulate development in Special Flood Hazard areas by applying the County's Floodplain Management Ordinance, Federal Emergency Management Agency regulations, and environmental review pursuant to the California Environmental Quality Act (CEQA). Rather than explicitly restrict development in tsunami and flood hazard areas, unless a site is repeatedly and

significantly affected by flooding, require through amendments to County codes, new development to be designed, elevated, sited, and/or strengthened against flood inundation. Flood adaptation measures should, at a minimum, be consistent with FEMA regulations to reduce flood risk to residential buildings. Where possible, use nature-based flood adaptation measures, such as widening natural flood plains, creating constructed dunes, protecting and expanding wetlands, and creating new and expanding existing urban green spaces.

EHS-~~3~~4.1.f **Continue Compliance under the National Flood Insurance Program (NFIP).** Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements:

- Enforce the flood damage prevention ordinance.
- Participate in floodplain identification and mapping updates.
- Provide public assistance/information on floodplain requirements and impacts.

EHS-~~3~~4.1.g **Facilitate Community Coordination Around Shoreline Adaptation.** Develop a framework for incentivizing landowners to work together on shoreline protection projects and facilitating public communication and coordination around shoreline protection in a process that follows Safety Element policies and programs.

EHS-~~3~~4.2.a **Retain Ponding Areas.** Maintain publicly controlled flood ponding areas in a natural state for flood ~~control~~ management, and continue to promote compatible uses in ponding areas, such as agriculture, open space, and recreation.

EHS-~~3~~4.3.a **Require Hydrologic, Hydraulic, and Geomorphic Studies.** Continue to require submission of detailed hydrologic and ~~geologic~~ geomorphic studies for any proposed development that could increase sedimentation of a watercourse or alter natural drainage patterns. Amend the Development Code to include findings to continue to regulate development in flood prone areas to ensure public health and safety and to preserve the hydraulic and geomorphic integrity of the stream system and associated habitat.

EHS-~~3~~4.3.b **Assess the Cumulative Impacts of Development in Watersheds on Flood Prone Areas.** Consider the effects of upstream development, including impervious surfaces, alteration of drainage patterns, reduction of vegetation, increased sedimentation, and others, on the potential for flooding in low-lying areas. Consider watershed studies to gather detailed information.

~~EHS-3~~4.3.c ~~**Develop Watershed Management and Monitoring Plans.** Develop watershed-specific, integrated watershed management and monitoring plans that include development guidelines, natural flood mitigation measures, biomechanical technologies, and the enhancement of hydrological and ecological processes. The~~

~~guiding principles of the watershed plans shall equally consider habitat and species protection and monitoring as well as the protection of human life and property.~~

EHS-~~3~~4.4.a **Maintain ~~Update~~ Current Dam ~~Inundation~~ Failure Maps.** ~~Update and make~~ Maintain up-to-date public inundation maps for dam/reservoir complexes where downstream valleys are inhabited and the risk of loss of life and extensive property damage is significant. Coordinate with water districts to obtain the most current information from their dam safety programs and reports submitted to the State Division of Safety of Dams.

EHS-~~3~~4.4.b **Review and Inspect Small Dams.** Maintain permit authority over and continue to oversee construction of dams too small to be regulated by the State or federal government.

~~EHS-34.k~~ **~~Anticipate Climate Change Impacts, Including Sea Level Rise.~~** ~~Recent predictions of sea level rise for the San Francisco Bay region by BCDC and USGS based on climate models and hydrodynamic modeling of the San Francisco Bay Estuary Institute indicate 16 inches of rise by mid-century and 55 inches by 2100 Recent guidance from the California Coastal Commission instructs local coastal resilience planners to use sea level rise targets based on the best available science and a minimum of 3.5 feet of SLR by 2050. Cooperate with the California Coastal Commission, U.S. Geological Survey, the San Francisco Bay Conservation and Development Commission, the California Landscape Cooperative's Climate Commons project and other monitoring agencies to track bay and ocean levels and share baseline topographic and resource data obtained by the County in implementing its own projects to enhance hydrodynamic and ecosystem modeling efforts and assessment of regional climate change impacts. Use official estimates for mean sea level rise and topographic data for environmental review. Environmental review for development applications and County infrastructure shall incorporate official mid-century sea level rise estimates, California Coastal Commission mid-century sea level rise projections, and require adaptive strategies for end-of-century sea level rise for any such project with expected life times beyond 2050.~~

~~EHS-34.l~~ **~~Limit Seawall Barriers.~~** ~~Limit repair, replacement, or construction of coastal sea walls and erosion barriers consistent with Local Coastal Program requirements, and as demonstrated to be necessary to protect persons and properties from rising sea level.~~

~~EHS-34.n~~ **~~Plan for Climate Change Impacts, Including Sea Level Rise.~~** ~~Consider sea level rise in future countywide and community plan efforts. Apply for membership in the National Flood Insurance Program's (NFIP) Community Rating System (CRS), and as appropriate through revisions to the Marin County Code, obtain reductions in flood insurance rates offered by the NFIP to community residents. Cooperate with FEMA in its efforts to comply with recent congressional mandates to incorporate predictions of sea level rise in its Flood Insurance Studies and FIRM. For development of watershed management plans and flood control~~

~~infrastructure consider official mid-century and end-of-century sea level rise estimates in hydraulic/hydrodynamic modeling, as well as climate adaptation strategies, including: avoidance/planned retreat, enhance levees, setback levees to accommodate habitat transition zones, buffer zones and beaches, expanded tidal prisms for enhanced natural scouring of channel sediments, raising and flood proofing structure, provision for additional floodwater pumping stations, and inland detention basin to reduce riverine peak discharges. Participate in the Bay Area Climate & Energy Resilience Project and its March 2013 Proposed 12-Month Action Plan, developed by the Bay Area Joint Policy Committee of the Association of Bay Area Governments. Revise the Marin County Hydrology manual to, at a minimum, incorporate use of updated rainfall frequency data from NOAA's Atlas 14 Volume 6, Vers. 2.1 California (rev. 2012).~~

EHS-4.5.a **Provide Flood Reduction Information Resources.** Provide private property owners with resources and recommendations for reinforcing development against flooding. Advocate for a hierarchy of flood adaptation measures beginning with the most preferred strategies, as follows: 1. nature-based solutions; 2. measures to accommodate flooding, such as reinforced or raised ground level floors; 3. a mix of soft (i.e., nature-based) and hard engineering strategies, 4. strictly hard engineering strategies (i.e., structural stabilization).

EHS-4.5.b **Participate in Incentive-Based Programs.** Continue participation in incentive-based programs such as the Community Rating System, which encourages community floodplain management practices that exceed NFIP minimum requirements, and StormReady, a voluntary NOAA National Weather Service program focusing on community communication and safety skills.

EHS-~~3~~4.5.c **Alert Property Owners.** Notify owners of property in areas with inundation or flooding potential regarding those hazards when they seek development review or other related County services.

EHS-~~3~~4.6.a ~~**Locate Critical Facilities Safely.** Amend the Development Code to prohibit placement of public safety structures within tsunami inundation or flood-prone areas.~~ **Protect and Ensure Continued Operation of Critical Public Facilities.** Locate new essential critical facilities, including hospitals and healthcare facilities, emergency shelters, fire stations, emergency command centers, emergency communications facilities, and utility infrastructure outside tsunami and flood hazard areas. If a critical public facility must be located in a tsunami and flood hazard area, ensure the facility is designed to withstand and remain operational under anticipated future flooding conditions. Where existing critical public facilities are at risk due to flooding, require on- and off-site flood risk adaptation measures to reduce potential losses. Flood risk adaptation measures may include but are not limited to raising electrical and gas systems, installing watertight doors, installing flood shields for windows and entrances, constructing flood barriers or floodwalls,

and raising the ground floor of the facility. Consider alternate, less hazard prone locations for lost structures and facilities.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[6] will be dependent upon the availability of adequate funding and staff resources.

[Note to Reader: Program Implementation Tables were moved from the end of Section 2.6 Environmental Hazards in the CWP to be included at the end of each goal. Table text is all new and is not shown with underline.]

Figure 2-23: Goal EHS-4. Safety from Flooding, Program Implementation Table

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-4.1.a Regulate Development in Flood and Inundation Areas	CDA, DPW, OES	Existing budget, Fees	High	Ongoing
EHS-4.1.b Update Maps	CDA, DPW	Existing budget	Med	Med-Term
EHS-4.1.c Revise Regulations	CDA, DPW	Existing & may require additional grants or revenue	Med	Med-Term
EHS-4.1.d Maintain Flood Management Measures	Flood Control Zones	Existing & may require additional grants or revenue	High	Ongoing
EHS-4.1.e Restrict Development in Flood Prone Areas to Minimize Inundation	CDA, DPW	Existing budget	High	Ongoing
EHS-4.1.f Continue Compliance under the National Flood Insurance Program (NFIP)	DPW	Existing budget	High	Ongoing
EHS-4.1.g Facilitate Community Coordination Around Shoreline Adaptation	CDA, DPW	Existing & may require additional grants or revenue	High	Med-Term
EHS-4.2.a Retain Ponding Areas	DPW	Will require	High	Ongoing

[6] Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (~~existing~~ programs ~~already in progress~~ whose implementation is expected to continue into the foreseeable future).

Program	Responsibility	Potential Funding	Priority	Time Frame
		additional grants or revenue		
EHS-4.3.a Require Hydrologic, Hydraulic, and Geomorphic Studies	CDA, DPW	Existing budget	High	Ongoing
EHS-4.3.b Assess the Cumulative Impacts of Development in Watersheds on Flood Prone Areas	CDA, DPW	Will require additional grants or revenue	Med	Long-Term
EHS-4.4.a Maintain Current Dam Failure Maps	CDA, OES	Existing budget	Med	Med-Term
EHS-4.4.b Review and Inspect Small Dams	CDA, DPW	Existing budget	Low	Ongoing
EHS-4.5.a Provide Flood Reduction Information Resources	CDA, DPW	Existing budget	Med	Ongoing
EHS-4.5.b Participate in Incentive-Based Programs	DPW, OES	Existing budget	Med	Ongoing
EHS-4.5.c Alert Property Owners	CDA	Existing budget & may require additional grants or revenue	High	Ongoing
EHS-4.6.a Protect and Ensure Continued Operation of Critical Public Facilities	DPW	Existing budget & may require additional grants or revenue	High	Short-Term

What Are the Desired Outcomes?

Goal EHS-5: Safety from Wildfire

Safety from ~~Fires~~ Wildfire. Protect people and property from hazards associated with wildland and structure fires.

Policies

EH-5.~~3~~ 1 **~~Adopt and~~ i Implement a Regional Fire Management Plan with Marin Fire Agencies: the Marin Wildfire Prevention Authority, County Fire, and FireSAFE Marin.** Develop a collaborative, proactive approach to manage wildfire losses by identifying hazard risks and enacting effective mitigation strategies.

EH-5.2 **Ensure Adequate Fire Protection.** Ensure that adequate fire protection, including adequate evacuation routes, is provided in new development and when modifications are made to existing development.

EH-5.~~5~~3 **Regulate Land Uses to Protect from Wildland Fires.** Use land use regulations, including but not limited to subdivision approvals and denials and permits for remodeling existing structures, as means of protecting people and property from hazards associated with wildland fires.

EH-5.~~1~~4 **Limit Risks to Structures.** Ensure that adequate fire ~~protection~~ protective features are in place in new development and when modifications are made to existing structures.

EH-5.~~2~~5 **Remove Hazardous Vegetation.** Abate the buildup of vegetation around existing structures or on vacant properties that could help fuel fires. (See also Natural Systems and Agriculture Element, BIO-1.4, Support Vegetation and Wildlife Disease Management Programs).

~~**EH-4.4 Ensure Adequate Emergency Response.** Ensure that there is an adequate number of trained and certified emergency medical technicians to address the increase in medical demand.~~

Why is this important?

Fire plays a critical role in California's diverse ecology and protecting people and property from fires will be a continuing challenge.

Environment: Wildfires and especially those that involve structures produce vast amounts of greenhouse gases, and release toxic chemicals to the atmosphere, soils, and waterways. Record-breaking fires in recent years have altered California's landscape: destroying vegetation, displacing wildlife, destroying thousands of buildings, forcing hundreds of thousands of people to flee their homes, and exposing millions of residents to dangerously unhealthy air. Controlling wildfires will protect the environment from these harmful effects. ~~Using measures such as controlled burning to~~

~~remove vegetation that has built up because of historic fire suppression efforts improves firefighting effectiveness and can help restore environmental balance in the county.~~

Economy: Wildfires have been expanding and are more destructive; reaching further into suburban and urban areas. In Northern California, wildfires have damaged thousands of homes, businesses, and utility infrastructure regionally in the past five years and burned thousands of acres of agricultural and open space lands reducing economic vitality and tax revenue generation of the affected communities and causing loss of tax revenue to the County. ~~Fire costs can soar to millions of dollars a day from suppression costs, destruction of homes, loss of home-based businesses, damage to utilities, and impacts on recreation areas. Minimizing flammable vegetation can reduce potential economic impact and help speed recovery.~~

Equity: Safety from wildfire is especially important for vulnerable populations as the ability to cope with the impacts of evacuation and displacement, and subsequent building repairs or reconstruction is disproportionately low. ~~Marin County has numerous structures located within the wildland-urban interface. Homes with wood siding, wood decks, and wood shingled roofs are at extreme risk from a wildland fire. Designing structures to be fire resistant protects all occupants as well as neighboring areas by limiting fuel available to a spreading fire.~~

How will results be achieved?

Implementing Programs

EHS-5.1.a **Collaborate with Marin Fire Agencies on Implementing the Community Wildfire Protection Plan.** Continue to collaborate with Marin Wildfire Prevention Authority and local fire agencies on implementing the Marin Community Wildfire Protection Plan programs and encourage Marin cities and towns to also support its recommendations.

EHS-~~4.l~~ 5.1.b **Continue ~~FIRESafe Marin Program~~ Wildfire Education.** Continue the various education efforts and safety projects sponsored by ~~FIRESafe Marin~~ Marin Fire Agencies and implemented through each neighborhood. Education and outreach efforts should include all vulnerable populations, be specific to each community, and focus on community led safety programs. Encourage community participation in programs such as Firewise USA that can help neighbors get organized, find direction, and take action to increase preparedness and reduce ignition risk of homes and structures.

EHS-~~4.a~~ 5.1.c **Provide Information About Fire Hazards.** Work with Marin Fire Agencies, ~~FIRESafe Marin, the Marin County Fire Department,~~ and other local, regional, and State agencies to make maps of areas subject to wildland fire hazard~~, publicly available, and to provide~~ public information and provide publicly available and accessible educational programs regarding fire hazards, and techniques for reducing susceptibility to fire damage and identifying areas of low water pressure.

EHS-5.1.d **Identify Areas with Insufficient Evacuation Opportunities.** Continue to collaborate with Marin Fire Agencies in the identification and mapping of areas with only one

point of ingress or egress and roads that do not meet current emergency access and evacuation standards and the preparation of a program that prioritizes corrective actions.

EHS-5.1.e **Commit Funding for Evacuation Safety.** Commit funding for projects identified by the Marin Fire Agencies, and, in particular, the Marin Wildfire Prevention Authority that enhance evacuation safety, spanning road improvement, signage, and notification systems.

EHS-5.1.f **Monitoring State Requirements for Evacuation Routes**. Track development of minimum standards for roads and evacuation routes and seek to adopt the standard. Apply any state standards for evacuation routes to new development.

EHS-~~4.m~~ 5.1.g Continue to Use Technology to Promote Fire Safety. Continue to apply computer technology, such as Geographic Information Systems, vegetation inventory, evacuation planning and air movement modeling programs, to identify, analyze, and plan for potential fire hazards, including mapping and data analysis for conformance with evolving State standards. Notify affected parties of any relevant findings and make the information available to the public.

EHS-5.2.a **Assess and Project Future Fire Protection Needs.** Conduct an assessment of current fire protection capabilities and project the future needs for fire protection, considering future changes in housing, vegetation, access, and water supply. Ensure all communities in unincorporated Marin have adequate fire protection, emergency vehicle access, and adequate water supply for peak fire flow requirements.

EHS-5.2.b **Consider Development Impacts to Fire Service.** Consider additional impact or mitigation fees, or a benefit assessment, to offset the impact of new development on fire services.

EHS-5.2.c **Describe Training Needs for Emergency Services.** Work with the Office of Emergency Services, Marin County Fire Department, Marin County Sherriff, and other organizations to identify and describe goals and standards for emergency service training.

EHS-5.2.d **Continue to Improve Street Addressing.** Continue to implement the program to improve and standardize the County street addressing system in order to reduce emergency service response times. Where applicable, coordinate the program with the cities.

EHS-5.3.a **Continue to Revise Adopted Standards.** Continue to adopt revisions to the International Fire and Building Codes, as amended by the State of California, and other standards which address fire safety adopted by the State of California. Review, revise, and/or adopt existing or new local codes, ordinances, and Fire Safe Standards to reflect contemporary fire safe practices.

EHS-~~4.n~~ 5.3.b ~~Evaluate~~ Regularly Update Development Standards. Request Fire Department review of County requirements for peak-load water supply and roadways

(especially on hillsides) to determine whether those provisions need modification to meet evolving State standards, such as limiting narrow roads or one-way road use, grade/slope limits, minimum turning radius, and turnaround widths, to ensure adequate fire protection and suppression.

EHS-5.3.c **Require Rebuilding After a Disaster to Meet Current Standards.** Develop requirements for rebuilding after a disaster so redevelopment meets all current state and local building wildfire protection building code requirements relevant to the particular fire hazard severity zone of the project.

EH-~~4.b~~ 5.3.d **Restrict Land Divisions.** Prohibit land divisions in very high and high fire hazard areas unless the availability of adequate and reliable water for fire suppression is ~~demonstrated and guaranteed~~ provided; access for firefighting vehicles and equipment, as well as evacuation for residents, is provided from more than one point; necessary fire trails and fuel breaks are provided; structures are built consistent with the most current building code and fire code requirements for high fire hazard areas ~~fire-resistant materials are used exclusively in construction~~; and adequate clearances from structures and use of fire-resistant plants in any landscaping is required.

EHS-~~4.i~~ 5.3.e **Conduct Life Safety Assessments.** Conduct a life safety assessment that considers the costs of fire safety maintenance prior to the County purchase of new land and facilities. Where feasible locate new essential public facilities outside of high fire risk areas, including hospitals and health care facilities, emergency shelters, emergency command centers and emergency communication facilities.

EHS-~~4.k~~ 5.4.a **Amended ~~Urban~~ Wildlands Urban Interface (WUI) Regulations.** Work with Marin Fire Agencies ~~Marin fire departments~~ to prepare and adopt WUI regulations for new development and substantial remodels ~~in order~~ to reduce fire hazards in high and extreme fire hazard areas. Track and update standards as the areas of high and extreme fire hazards are re-defined.

EHS-~~4.d~~ 5.4.b **Review Applications for Fire Safety.** Ensure new development meets all current building code and fire safety standards, including but not limited to ensuring the provision of an adequate water supply for fire suppression, providing sufficient road width for emergency vehicles and equipment, as well as evacuation for residents provided from more than one point, ~~Require applicants to identify~~ identification and maintenance of defensible space around structures, and that structures are built consistent with the most current build code and Cal Fire requirements for high fire hazard areas. ~~and compliance with fire safety standards, and c~~ Continue to work with local and State fire agencies to ensure that the California Fire Code (with local amendments), County Development Code, and State and local standards for construction are applied uniformly countywide.

EHS-~~4c~~ 5.4.c **Require Compliance with Fire Department Conditions.** Continue to refer land development and building permit applications to the County Fire Department or

local fire district for review, and incorporate their recommendations as conditions of approval as necessary to ensure public safety. Continue to require compliance with all provisions of the most recently adopted version of the California Fire Code (with local amendments).

EHS-~~4.e~~ 5.4.d Require Sprinkler Systems. Continue to require installation of automatic fire sprinkler systems in all new structures and existing structures undergoing substantial remodeling, and provide incentives for sprinkler installation in all other habitable structures, especially those in high fire hazard areas.

EHS-~~4.f~~ 5.4.e Require Fire-Resistant Roofing and Building Materials. Continue to require and provide incentives for Class A fire-resistant roofing for any new roof or replacement of more than 50% of an existing roof. Work with Marin County fire departments to prepare and adopt an ordinance requiring fire-resistant building materials in ~~extreme and~~ high fire hazard areas.

EHS-5.4.f Reduce Risk for Non-Conforming Development. For existing non-conforming development, the County should work with property owners to improve or mitigate access, water supply and fire flow, signing, and vegetation clearance to meet current State and/or locally adopted fire safety standards.

EHS-~~4.h~~ 5.5.a Require Adequate ~~Clearance~~ Vegetation Removal. Require standards for clearance of vegetation on vacant lots, and around structures, and landscaped areas to ensure timely and adequate removal of potential fire fuel on both public and private property according to State requirements (Public Resource Code 4291) and local ordinances. ~~Require Adequate Clearance. Require standards for clearance of vegetation on vacant lots, and around structures, and landscaped areas to ensure timely and adequate removal of potential fire fuel on both public and private property.~~

EHS-~~4.i~~ 5.5.b ~~Use Varied~~ Implement Ecologically Sound Methods of Vegetation Management ~~to Provide Fuel Breaks and Fire Suppression~~. Collaborate with the Marin Wildfire Prevention Authority Ecologically Sound Practices Partnership which focuses on developing best management practices for fuel reduction projects in wildlands, provides subject matter expertise for project development, and environmental regulatory compliance. Use the best fuel reduction methods (depending on the time of year, fuel types, reduction prescriptions, presence of sensitive biological resources, and cost to implement the Marin County Community Wildfire Protection Plan and Marin Wildfire Prevention Authority projects. This may include using California Department of Forestry inmate crews, the Tamalpais Fuel Crew, the Marin Conservation Corps, animal grazing, or fuel reduction contractors.

EHS-~~4.g~~ 5.5.c Develop and Maintain Fuel Breaks and Vegetation on Access Routes. Work with the Marin Fire Agencies, other public agencies, utility districts, and private landowners to construct and maintain ecologically sound fuel breaks and manage

vegetation along emergency access routes to facilitate effective fire suppression and evacuation.

EHS-5.5.d **Require Fuel Reduction and Management Plans for New Developments.** The County should require all new development projects with land classified as state responsibility areas (Public Resources Code Section 4102), land classified as high or very high fire hazard severity zones (HFHSZ or VHFHSZs; Section 51177), or within areas defined by local fire agencies as a "wildland urban interface" (WUI), to prepare a long-term comprehensive ecologically sensitive fuel reduction and management program, including provisions for multiple points of ingress and egress to improve evacuation and emergency response access and adequate water infrastructure for water supply and fire flow, and fire equipment access. (See Gov. Code, Section 66474.02.). The ecologically sensitive fuel reduction program should be consistent with MWPA's ecological sensitive vegetation management guidelines, as well as federal, state, and County environmental and biological resource protection regulations. Where environmental sensitive resources or habitats could be impacted by vegetation removal, the property owner shall observe all regulations for the protection of habitat values.

~~EHS-5.o~~ ~~**Support a Fire Management Plan.** Adopt a resolution supporting a Fire Management Plan (including a fuel break plan) and encourage Marin cities and towns to also support its recommendation.~~ [Now a part of 4.3a since there is a CWPP]

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[7] will be dependent upon the availability of adequate funding and staff resources.

[Note to Reader: Program Implementation Tables were moved from the end of Section 2.6 Environmental Hazards in the CWP to be included at the end of each goal. Table text is all new and is not shown with underline.]

Figure 2-24 Goal EHS-5. Safety from Wildfire, Program Implementation Table

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-5.1a Collaborate with Marin Fire Agencies on Implementing the Community Wildfire Protection Plan.	Fire Agencies / CDA	Existing budget & may require	High	Ongoing

[7] Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (~~existing~~ programs ~~already in progress~~ whose implementation is expected to continue into the foreseeable future).

Program	Responsibility	Potential Funding	Priority	Time Frame
		grant funding		
EHS-5.1b Continue FIRESafe Marin Program	Fire Agencies	Existing budget	Med	Ongoing
EHS-5.1.c Provide Information About Fire Hazards	Fire Agencies,	Existing budget	Med	Ongoing
EHS-5.1.d Identify Areas with Insufficient Evacuation Opportunities	Fire Agencies, CDA	Existing budget	High	Short-Term
EHS-5.1.e Commit Funding for Evacuation Safety	Fire Agencies	Existing budget & may require grant funding or additional revenue	High	Short-Term
EHS-5.1.f Monitor State Requirements for Evacuation Routes	Fire Agencies, CDA, DPW	Existing budget	Med	Ongoing
EHS-5.1.g Continue to Use Technology to Promote Fire Safety	Fire Agencies	Existing budget & may require grant funding or additional revenue	Med	Ongoing
EHS-5.2.a Assess and Project Future Fire Protection Needs	Fire Agencies	Existing budget	Med	Med-Term
EHS-5.2.b Consider Development Impacts to Fire Service	Fire Agencies, CDA, DPW	Existing budget	High	Ongoing
EHS-5.2.c Describe Training Needs for Emergency Services	Fire Agencies	Existing budget	Med	Short-Term
EHS-5.2.d Continue to Improve Street Addressing	Fire Agencies	Existing budget	Med	Ongoing
EHS-5.3.a Continue to Revise Adopted Standards	Fire Agencies, CDA	Existing budget	Med	Ongoing
EHS-5.3.b Regularly Update Development Standards	Fire Agencies, CDA	Existing budget	Med	Ongoing
EHS-5.3.c Require Rebuilding After a Disaster to Meet Current Standards	CDA, Fire Agencies	Existing budget	High	Short-Term
EHS-5.3.d Restrict Land Divisions	CDA, Fire Agencies	Existing budget	Med	Ongoing
EHS-5.3.e Conduct Life Safety Assessments	Fire Agencies	Existing budget & may require	Med	Ongoing

Program	Responsibility	Potential Funding	Priority	Time Frame
		grant funds or additional revenue		
EHS-5.4.a Amend Urban Wildlands Interface Regulations	CDA, Fire Agencies	Existing budget	Med	Short-Term
EHS-5.4.b Review Applications for Fire Safety	CDA, DPW, Fire Agencies	Existing budget	High	Ongoing
EHS-5.4.c Require Compliance with Fire Department Conditions	CDA, DPW, Fire Agencies	Existing budget	High	Ongoing
EHS-5.4.d Require Sprinkler Systems	CDA, DPW, Fire Agencies	Existing budget	High	Ongoing
EHS-5.4.e Require Fire Resistant Roofing and Building Materials	CDA, DPW, Fire Agencies	Existing budget	High	Ongoing
EHS-5.4.f Reduce Risk for Non-Conforming Development	CDA, DPW, Fire Agencies	Existing budget	High	Ongoing
EHS-5.5.a Require Adequate Vegetation Removal	Fire Agencies	Existing budget	High	Ongoing
EHS-5.5.b Implement Ecologically Sound Methods of Vegetation Management	Fire Agencies	Existing budget	Med	Short-Term
EHS-5.5.c Develop and Maintain Fuel Breaks and Vegetation on Access Routes	Fire Agencies	Existing budget	High	Ongoing
EHS-5.5.d Require Fuel Reduction and Management Plans for New Development	Fire Agencies, CDA, DPW	Existing budget & may require additional revenue	High	Short-Term

What Are the Desired Outcomes?

Goal EHS-6: Resilience to Climate Change

Resilience to Climate Change. Manage the threat of climate risks to the current and future Marin community.

Policies

EHS-6.1 **Increase Community Resilience.** Increase community resilience to climate change and protection of vulnerable populations. Engage in community education and community-driven planning that leads to identification of community priorities that increase resilience.

EHS-6.2 **Increase Infrastructure, Building, and Services Resilience.** Increase the resilience of Marin County infrastructure, buildings, and services with an initial focus on nature-based solutions.

EHS-6.3 **Adapt to Sea Level Rise.** Safeguard the Marin shoreline, coastline, natural resources, recreational resources, and urban uses from flooding due to rising sea levels.

EHS-6.4 **Plan for Extreme Heat and Weather Events.** Create a community that can continue to function and thrive with an increase in average temperatures, extreme heat days, and severe weather events.

EHS-6.5 **Adapt Water Supply.** Prepare for a reduced, long-term water supply resulting from more frequent and/or severe drought events.

Why is this important?

Environment: Increased climate hazards create vulnerabilities in both natural and human-made systems that depend on stable and healthy ecosystems.

Economy: While resilience is often viewed through the lenses of social equity and environmental quality, business continuity and reducing operational costs and risks is just as vital for Marin's climate resiliency and livability.

Equity: Climate hazards will disproportionately affect Marin's vulnerable residents. Increasing the capacity of vulnerable communities to respond and cope with environmental hazards ensures a strong community.

How will results be achieved?

Implementing Programs

EHS-6.1.a **Regular Review of Adaptation and Resiliency Strategies.** Periodically review the County's climate adaptation and resiliency strategies and update them as needed to ensure compliance with state laws and community needs. Use best practices to

review and amend at regular intervals all relevant public codes to incorporate the most current technical knowledge.

EHS-6.1.b **Develop Adaptation Plans.** Develop adaptation plans that lead to community resilience. Adaptation plans can be hazard specific or cover multiple hazards, they can cover the entire county or individual communities, but all adaptation plans should recognize the interactions among climate change impacts and should accomplish the following: be consistent with the goals, policies, and programs in this Safety Element; integrate and prioritize equity and social justice; lead to County actions that improve resilience; be phased over time, for example, by including adaptation pathways with identified triggers; incorporate nature-based measures; consider both public and private roles; include identified funding mechanisms for construction, operations and maintenance; include metrics for monitoring; be developed in coordination with relevant jurisdictions, agencies, organizations, and other stakeholders; include measures for continued coordination; and identify a lead jurisdiction, agency or organization.

EHS-6.1.c **Integrate Adaptation in Plan Documents.** Integrate climate adaptation into other plans, ordinances, and programs that dictate land use decisions in the community, such as the Countywide Plan, the Marin County Climate Action Plan, County Local Coastal Program, Marin County Multijurisdictional Local Hazard Mitigation Plan, community and area plans, and the Marin County Development Code.

EHS-6.1.d **Implement Climate Action Plan.** Implement the adaptation measures as contained in the Marin County Climate Action Plan necessary to increase unincorporated communities' resiliency.

EHS-6.1.e **Identify Funding and Support.** Identify funding programs and other support services for local agencies to pursue that could help provide resources for County and community adaptation efforts.

EHS-6.1.f **Disclose Current and Future Hazards.** Develop a resale inspection permit program that provides disclosure of hazard risk information to prospective buyers prior to the sale of property. The program should include detailed hazard information, such as very high and high hazard wildfire severity zones, flood zones, tsunami and future sea level rise inundation areas, and Alquist-Priolo zones.

EHS-6.1.g **Develop a Property Rating System.** Based on the information in the resale inspection permit program, develop a property rating system available to the public for the purpose of evaluating risks from current and future hazards. Evaluation of hazards may be one function of a larger rating system or the sole function. The primary purpose of including hazards information is to inform prospective buyers and renters of the risks associated with a property prior to the commencement of any property sale, rental, or lease. Upon completion of the Property Rating System, make the information available to potential renters prior to completing a rental or lease agreement.

EHS-6.1.h **Use Environmentally Sensitive Adaptation Strategies.** Where feasible the County should encourage the use of existing natural features and ecosystem processes, or the restoration thereof, in adaptation projects and measures. This includes systems and practices that use or mimic natural processes, such as permeable pavements, bioswales, and other engineered systems, such as levees that are combined with restored natural systems, to provide clean water, conserve ecosystem values and functions, and provide a wide array of benefits to people and wildlife. Proposals addressing adaptation must analyze the feasibility of natural features and ecosystem process before proposing alternative measures.

EHS-6.1.i **Establish and Leverage Partnerships.** Explore regional compacts or less formal partnerships with regional entities (both public and private) that can assist communities with technical assistance and potential funding. Collaborate with local and regional partners to support business resiliency through preparedness education, trainings, and resources. Align adaptation goals and strategies with local community groups and private sector entities to increase effectiveness.

EHS-6.l.j **Assess the Feasibility of Redevelopment.** Encourage private property owners to evaluate redevelopment of sites subject to loss from destructive flooding or wave action. Consider actions the County could take to facilitate the relocation of development out of flood hazard areas and Very High Wildfire Severity Hazard Zones. Consider an acquisition and buyout program which includes acquiring land from the landowner(s) and restricting future development on the land. Engage communities on the topic of managed retreat and provide assistance to establish a supporting funding mechanism such as a community land trust or repetitive loss program or Geologic Hazard Abatement Districts. Consider use of sites repeatedly struck by climate hazards for flood-adapted restoration or recreational areas.

Implementing Programs for EHS-6.2 Increase Infrastructure, Building, and Services Resilience.

EHS-6.2.a **Minimize Utility Service Interruptions.** Work with utility companies to ensure that power lines serving the unincorporated areas are maintained to avoid power shutoffs, minimize damage during extreme events, and reduce the risk of wildfires.

EHS-6.2.b **Assess Risk in County-Owned Buildings and Facilities.** Support capital planning to incorporate a climate risk evaluation of County-owned buildings and facilities that identifies risks from climate hazards, identifies measures to minimize risk, and provides a plan(s) for making improvements.

EHS-6.2.c **Broaden Communication Service and Minimize Communication Service Interruptions.** Prepare an analysis of gaps in communication services within the County and identify measures for broadening coverage, especially where communication facilities are needed to provide essential services. The analysis should include recommendations for new facilities locations, whether facilities can serve multiple functions, prioritization of facility locations that considers both the

communication services and the environmental impacts and administrative burdens of such facilities. (Also see Implementing Program EHS-1.1b under Goal EHS-1).

EHS-6.2.d **Support Resiliency for Financially Constrained Households.** Identify funding opportunities, including grant assistance programs, to support structural strengthening, renewable energy generation systems, and weatherizing and other energy efficiency activities, for low-income renters and property owners. (Also see Implementing Programs EHS1.1.b under Policy EHS-1.1 and Program 1.4.a under Policy EHS-1.4.)

EHS-6.2.e **Integrate Natural Infrastructure.** During the development review process, when developing alternatives and addressing adaptation in proposed projects, the County should require applicants to identify natural infrastructure that may be used through the conservation, preservation, or sustainable management of open space to reduce climate change hazards. Proposals addressing adaptation must analyze the feasibility of integrating natural infrastructure before proposing alternative measures.

Implementing Programs for EHS-6.3 Adapt to Sea Level Rise

EHS-6.3.a **Employ Sea Level Rise Scenarios in Planning.** ~~Recent predictions of sea level rise for the San Francisco Bay region by BCDC and USGS based on climate models and hydrodynamic modeling of the San Francisco Bay Estuary Institute indicate 16 inches of rise by mid-century and 55 inches by 2100~~ The State periodically recommends and updates a range of sea level rise scenarios for planning purposes. The guidance is developed using the best available science and the modeling is based on internationally accepted greenhouse gas scenarios used by the United Nations Intergovernmental Panel on Climate Change. The County should ~~C~~ cooperate with state, federal, and other monitoring agencies to track bay and ocean levels and share baseline topographic and resource data obtained by the County in implementing its own projects to enhance hydrodynamic and ecosystem modeling efforts and assessment of regional climate change impacts. ~~Use official estimates for mean sea level rise and topographic data for environmental review~~. Project design and environmental review for development applications and County sponsored projects ~~infrastructure~~ should incorporate ~~official mid-century sea level rise estimates,~~ the most current State of California recommendations for sea level rise scenarios as appropriate for the risk tolerance and expected life of the project. ~~and require adaptive strategies for end-of-century sea level rise for any such project with expected life times beyond 2050.~~

EHS-6.3.b **Amend the Bayfront Conservation Combining District (BFC).** Amend the Bayfront Conservation Combining District, Marin County Code Title 22, to incorporate sea level rise adaptation measures that promote public safety consistent with the goals of the BFC.

EHS-6.3.c **Explore Future Bayland Corridor Amendment.** Explore expanding and aligning the Baylands Corridor and BFC area to align both the geographic extent and the policy

direction. The geographic extent should include areas subject to future flooding and related policies and programs should include standards to protect from or adapt to rising sea level.

EHS-6.3.d **Advocate with State and Federal Agencies.** Advocate with state and federal resource agencies for new policies making living shoreline projects more easily permitted by recognizing the long-term habitat and biodiversity benefits.

EHS-6.3.e **Update Other Elements of the Countywide Plan.** Update other Elements of the Countywide Plan to reflect the County's approach to Sea Level Rise planning, where nature-based alternatives are evaluated and implemented whenever they will achieve project objectives.

EHS-6.3.f **Take a Leadership Role in Multijurisdictional Sea Level Rise Planning.** Identify funding and resources for a multijurisdictional approach to sea level rise adaptation planning. Include representation from each jurisdiction and identify countywide priorities for adapting to sea level rise. (Also see Develop Adaptation Plans EH-6.1.b.)

EHS-6.3.g ~~**Plan for Climate Change Impacts, Including Sea Level Rise.**~~ **Consider Sea Level Rise in Flood Control Planning and Projects.** Consider sea level rise in future ~~countywide and community plan~~ flood control efforts. ~~Apply for membership in the National Flood Insurance Program's (NFIP) Community Rating System (CRS), and as appropriate through revisions to the Marin County Code, obtain reductions in flood insurance rates offered by the NFIP to community residents. official mid-century and end-of century sea level rise estimates~~ in ~~Participate in the Bay Area Climate & Energy Resilience Project and its March 2013 Proposed 12-Month Action Plan, developed by the Bay Area Joint Policy Committee of the Association of Bay Area Governments~~. Cooperate with FEMA in its efforts to comply with recent congressional mandates to incorporate predictions of sea level rise in its Flood Insurance Studies and FIRM. Periodically revise the Marin County Hydrology Manual to, at a minimum, incorporate use of the most recent ~~updated~~ rainfall frequency data from NOAA.~~'s Atlas 14 Volume 6, Vers. 2.1 California (rev. 2012).~~

EHS-6.3.h **Partner to Protect Key Infrastructure Owned and Operated by Others.** The County is dependent on key infrastructure such as water supply systems, waste water treatment systems, roads and bridges, electricity grid, and telecommunications that are owned and maintained by numerous agencies and private companies. Marin County should develop a systematic approach to collaborating and working cooperatively with these entities to ensure the long-term, continued functioning of key infrastructure within Marin County.

EHS-6.3.i **Limit Seawall Barriers.** Limit repair, replacement, or construction of coastal sea walls and erosion barriers in order to avoid offsite impacts consistent with Local Coastal Program requirements and San Francisco Bay Conservation and

Development Commission standards, and as demonstrated to be necessary to protect persons and properties from rising sea level.

EHS-6.3.j **Strengthen Sea Level Rise Education and Outreach Programs.** Sea level rise adaptation planning can only be successful when communities understand the interrelated impacts of future sea level rise and the range of options to address those impacts through time. The County should develop more robust sea level rise education and outreach to help communities have informed discussions around adaptation options, adaptation pathways, costs, and where responsibilities for protecting assets lie.

EHS-6.3.k **Study Impacts of Rising Groundwater Levels from Sea Level Rise.** Conduct studies on the effects of rising groundwater on the community and the built environment including the potential transport of toxic or hazardous chemicals in the soil at contamination sites and the effects on septic systems. In areas where rising groundwater levels could adversely impact the functioning of existing or future septic systems, the County will undertake a study to identify the hazards and identify solutions.

Implementing Programs for EHS-6.4 Plan for Extreme Heat and Weather Events.

EHS-6.4.a **Develop Resilience Hubs.** Work with vulnerable populations to develop and implement a plan that identifies priority resilience hub locations and outlines necessary steps to build hubs that serve multiple purposes, including community centers in non-emergency and emergency situations, operations and aide distribution centers in emergencies, and recovery centers post emergencies. The plan should include siting criteria that prioritizes serving the needs of vulnerable populations and using that criteria to identify potential sites in the county. For each priority site, the plan should identify potential hub functions, needed improvements to existing facilities, development and operation costs (including any avoided costs as a result of building the hubs), feasibility of installing microgrids to sustain power in emergencies, and potential funding and financing mechanisms.

EHS-6.4.b **Ensure Access to Cooling Centers.** Identify areas in Marin County where cooling centers are needed and where they can be located within resilience hubs. Identify ways for individuals with restricted mobility to reach cooling centers

EHS-6.4.c **Support Heat Risk Awareness.** Provide guidance to employers, residents, and workers to ensure that outdoor workers are aware of the harm posed by climate-related heat effects and how to reduce them. Partner with private sector and community-based organizations to increase information spread.

Implementing Programs for EHS-6.5 Adapt Water Supply.

EHS-6.5.a **Plan for Drought.** Prepare for a reduced, long-term water supply resulting from more frequent and severe drought events, including working with regional water providers to implement extensive water conservation measures and ensure

sustainable water supplies including increasing recycled water infrastructure and capacity.

EHS-6.5.b **Partner with Water Providers to Improve Water Storage and Efficiency.** Improve water storage and efficiency by partnering with the following water managers: water agencies and irrigation districts to explore ways to improve and increase storage capacity and generation efficiency; utility providers to upgrade water systems to accommodate projected changes in water quality and availability; and local water providers in the county to increase participation in water conservation programs to reduce water use throughout Marin County.

EHS-6.5.c **Maintain Adequate Agricultural Water Supply.** The County should encourage policies that preserve and protect adequate and affordable agricultural irrigation water supplies for commercial farmers and ranchers to maximize potential wildland fire mitigation, habitat benefits, carbon sequestration, and economic activity. (See Goal AG-1 in the Agriculture and Food Section, PFS-2 in the Public Facilities and Services Section, and WR-3 in the Water Resources Section.)

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[8] will be dependent upon the availability of adequate funding and staff resources.

[Note to Reader: Program Implementation Tables were moved from the end of Section 2.6 Environmental Hazards in the CWP to be included at the end of each goal. Table text is all new and is not shown with underline.]

Figure 2-25: Goal EHS-6. Resilience to Climate Change, Program Implementation Table

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-6.1. a Regular Review of Adaptation and Resiliency Strategies	CDA, DPW, County Parks, Fire Agencies, OES, HHS	Existing budget & new grant funds or revenue	Med	Long-Term & Ongoing
EHS-6.1.b Develop Adaptation Plans	CDA, DPW	Will require new grant funds or revenue	Med	Short-Term

[8] Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (~~existing~~ programs ~~already in progress~~ whose implementation is expected to continue into the foreseeable future).

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-6.1.c Integrate Adaptation in Plan Documents	CDA, DPW	Existing budget	Med	Long-Term
EHS-6.1.d Implement Climate Action Plan	CDA, DPW	Existing budget	High	Long-Term & Ongoing
EHS-6.1.e Identify Funding and Support	CDA, DPW	Existing budget	High	Short-Term
EHS-6.1.f Disclose Current and Future Hazards	CDA	Existing budget & may require additional revenue	High	Short-Term
EHS-6.1.g Develop a Property Rating System	CDA	Existing budget & may require additional revenue	High	Short-Term
EHS-6.1.h Use Environmentally Sensitive Adaptation Strategies	CDA, DPW, County Parks	Existing budget	Med	Short-Term and Ongoing
EHS-6.1.i Establish and Leverage Partnerships	Countywide	Existing budget	High	Ongoing
EHS-6.1.j Assess the Feasibility of Redevelopment	CDA	Existing budget & may require additional resources		
EHS-6.2.a Minimize Utility Service Interruptions	Private & Public Utilities, DPW, OES	Existing budget and may require additional funds	High	Short-Term
EHS-6.2.b Assess Risk in County-Owned Building and Facilities	DPW, OES	Requires additional funding	High	Med-Term
EHS-6.2.c Broaden Communication Service and Minimize Communication Service Interruptions	Private Communication Companies, OES, Fire Agencies, CDA, County Parks	Existing budget	High	Med-Term

Program	Responsibility	Potential Funding	Priority	Time Frame
EHS-6.2.d Support Resiliency for Financially Constrained Households	CDA, OES, Fire Agencies,	Will require additional revenue	High	Long-Term
EHS-6.2.e Integrate Natural Infrastructure	CDA, DPW, state & federal resource agencies	Existing budget	Med	Long-Term
EHS-6.3.a Employ Sea Level Rise Scenarios in Planning	CDA, DPW, County Parks	Existing budget	Med	Short-Term & Ongoing
EHS-6.3.b Amend the Bayfront Conservation Combining District	CDA	Existing budget	High	Short-Term
EHS-6.3.c Explore Future Bayland Corridor Amendment	CDA	Existing budget	Med	Med-Term
EHS-6.3.d Advocate with State and Federal Agencies	Countywide	Existing budget	Med	Short-Term
EHS-6.3.e Update Other Elements of the Countywide Plan	CDA	Existing budget	Med	Long-Term
EHS-6.3.f Take a Leadership Role in Multijurisdictional Sea Level Rise Planning	DPW, CDA, County Parks, Countywide	Existing budge & may require additional funding	High	Short-Term
EHS-6.3.g Consider Sea Level Rise in Flood Control Planning and Projects	DPW	Existing budget	High	Ongoing
EHS-6.3.h Partner to Protect Key Infrastructure Owned and Operated by Others	Countywide, CDA, DPW	Existing budget	Med	Med-Term
EHS-6.3.i Limit Seawall Barriers	CDA	Existing budget	Low	Ongoing
EHS-6.3.j Strengthen Sea Level Rise Education and Outreach Programs	DPW, CDA, County Parks	Existing budget & may need additional resources	High	Short-Term
EHS-6.3.k Study Impacts of Rising Groundwater Levels from Sea Level Rise	CDA	Existing budget & will require additional grant funding	Med	Med-Term
EHS-6.4.a Develop Resilience Hubs	CDA	Existing budget & will require additional	High	Med-Term

Program	Responsibility	Potential Funding	Priority	Time Frame
		grant funding		
EHS-6.4.b Ensure Access to Cooling Centers	CDA, OES, Fire Agencies	Existing budget & may require additional resources	Med	Long-Term
EHS-6.4.c Support Heat Risk Awareness	CDA	Existing budget	Med	Long-Term
EHS-6.5.a Plan for Drought	Countywide, Water Districts	Existing budget	High	Long-Term
EHS-6.5.b Partner with Water Providers to Improve Water Storage and Efficiency	Countywide, Water Districts	Existing budget	High	Long-Term
EHS-6.5.c Maintain Adequate Agricultural Water Supply	Countywide, Water Districts	Existing budget	Med	Long-Term

Program ~~Implementation and~~ Monitoring

Relationship of Goals to Guiding Principles

Figure 2-26: Relationship of Goals to Guiding Principles Table

This figure illustrates the relationship of each goal in this Section to the Guiding Principles.

Goals / Guiding Principles	Link equity, economy, and the environment locally, regionally, and globally.	Minimize the use of finite resources, and use all resources efficiently and effectively.	Reduce the use and minimize the release of hazardous materials.	Reduce greenhouse gas emissions that contribute to global warming.	Preserve our natural assets.	Protect our agricultural assets.	Provide efficient and effective transportation.	Supply housing affordable to the full range of our members of the workforce and diverse. community.	Foster businesses that create economic, environmental, and social benefits.	Educate and prepare our workforce and residents.	Cultivate ethnic, cultural, and socioeconomic diversity.	Support public health, safety, and social justice.
EHS-1 Equitable Community Safety Planning	•									•		•
EHS-2 Disaster Preparedness, Response, and Evacuation	•									•		•
EHS-3 Safety from Seismic and Geologic Hazards	•									•		•
EHS-4 Safety from Flooding	•									•		•
EHS-5 Safety from Wildfire	•				•					•		•
EHS-6 Resilience to Climate Change	•				•				•	•		•

How Will Success Be Measured

Indicator Monitoring

Nonbinding indicators, benchmarks, and targets will help to measure and evaluate progress.[9] This process will also provide a context in which to consider the need for new or revised implementation measures.

Figure 2-27 Indicator Monitoring Table

Indicator	Benchmark	Target
Number of Marin residents trained in GetReady, CERT, and Voluntary Disaster Service Workers.	Pending	2.5% of county population trained by 2025 and 3% trained by 2030.
Number of county employees trained as disaster service workers to federal standards as documented by County Human Resources.	Pending	100% of County emergency first responders, Emergency Operations Center staff, and other County employees with designated disaster response roles by 2025 and maintain indefinitely. 100% of trained employees to repeat at least one disaster response training class once every two years.
Regularly updated climate change modeling information and mapping.		Triannual review and revisions, if needed, to the County's climate change modeling projections and hazard mapping.
Number of retrofitted or relocated County buildings and critical facilities.		25% of identified at-risk County-owned structures and critical facilities retrofitted or relocated by 2030, and 50% retrofitted or relocated by 2050.
Number of retrofitted or relocated miles of County roads.		25% of identified at-risk County-maintained road miles retrofitted or relocated by 2040, and 50% retrofitted or relocated by 2050.

[9] Many factors beyond Marin County government control, including adequate funding and staff resources, may affect the estimated time frame for achieving targets and program implementation.

Reviewed and updated climate adaptation and resiliency strategies.		Annual review of climate adaptation and resiliency strategies, and updated strategies as needed, in perpetuity.
Percentage of upgraded County-maintained utilities facilities and infrastructure.		25% of identified at-risk County-maintained utilities facilities and infrastructure upgraded by 2030, 50% upgraded by 2035.
Regularly updated vulnerable communities database and mapping.		Following database development, biannual updates of vulnerable communities data and mapping, in perpetuity.

~~Program Implementation~~

~~The Program Implementation Tables summarizing responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs appear below the programs for each goal. Program implementation within the estimated time frame will be dependent upon the availability of adequate funding and staff resources.~~

[Note to Reader: Program Implementation Tables were moved to the end of each Goal section]