ENINSULA RESILIENCE PLANNING PROJECT

BELMONT
VULNERABILITY ASSESSMENT SUMMARY

May 2025

Public Draft

Prepared for:

City of San Bruno
1 Twin Pines Ln
Belmont, CA 94022
650.616.7058

Prepared by:

PlaceWorks
2040 Bancroft Way, Suite 400
Berkeley, CA 94704
650.595.7414

Table of Contents

TABLE

FIGURES

Introduction

There are nine jurisdictions in San Mateo County working collaboratively on the Peninsula Resilience Planning (PREP) project: San Mateo 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 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).

Source: Governor's Office of Planning and Research. 2017. *State of California General Plan Guidelines*.

As a participant in PREP, Belmont 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 a Vulnerability Assessment to analyze how climate-related hazards may harm the community. California law requires that, as part of the need to assess and protect against hazards, safety elements analyze 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, City 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 Vulnerability Assessment identifies City and community resources to improve resiliency in Belmont in an integrated, thorough, and tailored way. The Vulnerability Assessment also informs updates to the Safety Element, which, in combination with the San Mateo County Multijurisdictional Local Hazard Mitigation Plan (LHMP), will help safeguard Belmont 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 in Belmont'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.

Community Profile

Belmont is in San Mateo County between San Francisco and San Jose. Belmont is a diverse community with a mix of single-family and multifamily residential neighborhoods, as well as open spaces, parks, and both commercial and industrial areas. Residential areas are primarily west of El Camino Real in Belmont's hillsides and are mostly low-density, single-family homes. Commercial and industrial areas are mostly concentrated east of and along El Camino Real. The area around the intersection of El Camino Real and Ralston Avenue, known as Belmont Village, serves as the city's town center and features a mix of commercial, office, public, and residential uses. Additional mixed-use areas are found along El Camino Real, both north and south of Belmont Village as well as near the Carlmont Shopping Center area along Ralston Avenue. Belmont has extensive open spaces and parks, primarily west of Alameda de las Pulgas. Parks and open spaces cover about 380 acres in Belmont, mostly in the hills. The natural habitats in Belmont are diverse, ranging from oak woodlands and shrub-dominated habitats in the western hills to herbaceous and aquatic habitats, including salt marshes, in eastern Belmont.

The city extends from the San Mateo foothills to the San Francisco Bay, with marshlands and sloughs to the east and hilly terrain rising to over 800 feet in the west. Major routes include El Camino Real, Alameda de las Pulgas, and Caltrain in the north-south direction, with Ralston Avenue providing east-west connectivity.

Belmont's community demographics exhibit several distinct differences when compared to San Mateo County. With a population of approximately 27,820, Belmont has a greater proportion of children, with 23 percent of residents under the age of 18, compared to 20 percent countywide. In contrast, the proportion of older adults in Belmont is lower, with 14 percent of residents aged 65 and older, compared to 17 percent in the county.

Belmont also has a lower proportion of residents who are linguistically isolated relative to the broader county. Only about 8 percent of Belmont residents are considered linguistically isolated, significantly lower than the county average of 16 percent. Belmont has a slightly higher poverty rate (7 percent) compared to the county rate of 6 percent. However, Belmont's median household income is substantially higher, at $185,944 versus $175,000 for the county. Furthermore, 31 percent of Belmont households are considered cost-burdened, meaning they spend a significant portion of their income on housing.

In terms of transportation and housing characteristics, 6 percent of Belmont households do not have access to a vehicle. The rate of overcrowded households in Belmont is also lower than the county, at 4 percent compared to 7 percent countywide. Additionally, Belmont has a slightly higher proportion of rental households, with 43 percent compared to the county average of 40 percent. **Table 1** shows community demographics in Belmont compared to all of San Mateo County.

Table 1: Community Demographics for Belmont and San Mateo County

Demographic	Belmont		San Mateo County	
	Number	Percentage	Number	Percentage
Population	27,820		754,250	
Children (under 18 years old)	6,389	23.00%	150,187	19.90%
Linguistically isolated persons	1,993	7.60%	116,306	16.30%
Older adults (65 years and older)	3,920	14.10%	127,520	16.90%
Persons with disabilities	2,230	8.10%	65,466	8.70%
Persons working outdoors	1,328	4.90%	41,748	5.44%
Persons in poverty	1,886	6.90%	48,137	6.40%
Unhoused persons	13	-	1,092	-
Number of households	10,811		264,323	
Median household income	$185,944	-	$175,000	-
Cost-burdened households	3,309	31.35%	94,625	36.55%
Households without access to internet	618	5.70%	14,371	5.40%
Households without a vehicle	693	6.40%	14,752	5.58%
Overcrowded households	387	3.58%	19,366	7.33%
Rental households	4,689	43.37%	106,955	40.46%

Source: American Community Survey, 2022, ACS 5-Year Estimates.

Climate Hazards

Climate change is the long-term shift in average weather patterns, including significant alterations in temperature, precipitation, and wind patterns over an extended period—typically decades or longer. Rising levels of carbon dioxide and other greenhouse gases in the atmosphere are the primary drivers of climate change, trapping heat and disrupting global climate systems. Rising global temperatures are causing more frequent and intense heatwaves, storms, floods, droughts, wildfires, and other hazards. These events are frequently concurrent, 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. These hazards are air quality and smoke, drought, extreme heat and warm nights, flooding, human health hazards, landslides sea level rise and groundwater emergence, severe weather, and wildfire.

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.*

Air Quality and Smoke

Air quality directly affects the health, well-being, and everyday quality of life for all residents of Belmont. Poor air quality poses significant health risks, such as respiratory and cardiovascular illness, and these concerns have become especially urgent due to the increasing frequency of wildfires in the region and other climate-related factors.[1] Air pollutants come from mobile sources such as cars and trucks, stationary sources like factories 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 (O_3) 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 our quality of life, and poor air quality leads to more health issues, strains healthcare, and restricts outdoor activities. Ensuring clean air is vital, especially for frontline communities.

Frontline Communities of Concern

A frontline community of concern refers to groups disproportionately impacted by environmental, social, or economic challenges. Often marginalized and with few resources available to them to help address these challenges, these communities face the most immediate effects of issues like climate change, pollution, and inequality. The term emphasizes the need for equitable solutions that prioritize those most affected.

Exposure to air pollutants, such as ozone and particulate matter, can lead to respiratory conditions, exacerbate asthma, and increase the risk of heart attacks, strokes, and certain types of cancer. [2] 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.[3] The Bay Area Air Quality Management District (BAAQMD) has played a key role in monitoring and improving air quality throughout the region, resulting in

Bay Area Air Quality Management District Programs

The **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.

notable progress even as population, traffic, and industrial activities have grown.[4] Despite these efforts, air quality hazards remain a persistent threat in the region.[5]

Wildfire smoke has become an increasingly significant concern for air quality in Belmont and the broader region. Wildfire smoke contains a complex mix of gases and fine particulate matter, especially fine particulate matter, consisting of tiny particles that can penetrate deeply into lung tissue and impact cardiovascular health.[6] The health risks associated with wildfire smoke are particularly severe for frontline 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.[7] The frequency of wildfires has been rising across California, driven by hotter and drier conditions associated with climate change and resulting in more frequent exposure to hazardous air quality conditions for many residents and visitors.

Drought

A drought is where conditions are drier than normal for an extended period, making less water available for people and ecosystems. Drought is part of a normal climate cycle in California, but prolonged drought conditions can harm ecosystems and the regional economy. Though droughts do not typically cause direct loss of life or structural damage, they can lead to critical environmental and economic harm, including higher water costs, habitat degradation, and heightened wildfire risks. Water demands, such as for (or due to) population growth and irrigation, exacerbate these impacts, complicating water allocation and potentially leading to restrictions and water quality issues.

Decreased groundwater negatively impacts stream flows, particularly in summer. Prolonged drought conditions also increase wildfire susceptibility due to drier vegetation, particularly in the western portion of the city.

Climate change is likely to result in more frequent and severe droughts across the state. Overall, precipitation levels are expected to increase slightly in Belmont, from a historical annual average (as measured between 1961 and 1990) of 22.5 to 25.1 inches by midcentury (2035 to 2064) and 27.6 inches by late century (2070 to 2099). However, more years with extreme levels

Water Delivery in Belmont

The City of Belmont receives its water from the Mid-Peninsula Water District via the San Francisco Public Utilities Commission. Most of the water supply is drawn from the Sierra Nevada through the Hetch Hetchy Regional System. Approximately 85 percent of the Hetch Hetchy Regional Water System's water supply comes from Sierra Nevada snowmelt stored in the Hetch Hetchy reservoir on the Tuolumne River in Yosemite National Park. The remaining 15 percent of water comes from runoff in the Alameda and Peninsula watersheds. This local water is captured in reservoirs in San Mateo and Alameda Counties. Delivering approximately 260 million gallons of water per day, 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.

of precipitation, both high and low, are likely as a result of climate change. Reduced winter precipitation levels and warmer temperatures have greatly decreased the size of the Sierra Nevada snowpack (the volume of accumulated snow), which in turn makes less fresh water available for communities throughout California.[8] More intense droughts are expected to harden soil and cause aquifer levels to drop due to reduced groundwater recharge. When rains return, more water may run off rather than infiltrate into soils, potentially causing downstream flooding. Higher temperatures are expected to further increase evaporation, worsening drought conditions.

OneWatershed: Building Regional Climate Resilience

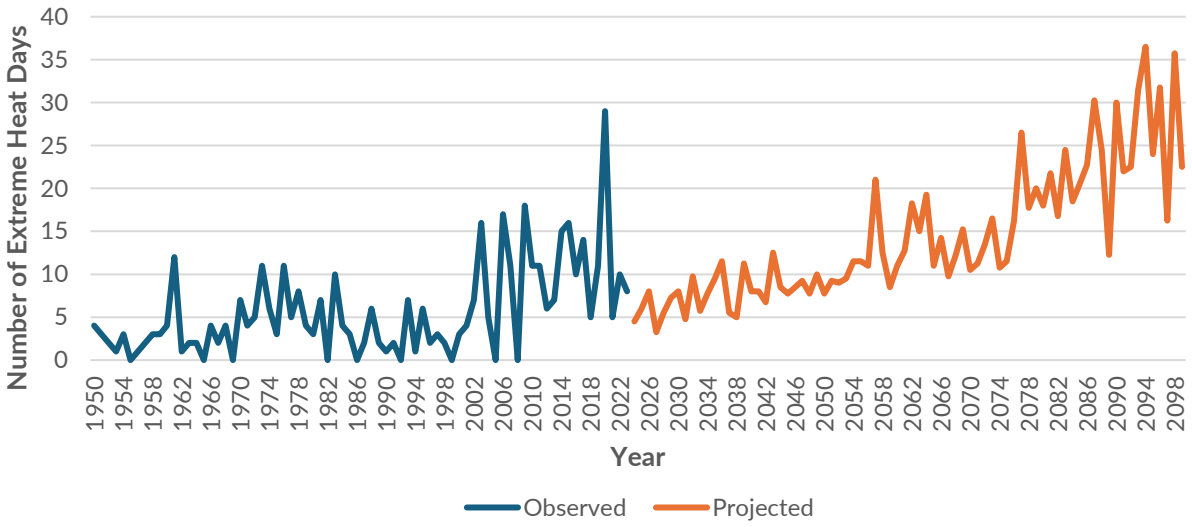
OneWatershed is a comprehensive framework that addresses the shared risks of climate change to water infrastructure and resources across San Mateo County, including stormwater, wastewater, and drinking water systems. This innovative approach emphasizes building adaptive capacity for climate impacts, 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.

Extreme Heat and Warm Nights

Extreme heat is a growing concern for Belmont, with increasing impacts to public health, infrastructure, and the environment. 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. Extended periods of extreme heat, known as heat waves, threaten community safety, drive up energy costs, and exacerbate the risks of wildfire and water shortages. An extreme heat day in Belmont is one where the maximum temperature exceeds 91.6 degrees Fahrenheit. As shown in **Figure 1,**[*] climate change is expected to increase extreme heat days in the city from a historic annual average of 4 days per year to 11 days per year by midcentury (2035 to 2064) and 21 days per year by late century (2070 to 2099).[9]

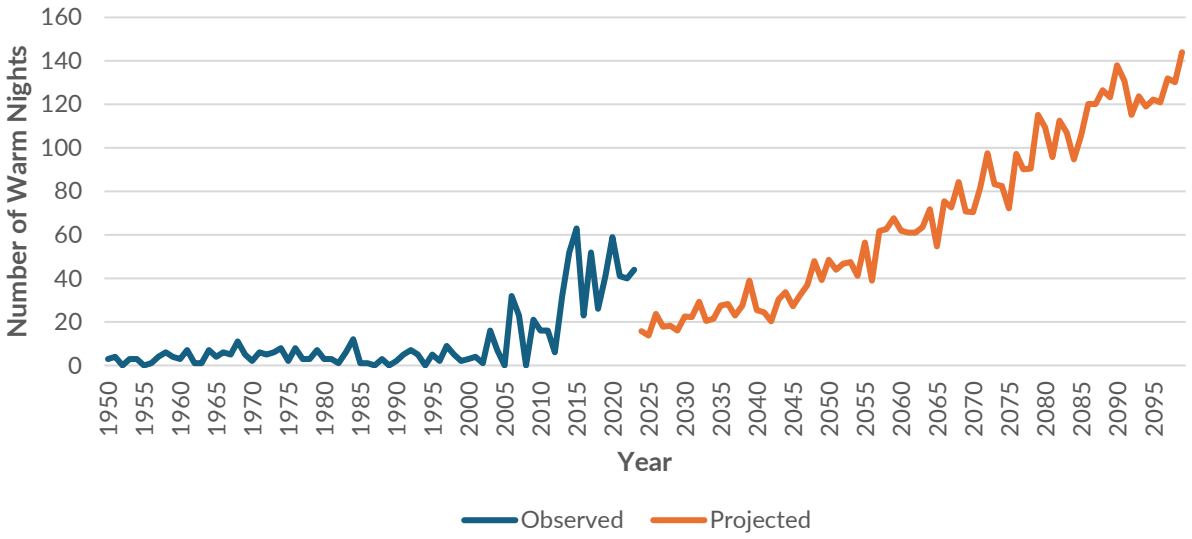
[*] The Cal-Adapt database at time of writing uses Representative Concentration Pathways (RCPs) to project future conditions. The projections listed in this report use RCP 8.5, which assumes global emissions continue to increase at least until the end of century, which is consistent with the International Panel on Climate Change Sixth Assessment Report.
† Figures 1 and 2 use observed data from the Cal-Adapt database, which provides data from 1950 to 2005, the nearest National Weather Service weather stations, which provides data from 2006 to 2023, and projected data from the Cal-adapt database, which provides data from 2024 to 2099. Due to the different database sources, the observed and projected data may not match.

Figure 1. Observed and Projected Extreme Heat Days in Belmont †



When the daily minimum temperatures remain significantly above normal, warm nights can worsen an extreme heat day because overnight temperatures don't get low enough to provide the community with any relief from high temperatures. A warm night is when temperatures remain above 58.5 degrees in Belmont. As shown in **Figure 2**, warm nights are projected to increase from a historic 6 nights per year to 43 nights per year by midcentury and 109 nights per year by late century.[10]

Figure 2. Observed and Projected Warm Nights in Belmont



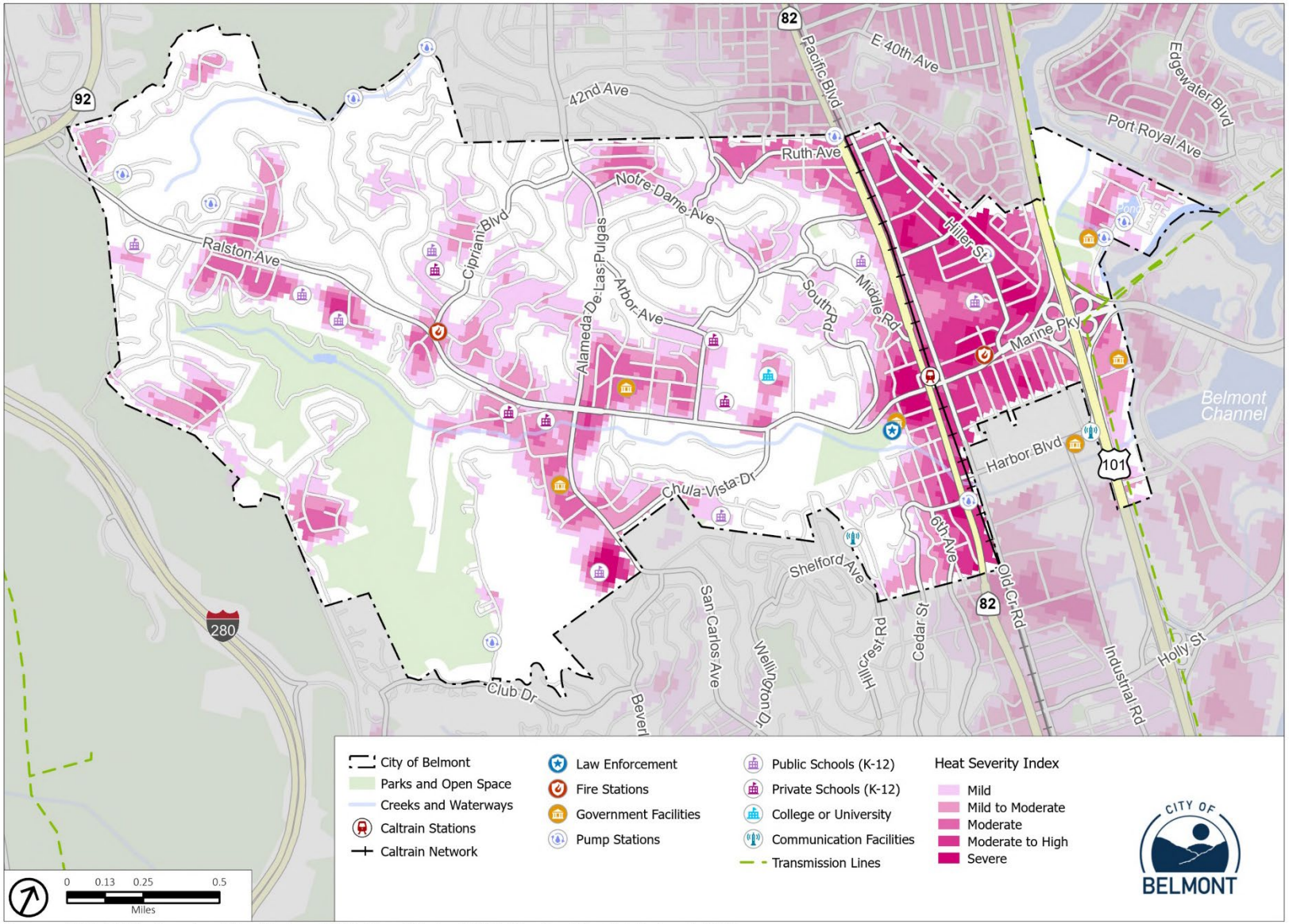
Extreme heat is one of the deadliest climate-related hazards nationwide; the Center for Disease Control and Prevention noted a rise in heat-related deaths—from 297 in 2004 to over 2,300 in

2023.[11, 12] These numbers are likely a significant undercount, as they do not include deaths caused by other factors that are exacerbated by extreme heat. The rising frequency and intensity of extreme heat events pose significant public health concerns, especially in areas such as Belmont 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 can exacerbate extreme heat impacts in densely populated areas, especially those that have limited tree canopy. **Figure 3** shows the areas of Belmont that may experience higher temperatures on extreme heat days due to limited shade cover and presence of heat-absorbing materials. Areas most at risk include Downtown Belmont and areas along El Camino Real, neighborhoods along Ralston Avenue, Crystal Springs Uplands School, Fox Elementary School, Merry Moppet Preschool & Belmont Oaks Academy, Serendipity School, Carlmont High School, Ralston Middle School, Immaculate Heart of Mary School, and Belmont Heights.

Even slight increases in temperature can overwhelm a community's adaptive capacity, straining public health systems and infrastructure. This leads to higher risks of dehydration, heat-related illnesses, and respiratory issues, disrupting daily life and economic activity.[13] Extreme heat stresses infrastructure, as higher demand for air conditioning can overload the power grid and cause outages, and very high heat can degrade transportation systems leading to delays and damage. Rising temperatures also harm local ecosystems by increasing water temperatures in local lakes and streams, harming fish and plant species.

Hallmark Park in Belmont. Source: City of Belmont

Figure 3. Heat Severity Index in Belmont



Source: ESRI, 2023; County of San Mateo, 2023; PlaceWorks, 2023; The Trust for Public Land, 2019

Flooding

Flooding occurs when water surpasses the capacity of local water bodies to contain it, creeks and rivers to carry it, or soil to absorb it, which is a significant concern for Belmont. 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 serving the city. Standing water can weaken structural foundations, damage electrical and communication 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 ecosystems more vulnerable. 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 increased home insurance costs.

Floodplains and Flood Recurrence

According to the Federal Emergency Management Agency (FEMA), 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.

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.

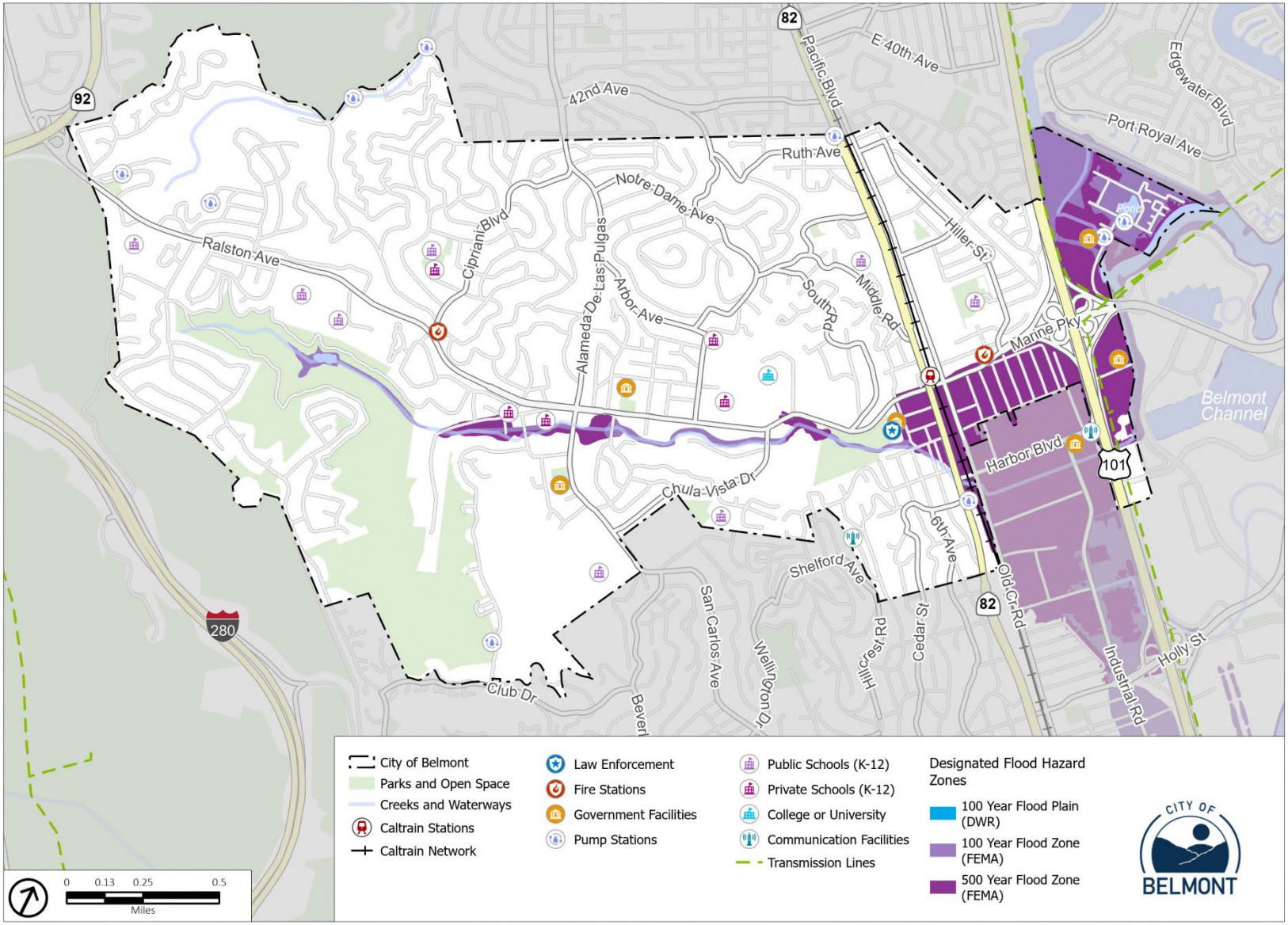
Floods are among the most damaging natural hazards in Belmont, and climate change is expected to make flood events worse due to fewer yet more intense precipitation events, in the form of atmospheric rivers.[14] For example, what is currently a 200-year storm, or one that has a 1 in 200 chance of occurring each year, by 2100 could increase in frequency by 40 to 50 years (to a 1 in 150/160 chance each year).[15] 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 rainfall does return, more water runs off the surface than is absorbed into the ground, which can increase flooding downstream.

As shown in **Figure 4** and on the online PREP Map Viewer, several areas in Belmont fall within the 100-year Flood Zones. In southwestern Belmont, a 100-year flood zone is near Waterdog Lake and generally runs the length of Belmont Creek down to El Camino Real. East of US

Highway 101, 100-year flood zone areas include the O'Neill Slough and marshland, including parcels with offices and residential development. The lower sections of Belmont Creek have experienced multiple flooding incidents during extreme winter events. The lower, flatter segment of Belmont Creek, which runs through the Harbor Industrial Area in Belmont's sphere of influence, is prone to flooding during rain events. To address these issues, the Belmont Creek Stormwater Detention and Creek Restoration Project, scheduled for 2025-2027, aims to mitigate downstream flooding, particularly along the reach of Twin Pines Park. The project is a joint effort with the City of Belmont, the City of San Carlos, San Mateo County, and OneShoreline. Flooding also occurs outside of these mapped floodplains, especially in low-lying areas with inadequate drainage. Floodplain areas near the bay shoreline are likely to expand as sea level rises and the tide regularly moves farther inland. There is also the risk of flooding in industrial and commercial areas, which could cause the movement of pollution and hazardous materials through the soil and groundwater.

Belmont Sports Complex and Conference Center near O'Neill Slough. Source: City of Belmont

Figure 4. Flood Hazard Zones in Belmont



Source: ESRI, 2023; County of San Mateo, 2023; PlaceWorks, 2023; FEMA; DWR, 2021

Human Health Hazards

Human health hazards, including bacteria, viruses, parasites, and other pathogens, pose significant concerns in Belmont. 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.[16] 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.[17]

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. The combination of these factors suggests that human health hazards may 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.

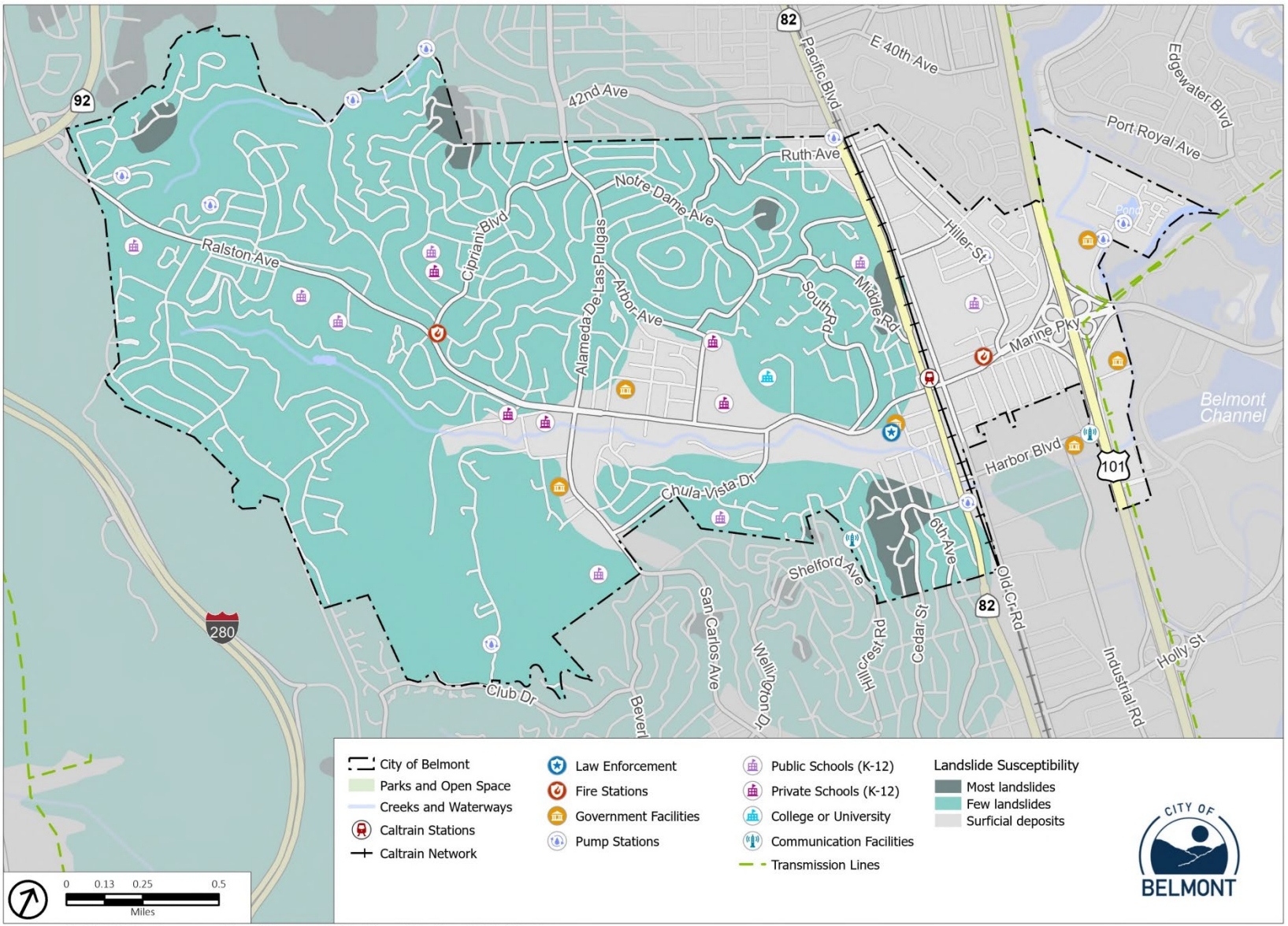
Landslides

A landslide, defined as the movement of rock, soil, or debris down a slope, is often triggered by natural events such as heavy rainfall. In Belmont, landslides commonly occur during or after intense rainfall, particularly in areas previously affected by wildfires where vegetation loss destabilizes slopes. Landslides can travel significant distances, accumulating debris and amplifying their destructive impact as they move downslope.

As shown in **Figure 5** and on the online PREP Map Viewer, western Belmont, especially in the Western Hills and specified locations identified in the San Juan Hills Area Plan, are in high landslide risk areas and most susceptible to landslide hazards. Additionally, there is a large landslide-prone area in southwest Belmont, specifically in the Sunnyslope neighborhood These high-risk areas have a history of landslide movements, making them susceptible to future events due to underlying geological conditions such as weak soil, fractured rock, or steep slopes. While heavy rainfall or seismic activity can increase the likelihood of landslides, even areas without a history of sliding can be at risk. Outside of the high-risk areas, moderately susceptible regions include areas adjacent to the Western Hills and Waterdog Lake. These areas experience fewer landslides. Low-risk areas are generally east of El Camino Real.

Although infrequent, small landslides in Belmont generally occur in the residential hills. Landslides pose the greatest geologic hazards to these hillsides. Despite varying levels of risk, the overall annual probability of landslides in the city remains high due to recurring conditions that contribute to slope instability.

Figure 5. Landslide Susceptibility Areas in Belmont



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

Climate change is expected to exacerbate landslide hazards by increasing frequency of wildfires and severe storms that can likely elevate the risk of landslides, particularly fast-moving debris flows. Wildfires remove stabilizing vegetation and alter soil properties, making slopes more vulnerable to erosion during and after subsequent storms. As the climate becomes drier, with occasional extreme rainfall events, the city is likely to experience more landslides and mudslides, as drier conditions can weaken the soil structure and kill vegetation that helps to stabilize slopes. Landslides can displace residents, block emergency routes, and damage critical infrastructure, disrupting daily life and requiring costly repairs.

Sea Level Rise and Emergent Groundwater

As global temperatures rise, glaciers and other polar ice melt, causing sea levels to rise. High average temperatures can also cause ocean water to expand, causing further rises in sea level. According to the 2024 California Ocean Protection Council's *State of California Sea Level Rise Guidance*, sea levels in Belmont 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 with storm surge, and King Tide events adding an additional 24 to 36 inches of temporary flooding that would move farther inland.[18] Belmont, and its buildings and infrastructure that line the shoreline, are already vulnerable to damage from shoreline flooding, which will increase as the sea levels rise and move farther inland.

As shown in **Figure 6**, and on the online PREP Map Viewer, sea level rise will cause temporary and/or permanent inundation risks in all areas of the city east of Highway 101, as well as some residential areas west of Highway 101. **Figure 6** illustrates the spatial data available through the Bay Conservation and Development Commission's Adapting to Rising Tides Initiative that is closest to the projections listed above, which ultimately shows a conservative estimate of sea level rise.

Emergent groundwater is a consequence of sea level rise. It occurs when freshwater is pushed upward by denser saline water that travels farther inland, causing temporary or permanent inundation.[19] 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.[20] Emergent groundwater is expected to rise at the same rate as sea level rise, causing groundwater to emerge at the surface in low-lying areas.[21]

As shown in **Figure 7**, and on the online PREP Map Viewer, by 2100, emergent groundwater will impact land east of Highway 101, including Belmont Sports Park, as well as some residential areas west of Highway 101.

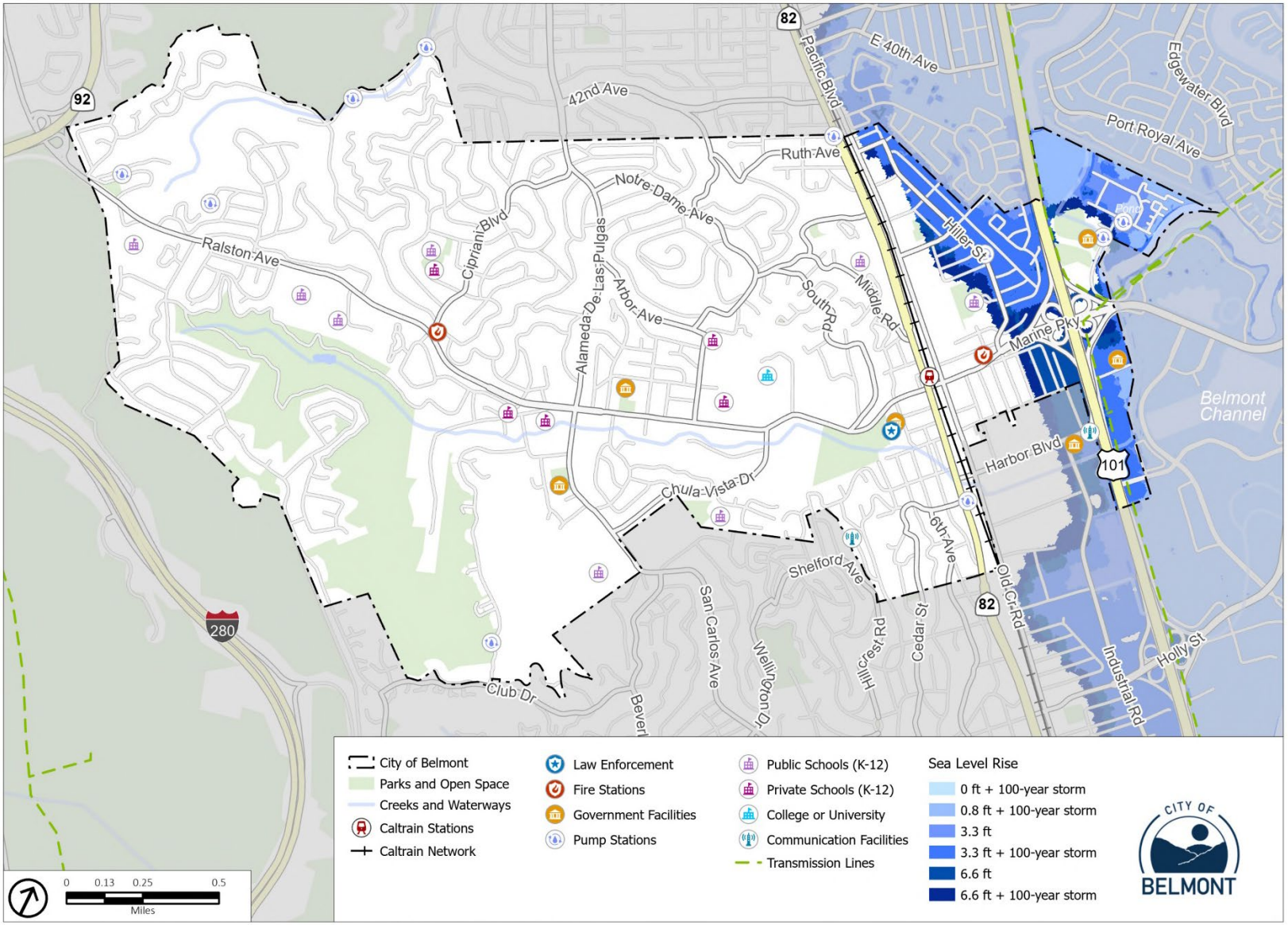
Liquefaction

Liquefaction occurs when water-saturated soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a puddinglike liquid. Building and foundations lose strength and may sink into what was previously solid ground. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people.

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 level farther inland. As sea levels rise and emergent groundwater increases, 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. Rising sea levels and emergent groundwater will interact directly with stormwater from inland sources, causing more severe flooding near creeks and at the outlets of drainage systems.

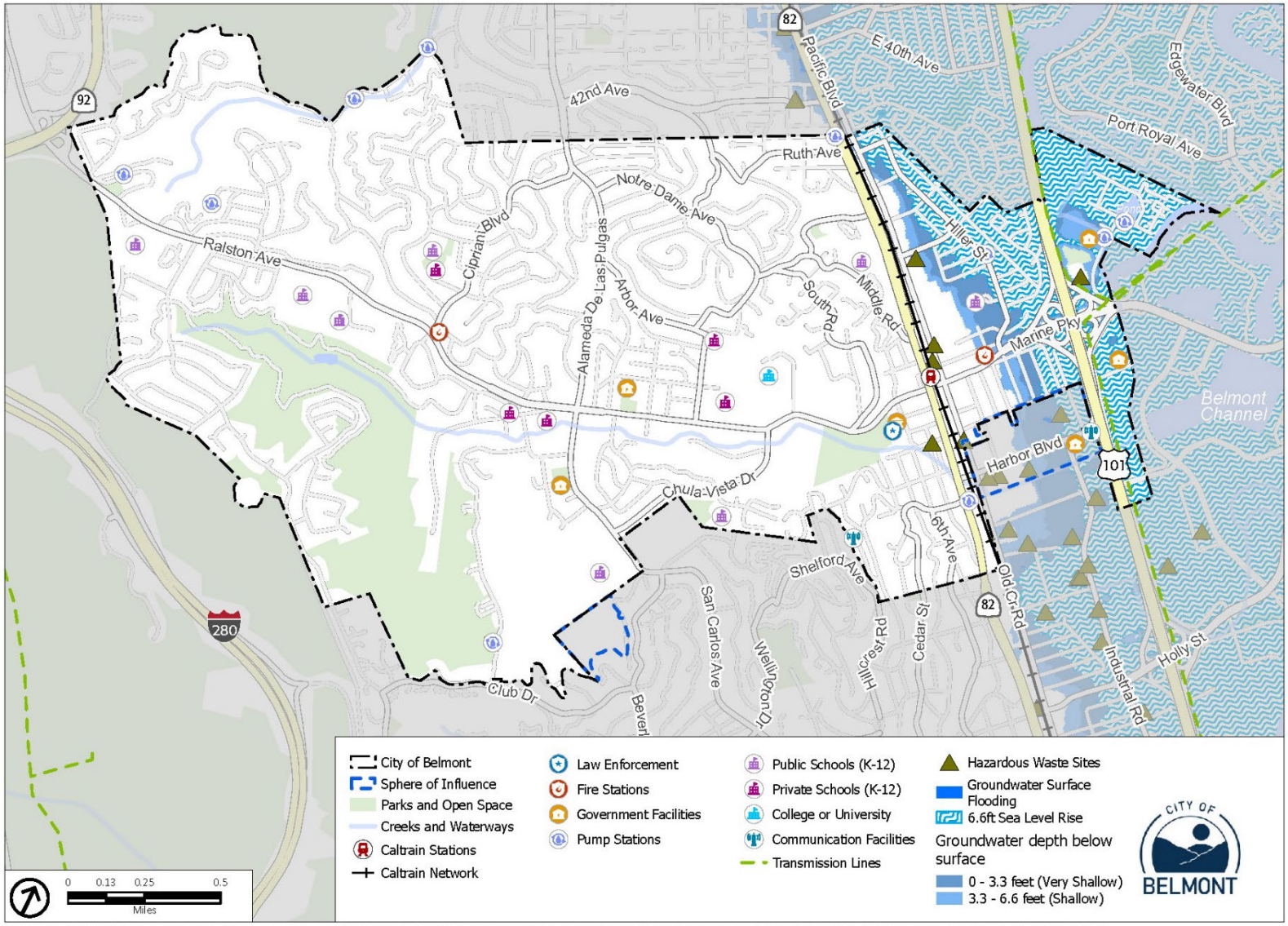
Belmont Caltrain Station. Source: City of Belmont

Figure 6. Sea Level Rise Projections in Belmont



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

Figure 7. Emergent Groundwater in 2100 in Belmont



Source: ESRI, 2023; County of San Mateo, 2023; PlaceWorks, 2023; California Office of Environmental Health Hazard Assessment, 2021; USGS, 2020
*Sphere of Influence is being considered for future annexation.

Severe Weather

Severe weather poses a significant threat to Belmont, disrupting daily life, compromising safety, and affecting infrastructure and ecosystems. The types of dangers posed by severe weather vary widely and may include injury or death, flooding (discussed more detail in the flooding section), landslides (discussed in more detail in the landslides section) damage to buildings and structures, fallen trees, roads blocked by debris, and fires sparked by lightning (discussed in more detail in the wildfire section). Severe weather, often caused by intense storms, can produce 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 can cause an explosion or fire. High wind events can also exacerbate the risk of wildfires in the region, which can harm local air quality in the city. The most common severe weather events that have historically impacted Belmont are heavy rains (usually a result of atmospheric rivers), thunderstorms, and windstorms.

While average annual rainfall may increase only slightly in Belmont, 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 high wind events. Utility companies like the Pacific Gas and Electric Company (PG&E) may shut off power lines during severe weather to prevent them from sparking fires causing power outages that may last for extended periods. Without 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 refrigeration to keep medications cool.

Wildfire

Wildfires pose a significant and growing threat to Belmont and the greater region. The city's Mediterranean climate, hilly topography, and diverse plant communities create ideal conditions for wildfire. 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 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. Wetter years, while seemingly beneficial, lead to increased vegetation growth, which subsequently dries out during drought periods, adding even more fuel to fire-prone landscapes. Ecosystem pest outbreaks 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.

Historically, an annual average of 31.1 acres burned in Belmont; however, this is projected to increase by over 100 percent to 72.1 acres by midcentury (2035 to 2064) and by 146 percent compared to historic levels to 76.5 acres by late century (2070 to 2099).[22] As this is an annual average, some years are likely to see little or no wildfires in the city, while other years are likely to see much larger fires.

San Mateo Consolidated Fire Department

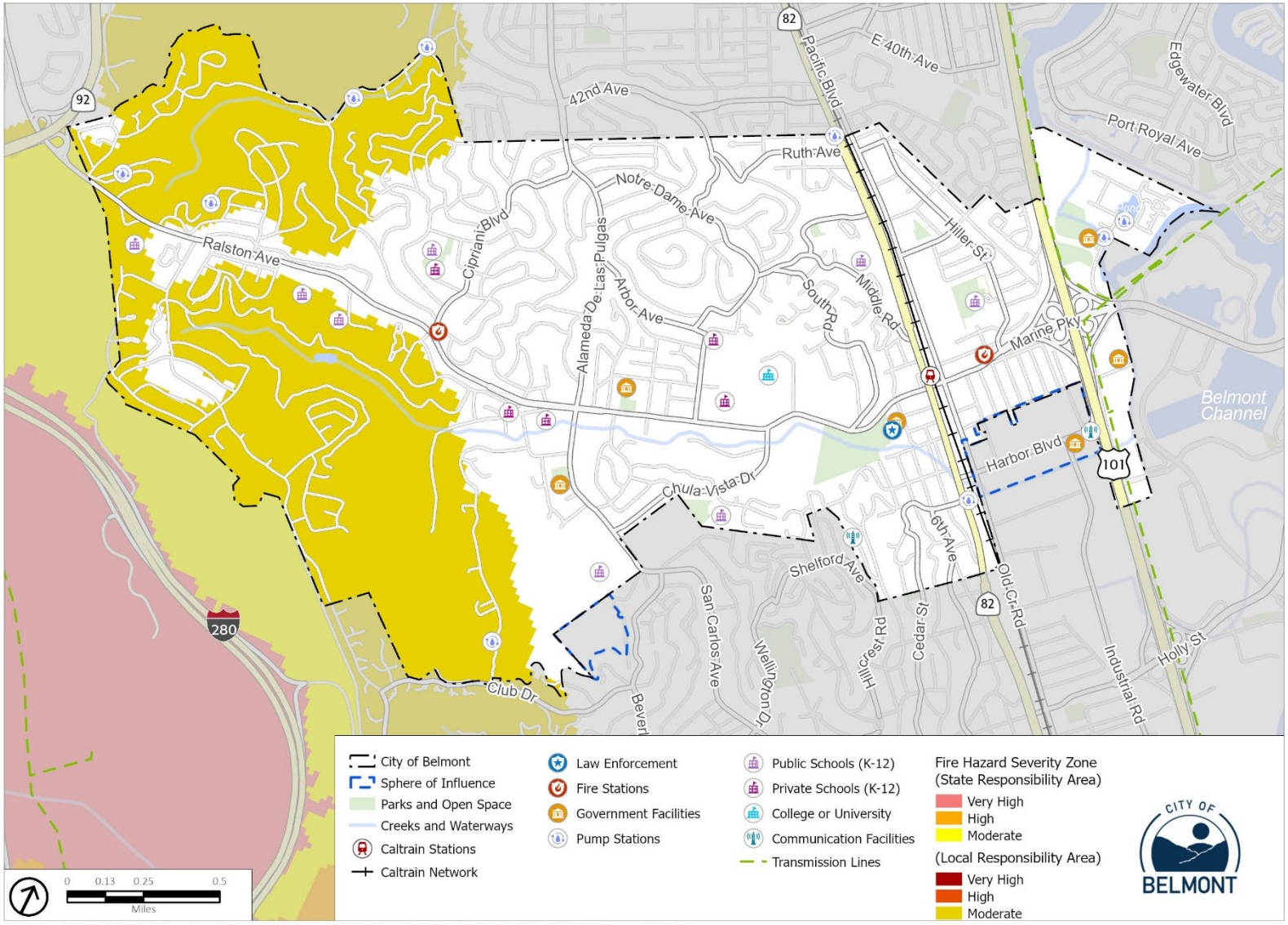
The San Mateo Consolidated Fire Department (SMC Fire) was formed by the merger of the fire departments of San Mateo, Foster City, and Belmont. The department began operations in 2019 and operates two fire stations in Belmont: Fire Station 14 at 911 Granada Street and Fire Station 15 at 2701 Cipriani Boulevard. SMC Fire provides fire response services for Belmont and enforces local fire regulations.

SMC Fire adopts the 2022 California Fire Code (Ordinance 2022-001) and amends sections based on geographic, climactic, and topographic factors. Included in the amendments are items dealing specifically with the wildland fire threat, including the adoption and amendment of the 2021 International Wildland Urban Interface Code. The City of Belmont includes this adoption in their Municipal Code in Chapter 7, Article IV (Construction Regulations), and in Division 7 (Fire Code) and delegates enforcement to SMC Fire. Compliance with these codes ensures new development meets the latest fire safety standards, including the use of fire-resistant materials, maintaining clearances around structures to prevent ignitions, and designing sites to facilitate firefighting equipment and personnel during responses.

Figure 8 and the online PREP Map Viewer illustrate the officially designated fire hazard severity zones in the city. There are 971 acres of Belmont designated as a Moderate fire hazard severity zone, which is largely in the hillside areas west of Alameda de Las Pulgas. The fire hazard severity zones in the city include the canyons in the Western Hills neighborhoods and San Juan Canyon. Homes around these areas and other wildfire-prone open space are in the WUI and so face a higher risk of wildfire.

Human activities are the leading cause of wildfires, and increased development near these wildland areas has amplified the likelihood and risk of wildfire events.[23] Wildfires not only destroy homes and infrastructure but can also displace entire communities and degrade critical wildlife habitat. The economic consequences are significant, including property damage and fire suppression costs. Moreover, the loss of natural spaces impacts recreation, tourism, and local biodiversity.

Figure 8. Fire Hazard Severity Zones



Source: ESRI, 2023; County of San Mateo, 2023; PlaceWorks, 2023; CAL FIRE 2024 and 2025
*Sphere of Influence is being considered for future annexation.

Key Findings

The following section presents the key findings of the Vulnerability Assessment for Belmont, 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 that should be considered the City'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, 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 is responsible for the most priority vulnerabilities in Belmont, followed by sea level rise, wildfire, and extreme heat. In Belmont, the populations facing the greatest risk from climate change include older adults, low-resourced households, and persons with chronic illnesses and/or disabilities.

Priority Vulnerabilities

In addition to the severity of impacts from climate change and related hazards, other factors that affect whether a population or asset is considered a priority vulnerability include:

- Size of the population or the importance of the asset.
- Equity considerations and history of marginalization.
- Role in supporting community well-being.
- Community values and concerns.
- Ability to resist and recover from hazards.
- Potential for cascading and compounding impacts.

Climate change is expected to affect everyone and all locations in Belmont to some degree. This section does not describe all the impacts from climate change and associated hazards. Rather, it identifies the populations and assets who are most frequently designated as priority vulnerabilities. Other populations and assets not listed here may still face significant harm from climate change.

Older Adults

Most Vulnerable To:

Older adults are 14 percent of Belmont's population, and approximately 5 percent of Belmont households consist of older adults living alone.

Source: American Community Survey. 2022. ACS 5-Year Estimates.

Older adults face a distinct set of vulnerabilities during emergencies, and it is essential to understand these challenges to protect this population effectively. 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 Belmont's cooling centers (Belmont Library and Twin Pines Community Center) while dealing with mobility impairments or vision issues significantly increases their risk of harm. These impairments mean that it can take longer for older adults to respond, 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 when exposed to wildfire smoke or extreme heat. Additionally, many older adults depend on

regular medication, and the unavailability of these medications during disasters can have severe consequences. For example, disrupted access to essential medications during a major flood could escalate an already dangerous situation into a life-threatening emergency.

Older adults in care homes face additional vulnerabilities, as they rely on caregivers and 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. 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.

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 our community.

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

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. 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.

Low-Resourced Households

Most Vulnerable To:

Approximately 6 percent of Belmont residents earn incomes at or below poverty level. Approximately 3 percent of Belmont homes are overcrowded.

Source: American Community Survey. 2022. ACS 5-Year Estimates.

Low-resourced households are among the populations most at risk of climate change hazards in Belmont. 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 households typically lack sufficient resources to invest in home repairs and weatherization improvements, air conditioning and efficient appliances, healthcare, and other means to prepare for and recover from hazardous events. Limited financial resources may prevent these households from affording adequate housing, which means they are more likely to be renters and live in older buildings with poor maintenance, structural damage, or inadequate sanitation. These conditions create an ideal environment for vector-borne pests that can carry harmful pathogens. Overcrowded households may have limited ability to cope with illnesses caused by vectors, extreme temperatures, or exposure to mold and mildew, because 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.

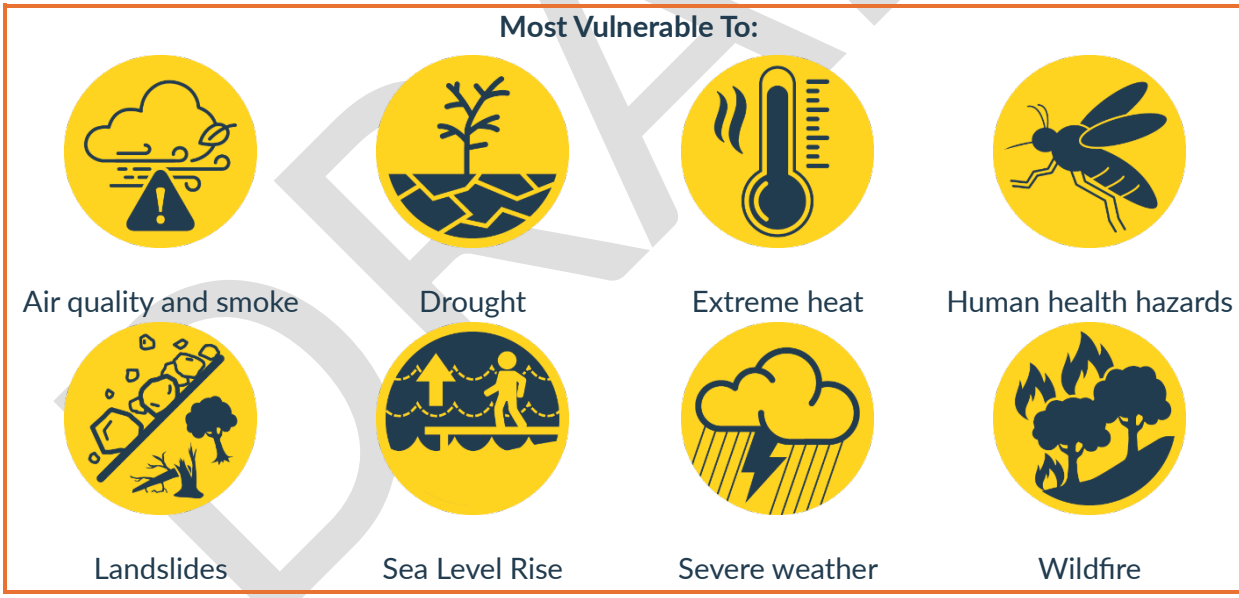
Adaptive Capacity Resources

To address these challenges, 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. The Genasys Protect citizen site and app provide access to emergency information and tools to help residents stay informed during evolving emergencies. Genasys Protect also works in conjunction with existing emergency alert notification systems, such as SMC Alert.

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

During drought, low-resourced households may be especially vulnerable to increases in water price due to existing water affordability concerns and additional water conservation pricing and may be unable to afford water-efficient appliances to reduce water use.[24]

Persons with Chronic Illnesses and/or Disabilities



Persons with chronic illnesses and/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

Approximately 8 percent of Belmont's population has some form of disability.

Source: American Community Survey. 2022. ACS 5-Year Estimates.

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.

Support from local organizations like the **Center for Independence for Individuals with Disabilities** is vital in helping these individuals prepare for and recover from disasters, providing resources such as emergency kits and backup power options. However, the unique vulnerabilities of these populations demand greater coordination and preparedness to ensure their safety in a changing climate.

Flooding, poor air quality, drought, extreme heat, severe weather, and wildfire pose additional risks to individuals with chronic conditions or disabilities. These individuals 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, while 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 event, 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.

Emergency Services

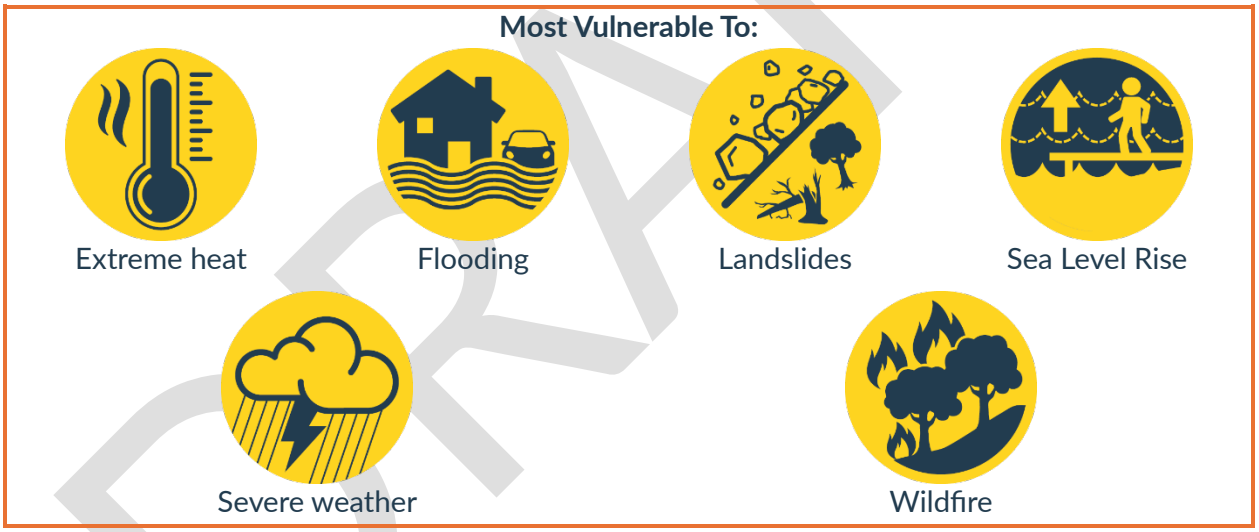
Belmont's emergency services include emergency medical response, fire protection services, and law enforcement response provided by the San Mateo Consolidated Fire Department and Belmont Police Department. These are always critical services, during normal conditions and immediately after emergency events. However, several climate hazards can disrupt these services, putting community members at risk. Poor air quality and extreme heat can significantly

increase the number of calls for emergency response, putting stress on the services and potentially leading to a shortage of care providers for medical emergencies.

Severe weather is another major hazard of concern for Belmont's emergency service providers. Strong winds during severe weather can knock down trees and blow debris and heavy rains can cause flooding or even landslides, blocking roadways. If roadways are obstructed, emergency responders may be delayed. This is of particular concern in neighborhoods near Waterdog Lake & Open Space and San Juan Canyon, which have limited road connections. Emergency medical responders may also be constrained during major public health emergencies, when responders may be short-staffed due to people on medical leave and an influx of patients.

Some emergency response facilities, such as the fire station on Granada Street is in a flood-prone and wildfire-prone area and may be damaged by flooding or wildfire, reducing the capacity of emergency response services. An increase in the frequency and intensity of many hazards, as expected under climate change, can also create stress on emergency responders and exceed local response capacities.

Energy and Communication Infrastructure and Services



Residents, visitors, and workers rely on the City's energy and communication infrastructure and services to work, play, 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 powerlines, including flooding, landslides, sea level rise, severe weather, and wildfire. This infrastructure supports electricity, natural gas, internet, and phone services for the community.

Sea level rise poses a significant threat, especially when combined with extreme storm events. By 2050, at 3.3 feet of sea level rise with a 100-year storm event, 0.7 miles of transmission lines and PG&E's Belmont Substation are vulnerable to inundation. Impacts to transmission lines could lead to power outages, which would hinder emergency response and coordination during severe

events. This loss of power would disrupt daily activities, affect communication networks, and compromise life support systems, putting residents' health and safety at risk. A loss of an electricity substation could lead to power outages, which would not only disrupt daily activities but also affect communication networks and life support systems, putting residents' health and safety at risk.

Landslides, wildfire, and severe weather can down or damage power lines and disrupt natural gas supplies. Downed infrastructure may damage roads and buildings, posing risks to people and potentially requiring road closures. Damaged infrastructure may also create fire hazards due to exposed electrical wires or ruptured gas lines, increasing the risk of ignition in vulnerable areas.

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 causes stress on the grid. The heat also causes more demand for electricity (usually to run air conditioning units), causing further stress on the power lines that may lead to brownouts and blackouts. A power or communication outage could affect emergency medical response and emergency resource services. The loss of power often means a loss of refrigeration, ruining food in homes and businesses, which can be particularly harmful to financially constrained households and small businesses.

Water and Wastewater Infrastructure and Services

Most Vulnerable To:

The Mid-Peninsula Water District provides water services to the City of Belmont, which depends on pipelines, pump stations, and treatment facilities for drinking water, cooking, cleaning, recreation, business operations, and medical needs. The Mid-Peninsula Water District sources most of its supply from the Sierra Nevada through the Hetch Hetchy Regional System. Silicon Valley Clean Water provides wastewater services to Belmont. These infrastructure and services are at risk from drought, flooding, emergent groundwater, sea level rise, landslides, and wildfires.

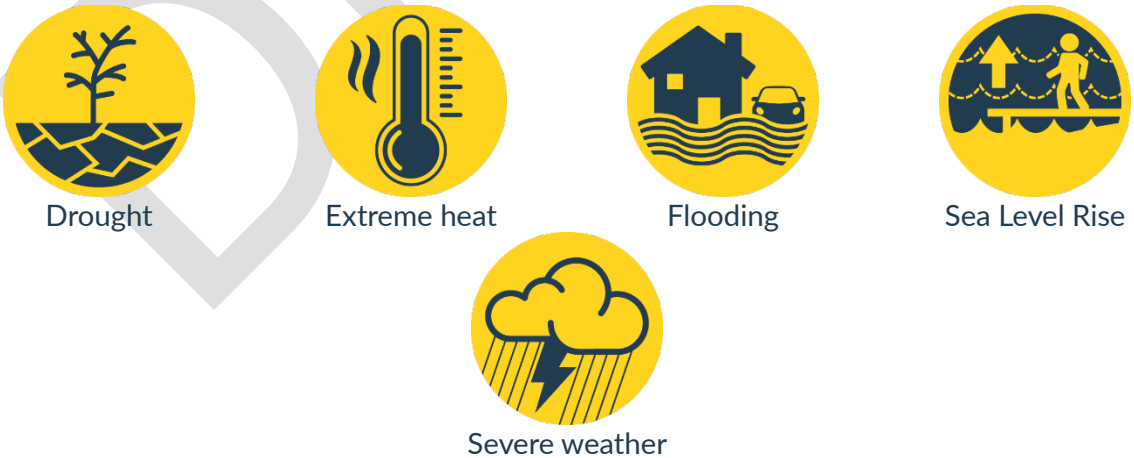
Drought conditions can impact Belmont's ability to provide reliable water services, leading to water use restrictions, which limit the amount of water available to residents and businesses and may increase water costs. Drought can reduce sewer flow, making wastewater more concentrated and requiring additional treatment to meet water quality standards, which in turn increases energy use. Reduced flow also decreases the flushing of debris from pipes, reducing system efficacy and potentially leading to infrastructure damage or service disruptions.

Belmont's sewer system is vulnerable to flooding, sea level rise, and emergent groundwater in areas east of Highway 101 and some residential areas to the west. The Silicon Valley Clean Water Wastewater Treatment Plant facility is vulnerable to inundation with as little as 1.6 feet of sea level rise and is also in an existing 100-year floodplain. Additionally, three pump stations are at risk from 3.3 feet of sea level rise combined with a 100-year storm event. Damage to wastewater systems could have widespread public health impacts if untreated wastewater contaminates the water and soil. If the event of a malfunction or disruption at the treatment plant, sewage backups could occur, potentially contaminating streams and water systems. Pump stations, which collect sewage, are vulnerable to saltwater intrusion during storm events and sea level rise, potentially causing wastewater to overflow into the environment. Buried water pipelines could be exposed to saltwater, which can damage the pipes, often with damage going unnoticed until major failures occur.

Additionally, landslides can damage water and wastewater lines going to buildings, leading to sewer overflows or suspension of water services. Damage to the water system from any hazard could increase wildfire vulnerability, as the system is essential for firefighting efforts, though it is not designed to handle major wildfires. Wildfires can further degrade water supplies if facilities such as San Andreas Lake are contaminated by ash and fire retardants, reducing water availability.

Aquatic Habitat

Most Vulnerable To:



Aquatic habitats in the community include riparian areas such as Belmont Creek, Waterdog Lake, and the salt marshes of O'Neill Slough. These aquatic habitats contribute to Belmont's community character, providing recreational opportunities, and the local salt marshes help buffer the community against flooding and sea level rise from the San Francisco Bay. They also play a crucial role in water filtration, removing pollutants and improving water quality for both human and ecological needs. These habitats offer critical habitat for diverse wildlife, supporting a variety of plant and animal species, some of which are rare or endangered. However, these aquatic habitats are among the most vulnerable habitats in the community.

OneShoreline

OneShoreline is collaborating with local jurisdictions, including Belmont, to plan debris removal at five sites across four creeks, including Belmont Creek. Programs like OneShoreline's Routine Maintenance Program for Bayside Creeks can reduce flood risks in the community. 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.

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. During a drought, riparian areas can dry up, substantially changing the ecosystem's character. Lower water levels in a creek can result in higher water temperatures and lower dissolved oxygen levels, both potentially dangerous conditions for aquatic species.

In contrast, riparian areas may be overwhelmed by floodwaters and damaged by debris. However, the underlying vulnerabilities to flooding are likely to persist and additional resilience efforts will likely be necessary. During drought conditions, marsh ecosystems can become increasingly fragmented due to the reduction in freshwater inflow. The absence of adequate freshwater input leads to sections of the marshland drying out and breaking apart, resulting in a loss of habitat continuity and decreased ecological stability. Floods and severe weather can cause the opposite problem, eroding the banks of riparian areas and upsetting the balance between freshwater and saltwater in the marshlands by flooding the ecosystem with sediment from upstream. Sea level rise also threatens Belmont's salt marshes, causing permanent inundation leading to the transition of marshlands to mud flats.

Other Priority Vulnerabilities

Although the following populations and assets are not identified as priority vulnerabilities for as many hazards as those previously discussed, they are still of significant importance and concern to the community. Given the potential consequences for harm to these populations and assets, it is essential that they are recognized for community planning and risk assessment efforts. Addressing these priority vulnerabilities proactively can help mitigate their impacts and enhance the City's overall resilience.

Belmont Hills looking towards San Francisco. Source: San Mateo County.

Isolated Persons

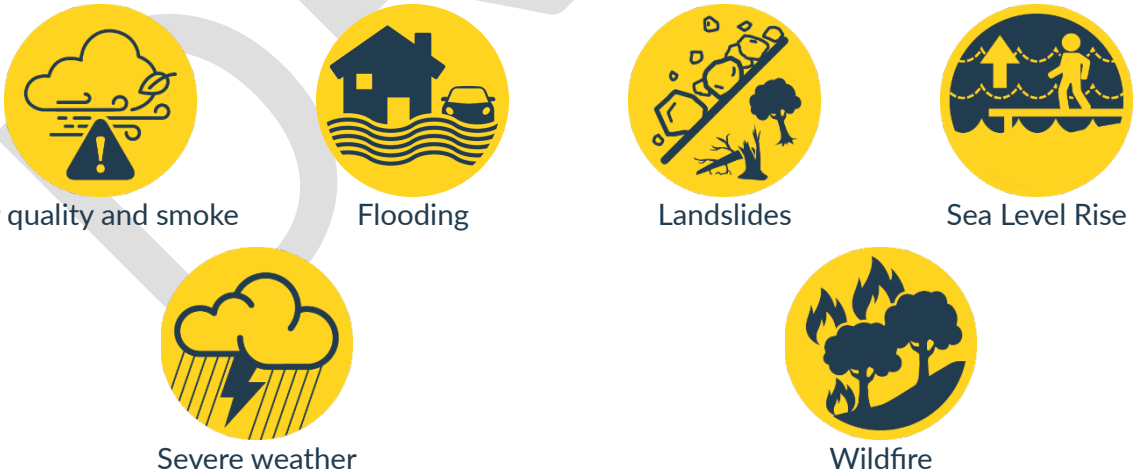
Most Vulnerable To:

> In Belmont, approximately 8 percent are limited English-speaking households, 6 percent lack internet access, and 7 percent do not have a personal vehicle.
>
> *Source: American Community Survey. 2022. ACS 5-Year Estimates.*

Isolated persons are another group in Belmont who are priority vulnerabilities for many hazards. This includes people who do not speak English, lack access to a personal vehicle or telecommunications, or otherwise lack regular social and technological connections. Although these populations are a relatively small proportion of the total population, their isolated nature means that they often do not receive information about protecting against hazards or responding to imminent or ongoing hazards. This can include lifesaving information, such as evacuation orders or the location of cooling centers. Community-based organizations, such as El Concilio, help to reduce these vulnerabilities by providing services and outreach to marginalized and isolated persons in San Mateo County, but their capacity and resources are limited.

Transportation Infrastructure and Services

Most Vulnerable To:



The City's transportation infrastructure—roads, highways, bridges, evacuation routes, and transit networks—is crucial for community health and safety. These systems are vulnerable to poor air quality, flooding, landslides, sea level rise, severe weather, and wildfire. Damage disrupts daily life,

interrupts services, and affects freight and supply chains essential for businesses and households. Additionally, damage to transit networks hinders mobility for those reliant on public transportation, limiting access to jobs, healthcare, and essential services. During emergencies, compromised networks can obstruct evacuations and delay emergency response.

Wildfires, flooding, and severe weather can block or damage roadways, isolating communities, limiting evacuation options, and delaying healthcare services. Key routes like Highway 101, Ralston Avenue, and El Camino Real are crucial for freight movement across the region, and disruptions can have broader economic implications. Sea level rise and flooding may damage pavement, increasing maintenance costs and creating unsafe conditions. These issues also affect transit services, reducing reliability and increasing travel times, particularly in flood-prone areas.

Access to Belmont may become challenging if main routes are closed. Flooding can affect narrow access roads with poor drainage, causing long-term delays and costly cleanup. Highway 101 is especially vital for evacuation; its blockage could leave residents stranded. Bus stops and the Caltrain rail line face increased disruption risk, reducing access to public transportation services. Without adaptation measures, sea level rise could negatively impact communities and critical transportation infrastructure, affecting connections for the entire region. Disruption of transportation networks can lead to widespread consequences, impacting daily life, economic stability, and resilience, particularly for vulnerable populations.

Homes

Most Vulnerable To:

Homes and residential structures are an essential part of every community, and Belmont, 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 Belmont 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 allow 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.

Hardwood Forests and Woodlands

Most Vulnerable To:

Hardwood 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 in western Belmont, as well as the potential of cascading or compounding effects from drought, extreme heat, and ecosystems pest infestations.[25]

Oak forests and woodlands are the dominant ecosystems in Waterdog Lake & Open Space, San Juan Canyon Open Space, Twin Pines Park, and other open space areas in Belmont, especially in the community's hills. Drought can kill or stress the trees in Belmont, degrading the quality of the woodland and making the ecosystem more susceptible to fires. Such environmental stresses also increase the risk of diseases such as sudden oak death or other pests, which can further contribute to ecosystem loss. While oak woodlands are often resilient to low-intensity ground fires, more intense wildfires (which are likely to occur more often with climate change) can be fatal to mature trees, disrupting the ecosystem's balance.[26]

In the hillier areas of western Belmont, landslides pose a threat to the local oak woodlands. Mature trees can often survive smaller landslides, but these can kill ground cover that is a vital part of the ecosystem, and damage from frequent landslides can weaken the overall health of the ecosystem over time. Oak woodlands in Belmont are also vulnerable to severe weather, which can blow down trees and branches, as well as more easily spread diseases such as Sudden Oak Death. While this is unlikely to do long-term harm to the ecosystem on its own, it can affect ecosystem health in combination with other hazards that place additional stress on the local flora.

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 Vulnerability Assessment process will be used to inform the goals, policies, and actions that will be included in the Safety Element.

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. [27] [28]

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. [29]

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. [30]

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. [31]

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.

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. [32]

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.

Appendix A: Methods

The Vulnerability Assessment considers the threats from all relevant natural *hazards*, 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 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*, 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 city, 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, or the combination of exposure to the hazard and sensitivity of a 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 Belmont 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 opportunities such as funding, tools, and resources; or to respond to the impacts of climate change. The project team will assess the adaptive capacity of each population or asset for each applicable identified hazard. The City is already implementing several measures to increase adaptive capacity, including the Municipal Code requirements, Capital Improvement Program, and Climate Action Plan.

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 Belmont.

Appendix B: Populations and Assets

The City 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 City collected population data from the U.S. Census, the California Healthy Places Index, and the San Mateo County Homeless Point-in-Time Count. These 15 populations are:

1. Children and youth (under 18).
2. Cost-burdened/low-income/overcrowded households: Cost-burdened households are those paying 30 percent or more of their income toward housing expenses.[33] The State identifies $149,100 as the low-income threshold for a household of four people in San Mateo County in 2023.[34] Approximately 6 percent of Belmont residents earn incomes at or below poverty level.[35] Overcrowded households include housing units that have more than one person per room (excluding bathrooms and kitchens). Approximately 3 percent of Belmont homes are overcrowded.[36]
3. Households in poverty: The federal poverty line for a household of four is $31,200 a year.[37] However, in San Mateo County, the acutely low poverty line (15 percent of area median income) is even lower, which is $26,250 for a household of four.[38, 39] Approximately 7 percent of Belmont residents earn incomes at or below poverty level.[40]
4. Immigrant communities/linguistically isolated persons: Communities consisting of foreign-born populations, including immigrants, refugees, and undocumented persons. Linguistically isolated persons include households without a member who is fluent in English. Spanish, Chinese, and Japanese are the primary languages in Belmont among households that are not fluent in English.[41]
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.[42,43]
6. Outdoor workers: Workers in landscaping, construction, outdoor recreation, etc.
7. Persons experiencing homelessness: 2022 Point-in-Time count reported 13 total persons experiencing homelessness (all unsheltered) in Belmont.[44]
8. Persons living on single-access roads (roads with only a single entry or exit point): Single-access roads are generally in the western portion of Belmont, near the hillsides of the community.
9. Persons with chronic illnesses and/or disabilities: Approximately 7 percent of Belmont's population has some form of disability.[45]
10. Persons without a high school degree: Approximately 8 percent of Belmont's adult population has not obtained a high school degree or equivalent.[46]

11. Persons without access to lifelines: Persons without reliable access to a car, transit, or communication systems. Approximately 7 percent of Belmont households do not have access to a personal vehicle.[47] Approximately 6 percent of Belmont households do not have an internet subscription.[48]
12. Renters: Approximately 44 percent of Belmont housing units are renter-occupied.[49]
13. Seniors (65+): Seniors constitute 14 percent of Belmont's population.[50] Approximately 5 percent of Belmont households are seniors living alone. [51]
14. College students.
15. Unemployed persons: Belmont's civilian labor force unemployment rate is approximately 4 percent.[52]

Infrastructure

The City gathered details on infrastructure from state and local geographic information system (GIS) data, and the *2021 San Mateo County Multijurisdictional Local Hazard Mitigation Plan*. These seven asset groups are:

1. Energy and communication infrastructure:
    - Transmission Lines: Pacific Gas and Electric Company (PG&E).
    - Natural gas pipelines and structures: PG&E.
2. Flood control and stormwater infrastructure, including Twin Pines Detention Basin (future project), Belmont Creek Restoration Project, and other green infrastructure items (planning phase).
3. Vehicle fuel stations:
    - Electric vehicle charging stations: two public charging stations.53
    - Gas stations
4. Hazardous materials sites: 42 cleanup sites (four open and active sites) identified via the State Water Control Board's GeoTracker database;[54] six toxic substance sites (one open and active site) identified via the State Department of Toxic Substance Control's EnviroStor database.[55]
5. Transportation infrastructure:
    - Freeways and State Highway: Highway 101, State Route 92, Interstate 280.
    - Arterial roadways: State Route 82 (El Camino Real), Ralston Avenue, Alameda de las Pulgas.
    - Collector roadways: Hallmark Drive, Notre Dame Avenue, Chula Vista Drive, Carlmont Drive, Hastings Drive, Hiller Street, Old Country Road, 6th Avenue, Cipriani Boulevard.
    - Transit facilities: Stops and other facilities provided by SamTrans and San Mateo County Transit District.
    - Railway: Caltrain.
    - Airports: San Francisco International Airport (SFO).
6. Parks, recreational facilities, and open space:[56]

- Neighborhoods and Mini Parks: Alexander Park, Cipriani Park and Dog Park, College View Park, Davey Glen Park, Hallmark Park, Hastings Tot Lot, O'Donnell Park, Patricia Wharton Park, Semeria Park, Wakefield Park.
- Community Parks: Barrett Community Center and Park, Belameda Park, Belmont Sports Complex, McDougal Field, Twin Pines Park.
- Undeveloped Park Areas: Ralston Ranch Park, Hidden Canyon Park.
- School Athletic Fields: Central School, Fox School, Nesbit School, Ralston Middle School.
- Open Space and Trail Areas: San Juan Canyon, Waterdog Lake.

7. Water and wastewater infrastructure: Silicon Valley Clean Water Wastewater Treatment Facility, gravity sewer pipelines, lower laterals, force mains, lift stations, pump stations, water storage tanks and reservoirs (including Hetch Hetchy, Calaveras, San Antonio, Crystal Springs, Pilarcitos, and San Andreas reservoirs).

Buildings

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

1. Government and community facilities: Belmont City Offices/Barrett Community Center, Belmont Public Library, Belmont Sports Complex Conference Center Belmont Corporation Yard, Manor Building, Lodge Building, Cottage Building, and Belmont Senior and Community Center.
2. Commercial centers: Carlmont Village Shopping Center, Ralston Plaza, Belmont Village, and Belmont Plaza.
3. Medical and care facilities: Dignity Health Medical Group, and adult care and senior living facilities.
4. Homes and residential structures: Multifamily and single-family residences.
5. Public safety buildings: Belmont Fire Protection District Station 14, Belmont Fire Protection District Station 15, and Police Department (located in City Hall building).
6. Schools:
    a. Elementary Schools: Central Elementary, Cipriani Elementary, Fox Elementary, Nesbit Elementary, Redwood Shores Elementary, Sandpiper Elementary
    b. Middle Schools: Ralston Middle School
    c. High Schools: Carlmont High School
    d. Universities: Notre Dame de Namur University
    e. Private Schools: Notre Dame Elementary, Hanlin Academy, Field Middle School, Serendipity School, Immaculate Heart of Mary School, Charles Armstrong School, Compass High School, Gloria Dei Lutheran Continuation School, Belmont Oaks Academy, Peninsula Jewish Community Preschool, Merry Moppet Preschool, Holy Cross Preschool.
7. Daycare Centers: Belmont Community Learning Center, Footsteps Daycare, Mundo Azul Family Daycare, DeMartini Child Care.

Economic Drivers

The City determined important economic assets based on the 2022 Comprehensive Annual Financial Report and land uses in the city. These five assets are:

1. Commercial and retail centers.
2. Education services.
3. Major employers: Ring Central, Inc., Autobahn Motors, Safeway, Lunardi's Market, Silverado – Belmont Hills.
4. Medical services and biotechnology.
5. Hospitality and tourism.

Ecosystems and Natural Resources

The City determined the ecosystems and natural resources based on information from the Conservation Element of the General Plan. These five resources are:

1. Hardwood Forest/Woodland: Montaine Hardwood, Valley Oak Woodland, Coastal Oak Woodland, and Blue Oak Woodland.
2. Riparian and Aquatic: Valley Foothill Riparian, Lacustrine. This includes seasonal creeks, Belmont Creek, and Waterdog Lake.
3. Scrub and Chaparral: Coastal Scrub, Chamise-Redshank Chaparral. Shrub-dominated habitats are found mostly in the southwestern area of Belmont.
4. Wetland: Saline Emergent Wetland. Wetland habitats are found in a few areas in eastern Belmont, near the O'Neill Slough.
5. Herbaceous: Annual grass.

Key Services

These assets are based on typical services provided in cities throughout California, which are supported by the infrastructure and buildings listed previously. 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 seven services are:

1. Education services: Belmont-Redwood Shores School District (public education from kindergarten through eighth grade), Sequoia Union High School District (public education from ninth to twelfth grades), private schools, and childcare.
2. Emergency services: San Mateo Consolidated Fire Department, Belmont Police Department, San Mateo County Department of Emergency Management, and San Mateo Operational Area Emergency Services Council.
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. Public transit access: SamTrans, Caltrain, San Mateo County Transit District, San Mateo County Transportation Authority, and Peninsula Corridor Joint Powers Authority.
6. Solid waste removal: Recology and South Bayside Waste Management Authority.

7. Water and wastewater: City of Belmont Public Works Department (wastewater services), Mid-Peninsula Water District (water services). All of the Mid-Peninsula Water District's water supply is provided by the San Francisco Public Utilities Commission.

Endnotes

[1] Environmental Protection Agency. 2024. Research on Health Effects from Air Pollution. https://www.epa.gov/air-research/research-health-effects-air-pollution
[2] Environmental Protection Agency. 2024. "Research on Health Effects from Air Pollution." https://www.epa.gov/air-research/research-health-effects-air-pollution.
[3] Bay Area Air Quality Management District. 2017, April 19. *Final 2017 Clean Air Plan*. Appendix C. https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a-proposed-final-cap-vol-1-pdf.pdf?la=en.
[4] Bay Area Air Quality Management District. 2024, October 24 (accessed). History of the Air District. https://www.baaqmd.gov/about-the-air-district/history-of-air-district.
[5] Bay Area Air Quality Management District. 2023. *2023 Annual Report*. https://www.baaqmd.gov/publications/annual-reports.
[6] U.S. Environmental Protection Agency. 2024, October 10 (accessed). Why Wildfire Smoke is a Health Concern. https://www.epa.gov/wildfire-smoke-course/why-wildfire-smoke-health-concern.
[7] Environmental Protection Agency. 2023. *Health Effects Attributed to Wildfire Smoke*. https://www.epa.gov/wildfire-smoke-course/health-effects-attributed-wildfire-smoke.
[8] Halofsky, J.E., Peterson, D.L., Buluç, L.Y., & Ko, J.M. 2021. Climate change vulnerability and adaptation for infrastructure and recreation in the Sierra Nevada. Gen. Tech. Rep. PSW-GTR-272. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.
[9] Cal-Adapt. 2024, October 15 (accessed). Extreme Heat Days and Warm Nights. https://cal-adapt.org/tools/extreme-heat.
[10] Cal-Adapt. 2024, October 15 (accessed). Extreme Heat Days and Warm Nights. https://cal-adapt.org/tools/extreme-heat.
[11] Center for Disease Control and Prevention. 2022. QuickStats: Deaths Involving Exposure to Excessive Heat, by Sex — National Vital Statistics System, United States, 1999–2020. https://www.cdc.gov/mmwr/volumes/71/wr/mm7134a5.htm#:~:text=During%201999%E2%80%932020%2C%20the%20annual,than%20among%20females%20each%20year.
[12] U.S. Department of Health and Human Services. 2024. Extreme Heat. https://www.hhs.gov/climate-change-health-equity-environmental-justice/climate-change-health-equity/climate-health-outlook/extreme-heat/index.html#:~:text=Heat%2Drelated%20deaths%20have%20been,2022%2C%20and%202%2C302%20in%202023.
[13] U.S. Environmental Protection Agency. N.d. Climate impacts on Human Health. https://climatechange.chicago.gov/climate-impacts/climate-impacts-human-health#ref1.
[14] National Oceanic and Atmospheric Administration. 2023. What are atmospheric rivers?. https://www.noaa.gov/stories/what-are-atmospheric-rivers.
[15] Ackerly, David, Andrew Jones, Mark Stacey, Bruce Riordan. (University of California, Berkeley). 2018. San Francisco Bay Area Summary Report. *California's Fourth Climate Change Assessment*. Publication number: CCCA4-SUM-2018-005.
[16] California Office of Environmental Health Hazard Assessment. 2024. Vector-borne diseases. https://oehha.ca.gov/climate-change/epic-2022/impacts-human-health/vector-borne-diseases#:~:text=Warming%20temperatures%20and%20changes%20in,the%20blood%20of%20infected%20birds.
[17] California Office of Environmental Health Hazard Assessment. 2024. Vector-borne diseases. https://oehha.ca.gov/climate-change/epic-2022/impacts-human-health/vector-borne-diseases#:~:text=Warming%20temperatures%20and%20changes%20in,the%20blood%20of%20infected%20birds.
[18] San Francisco Bay Conservation and Development Commission. 2024. *Regional Shoreline Adaptation Plan.* https://www.bayadapt.org/wp-content/uploads/2024/09/BCDC_Draft_Regional_Shoreline_Adaptation_Plan_Appendix-A_Spreads.pdf.

[19] Ocean Protection Council. 2024. State of California Sea Level Rise Guidance. https://opc.ca.gov/wp-content/uploads/2024/05/California-Sea-Level-Rise-Guidance-2024-508.pdf.
[20] Ocean Protection Council. 2024. State of California Sea Level Rise Guidance. https://opc.ca.gov/wp-content/uploads/2024/05/California-Sea-Level-Rise-Guidance-2024-508.pdf.
[21] Ocean Protection Council. 2024. State of California Sea Level Rise Guidance. https://opc.ca.gov/wp-content/uploads/2024/05/California-Sea-Level-Rise-Guidance-2024-508.pdf.
[22] Cal-Adapt. 2024, October 15 (accessed). Wildfire. https://cal-adapt.org/tools/wildfire.
[23] Western Fire Chiefs Association. 2024. What Causes Wildfires? https://wfca.com/wildfire-articles/what-causes-wildfires/#:~:text=Vehicles,Prescribed%20Burning%20&%20Arson.
[24] City of East Palo Alto. 2022. 2030 Climate Action Plan and Adaptation Strategies.
[25] Dwomoh, FK., Brown, JF., Tollerud, HJ., Auch, RF. 2021. "Hotter Drought Escalates Tree Cover Declines in Blue Oak Woodlands of California." *Frontiers*. https://www.frontiersin.org/articles/10.3389/fclim.2021.689945/full.
[26] Harper, J. M., Standiford, R. B., & LeBlanc, J. W. 1994. The role of fire in California's oak woodlands. UC Oaks. https://oaks.cnr.berkeley.edu/the-role-of-fire-in-californias-oak-woodlands-2/
[27] Louise Bedsworth, Dan Cayan, Guido Franco, Leah Fisher, Sonya Ziaja, "Statewide Summary Report," in *California's Fourth Climate Change Assessment*, publication number: SUMCCCA4-2018-013, 2018.
[28] California Natural Resource Agency, *Safeguarding California Plan: 2018 Update: California's Climate Adaptation Strategy*, 2018, http://resources.ca.gov/docs/climate/ safeguarding/update2018/safeguarding-california-plan-2018-update.pdf
[29] Intergovernmental Panel on Climate Change, "Annex II: Glossary," ed. K. J. Mach, S. Planton, and C. von Stechow, in *Climate Change 2014: Synthesis Report*, ed. Core Writing Team, R. K. Pachauri, and L. A. Meyer (Geneva, Switzerland: IPCC, 2014), p. 117–130, https://www.ipcc.ch/report/ar5/syr/
[30] Louise Bedsworth, Dan Cayan, Guido Franco, Leah Fisher, Sonya Ziaja, "Statewide Summary Report," in *California's Fourth Climate Change Assessment*, publication number: SUMCCCA4-2018-013, 2018.
[31] California Governor's Office of Emergency Services, *California State Hazard Mitigation Plan*, 2018, https://www.caloes.ca.gov/cal-oes-divisions/hazard-mitigation/hazard-mitigation-planning/state-hazard-mitigation-plan
[32] Neil Adger, "Vulnerability," *Global Environmental Change* 16 (2006): 268–281, https://www.geos.ed.ac.uk/~nabo/ meetings/glthec/materials/simpson/ GEC_sdarticle2.pdf
[33] City of Belmont. 2023. City of Belmont Housing Element 2023 - 2031. https://www.belmont.gov/departments/administrative-services/city-manager/housing/housing-element-documents.
[34] San Mateo County. 2023. 2023 San Mateo County Income Limits. https://www.smcgov.org/media/144471/download?inline=.
[35] United States Census Bureau. Belmont city, California. Available: https://data.census.gov/profile/Belmont_city,_California?g=160XX00US0605108.
[36] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Occupancy Characteristics, S2501. https://data.census.gov/table/ACSST5Y2021.S2501?q=household+characteristics&g=160XX00US0605108.
[37] Office of the Assistant Secretary for Planning and Evaluation. 2024. "HHS Poverty Guidelines for 2023. https://aspe.hhs.gov/topics/poverty-economic-mobility/poverty-guidelines.
[38] San Mateo County. 2023. 2023 San Mateo County Income Limits. https://www.smcgov.org/media/144471/download?inline=.
[39] Office of the Assistant Secretary for Planning and Evaluation. 2023. HHS Poverty Guidelines for 2023. https://aspe.hhs.gov/topics/poverty-economic-mobility/poverty-guidelines.
[40] United States Census Bureau. Belmont City, California. https://data.census.gov/profile/Belmont_city,_California?g=160XX00US0605108.
[41] American Community Survey. 2015. 2015: ACS 5-Year Estimates, Language Spoken at Home by Ability to Speak English for the Population 5 Years and Over, B16001. https://data.census.gov/table?q=B16001&g=160XX00US0605108.

[42] Public Health Alliance of Southern California. 2018. *Healthy Places Index*. https://map.healthyplacesindex.org/
[43] Roos, Michelle. (E4 Strategic Solutions). 2018. Climate Justice Summary Report. California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-012.
[44] County of San Mateo Human Services Agency. 2022. 2022 San Mateo Count One Day Homeless Count and Survey. https://www.smcgov.org/media/130611/download?inline=.
[45] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Disability Characteristics, S1810. https://data.census.gov/table?q=S1810&g=160XX00US0605108.
[46] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Educational Attainment, S1501. https://data.census.gov/table?q=S1501&g=160XX00US0605108.
[47] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Physical Housing Characteristics for Occupied Housing Units, S2504. https://data.census.gov/table?q=S2504&g=160XX00US0605108.
[48] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Types of Computers and Internet Subscriptions, S2801. https://data.census.gov/table?q=S2801&g=160XX00US0605108.
[49] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Demographic Characteristics for Occupied Housing Units, S2502. https://data.census.gov/table?q=S2502&g=160XX00US0605108.
[50] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Age and Sex, S0101. https://data.census.gov/table?q=S0101&g=160XX00US0605108.
[51] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Selected Social Characteristics in the United States, DP02. https://data.census.gov/table?q=DP02&g=160XX00US0605108.
[52] American Community Survey. 2021. 2021: ACS 5-Year Estimates, Selected Economic Characteristics, DP03. https://data.census.gov/table?q=DP03&g=160XX00US0605108.
[53] U.S. Department of Energy. 2023. Electric Vehicle Charging Station Locations. https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC&location=belmont%20ca.
[54] California State Water Resources Control Board. 2023. GeoTracker Database. https://geotracker.waterboards.ca.gov/map/?CMD=runreport&myaddress.
[55] California Department of Toxic Substances Control. 2023. EnviroStor Database. https://www.envirostor.dtsc.ca.gov/public/map/?myaddress.
[56] City of Belmont. 2017. *City of Belmont 2035 General Plan*. Parks, Recreation, and Open Space Element. https://www.belmont.gov/home/showpublisheddocument/16483/636651105574800000.