PENINSULA RESILIENCE PLANNING PROJECT

SAN MATEO COUNTY VULNERABILITY ASSESSMENT SUMMARY

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Public Draft

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Introduction

There are nine jurisdictions in San Mateo County working collaboratively on the Peninsula Resilience Planning (PREP) project: San Mateo County (County), the Town of Atherton, and the cities of Belmont, Brisbane, Burlingame, East Palo Alto, Half Moon Bay, Pacifica, and San Bruno. The PREP project is a coordinated effort to identify the hazards facing communities across San Mateo County, evaluate how these hazards may change with the changing climate, recognize the communities and community features that are most vulnerable, and develop strategies for improving community safety and resilience.

What is a General Plan?

A general plan is each local government's blueprint for meeting the community's long-term vision for the future, with goals, policies, and actions for achieving the vision. All cities and counties in California are required to have General Plans with, at minimum, eight chapters, or elements: Land Use, Circulation, Housing, Conservation, Open Space, Noise, Safety, and Environmental Justice (if applicable). [1]

As a participant in PREP, the County is conducting a comprehensive update of its Safety Element. As part of the technical background work for the update to the San Mateo County Safety Element, the PREP team prepared an updated Climate Change Vulnerability Assessment to analyze how climate-related hazards may harm the community. California law* requires that safety elements include information and policies to address the threat posed by climate change. As a part of this requirement, a safety element must include an analysis of climate vulnerability, which is the degree to which people, nature, the built environment, and other systems are susceptible to harm from climate change and associated hazards. This includes physical and mental injuries, property damage or destruction, environmental harm, economic damage, and other factors.

The Vulnerability Assessment helps community members, County staff, and decision makers understand how climate change hazards may alter community conditions and what parts of the community (people and places) should be prioritized for adaptation and resilience. This assessment informs ways to improve resiliency in San Mateo County in a way that is integrated, thorough, and tailored. The Vulnerability Assessment also informs updates to the Safety Element, which, in combination with the San Mateo County Multijurisdictional Local Hazard Mitigation Plan, will help safeguard San Mateo County against both current and future hazard conditions, including the changes in hazard events from climate change. The findings from the Vulnerability Assessment process will be used to inform the goals, policies, and actions that will be included in San Mateo County's updated Safety Element. This assessment does not include hazards that are present in the community but are not affected by climate change, such as earthquakes.

* California Government Code Section 65302(g)(4), established by Senate Bill 379 in 2015.

Community Profile

San Mateo County covers the area from south of San Francisco to Santa Clara Valley and the mountains around Santa Cruz. The urbanized east side of the County, or Bayside, is very different from the smaller communities, farms, and natural landscape of the western side (Coastside), as shown in Figure 1.

Along the shores of San Francisco Bay, on the Bayside, is a continuous chain of small and medium-size communities, ranging from working-class neighborhoods to some of the wealthiest areas in the country. There are several key commercial and industrial centers along the Bayside that function as job centers for the region. Multiple freeways (particularly Highways 101, 280, and 92) and public transit lines run through these communities, connecting San Mateo County with the rest of the Bay Area. The unincorporated communities along the Bayside are mostly a mix of residential and open space areas, except for San Francisco International Airport; West Menlo Park, which has commercial uses; and the Harbor/Industrial neighborhood between Belmont and Redwood City, which has industrial and manufacturing facilities. This includes Broadmoor, an unincorporated area surrounded by Daly City that is one of the most populous unincorporated communities in the county. Most of these residential communities are predominantly middle class or wealthy, but the Bayside also includes the unincorporated community of North Fair Oaks, along with a group of mobile home parks north of Highway 101 between Redwood City and Menlo Park. These unincorporated communities consist of residential, commercial, railroad, and industrial areas, with few parks and green spaces. Residents of these unincorporated communities have lower incomes than the countywide average and many are members of frontline communities, those who often face the most immediate and serious risk of harm from natural hazards.

The Coastside of San Mateo County is very different from the urbanized Bayside. The developed areas of the Coastside are suburban, largely residential communities in the northern part of the county. This includes the communities of El Granada, Miramar, Montara, Moss Beach, and Princeton. South of Half Moon Bay are the communities of La Honda, Loma Mar, Pescadero, Sky Londa, and the unincorporated lands south of Half Moon Bay and west of State Route 35. The coastal region has a rural setting, with primary economic drivers focused on agriculture, outdoor recreation, and tourism. This side of San Mateo County is more rural and geographically isolated, with Highway 1 forming the primary transportation route in the region. Highway 92 connects Half Moon Bay to the urbanized Bayside, but the communities south of Half Moon Bay are more remote, with primary vehicle north/south access via Highway 1 and east/west access via State Route 84 and Pescadero Road. Large open spaces and parks such as Purisima Creek Redwoods Open Space Preserve, La Honda Creek Open Space Preserve, Portola Redwoods State Park, Pescadero Creek Park, and Butano State Park support the outdoor recreation and tourism industries. The stark contrast in the landscapes of the Bayside and the Coastside translates to very different vulnerabilities in the two areas.

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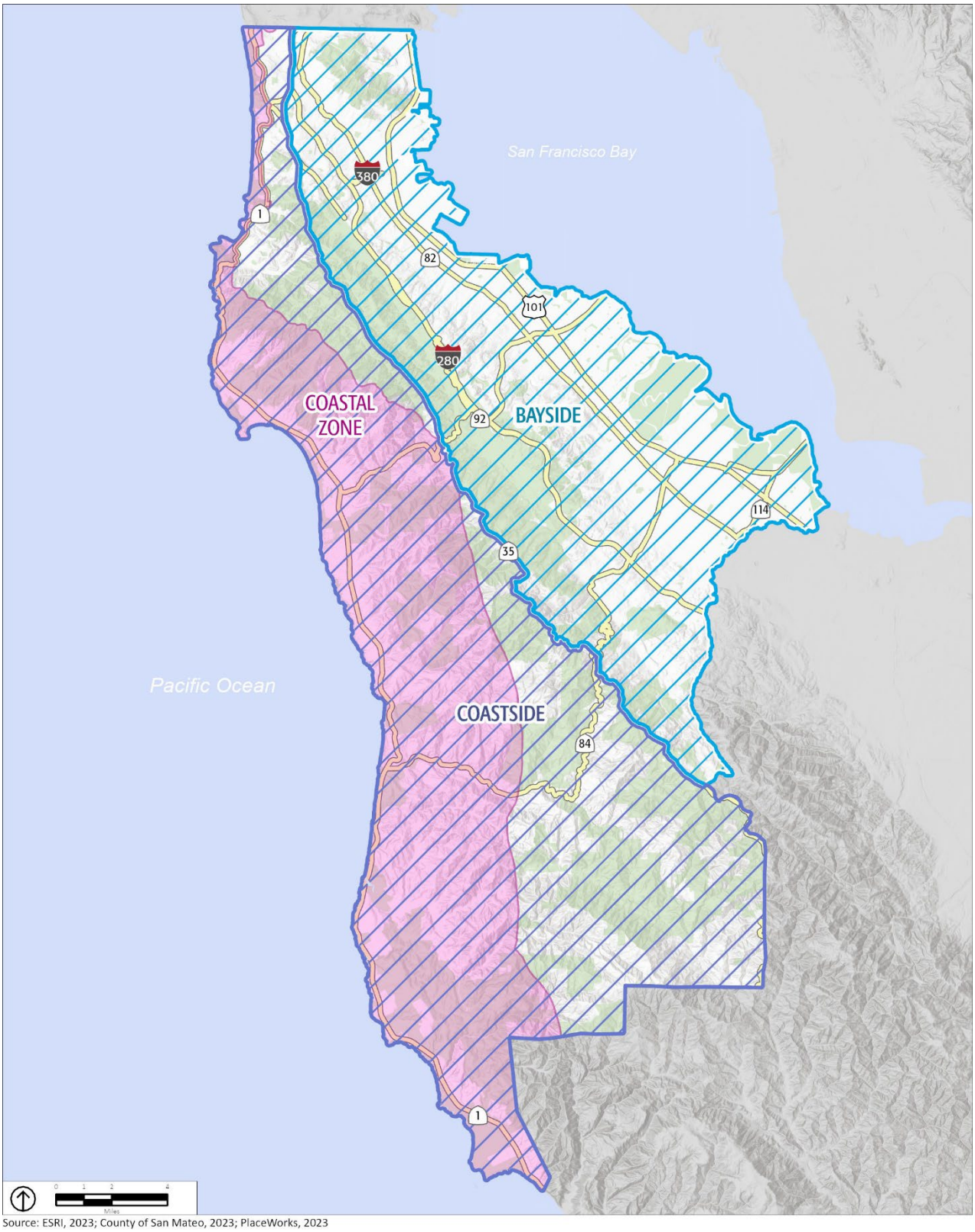
Figure 1: San Mateo County regions



Source: ESRI, 2023; County of San Mateo, 2023; PlaceWorks, 2023

The unincorporated areas of San Mateo County exhibit distinct demographic and socioeconomic characteristics compared to the county as a whole. Unincorporated areas have a population of approximately 62,500 individuals in approximately 20,500 households. The average household income in the unincorporated areas is $150,000, lower than the countywide median of $175,000. The unincorporated communities of North Fair Oaks, the South Coast communities such as Pescadero, and some of the Midcoast communities (the area between Half Moon Bay and Pacifica) such as Moss Beach and Princeton are among the lower-income or resource-constrained areas, while many of the Bayside unincorporated communities are on the wealthy to very wealthy side of the spectrum. North Fair Oaks and some of the coastal unincorporated communities are characterized by lower incomes and resource constraints, facing challenges related to access to services and economic opportunities. In contrast, many of the Bayside unincorporated communities, such as Burlingame Hills and Emerald Lake Hills, are notably affluent, with a high concentration of wealth and extensive resources. There are a higher proportion of unincorporated residents working in outdoor occupations compared to the entire county. The unincorporated areas have higher rates of cost-burdened households, overcrowded living conditions, and households in mobile homes. However, compared to all of San Mateo County, the unincorporated areas have a lower rate of linguistic isolation. There are slightly fewer individuals with disabilities and fewer residents living in poverty in unincorporated areas compared to county averages. Households in the unincorporated areas are less likely to be without internet access or vehicles compared to the county overall. Furthermore, rental households are less common, with about 24 percent of households in unincorporated areas renting, compared to 40 percent countywide. **Table 1** shows community demographics in the unincorporated County compared to all of San Mateo County.

Table 1: Community Demographics for the Unincorporated County and San Mateo County

Demographic	Unincorporated County		San Mateo County	
	Number	Percent	Number	Percent
Population	62,509		754,250	
Children (under 18 years old)	13,063	20.90%	150,187	19.90%
Linguistically isolated persons*	7,520	12.03%	116,306	16.30%
Older adults (65 years and older)	10,999	17.60%	127,520	16.90%
Older adults living alone	1,944	9.49%	26,168	9.90%
Persons with disabilities	4,913	7.86%	65,466	8.70%
Persons working outdoors	4,112	7.28%	41,748	5.44%
Persons in poverty	3,813	6.10%	48,137	6.40%
Unhoused persons	105	-	1,092	-
Number of households	20,489		264,323	
Median household income	149,907	-	175,000	-

* Linguistically isolated persons include households without a member who is fluent in English. Spanish, Chinese, and Tagalog are the primary languages in San Mateo among households that are not fluent in English.

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Demographic	Unincorporated County		San Mateo County	
	Number	Percent	Number	Percent
Households without access to internet	993	4.85%	14,371	5.40%
Households without a vehicle	426	2.08%	14,752	5.58%
Cost-burdened households	6,576	32.74%	94,625	36.55%
Overcrowded households	1,434	7.00%	19,366	7.33%
Households in mobile homes	842	4.11%	3,111	1.10%
Rental households	5,016	24.48%	106,955	40.46%
Source: American Community Survey. 2022. ACS 5-Year Estimates.				

Major Findings

The urbanized Bayside faces heightened risk from flooding, extreme heat, air quality hazards, and sea level rise. These hazards threaten transportation networks, homes, industrial hubs, and frontline communities, among many others in the area. Low-lying areas like North Fair Oaks and the unincorporated mobile home parks northeast of Redwood City experience disproportionate impacts from flood events. Meanwhile, major job centers and transit corridors such as Highways 101, 280, and 92 face increasing risks of disruption due to flooding, extreme weather events, and heat-related infrastructure strain. Rising temperatures amplify public health risks for vulnerable populations, especially low-income households, older adults, and outdoor workers. Critical infrastructure, including San Francisco International Airport and regional hospitals, is highly exposed to climate hazards such as sea level rise and flooding.

The rural Coastside faces impacts from coastal erosion, sea level rise, wildfires, landslides, and severe weather, threatening small unincorporated communities, agriculture, and tourism-based economies. Highway 1, the region's primary transportation route, is at risk of closure from severe storms, landslides, and erosion, threatening to isolate coastal communities. Agricultural lands face growing challenges from drought, agricultural pests, and shifting precipitation patterns, impacting local food production and farmworker livelihoods. Wildfire hazards in forested areas pose threats to homes, outdoor recreation, and emergency response. Coastal infrastructure and vital services, such as Seton Medical Center Coastside, are particularly vulnerable to extreme heat, human health hazards, severe weather, flooding, sea level rise, and wildfire. Seton Medical Center Coastside in Moss Beach is the only medical center in the Coastside, with the exception of a limited-hours emergency care center in Half Moon Bay, and it plays a crucial role in delivering both emergency and routine care to the region. When Seton Medical Center Coastside is forced to close due to disasters or emergencies, coastal residents lose vital access to healthcare services. In such situations, some patients are transferred to Seton Medical Center in Daly City for treatment.

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Climate Hazards

Cascading and Compounding Effects

Cascading Effects: When an extreme event causes a series of secondary events that are larger than the initial impact.

Compounding Effects: When multiple hazards or drivers occur simultaneously, amplifying their collective impact.

Source: IPCC. 2019. *Extremes, Abrupt Changes and Managing Risk.* https://www.ipcc.ch/srocc/chapter/chapter-6/

Climate change is the long-term shift in the average weather patterns, including significant alterations in temperature, precipitation, and wind patterns over an extended period—typically decades or longer. Rising global temperatures are causing more frequent and intense heatwaves, storms, floods, droughts, wildfires, and other hazards. These events frequently occur concurrently, resulting in cascading impacts that are progressively more difficult to manage, such as droughts amplifying wildfire risk or extreme heat exacerbating water scarcity. This section lays out the major hazards that are affected by climate change in San Mateo County, and how these hazards are expected to change in the coming years and decades. This vulnerability assessment considered the following hazards:

- Agriculture and ecosystem pests
- Air quality and smoke
- Coastal erosion
- Drought
- Extreme heat
- Flooding
- Human health hazards
- Landslides
- Sea level rise and emergent groundwater
- Severe weather
- Wildfire

Agriculture and Ecosystem Pests

Agricultural and ecosystem pests are plant and animal species that can harm San Mateo County's natural environment and agricultural areas. They pose significant challenges for San Mateo County, affecting not just outdoor workers but also the health and productivity of agricultural areas. Climate change is expected to worsen these problems by increasing the abundance and range of both native and non-native pests. Invasive plant species threaten local ecosystems by outcompeting native flora, disrupting habitats, and reducing biodiversity. They also harm agriculture by degrading soil quality and competing with crops.

San Mateo's agricultural sector, particularly on the Coastside, faces threats from pests like the flighted spongy moth complex, Asian citrus psyllid, and Mediterranean fruit fly, among others, leading to economic losses and increased control costs.[2] The introduction of non-native pests can result in long-lasting damage, making preventive efforts crucial.

Warmer temperatures and shifting precipitation patterns caused by climate change can weaken crops, trees, and livestock, making them more susceptible to infestations and infections. Climate change also creates favorable conditions for invasive species to establish themselves because

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extreme weather events disrupt native communities. In aquatic environments, rising temperatures and drought conditions decrease dissolved oxygen levels, causing harmful algal blooms and allowing invasive species to thrive, complicating management efforts.

The economic consequences of crop losses and increased pest control efforts triggered by elevated pest activity can increase food costs because smaller crop yields lead to a smaller crop supply and ultimately higher prices, and the additional costs of pest management are often passed on to community members. Increased pesticide use can contaminate soil and water, harm non-target species such as pollinators, and disrupt natural predator-prey relationships, resulting in lasting damage to the natural environment. These changes can degrade crucial ecosystem services like pollination, water purification, and soil stabilization, which are essential for agriculture and biodiversity. Such damage diminishes the unique natural character of San Mateo County and can negatively impact the local economy, public health, and overall quality of life. Furthermore, agricultural workers are susceptible to several health problems as a result of occupational exposure to toxic substances, especially pesticides. Chronic exposure to pesticides is linked to serious health conditions.[3]

Pest Detection Program

The San Mateo County Agriculture Weights and Measures manages the Pest Detection program, which is designed to proactively detect pests before they can establish and cause significant damage to crops and ecosystems. The program includes the placement of insect traps throughout the county and visual inspections to detect Asian citrus psyllids, European grapevine moths, fruit flies, glassy-winged sharpshooters, spongey moths and gypsy moths, and Japanese beetles. This ensures rapid response efforts to prevent damage.

Source: County of San Mateo. 2025. *Pest Detection.* https://www.smcgov.org/agwm/pest-detection

Air Quality and Smoke

Air quality directly affects the health, well-being, and everyday quality of life for all communities in San Mateo County. Poor air quality poses significant health risks, such as respiratory and cardiovascular illness, and these concerns have become especially urgent due to the growing frequency of wildfires in the region and other climate-related factors.[4] Air pollutants come from mobile sources such as cars and trucks, stationary sources like manufacturing facilities and other industrial sites, dust from construction sites, smoke from wildfires, and other sources. Climate change directly impacts and exacerbates air quality through increased temperatures, severe weather, wildfires, changes in precipitation patterns, and other mechanisms. Ozone forms when pollutants from motor vehicles, industrial emissions, power plants, and refineries react with sunlight and warmer temperatures speed up these reactions. Warmer temperatures also lengthen the growing seasons of plants and trees, increasing allergen production. Air quality significantly affects quality of life, and poor air quality leads to more health issues, strains healthcare, and

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restricts outdoor activities. Ensuring clean air is vital, especially for frontline communities of concern.

Exposure to air pollutants such as ozone (O_3) and particulate matter (PM) can lead to respiratory conditions, exacerbate asthma, and increase the risks of heart attacks, strokes, and certain types of cancer. The financial burden of poor air quality in the Bay Area is estimated at $32 billion annually, which includes costs associated with premature deaths, healthcare expenses, reduced productivity, and other related issues.[5] These figures highlight the serious consequences for both individual health and the regional economy. The Bay Area Air Quality Management District (BAAQMD) has played a key role in monitoring and improving air quality throughout the region, resulting in notable progress even as population, traffic, and industrial activities have grown.[6] Despite these efforts, air quality hazards remain persistent threats in the region.[7]

Bay Area Air Quality Management District Programs

BAAQMD has several programs to reduce air pollution from multiple sources.

The **Spare the Air Program** issues alerts on days when air quality is expected to be poor due to high levels of ozone or particulate matter. On Spare the Air days, residents are encouraged to limit activities that contribute to air pollution, such as driving, using gas-powered equipment, or wood burning.

Employers with 50 or more full-time employees in the Bay Area are required to provide Commuter Benefits Programs to encourage the use of alternative modes of transportation, such as public transit, vanpool, or biking, to reduce emissions from commuting.

Source: Bay Area Air Quality Management District. 2025. *Spare the Air.* https://www.baaqmd.gov/en/about-air-quality/spare-the-air

Wildfire smoke has become an increasingly significant concern for air quality in San Mateo County and the broader region. Wildfire smoke contains a complex mixture of gases and fine particulate matter, especially $PM_{2.5}$, which consists of tiny particles that can penetrate deeply into lung tissue and impact cardiovascular health.[8] The health risks associated with wildfire smoke are particularly severe for vulnerable populations, including children, older adults, individuals with pre-existing respiratory or cardiovascular conditions, and low-resourced residents, who may experience more severe acute and chronic health effects.[9] The frequency of wildfires has been rising, driven by hotter and drier conditions associated with climate change, resulting in more frequent exposure to hazardous air quality conditions for many residents and visitors.

Coastal Erosion

Coastal erosion is the process by which strong wave action, local sea level rise, and coastal flooding wear down or carry away rocks, soils, and sands along the coast. This includes erosion of beaches, dunes, bluffs, and cliffs. Many of the dune areas consist of open space in the form of low-lying beaches, and bluff areas contain buildings and infrastructure that could be damaged or destroyed by coastal erosion. Bluff erosion is particularly dangerous because bluffs can collapse

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rapidly and with little warning, harming people and community assets both above and below the bluffs. The Coastside contains steep cliffs, bluffs, or low-lying beaches and dunes, which can quickly erode due to sea level rise and increased wave action.[10]

Climate change is expected to increase sea level rise, storm frequency and intensity, and potentially wind action. All these factors increase the rate of coastal erosion along the Pacific coastline of San Mateo County. According to the County of San Mateo *South Coast Sea Level Rise Vulnerability Assessment and Adaptation Report*, approximately 537 acres of land south of Half Moon Bay is currently at risk of dune erosion, which is projected to increase by 478 acres at 0.8 feet of sea level rise, an additional 170 acres with 1.6 feet of sea level rise, and an additional 430 feet with 4.9 feet of sea level rise.[11] The bluffs between Half Moon Bay and Pacifica are projected to erode at a similar rate. State Route 1, essential recreation areas, and homes and apartments are in coastal erosion zones, which can undermine the foundations of these structures or cause dunes to retreat and flood waters to move farther inland during storms. Coastal flooding from storms has already created a need to convert Mirada Road in Miramar from two-way to one-way traffic.

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Pillar Point Harbor Area Shoreline Protection and Enhancement Study and Pillar Point Sea Level Rise and Princeton by the Sea Shoreline Project

The Pillar Point Harbor Area Shoreline Protection and Enhancement Study addresses significant coastal erosion and flooding threats along the northern Half Moon Bay coastline. This area, encompassing key destinations like Mavericks Beach, Surfers Beach, and Miramar Beach, has experienced accelerated erosion since the construction of breakwaters in the early 1960s by the U.S. Army Corps of Engineers. The erosion has compromised vital infrastructure, including State Route 1 and the California Coastal Trail, and poses risks to the Princeton community. The findings of this study were presented to the San Mateo County Harbor District Board of Commissioners in May 2023.

Previous efforts, such as the U.S. Army Corps of Engineers' studies and the San Mateo County Harbor District's West Trail Living Shoreline Project and Surfers Beach Restoration Pilot Project, have addressed specific erosion issues but lacked a comprehensive approach. The Pillar Point Harbor Area Shoreline Protection and Enhancement Study aims to develop a holistic shoreline management strategy, encompassing the coastline from Mavericks Beach to the Mirada Road bridge. The focus is on long-term solutions that protect against current and future threats, including sea level rise and climate-driven storms. The study emphasizes nature-based solutions and seeks substantial input from governmental and non-governmental stakeholders to ensure effective and sustainable outcomes.

In 2024, Congress enacted the Water Resources Development Act of 2024, authorizing the U.S. Army Corps of Engineers to undertake projects to enhance rivers and harbors, improve flood protection and storm mitigation, and upgrade wastewater and stormwater infrastructure, including at Pillar Point. This initiative aims to address shoreline damage caused by navigation structures, specifically the Pillar Point Breakwater. Once completed, the shoreline at Princeton by the Sea will be restored, mitigating existing damage and preventing future erosion. Sources:

OneShoreline. 2025. *Pillar Point Harbor Area Shoreline Protection and Enhancement Study.* https://oneshoreline.org/projects/pillar-point/

U.S. Army Corps of Engineers. 2024, February 29. *Princeton Shoreline, San Mateo, California, Sec. 111 CAP.* https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Current-Projects/Princeton-Shoreline-San-Mateo-California-Sec-111-CAP/

Drought

A drought is where conditions are drier than normal for an extended period, making less water available for people and ecosystems. While drought is a normal occurrence in California, prolonged drought conditions can harm ecosystems and the regional economy. While droughts in modern California do not typically cause direct loss of life or structural damage, they can lead to critical environmental and economic harm, including crop loss, increased water costs, habitat degradation, and heightened wildfire risks. Increasing water demands, such as population growth and increased use of irrigation for agriculture and landscaped areas, exacerbate these impacts, complicating water allocation and potentially leading to restrictions and quality issues.

During a drought, groundwater reserves deplete faster from increased pumping and less replenishment from precipitation. This can lead to lowered groundwater levels and issues like diminished pumping capacity, which could lead to fewer households receiving water or creating more challenges in meeting community water needs. Decreased groundwater negatively impacts stream flows, particularly in summer, leading to reduced water availability for ecosystems and wildlife that depend on these flows. Prolonged drought conditions also increase wildfire susceptibility due to dried vegetation and pest vulnerability.

Water Delivery in San Mateo County

Many of the cities, water districts, and private utilities in San Mateo County rely on the Hetch Hetchy Regional Water System for water supplies. The regional water system provides water to San Mateo County, as well as San Francisco, Santa Clara, and Alameda Counties. Approximately 85 percent of the water comes from Sierra Nevada snowmelt stored in the Hetch Hetchy reservoir on the Tuolumne River in Yosemite National Park. Hetch Hetchy water travels 160 miles via gravity from Yosemite to the San Francisco Bay Area. The remaining 15 percent of water comes from runoff in the Alameda County and Peninsula watersheds. The regional system consists of over 280 miles of pipelines, over 60 miles of tunnels, 11 reservoirs, 5 pump stations, and 2 water treatment plants. Some parts of San Mateo County also rely on groundwater wells.

Source: Bay Area Water Supply and Conservation Agency. 2025. *Hetch Hetchy System.* https://bawsca.org/water/supply/hetchhetchy

Many of the cities, water districts, and private utilities in San Mateo County rely on the Hetch Hetchy Regional Water System for water supplies. Many of the Coastside agricultural lands and the more rural and remote communities in the county, especially those in the coastal areas south of Half Moon Bay, also rely on groundwater wells. In some places these wells are privately owned and supply water to a single property or landowner, while other wells supply water for small-scale community water systems.

California regularly experiences droughts, but scientists predict climate change will result in more frequent and severe droughts across the state. Overall, precipitation levels are expected to stay

similar or even increase in some places. However, more years with extreme levels of precipitation, both high and low, are likely a result of climate change. In years with lower than average winter precipitation levels and warmer temperatures, the size of the Sierra Nevada snowpack (the volume of accumulated snow) decreases significantly, which in turn makes less fresh water available for communities throughout California, including those that receive water from the Hetch Hetchy Regional Water System.[12] More intense droughts are expected to harden soil and cause aquifer levels to drop due to reduced groundwater recharge. Reduced groundwater will have the greatest impact on South Coast communities that rely on groundwater for water supplies. Additionally, when rains return, more water will run off rather than infiltrate into soils, potentially causing downstream flooding. Higher temperatures will further increase evaporation, worsening drought conditions.

Leak Detection Pilot Study

The County's Sustainability Department partnered with WaterNow Alliance and local jurisdictions to install water leak detection devices in homes through a pilot study. The pilot study was completed in Foster City and Burlingame, the results of which will be used to form and implement water conservation programs throughout the county.

Source: Water Alliance. 2025. *Leak Detection Pilot Study*. https://waternow.org/our-work/our-work-projects/leak-detection-pilot-program/

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Extreme Heat

Extreme heat is an increasingly serious issue for San Mateo County, threatening public health, infrastructure, and the environment. The State refers to extreme heat as temperatures that are well above normal conditions and characterizes extreme heat events as consecutive unusually hot days and nights for a given area. Extreme heat days are defined as temperatures exceeding 98 percent of historical highs, and these events are becoming more frequent and intense due to climate change.[13, 14] Extended periods of extreme heat, known as heat events or waves, threaten community safety, drive up energy costs, and exacerbate the risks of wildfires and water shortages.

California's 2022 Extreme Heat Action Plan

The 2022 Action Plan outlines California's all-of-government approach to mitigating the health, economic, cultural, ecological, and social impacts of increasing average temperatures and heat waves. This plan outlines a strategic and comprehensive set of state actions to address extreme heat and constitutes California's response to what has become known as "extreme heat" and accompanying "extreme heat events."

Source: State of California. 2022. *Protecting Californians from Extreme Heat: A State Action Plan to Build Community Resilience*. https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Climate-Resilience/2022-Final-Extreme-Heat-Action-Plan.pdf

Different regions of the state experience extreme heat differently; temperatures of 100 degrees are normal in places like Sacramento, but almost unprecedented in San Mateo County. The county has different extreme heat temperatures in different regions. On an extreme heat day, temperatures reach at least 83 degrees in Broadmoor, 93.6 degrees in Emerald Lake Hills, 95.3 degrees in North Fair Oaks, 80 degrees in El Granada, and 85.6 degrees in Pescadero.[15] According to data from the San Mateo County Extreme Heat Dashboard, [16] the county already experiences high heat events, and even small increases in temperature can negatively impact public health. North Fair Oaks, Menlo Park, Redwood City, and East Palo Alto are projected to be the most impacted areas, though coastal residents should also prepare for increasing temperatures.[17] Although temperatures are lower in coastal areas, it is still dangerous when temperatures are higher than usual, because people and assets may not have the resources to cope with them. This is particularly the case in North Fair Oaks, where equity issues such as income disparities, housing stock quality, and higher renter occupancies further exacerbate vulnerabilities. Across all of San Mateo County, temperatures above 85 degrees are considered high heat days, with an increased threat of heat-related illnesses and other constraints even if this temperature does not reach the local extreme heat threshold.[18] The warmer temperatures brought on by climate change are likely to cause an increase in extreme heat events locally.

Table 2 shows how climate change is expected to increase the number of extreme heat days in different regions of the county.

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Table 2: Projected Number of Annual Extreme Heat Days

Sub-regional Location	Observed (1961–1990)	Near Term (2025–2035)	Mid-century (2035–2064)	Late Century (2070–2099)
Countywide	5	8	12	25
Broadmoor	3	5	7	16
Emerald Lake Hills	4	8	12	22
North Fair Oaks	4	8	12	21
El Granada	4	7	9	23
Pescadero	4	7	10	19
Note: These projections are based on Cal-Adapt's high-emission scenario (RCP 8.5), a "no-mitigation" pathway where global greenhouse gas emissions continue to increase throughout the 21st century. In Cal-Adapt, RCP 8.5 models "business as usual" scenarios, providing insights into the potential worst-case impacts if significant mitigation efforts are not implemented.				

When the daily minimum temperatures remain significantly above normal, warm nights can worsen an extreme heat day because people and assets may not get relief from high temperatures. A warm night is when temperatures remain above 57.8 degrees in Broadmoor, 58 degrees in Emerald Lake Hills, 60.2 degrees in North Fair Oaks, 56.3 degrees in El Granada, and 56.3 degrees in Pescadero.[19] **Table 3** shows the number of warm nights projected in the county and subregions.

Table 3: Projected Number of Annual Warm Nights

Sub-regional Location	Observed (1961–1990)	Near Term (2025–2035)	Mid-century (2035–2064)	Late Century (2070–2099)
Countywide	7	25	49	122
Broadmoor	7	21	49	129
Emerald Lake Hills	6	22	43	106
North Fair Oaks	6	22	42	103
El Granada	7	22	44	120
Pescadero	7	22	44	120
Note: These projections are based on Cal-Adapt's high-emission scenario (RCP 8.5), a "no-mitigation" pathway where global greenhouse gas emissions continue to increase throughout the 21st century. In Cal-Adapt, RCP 8.5 models "business as usual" scenarios, providing insights into the potential worst-case impacts if significant mitigation efforts are not implemented.				

Extreme heat is one of the deadliest climate-related hazards nationwide, with the Centers for Disease Control and Prevention noting a rise in heat-related deaths—from 297 in 2004 to over 2,300 in 2023.[20,21] The rising frequency and intensity of extreme heat events pose significant public health concerns, especially in areas such as San Mateo County that have historically experienced milder temperatures and are home to residents without access to climate-controlled environments. Warmer temperatures and the urban heat island effect an exacerbate extreme heat impacts in densely populated areas. The urban heat island effect refers to the phenomenon where urban areas experience significantly higher temperatures than their surrounding rural

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areas. This temperature difference is primarily due to human activities and land use changes associated with urbanization, which replace natural landscapes with heat-absorbing materials such as concrete and asphalt. Even slight increases in temperature can overwhelm a community's adaptive capacity, straining public health systems and infrastructure. This leads to heightened risks of dehydration, heat-related illnesses, and respiratory issues, disrupting daily life and economic activity.[22]

Extreme heat also stresses infrastructure, as heightened air conditioning demand risks overloading the power grid and causing outages, and very high heat can degrade transportation systems, such as causing asphalt on roads to soften and buckle, leading to delays and damage. Additionally, rising temperatures harm local ecosystems by increasing water temperatures in local lakes and streams, harming fish and plant species.

Floodplains and Flood Recurrence

According to the Federal Emergency Management Agency, a floodplain is any area of land that could be flooded by water from any source, but are often next to creeks, lakes, oceans, and ponds. The 100-year floodplain is the area that has a 1 percent (1 in 100) chance of being flooded in any given year. This would also be the area that would flood during a 100-year storm. The 500-year floodplain is the area that has a 0.2 percent (1 in 500) chance of being flooded in any given year due to a 500-year storm.

Source: Federal Emergency Management Agency. 2025. *Flood Zones*. https://www.fema.gov/about/glossary/flood-zones

Flooding

Flooding occurs when normally dry land is covered by water. This can include creeks and streams overtopping their banks, heavy rainfall that surpasses the capacity of drains to carry the water away, and very high tides. It can also occur as a result of dam failure, water or wastewater infrastructure failure, or tsunamis. Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide, significantly threatening the health and life of community members and causing substantial damage to structures, landscapes, and utilities in the region. Standing water can weaken structural foundations, damage electrical systems, and create breeding grounds for vector-borne illnesses. Flooding also accelerates soil erosion, reduces water quality, and leads to the loss of important environmental resources, making

Atmospheric Rivers

An atmospheric river is a long, narrow band of moisture in the atmosphere moving from the tropics that can cause heavy rain or snow when it moves over land. These storms are responsible for over half of California's water supply, but also the majority of the flooding and mudslide events across the state.

Source: Emily Mendez. 2024. *A Climate Expert Explains Why Atmospheric Rivers Are Causing Historic Rainfall in California*. Lamont-Doherty Earth Observatory: Columbia Climate School.

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ecosystems more vulnerable. The impacts of increased flooding go beyond immediate property damage. Flooding can lead to long-term public health problems if mold and mildew grow in buildings, displace communities if homes are destroyed or become uninhabitable, and increase economic burdens, such as rising home insurance costs.

Floods are among the most damaging natural hazards in unincorporated San Mateo County, although the nature of floods are different on the Coastside compared to the Bayside. Climate change is expected to make flood events worse due to fewer yet more intense precipitation events in the form of atmospheric rivers.[23] For example, what is currently a 200-year storm, or one that has a 1 in 200 chance of occurring each year, by 2100 could increase in frequency by 40 to 50 years (to a 1 in 150/160 chance each year).[24] This means that the 100-year and 500-year floodplains may expand, and the current floodplains may become 40- to 50-year floodplains. Climate change is also likely to increase the frequency and severity of droughts that cause soil to dry out and become hard. When precipitation does return, more water runs off the surface than is absorbed into the ground, which can increase flooding downstream.

OneShoreline Projects

OneShoreline is launching the **Millbrae and Burlingame Shoreline Resilience Project** aiming to protect the shoreline and nearby areas in Millbrae, Burlingame, and San Mateo from sea level rise, extreme storms, and other climate change impacts. The project focuses on coastal flood protection, habitat restoration, and enhancing public access and recreation along the San Francisco Bay shoreline. The project will provide a long-term climate resilience solution for critical infrastructure that is vulnerable to flooding.

OneShoreline is also collaborating with local jurisdictions to plan debris removal at five sites across four creeks: San Bruno Creek, Belmont Creek, Cordilleras Creek, and Atherton Channel. Programs like **OneShoreline's Routine Maintenance Program for Bayside Creeks** can reduce flood risks in the surrounding areas.

Additionally, OneShoreline is collaborating with Belmont to launch the **Belmont Creek Stormwater Detention and Creek Restoration Project** in 2025 that intends to address the severe erosion, bank failure, and incessant downstream flooding along the reach in Twin Pines Park. Belmont Creek originates in Belmont and runs through the unincorporated Harbor Industrial Area of San Mateo County along the border of San Carlos before reaching San Francisco Bay. The lower, flatter segment of Belmont Creek that runs through the Harbor Industrial Area can experience flooding in rain events as well as siltation from upstream sediment, requiring periodic channel dredging and maintenance. Flooding in Belmont Creek is worsened by the lack of dredging and maintenance in the lower segment, where the original design capacity is diminished due to overgrown vegetation and sediment buildup in the creek channel.

Source: OneShoreline. *Current Project List*. https://oneshoreline.org/projects/

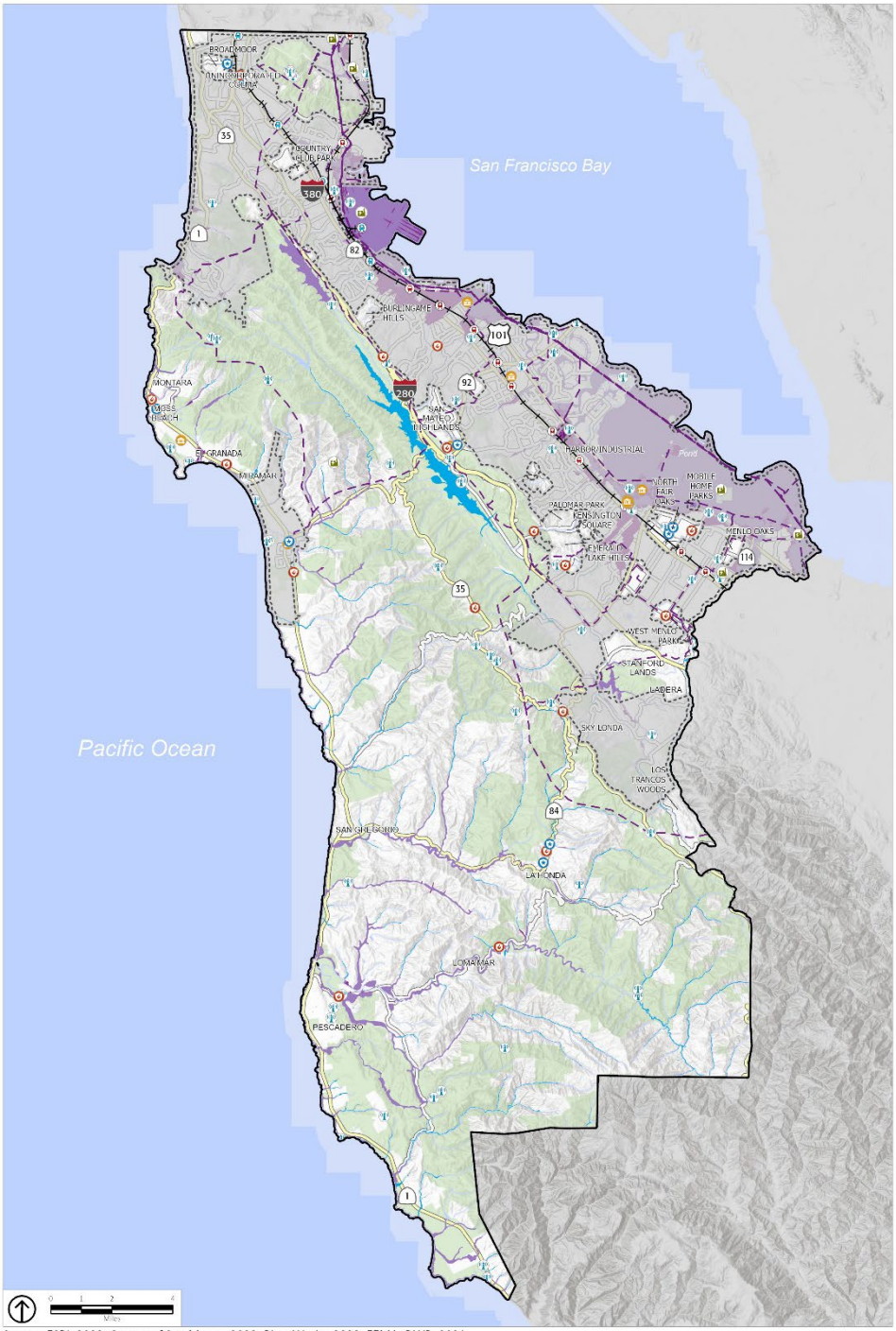
As shown on **Figure 2** and on the online PREP Map Viewer, flood-prone areas in the interior of the unincorporated county occur primarily along creeks, rivers, and lakes, such as Crystal Spring Reservoir, San Andreas Lake, Denniston Creek, and San Gregorio Creek. However, the flood hazard zones expand where the creeks drain into either the San Francisco Bay or the Pacific Ocean. For example, Pescadero Creek's 100-year and 500-year floodplains widen along Pescadero State Beach, and most of the land east of El Camino Real near the bay shoreline is in a floodplain. These coastal and bayshore floodplains include several segments of Highways 1 and 101, most of the developed areas of Pescadero, the unincorporated Harbor/Industrial area between Belmont and San Carlos, large sections of other key roadways such as Pescadero Creek Road, and multiple State beaches. During flood events, floodwaters often block Pescadero Creek Road and isolate the community. Flooding can block other rural roads or cause erosion over time, leading to further isolation of rural communities. Coastal and bayshore floodplains are likely to expand as sea level rises and the tide regularly moves farther inland.

Flooding also occurs outside of these mapped floodplains, especially in low-lying areas with inadequate drainage. Despite being outside of FEMA designated floodplains and considered as low risk, communities such as North Fair Oaks have still faced flooding, infrastructure damage, and economic loss during storm events. The impacts of flooding will continue to affect residents in low-lying areas who depend on local services, employment opportunities, and regional transportation networks.

OneWatershed: Building Regional Climate Resilience

OneWatershed is a comprehensive framework that addresses the shared risks of climate change to water infrastructure and resources across San Mateo County, including stormwater, wastewater, and drinking water systems. This innovative approach emphasizes building adaptive capacity for climate impacts, with a particular focus on the county's most vulnerable communities. OneWatershed builds on years of climate resilience planning, harnessing resources and partnerships under a unified program to advance shared goals around overlapping climate risks. By taking a watershed-based perspective, OneWatershed enables coordinated planning and implementation of climate adaptation strategies that benefit both infrastructure systems and the communities they serve. The framework represents phase one of a multi-year strategy to build systematic and transformational change in how San Mateo County approaches integrated watershed management and climate resilience.

Figure 2. Flood Hazard Zones in the Unincorporated County



Human Health Hazards

Human health hazards, including bacteria, viruses, parasites, and other pathogens, pose significant concerns in San Mateo County. These conditions can result in physical injuries, fatalities, mental health issues, and exacerbate pre-existing conditions like asthma and allergies. Rats, mice, ticks, and mosquitos are common vectors, meaning that they often spread the pathogens that can cause illness. Rising temperatures and changing precipitation patterns due to climate change promote the proliferation of disease-carrying vectors. Warmer, wetter conditions allow for increased populations of mosquitoes and ticks, extending their geographic range and spreading diseases like West Nile virus, dengue fever, and Lyme disease.[25] As temperatures rise and extreme weather events, such as heavy rainfall, become more frequent, these vectors can spread more broadly, transmitting diseases that threaten public health.[26]

Heatwaves, another increasing hazard due to climate change, can directly impact human health by causing heat-related illnesses and deaths, while also worsening respiratory conditions due to increased air pollution. These impacts are not experienced equally, as inequities in healthcare access, socioeconomic conditions, and pre-existing disparities in public health infrastructure mean that some communities are more vulnerable than others. Frontline groups, including low-income populations, racial and ethnic minorities, and those living in areas with limited healthcare facilities, often face the greatest risks. Climate change stressors, such as heatwaves, flooding, and the spread of disease-carrying vectors, are likely to exacerbate these inequities by disproportionately impacting these already-vulnerable populations. Addressing these challenges requires targeted interventions that prioritize equity in public health planning and climate adaptation strategies. The combination of these factors suggests that human health hazards will become more pervasive and severe as climate change progresses, making proactive public health measures even more critical. The implications of these health hazards extend beyond individual well-being, placing strain on healthcare systems, increasing economic burdens, and affecting mental health.

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Landslides

A landslide, defined as the movement of rock, soil, or debris down a slope, is often triggered by natural events such as heavy rainfall, floods, or wildfires. In San Mateo County, landslides commonly occur during or after intense rainfall, particularly in areas previously affected by wildfires where vegetation loss destabilizes slopes. These events threaten homes and infrastructure, disrupt transportation networks, and contribute to downslope erosion. Landslides can travel significant distances, accumulating debris and amplifying their destructive impact as they move downslope.

As shown on **Figure 3** and on the online PREP Map Viewer, the coastal areas of the county are the most susceptible to landslide hazards, especially Sky Londa, La Honda, and Loma Mar. These areas have a history of previous landslides movements, making them susceptible to sliding again from heavy rainfall or seismic activity. Roadways in high-risk landslide areas include Interstate 280 and State Routes 84, and 35. Most landslides occur in these areas, where the risk is highest. However, landslides can occur outside these high-risk regions as well, including areas where few landslides occur and activity is considered moderate, presenting a medium level of risk. These moderately susceptible regions experience fewer landslides but remain at some risk of future events. In contrast, areas with surficial deposits—where landslides are least likely—present the lowest risk and are the least susceptible to landslide events. Despite these varying levels of risk, the overall annual probability of landslides in the county remains high due to these recurring conditions that contribute to slope instability.

Climate change is expected to exacerbate landslide hazards by increasing frequency of wildfires and severe storms, which will likely elevate the risk of landslides, particularly fast-moving debris flows. Wildfires remove stabilizing vegetation and alter soil properties by drying them out and reducing their capacity to retain water, making slopes more vulnerable to erosion during and after subsequent storms. While the region may not experience significant changes in annual precipitation averages and may even see a modest increase, drier conditions during certain periods could still occur, with occasional extreme rainfall events, the county will experience more landslides and mudslides, which pose significant challenges to regional safety. Landslides can displace residents, block emergency routes, and damage critical infrastructure, disrupting daily life and requiring costly repairs.

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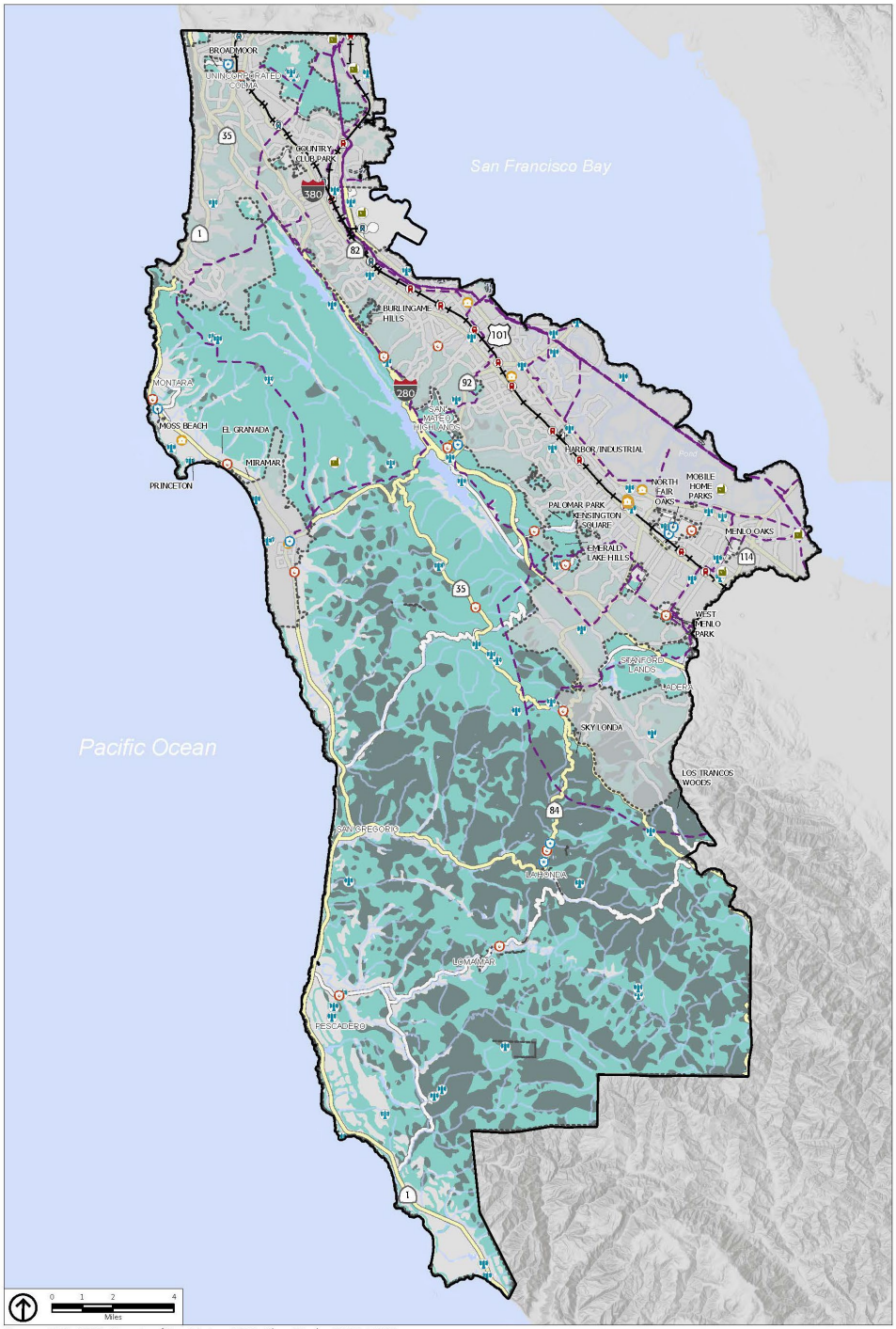
Figure 3. Landslide Susceptibility



Ocean Acidification

Ocean acidification is a shift in ocean chemistry brought on by climate change. As levels of carbon dioxide (one of the primary gases responsible for climate change) increase in the atmosphere, some of the carbon dioxide in the air reacts with ocean water to form carbonic acid. The carbonic acid levels in the ocean water increase, making the ocean more acidic. If climate change continues on its current path, by 2100 the ocean's surface is expected to be more acidic than it has been in the past 20 million years. [27]

Although this shift in ocean acidity would not be noticeable to people without special instruments, it has profound impacts for ocean life. Shellfish, plankton, corals, and many other species form shells from materials that react with carbonic acid. A more acidic ocean means that these species may be unable to grow shells or cause them to grow at a much slower rate. Ocean acidification can cause other species, even those without a shell, to change their behaviors in a way that affects their growth, reproduction, or other behavior. Species that are not directly affected by ocean acidification can be harmed if acidification decreases the availability of their food or other species that they depend on.

In addition to ecosystem harm, ocean acidification can have economic impacts. Many of the species that are vulnerable to ocean acidification are commercially valuable. Acidification can cause a decrease in catch yields or may result in a fishery being shut down, affecting both commercial fisheries and the recreational/sport fishing industries.

Sea Level Rise and Emergent Groundwater

As global temperatures rise, glaciers and other polar ice melt. As this water flows into the ocean, sea levels increase. High average temperatures can also cause ocean water to expand, causing further rises in sea levels. According to the 2024 California Ocean Protection Council's *State of California Sea Level Rise Guidance*, sea levels on both the Bayside and Coastside of San Mateo County are projected to increase by as much as 0.4 feet (5 inches) by 2030, 1.3 feet (16 inches) by 2050, and 6.5 feet (78 inches) by 2100. However, sea levels could also rise faster than these projections, and storm surge, wave runup, and King Tide events could add an additional 24 to 36 inches of temporary flooding that would move farther inland.[28]

King Tide Events

A King Tide is a non-scientific term used to describe exceptionally high tides. Tides are long-period waves that roll around the planet as the ocean is "pulled" back and forth by the gravitational pull of the moon and the sun as these bodies interact with the Earth in their monthly and yearly orbits. Higher than normal tides typically occur during a new or full moon and when the Moon is closest to Earth, or during specific seasons around the country.

Source: National Oceanic and Atmospheric Administration. 2024. *What is a King Tide?* https://oceanservice.noaa.gov/facts/kingtide.html

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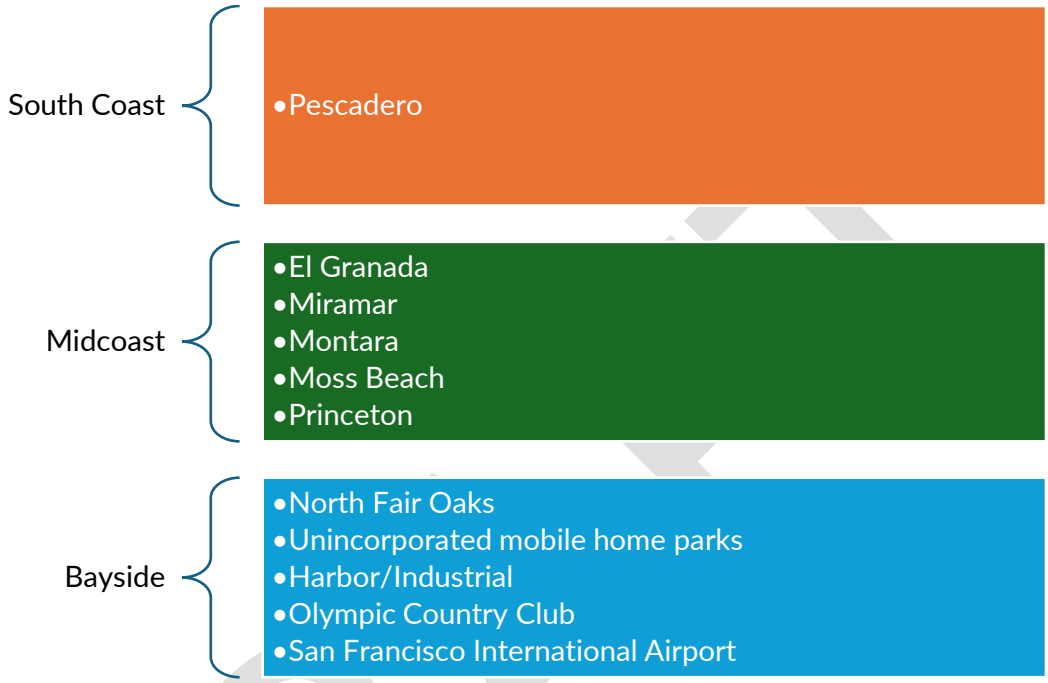
As shown on **Figures 4** through **7** and on the online PREP Map Viewer, sea level rise impacts all subregions of the county.

Figure 4. Unincorporated Communities Most at Risk from Sea Level Rise in San Mateo County



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The communities facing the most significant impacts from sea level rise are Pescadero, El Granada, Miramar, Montara, Moss Beach, Princeton, North Fair Oaks, unincorporated mobile home parks near Redwood City, the Harbor/Industrial area, Olympic Country Club, and the San Francisco International Airport.

Emergent groundwater is a consequence of sea level rise. It occurs when groundwater is pushed upward by denser saline water that travels further inland, raising the water level and in some places causing the groundwater to emerge to the surface, where causes temporary or permanent inundation.[29] Higher groundwater levels, even if it does not emerge to the surface, can infiltrate storm drains, destabilize pipes, spread soil or groundwater contamination, undermine building foundations, corrode infrastructure not designed for saline groundwater, and increase liquefaction hazards.[30]

Groundwater levels are expected to rise at the same rate as sea level rise in areas within half a mile from the shoreline. However, in areas where groundwater is being actively pumped, this rise could extend further inland, meaning that the effects of sea level rise on groundwater might spread beyond this half-mile zone. Groundwater pumping in San Mateo County is relatively limited, but some pumping does occur in basins such as the San Mateo Plain Subbasin, which extends from San Mateo to Santa Clara County, and the Westside Basin, which extends from San Francisco to Burlingame. There is also some limited groundwater pumping around Pescadero.

OneShoreline's Sea Level Rise Adaptation Efforts

OneShoreline addresses sea level rise in San Mateo County through integrated planning, multi-jurisdictional collaboration, and sustainable funding initiatives. By working with cities and developers, it ensures that infrastructure and development incorporate future climate resilience, such as higher sea levels and intense storms.

Key capital projects include coordinating shoreline protection with cities like Burlingame and Millbrae, addressing erosion and flooding along the Pacific Coast and Redwood Shores, and restoring natural features like marshes for flood mitigation. OneShoreline also provides recommendations and guidance to local communities to address sea level rise and related issues. OneShoreline has prepared a Planning Policy Guidance resource for San Mateo County jurisdictions to help account for increases in flooding, sea level rise, and emergent groundwater in land use planning and development.

Source: OneShoreline. 2024. *Priorities and Accomplishments.* https://oneshoreline.org/priorities/

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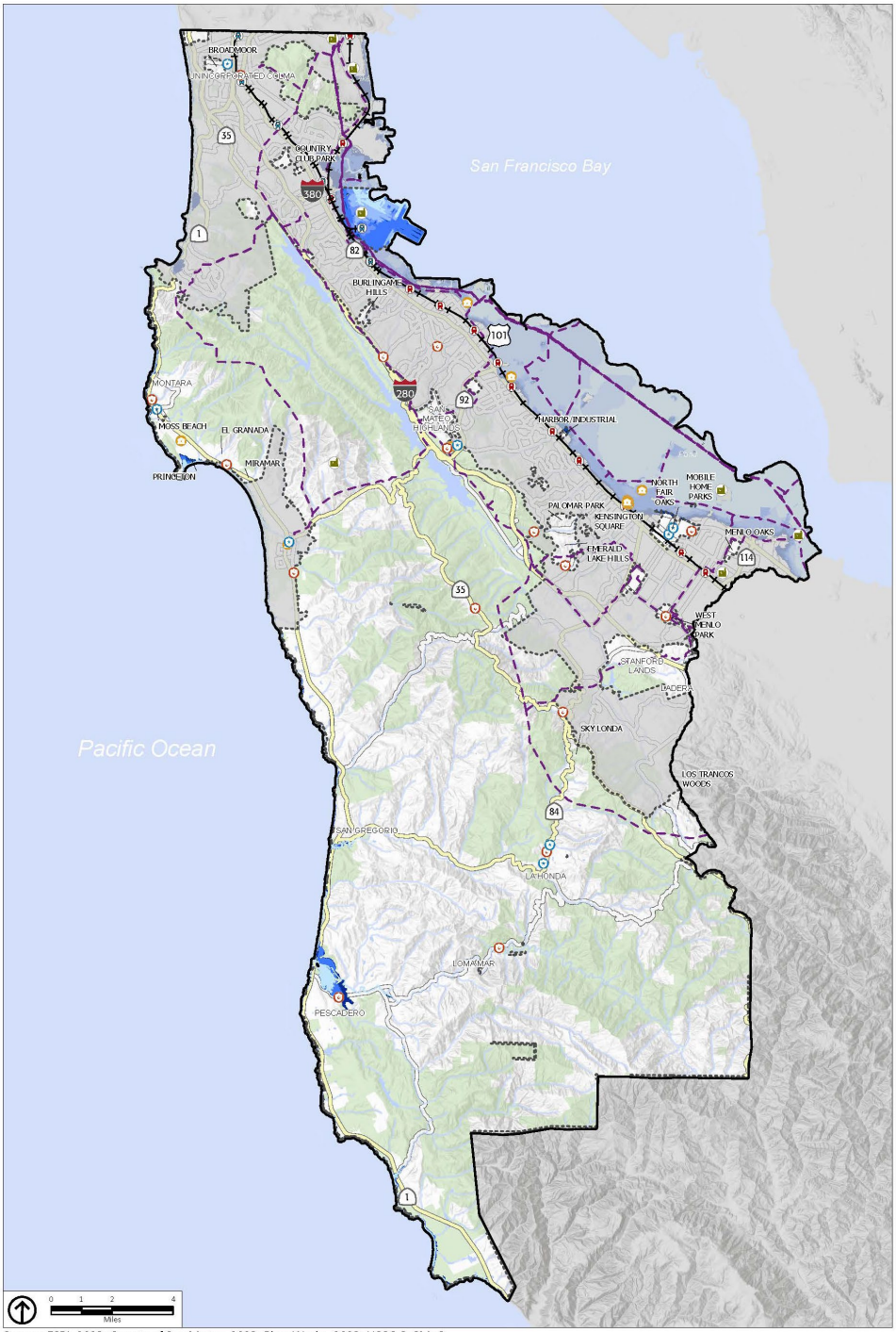
Figure 5. Sea Level Rise Projections in the Unincorporated County



Source: ESRI, 2023; County of San Mateo, 2023; PlaceWorks, 2023; USGS CoSMoS

- San Mateo County Boundary
- Unincorporated Areas
- Parks and Open Space
- Creeks and Waterways
- BART Stations
- Caltrain Stations
- BART Network
- Caltrain Network
- Transmission Lines
- Law Enforcement
- Fire Stations
- Government Facilities
- California Power Plants

Sea Level Rise

- 0 ft + 100-year storm
- 0.8 ft + 100-year storm
- 3.3 ft
- 3.3 ft + 100-year storm
- 6.6 ft
- 6.6 ft + 100-year storm

Figure 6. Sea Level Rise Projections in the Midcoast

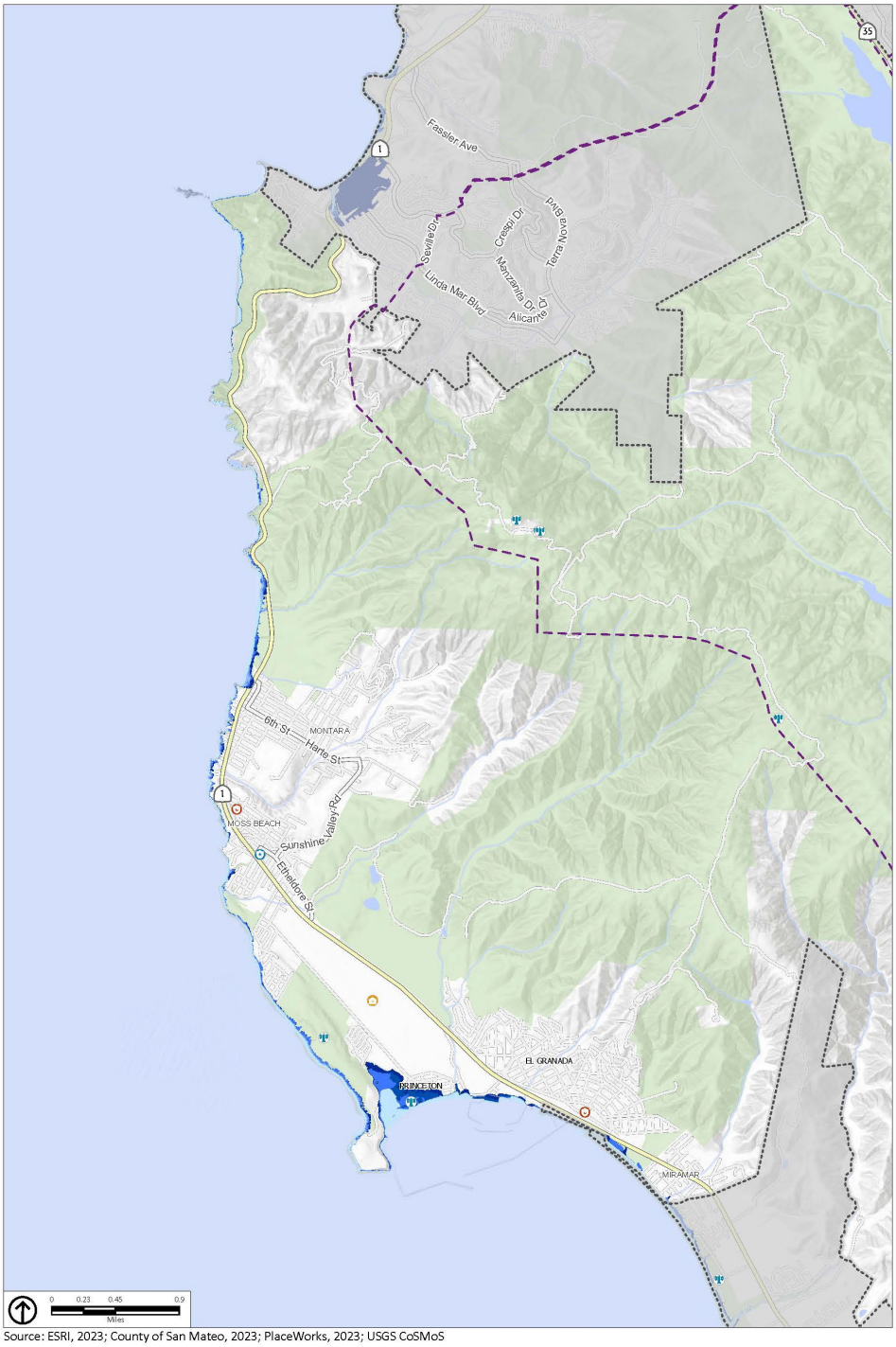
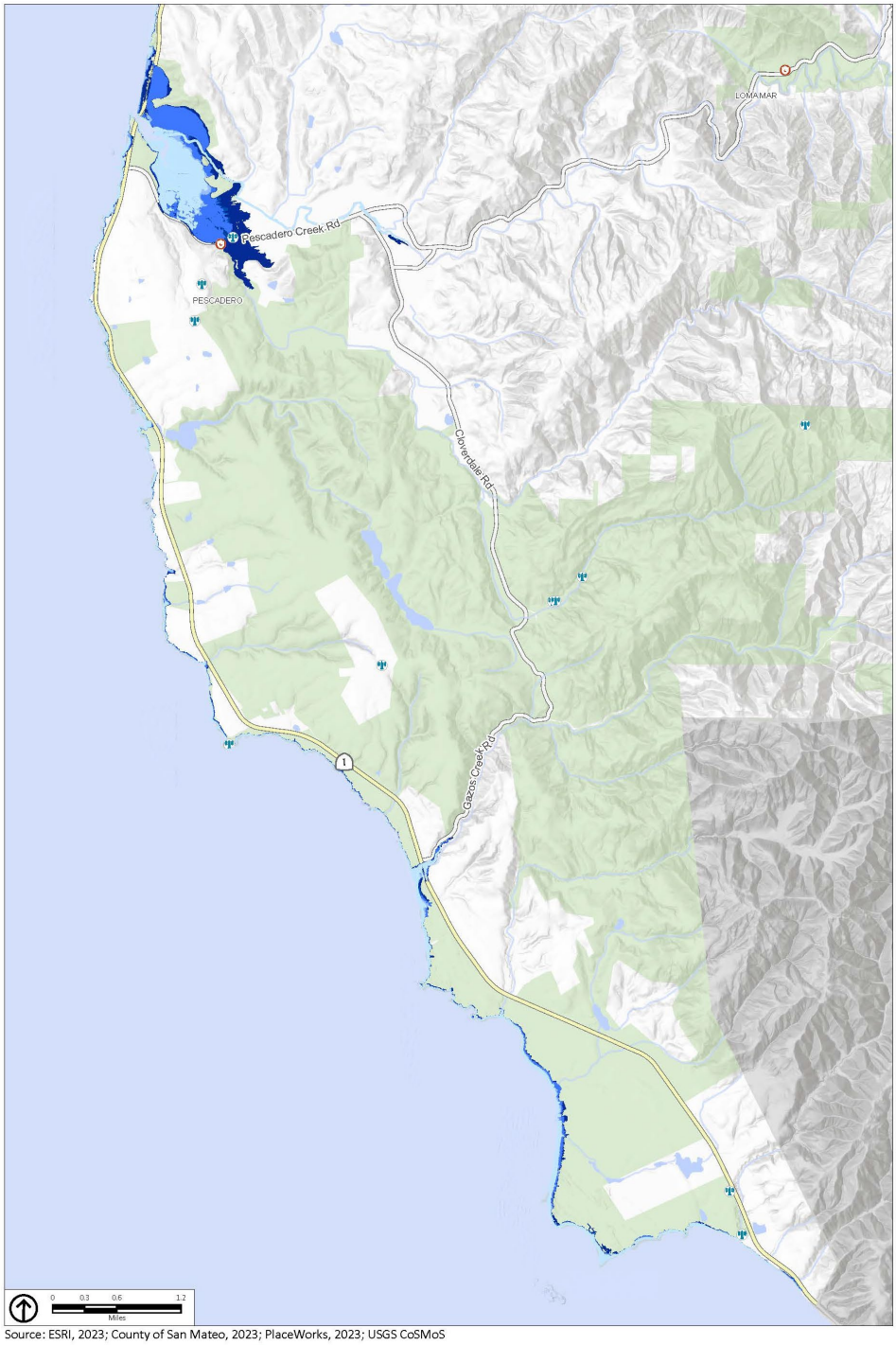
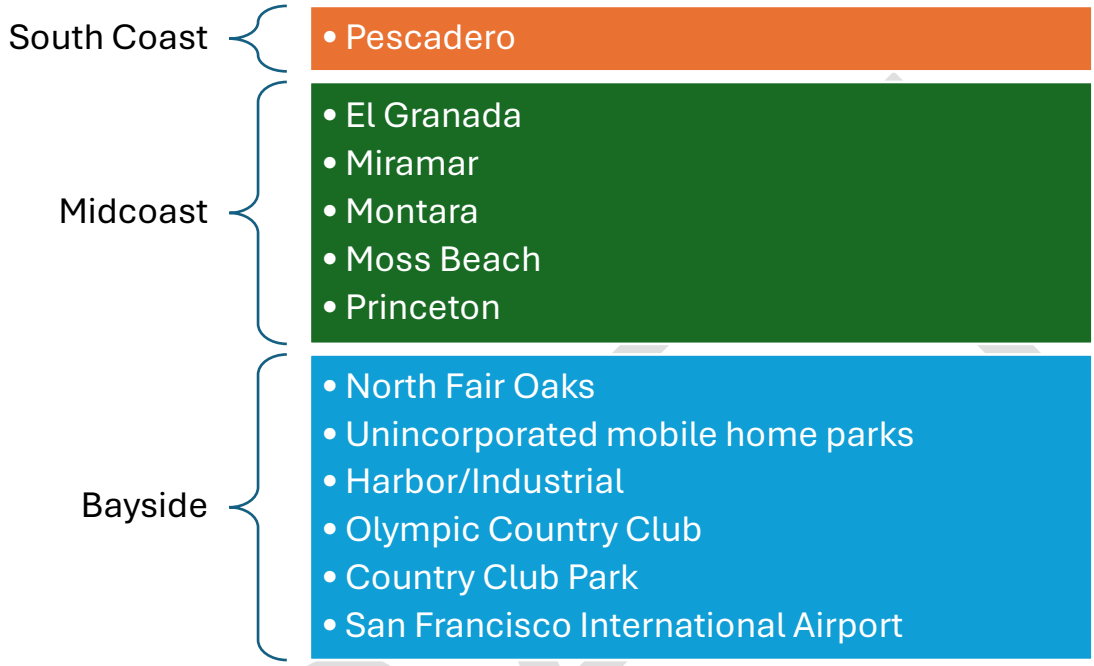


Figure 7. Sea Level Rise Projections in the South Coast



As shown in **Figures 8** through **11** and on the online PREP Map Viewer, emergent groundwater impacts all subregions of the county. Impacted subregions include the following:

Figure 8. Unincorporated Communities Most at Risk from Emergent Groundwater in San Mateo County



Similar to sea level rise, the communities facing the most significant impacts from emergent groundwater are Pescadero, El Granada, Montara, Moss Beach, North Fair Oaks, unincorporated mobile home parks near Redwood City, the Harbor/Industrial area, Olympic Country Club, County Club Park, and the San Francisco International Airport. Though the exact level of future sea level rise is uncertain, it is expected to increase the frequency, duration, and magnitude of flood events and push groundwater to emergent levels further inland. As sea levels rise, the number of individuals and properties at risk will increase, which will in turn lead to a higher likelihood of flood damage and other adverse consequences for both coastal and inland areas.

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Figure 9. Emergent Groundwater in 2100 in the Unincorporated County

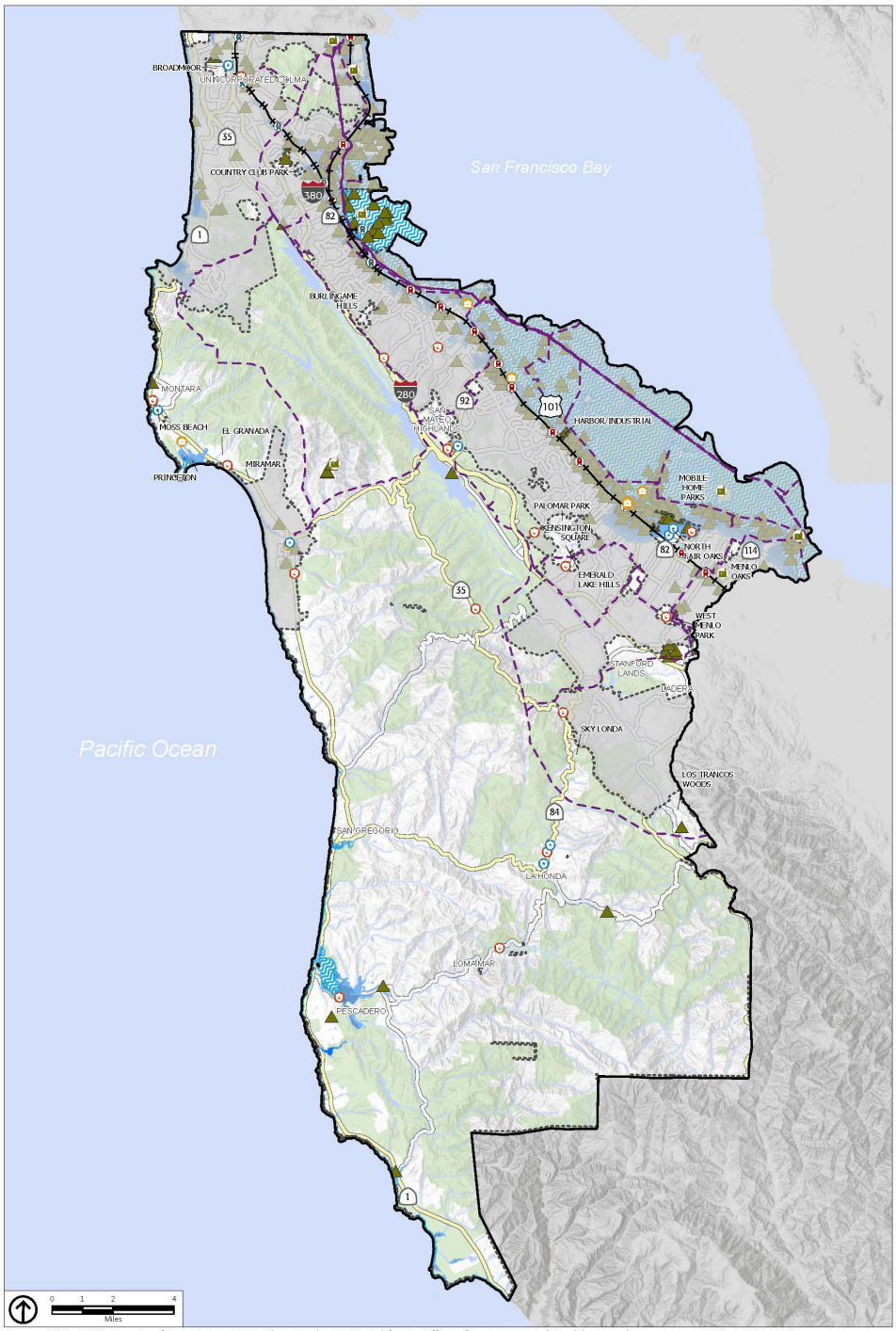


Figure 10. Emergent Groundwater in 2100 in the Midcoast

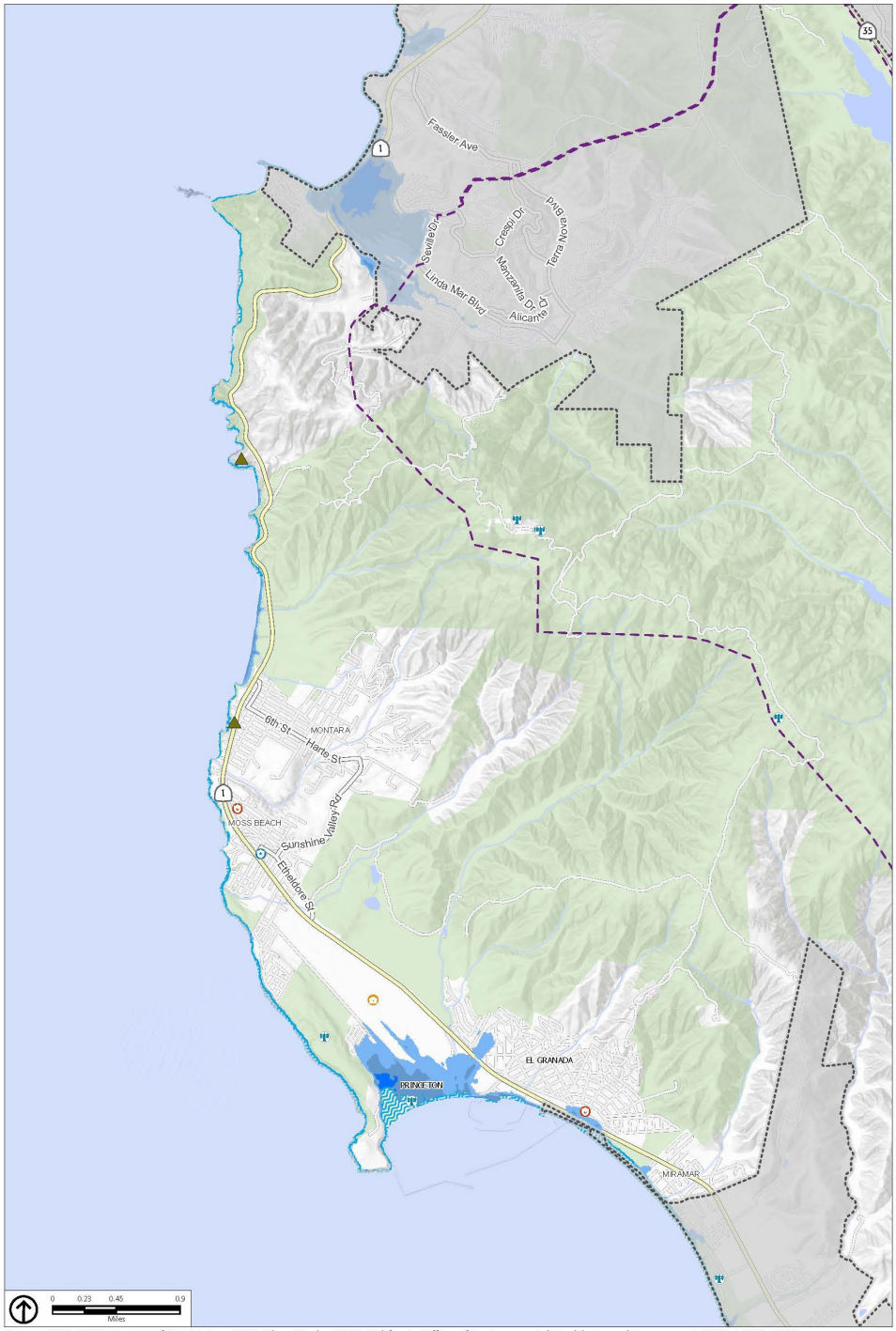
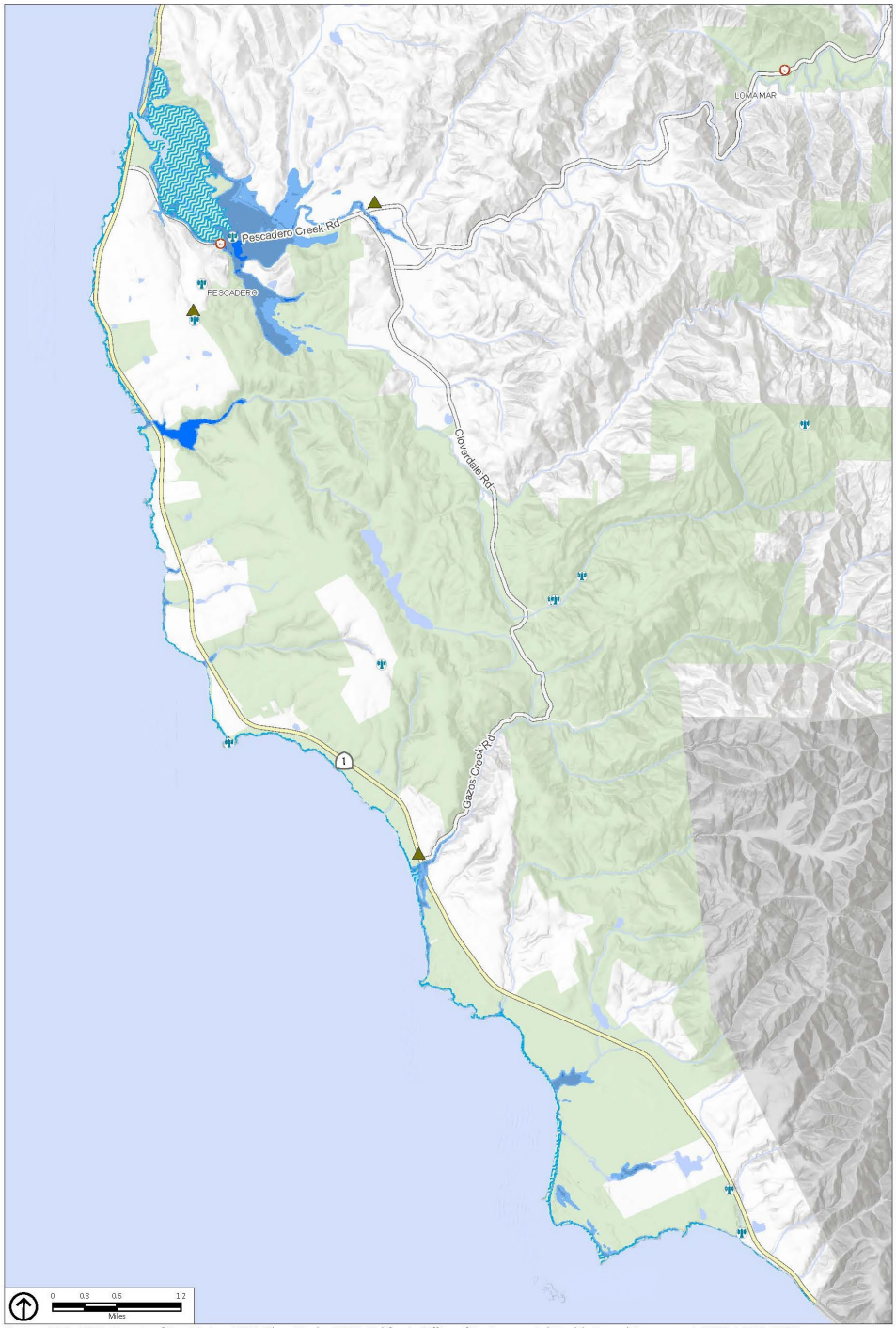


Figure 11. Emergent Groundwater in 2100 in the South Coast



Severe Weather

Severe weather poses a significant threat to San Mateo County, disrupting daily life, compromising safety, and affecting infrastructure and ecosystems. Severe weather is usually caused by intense storm systems, although types of strong winds can occur without a storm. The types of dangers posed by severe weather vary widely and may include injuries or deaths, damage to buildings and structures, fallen trees and roads blocked by debris, and fires sparked by lightning. Severe weather often produces high winds and lightning that can damage structures and cause power outages. Lightning from these storms can ignite wildfires and structure fires that can cause damage to buildings and endanger people. Objects such as vehicles, unprotected structures like bus stops or carports, fences, telephone poles, or trees can also be struck directly by lightning, which may cause an explosion or fire. The most common severe weather events that have historically impacted San Mateo County are heavy rains (usually a result of atmospheric rivers), thunderstorms, and windstorms.

While average annual rainfall may increase only slightly in San Mateo County, climate change is expected to cause an increase in the number of years with intense levels of precipitation. Heavy rainfall can increase the frequency and severity of other hazards, including flooding.

Public safety power shutoff events are used as a preventive strategy to reduce wildfire risk during severe weather, especially during high winds and dry conditions. Utility companies like the Pacific Gas and Electric Company (PG&E) may shut off power lines during high winds, especially during hot and dry conditions, to prevent them from sparking fires causing power outages that may last for extended periods. Without backup power, communication networks may be disrupted, making it harder for residents to receive emergency notifications and for first responders to coordinate effectively. People who depend on medical devices, such as oxygen concentrators or ventilators, are at greater risk during power outages, as are those who need electricity for climate control to keep indoor temperatures safe. The loss of power to communications and other critical infrastructure disrupts access to goods and services. Many residents in San Mateo County's coastal and hillside areas depend on landlines for phone service due to unreliable cellphone coverage. This service includes free 9-1-1 access and relay services for individuals with speech or hearing impairments. Recently, AT&T requested that it no longer be required to provide landline service in large areas of California, including most of San Mateo County. In 2024, State regulators denied this request, in part due to opposition from the San Mateo County Board of Supervisors, and continued to require that AT&T provide this service.

Wildfire

Wildfires pose a significant and growing threat to San Mateo County. The county's Mediterranean climate, steep topography, and diverse plant communities create ideal conditions for wildfire development. Historically, the fire season extended from early summer through late fall of each year during the hotter, drier months, although it is increasingly a hazard that can occur

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year-round due to higher temperatures, lower moisture content in air and plant matter, accumulation of vegetation, and high winds. Rising temperatures and prolonged droughts dry out vegetation, creating abundant fuel for fires. Pest outbreaks, such as bark beetle infestations, leave behind weakened and dead trees that serve as additional fuel, while extreme heat and erratic wind conditions make wildfires more unpredictable and harder to control. The fire season is extending beyond historical norms, leaving communities vulnerable for much longer periods.

Figure 12 and on the online PREP Map Viewer, illustrate State-designated very high, high, and moderate fire hazard severity zones throughout the county. The Wildland-Urban Interface is where human development, such as homes and residential development, meets with undeveloped wildland vegetation. Wildfire-prone areas in the unincorporated county are generally in the foothills and open space areas on both the Bayside and Coastside. The communities most at risk are those surrounded by extensive open spaces and forested lands, often located along hillsides and ridgelines, which heightens their vulnerability to wildfires, as shown in **Figure 13**.

FIRE SAFE San Mateo County

FIRE SAFE San Mateo County conducts fuel reduction projects through the county to minimize overgrown vegetation around homes and community infrastructure. These programs include a countywide Chipper Program in communities such as Montara, La Honda, Loma Mar, and Sky Londa, as well as fuel reduction projects along Highway 84, shaded fuel breaks, and fuel reduction projects in parks and open space.

Source: FIRE SAFE San Mateo County. 2025. *Neighborhood Chipper Program.* https://www.firesafesanmateo.org/programs/chipper-program

Human activities are the leading cause of wildfires, and increased development near these wildland areas has amplified the likelihood and risk of wildfire events.[31] Wildfires not only destroy homes and infrastructure but can also displace entire communities and degrade critical wildlife habitats. The economic consequences are significant, ranging from property damage and fire suppression costs to long-term business disruptions. Moreover, the loss of natural spaces impacts recreation, tourism, and local biodiversity.

Historically, an annual average of 1,181 acres burned in San Mateo County;* however, this is projected to increase by over 100 percent to 2,413 acres by mid-century (2035 to 2064) and by 140 percent compared to historic levels to 2,847 acres by late century (2070 to 2099).[32] As this is an annual average, some years are likely to see little or no wildfires in the unincorporated area, and other years are likely to see much larger fires.

* Historical annual averages are based on modeled historical data from 1961 to 1990.

Figure 12. Fire Hazard Severity Zones in the Unincorporated County

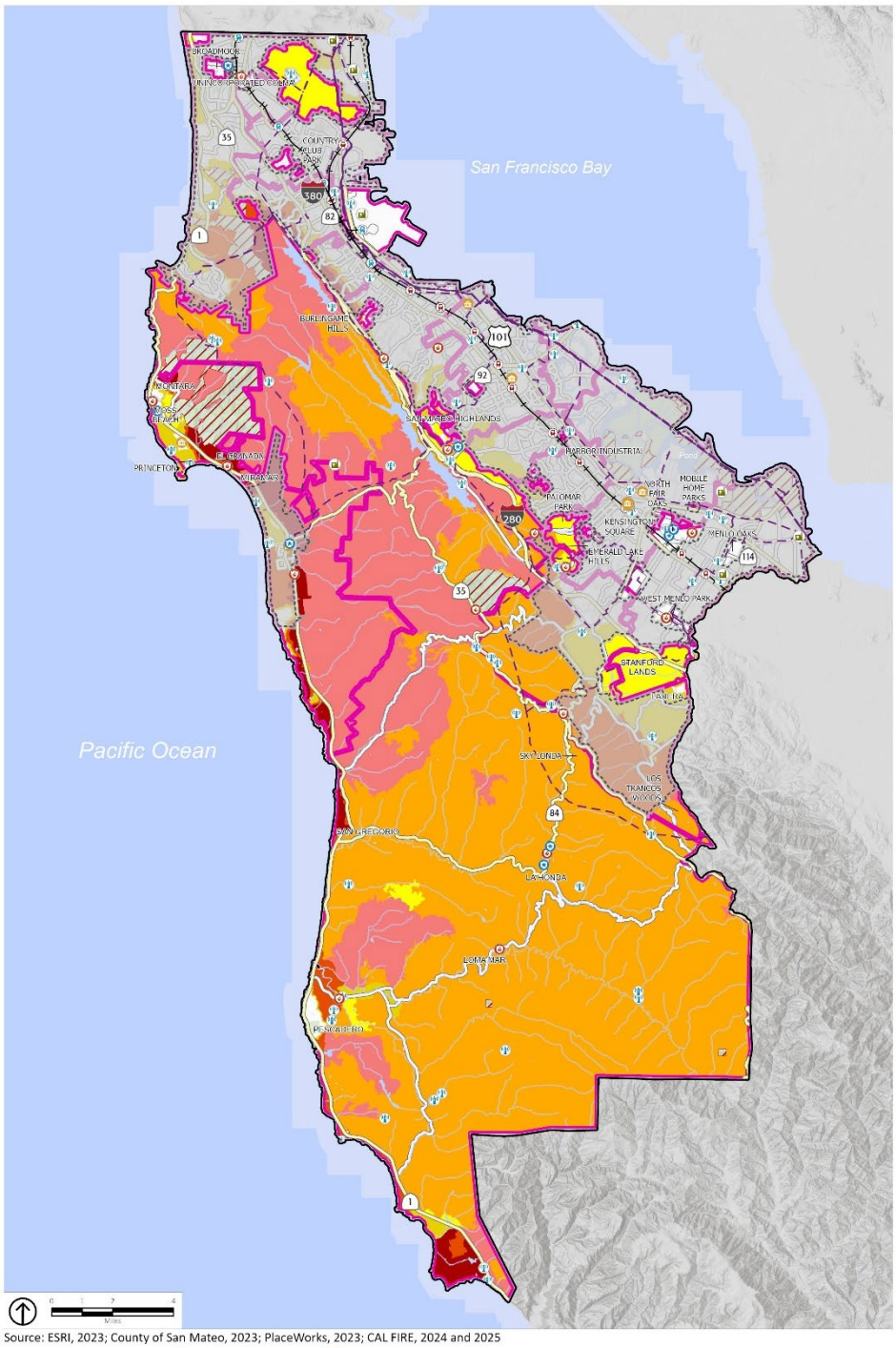
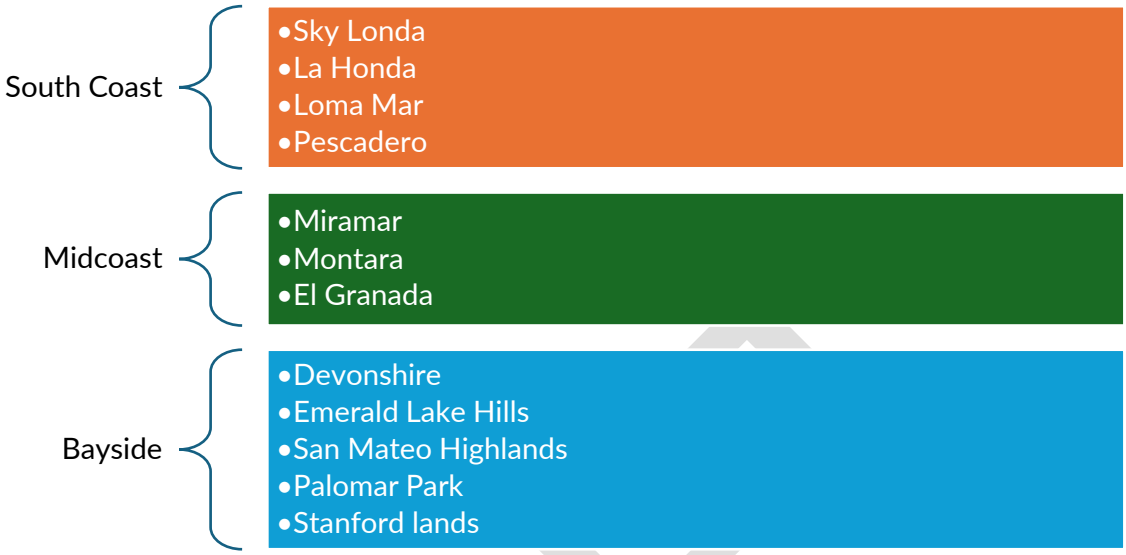


Figure 13. Unincorporated Communities in Wildfire-Prone Areas in San Mateo County



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Key Findings

The following section presents the key findings of the Vulnerability Assessment for unincorporated San Mateo County, highlighting the people and community features that were identified as priority vulnerabilities. Priority vulnerabilities are the people, buildings, infrastructure, economic drivers, ecosystems and natural resources, and key services who should be considered as the County's priorities in adaptation and resilience planning. Identifying a population or a community asset as a priority vulnerability reflects the severity of climate change impacts and level of harm, but also considers other factors such as the size of the population, current and historic injustices and discrimination, the role that the asset plays in maintaining community-wide well-being, and the potential of the population or asset to be impacted by compounding or cascading effects of interacting hazards. Severe weather, such as heavy rains, thunderstorms, and windstorms, is responsible for the most priority vulnerabilities in San Mateo County, followed by flooding, wildfire, extreme heat, and landslides.

In alignment with the County's equity policies, the San Mateo County Office of Racial and Social Justice plays a crucial role in supporting the integration of an equity lens into County operations. Established through the Board of Supervisors' 2021 resolution to Advance Racial Equity Efforts and the 2024 Equity Ordinance, this office uses equity frameworks and tools such as equity action plans and equity impact assessments to ensure inclusive planning. These efforts directly address current and historic injustices. By integrating these equity considerations into the Vulnerability Assessment and Safety Element, the County ensures that its resilience strategies are inclusive and effectively mitigate climate impacts for vulnerable populations. This approach aligns with the County's aim to create a strong, diverse, and equitable community where all people feel a deep sense of belonging and are empowered to voice their needs and manifest their aspirations. Additional information regarding the County's equity framework and Equity Ordinance can be found here: https://www.smcgov.org/ceo/county-equity-framework.Climate change is expected to affect everyone and all locations in San Mateo County to some degree. This highlights the importance of the Vulnerability Assessment which identifies the populations and assets most at risk, ensuring that strategies to address their needs are targeted and effective. By addressing the needs of vulnerable populations, these strategies can also serve as universal solutions that benefit the whole population. This section does not describe all impacts from climate change and associated hazards. Rather, it identifies the populations and assets who are most frequently designated as priority vulnerabilities. Populations and assets not listed here may still face significant harm from climate change.

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Low-Resourced Households

Most Vulnerable To:

Low-resourced households are among the populations most at risk of climate change hazards throughout San Mateo County. This includes cost-burdened households (those that pay more than 30 percent of their income on housing costs), low-income households,* overcrowded households (households that have more than one person per room of the home), and households in poverty.† These households face numerous challenges, including lower median incomes, higher rates of residential displacement, and limited access to affordable housing options. The pressure of rising housing costs often forces long-time residents to relocate, disrupting established social networks and community cohesion. Low-resourced people of color and immigrants are even more susceptible owing to marginalization and discrimination, and in some cases distrust of government services and lack of a social support network.

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* The State identifies $149,100 as the low-income threshold for a household of four people in San Mateo County in 2023.
† The federal poverty line for a household of four is $31,200 a year. However, in San Mateo County, the acutely low poverty line is even lower at $26,250 for a household of four.

Low-resourced households typically lack sufficient resources to invest in home repairs and weatherization improvements, air conditioning and efficient appliances, health care, and other means to prepare for and recover from hazardous events. Rising sea levels exacerbate these vulnerabilities by increasing the risk of shoreline flooding, which can damage buildings, disrupt infrastructure, and create hazardous living conditions. Inundation caused by sea level rise may create substantial hardship for low-resourced households if they must allocate funds to protect their homes or fix damage from flood events. Evacuation concerns are significant for these households, as they may lack access to reliable transportation or the financial means to leave during emergencies, making it difficult to comply with evacuation orders. Additionally, they often lack access to emergency shelters that can accommodate their needs or have the capacity for large families. Limited financial resources may prevent these households from affording adequate housing, which means they are more likely to live in older buildings with poor maintenance, structural damage, or inadequate sanitation. These conditions create an ideal environment for pests which can carry harmful pathogens.

Adaptive Capacity Resources

To address the challenges faced by low-resourced households, the Federal Emergency Management Agency may provide disaster assistance in the form of grants to help pay for temporary housing, essential home repairs, and other disaster-related needs such as medical and dental expenses, transportation, childcare, and moving expenses. Additionally, emergency alerts are available via SMC Alert and the Genasys Protect citizen site and app, which allows users to receive immediate alerts and stay informed about evolving emergencies.

PG&E offers water-efficiency programs and rebates, which can help reduce water costs. However, some households may not be able to participate in these programs. Available incentives and rebates may not be sufficient to support households in poverty, who may be disproportionately impacted by cost increases associated with drought and unable to afford water-efficiency measures.

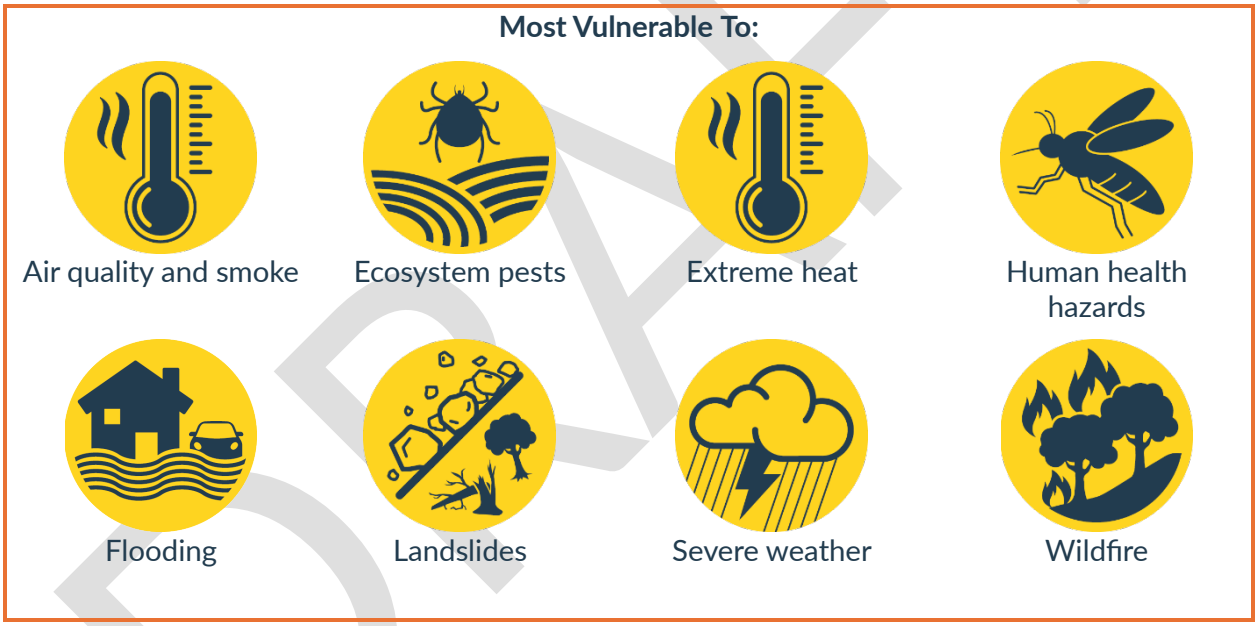
Overcrowded households may have limited ability to cope with illnesses caused by vectors, extreme temperatures, or exposure to mold and mildew, as persons living in these households are in close proximity to others, causing illnesses to spread more easily. These households may be financially strained by medical costs and inability to work due to illness. During drought, low-resourced households may be especially vulnerable to increases in water prices due to water conservation pricing and may be unable to afford water-efficient appliances.

Low-resourced households are distributed throughout the unincorporated areas, with significant concentrations in North Fair Oaks and nearby Mobile Home Parks. These communities face numerous challenges, including lower median incomes, higher rates of residential displacement, and limited access to affordable housing options. The pressure of rising housing costs and gentrification in surrounding areas often forces long-time residents to relocate, disrupting

established social networks and community cohesion. Research shows that community resilience is significantly bolstered by strong social networks and a sense of cohesion, as these elements provide emotional support, resource sharing, and collective problem-solving during times of change or hardship. Highlighting the importance of these connections earlier underscores their role in mitigating the impacts of displacement and fostering stability.[33, 34]

In addition to economic challenges, these areas frequently have fewer resources for infrastructure improvements, such as transportation, public services, and green spaces, compared to incorporated areas of the county. This lack of investment can lead to disparities in quality of life, with residents experiencing higher levels of environmental and public health risks. For instance, inadequate drainage systems, older housing stock, and proximity to industrial zones can result in heightened exposure to pollutants, while reduced access to health care and educational opportunities further exacerbate inequalities.

People with High Outdoor Exposure



Outdoor workers and individuals experiencing homelessness spend significant time outdoors, which may bring them into direct contact with numerous hazardous conditions. Outdoor workers in San Mateo County are most closely tied to landscaping, construction, agriculture, and recreation. Outdoor workers are often from low-resourced households, including immigrant communities, low-income households, and low-resourced people of color. Many immigrants and people of color are disproportionately represented in outdoor occupations. These jobs often have fewer educational requirements, making them accessible to those facing challenges such as a lack of legal status, language barriers, or the need to support their families. Additionally, systemic barriers limit access for many people of color to higher-paying, safer jobs, leading to a concentration in low-wage, physically demanding work. Individuals living in poverty or

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experiencing economic instability are more likely to take on low-paying, high-risk jobs with limited protections, many of which are outdoor occupations. These positions are often seasonal or temporary, which further contributes to their economic insecurity.

In the Coastside, outdoor workers are usually agriculture and outdoor recreation employees, while outdoor workers in the Bayside usually work in landscaping and construction. In both cases the physical demands of their jobs often require wearing heavy gear and performing manual labor, which increases their susceptibility to heat-related illnesses during periods of extreme heat. Natural disasters, such as wildfires or severe weather, can disrupt their ability to work, leading to economic instability. This financial strain can limit their access to timely medical care, creating a cycle of vulnerability that is difficult to break. Individuals experiencing homelessness face even greater challenges. Without consistent access to adequate shelter, they are left exposed to extreme weather events and hazardous conditions, putting their health and safety at significant risk. Additionally, outdoor workers may be directly exposed to hazardous flood conditions and may be unable to reach work if roads are damaged or blocked.

Ecosystem pests pose significant threats to the job stability and health of outdoor workers. Pest infestations can disrupt their jobs, leading to economic consequences if work is delayed or halted. For low-resourced households employed in these sectors, pest-induced damage to crops can result in severe economic hardship. Agriculture can be affected by fungal pathogens, invasive disease vectors, and pests as temperatures continue to warm, which could affect the quality or viability of crops within the county. Pests and diseases that weaken trees and severe weather can cause trees to fall, harming recreational areas where outdoor workers are employed. This not only creates safety hazards but also discourages tourism and deters visitors, further reducing job prospects and exacerbating economic challenges for these workers. Additionally, the increased use of pesticides and insecticides to manage pest outbreaks can pose health risks to these workers, potentially resulting in both acute and long-term health issues.

County of San Mateo Farmworker Advisory Commission

The Commission promotes programs and policies that address the unmet needs of farmworkers in San Mateo County. Potential areas of focus include: advising the Board of Supervisors and County agencies on effectively reaching out to farmworkers and their families; helping farmworkers and their families navigate public agencies and access benefits and services; raising awareness among farmworkers about labor laws and other protections; bringing visibility to issues that disproportionately affect farmworkers; and helping to build trust and relationships in the County's agricultural community, particularly between employers and employees.

Source: San Mateo County. 2025. *Farmworker Advisory Commission*. https://www.smcgov.org/ceo/farmworker-advisory-commission

Vulnerable groups face cascading vulnerabilities, where existing barriers such as limited healthcare access, unstable housing, or economic insecurity exacerbate the harm from

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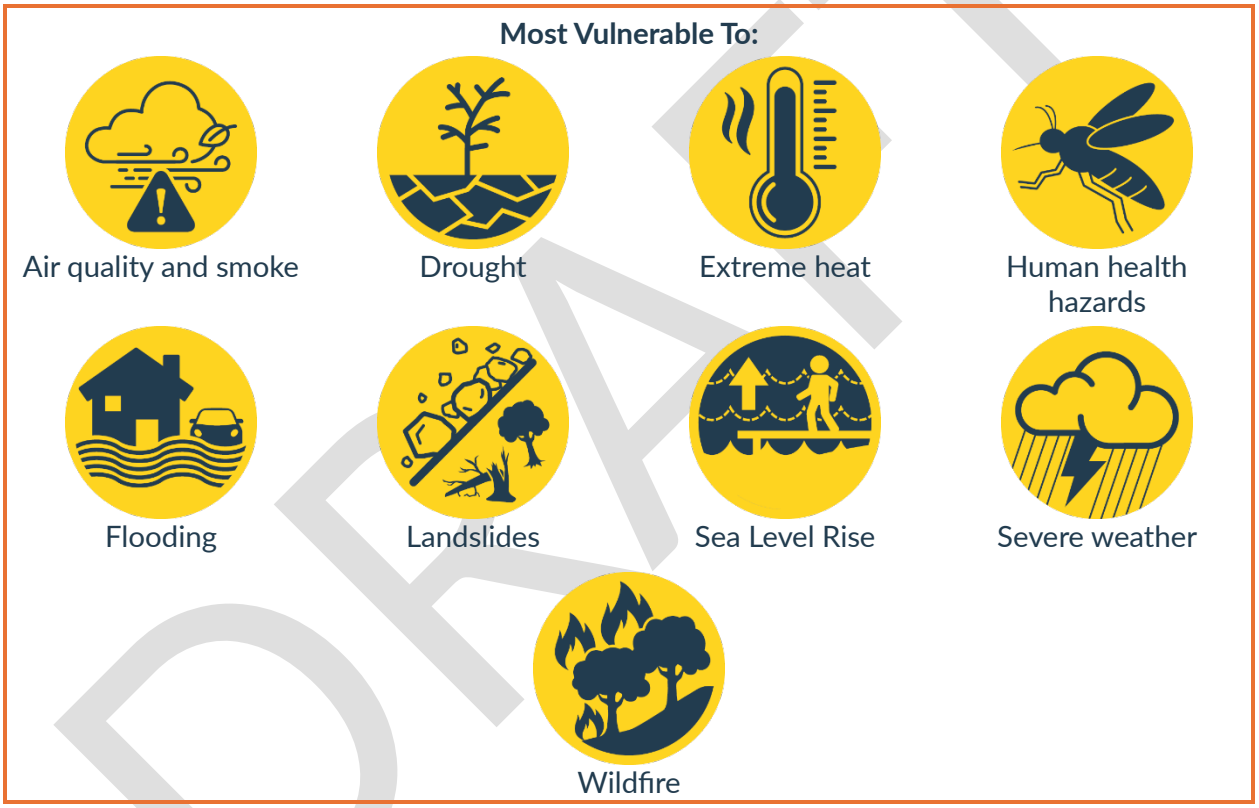
environmental risks. Poor air quality worsens pre-existing health conditions, making it difficult for those affected to maintain well-being. Extreme heat leads to heat-related illnesses, such as heat exhaustion or heatstroke, which are particularly dangerous for those with underlying health issues or inadequate shelter. Hazards, such as floods and severe weather, threaten both physical safety and economic stability, often displacing individuals and leading to long-term financial hardship. These compounding risks, combined with existing barriers, make recovery increasingly difficult, especially for those lacking adequate resources or support networks. The absence of robust healthcare, secure housing, and economic opportunities further deepens the vulnerability of these groups, leaving them with limited means to adapt or recover from repeated hazards.

Persons with Chronic Illnesses and/or Disabilities



Persons with chronic illnesses or disabilities are among the most vulnerable populations during emergencies due to physical, medical, and social factors that limit their ability to respond and recover effectively. Many individuals with chronic illnesses or disabilities have weakened immune systems due to pre-existing conditions or medications, which makes it harder for them to fight off new illnesses. Exposure to allergens and vector-borne diseases can exacerbate existing conditions, complicating treatment and recovery. Additionally, these individuals are more sensitive to heat-related health effects and smoke exposure, making them particularly at risk during extreme weather events.

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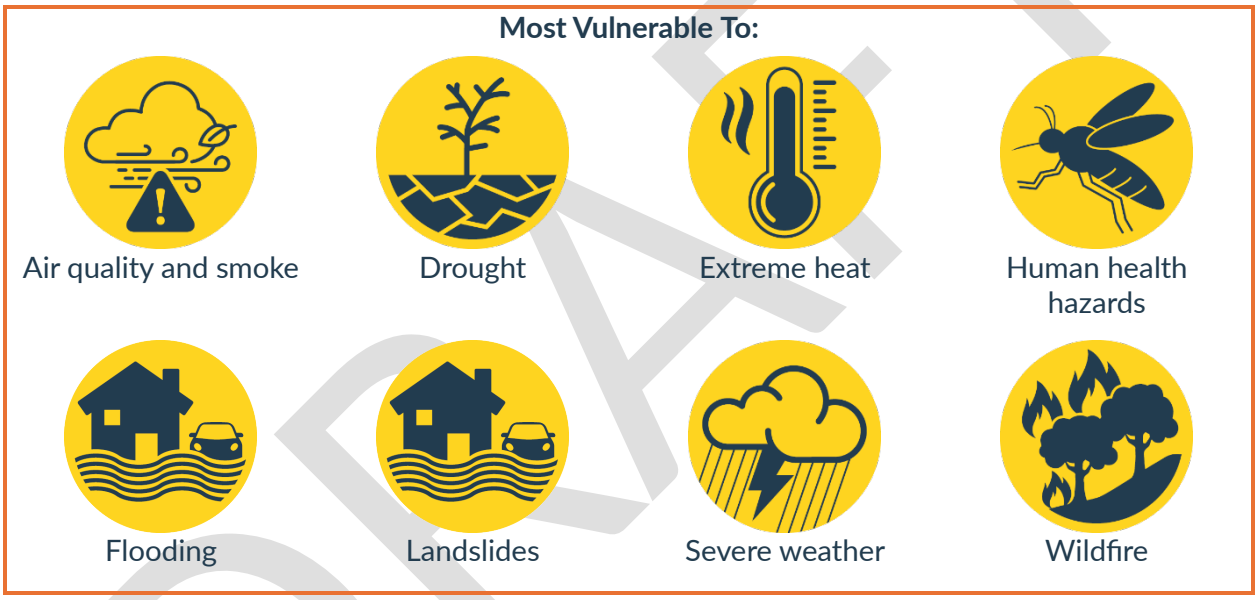
Hazards, including flooding, poor air quality, drought, extreme heat, severe weather, and wildfire, pose additional risks, as individuals with chronic conditions or disabilities may be more likely to be injured or become ill, and they may rely on medications or medical devices that can be lost, damaged, or rendered unusable. Poor air quality and wildfire smoke can exacerbate respiratory conditions, and drought can limit access to clean water, further impacting health. Extreme heat increases the risk of heat-related illnesses, and severe weather events can lead to injuries and disrupt essential medical care. Loss of power, such as during a public safety power shutoff, can be especially dangerous for those who need electricity to operate medical devices or store medications, a situation that becomes more likely during extreme heat, severe weather, or flooding. Furthermore, people with disabilities often face barriers in preparing their homes for emergencies and evacuating to safety before and during severe weather or flooding events.

Older Adults



Older adults face a distinct set of vulnerabilities due to a combination of physical, sensory, and cognitive limitations, which are exacerbated by climate changes and during emergencies and hazardous events. Many older adults experience reduced mobility, impaired vision, and hearing loss, which can make it difficult for them to respond quickly to sudden threats such as natural disasters. For instance, attempting to evacuate during a wildfire, or accessing cooling centers while dealing with mobility impairments or vision issues significantly increases their risk. Physical

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limitations often lead to delays in older adults taking protective actions or can cause them to take longer to respond during emergencies, increasing their risk of harm. Furthermore, they are more susceptible to injuries from a hazardous event and may face a more difficult recovery. Older adults are highly susceptible to cascading and compounding impacts from natural hazards, as the interplay of physical limitations, chronic health issues, economic constraints, and limited access to information can converge to place their lives at considerable risk. Chronic health conditions further exacerbate these vulnerabilities. Conditions such as heart disease, diabetes, and respiratory issues can be significantly worsened during crises, particularly exposure to wildfire smoke or extreme heat.

Older adults in care homes face additional vulnerabilities, as they may depend on caregivers or institutional protocols for emergency response, which can vary in effectiveness, depending on the availability and capability of caregivers or the adequacy of institutional protocols. During emergencies, such as wildfires or extreme weather events, the adequacy of care can be compromised by limited staff availability, as caregivers may also be affected or unable to reach the facility. This situation is particularly concerning during widespread emergencies, where swift evacuations or the provision of necessary care can be severely delayed, increasing the risks faced by these individuals. Additionally, older adults in care homes may also have complex medical needs that require specialized attention, and disruptions in care can have severe, potentially life-threatening consequences. For example, disrupted access to essential medications during a major flood could escalate an already dangerous situation into a life-threatening emergency.

Adaptive Capacity Resources

Center for Independence for Individuals with Disabilities provides support services, community awareness, and systems change advocacy to promote full and equal community integration and participation of people with disabilities in San Mateo County.

Peninsula Rides provides seniors and those with accessibility needs in San Mateo County with the resources to stay mobile and get around the community.

Redi-Wheels and RediCoast offered by the San Mateo County Transit District, provides paratransit services. Paratransit is for persons with disabilities who cannot independently use SamTrans bus service some of the time or all of the time.

Sources:

Center for Independence of Individuals with Disabilities. 2025. *Center for Independence of Individuals with Disabilities*. https://www.cidsanmateo.org/

San Mateo County Transit District. 2025. *Peninsula Rides*. https://peninsularides.com/

San Mateo County Transit District. 2025. *Paratransit*. https://www.samtrans.com/accessibility/paratransit

Low-income older adults who live alone face unique and significant challenges during emergencies. Without access to on-site caregivers or a support network, they may struggle to receive timely assistance or take protective actions. Their isolation can leave them particularly

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vulnerable to delays in accessing resources like transportation to evacuation centers or medical care. In many cases, these individuals may face greater risks than those in care homes, where caregivers are available to provide immediate aid and implement emergency protocols. This disparity underscores the critical need for targeted interventions to support isolated older adults in maintaining their safety and well-being during hazardous events.

Senior Coastsiders Community Resilience Hub

The Senior Coastsiders in Half Moon Bay has transformed into a community resilience hub for Coastside residents. The senior center has been outfitted with air coolers and purifiers, misting fans, back up batteries, indoor and outdoor air quality monitors, and thermal window coverings for temperature control during hazardous events. The facility serves as a cooling center, charging station, and clean air haven during extreme heat, power outages, and poor air quality.

Source: San Mateo County. 2025. *Climate Resilience.* https://www.smcsustainability.org/climate-change/climate-resilience/community-resilience/

Economic and social factors also compound these risks. Older adults receive, on average, less income than middle-aged adults. While some continue to work in high-income positions or have ample financial resources due to retirement funds or other investments, many have limited, fixed incomes, which limits their ability to invest in necessary disaster preparedness measures, such as purchasing emergency supplies or making their homes more resilient to natural hazards. This ultimately can increase their vulnerability to hazard events. Many older adults are unable to drive, leaving them dependent on external assistance if they need to evacuate. Several programs in the county help to mitigate against these harms, including those provided by the Center for Independence for Individuals with Disabilities, Peninsula Rides and other transportation services, and the County Health Department's Aging and Adult Services programs. The digital divide is another key factor, given that some older adults may be less familiar with digital technology, making it difficult for them to receive timely alerts and critical information disseminated through smartphones, social media, or emergency apps.

Transportation Infrastructure and Services

Most Vulnerable To:


Coastal erosion


Extreme heat


Flooding


Landslides

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Sea level rise


Severe weather


Wildfire

The County's roads and highways, bridges and tunnels, transit networks and facilities, bikeways, and pedestrian facilities, and other transportation services play a pivotal role in supporting community health, safety, and well-being. These systems span the county and are especially vulnerable to flooding, landslides, sea level rise, severe weather, and wildfire. During normal conditions, damage to transportation infrastructure and services prevents people from going about their daily lives, interrupts many key services, and disrupts freight and shipping, including vital supply chains that support both businesses and households. Damage to transit networks also significantly impacts mobility for those who rely on public transportation, leading to reduced access to jobs, healthcare, and other essential services. During emergency events the potential for harm is even greater, as damaged transportation networks can block evacuations, prevent or delay emergency response, and significantly hinder deliveries of vital supplies.

Throughout San Mateo County, roads and highways are a priority vulnerability. Roadways can be damaged or blocked by wildfire, landslides, flooding, and as an effect of severe weather if debris is knocked into the road. Extreme heat events can significantly affect transportation infrastructure, causing travel disruptions and long-term damage. High temperatures can expand and warp railway tracks and pavement, leading to issues such as potholes and rutted roads. Prolonged heat may cause train tracks to buckle, increasing the risk of derailments. These impacts often result in road and rail closures, travel delays, and accelerated infrastructure degradation. For instance, during high-heat events, BART and Caltrain must reduce their operating speeds to ensure safety.

In coastal areas, there are limited roads and few parallel routes, making transportation networks highly vulnerable to hazards, such as landslides, flooding, severe weather, and coastal erosion. Harm to these routes, especially Highway 1, State Route 84, and State Route 92, could isolate the entire Coastside region and be dangerous when evacuations are needed. Adjacent trail systems, such as the multi-modal trail near Highway 1, could provide alternative emergency access during a natural disaster, offering additional routes for evacuation and emergency response. Even in the more developed Bayside communities, these infrastructure networks are subject to disruptions. On the Bayside, Highway 101 is primarily vulnerable to flooding and sea level rise, whereas Interstate 280 and State Routes 82, 84, and 35 are vulnerable to landslides and wildfire. Highway 101, Interstate 280, State Route 82, and other local roads can be damaged or blocked by these hazards, isolating communities in the region from goods and services. Freight movement is also impacted, as these key routes are essential for the transport of goods across the county and greater region. Disruptions to these routes not only affect local deliveries but also have broader

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economic implications for the region. In an extreme scenario, these hazards could block multiple roads in the unincorporated communities, significantly limiting evacuation options and delaying access to healthcare and other emergency services. The South Coast communities, such as Pescadero and La Honda, are particularly vulnerable due to their geographic isolation from other regions of the county. With Highway 1 as the primary transportation route, these rural areas face heightened challenges in emergencies, where road closures could leave residents with few, if any, options for timely assistance or evacuation.

Sea level rise and flooding may damage pavement, potentially increasing road maintenance costs and creating unsafe driving, walking, and biking conditions. These hazards also directly impact transit services, such as buses, by disrupting access to transit routes and facilities, leading to reduced service reliability and longer travel times. According to the County's Multijurisdictional Local Hazard Mitigation Plan, the 100-year floodplain includes Highway 101, State Routes 1, 82, 84, 92, 109, 114, and Interstate 380, as well as local roadways. Damage to these roadways could severely impact the integrity of roadways and interrupt traffic flow in the county. Access to and from unincorporated communities can become challenging if one or more main access points are closed. Flooding can also affect neighborhood access roads that are narrow and have poor drainage, causing long-term delays and requiring costly cleanup.

Some evacuation routes, including Highway 101, run through areas that are subject to sea level rise, and so may be temporarily or permanently flooded, preventing timely evacuations. Highway 101 and Interstate 280, as well as State Routes 35, 84, 92, and 1 are the primary routes serving unincorporated communities. If these roads are blocked or damaged, residents may face significant delays or even be unable to evacuate entirely, depending on the extent of the disruption. Public transit disruptions along these corridors could also hinder evacuation efforts for transit-dependent populations. To further enhance the County's preparedness during emergencies, the Department of Emergency Management is developing an All-Hazards Evacuation Plan. This plan will analyze evacuation constraints across San Mateo County and establish protocols, policies, and procedures associated with disaster response as it pertains to a variety of emergency situations, to further safeguard the well-being of the community. While improvements to public transit infrastructure and roadways could reduce these constraints, they are likely to require substantial funding that could strain local budgets, demand additional resources, and take a significant amount of time to complete. Additionally, the County does not have sufficient resources to fully implement its planned and community-desired projects to improve mobility and access. External funding is heavily relied upon for all transportation improvements, leaving little flexibility for prevention-focused initiatives alone. This situation could leave some communities without sufficient evacuation access for extended periods of time, particularly those in more remote areas.

Residents in the unincorporated county rely on public transportation services and infrastructure to conduct their daily activities and reach jobs, friends, and vital health and support services. State Route 1, a critical corridor to the South Coast region, is already impacted by sea level rise

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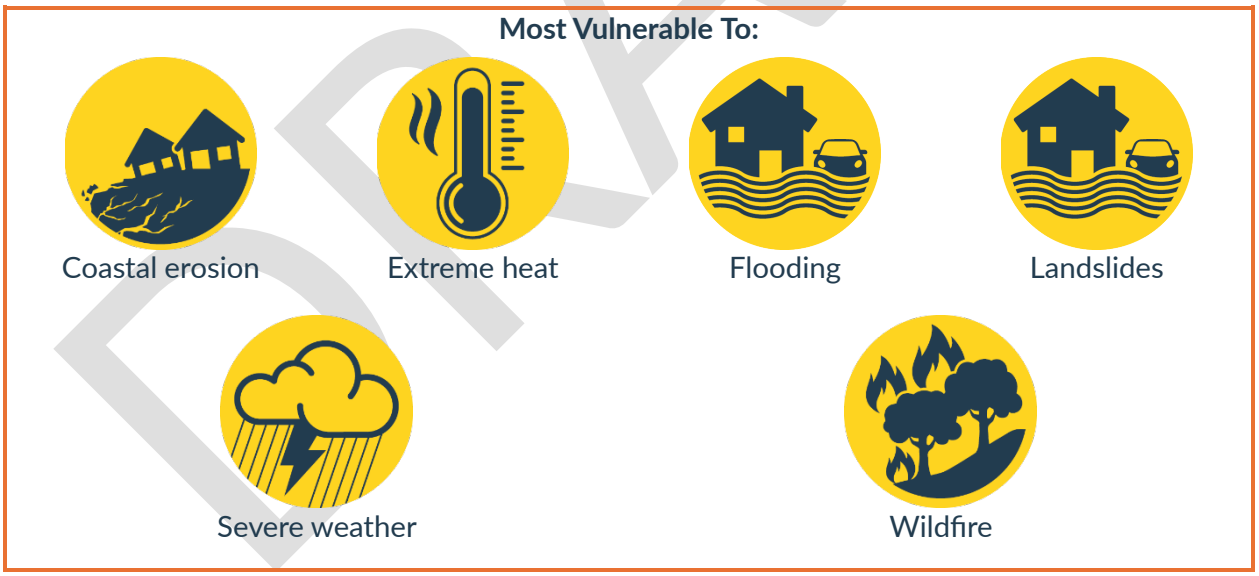
hazards, but will be increasingly exposed to erosion and flood over time, with over four miles of roadway exposed to 4.9 feet of sea level rise. Increasing flooding and erosion of coastal trails and coastal access infrastructure like parking lots and restrooms will reduce public coastal access in the future.[35] These challenges extend to transit accessibility as well, as many bus stops and transit facilities in coastal areas will face increased risk of disruption, reducing access to public transportation services. Based on all projections, sea level rise could negatively impact communities if no adaptation measures are taken.

The impacts of sea level rise extend well beyond the immediate flood zones, significantly affecting critical transportation infrastructure. Roads, railways, and transit hubs located in flood-prone areas serve as vital connections for the entire community, not just those directly exposed to flooding. When these transportation networks are compromised due to rising waters, the consequences extend throughout the region, resulting in widespread disruptions to transit, supply chains, and emergency response capabilities. Public transportation services are essential for residents to access jobs, friends, and critical health and support services. Sea level rise impacts extend beyond immediate flood zones, affecting key infrastructure in flood-prone areas. Disruption of these services due to flooding will have cascading effects throughout the city, impacting daily life, economic stability, and overall resilience, increasing isolation for vulnerable populations and reducing mobility for those relying on public transit.

Energy and Communication Infrastructure and Services



Residents, visitors, and workers rely on the County's energy and communication infrastructure and services to work, play, stay connected, and remain healthy and safe. Energy delivery and communication infrastructure and services are highly vulnerable to hazards that could undermine their foundations or cause damage to the power lines, including coastal erosion, flooding, landslides, severe weather, and wildfire. This infrastructure supports electricity, natural gas, internet, and phone services for residents, visitors, and businesses. These networks are

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vulnerable throughout the county, but the threat to these systems and the people who depend on them is particularly high on the South Coast due to the remote nature of the area. Moreover, infrastructure in the South Coast has limited redundancy, meaning that if a piece of infrastructure fails, there are less likely to be other facilities or parts of the infrastructure network that can provide services instead.

Landslides, wildfire, and severe weather can damage power lines and disrupt natural gas supplies. Downed or damaged infrastructure may damage roads and buildings, posing risks to people and potentially requiring road closures. The communities most at risk include those in hillside areas and elevated fire hazard zones, such as La Honda, Pescadero, Montara, and Palomar Park. Damaged infrastructure may also create fire hazards and can be further impacted by floodwaters and extreme heat. Power lines along the Bayside are particularly vulnerable to flooding.

Extreme heat can regularly cause power outages due to a combination of mechanical failure of electrical grid equipment, heat damage to the wires themselves, and high demand for electricity because of cooling equipment, all of which cause stress on the grid. A power or communication outage could affect emergency medical response and emergency resource services. Delayed or interrupted response to these services could have a direct impact on the health and well-being of populations of the county, such as older adults, low-income households, and persons with chronic illnesses and/or disabilities. The loss of power often means a loss of refrigeration, ruining food in homes and businesses. This can be particularly harmful to financially constrained households and small businesses.

San Francisco International Airport

Most Vulnerable To:

San Francisco International Airport is one of the busiest airports in the United States, and any disruptions to the airport could severely interfere with domestic and international air travel.[36] As sea levels rise, the risk of storm surge increases, which can disrupt operations and damage critical infrastructure, including access roads and public transit connections to the airport. Inundation from sea level rise, storm surges, and inland flooding can overwhelm airport drainage systems, leading to standing water on the runways, terminals, and other critical airport infrastructure. Damage to airport facilities could require costly repairs and prolonged closures, causing significant economic losses for businesses in the region. Such disruptions could prevent visitors from traveling to or from the airport, negatively affecting the county's recreation and tourism industries, including local attractions, hospitality services, and seasonal events that draw visitors.

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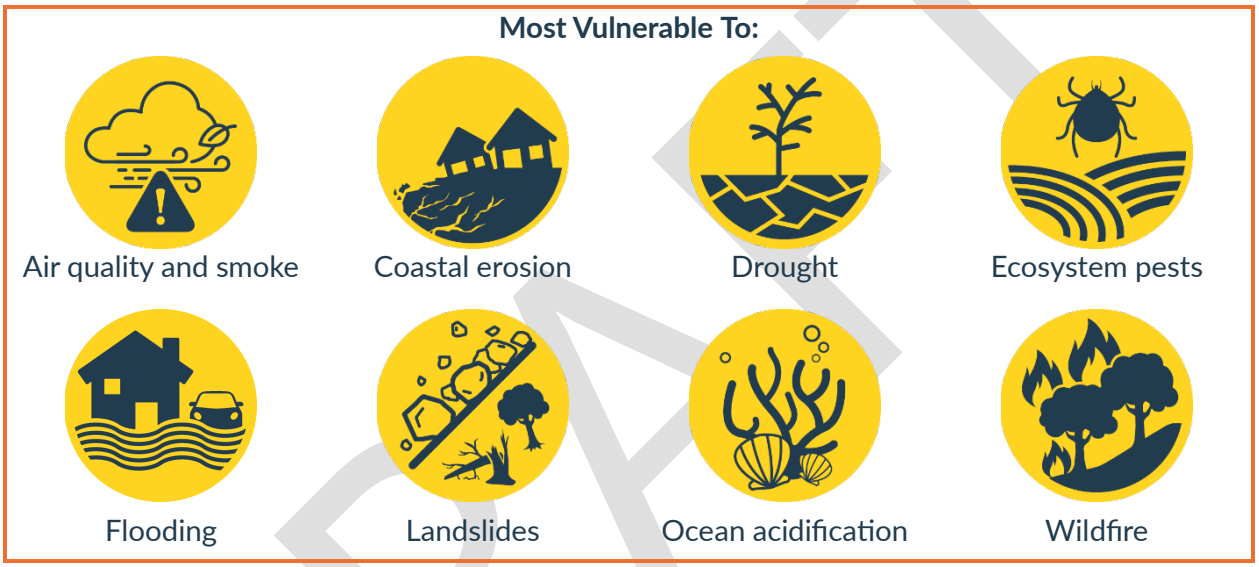
To address these challenges, the San Francisco International Airport has implemented the SFO Shoreline Protection Program. This program aims to protect the airport's assets and operations from flooding caused by a 100-year storm surge and future sea level rise due to climate change. The program focuses on developing a comprehensive shoreline protection system designed to safeguard travelers, airport workers, and vital assets belonging to both the airport and the City and County of San Francisco. It aims to protect against a 100-year storm event and incorporate measures to address future sea level rise.

Outdoor Recreation, Tourism, and Agriculture



The coastal regions of San Mateo County are recognized for agriculture, tourism, and outdoor recreation opportunities. This area is known for coastal recreation activities, such as surfing at the Mavericks surf break, commercial fishing out of Pillars Point Harbor, and hiking along the California Coastal Trail and in large open spaces and parks.

Highway 1 and the bridges along the highway, in addition to local County maintained roads along the coast, such as Mirada Road, are highly vulnerable to sea level rise, flooding, landslides, and severe weather, which can damage the roadways and make them impassable. Additionally, State and County maintained roads in the Santa Cruz Mountains are vulnerable to landslides. These vulnerabilities could prevent visitors from traveling to the region, especially during severe weather events, damaging the outdoor recreation industry and affecting the workers who rely on tourism. At the same time, the Coastside may experience increased tourism as it becomes a climate refuge for residents of inland Bay Area communities facing hazards such as extreme heat and severe weather. Increased visitors place additional pressure on these coastal areas, making it necessary to better manage natural resources and infrastructure to accommodate more people while still protecting the environment.

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Agriculture is sensitive to changes in weather and biological threats, which can lead to lower crop yields and economic losses. Agriculture and related agricultural tourism, one of the primary economic drivers in the coastal region, can be harmed by agriculture pests and diseases that ravage plants and animals, drought and extreme heat that weaken or ruin crops, and severe weather that decimates agricultural products. These can include fungal pathogens such as powdery mildew and rust fungi, invasive disease vectors such as the glassy-winged sharpshooter, and pests such as aphids and spider mites, which are exacerbated by rising temperatures and threaten agricultural operations. Pests can significantly harm agricultural operations by weakening plants, reducing yields, and spreading diseases across various agricultural operations, leading to economic losses and operational challenges. These hazards not only affect food production but the financial security of farmers and outdoor workers.

Outdoor recreation locations, such as those along the coast in Pescadero or San Gregorio, could be damaged by hazards such as sea level rise and coastal erosion, and inland areas such as Portola Redwoods State Park could be damaged by hazards such as landslides and wildfire. Coastal erosion can damage popular recreational spots, and wildfires can destroy ecosystems and threaten visitors. If roadways are washed out or become impassable, visitors may be unable to reach outdoor recreation locations or be deterred from traveling to the region.

Outdoor workers, many of whom are from low-resourced households, including immigrant communities, low-income households, and people of color, may face economic hardships if the agricultural and outdoor recreation industries are harmed. These workers are often concentrated in physically demanding, low-paying jobs with limited protections, making them particularly vulnerable to disruptions. The seasonal or temporary nature of many outdoor jobs further contributes to their economic insecurity, especially in the face of hazards such as sea level rise, coastal erosion, wildfires, and landslides.

On the Coastside, ocean acidification threatens many key species in the ecosystem. This can disrupt important recreational fisheries and may harm other recreational environments, including the local tide pools.

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Forests and Woodlands

Most Vulnerable To:


Ecosystem pests


Drought


Extreme heat


Severe weather


Wildfire

San Mateo County's forests and woodlands provide a wide range of valuable ecological services, including supporting biodiversity, sequestering carbon, offering recreational opportunities, and stabilizing soil. However, these ecosystems are increasingly threatened by climate change hazards, largely due to their significant overlap with high and very high fire severity zones, as well as the potential of cascading effects from drought, extreme heat, and ecosystems pest infestations.[37, 38] Weakened and dead forest and woodland habitats can ignite more quickly during a wildfire, creating devastating wildfires that burn at higher temperatures.[39] These weakened trees can also fall during severe weather events, damaging structures and blocking roadways. As climate change drives warmer and drier conditions, these ecosystems struggle to recover from wildfires.[40]

Oak woodlands, though resilient to low-intensity ground fires, are increasingly at risk from repeated high-intensity fires, which are becoming more frequent due to climate change. Repeated high-intensity fires can kill mature trees that would otherwise survive single low-intensity fires, disrupting the ecosystem's balance.[41] [42] Also, once oak trees are infected with Sudden Oak Death, they have no defense against the disease. Loss of these trees can significantly change the ecosystem and harm ecosystems that are dependent on the oaks.

Specific areas of forested habitat most at risk include Rancho Corral de Tierra, Montara Mountain, Sweeney Ridge, Creek Park, Sam McDonald Park, and the multiple open space preserves along State Route 35. There are other large areas of undeveloped open space throughout San Mateo County alongside more urbanized communities, where forested and woodland habitats are fragmented. While the Bayside is primarily urban, developed land uses, woodland-savanna ecosystems are scattered throughout the more inland areas of the South Coast and Bayside, in the eastern foothills, and along valley borders from Crystal Springs

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Reservoir southward. These fragmentated habitats exacerbate vulnerabilities by disrupting ecological continuity, reducing habitat size, and isolating species populations. This fragmentation limits the movement of wildlife, reduces genetic diversity, and reduces resilience. As a result, the ecosystem becomes more susceptible to pests, which can spread more easily among weakened plant populations, as well as to drought, which has a greater impact on small, isolated patches. Fragmentation also increases the likelihood of landslides by destabilizing soil, especially on steep slopes, and makes the ecosystem less capable of withstanding severe weather and wildfires. The interaction between urban development and natural habitats complicates efforts to manage and protect these ecosystems by creating fragmented landscapes that disrupt natural processes. Urban development often leads to habitat loss, increased human-wildlife conflict, and altered water flows, all of which make it more challenging to maintain ecological balance and resilience.

While techniques to improve forest resilience to wildfire do exist, they may be challenging to scale to the size of the region's larger forested areas. These forests play an important role in supporting the region's outdoor recreation and tourism industries. Flammable forests increase wildfire risks for the entire region.

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Aquatic Habitat

Most Vulnerable To:

Aquatic habitats in the unincorporated areas of the county consist of riparian areas, streambanks, freshwater marshes, and salt marshes, along with the shoreline ecosystems along the Pacific coast and bayside. These habitats provide numerous benefits, including flood control by absorbing excess rainwater, reducing the risk of flooding in nearby areas, and stabilizing streambanks to prevent erosion. They also play a crucial role in water filtration, removing pollutants and improving water quality for both human and ecological needs. Additionally, these habitats offer critical habitat for diverse wildlife, supporting a variety of plant and animal species. Some of these species have commercial and recreational value, such as the Dungeness crab, a valuable local fishery. Other species in these ecosystems are rare or endangered. Riparian areas can be found in several communities across San Mateo County, including the South Coast communities of Pescadero, Loma Mar, and Los Trancos Woods, as well as in Bayside communities such as the Stanford lands and San Mateo Highlands.

Significant wetlands include Pescadero Marsh and Pillar Point Marsh on the Coastside, a salt marsh near Redwood City on the Bayside, and freshwater marshes in locations such as San Bruno Mountain and Crystal Springs Reservoir. Salt marshes are found in Pescadero on the South Coast and near San Francisco International Airport on the Bayside. Freshwater marshes are found along the edges of reservoirs, lakes, ponds, and streams, with key locations including Pillar Point, near the mouths of San Gregorio and Pescadero Creeks, and adjacent to Pilarcitos Lake and Crystal Springs Reservoir. Freshwater marshes are also found in the communities of Princeton, Pescadero, and San Francisco International Airport.

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OneShoreline's Bayfront Canal and Atherton Channel Flood Protection and Ecosystem Restoration Project

The Bayfront Canal and Atherton Channel Flood Protection and Ecosystem Restoration Project, led by OneShoreline, addresses chronic flooding in the low-elevation areas of Redwood City, Menlo Park, Atherton, and unincorporated San Mateo County. Historically, high tides have impeded stormwater drainage from the Bayfront Canal and Atherton Channel into San Francisco Bay, causing frequent flooding of nearby mobile home parks and businesses.

To mitigate this issue, the project constructed an underground culvert system to divert excess stormwater into managed ponds of the South Bay Salt Pond Restoration Project. This diversion reduces flood risk and enhances local ecosystems. The project also installed a trash capture device to improve water quality in the Bay.

Source: OneShoreline. 2025. *Bayfront Canal & Atherton Channel Flood Protection and Ecosystem Restoration Project*. https://oneshoreline.org/projects/bayfront-atherton-flood-protection/

Several existing factors play a role in the sensitivity of these ecosystems to changing conditions, such as fragmentation, existing pollution levels, and built structures that may impede the natural adaptive migration of the ecosystems as sea levels rise, drought intensifies, and temperatures increase. Droughts and extreme heat can raise water temperatures, leading to harmful algal blooms and lower dissolved oxygen levels for aquatic life. Severe storms and flooding can be detrimental to streambanks and riparian areas, eroding streambanks in natural streams in the coastal regions of the county and causing higher peak flows in channelized streams and creeks in the Bayside. In the coastal areas of San Mateo County, ecosystems and natural resources generally fare better than in other regions, since there are still many connected, thriving habitats and natural areas in and surrounding more developed lands compared to the more urbanized Bayside areas. Ocean acidification threatens a number of aquatic plant and animal species, harming the ocean ecosystem as well as recreational and commercial activities that depend on the health of these ecosystems.

Marshlands can be affected by an influx of water from sea level rise and flooding, but also drought conditions. Sea level rise can permanently inundate marshes, causing the conversion of the ecosystem to mudflats.[43] Inland flooding from severe storms can cause sediment and contaminants to flow into these ecosystems, harming the plant life and causing algal blooms. Droughts can significantly reduce the availability of water in freshwater marshes, leading to reduced habitat availability and declining water quality, which in turn negatively impacts the wildlife that rely on these ecosystems for survival.

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Homes

Most Vulnerable To:


Flooding


Sea level rise


Landslides


Severe weather


Wildfire

Homes and residential structures are an essential part of every community, and San Mateo County, like in other areas of the Bay Area and California, faces a chronic housing crisis fueled by high costs and a limited supply of housing. Climate change has the potential to make this crisis worse. Houses and apartment buildings throughout the unincorporated county can be damaged or destroyed by wildfires, flooding events, landslides during or after heavy rainfall, inundation from sea level rise, and severe storms. Even if initial damage is minor, standing or retained water can cause mold and mildew to grow, causing homes to become uninhabitable. Although extreme heat events and poor air quality may not affect the structural integrity of homes and residential structures, these events can cause unhealthy indoor air temperatures and quality, resulting in dangerous living conditions for occupants. If homes become uninhabitable, residents can be displaced and may face significant challenges in finding alternative housing options, often resulting in prolonged periods of instability or even homelessness. This issue is particularly critical in areas like North Fair Oaks, where residents are surrounded by higher income communities, leading to inequitable access to affordable housing options and making it difficult for displaced

Housing and Climate Readiness Toolkit

Climate Ready SMC prepared the *Housing and Climate Readiness in San Mateo County Toolkit* in 2022 to encourage new housing that supports community resilience and reduces greenhouse gas emissions. The toolkit identifies best practices in site design and land use decisions to balance the need for housing with planning for sea level rise, flooding, wildfires, and extreme heat. Strategies range from policies in planning documents to building design methods, with the goal of integrating resilience into each aspect of housing throughout the county.

Source: Climate Ready SMC. 2022. *Housing and Climate Readiness in San Mateo County Toolkit*. https://homeforallsmc.org/wp-content/uploads/2022/04/Housing-and-Climate-Readiness-Toolkit.pdf

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residents to remain within their community. Coastal areas also face unique challenges, being isolated from other regions of the county and having a limited housing supply, which further limits the ability of residents to find nearby alternatives. These equity considerations underscore the need for targeted support and resources for vulnerable communities, including affordable housing programs, emergency assistance, and community planning efforts, to ensure fair access to safe and affordable housing and to prevent displacement.

Health Services and Medical and Care Facilities

Most Vulnerable To:


Extreme heat


Human health hazards


Severe weather


Sea level rise


Wildfire

Health services and medical care facilities, including health service providers, are primarily concentrated in Bayside communities. However, on the coast, Seton Medical Center Coastside is the only medical center, and it plays a crucial role in delivering both emergency and routine care to the region. When disasters or emergencies close Seton Medical Center Coastside, coastal residents lose access to critical healthcare services. In emergencies, some patients are transported to Seton Medical Center in Daly City. Additionally, while urgent care facilities are located in Half Moon Bay, these facilities often have limited operating hours and types of services that they provide.

These facilities are particularly vulnerable to extreme heat, human health hazards, severe weather, flooding, sea level rise, and wildfire. Seton Medical Center Coastside, located in a Moderate Fire Hazard Severity Zone, is the only coastal medical center at risk from wildfire. Wildfire could severely damage or destroy critical infrastructure, disrupting access to essential healthcare services on the coast. Kaiser Hospital in Redwood City, which provides medical services to unincorporated mid-South Bayside communities, is the only hospital located in areas subject to flooding and sea level rise hazards based on current mapping. Flooding can disrupt essential hospital operations, creating significant challenges. Additionally, the impacts of sea level rise extend beyond individual facilities, potentially affecting overall community health outcomes.

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During floods, limited access to hospitals may lead to delays in receiving urgent medical care. During a community-wide health event, the demand for health services can increase significantly, often surpassing the available staff and resources. For example, extreme heat events may lead to an influx of patients with heat-related illnesses, such as heatstroke or dehydration. Severe weather could cause injuries that further strain emergency care services. Additionally, outbreaks of infectious diseases can overwhelm medical providers, making it difficult to provide adequate care to all residents. Severe weather events can damage or destroy essential infrastructure, jeopardizing access to healthcare services. Such events can disrupt medical operations and strain resources, putting additional pressure on the healthcare system.

Equity concerns are especially evident given the disparities in healthcare access and the heightened vulnerabilities faced by marginalized communities during emergencies. In areas like North Fair Oaks and the nearby Mobile Home Parks, access to medical services is already limited, with residents facing systemic barriers to healthcare even under normal circumstances. When increased demand due to hazards, such as infectious disease outbreaks or prolonged extreme heat, pushes these limited resources beyond capacity, marginalized communities are disproportionately affected. Residents in these areas often lack the means to travel to better-equipped facilities, exacerbating health disparities during emergencies.

The COVID-19 pandemic provided critical lessons about these vulnerabilities. During the pandemic, healthcare systems across the country were overwhelmed, but communities with fewer resources, such as North Fair Oaks, faced even greater challenges accessing timely and adequate care. The pandemic highlighted the importance of ensuring that all communities, particularly those historically underserved, have equitable access to healthcare resources and adaptive measures to withstand future health crises. Strengthening healthcare infrastructure and expanding resources in underserved areas is vital to address these inequities and enhance resilience to future hazards like extreme heat, severe weather, and public health emergencies.

Next Steps

The vulnerability assessment is a key technical study needed to update the Safety Element. The vulnerability assessment helps community members, agency staff, and decision makers understand how climate change hazards may alter community conditions and what parts of the community (people and places) should be prioritized for adaptation and resilience. The findings from the climate change vulnerability assessment process will be used to inform the goals, policies, and actions that will be included in the Safety Element.

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Glossary

Adaptation: Making changes in response to current or future conditions (such as the increased frequency and intensity of climate-related hazards), usually to reduce harm and to take advantage of new opportunities. [44, 45]

Adaptive Capacity: The combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities. [46]

Cascading or Compounding Effects: Extreme events that link together hazards over days, weeks, or months, resulting in multiplied effects that cause secondary and sometimes tertiary damage, exceeding the damage of the initial hazard event.

Climate Change: A change in the state of the climate that can be identified by changes in the mean, and/or the variability, of its properties, and that persists for an extended period, typically decades or longer.

Community Asset: A valued feature of a community that may be harmed by climate change. Community assets may include buildings, infrastructure, community services, ecosystems, and economic drivers.

Exposure: The presence of people; infrastructure; natural systems; and economic, cultural, and social resources in areas that are subject to harm. [47]

Goal: An ideal future end state related to public health, safety, or general welfare.

Hazard: An event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, damage to the environment, interruption of business, or other types of harm or loss. [48]

Impact: The effects (especially the negative effects) of a hazard or other conditions associated with climate change.

Policy: A specific statement that guides decision making, indicating a commitment of the local legislative body to a particular course of action.

Program: An action, procedure, program, or technique that carries out a General Plan policy.

Resilience: The capacity of any entity—an individual, a community, an organization, or a natural system—to prepare for disruptions, to recover from shocks and stresses, and to adapt and change from a disruptive experience. Community resilience is the ability of communities to withstand, recover, and to learn from past disasters to strengthen future response and recovery efforts.

Risk: The potential for damage or loss created by the interaction of hazards with assets such as buildings, infrastructure, or natural and cultural resources.

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Vulnerability: The degree to which natural, built, and human systems are susceptible to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt. [49]

Vulnerability Assessment: An analysis of how a changing climate may harm a community and which elements—people, buildings and structures, resources, and other assets—are most vulnerable to its effects based on an assessment of exposure, sensitivity, potential impact(s), and the community's adaptive capacity.

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Appendix A: Methods

The Vulnerability Assessment considers the threats from relevant natural *hazards* related to climate change, which are events or physical conditions that have the potential to cause harm or loss and will emphasize changes to hazard frequency and severity due to climate change. The Safety Element update addresses all relevant natural and human caused hazards, such as seismic hazards and hazardous materials. However, these hazards are not included in the Vulnerability Assessment, as climate change does not substantially change their frequency or severity.

The Vulnerability Assessment also assesses *populations* and *assets* facing potential harm from the hazards. This includes the risk of physical damage to buildings and infrastructure, social vulnerability of persons likely to be disproportionately harmed by hazards, potential disruption to the city's economic engines, and loss of important services.

The Vulnerability Assessment is based on accurate and up-to-date information, including the Cal-Adapt database, the *California Adaptation Planning Guide (2020)*, and the *San Mateo County Multijurisdictional Local Hazard Mitigation Plan* (2021). As outlined in the *California Adaptation Planning Guide*, the Vulnerability Assessment follows a four-step process:

1. **Identify Exposure.** In a vulnerability assessment, *exposure* is the presence of people, infrastructure, natural systems, and resources (economic, cultural, and social) in areas subject to harm. A *hazard*, in this context also called a climate change hazard, is an event or physical condition that has the potential to cause types of harm or loss. This step includes confirming applicable hazards in the county, describing historical hazards, describing how hazards are expected to change, and mapping the hazard-prone areas. The creation and review of this memo is part of this step of the Vulnerability Assessment.
2. **Analyze Sensitivity and Potential Impacts**. *Sensitivity* is the level to which changing climate conditions affect a population or community, species, natural system, government, asset, or resource. Potential *impacts* are the effects of a climate change hazard, the combination of exposure to the hazard and sensitivity of the population or asset to it. For example, suppose an increase in extreme heat events is the hazard. In that case, the greater risk of heat-related illness in susceptible persons is the exposure, and the sensitivity is the degree of the impact from the exposure. Each population and asset in San Mateo County is likely to experience different impacts. The project team will assess the sensitivities and potential impacts to each population or asset from each applicable climate change hazard.
3. **Evaluate Adaptive Capacity.** *Adaptive capacity* is the ability of people and assets to adjust to potential damage from climate change hazards, to take advantage of existing resources and opportunities such as funding or tools, and to respond to the impacts of climate change. The project team will assess the adaptive capacity of each population and asset for each applicable identified hazard. The County is already implementing several measures to increase adaptive capacity including the Municipal Code requirements,

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Capital Improvement Program, Climate Action Plan, and others listed in the Adaptive Capacity Resources section, below.

4. **Conduct Vulnerability Scoring**. *Vulnerability* is defined as the combination of impact and adaptive capacity as affected by the level of exposure to changing climate conditions. Following the process in the *California Adaptation Planning Guide*, the project team will score impact and adaptive capacity for each population and asset affected by each hazard on a scale of low, medium, and high, to identify vulnerability on a scale of one to five and prioritize the most vulnerable populations and assets in San Mateo County.

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Appendix B: Populations and Assets

The County included the following populations and other assets in the Vulnerability Assessment. Each list includes a description and source of data needed to support the Vulnerability Assessment.

Populations

The County collected population data from the U.S. Census (American Community Survey and Decennial Census), the California Healthy Places Index, and the San Mateo County Homeless Point in Time Count. These 19 populations, informed by the California Executive Order B-30-15 Resiliency Guidebook: Vulnerable Populations, are:

1. Children (under 18).
2. Cost-burdened/low-income/households in poverty. Cost-burdened households are those paying 30% or more of their income towards housing expenses. Approximately 33 percent of households in the unincorporated County are cost-burdened. The State identifies $149,100 as the low-income threshold for a household of four people in San Mateo County in 2023. The federal poverty line for a household of four is $31,200 a year. However, in San Mateo County, the acutely low poverty line is even lower, which is $26,250 for a household of four. Approximately 6 percent of people in the unincorporated County are below the poverty line.
3. Overcrowded households. Overcrowded households include housing units that have more than 1.0 persons or more per room (excluding bathrooms and kitchens). Approximately 7 percent of households in the unincorporated County are overcrowded.
4. Immigrant communities/linguistically isolated persons. Communities consisting of foreign-born populations, including refugees, undocumented persons, and other immigrants. Linguistically isolated persons include households without a member who is fluent in English. Spanish, Chinese, and Tagalog are the primary languages in San Mateo among households that are not fluent in English.
5. Low-resourced people of color: Persons identifying as a member of a racial and/or ethnic group and facing limited access to resources, such as financial, social, healthcare, or educational assistance.
6. Outdoor workers: workers in agriculture, landscaping, construction, outdoor recreation, etc.
7. Persons experiencing homelessness: 2022 Point In Time count reported 105 total persons experiencing homelessness (all unsheltered) within unincorporated San Mateo County.
8. Persons living in areas with more impervious surfaces and/or less tree canopy.
9. Persons living in congregate settings (residential facilities such as skilled nursing facilities, long-term care facilities, residential mental health and substance use treatment facilities, correctional facilities, etc.).

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10. Persons who are physically or socially isolated, e.g., living on single access roads (roads with only a single entry or exit point).
11. Persons with chronic physical or mental illnesses and/or disabilities. Approximately 7 percent of residents in the unincorporated County have a disability of some type, including hearing, vision, cognitive, ambulatory, self-care, or independent living disabilities.
12. Persons without a high school degree. Approximately 12 percent of unincorporated County residents at least 25 years old do not have a high school degree.
13. Persons without access to life-supporting resources: Persons without reliable access to a car, transit, communication systems, adequate housing, heating/cooling, food, health insurance/healthcare. Approximately 2 percent of households in the unincorporated County lack access to a personal vehicle and approximately 6 percent of households in the unincorporated County do not have Internet access.
14. Pregnant persons.
15. Renters. Approximately 25 percent of unincorporated County households are rental households.
16. Older adults (65+). Approximately 17 percent of unincorporated County residents are at least 65 years of age.
17. Older adults living alone. Approximately 16 percent of senior citizens in the unincorporated County live alone.
18. College students. Approximately 7 percent of unincorporated County residents are enrolled in college, including those in graduate or professional schools.
19. Unemployed persons. As of September 2023, the unemployment rate in San Mateo County was 3.2 percent.

Infrastructure

The County gathered details on infrastructure from state and local GIS data, and the *2021 San Mateo County Multijurisdictional Local Hazard Mitigation Plan*. These 13 asset groups are:

1. Airports: San Francisco International Airport, Half Moon Bay Airport, San Carlos Airport.
2. Bicycling and pedestrian trails.
3. Bridges (as mapped by the California Office of Emergency Service and the California Department of Transportation).
4. Energy and communication infrastructure:
    - Transmission Lines: Pacific Gas & Electric (PG&E).
    - Natural gas pipelines and structures: PG&E.
    - Cell towers, radio sites, fiber optic lines, and internet lines.
5. Dams/Reservoirs:
    - Dams with potential to endanger lives and property in the county (LHMP): Bear Gulch, Emerald Lake 1 Lower, Felt Lake, Lower Crystal Spring, Pilarcitos, San Andreas, Searsville, Spencer Lake, Coastways, Crocker, Laurel Creek, Notre Dame,

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Pomponio Ranch, as well as any relevant dams located outside of San Mateo County.
    - Other dams within San Mateo County (Division of Safety of Dams): Bean Hollow #2, Bean Hollow #3, Canada Road, Green Oaks #1, Johnston, Lake Lucerne, Marina Lagoon, Rickey.
6. Flood control and stormwater infrastructure:
    - Concrete lined channels.
    - Culverts.
    - Levees.
7. Vehicle fuel stations:
    - Electric vehicle charging stations.
    - Gas stations.
8. Evacuation routes
9. Hazardous materials sites: Four sites (none with active cleanup activities) identified in the Department of Toxic Substances Control's EnviroStor database; 42 sites (one with active cleanup or evaluation activities) identified in the State Water Control Board's Geotracker database.
10. Transportation infrastructure:
    - Freeways and Highways: US Route 101, Highway 1, Interstate 280, Interstate 380, State Route 35, State Route 82, State Route 84, State Route 92, State Route 109, State Route 114.
    - County roads
    - Transit facilities: stops and other facilities provided by SamTrans and BART.
    - Railways: Caltrain (Peninsula Corridor), Union Pacific Railway.
11. Parks, recreational facilities, and open space:
    - County Parks: Coyote Point Marina, Coyote Point Recreation Area, Crystal Springs Regional Trail, Flood Park, Friendship Park, Huddart Park, Junipero Serra Park, Memorial Park, Mirada Surf, Moss Beach Park, Pescadero Creek Park, Pillar Point Bluff, Quarry Park, Sam McDonald Park, San Pedro Valley Park, Sanchez Adobe, Tunitas Creek Beach, Woodside Store, Wunderlich Park, Edgewood Park & Natural Preserve, Fitzgerald Marine Reserve, Devil's Slide Trail, Pigeon Point Park, Cowell Purisima Trail,.
    - State Parks: San Bruno Mountain State & County Park, Thornton State Beach, Pacifica State Beach, Grey Whale Cove State Beach, McNee Ranch, Montara State Beach, Half Moon Bay State Beaches, San Gregorio State Beach, South Coast Beaches, Pomponio State Beach, Pescadero State Beach, Portola State Park, Bean Hollow State Beach, Butano State Park, Gazos Creek Fishing Access, Ano Nuevo State Reserve, Montara and Pigeon Point Youth Hostels.
    - Open Space Preserves: San Mateo County Baylands, Thornewood, Windy Hill, Coal Creek, Russian Ridge, Los Trancos (portion of), Skyline Ridge (portion of),

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Long Ridge, Edgewood Park, Montebello (portion of), La Honda Creek, Hassler, Purisima Creek Redwoods.
- Trail Areas

12. Solid waste facilities and closed landfills (as mapped by CalRecycle).
13. Water and wastewater infrastructure: Potable water systems (CSA 7 and CSA 11) managed by the County, South San Francisco/San Bruno Water Quality Control Plant, San Francisco International Airport Water Quality Control Plant, City of Millbrae Water Quality Control Plant, City of San Mateo Water Quality Control Plant, South Bayside System Authority Wastewater Treatment Plant, Mid-Coastside Sewer Authority Wastewater Treatment Plant, private wells, septic systems, gravity sewers, lower laterals, force mains, lift stations, pump stations, storm drains, creeks, pipes, water storage tanks and reservoirs (including Hetch Hetchy, Calaveras, San Antonio, Crystal Springs, Pilarcitos, and San Andreas reservoirs).

Buildings

The County collected buildings data from Google Maps, the California School Database, and local agency websites and GIS records. These nine assets are:

1. Community centers and libraries (includes facilities in incorporated areas that also serve unincorporated communities)
2. Commercial centers (includes facilities in incorporated areas that also serve unincorporated communities)
3. Congregate Settings: Residential facilities such as skilled nursing facilities, long-term care facilities, residential mental health and substance use treatment facilities, correctional facilities, etc.
4. County government buildings: San Mateo County Government Center, San Mateo County Superior Court, and San Mateo County Health Department.
5. Historic buildings and museums
6. Homes and residential structures: Multi-family and single-family residences.
7. Medical and care facilities: Kaiser Permanente, Mills-Peninsula Health Services, San Mateo Medical Center and clinics, Sequoia Hospital, Seton Medical Center.
8. Public safety buildings: San Mateo County Fire Department, San Mateo County Sheriff's Office.
9. Schools: Public and private elementary, junior high/middle, and high schools, and colleges.

Economic Drivers

The County determined important economic assets based on the 2022 Comprehensive Annual Financial Report and land uses within the county. These eight assets are:

1. Major employers: Meta (Facebook Inc.), Genentech Inc., Oracle Corp., United Airlines, County of San Mateo, Gilead Sciences Inc., YouTube, Sony Interactive Entertainment, Alaska Airlines,

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Electronic Arts Inc., Visa USA/VISA International, Kaiser Permanente, Mills-Peninsula Health Services, Safeway Inc.

2. Technology, research, and development.
3. Healthcare and life sciences.
4. Finance.
5. Government administration.
6. San Francisco International Airport.
7. Outdoor recreation.
8. Education services.

Ecosystems and Natural Resources

The County determined the ecosystems and natural resources based on information from the San Mateo County General Plan (Appendix A: Vegetative Communities). These 11 are:

1. Coastal shoreline: Coastal shoreline vegetation grows in loose sand above the high tide line and can be found on sandy beaches, dunes, and cliffs along the San Mateo County coastline.
2. Coastal marine: Coastal marine vegetation thrives within shallow offshore waters, intertidal, and subtidal areas.
3. Salt marsh: Salt marsh vegetation is found in the saltwater marshes along the tideland margin of San Francisco Bay and in Pescadero Marsh.
4. Freshwater marsh: Freshwater marsh vegetation grows along the edges of reservoirs, lakes, ponds, and streams and in freshwater marshes. In San Mateo County, freshwater marshes are located at Pillar Point, near the mouths of the San Gregorio and Pescadero Creeks, and adjacent to Pilarcitos Lake, Crystal Springs Reservoir and other man-made reservoirs.
5. Coastal scrub:
    - Northern coastal scrub: Northern coastal scrub vegetation is generally found along the coastal area of the County.
    - Coastal sage scrub: Coastal sage scrub vegetation is found on the drier coastal bluffs and hills adjacent to chaparral vegetation.
6. Chaparral: Chaparral vegetation is located primarily on the dry eastern slopes and ridges and steep, south-facing slopes in San Mateo County.
7. Grassland: Grassland vegetation in San Mateo County is found on the eastern side of the Santa Cruz Mountains, on the tops of some ridges, and often adjacent to chaparral vegetation.
8. Woodland-Savanna: Woodland-savanna vegetation is found in San Mateo County in the eastern foothills and along valley borders from Crystal Springs Reservoir southward.
9. Mixed evergreen: Mixed evergreen forest vegetation generally occurs along the drier inland margins of the coniferous forests and at higher elevations within the forests.
10. Coniferous forest: In San Mateo County, the coniferous forests are dense, with trees up to 350 feet tall, and occur predominantly on the wetter, seaward slopes of the Santa Cruz Mountains.

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11. Streambank: While vegetation along small streams is usually representative of the vegetation found in the surrounding areas, vegetation along larger streams, especially near the lower stream courses, commonly consists of certain water-loving plants.

Key Services

These assets are based on typical services provided in cities throughout California, which are supported by the infrastructure and buildings listed above. Key community services include the operation and functions needed to provide and maintain services. The Vulnerability Assessment assesses the infrastructure and people needed to support them separately. These nine services are:

1. Education services: various school districts and universities.
2. Emergency medical response: San Mateo County Emergency Medical Services Agency.
3. Energy delivery and communication services: Peninsula Clean Energy, PG&E, radio, television, cellular and landline phone, and internet.
4. Government administration and community services.
5. Emergency resources: Cooling centers at County and local libraries, and community resilience hubs.
6. Public safety response: San Mateo County Department of Public Works, Community Emergency Response Team and San Mateo County Sheriff Office. San Mateo County Fire Department, San Mateo County Department of Emergency Management, San Mateo Operational Area Emergency Services Council.
7. Public transit access: SamTrans, Caltrain, BART.
8. Solid waste removal: South San Francisco Scavenger Company, Recology, Green Waste Recovery Inc., Ox Mountain Landfill, Recology San Bruno, Recology San Mateo County, Recology of the Coast, Republic Services, South San Francisco Scavenger Company Inc.
9. Water and wastewater treatment, delivery, and collection:
    - San Francisco Public Utilities Commission, Cal Water, Mid-Peninsula Water District and San Mateo County Department of Public Works. The San Mateo County Department of Public Works operates and maintains ten sanitary sewer districts in the various areas of the County including: Burlingame Hills Sewer Maintenance District, Crystal Springs County Sanitation District, Devonshire County Sanitation District, Edgewood Sewer Maintenance District, Emerald Lake Heights Sewer Maintenance District, Fair Oaks Sewer Maintenance District, Harbor Industrial Sewer Maintenance District, Kensington Square Sewer Maintenance District, Oak Knoll Sewer Maintenance District, Scenic Heights County Sanitation District. The County does not operate treatment plants. The County has two water service areas that provide residents and businesses, in the communities that they serve, with adequate and reliable supplies of high-quality water to meet present and future needs; the County Public Works Department oversees County CSA 7 and CSA 11.

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