

HAZARDS AND SAFETY



Issues and topics related to health and safety within the Planning Area are addressed in this chapter. Some of these hazards may be naturally induced, such as wildfire hazards. Other health and safety hazards may be the result of natural hazards, which are exacerbated by human activity, such as development in areas prone to flooding. Additional hazards are entirely human-made, including airport crash hazards and exposure to hazardous materials. For seismic and geologic hazards in the Planning Area, see Section 4 (Geology, Soils, and Seismicity) of the *Conservation Existing Conditions Report*.

Topics:

- 1 **Emergency Response and Evacuation Routes**
- 2 **Hazardous Materials and Waste**
- 3 **Wildfire Hazards**
- 4 **Flooding**
- 5 **Air Traffic**

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1 EMERGENCY RESPONSE AND EVACUATION ROUTES

This section addresses the emergency response plans, procedures, and evacuations routes in the Planning Area. Specific hazards are addressed elsewhere in the document, as follows:

- Public Safety (see the *Community Services and Utilities Existing Conditions Report*);
- Hazardous Materials and Waste (see Section 2 of this report);
- Fire Hazard (see Section 3 of this report);
- Flooding (see Section 4 of this report);
- Air Traffic (see Section 5 of this report);
- Geology, Soils, and Seismicity (see Section 4 of the *Conservation Existing Conditions Report*); and
- Climate Change (see the *Climate Change Existing Conditions Report*).

REGULATORY FRAMEWORK

FEDERAL

Comprehensive Environmental Response, Compensation & Liability Act

The Comprehensive Environmental Response, Compensation & Liability Act (CERCLA), commonly associated with the term “Superfund,” established:

- Regulations concerning closed and abandoned hazardous waste sites
- Liability of parties responsible for any releases of hazardous waste at these sites
- Funding for cleanup when responsible parties cannot be identified

Resource Conservation and Recovery Act (RCRA)

The Resource Conservation and Recovery Act (RCRA) established the United States Environmental Protection Agency (U.S. EPA) “cradle to grave” control (generation, transportation, treatment, storage, and disposal) over hazardous materials and wastes. In California, the Department of Toxic Substances Control (DTSC) has RCRA authorization.

Emergency Management Assistance Compact

The Emergency Management Assistance Compact (EMAC) is a congressionally authorized interstate mutual aid compact that provides a mechanism through which states can assist other states during emergencies. All states have joined EMAC by adopting model language into their state’s statutes. EMAC addresses reimbursement, liability, compensation, and licensure issues.

National Emergencies Act

The National Emergencies Act (NEA) allows the president to declare a national emergency, which triggers emergency authorities contained in other federal statutes. The NEA does not contain any specific emergency authority on its own but relies on the emergency authorities in other statutes, such as the Public Health Service Act.

Pandemic and All Hazards Preparedness Act

The Pandemic and All Hazards Preparedness Act (PAHPA) addresses the organization of public health emergency preparedness and response activities and authorizes programs concerning medical surge capacity, the capacity of states and localities to prepare for and respond to public health emergencies, and the development of countermeasures to biological threats (the Biodefense Advanced Research and Development Authority [BARDA]). Many of the offices and programs within the Department of Health and Human Services (HHS) that state public health preparedness programs interact with daily were developed or refined through PAHPA, including the Office of the Assistant Secretary for Preparedness and Response, grant programs such as Public Health Emergency Preparedness (PHEP) grants, the Hospital Preparedness Program, and the Healthcare Facility Partnership Program. The act also focuses on the needs of at-risk populations in emergency planning

and response. PAHPA was reauthorized in March 2013 in the Pandemic and All-Hazards Preparedness Reauthorization Act (PAHPRA).

Public Health Service Act Section 319

Authorizes the HHS secretary to determine that a public health emergency exists, which triggers emergency powers that permit the federal government to assist state and local governments, suspend or modify certain legal requirements, and expend available funds to address public health emergencies. A Section 319 public health emergency declaration is separate and distinct from a presidential declaration under the National Emergencies Act or the Stafford Act. The secretary does not need a presidential declaration to issue a public health emergency declaration under Section 319; however, a presidential declaration is required in addition to a Section 319 declaration if the secretary wants to exercise waiver authority under Social Security Act Section 1135. Other sections of the Public Health Service Act, including Sections 301 and 311, permit the secretary to render assistance to states and localities without declaring a public health emergency.

Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act)

Authorizes the delivery of federal emergency technical, financial, logistical, and other assistance to states and localities. A governor must first determine that an event overwhelms the state's capacity to respond and request a presidential declaration under the Stafford Act before the president can declare all or a portion of a state a "major disaster" or "emergency" area. The Federal Emergency Management Agency (FEMA) coordinates administration of disaster relief resources and assistance to states. The President can declare an emergency without first receiving a gubernatorial request if the emergency involves an area of federal primary responsibility such as a federal building. A Stafford Act declaration can be used to trigger other public health emergency response authorities such as Social Security Act Section 1135 waiver authorities.

Social Security Act Section 1135

Authorizes the HHS secretary to temporarily waive or modify certain Medicare, Medicaid, Children's Health Insurance Program (CHIP), and Health Insurance Portability and Accountability Act (HIPAA) requirements affecting healthcare facilities and providers during national emergencies. Section 1135 waivers require both a presidential declaration under the National Emergencies Act or Stafford Act and a public health emergency determination by the HHS secretary under Public Health Service Act Section 319. Once the 1135 waiver authority has been issued, individual providers' requirements are not automatically modified; the waivers are implemented on a case-by-case basis through the Centers for Medicare & Medicaid Services, HHS regional offices, and state health facility survey agencies.

STATE

California Emergency Services Act

The California Emergency Services Act (ESA) creates the state Office of Emergency Services, within the office of the Governor, and confers powers upon the Governor and the chief executives and governing bodies of the state during emergencies. Another goal of this act is for all emergency services functions of the state be coordinated as far as possible with the comparable functions of its political subdivisions, of the federal government including its various departments and agencies, of other states, and of private agencies of every type, to the end that the most effective use may be made of all manpower, resources, and facilities for dealing with any emergency that may occur.

The California Disaster and Civil Defense Master Mutual Aid Agreement is an agreement made and entered into by and between the State of California, its various departments and agencies, and the various political subdivisions of the state, to facilitate implementation of the purposes of the California Emergency Services Act.

California Disaster Assistance Act

The California Disaster Assistance Act (CDAA) authorizes the Director of the California Governor's Office of Emergency Services (Cal OES) to administer a disaster assistance program that provides financial assistance from the state for costs incurred by local governments due to a disaster event.

California Health & Safety Code

Division 20 of the Health and Safety Code establishes Department of Toxic Substances Control authority and sets forth hazardous waste and underground storage tank regulations. In addition, the division creates a State superfund framework that mirrors the Federal program.

Food and Agriculture Code

Division 6 of the California Food and Agricultural Code (FAC) establishes pesticide application regulations. The division establishes training standards for pilots conducting aerial applications as well as permitting and certification requirements.

Water Code

Division 7 of the California Water Code, commonly referred to as the Porter-Cologne Water Quality Control Act, created the State Water Resources Control Board and the Regional Water Quality Control Boards. In addition, water quality responsibilities are established for the SWRCB and RWQCBs.

California Code of Regulations

Title 3 of the CCR pertains to the application of pesticides and related chemicals. Parties applying regulated substances must continuously evaluate application equipment, the weather, the treated lands, and all surrounding properties. Title 3 prohibits any application that would:

- Contaminate persons not involved in the application
- Damage non-target crops or animals or any other public or private property
- Contaminate public or private property or create health hazards on said property

Title 8 of the CCR establishes California Occupational Safety and Health Administration requirements related to public and worker protection. Topics addressed in Title 8 include materials exposure limits, equipment requirements, protective clothing, hazardous materials, and accident prevention. Construction safety and exposure standards for lead and asbestos are set forth in Title 8.

Title 14 of the CCR establishes minimum standards for solid waste handling and disposal.

Title 17 of the CCR establishes regulations relating to the use and disturbance of materials containing naturally occurring asbestos.

Title 22 of the CCR sets forth definitions of hazardous waste and special waste. The section also identifies hazardous waste criteria and establishes regulations pertaining to the storage, transport, and disposal of hazardous waste.

Title 26 of the CCR is a medley of State regulations pertaining to hazardous materials and waste that are presented in other regulatory sections. Title 26 mandates specific management criteria related to hazardous materials identification, packaging, and disposal. In addition, Title 26 establishes requirements for hazardous materials transport, containment, treatment, and disposal. Finally, staff training standards are set forth in Title 26.

Title 27 of the CCR sets forth a variety of regulations relating to the construction, operation, and maintenance of the State's landfills. The title establishes a landfill classification system and categories of waste. Each class of landfill is constructed to contain specific types of waste (household, inert, special, and hazardous).

Government Code Section 65302

Government Code Section 65302 outlines the State's requirements for local jurisdictions General Plans. On August 30, 2019, the Governor approved Senate Bill (SB) 99, which provides revisions to Government Code Section 65302 to update the State's General Plan requirements. Prior to SB 99, State law requires the legislative body of a local jurisdiction to adopt a comprehensive, long-term general plan that includes various elements, including a housing element and a safety element

for the protection of the community from unreasonable risks associated with the effects of various geologic and seismic hazards, flooding, and wildfires. Specifically, the previous law required the safety element to address, among other things, evacuation routes related to identified fire and geologic hazards; however, the updates to Government Code Section 65302 as part of SB 99 now requires local jurisdictions, upon the next revision of the housing element on or after January 1, 2020, to review and update the safety element to include information identifying residential developments in hazard areas that do not have at least two emergency evacuation routes¹.

State of California Hazard Mitigation Plan

The (CA) California State Hazard Mitigation Plan (SHMP) represents the state's primary hazard mitigation guidance document, providing an updated analysis of the state's historical and current hazards, hazard mitigation goals and objectives, and hazard mitigation strategies and actions. The plan represents the state's overall commitment to supporting a comprehensive mitigation strategy to reduce or eliminate potential risks and impacts of disasters to promote faster recovery after disasters and, overall, a more resilient state. State Hazard Mitigation Plans are required to meet the Elements outlined in the FEMA's State Mitigation Plan Review Guide (revised March 2015, effective March 2016). Upon approval, the CA SHMP is then adopted by the State for implementation for the next five (5) years. Cal OES is responsible for updating the SHMP for California. The current version of the SHMP was last updated in September 2018.

State of California Emergency Plan

The State of California Emergency Plan (SEP) addresses California's response to emergency situations associated with natural disasters or human-caused emergencies. The SEP provides a consistent, statewide framework to enable state, local, tribal governments, federal government, and the private sector to work together to mitigate, prepare for, respond to, and recover from the effects of emergencies regardless of cause, size, location, or complexity. In accordance with the California Emergency Services Act, this plan is in effect at all times and applies to all levels of State government and its political subdivisions.

The plan incorporates and complies with the principles and requirements found in federal and state laws, regulations, and guidelines. It is intended to conform to the requirements of California's Standardized Emergency Management System and the National Incident Management System and be consistent with federal emergency planning concepts such as the National Response Framework and catastrophic concept of operations (CONOPS) documents developed jointly by the Federal Emergency Management Agency Region IX and the State. CONOPS are developed in support of the State Emergency Plan. The plan is part of a larger planning framework that supports emergency management within the state.

The SEP includes a description of the California Standardized Emergency Management System, which manages multiagency and multijurisdictional responses to emergencies in California and unifies all elements of California's emergency management community into a single integrated system and standardizes key elements. State agencies are required to use the Standardized Emergency Management System, and local government entities must use the system in order to be eligible for any reimbursement of response-related costs under the State's disaster assistance programs.

LOCAL

Town of Tiburon General Plan

The current Town of Tiburon General Plan identifies the following policy framework related to emergency response and evacuation routes.

Safety Element

¹ Legislative Counsel's Digest. 2019. Senate Bill No. 99. Available at: https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB99

Goals

SE-D: To encourage disaster preparedness planning for effective emergency response and to protect public safety

Policies

SE-23: In cooperation with other public agencies and appropriate public-interest organizations, the Town shall ensure that it is prepared to effectively respond to any emergency or disaster, including hazardous material releases.

SE-24: The Town shall make provisions to continue essential public services during and after emergencies and natural and other disasters.

Implementing Measures

SE-e: The Town shall continue to review and update the *Emergency Operations Plan* to ensure that it remains up-to-date.

SE-f: The Town shall adopt a Local Hazard Mitigation Plan to comply with the federal Disaster Mitigation Act of 2000 and maintain eligibility for hazard mitigation funding from FEMA.

SE-g: The Town shall use its best efforts to disseminate emergency preparedness information to the community.

SE-h: The Town shall conduct an immediate post-earthquake assessment of critical facilities and buildings in the Planning Area to determine the extent of damages, if any, to essential Town infrastructure. This should be performed by trained professional(s) utilizing the current state-of-knowledge regarding post-earthquake assessment.

Marin Operational Area Emergency Operations Plan

The Marin Operational Area Emergency Operations Plan (EOP) provides the planned response to extraordinary emergency situations associated with large-scale disasters affecting Marin County. The Marin Operational Area (OA) consists of the cities/towns, special districts, and the unincorporated areas within the county. The Marin OA EOP provides the overall concept, organizational framework, and policies for responding to a major emergency or disaster within the County. Agencies and organizations within the Marin OA separately publish documents to support this EOP, which further describe the operation or functional response to specific threats or specific emergency response disciplines. Additionally, each of these supporting plans contain checklists and other resource material designed to provide users with the basic considerations and actions necessary for effective emergency response for the specific hazard or function. The Marin County Office of Emergency Services (Marin OES) is responsible for managing all plans and documents that support and carry out the concepts and policies outlined in the EOP to ensure compatibility between plans and enhanced coordination among jurisdictions. The supporting documents of the Marin OA EOP fall into the following three categories:

1. **Operational Area EOP Annexes:** Functional annexes to the EOP which provide detailed guidance of managing response recovery operations in relation to specific threats or critical activities, such as Care and Shelter, Post-Disaster Housing, Spontaneous Volunteers, Bioterrorism, and Medical Health.
2. **Supporting Plans:** Other supporting plans addressing response procedures that may impact the county, such as the Local hazard Mitigation Plan, Golden Gate Bridge Major Incident Plan, and Hazardous Material Response.
3. **Strategic Guidance Documents:** Additional supporting documents that outline specific procedures or serve as resources to individual agencies or organizations, such as the Animal Services Protocol and the Access and Functional Needs (AFN) Planning Guidance.

Overall, the Marin OA EOP accomplishes the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting the Marin OA; and

- Establishes the overall operational concepts associated with Marin County’s Emergency Operations Center (EOC) activities and the recovery process.
- Facilitates multi-jurisdictional and interagency coordination in emergency operations, particularly between local government, private sector, operational area (geographic county boundary), State response levels and appropriate Federal agencies;
- Serves as a County plan, a reference document, and when possible, may be used for pre-emergency planning in addition to emergency operations;
- To be utilized in coordination with applicable local, State and Federal contingency plans and supporting documents discussed above and below;
- Identifies the components of an Emergency Management Organization (EMO) and establishes associated protocols required to effectively respond to, manage and recover from major emergencies and/or disasters;
- Establishes the operational concepts and procedures associated with field response to emergencies and EOC activities; and
- Establishes the organizational framework of the California Standardized Emergency Management System (SEMS) and the National Incident Management System (NIMS) within Marin County.

The Marin County EOP describes that Marin County is vulnerable to a wide range of threats. Table 1 provides an example EOP activation levels based on the emergency situation within the Marin OA. The Marin OA EOP may be activated by the County Administrator, Assistant/Deputy County Administrators, County Fire Chief or designee, sheriff or designee, Public Health Officer or designee, or the Director of Public Works or designee.

TABLE 1: MARIN COUNTY OA ACTIVATION LEVEL EXAMPLES

TRIGGER EVENT/SITUATION	ACTIVATION LEVEL	STAFFING	ACTIVITIES
Severe Weather Watch	Stand-By	None Limited to office or other location	None EOC is configured All Systems ready
Severe Weather or Tsunami Warning		EOC Director EOC Coordinator Liaison Officer Public Information Officer (PIO) Deputy PIO Section Chiefs Law, Fire, Medical/Health, Situation Analysis, Personnel, Supply, Communications, IT Support	Situation Analysis Public Information Response coordination Resource coordination Liaison Logistics support Financial Support
Significant incidents involving two or more cities/towns			
Earthquake with minor damages			
Substantial shaking – standby for aftershocks			
Severe Weather or Tsunami Warning	Minimal	All Minimal Level staff plus: Branches and Units as appropriate to situation	Situation Analysis Public Information Response coordination Resource coordination Liaison Logistics support Financial Support
Earthquake with substantial damage reported			
Intense shaking – standby for aftershock			
Major wind or rain storm with damage			
Two or more large incidents involving two or more cities/town			
Wildfire affecting developed area			
Major scheduled event			
Incident involving large-scale or possible large-scale evacuations	Partial to Full	Liaison/Agency reps as appropriate	
Major city or regional emergency – Multiple areas with heavy resource involvement		All positions Liaison/Agency reps as appropriate	Situation analysis Response Coordination Resource Coordination Logistics support Public Information
Earthquake with severe damage			

SOURCE: MARIN COUNTY SHERIFF'S OFFICE OF EMERGENCY SERVICES, OCTOBER 2014.

Marin OA EOP Annexes

The **Marin OA EOP – Tsunami Annex (Tsunami Annex)** was adopted by the Marin County Board of Supervisors in January 2018. The purpose of the Tsunami Annex to the Marin OA EOP² is to provide information and guidance for Tsunami Information Statements, Watches, Advisories, and Warning bulletins, local role in alert and warning dissemination, and roles and responsibilities of all response agencies. Additionally, the Marin County OA ERP provides a concept of operations for long term recovery and restoration after extensive damage due to all hazards including Tsunami³.

The **Marin OA EOP – Catastrophic Earthquake Mass Care and Sheltering Plan Annex** was adopted by the Marin County Board of Supervisors in August 2014. Mass care and sheltering is a critical component of the response to an earthquake. A magnitude 7.9 earthquake on the San Andreas Fault will result in an estimated 331,400 people in the 12- county Bay Area region who will need shelter

The **Marin OA EOP – Post-Disaster Housing Annex** was adopted by the Marin County Board of Supervisors in December 2003. In a major disaster such as wildfire or earthquake, large numbers of Marin County residents will lose their homes. Many will seek temporary shelter with relatives, friends, or at emergency congregate shelters operated by local governments and/or the American Red Cross. Marin County is especially vulnerable to a loss of housing stock as it has an almost zero vacancy rate, most of its workforce lives outside the county, most of the land is already developed or protected, and real estate prices are among the most expensive in the U.S. In 2001, a Post-Disaster Housing Working Group was formed by the Marin County Disaster Council to develop coordinated post-disaster housing strategies for the OA.

The Marin County Department of Health and Human Services prepared the **Marin OA EOP – Medical Health Disaster Annex** in November 2006. It outlines concepts and policies that will aid in providing medical health disaster response services in emergencies and disasters and is supported by subject or threat-specific plans and procedures which guide detailed response activities.

In November 2012, the Marin County Boards of Supervisors adopted the **Marin OA EOP –Mass Fatality Plan Annex**. The Marin OA Mass Fatality Annex is a scenario-based, function-specific operations plan for Marin County that focuses on impacts and challenges associated with a 7.9 catastrophic earthquake on the San Andreas Fault and can be used in an All-Hazards scenario.

In March 2009, the **Marin County Sheriff's Office of Emergency Services prepared the Marin Operational Area EOP – Oil Spill Annex**. The Annex to the Marin OA EOP provides information and guidance that is specific to oil spill threats. Due to large-scale international, national, and local marine commerce and transportation, Marin County and the San Francisco Bay Area coastal waters are distinctly vulnerable to large oil spills. The overall emergency management concepts, policies, and procedures contained in the Marin OA EOP and the California Bay Area Regional Contingency Plan (RECP) remain in place. The Annex establishes coordinated incident management and field-level procedures to be used in response to an oil spill large enough to trigger the implementation of the San Francisco Bay and Delta's (SFBD) Area Contingency Plan (ACP). When using the SFBD ACP, this Annex is referred to as the Marin County Local Contingency Plan (LCP).

In July 2010, the Marin County Department of Health and Human Services prepared the **Marin Operational Area EOP – Extreme Temperature Emergency Annex** to help reduce the effects of extreme temperature events. The purpose of this annex is to establish a system for identifying potential extreme temperature events, establish a mechanism for coordinating

² The Marin EOP addresses the planned response to extraordinary situations associated with large scale disasters affecting Marin County.

³ The Marin ERP establishes procedures and aligns responsibilities to ensure the effective management of emergency recovery operations within Marin County.

response to such an event, and provide decision-makers with options that can be used to prepare and respond to extreme temperature events. The Extreme Temperature Emergency Annex supports and is used in conjunction with the Marin EOP.

Marin County OA Emergency Recovery Plan

The Marin County Sheriff's Office of Emergency Services' Marin County OA Emergency Recovery Plan (ERP) was adopted by the Marin County Board of Supervisors in November 2012. While the Marin Operational Area EOP describes the planned response to emergencies, the ERP is designed to accommodate the special challenges inherent in all disasters, especially those severe disasters requiring significant recovery effort and support. This ERP establishes procedures and assigns responsibilities to ensure the effective management of emergency recovery operations within the Marin County Operational Area. It provides an All-Hazards framework for collaboration and coordination during emergencies in the county. Further, it describes operational concepts relating to recovery, identifies components of a recovery organization, and describes general responsibilities of the Marin County Sheriff's Office of Emergency Services and the other entities for the restoration of communities in Marin. The ERP also identifies resources that State and Federal agencies may provide.

Marin County Multi-Jurisdiction Local Hazard Mitigation Plan

Hazard mitigation is the use of long-term and short-term policies, programs, projects, and other activities to alleviate the death, injury, and property damage that can result from a disaster. Marin County and its partners developed the 2018 Multi-Jurisdictional Local Hazard Mitigation Plan (2018 LHMP) to assess risks posed by natural hazards and to develop a mitigation strategy for reducing the County's risks. The County prepared the 2018 LHMP in accordance with the requirements of the Disaster Mitigation Act of 2000 (DMA 2000). Additionally, the plan complies with federal and state hazard mitigation planning requirements to establish eligibility for funding under the FEMA grant programs. The 2018 LHMP replaced the County LHMP that was approved by FEMA on August 29, 2013 and serves as the current Local Hazard Mitigation Plan for all participating jurisdictions.

The Town of Tiburon is a participating jurisdiction of the 2018 LHMP, which includes jurisdiction-specific mitigation actions that are designed to reduce or eliminate losses resulting from natural hazards. The Town approved and adopted the 2018 LHMP on March 6, 2019. The 2018 LHMP identifies risks associated with earthquake, flood, fire, tsunami, landslide, and dam inundation events and assesses the vulnerability of the Town's structures and its transportation, communications, power, and water/sewage systems due to such events.

The 2018 LHMP includes an evaluation of the previous hazard mitigation plans to determine which actions have been completed or should be retained. Table 2 includes an evaluation of prior hazard mitigation actions in Tiburon and Table 3 outlines the current and potential hazard mitigation projects and programs in Tiburon.

TABLE 2: EVALUATION OF PRIOR MITIGATION ACTIONS IN TIBURON

ACTION NAME	COMPLETED	ONGOING	NOT STARTED	STILL RELEVANT	INCLUDED IN UPDATED ACTION PLAN
'Future Mitigation Actions' from 2012					
In January 2011, the Town Council adopted the 2010 California Building Code which applies to all construction activity within the Town boundaries. The California Building Code is comprised of 11 parts that incorporate public health, safety, energy, green building and access standards used in the design and construction of all buildings. The new code provisions will allow the Town to utilize the latest technologies~ advances in construction standards and seismic design for use in new residential and commercial construction and in remodels		X		X	MLT-3
As part-of the Capital Improvement Program, the Town will implement a Shoreline Park rip rap restoration, in order to shore up all the larger rocks at Shoreline Park and help	X				

ACTION NAME	COMPLETED	ONGOING	NOT STARTED	STILL RELEVANT	INCLUDED IN UPDATED ACTION PLAN
prevent erosion into the San Francisco Bay. Shoreline Park is fully exposed to the Bay which is susceptible to sea level rise, tsunamis and possible tidal flooding.					
Also as part of the Capital Improvement Program, the Town will implement a foundation repair to a section of Paradise Drive in order to shore up the embankment by constructing a "soil nail" wall. This would help stabilize the exposed earthen bank that holds up Paradise Dr. just past the Caprice restaurant, which street segment could be susceptible to landslide as a result of earthquakes or storms.			X	X	For Tiburon Annex
The Town will continue to research the possibility of construction of a new LEED certified Public Works Corp Yard, as this is the Town's primary critical facility in need of repair/updating. Seismic retrofit work would be done simultaneously in order to ensure this critical facility could withstand the next major earthquake in the Bay Area. This project is largely dependent on funding			X	X	For Tiburon Annex
In order to assist with the prevention of wildfires, the Town will work with Conservation Corps North Bay to obtain a matching Cal Fire Grant in order to implement the fire related items within the Town's Open Space Management Plan. The Town's Public Works Department will also begin working on a "zone approach" to remedy the highest priority areas in the open space to clear out invasive species and heavy brush. In addition, the Town will begin implementation of a program designed for residents living adjacent to open space, which outlines the guidelines for mowing grasses and vegetation clearing on open space lands.		X		X	X
'On-Going Mitigation Strategies' from 2012					
Continue to comply with all applicable building and fire codes as well as other regulations when constructing or significantly remodeling infrastructure facilities (INFR, HOUS, ECON, GOVT)		X		X	MLT-3
Continue to enforce and/or comply with State-mandated requirements, such as the California Environmental Quality Act (ENVR a-1)		X		X	Complying with State and Federal regulations is considered implicit in this plan
Incorporate FEMA guidelines and suggested activities into local government plans and procedures for managing flood hazards (LAND, GOVT, HOUS, INFR)		X		X	FLD-2
Continue to participate in FEMA's National Flood Insurance Program (GOVT d-5)		X		X	Complying with State and Federal regulations is considered implicit in this plan
Continue to facilitate the distribution of emergency preparedness materials and trainings through the Tiburon Office of Emergency Services (INFR, HOUS, ECON, GOVT)		X		X	For Tiburon Annex
Conduct periodic tests of the emergency sirens and BEARS emergency warning systems (GOVT c-15)		X		X	For Tiburon Annex
Continue to maintain the emergency operations center (GOVT c-1 0)		X		X	For Tiburon Annex

SOURCE: MARIN COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN, 2018.

TABLE 3: CURRENT AND POTENTIAL HAZARD MITIGATION PROJECTS AND PROGRAMS IN TIBURON

ACTIVITY	RESPONSIBLE AGENCY	POTENTIAL FUNDING SOURCE	TIMELINE
Mitigation Activities and Priorities from Prior Local Hazard Mitigation Plan			
As part of the Capital Improvement Program, the Town will implement a foundation repair to a section of Paradise Drive in order to shore up the embankment by constructing a "soil nail" wall. This would help stabilize the exposed earthen bank that holds up Paradise Dr. just past the Caprice restaurant, which street segment could be susceptible to landslide as a result of earthquakes or storms.	City Engineer/ Public Works	General Fund, Federal Grants	0-5 Years
The Town will continue to research the possibility of construction of a new LEED certified Public Works Corp Yard, as this is the Town's primary critical facility in need of repair/updating. Seismic retrofit work would be done simultaneously in order to ensure this critical facility could withstand the next major earthquake in the Bay Area. This project is largely dependent on funding.	City Engineer/ Public Works	General Fund, Federal Grants	0-5 Years
In order to assist with the prevention of wildfires, the Town will work with Conservation Corps North Bay to obtain a matching Cal Fire Grant in order to implement the fire related items within the Town's Open Space Management Plan. The Town's Public Works Department will also begin working on a "zone approach" to remedy the highest priority areas in the open space to clear out invasive species and heavy brush. In addition, the Town will begin implementation of a program designed for residents living adjacent to open space, which outlines the guidelines for mowing grasses and vegetation clearing on open space lands.	Fire Department	General Fund, Federal Grants	0-5 Years
Continue to facilitate the distribution of emergency preparedness materials and trainings through the Tiburon Office of Emergency Services.	Tiburon Office of Emergency Services	General Fund, Federal Grants	0-5 Years
Conduct periodic tests of the emergency sirens and BEARS emergency warning systems.	Tiburon Office of Emergency Services	General Fund, Federal Grants	0-5 Years
Continue to maintain the emergency operations center.	Tiburon Office of Emergency Services	General Fund, Federal Grants	0-5 Years
New Mitigation Activities and Priorities			
Address coastal erosion along Main Street seawall.	City Engineer/ Public Works	General Fund, Federal Grants	0-5 Years
Use existing hydraulic analysis to design and implement improvements to Beach Road area drainage.	City Engineer/ Public Works	General Fund, Federal Grants	0-5 Years
Culvert repair/replacement on San Rafael Avenue at Lagoon where flooding occurred. (Belvedere – Tiburon joint project)	City Engineer/ Public Works	General Fund, Federal Grants	0-5 Years

SOURCE: MARIN COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN, 2018

Belvedere Tiburon Joint Disaster Advisory Council

The Belvedere Tiburon Joint Disaster Advisory Council serves as an advisory committee to the Tiburon Town Council and Belvedere City Council. The duty of the Belvedere Tiburon Joint Disaster Advisory Council is to review and recommend for adoption by the Town and City, the Tiburon Peninsula emergency operations plan, disaster-related mutual aid plans and agreements. Such ordinances, resolutions, rules, and regulations as are necessary to implement such plans and agreements. It shall also be the duty of the Disaster Council to assist Town/City staff in preparing the community to act before, during and after a disaster (Tiburon Municipal Code 21-4 and Belvedere Municipal Code 2.32.060). The Disaster Council is responsible for the following:

- Review and evaluate disaster preparedness progress in the public and private sectors and report these findings to the Town/City Councils;
- Promote disaster preparedness through communication and education; and
- Harness the power of every resident through education and outreach, training, and volunteer service to make their families, homes, and communities safer from natural and/or man-made disasters or emergencies.

Tiburon Peninsula Emergency Operations Plan

The Tiburon Peninsula Emergency Operations Plan (Tiburon Peninsula EOP) addresses the planned response to extraordinary emergency situations associated with disasters affecting the City of Belvedere and Town of Tiburon. The plan also addresses integration and coordination with other governmental agencies when required and as guided by applying the Whole Community approach⁴. This plan is not intended to address the normal day-to-day emergency or well-established emergency procedures. This plan accomplishes the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting the Tiburon Peninsula; and
- Establishes the overall operational concepts associated with the Tiburon Peninsula's Emergency Operations Center (Tiburon Peninsula EOC) activities and the recovery process.

The Tiburon Peninsula EOP establishes policies and procedures and assigns responsibilities to ensure the effective management of emergency operations within the City and Town. It provides information on the Tiburon Peninsula's emergency management structure and how and when the Tiburon Peninsula EOC staff is activated. The overall objective of emergency management is to ensure the effective management, support and coordination of response forces and resources in preparing for and responding to situations associated with natural disasters, technological incidents, and national security emergencies. To carry out its responsibilities, the emergency management organization will accomplish the following objectives during a disaster/emergency using the Whole Community approach:

- Maintain overall coordination of emergency response and recovery operations. This includes on-scene incident management as required;
- Coordinate and liaise with other appropriate local government agencies, as well as applicable segments of private sector entities and volunteer agencies;
- Establish priorities and resolve conflicting demands for support;
- Prepare and disseminate emergency public information to alert, warn and inform the public; and
- Disseminate damage information and other essential data.

The Tiburon Peninsula Foundation

The Tiburon Peninsula Foundation was founded in 1969 to develop projects, often in partnership with other organizations to strengthen the character of the Tiburon Peninsula. The Tiburon Peninsula Foundation supports the community by participating in projects, partnerships, and collaborations. The foundation focuses on support for local schools, recreation department, Thrift Shop, Library, Chamber of Commerce and local individuals and the foundation's projects. Past projects have included: creating green medians, funding the preparation of a children's book about Tiburon's horse Blackie, forming Blackie's Student Brigade designed to engage the youth in the restoration of the ecosystems of Blackie's Pasture and Richardson Bay. Additionally, the Tiburon Peninsula Foundation (in collaboration with members from the City of Belvedere, Town of Tiburon, Tiburon Fire District, and Belvedere Community Foundation) developed the Get Ready Program in 2006, which provides information and required actions residents would need to take care of themselves and their family after a disaster.

The Get Ready Program

The Get Ready Program was developed following Hurricane Katrina in 2005 as an attempt to provide preparedness information for their residents. A grant several years later provided the opportunity to extend the training to all of Marin County and thousands of county residents have participated in the classes. This two-hour class teaches all residents to be informed about the potential risks that they may face, how to create a family emergency plan and what supplies they would need to care for themselves and their families for 5-7 days. Since classes began in May 2006, over 200 citizens have been

⁴ Whole Community Approach (FEMA) refers to meeting needs, regardless of demographics such as age, economics, or accessibility.

trained as instructors and more than 3,000 residents have completed the program, preparing themselves for the next disaster. The Get Ready Program has also been adapted into a 1-hour class for school children and their families and is offered to all 5th graders in Marin County. Provided by either teachers or community volunteers, students learn about potential hazards and how their families can prepare for and survive primarily natural disasters.

Marin County Civil Grand Jury

Roadblocks to Safer Evacuation in Marin

The Marin County Civil Grand Jury's *Roadblocks to Safer Evacuation in Marin* report (December 2020) made nine findings related to the lack of responsibility, authority, and oversight for safe evacuation routes across Marin jurisdictions. The report included five recommendations:

R1. Within 180 days of the date of this report, the governing boards of the County of Marin and its cities and towns should direct their respective planning and public works departments to include evacuation needs among their criteria for evaluating and recommending public works projects. R2. Within 180 days of the date of this report, the governing boards of the County of Marin and its cities and towns should adopt resolutions calling on the Transportation Authority of Marin to include evacuation needs among the criteria it considers when planning and funding public works projects. R3. In calendar year 2021, the County of Marin and its cities and towns should update the safety elements of their general plans to include evacuation planning. R4. Within 120 days of the date of this report, the Transportation Authority of Marin should establish a criterion requiring that evacuation impacts be examined and stated when planning and funding infrastructure projects. R5. Within 120 days of the date of this report, the Marin Wildfire Prevention Authority should invite a Transportation Authority of Marin representative to become an at-large, nonvoting member of its Advisory/Technical Committee to support program development, funding, and implementation of improvements in evacuation routes.

Wildfire Preparedness: A New Approach

The Marin County Civil Grand Jury's *Wildfire Preparedness: A New Approach* report (April 2019) reviewed conditions related to wildfire risks and assessed plans in place to address wildfire vulnerabilities. The report identified four primary areas of vulnerability for the County: vegetation management, public education, alerts, and evacuation. The report made 21 findings associated with these topics and one overall finding related to the lack of comprehensive, coordinated countywide policies and funding. The report provided recommendations for each topic area and recommended creation of a countywide entity to coordinate fire preparedness associated with vegetation management, fuel reduction crews, education, alerts and evacuations, and public participation.

Information in the report regarding evacuation routes and risks informed the Emergency Evacuation Readiness and Routes discussion under the Environmental Setting section below.

ENVIRONMENTAL SETTING

EMERGENCY OPERATIONS CENTER

The Tiburon Police Department was established in 1972 following the town's incorporation by eight years. In addition to normal police activities, the police station also houses the Emergency Operations Center, which is equipped to manage disaster response for Tiburon and Belvedere.

The Tiburon Emergency Operations Center is activated during extraordinary emergencies or events and during disasters. The Tiburon Peninsula EOP guides the Town on how to operate during an emergency. The Tiburon Peninsula EOP utilizes the Standard Emergency Management System criteria for identifying Tiburon Peninsula EOC activation levels. Tiburon also utilizes standard operating procedures established by Police, Fire and Public Works for conducting routine monitoring of events to determine appropriate actions prior to activating the EOC. Tiburon Peninsula EOC activations may be either planned or immediate need. When the Tiburon Peninsula EOC is activated as part of a planned need, staffing will be determined as

shown in Table 4. When the Tiburon Peninsula EOC is activated as part of an immediate need, the first arriving person in the EOC shall serve as EOC Director until relieved.

TABLE 4: EOC ACTIVATION LEVEL EXAMPLES

STATUS	ACTIVATION LEVEL	EOC STAFFING LEVEL	ACTIVITIES	NOTES
Cold	N/A	None	Stand-By	EOC is not set up or configured for operations
Warm	N/A	None	Stand-By	EOC is set up but not staffed
Hot	See Below	See Below	See Below	EOC is set up and staffed as noted below.
Hot	Level 1 (Minimal)	1 person (EOC Director)	Stand-By To monitor a developing emergency or due to a declared "Warning"	Examples: Severe Weather or Tsunami Warning; Significant Incidents involving Two or More Cities; Earthquake Advisory Level I.
Hot	Level 2 (Partial)	EOC Director, Planning/Intelligence & Logistic Coordinators	Potential wide spread and/or long duration emergency needing support and coordination. Determine specific General or Management Staff positions per anticipated emergency needs.	Examples: Severe Weather or Tsunami Warning; Earthquake with Substantial Local damage reported; Earthquake Advisory Level II or III; Major rain or Wind Storm with Damage; Two or More large Incidents involving Two or More Cities; Wildfire affecting Developed Area; Major Scheduled Event; Incident involving large-scale or possible large-scale evacuations.
Hot	Level 3 (Full)	All listed EOC positions indicated in the EOP	Major incident or event obvious damage or when a Proclamation of a Local Emergency is needed	Examples: Major city or regional emergency - multiple areas with heavy resource involvement; Major Wild land Fire or Earthquake with Severe Damage

SOURCE: *TIBURON PENINSULA EOP, MAY 2019.*

At the local level, the Tiburon Peninsula EOC is used as the central location for gathering and disseminating information, coordinating all jurisdictional emergency operations, and coordinating with the Marin County Office of Emergency Services (OES) and the Marin County Operational Area EOC level during events outside the scope of the City of Belvedere and/or the Town of Tiburon. When a disaster occurs and two or more of the county's local jurisdictions' EOCs (or at the request of one local jurisdiction) within the Marin County OA are activated, the Marin OA EOC serves as the focal point for information transfer and supports requests by cities/towns, such as the City of Belvedere and Town of Tiburon. The OA EOC is maintained by the Marin OES, which is responsible for planning, outreach, and training as it relates to disaster management and emergency preparedness in Marin County.

If the scope of an emergency is larger than the Marin OA, regional- and state-level EOCs may need to be activated and serve as the focal point of information between counties, cities, and towns. The California Governor's Office of Emergency Services is a California cabinet-level agency that is responsible for emergency preparedness, response, recovery, and homeland security activities within the state.

TIBURON VULNERABILITY AND THREAT ASSESSMENT

The State of California Emergency Plan (SEP), Marin OA EOP, and Tiburon Peninsula EOP each identify hazards and vulnerabilities that have the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural losses, damage to the environment, interruption of business, or other types of harm or loss. The Tiburon Peninsula is vulnerable to a wide range of threats. In recent years, the Tiburon Peninsula has experienced events such as earthquakes, floods, fires, hazardous materials spills, landslides, and storms. There are three broad categories of hazards identified in the Tiburon Peninsula EOP that can affect the peninsula, including natural, technological, and man-made threats. Table 5 below outlines potential threats and hazards in the Tiburon Peninsula.

TABLE 5: POTENTIAL THREATS AND HAZARDS

NATURAL	TECHNOLOGICAL	MANMADE
Earthquake	Public Health Crisis	Transportation Accident
Flood	Hazardous Materials Incident (e.g., oil spill)	Terrorism
Wildland Fire	Dam Failure	Civil Disturbance
Winter Storm	Energy Disruption	National Security Emergency
Tsunami	Radiological Incident	Security Related Threats
Landslide		
Drought		
Extreme Temperature Event		
Climate Change/Sea Level Rise		

SOURCE: TIBURON PENINSULA EOP, MAY 2019.

The following provides a description of the various hazards and vulnerabilities that have the potential to occur in the Planning Area.

Earthquake

According to the FEMA, nearly 70% of the national earthquake risk – an annualized loss of \$3.1 billion dollars – is concentrated in the State of California. Growing urbanization and increasing reliance on complex infrastructure for power, water, telecommunications, and transportation magnify that risk. Varying in type and intensity, earthquakes are perhaps the least predictable of any of the potential hazards. Often, the main earthquake is followed by a series of aftershocks. Aftershocks can be larger than the original quake and pose a significant threat to those responding to the first event.

Several known active and potentially active earthquake faults are located within and near Marin County, including the San Andreas and the Rogers Creek/Healdsburg (Belvedere Tiburon Joint Disaster Advisory Council, May 2019). A major earthquake occurring in or near these areas could result in deaths, casualties, property and environmental damage, and disruption of normal government and community services and activities. The effects could be aggravated by collateral emergencies such as fires, flooding, hazardous material spills, utility disruptions, landslides, dam failures and transportation emergencies. The location of the epicenter, as well as the time of day and season of the year, would significantly influence the number of casualties and the amount of damage. Section 4 (Geology, Soils, and Seismicity) of the *Conservation Existing Conditions Report* provides further detail on earthquake risks in the Planning Area, including an overview of the potential for geological hazards to occur. Faults in the vicinity of the Planning Area are shown on Figure 4-3 of the *Conservation Existing Conditions Report*.

A major earthquake event would exceed the response capability of the City of Belvedere and Town of Tiburon’s emergency management organizations, requiring assistance from adjacent cities and towns, from volunteer and private agencies, the Marin County Sheriff’s OES, the Governor’s Office of Emergency Services and the federal government (Belvedere Tiburon Joint Disaster Advisory Council, May 2019). Response efforts will be significantly hampered by the loss of communications and transportation systems.

As part of the 2018 LHMP, a vulnerability assessment was prepared to identify the number of vulnerable structures, transportation facilities, communication facilities, power facilities, water and sewage facilities, and critical facilities in Tiburon that would be damaged/impacted from an earthquake hazard. Table 6 identifies the potentially vulnerable assets in Tiburon from an earthquake.

TABLE 6: VULNERABLE ASSETS/FACILITIES IN TIBURON – EARTHQUAKES

VULNERABLE ASSETS	NUMBER
Structures	
Single-Family Structures	2,402
Multi-Family Structures	870
Commercial Structures	49

VULNERABLE ASSETS	NUMBER
Industrial Structures	0
Historic Structures	4
Transportation Facilities	
Roads	45
Ferry Landing	1
Railroad	0
Communication Facilities	
Communication Facility	1
Power Facilities	
Transmission Tower	0
Substation	0
Natural Gas Substation	0
Electric Transmission Line	0
Natural Gas Pipeline	4
Water and Sewage Facilities	
Wastewater Treatment Plants	3
Pump Stations	2
Critical Facilities	
Schools	4
Law Enforcement and Fire	3
Medical Facilities	0
Airport	0

SOURCE: MARIN COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN, 2018.

Fire

Wildland fire hazards exist in varying degrees throughout the Tiburon Peninsula and probably pose the greatest threat to public safety and property of all other potential hazards. The fire season generally lasts from five to six months, but has been elongated due to climate change. The wildland fire hazard is caused by a combination of factors including weather, topography, highly flammable vegetation/fuel loading and human activity. Since 1954, 73 percent of presidentially declared disasters in California were the result of wildfires. Over the past 57 years, wildfires have claimed 97 lives, resulted in 1,504 injuries, and \$2.1 billion in California Governor's Office of Emergency Services (Cal OES) administered disaster costs.

According to the Tiburon Peninsula EOP, approximately 50% of the community is in a designated Wildland-Urban Interface (WUI) Zones by local authority. This includes both public and private lands. Public lands are lands owned by the Town of Tiburon as well as the County of Marin, and the Marin County Open Space District. The Marin County Open Space District, in conjunction with the Town of Tiburon owns or manages approximately 800 acres of land on the Tiburon Peninsula. These areas are characterized by steep slopes and are covered by dense stands of vegetation which can burn explosively and contribute to fire spread. A major fire has not occurred in Tiburon or Belvedere in a decade, but neighboring Angel Island did burn substantially in 2008 (Belvedere Tiburon Joint Disaster Advisory Council, May 2019). Section 3 of this report discusses wildfire hazards in more detail. Figures 1, Fire Threat, 2, Fire Hazard Severity Zones, and 3, Fire Hazards and Wildland Urban Interface, Intermix, and Wildfire Influence Zones.

As part of the 2018 LHMP, a vulnerability assessment was prepared to identify the number of vulnerable structures, transportation facilities, communication facilities, power facilities, water and sewage facilities, and critical facilities in Tiburon that would be damaged/impacted from wildfire. Table 7 identifies the potentially vulnerable assets in Tiburon from fires. Section 4 of this report provides further detail on fire risks in the Planning Area.

TABLE 7: VULNERABLE ASSETS/FACILITIES IN TIBURON – FIRE

VULNERABLE ASSETS	NUMBER
Structures	
Single-Family Structures	2,191
Multi-Family Structures	729
Commercial Structures	9
Industrial Structures	0
Historic Structures	0
Transportation Facilities	
Roads	39
Ferry Landing	0
Railroad	0
Communication Facilities	
Communication Facility	1
Power Facilities	
Transmission Tower	0
Substation	0
Natural Gas Substation	0
Electric Transmission Line	0
Natural Gas Pipeline	3
Water and Sewage Facilities	
Wastewater Treatment Plants	0
Pump Stations	0
Critical Facilities	
Schools	0
Law Enforcement and Fire	2
Medical Facilities	0
Airport	0

SOURCE: MARIN COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN, 2018.

Flood

Substantially populated counties with disproportionately high numbers of individuals with a disability or an access or functional need are in flood-prone areas such as the San Francisco Bay Area. Over five million Californians, or approximately 15 percent of the total population, live in a Flood Insurance Rate Map (FIRM) designated floodplain. Most of this population resides in expanding urban centers located in floodplains where flooding could result in extensive loss of life and billions of dollars in damages.

Floods are generally classed as either slow-rise or flash floods. Slow-rise floods may be preceded by a warning time measured in hours or days. Evacuation and sandbagging for a slow-rise flood may lessen flood-related damage. Conversely, flash floods are the most difficult to prepare for, due to the extremely short warning time, if any is given at all. Flash flood warnings usually require immediate evacuation within the hour.

A large portion of developed and undeveloped low-lying lands on the Tiburon Peninsula are subject to flooding due to a combination of factors including periodic heavy winter rainfalls, tidal fluctuations, and potentials for tsunamis. During heavy rainfall conditions, and especially when combined with high tides, certain areas are known to flood, including Beach Road at Tiburon Blvd., Tiburon Blvd at Ned's Way, and Tiburon Blvd near Greenwood Beach Rd by the 76 gas station. Actions, such as clearing storm drains, are taken by the Departments of Public Works in Belvedere and Tiburon to mitigate flooding on the Peninsula regularly and prior to expected storms (Belvedere Tiburon Joint Disaster Advisory Council, May 2019). Flooding hazards in the vicinity of the Planning Area are discussed in greater detail in Section 4 of this report and are shown

on Figures 4, FEMA Flood Zone Designations, and 5, Tsunami Inundation Zones. Projected sea level rise and flooding events associated with climate change are discussed in the *Climate Change Existing Conditions Report*.

As part of the 2018 LHMP, a vulnerability assessment was prepared to identify the number of vulnerable structures, transportation facilities, communication facilities, power facilities, water and sewage facilities, and critical facilities in Tiburon that would be damaged/impacted from a flood hazard. Table 8 identifies the potentially vulnerable assets in Tiburon from flooding.

TABLE 8: VULNERABLE ASSETS/FACILITIES IN TIBURON – FLOODING

VULNERABLE ASSETS	NUMBER
Structures	
Single-Family Structures	61
Multi-Family Structures	41
Commercial Structures	43
Industrial Structures	0
Historic Structures	1
Transportation Facilities	
Roads	3
Ferry Landing	1
Railroad	0
Communication Facilities	
Communication Facility	0
Power Facilities	
Transmission Tower	0
Substation	0
Natural Gas Substation	0
Electric Transmission Line	0
Natural Gas Pipeline	0
Water and Sewage Facilities	
Wastewater Treatment Plants	1
Pump Stations	0
Critical Facilities	
Schools	4
Law Enforcement and Fire	1
Medical Facilities	0
Airport	0

SOURCE: MARIN COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN, 2018.

Landslides

Landslides commonly occur in connection with other major natural disasters such as earthquakes, volcanic eruptions, wildfires, and floods; however, landslides can also be caused by normal, seasonal rainfall or erosion. Expansion of residential and recreational developments into hillside areas leads to more people threatened by landslides each year. The Town of Tiburon lies in the California Coast Ranges and has two contrasting topographic settings: steep hills and ridges, and flat marshlands, bay plains, and mudflats. The hills and ridges of Marin are characterized by very steep slopes and defined differences in the strength and stability of the geological materials underlying the surface soils (Belvedere Tiburon Joint Disaster Advisory Council, May 2019).

Landslides constitute one of the principal hazards to structures, roads, and utilities on these hillsides. A typical soil debris avalanche in Marin involves several hundred cubic yards of soil and colluvium (rock fragments, sand, etc.) that accumulate on steep slopes or at the foot of cliffs and is the result of total saturation of a part of the regolith (mantlerock or the loose,

unconsolidated material, residual or transported, that rests on the solid rock of the earth's crust) on a hillside (Belvedere Tiburon Joint Disaster Advisory Council, May 2019). During the last 20 years, they have occurred abundantly when excessive rain fall occurs in a relatively short period of time or when a heavy storm brings rain to an already saturated ground. Section 4 (Geology, Soils, and Seismicity) of the *Conservation Existing Conditions Report* provides further detail on earthquake risks in the Planning Area, including an overview of the potential for geological hazards to occur. Faults in the vicinity of the Planning Area are shown on Figure 4-3 of the *Conservation Existing Conditions Report*.

As part of the 2018 LHMP, a vulnerability assessment was prepared to identify the number of vulnerable structures, transportation facilities, communication facilities, power facilities, water and sewage facilities, and critical facilities in Tiburon that would be damaged/impacted by landslides. Table 9 identifies the potentially vulnerable assets in Tiburon from landslides.

TABLE 9: VULNERABLE ASSETS/FACILITIES IN TIBURON – LANDSLIDES

VULNERABLE ASSETS	NUMBER
Structures	
Single-Family Structures	582
Multi-Family Structures	49
Commercial Structures	0
Industrial Structures	0
Historic Structures	1
Transportation Facilities	
Roads	11
Ferry Landing	0
Railroad	0
Communication Facilities	
Communication Facility	0
Power Facilities	
Transmission Tower	0
Substation	0
Natural Gas Substation	0
Electric Transmission Line	0
Natural Gas Pipeline	2
Water and Sewage Facilities	
Wastewater Treatment Plants	0
Pump Stations	0
Critical Facilities	
Schools	0
Law Enforcement and Fire	0
Medical Facilities	0
Airport	0

SOURCE: MARIN COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN, 2018.

Dam and Levee Failure

California has over 1,400 dams and over 13,000 miles of mostly earthen levees that protect the state's residents, agricultural lands, and water supply. Dam failure is the collapse or failure of an impoundment that causes significant downstream flooding. The most common cause of dam failure is overtopping where the water behind the dam flows over the face of the dam and erodes the structure. This is most common during heavy rainstorms. The principal consequences of dam failure are injury, loss of life, and significant downstream property damage.

As described in Section 4 of this report, there are no dams located on the Tiburon Peninsula and the Planning Area is not located within a dam inundation zone.

Severe Weather

While Marin County enjoys a moderate climate year-round, the unexpected extremes of temperatures can be dangerous to segments of the population unable to take adequate measures to protect themselves. Extremely hot or cold temperatures can result in death, especially among the medically fragile and elderly, and have significant impacts on agriculture. Approximately 47 people are hospitalized each year from heat-related emergencies in Marin County⁵. Additionally, 93 people died in California from heat-related emergencies in 2018⁶; however, a severe or extended heat wave can cause more casualties. For example, a 13-day heat wave in 2006 resulted in 136 deaths.

Marin County's Extreme Temperature Annex serves as a guide to help reduce the effects of extreme temperature events. According to the Extreme Temperature Annex, Marin County normally enjoys a moderate Mediterranean-type climate ranging from an average low of 41°F to a high of 81°F. However, these are average temperatures and Marin County has historically encountered temperatures in the summer ranging as high as 110°F in 1961 to a low of 20°F in the winter of 1990. The Marin County Health and Human Services Department maintains a list of potential cooling and heating centers that have agreed to extend their hours of operation and where people could go to get out of extreme weather events. The closest extreme temperature centers to Tiburon are in San Rafael.

While there are no identified extreme temperature centers within the Tiburon Planning Area, Tiburon may choose to open a cooling/heating center during an extreme weather event. The Marin County's Extreme Temperature Annex provides suggested minimum criteria for extreme temperature centers that jurisdictions can refer to and utilize. Additionally, the Extreme Temperature Annex provides sample press releases for local jurisdictions to utilize to alert the community of open extreme temperature centers in the Planning Area. Incidences of severe weather are projected to increase in the future under climate change scenarios as discussed in the *Climate Change Existing Conditions Report*.

Tsunami

A tsunami is a series of traveling ocean waves generated by earthquake or underwater landslides. As the tsunami crosses the deep ocean, its length from crest to crest may be one hundred miles or more, its height from the bottom of the wave to the crest only a few feet. As the tsunami enters the shallow water of coastlines in its path, the velocity of its waves diminishes and wave height increases. It is in these shallow waters that tsunamis become a threat to life and property, as they can crest to heights of more than 100 feet, and strike with devastating force. Depending on the location of an incident, a tsunami can reach the California coast in as little as ten minutes, for a local-source earthquake, or take from five to 14 hours, for a distant-source earthquake. The Great Alaskan earthquake of 1964 generated a tsunami that killed 12 people and destroyed 30 blocks in Crescent City, California.

Figure 5 shows the Tsunami Inundation Areas within the Tiburon Peninsula. Numerous residences, businesses, and yacht clubs on the Tiburon Peninsula are waterfront properties and are located within tsunami inundation areas. Additionally, many recreational areas such as beaches, shoreline park, Paradise Park, and the multiuse path along the shoreline are at risk from tsunamis. A tidal surge from a tsunami could lead to flooding of low-lying areas, similar to a winter storm related slow rise flood, but much more rapid and less predictable. Inundation could continue for up to 24 hours from the time of initial impact. As part of the Marin County Multi-Jurisdictional Local Hazard Mitigation Plan, a vulnerability assessment was prepared to identify the number of vulnerable structures, transportation facilities, communication facilities, power facilities, water and sewage facilities, and critical facilities in Tiburon that would be damaged/impacted by tsunamis. Table 10 identifies the potentially vulnerable assets in Tiburon from Tsunamis.

⁵ Tracking California. 2021. Heat Related Illness Summary Tables. Available at: <https://www.trackingcalifornia.org/heat-related-illness/heat-related-illness-summary-tables>

⁶ Tracking California. 2021. Heat Related Death Summary Tables. Available at: <https://www.trackingcalifornia.org/heat-related-illness/heat-related-deaths-summary-tables>

TABLE 10: VULNERABLE ASSETS/FACILITIES IN TIBURON – TSUNAMIS

VULNERABLE ASSETS	NUMBER
Structures	
Single-Family Structures	53
Multi-Family Structures	72
Commercial Structures	45
Industrial Structures	0
Historic Structures	0
Transportation Facilities	
Roads	4
Ferry Landing	1
Railroad	0
Communication Facilities	
Communication Facility	0
Power Facilities	
Transmission Tower	0
Substation	0
Natural Gas Substation	0
Electric Transmission Line	0
Natural Gas Pipeline	2
Water and Sewage Facilities	
Wastewater Treatment Plants	1
Pump Stations	0
Critical Facilities	
Schools	0
Law Enforcement and Fire	1
Medical Facilities	0
Airport	0

SOURCE: MARIN COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN, 2018.

Section 4 of this report provides further detail on tsunami risks in the Planning Area.

Winter Storm

In recent years, winter storms in California have grown increasingly intense and longer lasting. Flash floods, mudslides, high coastal surf, coastal erosion, stream and creek flooding, snowstorms, and avalanches have all recently occurred. Especially noteworthy are the tropical storms that are blown into California on a wind current called the “Pineapple Express”. From the central Pacific, warm storm fronts move quickly and directly northwest, picking up energy and pulling moisture from the ocean as they travel. Once they come ashore and are forced to rise over the coastal mountains, they cool and begin to drop their moisture. Winter storms frequently drop large amounts of rain onto the coastal mountains which can result in flash flooding and landslides

In Marin County, winter storms frequently drop large amounts of rain onto the coastal mountains. This often causes flash flooding and landslides. Another frequent storm behavior is high winds. High winds are most common and dramatic along the coast and in the coastal mountains. The high winds result in damage to structures, downed trees, broken telephone lines, as well as arcing and downed power lines. Due to the rugged nature of the area, it can take days or weeks to make full repairs to electrical transmission and distribution lines. Power outages are a major issue almost every winter.

In recent history, the winter storms of 1970, 1973, 1982, 1983, 1986, 1998, 2005, and 2006 caused significant damage. For example, Corte Madera Creek has had a history of flooding that caused severe damage to the surrounding communities with the largest recorded flows in the winter of 1982 and more recently in December 2005 and January 2006. During this

period, widespread localized flooding occurred in almost all areas of the County. San Anselmo, Ross, Fairfax, and Mill Valley were the most heavily impacted. Power outages peaked at 10,000 customers in January. Nine schools closed due to mud, water, and road damages and over 20 major roads were closed during the early part of the storm. Two levees in the Novato area were damaged. Over a thousand homes, apartments, and businesses were damaged or destroyed⁷.

Drought

A gradual phenomenon, drought often takes two or three consecutive winters with less than average precipitation to produce any significant impacts. Drought produces a variety of impacts that span many sectors of the economy and reach well beyond the area experiencing physical drought. Impacts are commonly referred to as direct or indirect. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and rationing are a few examples of direct impacts.

California has experienced major droughts in 1912-13, 1918-20, 1923-24, 1929-34, 1947-50, 1959-61, 1976-77, and 1987-92 and 2010-18. The drought of 1976-77 was the worst in the state's recent history due to the driest (1977) and fourth driest (1976) years on record. Statewide, California's average annual rainfall is 200,000,000 acre-feet. In 1977, precipitation totaled only 90,000,000 acre-feet, or 45 percent of average. This drought left California with dangerously low reservoir and ground water levels. 47 of the state's 58 counties declared emergencies, and economic losses totaled \$2.4 billion (Marin County Sheriff's Office of Emergency Service, 2014).

Marin County is very sensitive to the impacts of drought due to its growing population, dependence on fragile water sources, agricultural economic base, and environmental concerns. Marin County has two principal sources of water for domestic, commercial, industrial, and agricultural use: the Mt. Tamalpais Watershed and water imported from the Russian and Eel Rivers. Some communities make use of limited groundwater sources. Additional water sources include diversions from small streams and reservoirs. Most West Marin communities depend completely on ground water pumping and storage of surface waters from rainfall and streams.

As discussed in the *Climate Change Existing Conditions Report*, the Marin Municipal Water District (MMWD) projects reduced storage levels under modeled climate change scenarios which may increase MMWD's vulnerability to drought events as well as catastrophic events with shore, intense impact periods.

Hazardous Materials Incident

A hazardous material is any substance that may be explosive, flammable, poisonous, corrosive, reactive, radioactive, or any combination thereof, because of its quantity, concentration, or characteristics. Hazardous materials require special care and handling because of the threats they pose to public health, safety, and the environment. The production, transportation and use of hazardous materials have become a normal part of society. California has approximately 160,000 businesses regulated for storing, transporting, or handling hazardous materials. There are also four nuclear power plant sites in the state, one of which is operational and three in the process of being decommissioned. General categories of hazardous materials include chemical, biological, radiological, nuclear, explosive, oil spills, and any incident that results in the release of agents into the environment including stationary sources, railway, ports, and highways.

There are about 6,600 hazardous materials releases each year. Depending on the severity of release and type of material, a hazardous materials emergency may cause injury, death, property damage, environmental damage, or may result in orders to evacuate or shelter in place. The Tiburon Peninsula is not home to the large industrial complexes normally associated with a high incidence of hazardous material emergencies. Marin County is served by one hazardous materials team. Due to traffic congestion, it is estimated that significant out-of-county assistance may be unavailable for a period of one to three hours – especially if the incident occurs at a peak traffic time.

⁷ Marin County Sheriff's Office of Emergency Services. 2014. Marin Operational Area Emergency Operations Plan.

According to the Tiburon Peninsula EOP, hazardous materials incidents on the Peninsula would most likely occur on the transportation routes or at fixed hazardous materials sites within the City of Belvedere or Town of Tiburon. Hazardous materials are often moved through the area on U.S. Highway 101; however, they rarely pass through the Tiburon Peninsula. Limited hazardous materials would come onto the Peninsula as the only locations that have gas pumps are the 76 Station at Greenwood Beach Road and Tiburon Boulevard and at the Department of Public Works Corporation Yards in both Belvedere and Tiburon (Belvedere Tiburon Joint Disaster Advisory Council, May 2019). Section 2 of this report provides further detail on hazardous materials risks in the Planning Area.

Climate Change/Sea Level Rise

The effects of increasing global temperature are far-reaching and extremely difficult to quantify. The scientific community continues to study the effects of global climate change. In general, increases in the ambient global temperature due to increased GHGs are anticipated to result in rising sea levels, which could threaten coastal areas through accelerated coastal erosion, threats to levees and inland water systems and disruption to coastal wetlands and habitat.

Climate change has the potential to significantly affect Tiburon's residents and businesses, as well as other communities in the San Francisco Bay and around the world. For example, in Marin, a modest 10- inch sea level rise could reach 700 buildings and 8 miles of roads along the bay, and a 60-inch rise, combined with a 100-year storm surge, could inundate 12,000 buildings and 130 miles of roads⁸. At-a-glance, the long-term projection impacts of sea level rise under a 100-year storm surge could result in over \$400 million in assessed value damage and nearly \$600 million in the single-family market in Tiburon, as well as approximately 2.5 miles of flooded roadways exposed to saltwater and erosion (Marin County Department of Public Works, June 2017).

Section 2 of the *Climate Change Existing Conditions Report* includes a detailed discussion of the potential threats to Tiburon due to climate change and sea level rise.

Energy Disruption

Modern society has increasingly grown dependent on technologies which use various sources of energy. Events in the last 30 years have underscored the major impacts that a disruption in the energy supply can have, such as the major Arab oil embargo in 1973 which led to an increase in domestic oil production, additional investment in alternative energy sources, and inflation and a marked reduction in the Gross National Product (Belvedere Tiburon Joint Disaster Advisory Council, May 2019).

In California, energy production, storage, and distribution systems are vulnerable to physical hazards as well as shortages caused by market forces, weather, and operating conditions. For example, incidents like the Aliso Canyon leak, during which nearly 100,000 tons of methane gas escaped, may lead to blackouts or disruption in the production of energy. There is no significant manufacturing of any petroleum products in Marin or on the Tiburon peninsula. The majority of these products are imported from Bay Area refineries. A natural gas pipeline feeds much of the population along the U.S. Highway 101 corridor and feeds smaller distribution lines in Belvedere and Tiburon (Belvedere Tiburon Joint Disaster Advisory Council, May 2019).

Civil Unrest/Disturbance

Civil unrest/disturbance includes incidents that are intended to disrupt a community to the degree that law enforcement intervention is required to maintain public safety. Civil disturbances are generally associated with controversial political, judicial, or economic issues and/or events. Every major metropolitan area in California has experienced and is at risk for civil unrest. The most significant civil unrest incident in the state was the 1992 Los Angeles Civil Disturbance that resulted

⁸ Marin County Department of Public Works. June 2017. Marin Shoreline Sea Level Rise Vulnerability Assessment (pp. 25, 43, 63).

in 53 deaths, over 2,300 injuries, and over \$800 million in damages. This event also precipitated simultaneous, but smaller, incidents throughout California and the country. The most recent civil unrest/disturbance in California were the police brutality protests of May 2020, which resulted in the national guard being deployed in some cities across the state, including San Francisco, Los Angeles, and Sacramento.

The *Community Services and Facilities Existing Conditions Report* will provide further detail on public safety services (such as police) serving the Planning Area.

Pandemic and Epidemic

One of the gravest threats to the life safety of Marin County residents and visitors is posed by biological agents that occur naturally. Bacteria and viruses continue to evolve and spread. Drug-resistant strains of these pathogens also pose serious challenges to modern medicine. A public health crisis will immediately impact the width and breadth of emergency medical services.

A disease outbreak can cause illness and result in significant casualties. Since 1900, there have been four influenza pandemics that killed approximately 775,000 people in the United States. Presently, a newly identified coronavirus, SARS-CoV-2, has caused a worldwide pandemic of respiratory illness, called COVID-19. Covid-19 appeared in Wuhan, a city in China, in December 2019 and eventually spread worldwide. As of December 17, 2020, there are over 74.7 million confirmed cases worldwide, which has resulted in over 1.66 million deaths⁹. In the United States alone, there are over 17 million confirmed cases, which have resulted in approximately 310,000 deaths. California accounts for over 1.7 million of those confirmed cases and approximately 22,000 of the Covid-19-related deaths.

The 2014 Ebola virus, 2016 Zika, and the 2020 Covid-19 outbreaks highlight how, in the absence of a functional health system to monitor the public health situation and quickly develop an integrated response, an epidemic can proliferate rapidly and pose significant problems to our communities. The *Community Services and Facilities Existing Conditions Report* provides further detail on public safety services serving the Planning Area.

Terrorist Attack/Cyber Attack

The Federal Bureau of Investigation (FBI) defines terrorism as “the unlawful use of force against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in the furtherance of political or social objectives”. Since the events of September 11, 2001, a significant increase in the assessment and preparation for terrorism has been a national priority.

Experts generally agree that there are five of categories Weapons of Mass Destruction (WMD) which terrorists could use: Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE). Therefore, CBRNE weapons are a threat to the people of California. Chemical weapons, biological agents, and explosive devices are used to cause fear and to injure or kill. Radiation Dispersal Devices (RDDs) are explosive devices that contain radioactive materials to spread contamination causing disruption of normal activities. An Improvised Nuclear Device (IND) is a nuclear weapon bought or stolen from a nuclear state, or a weapon fabricated by a terrorist group from illegally obtained nuclear weapons material, that produces a nuclear explosion and causes widespread destruction from the blast as well as dangerous radioactive fallout over large areas. Although traditional nuclear weapons, RDDs, or INDs have not been used by foreign governments or terrorists to date, these unlikely events would have extremely high consequences. A nuclear detonation would challenge the capacity of public health and first responder systems and have widespread impacts to the public at large.

According to the Tiburon Peninsula EOP, the San Francisco Bay Area contains many high-profile sites and buildings that are considered potential terrorist targets. Therefore, even though Marin County and the Tiburon Peninsula may not suffer such an attack, it is likely that it will be asked to provide support to this major metropolitan area that has been impacted.

⁹Johns Hopkins University of Medicine Coronavirus Resource Center. December 2020. Available at: <https://coronavirus.jhu.edu/map.htm> |

Another consideration is the potential for large numbers of the public to move from the impacted area due to actual or perceived dangers.

The *Community Services and Facilities Existing Conditions Report* provides further detail on public safety services (such as police) serving the Planning Area.

EMERGENCY EVACUATION READINESS AND ROUTES

In 2020, California experienced its worst fire season to date, resulting in approximately 4,178,000 estimated acres burned, 9,639 number of fire incidents, and 10,488 structures damaged or destroyed (as of December 22, 2020)¹⁰. California's 2020 fire season got off to an early start in mid-August with dry lightning that sparked five of the six largest wildfires in the state's history. As of the end of September, nearly four million acres had burned, 22 major wildfires were still active, and 30 people were dead¹¹. As fires burned throughout the San Francisco Bay Area, Marin County sheltered from heavy smoke and kept an eye on the Woodward Fire in the Point Reyes National Seashore, understanding an evacuation could be on a horizon.

While California wildfire season brings the largest threat of mandatory evacuations throughout the state, any hazard or emergency that occurs within a community can force residents to evacuate. For example, in November 2018, heavy downpours across Southern California prompted flash flood warnings and mandatory evacuations for about 4,000 homes, resulting in the mass evacuation of thousands of Malibu residents.¹² Evacuations such as these are a real reality for Marin County and the Town of Tiburon due to the community's susceptibility to hazards and threats, such as wildfires, flooding, tsunamis, and earthquakes, as described above.

In April 2019, the Marin County Civil Grand Jury released the 2019 *Wildfire Preparedness: A New Approach* report, which reviewed the conditions that makes Marin County vulnerable to wildfire and assessed community's readiness to facilitate mass evacuations. The report concluded that evacuations throughout Marin will be chaotic, and could be deadly, especially during a wildfire due to the County's geography, overgrown vegetation, and existing transportation network. Additionally, the report concluded that emergency planners in many jurisdictions throughout Marin, including Tiburon, do not publicize all possible evacuation routes and other exits including stairs, paths, fire roads and shortcuts because of the unpredictability of wildfires.

The geography of Marin County is varied and most of the county is open space, much of which has become dangerously overgrown (Marin County Civil Grand Jury, 2019). In several areas, an "urban interface" fire hazard is created as neighborhoods directly border wild lands, parks, or heavily vegetated areas. These areas often have mature vegetation and large brush or tree canopies which could cause the fire to spread quickly. Approximately 69,000 homes in Marin are in the Wildland Urban Interface (WUI) area. Additionally, approximately 50% of the Tiburon Peninsula is in a WUI area, as designated by local authority¹³. In the WUI zones, many residential communities are in steep, box canyons with only one entry or exit road. Houses built on hills are frequently connected to safety only by narrow, winding roads that lack shoulders and have a steep drop to one side. Roads in these areas also snake through hills covered by dense vegetation. Additionally, structures located in the WUI Zone increase fuel loading. Many of the homes are built from wood with wood siding and wood shake/shingle roofing.

The topography and overgrown vegetation within Marin County and Tiburon create conditions for vulnerable to catastrophic evacuation failures. For example, the Camp Fire, named for Camp Creek Road where it is believed to have started east of Paradise, was the single most destructive wildfire in California history and the worst in the United States in a century. Close to 19,000 structures burned. Evacuations in the Camp Fire proved deadly due to poor vegetation management on both sides

¹⁰ CalFire. 2020. 2020 Incident Archive. Available at: <https://www.fire.ca.gov/incidents/2020/>

¹¹ Marin County Civil Grand Jury. 2020. Roadblocks to Safer Evacuation in Marin.

¹² CBS Interactive Inc. 2018. "Thousands evacuated as flash floods, mudslides hit wildfire-ravaged California".

¹³ Belvedere Tiburon Joint Disaster Advisory Council. 2019. Tiburon Peninsula EOP.

of the evacuation routes, which created fuel loads that sent temperatures to over 1500 degrees. This intense heat melted tires and wheel rims, and many newer cars simply ceased to operate when their air intake temperature sensors detected extreme heat. Roads were blocked with abandoned cars, fallen trees and downed power lines, which led to panic -- creating a lethally dangerous situation for those attempting to escape the fire, resulting in some people dying in their cars while attempting to evacuate¹⁴. The Marin County Civil Grand Jury's 2019 *Wildfire Preparedness: A New Approach* report included a list of 22 findings and 15 recommendations. Of the 22 findings, the following eight were related to evacuations in Marin County:

- In the WUI and in many town centers, infrastructure and roads are inadequate for mass evacuations (F14);
- Evacuation routes are dangerously overgrown with vegetation and many evacuation routes are too narrow to allow safe passage in an emergency (F15);
- Emergency planners often do not publicize evacuation routes due to their mistrust of the public (F16);
- Town councils, planners, and public works officials have not addressed traffic choke points and, in some instances, they have created obstacles to traffic flow by the installation of concrete medians, bumpouts, curbs, speed bumps, and lane reductions (F17);
- No studies have been performed to determine how long it would take to evacuate entire communities via existing evacuation corridors (F18);
- The implementation of traffic-light sequencing and coordination to allow mass egress, and the conversion of two-way roads into one-way evacuation routes to ease traffic congestion, are dangerously delayed and years away from being implemented (F19);
- Public transit is a neglected asset of emergency response preparedness: all operators except one transit agency are left out of the command structure and none is integrated into the emergency radio communication system MERA (F20); and
- A bureaucratic culture of complacency and inertia exists in Marin. Government often fails to act quickly to repair known gaps in emergency preparedness, to think flexibly, and to prioritize safety in its planning and policies (F21).

Additionally, the following six recommendations were related to assist in improving evacuations:

- Research, develop, and publish plans for the mass movement of populations along designated evacuation routes (R9);
- Give the highest priority to mitigating known choke points and to maximizing the capacity of existing evacuation routes (R10);
- Incorporate and prioritize plans for mass evacuations in all pending and future traffic/road projects along major escape routes (R11);
- Educate, prepare, and drill for evacuations in all communities (R12);
- Fully integrate public transit into the MERA communications system without further delay (R13); and
- The Transportation Authority of Marin must convene all stakeholders no later than December 31, 2019, to address congestion on escape routes in an evacuation (R14).

In addition, the Marin County Civil Grand Jury made four recommendations calling on the Transportation Authority of Marin (TAM) to participate in planning, prioritizing, and funding evacuation projects. The Marin County Civil Grand Jury requested responses from all local jurisdictions governing bodies, including the TAM, Tiburon Town Council, and Tiburon Fire Protection Districts (see the *Tiburon Evacuation Readiness* section for the Tiburon Fire Protection Districts' response), to either agree or disagree with the Grand Jury's findings/recommendations. In accordance with Penal Code Section 933(c), TAM responded to that Grand Jury report by stating that TAM is a funding agency and does not set local policy. Overall, the

¹⁴ Krieger, Lisa and Debolt, David. "Camp Fire: Paradise residents say they received no mass cellphone alerts to evacuate, or to warn of fires - Residents learned late of the danger --then faced gridlock." The Mercury News. Nov.18, 2018

responses from local jurisdictions in Marin County illustrated considerable uncertainty about who has the ultimate responsibility for building the transportation infrastructure capable of evacuating Marin residents safely in a rapidly evolving emergency.¹⁵

Based on the responses received from local jurisdictions on the *Wildfire Preparedness: A New Approach* report and the level of destruction caused by the 2020 fire season by the end of September, the Marin County Civil Grand Jury recently prepared the *Roadblocks to Safer Evacuation in Marin* report to further analyze evacuations in Marin County. Specifically, the report sought to determine whether Marin's evacuation needs are adequately considered when government entities plan and build improvements to roads and traffic infrastructure. The Civil Grand Jury identified major concerns with choke points on major arterial routes and natural and constructed obstacles on Marin's narrow hillside and feeder roads, which impede safe and quick evacuations in Marin County. Additionally, the report identified political confusion related to who has the political authority for the many aspects of planning and implementing evacuations. Further, the Civil Grand Jury found no one had a complete grasp of all of the interconnected components of evacuation planning, whether it be educating the public, cutting back vegetation, improving mapping and signage, designating refuge centers, executing evacuation during emergencies, or actually building and improving the infrastructure to support a mass evacuation¹⁶. After completing its investigation, the Grand Jury concluded the ultimate responsibility for road improvements and establishing safe evacuation routes lies with our elected officials, specifically the Marin County Board of Supervisors as well as Marin's town and city councilmembers. Additionally, this work will require support from the Transportation Authority of Marin, who is a resource and the primary source of funding for transportation infrastructure projects in the county. Overall, the Marin County Civil Grand Jury made the following nine findings during their investigation:

- No single agency or jurisdiction is taking responsibility and authority for building infrastructure for safe evacuation routes across jurisdictions in Marin County (F1);
- There is confusion in the county as to who has ultimate responsibility and authority for ensuring that Marin has safe evacuation routes (F2);
- Marin County Board of Supervisors and town and city councils have the responsibility for safe evacuation routing, and they have not sufficiently considered evacuation as a criterion when approving improvements to roads and traffic infrastructure in their jurisdictions (F3);
- County and municipal administrators, public works, and traffic engineers have not adequately considered mass evacuation as a criterion for planning and funding traffic infrastructure improvements (F4);
- Most Marin jurisdictions have not yet included urgently needed evacuation plans in their general plans as required by state law and as recommended by the Governor's Office of Planning and Research (F5);
- As Marin's designated "congestion management agency," the Transportation Authority of Marin, is best positioned to coordinate and support the funding of public works projects for improving evacuation routes, including cross-jurisdictional evacuation routes (F6);
- Contrary to its previous responses to the Grand Jury, the Transportation Authority of Marin is not precluded or constrained from incorporating evacuation planning needs as a criterion in its infrastructure projects (F7);
- The Transportation Authority of Marin's decision-making process is inadequate unless it includes evacuation as a criterion when funding improvements (F8); and
- The Marin Wildfire Prevention Authority's Advisory/Technical Committee would benefit from having the expertise of the Transportation Authority of Marin to advise on evacuation infrastructure needs (F9).

Based on the nine findings above, the Marin County Civil Grand Jury recommended the following next steps needed to build for safer and efficient evacuations:

¹⁵ Marin County Civil Grand Jury. 2020. Roadblocks to Safer Evacuation in Marin. [pg. 1].

¹⁶ Marin County Civil Grand Jury. 2020. Roadblocks to Safer Evacuation in Marin. [pg. 6].

- Within 180 days of the date of this report, the governing boards of the County of Marin and its cities and towns should direct their respective planning and public works departments to include evacuation needs among their criteria for evaluating and recommending public works projects (R1);
- Within 180 days of the date of this report, the governing boards of the County of Marin and its cities and towns should adopt resolutions calling on the Transportation Authority of Marin to include evacuation needs among the criteria it considers when planning and funding public works projects (R2);
- In calendar year 2021, the County of Marin and its cities and towns should update the safety elements of their general plans to include evacuation planning (R3);
- Within 120 days of the date of this report, the Transportation Authority of Marin should establish a criterion requiring that evacuation impacts be examined and stated when planning and funding infrastructure projects (R4); and
- Within 120 days of the date of this report, the Marin Wildfire Prevention Authority should invite a Transportation Authority of Marin representative to become an at-large, nonvoting member of its Advisory/Technical Committee to support program development, funding, and implementation of improvements in evacuation routes (R5).

Pursuant to Penal Code Section 933.05, the Civil Grand Jury requested a response from jurisdictions in Marin County – including the Town of Tiburon, to explain whether they agree or disagree with the evacuation findings and recommendations above. To date, no jurisdiction has submitted a response to the Civil Grand Jury, including the Town of Tiburon.

Tiburon Evacuation Readiness

The Town of Tiburon is situated in the south-eastern area of Marin County to the east of Highway 101 located on the Tiburon Peninsula. It is bordered by Corte Madera to the north and Belvedere for a small apportionment to the south, but a majority of its area is surrounded by the waters of the Richardson Bay and San Francisco Bay. Tiburon Peninsula geography ranges from waterfront properties to wildland-urban intermix on the hillsides (Belvedere Tiburon Joint Disaster Advisory Council, May 2019). Because the Tiburon Planning Area is a peninsula, it possesses unique constraints for circulation. The constraints are largely a function of the relative isolation that results from being a lengthy peninsula and from the topography that is dominated by relatively steep hillsides¹⁷.

One of the major problems Tiburon faces during any emergency is the possibility of becoming isolated from surrounding cities or counties and any subsequent resources or help. The Tiburon Peninsula has one major road (Tiburon Boulevard) and one minor road (Paradise Drive) which provide primary access to the entire Planning Area. Additionally, there is a second minor road (Trestle Glen Boulevard) connecting Tiburon Boulevard and Paradise Drive in the northern portion of the Planning Area; however, the remaining transportation network consists of narrow local streets within the hillsides. Therefore, the susceptibility to road blockages is high and delays during evacuations will be inevitable. During an emergency, some areas could be inaccessible to emergency service personnel and vehicles due to the limited access to the area.

In the event of an area-wide emergency, evacuation of the Tiburon Planning Area would be difficult. Evacuation traffic on Tiburon Boulevard (Highway 131) would cause severe congestion since that is the only major access route for most of the Planning Area. As residents use the Highway 101 Tiburon Boulevard/East Blithedale Avenue interchange to evacuate out of Marin County, key choke points would occur causing massive delays for Tiburon residents, especially those located in residential areas in the southern portion of the peninsula. The Tiburon Boulevard/East Blithedale Avenue interchange serves Mill Valley to the west of Highway 101 (via East Blithedale Avenue) and Strawberry, Tiburon, and Belvedere to the east (along State Route 131, also known as Tiburon Boulevard).

In September 2017, traffic counts show that each weekday about 80,000 vehicles traverse the interchange's approach roadways of East Blithedale Avenue, Tiburon Boulevard, and Redwood Highway Frontage Road. Traffic congestion occurs during morning, after-school, and late afternoon/early evening periods, with heavy delays noted for those traveling west on

¹⁷ Town of Tiburon. As Amended Through February 3, 2016. Town of Tiburon General Plan. [Circulation Element pg. 5-1]

Tiburon Boulevard to utilize the Highway 101 on-ramp¹⁸. Additionally, Northbound Highway 101 suffers from recurring congestion, further constraining throughput along the interchange's roadways. During an evacuation of the Tiburon Peninsula area, it is anticipated that over 17,000 residents from Tiburon, Belvedere, and Strawberry would potentially utilize this interchange as the main evacuation route since it is the closest interchange to all three communities.

As identified in the previous section, the Marin County Civil Grand Jury's *2019 Wildfire Preparedness: A New Approach* report requested responses from all local jurisdictions governing bodies, including the Tiburon Town Council and Tiburon Fire Protection Districts, to either agree or disagree with the Grand Jury's findings/recommendations related to evacuation routes. In accordance with Penal Code Section 933(c), the Tiburon Fire Protection District submitted a response agreeing with a number of the evacuation-related findings that the Town is currently ill-prepared for a major evacuation¹⁹. The Tiburon Fire Protection District agreed that historical roadways in Tiburon may lack the necessary width for rapid evacuations. Additionally, the Tiburon Fire Protection District agreed that no studies have been performed to determine how long it would take to evacuate entirely the community via existing evacuation corridors. The Tiburon Fire Protection District further agreed that implementation of traffic-light sequencing and coordination to allow mass egress, and the conversion of two-way roads into one-way evacuation routes to ease traffic congestion, are dangerously delayed and years away from being ready to be implemented.

Potential Tiburon Evacuation Routes

There has not been formal mapping of evacuation routes for the Town or the regional Tiburon Peninsula area. FIRESafe MARIN is working with fire agencies, cities, towns, and other local partners to develop improved wildfire evacuation maps, referred to as "Fire Clear" maps but has not yet developed maps for the southern Marin area, including Tiburon.

The Town approved an Evacuation Decal program in August 2018 to demarcate potential evaluation routes to assist residents, businesses, and visitors in evacuating in the event of the disaster. The Evacuation Decal program was developed by the Tiburon Fire Protection District with input from the Belvedere Tiburon Joint Disaster Advisory Council. The approved Evacuation Route Marker map is shown as Figure 1

The primary land use designations within the Tiburon town limits include Residential (52%), Open Space (22%), and Parks (22%)²⁰. Due to Tiburon's location along a peninsula in the south-easternmost area of the County with limited major roadways and access routes, it is anticipated that the residential areas of the Town would struggle to evacuate. Based on a review of the existing General Plan Land Use Map, the residential land uses in Tiburon are generally clustered in five main areas. The following provides an overview of the potential evacuation routes each residential area may utilize during an emergency evacuation and the potential challenges each could face during a mass evacuation.

The first is a cluster of residential land uses in the northeastern area of the Town adjacent to the Paradise Cay Yacht Harbor along the coast and to the west in the hills. The main access road for these residential clusters is Paradise Road, which is a collector street from which local streets stem off. During an emergency evacuation, it is anticipated that both residential clusters would utilize Paradise Road and either evacuate to the north or to the south/west. If residents evacuate to the north, they will evacuate via Paradise Drive to eventually access the Highway 101 Tamalpais Drive/Paradise Drive interchange. If residents evacuate to the south/west, they will travel south on Paradise Drive and west on Trestle Glen Boulevard to connect to Tiburon Boulevard and eventually access the Highway 101 Tiburon Boulevard/East Blithedale Avenue interchange. According to Google Earth imagery, dirt fire roads run within the mountains west of the hillside residences appear to potentially be available for use during an emergency evacuation. The fire roads connect to roadways within the residential

¹⁸ Transportation Authority of Marin. 2017. Highway 101 Interchange: Tiburon Boulevard (Highway 131) and East Blithedale Avenue

¹⁹ Tiburon Fire Protection District. 2019. Grand Jury Report: 2019 Wildfire Preparedness: A New Approach Response. Available at: <https://www.marincounty.org/-/media/files/departments/gj/reports-responses/2018-19/responses/wildfire-preparedness-a-new-approach/wildfire--tiburon-fd.pdf?la=en>

²⁰ Marin Local Agency Formation Commission. 2020. Tiburon Peninsula Region Municipal Service Review [pg. 35]

areas northeast of Tiburon close within Corte Madera and the second cluster of residences in the northwestern area of Tiburon. The main issue with this residential area's evacuation is the distance to both Highway 101 interchanges and the fact that this residential area is situated in the westernmost portion along the coast. Corte Madera residents will be utilizing the Highway 101 Tamalpais Drive/Paradise Drive interchange and Strawberry, Belvedere and Tiburon will be utilizing Tiburon Boulevard/East Blithedale Avenue interchange during an evacuation; thus, this residential community should anticipate large delays.

The second is a cluster of residential land uses in the northwestern area of the Town located in the hills north of Tiburon Boulevard and Trestle Glen Boulevard. During an emergency evacuation, it is anticipated that this residential clusters would utilize Tiburon Boulevard to the west to eventually access the Highway 101 Tiburon Boulevard/East Blithedale Avenue interchange to evacuate out of Marin County. This residential cluster could also utilize Trestle Glen Boulevard to access Paradise Drive and evacuate to the north similar to the first residential cluster. This residential area is in the best position in Tiburon to evacuate during an emergency due to its proximity to the Highway 101 Tiburon Boulevard/East Blithedale Avenue interchange.

The third is cluster of residences located in the hills east of Richardson Bay, generally bound on the north by Trestle Glen Boulevard, on the west by Tiburon Boulevard, on the south by Gilmartin Drive, and on the east by Paradise Drive. During an evacuation, residences have the option to utilize the local streets to evacuate to the north utilizing Trestle Glen Boulevard to access Paradise Drive and eventually the Highway 101 Tamalpais Drive/Paradise Drive interchange or evacuate to the west utilizing Tiburon Boulevard to access the Highway 101 Tiburon Boulevard/East Blithedale Avenue interchange. The struggles faced by this residential cluster mainly relate to the windy and narrow local streets that provide access to either Tiburon Boulevard or Trestle Glen Boulevard. Additionally, this residential area should expect delays when utilizing either evacuation route due to large number of residents from the closer residential areas accessing the interchanges first.

The fourth residential area is east of Belvedere clustered within the hills generally bound by Gilmartin Drive on the north and Mar West Street on the south. This residential community should expect large delays while trying to evacuate due the only evacuation route available to it is Tiburon Boulevard and large number of residences are located high up in the mountains. Residences within this area will need to utilize one of the few local streets connecting to Tiburon Boulevard, such as Gilmartin Road, Lyford Drive, or Mar West Street, to then evacuate along Tiburon Boulevard to access the Highway 101 Tiburon Boulevard/East Blithedale Avenue interchange, which will already be impacted from neighboring communities and Tiburon residential areas located closer to the interchange. Additionally, this residential area will face delays from Belvedere residents trying to access Tiburon Boulevard at similar access points, which could cause a bottleneck of vehicles trying to escape. Overall, this residential area will have a very difficult time evacuating during an emergency.

The fifth residential area of Tiburon is clustered in the hills in the southernmost area the Town generally located west of Keil Cove, east of the Boardwalk Shopping Center and Tiburon Peninsula Club, and northeast of the Tiburon Ferry Terminal. This residential area has two potential evacuation routes. The first is utilizing Mar West Street to evacuate via Tiburon Boulevard travelling along the western coast to eventually access the Highway 101 Tiburon Boulevard/East Blithedale Avenue interchange. The second is to use the local streets in the hills to evacuate via Paradise Drive along the eastern coast to meet up and eventually evacuate via to the Highway 101 Tamalpais Drive/Paradise Drive interchange to escape. While this residential area does have two evacuation routes, it will have a very difficult time evacuating during an emergency and face major delays. It is the southernmost residential area and, as previously mentioned, it is anticipated that over 17,000 residents from Tiburon, Belvedere, and Strawberry would be utilizing the local roadways and interchanges to try and evacuate.

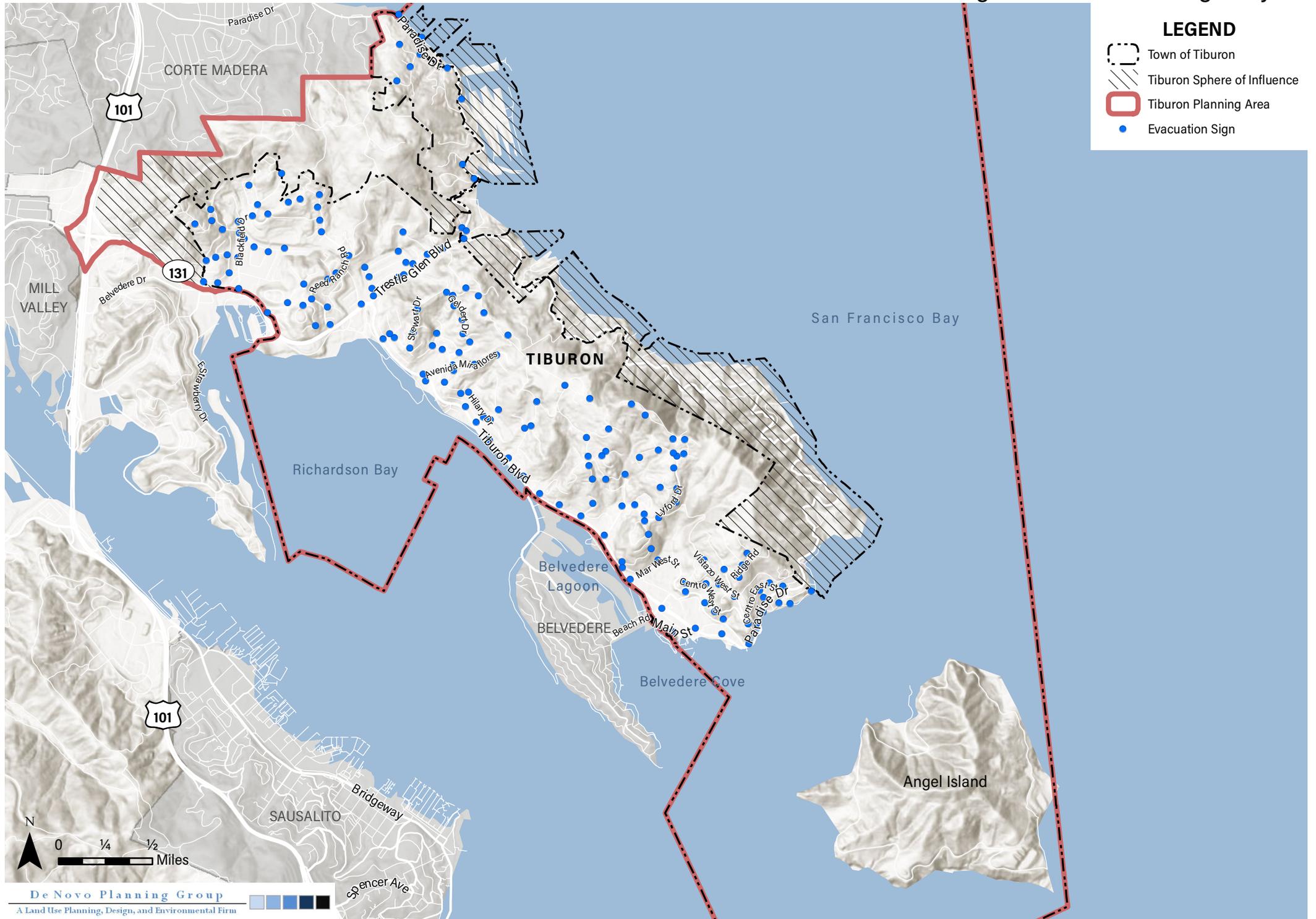
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Figure 1. Evacuation Sign Layout



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2 HAZARDOUS MATERIALS AND WASTE

A hazardous material is a substance or combination of substances which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may either (1) cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating irreversible illness; or (2) pose a substantial present or potential hazard to human health and safety or the environment when improperly treated, stored, transported, or disposed of. Hazardous materials are mainly present because of industries involving chemical byproducts from manufacturing, petrochemicals, and hazardous building materials.

Hazardous waste is the subset of hazardous materials that has been abandoned, discarded, or recycled and is not properly contained, including contaminated soil or groundwater with concentrations of chemicals, infectious agents, or toxic elements sufficiently high to increase human mortality or to destroy the ecological environment. If a hazardous material is spilled and cannot be effectively picked up and used as a product, it is considered hazardous waste. If a hazardous material site is unused, and it is obvious there is no realistic intent to use the material, it is also considered to be a hazardous waste site. Examples of hazardous materials include flammable and combustible materials, corrosives, explosives, oxidizers, poisons, materials that react violently with water, radioactive materials, and chemicals.

REGULATORY FRAMEWORK

FEDERAL

Comprehensive Environmental Response, Compensation & Liability Act

The Comprehensive Environmental Response, Compensation & Liability Act (CERCLA), commonly associated with the term “Superfund,” established:

- Regulations concerning closed and abandoned hazardous waste sites
- Liability of parties responsible for any releases of hazardous waste at these sites
- Funding for cleanup when responsible parties cannot be identified

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) established the United States Environmental Protection Agency (U.S. EPA) “cradle to grave” control (generation, transportation, treatment, storage, and disposal) over hazardous materials and wastes. In California, the Department of Toxic Substances Control (DTSC) has RCRA authorization.

Clean Air Act

In accordance with the Clean Air Act, the U.S. EPA has established National Emissions Standards for Hazardous Air Pollutants. Exceeding the emissions standard for a given air pollutant may cause an increase in illnesses and/or fatalities.

Clean Water Act

The Clean Water Act (CWA), which amended the WPCA of 1972, sets forth the Section 404 program to regulate the discharge of dredged and fill material into Waters of the U.S. and the Section 402 National Pollutant Discharge Elimination System (NPDES) to regulate the discharge of pollutants into Waters of the U.S. The Section 401 Water Quality Certification program establishes a framework of water quality protection for activities requiring a variety of Federal permits and approvals (including CWA Section 404, CWA Section 402, FERC Hydropower and Section 10 Rivers and Harbors).

STATE

California Health & Safety Code

Division 20 of the Health and Safety Code establishes Department of Toxic Substances Control (DTSC) authority and sets forth hazardous waste and underground storage tank regulations. In addition, the division creates a State superfund framework that mirrors the Federal program.

Division 11 of the Health and Safety Code establishes regulations related to a variety of explosive substances and devices, including high explosives and fireworks. Section 12000 et seq. establishes regulations related to explosives and explosive devices, including permitting, handling, storage, and transport (in quantities greater than 1,000 pounds).

Division 12.5 of the Health and Safety Code establishes requirements for buildings used by the public, including essential services buildings, earthquake hazard mitigation technologies, school buildings, and postsecondary buildings.

Division 26 of the Health and Safety Code establishes California Air Resources Board (CARB) authority. The division designates CARB as the air pollution control agency per Federal regulations and charges the Board with meeting Clean Air Act requirements.

California Vehicle Code

Section 31600 (Transportation of Explosives) of the California Vehicle Code establishes requirements related to the transportation of explosives in quantities greater than 1,000 pounds, including licensing and route identification.

Food and Agriculture Code

Division 6 of the California Food and Agricultural Code (FAC) establishes pesticide application regulations. The division establishes training standards for pilots conducting aerial applications as well as permitting and certification requirements.

Water Code

Division 7 of the California Water Code, commonly referred to as the Porter-Cologne Water Quality Control Act, created the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCB). In addition, water quality responsibilities are established for the SWRCB and RWQCBs.

California Code of Regulations

Title 3 of the California Code of Regulations (CCR) pertains to the application of pesticides and related chemicals. Parties applying regulated substances must continuously evaluate application equipment, the weather, the treated lands, and all surrounding properties. Title 3 prohibits any application that would:

- Contaminate persons not involved in the application
- Damage non-target crops or animals or any other public or private property
- Contaminate public or private property or create health hazards on said property

Title 8 of the CCR establishes California Occupational Safety and Health Administration (Cal OSHA) requirements related to public and worker protection. Topics addressed in Title 8 include materials exposure limits, equipment requirements, protective clothing, hazardous materials, and accident prevention. Construction safety and exposure standards for lead and asbestos are set forth in Title 8.

Title 14 of the CCR establishes minimum standards for solid waste handling and disposal.

Title 17 of the CCR establishes regulations relating to the use and disturbance of materials containing naturally occurring asbestos.

Title 22 of the CCR sets forth definitions of hazardous waste and special waste. The section also identifies hazardous waste criteria and establishes regulations pertaining to the storage, transport, and disposal of hazardous waste.

Title 26 of the CCR is a medley of State regulations pertaining to hazardous materials and waste that are presented in other regulatory sections. Title 26 mandates specific management criteria related to hazardous materials identification, packaging, and disposal. In addition, Title 26 establishes requirements for hazardous materials transport, containment, treatment, and disposal. Finally, staff training standards are set forth in Title 26.

Title 27 of the CCR sets forth a variety of regulations relating to the construction, operation, and maintenance of the State's landfills. The title establishes a landfill classification system and categories of waste. Each class of landfill is constructed to contain specific types of waste (household, inert, special, and hazardous).

LOCAL

Town of Tiburon General Plan

The current Town of Tiburon General Plan identifies the following goals, policies, and implementing measures related to hazardous materials and waste:

Safety Element

Goals

SE-A: To maintain a safe and healthy community.

SE-B: To identify hazardous areas and to discourage to the maximum extent feasible development of areas subject to hazards including, but not limited to, geotechnical hazards, unstable slopes and flood-prone areas.

SE-E: To reduce the impact of hazardous materials exposure and to strive to reduce threats to health, safety, and the environment from hazardous materials.

Policies

SE-1: The Town shall permit development only in those areas where potential danger to the health, safety, and welfare of the residents of the community can be avoided or adequately mitigated.

SE-2: The Town shall require development and construction to be located, designed, and implemented to avoid, eliminate, or reduce geologic and non-geologic hazards.

SE-25: The Town shall actively address the need to reduce exposure to hazardous materials.

SE-26: The Town shall encourage residents and businesses to reduce or eliminate the use of hazardous materials, including encouraging residents to purchase toxic substances in only the amount needed to do the job, or use non-toxic alternatives that do not pose a threat.

SE-27: The Town seeks to reduce the presence of hazardous materials in the community and supports the operation of recycling centers that take hazardous substances; such as oil, paint, pesticides, cleaners, chlorine products, etc.

Implementing Measures

SE-l: The Town shall evaluate the potential impacts related to hazardous materials during the environmental review process for new developments or businesses where the production, use, storage, transport, or disposal of hazardous materials is proposed. The potential impacts should be fully mitigated.

SE-m: The Town shall coordinate hazardous materials with other public agencies.

ENVIRONMENTAL SETTING

This section describes the existing environmental setting as it existing or historic hazardous sites located within the Plan Area. The primary sources of information for the following discussion includes the EnviroStor Data Management System (administered by the DTSC), the Hazardous Waste and Substances Sites (Cortese) List (administered by the DTSC), GeoTracker (administered by the State Water Resources Control Board), and the Solid Waste Information System (SWIS) (administered by CalRecycle).

ENVIROSTOR DATA MANAGEMENT SYSTEM

The DTSC maintains the *EnviroStor Data Management System*, which provides information on hazardous waste facilities (both permitted and corrective action) as well as any available site cleanup information. This site cleanup information includes: Federal Superfund Sites (NPL), State Response Sites, Voluntary Cleanup Sites, School Cleanup Sites, Corrective Action Sites, Tiered Permit Sites, and Evaluation / Investigation Sites. The hazardous waste facilities include: Permitted–Operating, Post-Closure Permitted, and Historical Non-Operating.

There are two listings in the Town of Tiburon listed in the EnviroStor database. Table 11 provides the listings located within the Planning Area. A discussion of each of the sites follows the table.

TABLE 11: TIBURON SITE CLEANUP AND HAZARDOUS FACILITIES LIST (ENVIROSTOR)

NAME	STATUS	PROJECT TYPE	ADDRESS
Fort McDowell	Active	State Response	Angel Island
Naval Net Depot	No Further Action	Military Evaluation	Juanita Lane, Tiburon

SOURCE: CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL, ENVIROSTOR DATABASE, 202.

Fort McDowell/Angel Island

The Fort McDowell/Angel Island site is identified as a Formerly Used Defense Site (FUDS) and is designated as a State Response Site with a status of Active in EnviroStor. According to the site history information in EnviroStor, Fort McDowell is a former Department of Defense site comprising 640 acres (really 740 acres) and located on Angel Island in Marin County. Fort McDowell was established in 1850. The island was used by the U.S. Army as a discharge and replacement depot and as an installation for San Francisco harbor defenses. In 1941, the northeast corner of the island was designated the North Garrison of Fort McDowell and was used for troop barracks and a prisoner-of-war camp. A U.S. Marine Health Center was developed to quarantine facilities and disinfect ships in Ayala Cove. Fort McDowell was also utilized as a processing center and quarantine for soldiers returning from overseas bases for many years. On September 20, 1946, the site was declared surplus and over a period of years the ownership transferred to U.S. Department of the Interior (DoI) with management by the Bureau of Land Management (BLM). In 1954, a NIKE missile base was established at Point Blunt for defense against potential invading aircraft, which was eventually deactivated in 1962. Between 1954 and 1963, the property was transferred to State of California piecemeal.

Today Fort McDowell is open to, and used recreationally by, the public under the management of the California State Park Service. Only a small seven-acre portion of the site at the end of Point Blunt is under the jurisdiction of the U.S. Coast Guard supporting a lighthouse station. Access to the island is via ferry and private boats. Single family residential housing exists for full time California State Park Service employees and their families.

According to information on EnviroStor, the site contains underground storage tanks (USTs), aboveground storage tanks (ASTs), potentially contaminated soil, several buildings that pose a safety hazard, and potential ordnance. This property is also known or suspected to contain military and explosives of concern (e.g., unexploded ordnance) and therefore may present an explosive hazard. Based on the history of the island, five separate use areas are described below outlining the previous uses and potential hazardous sources on-site, except for munitions and explosives of concern, which is summarized after.

North Garrison – Fort McDowell: The North Garrison, originally known as China Cove, is in the northeast corner of the island. The site was used as an immigration detention station for Asian immigrants starting in 1905. In 1941, the island was transferred to the Army, and redesignated as the North Garrison of Fort McDowell. Army uses at this site included troop barracks and prisoner-of-war camp.

According to the 2003 Fort McDowell Site Investigation Report, potential hazardous sources identified at North Garrison during a preliminary assessment include a former ship fuel area with possible beach contamination, four former UST

locations, six possible remaining USTs, four ASTs, a rifle range, and pistol range, as well as a potential dump site adjacent to the pistol range.

East Garrison – Fort McDowell: The East Garrison was established in 1907. The garrison was used during the World War I as a recruit depot and during World War II as a debarkation and receiving point for troops sent to the Pacific Theater. The garrison included barracks, a hospital, motor pool area, gymnasium, incinerator, and several buildings. In 1986, the California Office of the State Architect (OSA) conducted a polychlorinated biphenyl (PCB) survey of the island. A PCB removal project began in 1987. During the removal project, a PCB spill occurred in front of the East Garrison Substation, and an unspecified quantity of contaminated soil was removed. The crawlspace of a Warehouse Building at the East Garrison was used by OSA as the PCB storage area during the 1987/1988 removal project. Several shallow metal containment trays were left by the state and some show patterns of liquid spillage. The State developed a dump site located southeast of the East Garrison Engineering Buildings. A historical account of the island mentions that the California Department of Parks and Recreation employees' children used the gymnasium facilities during the early years of state ownership.

According to the 2003 Fort McDowell Site Investigation Report, potential hazardous sources identified at East Garrison during a preliminary assessment include the former motor pool area (hazardous waste drum storage area, vehicle lift rack, oil change rack, incinerator, wash rack, and electrical equipment storage area, and former UST location), two possible remaining USTs, two 30,000-gallon ASTs, a former photo shop, an electrical substation, and former transformer pad.

Ayala Cove – Fort McDowell: Ayala Cove is located south of the Present State Parks boat launch area. The area was used as a quarantine station, which was established in 1892 by the U.S. Marine Health Service (later to become the U.S. Public Health Service). An extensive ship and baggage disinfection operation operated at the cove. The U.S. Army reportedly used the site during war times and took back ownership in 1952. Many of the buildings in this area were demolished after the area was conveyed to the Park Service in 1954. The four remaining buildings in this area are used by the Park Service as a Visitor's Center and residences for park employees.

According to the 2003 Fort McDowell Site Investigation Report, potential hazardous sources identified at Ayala Cove during a preliminary assessment include four former UST locations, three former AST locations, a former disinfection building, and a possible dumpsite.

West Garrison – Fort McDowell: The West Garrison, also known as Camp Reynolds, was established in 1850 and used by the Army during the Civil War era for the receipt and distribution of new recruits bound for the west. Several barracks buildings and a hospital are located in this area. Several gun batteries, including Battery Wallace, Battery Ledyard, and Battery Drew were established for defense of the bay and area located southeast of the West Garrison.

According to the 2003 Fort McDowell Site Investigation Report, potential hazardous sources identified at West Garrison during a preliminary assessment include a possible dumpsite in the parade grounds, a possible dumpsite near the West Garrison Hospital, a possible dumpsite at Pearl's beach, a possible UST at the lighthouse, and a paint shop.

Point Blunt – Fort McDowell: A gun battery was constructed on Point Blunt in 1864, but reportedly slid into the water in 1869. In 1954, the US Army established a Nike Missile Base at Point Blunt. Approximately, 100 men were stationed at the base and occupied buildings in the East Garrison. The base was in operation until 1962. A seven-acre strip of land on the southeast tip of the island is currently used as a U.S. Coast Guard lighthouse station.

The Nike Missile Facility located near Point Blunt consists of three missile magazines, a generator building, missile refueling area, missile assembly building, and sentry building. An Inventory Project Report prepared in November 1900 for Nike Battery 91 indicated the presence of 25 rusted 55-gallon drums in the refueling area. The 55-drums were moved to the motor pool in East Garrison in 1994. Soil sampling conducted at the refueling area in 1992 and again in 1997. The drums

and their contents were removed and disposed of in 1994. No further action was recommended based on the sample results, and DTSC issued a closure letter on November 25, 1998.

A Nike CON/HTRW Project (No. J09CA0943) was conducted to remove the hydraulic fluids, USTs, and associated pipelines between July and December 1995. According to the 2003 Fort McDowell Site Investigation Report, the following removal actions were conducted during the July to December 1995 timeframe:

- Removal and disposal of a 4,000-gallon UST;
- Removal and disposal of a concrete pump vault including the pump;
- Removal and disposal of approximately 25-feet of 2-inch underground pipe;
- Removal and disposal of an AST saddle (no tank);
- Cleaning, cutting, capping, and abandonment in-place of approximately 25-feet of underground pipe on the east end of the generator building;
- Disposal of 250-gallon and 500-gallon tanks stored on site that had been removed by others;
- Removal and disposal of the hydraulic fluid from the hydraulic system in each of the three missile vaults; and
- Flushing the hydraulic systems.

According to the 2003 Fort McDowell Site Investigation Report, potential hazardous sources identified at Point Blunt during a preliminary assessment include a possible cannonball disposal site and two possible remaining USTs.

Munitions and Explosives of Concern: In 2009, the Munitions Response Site Prioritization Protocol (MRSPP) Final Site Inspection Report for Fort McDowell was prepared to evaluate the evidence for the presence of munitions and explosives of concern (MEC) and munitions constituents (MC) at the site. The report analyzed the 1,000-inch Rifle Range site near the North Garrison Area, the P-100 Pistol Range near the East Garrison, the Quarry Point Mining Casement Area near the East Garrison, the Point Blunt Ordnance Dump Area in Point Blunt, the Mortar Hill Mining Casement Area in between the West Garrison and Point Blunt areas, and the Complex No. 1 near West Garrison.

The results of the MRSPP Site Inspection Report noted one explosive (nitroglycerin) was detected in Complex No. 1 site. No explosives were detected in any of the other sites; however, lead concentrations within soil found at the Quarry Point Mining Casement Area, 1,000 Inch Rifle Range, and Complex No. 1 exceeded human screening values. Additionally, at all sites, except the Mortar Hill Mining Casement Area, a number of other munitions constituent metals (i.e., mercury, lead, nickel, zinc, copper, etc.) were detected exceeding acceptable ESVs. Munitions constituents refers to any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. According to the 2009 MRSPP Site Investigation Report, further munitions constituents metal sampling should be conducted at all sites except the Mortar Hill Mining Casement Area and a Remedial Investigation and Feasibility Study (RI/FS) should be prepared for all sites. To date, additional munitions constituents metal sampling or a RI/FS has been prepared for the Fort McDowell site.

Upcoming Activities: According to EnviroStor, the Fort McDowell/Angel Island site is subject to future activities required by the cleanup oversight agencies (DTSC and Regional Water Quality Control Board 2 – San Francisco Bay). The first is a Preliminary Assessment Report due in 2022 of the Containerized/Hazardous, Toxic and Radioactive Waste area 02, which is the location for a historical fuel spill area.

The next is a Site Characterization Report due in 2022 of the Hazardous, Toxic and Radioactive Waste area 03, which is the historical location of the paint shop in the West Garrison area. Additionally, a Remedial Investigation Report and Site Characterization Report of the Hazardous, Toxic and Radioactive Waste area 03 are due in 2025.

Lastly, a Preliminary Assessment/Site Inspection Report (PA/SI) is due in 2025 to analyze the existing USTs and ASTs across the five separate use areas and see if there are any changes in site conditions due to USTs and ASTs. Additionally, a Feasibility Studying Report of the USTs and ASTS across the five separate use areas is due in 2026.

Naval Net Depot

The Naval Net Depot site is a Military Evaluation site with a status of No Further Action. According to the site history information in EnviroStor, the Naval Net Depot was originally purchased for use as a Navy Coaling Station in 1904. Since then, the site has had service ships carrying various cargo, such as cod, coal, and lumber.

From 1931 to 1940, the Naval Net Depot site was a nautical training school, harboring and servicing various cargo ships. In 1940, the Navy reclaimed the base for a storage and distribution center. The site was also used to store steel cable during construction of the Golden Gate Bridge, and later to fabricate anti-submarine nets. The site became part of the National Oceanographic and Atmospheric Administration of the Department of Commerce on October 4, 1970. From the late 1950s to 1962 the Naval Reserve Electronics Facility was located at the site. Other sections of the site became surplus property and are now sites for two County parks. The former Floating Dry Dock Training Center Annex is now Paradise Beach County Park and that part of the base west of Paradise Drive became Tiburon Upland Nature Reserve. Another parcel of land was officially transferred from the U.S. to San Francisco State University. All that is left of the Navy's presence on-site is a three-acre area used for instrument testing²¹.

The Naval Depot site has various facilities for servicing vessels, including an oil house, ships service fuel pumps, sewage treatment facilities, and several above-and-below-ground storage tanks. Thirty original buildings remain on site, approximately 20 of which are being used for on-site research. Most on-site buildings have asbestos tile siding, asbestos-wrapped piping, asbestos-wrapped boilers, and asbestos ceiling tiles. Part of the north dock has caved in, and the seawall has collapsed. There are several USTs on site.

A Phase I Environmental Site Assessment conducted for the Paradise Beach Park in 2015 indicated that there were no recognized environmental conditions associated with the Paradise Beach Park parcels. The Phase I indicated that on the Naval Net Depot Site, four USTs were removed in 1991 and soils impacted by fuel hydrocarbons (FHCs) were over-excavated, except inaccessible soils that were left in place beneath a concrete slab. Groundwater monitoring wells were installed and monitored over an 18-month period. The San Francisco Bay Regional Water Quality Control Board issued a no further action letter with respect to these USTs dated December 1, 1995. (ECA, 2015).

DTSC issued a letter concurring with the U.S. Army Corps of Engineers Finding of No Department of Defense Actions Indicated for the Tiburon Naval Net site on February 4, 2015.

CORTESE LIST

The Hazardous Waste and Substances Sites (Cortese) List is a planning document used by the State, local agencies, and developers to comply with the California Environmental Quality Act requirements in providing information about the location of hazardous materials release sites. Government Code Section 65962.5 requires the California Environmental Protection Agency to develop at least annually an updated Cortese List. California Department of Toxic Substances Control (DTSC) is responsible for a portion of the information contained in the Cortese List. Other State and local government agencies are required to provide additional hazardous material release information for the Cortese List. There is one Cortese List site within the Planning Area: Fort McDowell (U.S. EPA ID#: 71000007). This site is characterized as an active site and is located on Angel Island. Information about this site is provided in the previous EnviroStor discussion.

²¹ Ruhge, Justin M. Tiburon Naval Depot History. Available at: <http://www.militarymuseum.org/Tiburon.html>

GEOTRACKER

GeoTracker is the State Water Resources Control Board's online database that provides access to statewide environmental data and tracks regulatory data for the following types of sites:

- Leaking underground fuel tank (LUFT) cleanup sites;
- Cleanup Program Sites (CPS; also known as Site Cleanups and formerly known as Spills, Leaks, Investigations, and Cleanups [SLIC] sites);
- Military sites (consisting of military underground storage tank [UST] sites, military privatized sites, and military cleanup sites [formerly known as DoD non-UST]);
- Land disposal sites (landfills); and
- Permitted UST facilities.

In December of 202, a search was performed using GeoTracker to identify any known or suspected (reported but not yet confirmed) sources of environmental hazards within the Town of Tiburon.

Leaking Underground Storage Tanks (LUST)

There are eight locations with a Tiburon address that are listed in the GeoTracker database for Leaking Underground Storage Tanks (LUST). All the locations have undergone LUST cleanup and the State has closed the case. None of the locations in Tiburon have an open case. Table 12 lists the location of LUSTs in Tiburon.

TABLE 12: TIBURON LUST CLEANUP SITES

NAME	STATUS	LOCATION
Chevron 9-4493	Completed - Case Closed	1515 Tiburon Highway
Mobil	Completed - Case Closed	1600 Tiburon Boulevard
Texaco	Completed - Case Closed	1660 Tiburon Boulevard
Tiburon Marine Fishery Service	Completed - Case Closed	3150 Paradise Drive
Tiburon Navy Net Depot Bldg 50	Completed - Case Closed	3150 Paradise Drive
Wilson Property	Completed - Case Closed	16 Old Landing Road
Paradise Clay	Completed - Case Closed	127 Trinidad Drive
Tosco – Facility #4886	Completed - Case Closed	25 Tiburon Boulevard

SOURCE: CALIFORNIA WATER RESOURCES CONTROL BOARD GEOTRACKER DATABASE, 2020.

Cleanup Program Sites

There is one location with a Tiburon address that is listed in the GeoTracker database as a Cleanup Program Site. The site, the Newhall Residence (Site T1000009130), has a cleanup status of Open – Inactive as of July 13, 2016. The potential contaminants of concern are heating oil/fuel oil, and the potential media of concern is the aquifer which is used for drinking water supply.

Military Cleanup Sites

There are four locations with a Tiburon address that are listed in the GeoTracker database as military cleanup sites, all of which are located on Angel Island. All the locations have a status of Open, including three site assessment sites and one inactive site (Nike Battery 91, Angel Island). Three of the locations are Military Privatized Sites, and one is a Military Cleanup Site (Nike Battery 91, Angel Island). Table 13 lists the location of the military cleanup sites in Tiburon.

TABLE 13: TIBURON MILITARY CLEANUP SITES

NAME	STATUS	LOCATION
Fort McDowell – Above Ground Storage Tanks 149 and 150	Open – Site Assessment	Eastern portion of Angel Island
Fort McDowell – Central Heating Plant	Open – Site Assessment	Northern portion of Angel Island
Fort McDowell – Fuel Tanks 158 and 159	Open – Site Assessment	Eastern portion of Angel Island
Nike Battery 91, Angel Island (J09CA094300)	Open – Inactive	PO Box 318, Angel Island

SOURCE: CALIFORNIA WATER RESOURCES CONTROL BOARD GEOTRACKER DATABASE, 2020.

SOLID WASTE INFORMATION SYSTEM (SWIS)

Facility/Site Listing

The Solid Waste Information System (SWIS) is a database of solid waste facilities that is maintained by the California Department of Resources Recycling and Recovery (CalRecycle). The SWIS data identifies active, planned, and closed sites. The Town of Tiburon has two solid waste facilities listed in the database, both of which are closed. The site details are listed in Table 14, below.

TABLE 14: CIWMB FACILITIES/SITES

NUMBER	NAME	ACTIVITY	REGULATORY STATUS	OPERATIONAL STATUS
21-CR-0027	Pozzi Disposal Site	Solid Waste Disposal Site	Unpermitted	Closed
21-CR-0003	Angel Island	Solid Waste Disposal Site	TBD (Pending Investigation)	Closed

SOURCE: CALIFORNIA DEPARTMENT OF RESOURCES RECYCLING AND RECOVERY, 2020.

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3 WILDFIRE HAZARDS

This section addresses the hazards associated with wildfires in the Planning Area. The discussion of fire suppression resources will be provided in the *Community Services and Utilities Existing Conditions Report*.

REGULATORY FRAMEWORK

FEDERAL

FY 2001 Appropriations Act

Title IV of the Appropriations Act required the identification of “Urban Wildland Interface Communities in the Vicinity of Federal Lands that are at High Risk from Wildfire” by the U.S. Departments of the Interior and Agriculture.

STATE

California Government Code Section 65302

Government Code Section 65302, which establishes standards for developing and updating General Plans, includes fire hazard assessment and Safety Element content requirements. This section describes that a Safety Element shall include protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence; liquefaction; and other seismic hazards identified pursuant to Chapter 7.8 (commencing with Section 2690) of Division 2 of the Public Resources Code, and other geologic hazards known to the legislative body; flooding; and wildland and urban fires. The Safety Element shall include mapping of known seismic and other geologic hazards. It shall also address evacuation routes, military installations, peakload water supply requirements, and minimum road widths and clearances around structures, as those items relate to identified fire and geologic hazards.

The Safety Element is also required to:

- Identify information regarding flood hazards;
- Establish a set of comprehensive goals, policies, and objectives for the protection of the community from the unreasonable risks of flooding;
- Establish a set of feasible implementation measures designed to carry out the applicable goals, policies, and objectives;
- Be reviewed and updated as necessary to address the risk of fire for land classified as state responsibility areas and land classified as very high fire hazard severity zones;
- Be reviewed and updated as necessary to address climate adaptation and resiliency strategies applicable to the city or county.

Assembly Bill 337

Per AB 337, local fire prevention authorities and the California Department of Forestry and Fire Protection (CalFire) are required to identify “Very High Fire Hazard Severity Zones (VHFHSZ) in Local Responsibility Areas (LRA). Standards related to brush clearance and the use of fire-resistant materials in fire hazard severity zones are also established.

California Public Resources Code

The State’s Fire Safe Regulations are set forth in Public Resources Code Section 4290, which include the establishment of State Responsibility Areas (SRA). An SRA is the area of the state where the State of California is financially responsible for the prevents and suppression of wildfires. SRA does not include lands within city boundaries or in federal ownership. Areas in federal ownership are under Federal Responsibility Areas (FRA), and areas within city boundaries are included in Local Responsibility Areas.

Public Resources Code Section 4291 sets forth defensible space requirements, which are applicable to anyone that *owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining a mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or land that is covered with flammable material* (Section 4291(a)). These requirements include:

- Maintenance of defensible space of 100 feet from each side and from the front and rear of the structure, not beyond the property line except as required by state law, local ordinance, rule, or regulation;
- An insurance company that insures an occupied dwelling or occupied structure may require a greater distance than that required under paragraph (1) if a fire expert, designated by the director, provides findings that the clearing is necessary to significantly reduce the risk of transmission of flame or heat sufficient to ignite the structure, and there is no other feasible mitigation measure possible to reduce the risk of ignition or spread of wildfire to the structure.
- Removal of the portion of a tree that extends within 10 feet of the outlet of a chimney or stovepipe;
- Maintenance of a tree, shrub, or other plant adjacent to or overhanging a building free of dead or dying wood;
- Maintenance of the roof of a structure free of leaves, needles, or other vegetative materials;
- Prior to constructing a new building or structure or rebuilding a building or structure damaged by a fire in an area subject to this section, the construction or rebuilding of which requires a building permit, the owner shall obtain a certification from the local building official that the dwelling or structure, as proposed to be built, complies with all applicable state and local building standards.

California Fire Code

The California Fire Code establishes standards related to the design, construction, and maintenance of buildings. The standards set forth in the California Fire Code range from designing for access by firefighters and equipment and minimum requirements for automatic sprinklers and fire hydrants to the appropriate storage and use of combustible materials.

California Code of Regulations Title 8

In accordance with California Code of Regulations Title 8, Sections 1270 and 6773 (*Fire Prevention and Fire Protection and Fire Equipment*), the Occupational Safety and Health Administration (Cal OSHA) establishes fire suppression service standards. The standards range from fire hose size requirements to the design of emergency access roads.

California Code of Regulations Title 14 (Natural Resources)

Division 1.5 (Department of Forestry and Fire Protection), Title 14 of the CCR establishes a variety of wildfire preparedness, prevention, and response regulations.

California Code of Regulations Title 19 (Public Safety)

Title 19 of the CCR establishes a variety of emergency fire response, fire prevention, and construction and construction materials standards.

California Code of Regulations Title 24 (CA Building Standards Code)

The California Fire Code is set forth in Part 9 of the Building Standards Code. The California Fire Code, which is pre-assembled with the International Fire Code by the International Code Council (ICC), contains fire-safety building standards referenced in other parts of Title 24.

California Health and Safety Code Section 13000 et seq.

State fire regulations are set forth in Section 13000 et seq. of the California Health and Safety Code, which is divided into “Fires and Fire Protection” and “Buildings Used by the Public.” The regulations provide for the enforcement of the California Fire Code and mandate the abatement of fire hazards.

The code establishes broadly applicable regulations, such as standards for buildings and fire protection devices, in addition to regulations for specific land uses, such as childcare facilities and high-rise structures.

California Public Utilities Code Section 8367 et seq.

State regulations relating to wildfire mitigation are set forth in Section 8387 of the California Public Utilities Code. The regulations provide that each local publicly owned electric utility and electrical cooperative shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of wildfire posed by those electrical lines and equipment. The local publicly owned electric utility or electrical cooperative is also required to prepare a wildfire mitigation plan.

LOCAL

Town of Tiburon General Plan

The current Town of Tiburon General Plan identifies the following policy framework related to fire:

Safety Element

Goals

SE-D: To encourage disaster preparedness planning for effective emergency response and to protect public safety.

Policies

SE-16: The Town shall work cooperatively with the local Fire Districts and other agencies to ensure the safe delivery of emergency services and the effective evacuation of the community in the event of a disaster.

SE-17: New development shall provide sufficient water supply and equipment for fire suppression to ensure that the requirements for minimum fire flow and the size, type and location of water mains and hydrants set forth in the Uniform Fire Code and by local ordinance are met.

SE-18: New development within areas of insufficient peak load water supply shall contribute to the construction of a new, or upgrading of an existing, water delivery system to meet requirements for minimum fire-flow.

SE-19: The Town shall work with the Fire Districts and other agencies to provide, enhance, and maintain adequate access, including secondary access, to all areas within the Planning Area.

SE-20: The Town shall require provision of defensible space in all projects where fire hazard is possible. Ongoing maintenance of defensible space buffers in new development projects shall be assured in a form satisfactory to the Town and the Fire Districts prior to construction of improvements.

Implementing Measures

SE-a: Where possible, the Town should advise the residents of the Tiburon Planning Area of ways that they can reduce geologic, fire and flooding hazards.

SE-c: Through the application review process, the Town shall continue to require review by the appropriate Fire District for fire prevention considerations.

SE-d: As part of an Open Space Management program, the Town shall develop a plan, including funding sources and/or other opportunities, such as volunteer groups, for reducing fire hazards and maintaining fire roads on Town-owned open space.

EXISTING CONDITIONS

CALFIRE FIRE THREAT AREAS

CalFire's Fire Threat Model identifies fire threats using fuel rank, which is a ranking system developed by CalFire that incorporates four wildfire factors: fuel model, slope, ladder index, and crown index, and modeled characteristics regarding fire probability and behaviors.

The U.S. Forest Service has developed a series of fuel models, which categorize fuels based on burn characteristics. These fuel models help predict fire behavior. In addition to fuel characteristics, slope is an important contributor to fire hazard levels. A surface ranking system has been developed by CalFire, which incorporates the applicable fuel models and slope data. The model categorizes slope into six ranges: 0-10%, 11-25%, 26-40%, 41-55%, 56-75% and >75%. The combined fuel model and slope data are organized into three categories, referred to as surface rank. Thus, surface rank reflects the quantity and burn characteristics of the fuels and the topography in a given area.

The ladder index is the distance from the ground to the lowest leafy vegetation for tree and plant species. The crown index reflects the quantity of leafy vegetation present within individual specimens of a given species.

The surface rank, ladder index, and crown index for a given area are combined to establish a fuel rank of medium, high, or very high. Fuel rank is used by CalFire to identify areas in the California Fire Plan where large, catastrophic fires are most likely.

The fuel rank data are used by CalFire to delineate fire threat based on a system of ordinal ranking. Thus, the Fire Threat model creates discrete regions, which reflect fire probability and predicted fire behavior. The five classes of fire threat range from low to extreme.

As shown in Figure 2, the Town of Tiburon primarily contains areas with "moderate" and "high" fire threats. However, Figure 2 does identify three small areas with "low" fire threats, including one in the northwest portion of the Planning Area adjacent to Richardson Bay and Trestle Glen Boulevard, another in the southeast portion of the Planning Area east of Paradise Drive, and one along the southern shoreline of Angel Island. The two highest fire threat levels, "very high" and "extreme", are not mapped within or adjacent to the Planning Area. "High" fire threats are located in the northern and eastern portions of the Planning Area, where there tends to be a greater amount of combustible vegetation and where slopes are greater. CalFire data for the areas immediately north and west of the Planning Area include "moderate" and "high" fire threats.

FIRE HAZARD SEVERITY ZONES

The state has charged CalFire with the identification of Fire Hazard Severity Zones (FHSZ) within State Responsibility Areas. In addition, CalFire must recommend Very High Fire Hazard Severity Zones (VHFHSZ) identified within any Local Responsibility Areas. The FHSZ maps are used by the State Fire Marshall as a basis for the adoption of applicable building code standards. Figure 3 illustrates the City's Fire Hazard Severity Zones and Responsibility Areas.

As shown in Figure 3, there are no VHFHSZs located within the Town or Planning Area. While the majority of the Planning Area is not within a FHSZ, portions of the Planning Area are located in "moderate" and "high" FHSZs, including areas in the northern, northwestern, northeastern, and eastern portions of the Planning Area. No areas within or adjacent to the Planning Area are categorized as containing a "very high" FHSZs by CalFire.

WILDLAND-URBAN INTERFACE ZONES

Wildland fire hazards exist in varying degrees throughout the Tiburon Peninsula and probably pose the greatest threat to public safety and property of all other potential hazards. The fire season generally lasts from five to six months, but has been elongated due to climate change. Many homes have been built on steep slopes with vegetation near structures. These

slopes are often steep, located in rugged terrain, and have very few access routes. The majority of Tiburon is located within either a “Wildland-Urban Interface”, “Wildland-Urban Intermix”, or Wildfire Influence fire hazard zone.

A Wildland-Urban Interface (WUI) zone is an area where human made structures and infrastructure (e.g., cell towers, schools, water supply facilities, etc.) are in or adjacent to areas prone to wildfire. Approximately 60,000 acres in Marin County fall within the (WUI), where residences are intermixed with open space and wildland vegetation. Due to surrounding vegetation and proximity to wildlands, these areas are considered to be at greater risk of wildfires. A Wildland Urban Intermix zone is defined as a housing development interspersed in an area dominated by wildland vegetation subject to wildfire. Lastly, a Wildfire Influence Zone is an area where wildfire susceptible vegetation is within 1.5 miles from a Wildland-Urban Interface or Wildland-Urban Intermix zone.

Figure 4 identifies the Wildland-Urban Interface, Wildland-Urban Intermix, and Wildfire Influence Zones within Tiburon and the fire hazard severity for each. As shown in Figure 4, areas throughout Town and Planning Area have significant portions designated with a high fire hazard severity associated with Wildland Urban Interface, Wildland Urban Intermix, and Wildfire Urban Influence zones. Table 15 identifies the amount acres within the Planning Area located in an either a Wildland Urban Interface, Wildland Urban Intermix, and Wildfire Urban Influence zones.

TABLE 15: WUI TYPE BY FIRE HAZARD SEVERITY IN TIBURON PLANNING AREA

WUI TYPE	TOWN LIMITS	SOI	PLANNING AREA	GRAND TOTAL
WILDLAND-URBAN INTERFACE ZONE				
Not in a Fire Hazards Severity Zone	0.00	0.00	0.00	0.00
Moderate Fire Hazard Severity	427.49	169.79	1.19	598.46
High Fire Hazard Severity	388.90	71.09	4.28	464.27
<i>Wildland Urban Influence Subtotal</i>	<i>816.39</i>	<i>240.88</i>	<i>5.47</i>	<i>1,062.73</i>
WILDLAND-URBAN INTERMIX ZONE				
Not in a Fire Hazards Severity Zone	0.00	0.00	0.00	0.00
Moderate Fire Hazard Severity	108.29	72.19	0.96	181.45
High Fire Hazard Severity	126.83	72.50	1.64	200.97
<i>Wildland Urban Intermix Subtotal</i>	<i>235.12</i>	<i>144.69</i>	<i>2.60</i>	<i>382.42</i>
WILDFIRE URBAN INFLUENCE ZONE				
Not in a Fire Hazards Severity Zone	87.92	16.69	1.72	106.34
Moderate Fire Hazard Severity	616.53	64.78	2.31	683.62
High Fire Hazard Severity	415.24	309.19	304.39	1,028.82
<i>Wildfire Urban Influence Subtotal</i>	<i>1,119.69</i>	<i>390.66</i>	<i>308.42</i>	<i>1,818.78</i>
NOT IN A WUI ZONE				
Not in a Fire Hazards Severity Zone	7,536.49	122.74	30.73	7,689.96
Moderate Fire Hazard Severity	38.45	28.04	0.00	66.49
High Fire Hazard Severity	19.82	19.85	1.74	41.40
<i>Not in a WUI Zone Subtotal</i>	<i>7,594.76</i>	<i>170.63</i>	<i>32.47</i>	<i>7,797.85</i>
Total	9,765.96	946.86	348.96	11,061.78

SOURCE: CALFIRE FRAP *WILDLAND URBAN INTERFACE, INTERMIX, AND INFLUENCE ZONES – WITH HOUSING DENSITY AND HAZARD CLASS*, 2021.

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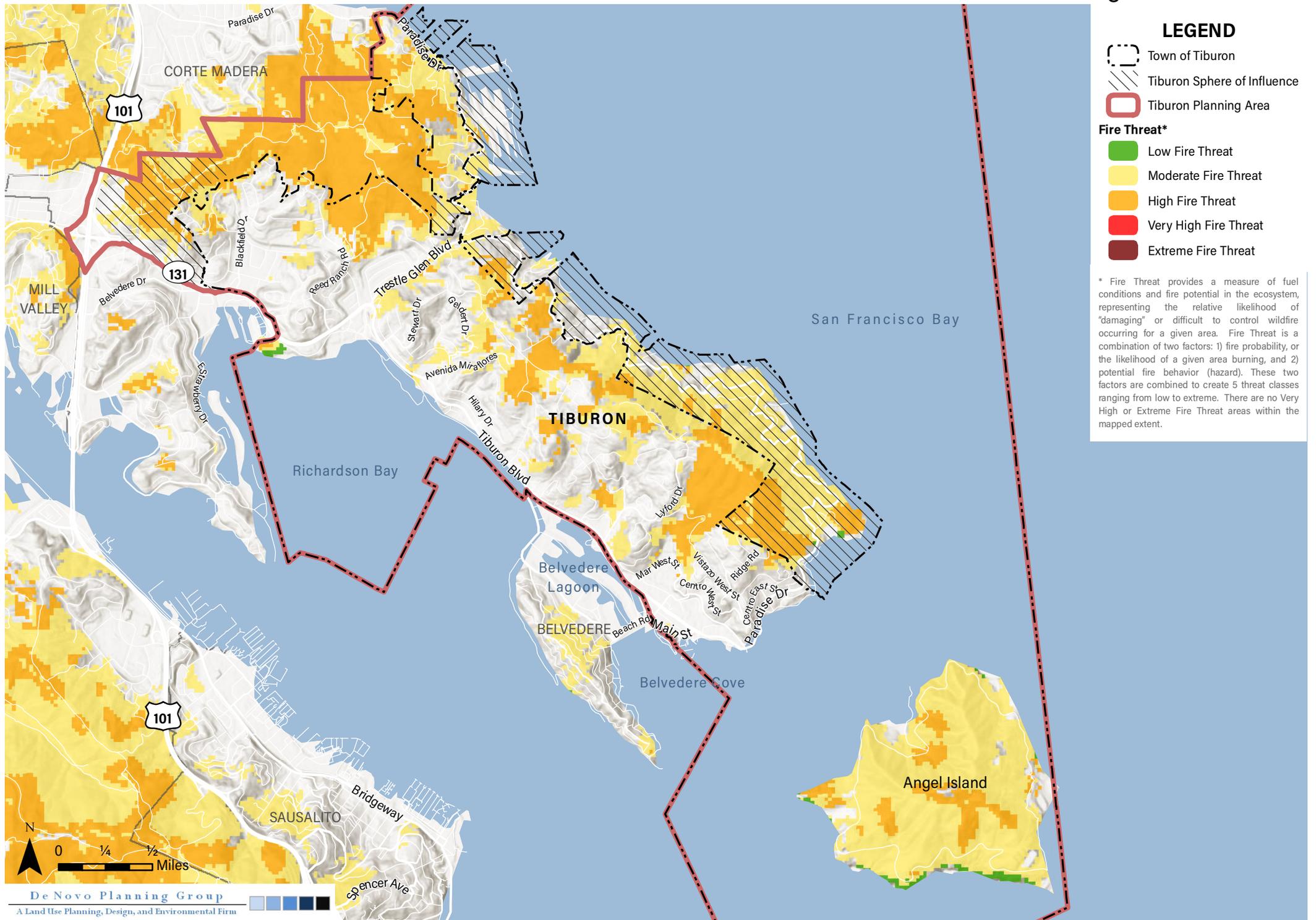
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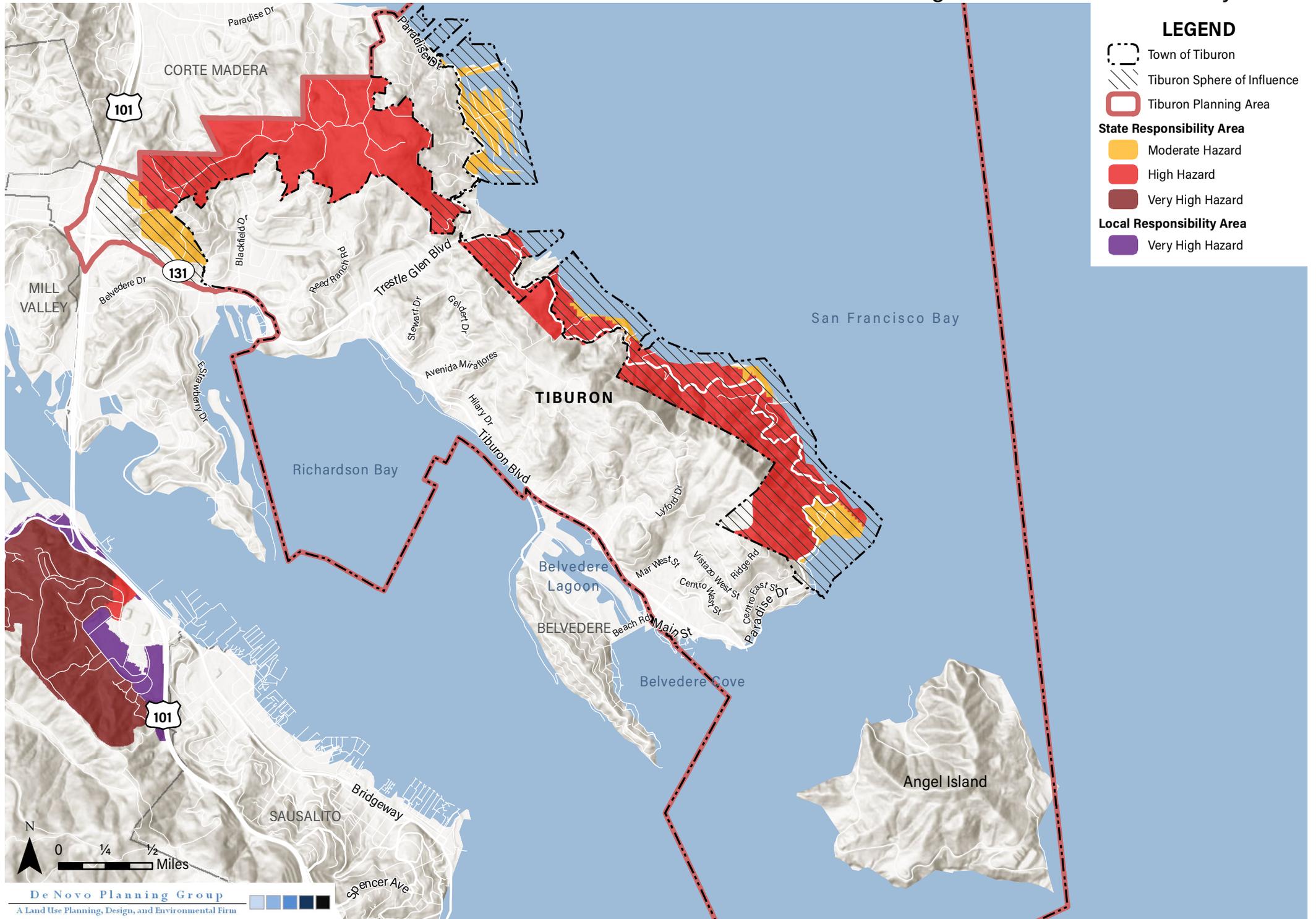
Figure 2: Fire Threat



Sources: ArcGIS Online World Hillshade Map Service; CalFireFRAP "Wildland Fire Threat (1thrt14_2). Map date: December 1, 2020. Revised March 4, 2021.

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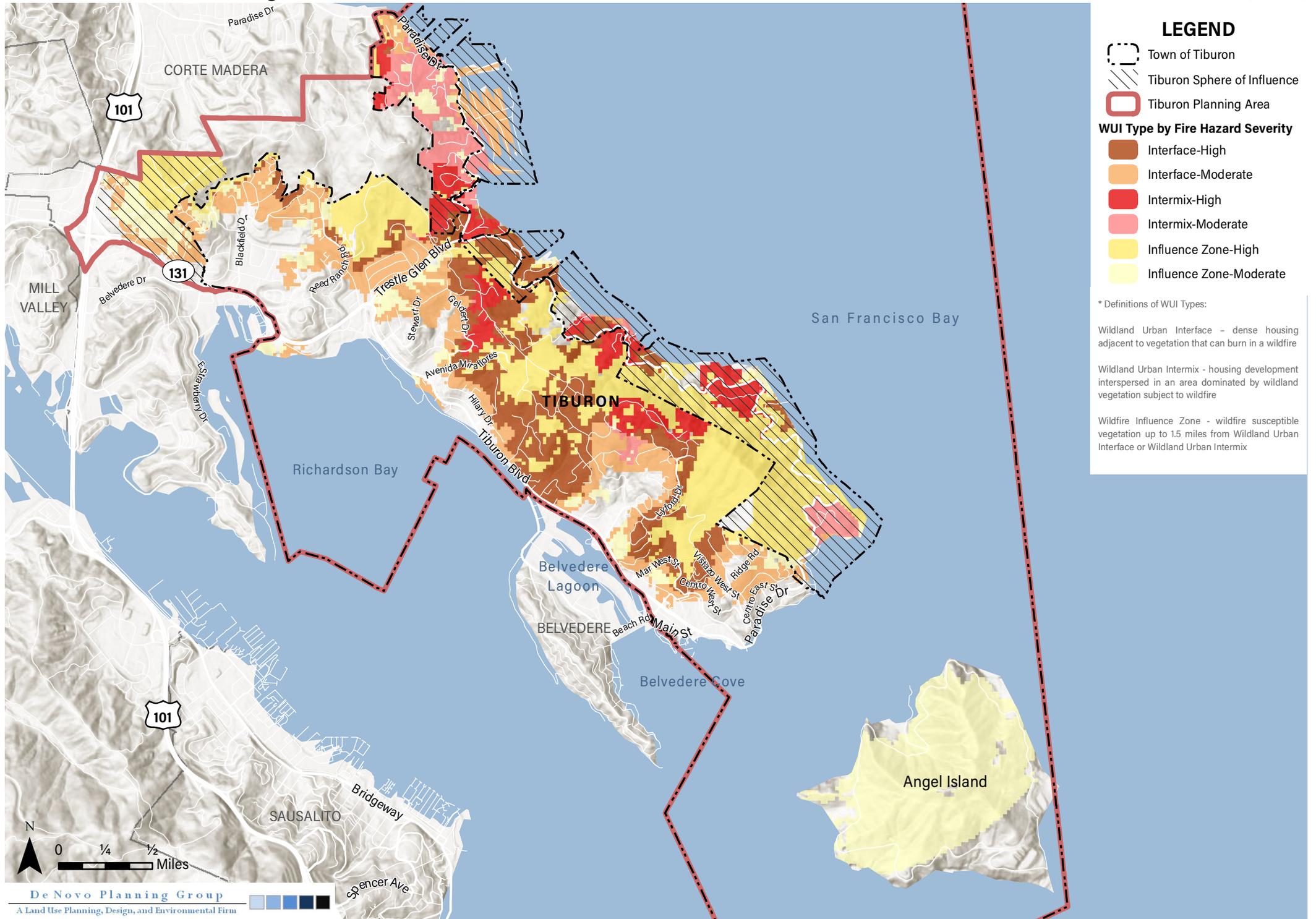
Figure 3: Fire Hazard Severity Zones



Sources: ArcGIS Online World Hillshade Map Service; CalFireFRAP fhzs06_3_21 and c21fhsl06_3. Map date: December 1, 2020. Revised March 4, 2021.

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Figure 4: Fire Hazards and Wildland Urban Interface, Intermix, and Wildfire Influence Zones (WUI)



Sources: ArcGIS Online World Hillshade Map Service; CalFireFRAP "Wildland Urban Interface, Intermix, and Wildfire Influence Zones - with Housing Density and Hazard Class" (WUI12_3). Map date: December 1, 2020. Revised March 4, 2021.

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4 FLOODING

This section addresses the hazards associated with flooding in the Planning Area. The discussion of storm drainage infrastructure is located in the *Community Services and Utilities Existing Conditions Report*. Flooding risks associated with climate change are discussed in the *Climate Change Existing Conditions Report*.

REGULATORY FRAMEWORK

FEDERAL

Federal Emergency Management Agency

The Federal Emergency Management Agency operates the National Flood Insurance Program (NFIP). Participants in the NFIP must satisfy certain mandated floodplain management criteria. The National Flood Insurance Act of 1968 has adopted as a desired level of protection, an expectation that developments should be protected from floodwater damage of the Intermediate Regional Flood (IRF). The IRF is defined as a flood that has an average frequency of occurrence on the order of once in 100 years, although such a flood may occur in any given year. Communities are occasionally audited by the California Department of Water Resources to insure the proper implementation of FEMA floodplain management regulations.

Rivers and Harbors Appropriation Act of 1899

One of the country's first environmental laws, this Act established a regulatory program to address activities that could affect navigation in Waters of the United States.

Water Pollution Control Act of 1972

The Water Pollution Control Act (WPCA) established a program to regulate activities that result in the discharge of pollutants to waters of the United States

Clean Water Act of 1977

The Clean Water Act (CWA), which amended the WPCA of 1972, sets forth the §404 program to regulate the discharge of dredged and fill material into Waters of the U.S. and the §402 National Pollutant Discharge Elimination System (NPDES) to regulate the discharge of pollutants into Waters of the U.S. The §401 Water Quality Certification program establishes a framework of water quality protection for activities requiring a variety of Federal permits and approvals (including CWA §404, CWA §402, FERC Hydropower and §10 Rivers and Harbors).

Flood Control Act

The Flood Control Act (1917) established survey and cost estimate requirements for flood hazards in the Sacramento Valley. All levees and structures constructed per the Act were to be maintained locally but controlled federally. All rights of way necessary for the construction of flood control infrastructure were to be provided to the Federal government at no cost. Federal involvement in the construction of flood control infrastructure, primarily dams and levees, became more pronounced upon passage of the Flood Control Act of 1936.

National Flood Insurance Program

The National Flood Insurance Act of 1968 identified three fundamental purposes: *Better indemnify individuals for flood losses through insurance; Reduce future flood damages through State and community floodplain management regulations; and Reduce Federal expenditures for disaster assistance and flood control.* While this act provided for subsidized flood insurance for existing structures, the provision of flood insurance by the FEMA became contingent on the adoption of floodplain regulations at the local level. The National Flood Insurance Act of 1968 led to the creation of the National Flood Insurance Program.

The NFIP goals are two-fold:

- To provide flood insurance for structures and contents in communities that adopt and enforce an ordinance outlining minimal floodplain management standards.
- To identify areas of high and low flood hazard and establish flood insurance rates for structures inside each flood hazard area.

Flood Disaster Protection Act

The Flood Disaster Protection Act (FDPA) of 1973 was a response to the shortcomings of the NFIP which were experienced during the flood season of 1972. The FDPA prohibited Federal assistance, including acquisition, construction, and financial assistance, within delineated floodplains in non-participating NFIP communities. Furthermore, all Federal agencies and/or federally insured and federally regulated lenders must require flood insurance for all acquisitions or developments in designated Special Flood Hazard Areas (SFHAs) in communities that participate in the NFIP.

Improvements, construction, and developments within SFHAs are generally subject to the following standards:

- All new construction and substantial improvements of residential buildings must have the lowest floor (including basement) elevated to or above the base flood elevation (BFE).
- All new construction and substantial improvements of non-residential buildings must either have the lowest floor (including basement) elevated to or above the BFE or dry-floodproofed to the BFE.
- Buildings can be elevated to or above the BFE using fill, or they can be elevated on extended foundation walls or other enclosure walls, on piles, or on columns.
- Extended foundation or other enclosure walls must be designed and constructed to withstand hydrostatic pressure and be constructed with flood-resistant materials and contain openings that will permit the automatic entry and exit of floodwaters. Any enclosed area below the BFE can only be used for the parking of vehicles, building access, or storage.

STATE

Assembly Bill 162

This bill requires a general plan's land use element to identify and annually review those areas covered by the general plan that are subject to flooding as identified by floodplain mapping prepared by the Federal Emergency Management Agency or the Department of Water Resources (DWR). The bill also requires, upon the next revision of the housing element, on or after January 1, 2009, the conservation element of the general plan to identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for purposes of groundwater recharge and stormwater management. By imposing new duties on local public officials, the bill creates a State-mandated local program.

This bill also requires, upon the next revision of the housing element, on or after January 1, 2009, the safety element to identify, among other things, information regarding flood hazards and to establish a set of comprehensive goals, policies, and objectives, based on specified information for the protection of the community from, among other things, the unreasonable risks of flooding.

Assembly Bill 70

This bill provides that a city or county may be required to contribute its fair and reasonable share of the property damage caused by a flood to the extent that it has increased the State's exposure to liability for property damage by unreasonably approving, as defined, new development in a previously undeveloped area, as defined, that is protected by a State flood control project, unless the city or county meets specified requirements.

CA Government Code

The Senate and Assembly bills identified above have resulted in various changes and additions to the California Government Code. Key sections related to the above referenced bills are identified below.

Section 65302

Revised safety elements must include maps of any 200-year floodplains and levee protection zones within the Planning Area.

Section 65584.04

Any land having inadequate flood protection, as determined by the FEMA or DWR, must be excluded from land identified as suitable for urban development within the planning area.

Section 8589.4

California Government Code Section 8589.4, commonly referred to as the Potential Flooding-Dam Inundation Act, requires owners of dams to prepare maps showing potential inundation areas in the event of dam failure. A dam failure inundation zone is different from a flood hazard zone under the National Flood Insurance Program. NFIP flood zones are areas along streams or coasts where storm flooding is possible from a “100-year flood.” In contrast, a dam failure inundation zone is the area downstream from a dam that could be flooded in the event of dam failure due to an earthquake or other catastrophe. Dam failure inundation maps are reviewed and approved by the California Office of Emergency Services. Sellers of real estate within inundation zones are required to disclose this information to prospective buyers.

LOCAL

Town of Tiburon Municipal Code

Flood Damage Prevention Ordinance (Municipal Code Chapter 13D) outlines specific requirements for new developments within floodplain areas that serve to minimize public and private losses due to flood conditions. In order to accomplish its purposes, this chapter includes methods and provisions for:

1. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;
2. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
3. Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters;
4. Controlling filling, grading, dredging and other development which may increase flood damage; and
5. Preventing or regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas.

The Town of Tiburon Urban Runoff Pollution Prevention Ordinance (Municipal Code Chapter 20A) requires that every development project that is subject to the development requirements in the City’s NPDES permit is required to also submit and implement a stormwater control plan that meets the criteria in the most recent version of the Bay Area Stormwater Management Agencies (BASMAA) Post Construction Manual. The Town of Tiburon Urban Runoff Pollution Prevention Ordinance requires that development projects maintain or reduce the volume, velocity, peak flow rate and duration of runoff as compared to the pre-development stormwater runoff and preventing stormwater pollution whenever possible, through stormwater management controls and ensuring that these management controls are properly maintained.

Town of Tiburon General Plan

The existing Town of Tiburon General Plan identifies the following goals, policies, and implementation measures related to flooding:

Safety Element

Goals

SE-B: To identify hazardous areas and to discourage to the maximum extent feasible development of areas subject to hazards including, but not limited to, geotechnical hazards, unstable slopes and flood-prone areas.

Policies

SE-9: The Town shall require new development and/ or construction, where feasible, to be outside Special Flood Hazard Areas (which are defined by FEMA as areas that would be inundated by a flood having a 1 % chance of occurring in any given year). Construction proposed within Special Flood Hazard Areas shall comply with the Town's Flood Damage Prevention Ordinance (Municipal Code Chapter 13D).

SE-10: The Town shall require structures constructed adjacent to areas subject to the 100-year tidal flood to be protected from destructive wave action.

SE-11: Drainage facilities within new subdivisions shall be designed to accommodate a 100-year storm.

SE-12: On-site detention of stormwater runoff shall be utilized to ensure that post-development peak flow rates from a site resulting from both the two-year and 100-year design rainstorms are not increased by new subdivisions or other permitted development projects.

SE-13: To the extent that new subdivisions are responsible for exceeding the capacity of any existing stormwater drainage system, the applicant shall be responsible for the cost of improvements to the system such that the capacity is not exceeded upon project completion.

SE-14: To offset the increased demand on the capacity, operation, and sustainability of the Town storm drain system, the Town shall expend its Stormwater Runoff Impact Fees to upgrade, enhance, and/ or rehabilitate the Town's public storm drain system.

SE-15: The Town shall track sea level rise predictions for San Francisco Bay and, should rates of sea level rise accelerate, the Town shall amend its flood control policies accordingly in coordination with other regional and federal authorities (e.g., BCDC, Army COE, FEMA). Such amendments would potentially include revised finished floor elevations for habitable structures, as well as revised runup elevations associated with earthquake-generated tsunamis.

Implementing Measures

SE-a: Where possible, the Town should advise the residents of the Tiburon Planning Area of ways that they can reduce geologic, fire and flooding hazards.

SE-b: The Town shall require project applicants for new development to prepare a hydraulic and geomorphic assessment of on-site and downstream drainageways that are affected by project area runoff. Characteristics pertinent to channel stability would include bank erosion, excessive bed scour or sediment deposition, bed slope adjustments, lateral channel migration or bifurcation, and the condition of riparian vegetation. In the event existing channel instabilities were noted, the applicant could either propose their own channel stabilization program, or defer to the mitigations generated during the Town's environmental review. Any proposed stabilization measures shall anticipate any project-related changes to the drainageway flow regime.

San Francisco Bay Regional Water Quality Control Board Municipal Regional Stormwater NPDES Permit

The 1987 amendments to the Clean Water Act [Section 402(p)] provided for US EPA regulation of several new categories of nonpoint pollution sources within the existing National Pollutant Discharge Elimination Program (NPDES). In Phase I, NPDES permits were issued for urban runoff discharges from municipalities of over 100,000 people, from plants in industries

recognized by the U.S. EPA as being likely sources of stormwater pollutants, and from construction activities that disturb more than five acres. Phase II implementation, effective March 10, 2003, extended NPDES urban runoff discharge permitting to cities of 50,000 to 100,000 people, and to construction sites that disturb between one and five acres. The SWRCB Water Quality Order No. 2003-0005-DWQ, adopted April 30, 2003, established the Phase II NPDES General Permit No. CAS000004 to cover Small Municipal Separate Storm Sewer Systems (MS4). Marin County and the Town of Tiburon are designated as Small MS4s and fall under this NPDES General Permit. Enforcement of permit conditions is the responsibility of Regional Board staff assisted by local municipal or county staff. In Marin, the County and all Marin's municipalities are subject to the conditions of the regulations described in the current 2013 Phase II Permit Water Quality Order No. 2013-0001-DWQ NPDES No. CAS000004, as amended by order Water Quality Order No. 2015-0133-EXEC, 2016-0069-EXEC, 2017-XXXX-DWQ, 2018-0001-EXEC, and 2018-0007-EXEC.

Marin County Stormwater Pollution Prevention Program

The Marin County Stormwater Pollution Prevention Program (MCSTOPPP) is a joint effort of Marin's cities, towns, and unincorporated areas to prevent stormwater pollution, protect and enhance water quality in creeks and wetlands, preserve beneficial uses of local waterways, and comply with State and Federal regulations. Each MCSTOPPP member agency implements a local stormwater pollution prevention program and funds the countywide MCSTOPPP, which provides for the coordination and consistency of approaches between the local stormwater programs and documents their efforts in annual reports. The annual reports include information on illegal discharge detection and elimination, street and storm drain cleaning, municipal and creek maintenance, stormwater and creek protection controls for development projects, business inspections, and public outreach, education, and participation. While MCSTOPPP provides guidance for compliance with NPDES permitting, permit compliance is administered by the specific municipality in which the project is proposed.

Bay Area Stormwater Management Agencies Post Construction Manual

The MCSTOPPP has approved the most recent version of the Bay Area Stormwater Management Agencies (BASMAA) Post Construction Manual as the applicable California Storm Water Quality Association Best Management Practices Handbook for projects within MCSTOPPP. The BASMAA Post Construction Manual is to assist applicants for development approvals to prepare submittals that demonstrate their project complies with the NPDES permit requirements. This manual is designed to facilitate the review of application and promote integrated Low Impact Development (LID) designs. LID design aims to mimic pre-project site hydrology as well as protect water quality. Runoff from roofs and impervious paved areas is dispersed to landscaped areas or routed to bioretention facilities distributed throughout the site. Bioretention facilities infiltrate some runoff and feature underdrains to convey treated stormwater to storm drains.

ENVIRONMENTAL SETTING

Flooding is a temporary increase in water flow that overtops the banks of a river, stream, or drainage channel to inundate adjacent areas not normally covered by water.

Much of Tiburon has steep topography and a minimal risk of flooding. However, there are low-lying areas of the Town, as well as areas adjacent to the Belvedere Lagoon, where flooding can occur. Localized flooding may occur in low spots or where infrastructure is unable to accommodate peak flows during a storm event. In most cases, water dissipates quickly after heavy rain ceases. For additional information on stormwater and drainage infrastructure see the Community Services and Facilities report.

CLIMATE

The Tiburon peninsula is in the Mediterranean-type climate zone typical of coastal central California. This zone is characterized by cool, wet winters and warm, dry summers, with almost all rain falling between the months of October and April. Tiburon averages approximately 47 inches of rain, on average, per year, and the wettest month is typically January averaging approximately 9.6 inches of rain. Summers in the Planning Area are warm ranging from an average high in July

of 85°F to an average low of approximately 54°F. Winters are cool and mild, with an average high of 56°F and a low of 41°F in January.

FEMA FLOOD ZONES

The FEMA mapping provides important guidance for the City in planning for flooding events and regulating development within identified flood hazard areas. The FEMA's National Flood Insurance Program is intended to encourage State and local governments to adopt responsible floodplain management programs and flood measures. As part of the program, the NFIP defines floodplain and floodway boundaries that are shown on Flood Insurance Rate Maps (FIRMs). The FEMA FIRM for the Planning Area is shown on Figure 4.

Areas that are subject to flooding are indicated by a series of alphabetical symbols, indicating anticipated exposure to flood events:

- **Zone A:** Subject to 100-year flooding with no base flood elevation determined. Identified as an area that has a one percent chance of being flooded in any given year.
- **Zone AE:** Subject to 100-year flooding with base flood elevations determined.
- **Zone AH:** Subject to 100-year flooding with flood depths between one and three feet being areas of ponding with base flood elevations determined.
- **500-year Flood Zone:** Subject to 500-year flooding. Identified as an area that has a 0.2 percent chance of being flooded in a given year.

Figure 5 identifies the areas within the Planning Area with a FEMA flood zone designation. The Planning Area is subject to flooding problems along the shoreline and waterfront areas. The primary flood hazards are the low-lying areas adjacent to the San Francisco Bay, Belvedere Cove, Belvedere Lagoon, and Richardson Bay. The low-lying areas along the Planning Area shorelines are subject to occasional flooding.

The 100-year floodplain is largely confined to the Boardwalk Shopping Center and Downtown Tiburon area adjacent to the Belvedere lagoon, as well as various portions along the coast, including near Keil Cove, Richardson Bay, and Paradise Cay. Additionally, various portions of land along the coast are designated within the 100-year flood zone with additional stormwater wave hazard. These areas are typically located near land designated within the 100-year flood zone, such as land adjacent to the Boardwalk Shopping Center, Paradise Cay and Richardson Bay. Similarly, the 500-year floodplain is typically located adjacent to land designated within the 100-year flood zone, including land within the Boardwalk Shopping Center, Paradise Cay, and land north of Richardson Bay. Additionally, land adjacent to Tiburon Boulevard near downtown is designated within the 500-year flood zone.

DAM INUNDATION

Earthquakes centered close to a dam are typically the most likely cause of dam failure. Dam Inundation maps have been required in California since 1972, following the 1971 San Fernando Earthquake and near failure of the Lower Van Norman Dam. The Planning Area is not within a dam inundation zone.

TSUNAMI

A tsunami is a series of waves in a water body caused by the displacement of a large volume of water, generally in an ocean or a large lake due to earthquakes, volcanic eruptions, and other underwater explosions. Depending on the location of an incident, a tsunami can reach the California coast in as little as ten minutes, for a local-source earthquake, or take from five to 14 hours, for a distant-source earthquake. The Great Alaskan earthquake of 1964 generated a tsunami that killed 12 people and destroyed 30 blocks in Crescent City, California.

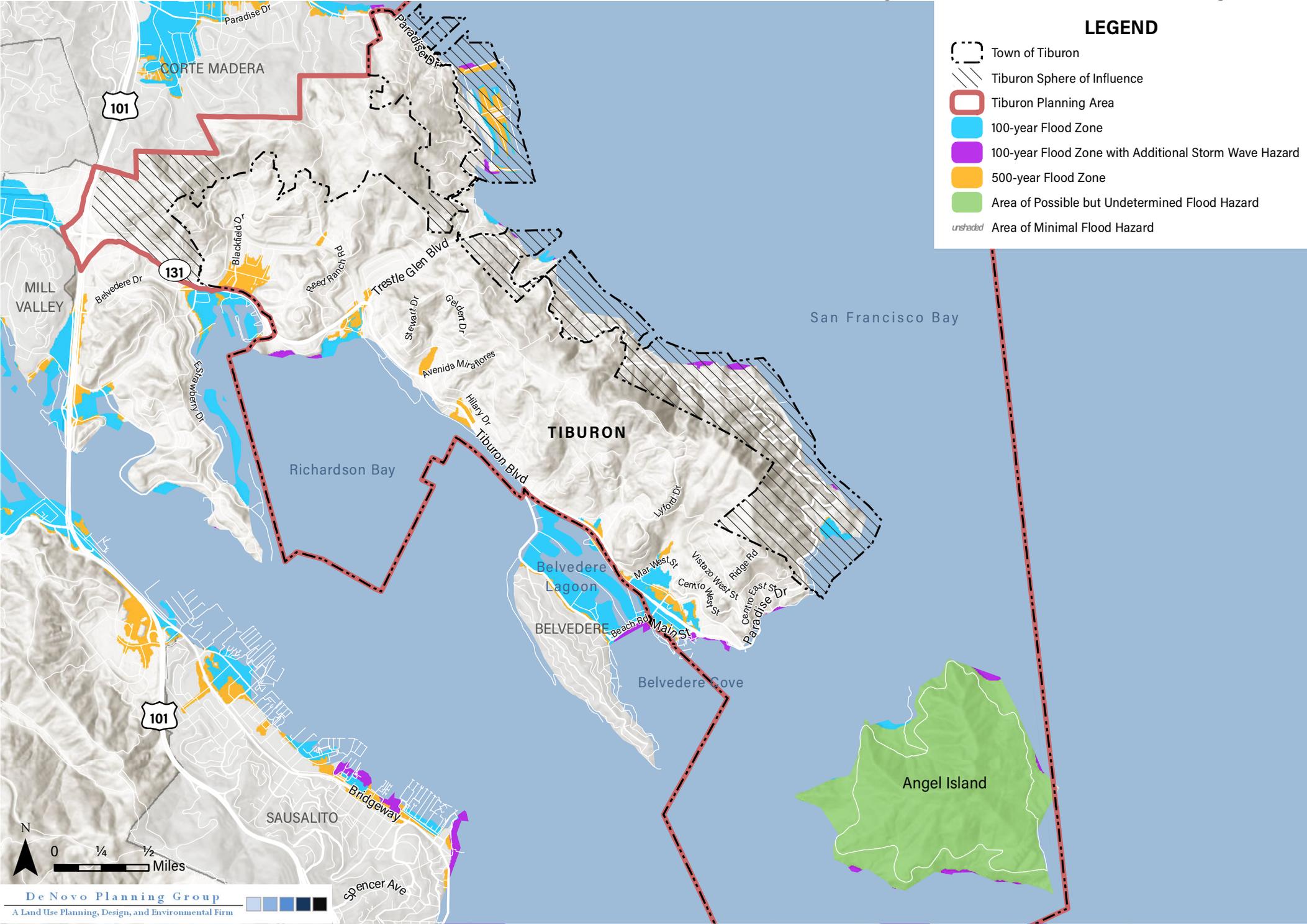
Figure 6 identifies portions of the Planning Area located within a tsunami inundation zone. As shown in Table 10, a tsunami has the potential to destroy/damage the ferry landing and a total of 170 structures within Tiburon, including 53 single-family structures, 72 multi-family structures, and 45 commercial structures. As previously mentioned, numerous residences, businesses, and yacht clubs on the Tiburon Peninsula are waterfront properties and are located within tsunami inundation areas. Specifically, all the residences adjacent to the Paradise Cay, Boardwalk Shopping Center, and the majority of the eastern coast are located within a tsunami inundation area. Additionally, many recreational areas such as beaches, shoreline park, Angel Island, Paradise Park, and the multiuse path or along the shoreline and are at risk from tsunamis.

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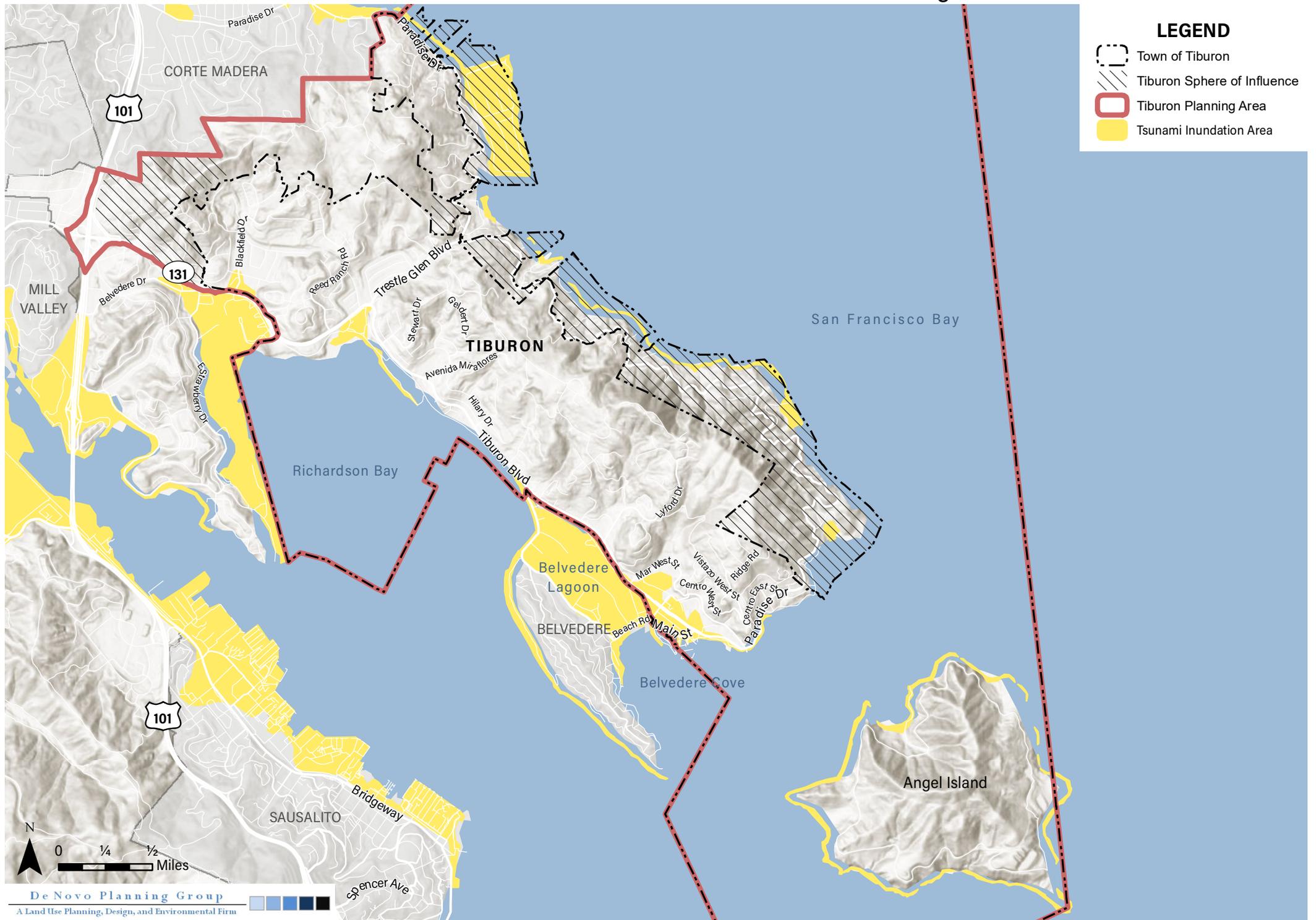
Figure 5: FEMA Flood Zone Designations



Sources: ArcGIS Online World Hillshade Map Service; FEMA. Map date: November 30, 2020. Revised March 4, 2021.

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Figure 6: Tsunami Inundation Zones



Sources: ArcGIS Online World Hillshade Map Service; CalEMA/CGS/USC "Tsunami Inundation Map for Emergency Planning," July 1, 2009. Map date: November 30, 2020. Revised March 4, 2021.

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5 AIR TRAFFIC

The State Division of Aeronautics has compiled extensive data regarding aircraft accidents around airports in California. This data is much more detailed and specific than data currently available from the FAA and the National Transportation Safety Board (NTSB). According to the California Airport Land Use Planning Handbook prepared by the State Division of Aeronautics, 18.2% of general aviation accidents occur during takeoff and initial climb and 44.2% of general aviation accidents occur during approach and landing. The State Division of Aeronautics has plotted accidents during these phases at airports across the country and has determined certain theoretical areas of high accident probability.

APPROACH AND LANDING ACCIDENTS

As nearly half of all general aviation accidents occur in the approach and landing phases of flight, considerable work has been done to determine the approximate probability of such accidents. Nearly 77% of accidents during this phase of flight occur during touchdown onto the runway or during the roll-out. These accidents typically consist of hard or long landings, ground loops (where the aircraft spins out on the ground), departures from the runway surface, etc. These types of accidents are rarely fatal and often do not involve other aircraft or structures. Commonly these accidents occur due to loss of control on the part of the pilot and, to some extent, weather conditions. (California Division of Aeronautics, 2011).

The remaining 23% of accidents during the approach and landing phase of flight occur as the aircraft is maneuvered towards the runway for landing, in a portion of the airspace around the airport commonly called the traffic pattern. Common causes of approach accidents include the pilot's misjudging of the rate of descent, poor visibility, unexpected downdrafts, or tall objects beneath the final approach course. Improper use of rudder on an aircraft during the last turn toward the runway can sometimes result in a stall (a cross-control stall) and resultant spin, causing the aircraft to strike the ground directly below the aircraft. The types of events that lead to approach accidents tend to place the accident site fairly close to the extended runway centerline. The probability of accidents increases as the flight path nears the approach end of the runway. (California Division of Aeronautics, 2011).

According to aircraft accident plotting provided by the State Division of Aeronautics, most accidents that occur during the approach and landing phase of flight occur on the airport surface itself. The remainder of accidents that occur during this phase of flight are generally clustered along the extended centerline of the runway, where the aircraft is flying closest to the ground and with the lowest airspeed. (California Division of Aeronautics, 2011).

TAKEOFF AND DEPARTURE ACCIDENTS

According to data collected by the State Division of Aeronautics, nearly 65% of all accidents during the takeoff and departure phase of flight occur during the initial climb phase, immediately after takeoff. This data is correlated by two physical constraints of general aviation aircraft:

- The takeoff and initial climb phase are times when the aircraft engine(s) is under maximum stress and is thus more susceptible to mechanical problems than at other phases of flight; and
- Average general aviation runways are not typically long enough to allow an aircraft that experiences a loss of power shortly after takeoff to land again and stop before the end of the runway.

While the majority of approach and landing accidents occur on or near to the centerline of the runway, accidents that occur during initial climb are more dispersed in their location as pilots are not attempting to get to any one specific point (such as a runway). Additionally, aircraft vary widely in payload, engine power, glide ratio, and several other factors that affect glide distance, handling characteristics after engine loss, and general response to engine failure. This further disperses the accident pattern. However, while the pattern is more dispersed than that seen for approach and landing accidents, the departure pattern is still generally localized in the direction of departure and within proximity of the centerline. This is partially because pilots are trained to fly straight ahead and avoid turns when experiencing a loss of power or engine failure. Turning

flight causes the aircraft to sink faster and flying straight allows for more time to attempt to fix the problem. (California Division of Aeronautics, 2011).

REGULATORY FRAMEWORK

FEDERAL

Aviation Act of 1958

The Federal Aviation Act resulted in the creation of the Federal Aviation Administration (FAA). The FAA was charged with the creation and maintenance of a National Airspace System.

Federal Aviation Regulations (CFR, Title 14)

The Federal Aviation Regulations (FAR) establish regulations related to aircraft, aeronautics, and inspections and permitting.

STATE

Aeronautics Act (Public Utilities Code §21001)

The Caltrans Division of Aeronautics bases many of its aviation policies on the Aeronautics Act. Policies include permits and annual inspections for public airports and hospital heliports and recommendations for schools proposed within two miles of airport runways.

Airport Land Use Commission Law (Public Utilities Code §21670 et seq.)

The law, passed in 1967, authorized the creation of Airport Land Use Commissions (ALUC) in California. Per the Public Utilities Code, the purpose of an ALUC is to protect *public health, safety, and welfare by encouraging orderly expansion of airports and the adoption of land use measures that minimizes exposure to excessive noise and safety hazards within areas around public airports to the extent that these areas are not already devoted to incompatible uses* (§21670). Furthermore, each ALUC must prepare an Airport Land Use Compatibility Plan (ALUCP). Each ALUCP, which must be based on a twenty-year planning horizon, should focus on broadly defined noise and safety impacts.

LOCAL

Town of Tiburon General Plan

The existing Town of Tiburon General Plan does not include policies related to airport facilities.

ENVIRONMENTAL SETTING

There are no private or public airport facilities in the Planning Area. The closest airport facility to the Planning Area is the San Rafael Airport. Airport facilities near the Planning Area and region are shown in Figure 6.

LOCAL AIRPORT FACILITIES

San Rafael Airport. The San Rafael Airport is in the City of San Rafael, approximately 7.4 miles north of the Tiburon city limits. The San Rafael Airport is a privately-owned executive airport with a 2,700 foot runway. The airport is located at an elevation of approximately 5 feet above Mean Sea Level (MSL). The Planning Area is not located within the airport influence zone for this airport.

MAJOR REGIONAL AIRPORT FACILITIES

San Francisco International Airport (SFO): SFO is the largest airport in the region, and a hub for United Airlines. It provides a wide range of domestic airline service and all the region's long-haul international flights. San Francisco serves 68% of regional Bay Area air passengers and 43% of regional air cargo shipments.

Metropolitan Oakland International Airport (OAK): Oakland Airport has traditionally been the hub for low cost carriers and a major air cargo center due to operations by FedEx and UPS. Oakland serves 17% of Bay Area regional air passengers and 52% of air cargo.

NATIONAL TRANSPORTATION SAFETY BOARD AVIATION ACCIDENT DATABASE

The National Transportation Safety Board Aviation Accident Database identifies one aircraft accident in Tiburon between January 1, 1950 to December 18, 2020. (National Transportation Safety Board, 2020). This incident occurred on September 30, 1986. After completing an aerial advertising flight across the San Francisco Bay, the pilot attempted a landing on up-sloping terrain. However, the terrain was steeper than anticipated and the pilot became distracted, resulting in the plane crashing and starting a wildfire. The pilot survived the crash; however, the plane (Cameron O-77) was destroyed.

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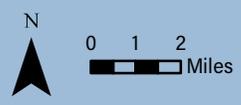
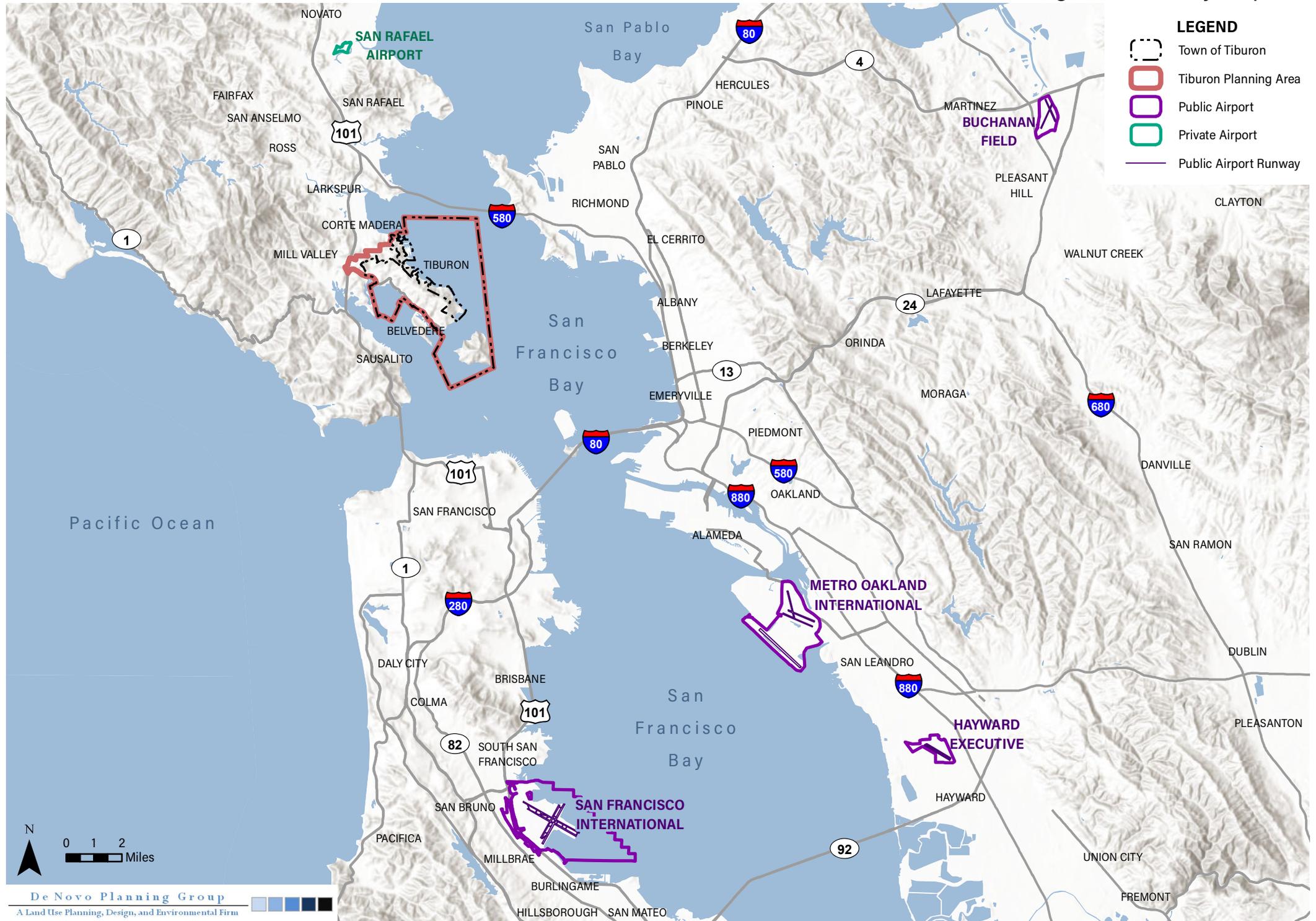
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Figure 7: Nearby Airports



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