Town of Atherton

Peninsula Resilience Planning

Draft Safety Element Background Report

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Prepared for:

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INTRODUCTION

This Existing Conditions Background Report discusses the natural and human-caused hazards that can affect the Town of Atherton. Each issue identified in this report includes a general overview of each hazard, how/where the hazard affects the town and its residents, information on past hazard events, current programs and regulatory frameworks in place to reduce the impacts associated with these hazards, as well as future conditions (including potential climate change impacts associated with these hazards). The intent of this report is to provide background information that informs how and why the goals, policies, and implementation actions within the updated General Plan Safety Element were developed.

The following are the key issues considered relevant to the Town of Atherton:

ISSUE 1: EMERGENCY PREPAREDNESS AND RESPONSE

General Overview

The Town of Atherton employs a multipronged approach for mitigating, responding to, and recovering from emergencies. This section reviews the town's major evacuation routes, emergency alert systems, and other emergency response programming. State law (Senate Bill 99, or SB 99) requires that the Atherton Safety Element identify residential areas with only one way in and out, as these may be areas where evacuations are constrained. State law (Assembly Bill 747, or AB 747) also requires that the Safety Element identify potential evacuation routes and their capacity, safety, and viability.

Emergency Alert Systems

SMC Alert/Rave Mobile Safety

SMC Alert is the primary alerting system available to the Town of Atherton. Messages sent vary from agency to agency. SMC Alert can be used to issue flood, fire, severe weather, or tsunami warnings; notify the community about the locations of emergency shelters; provide information about available evacuation routes; and activate special teams within the community such as Community Emergency Response Team (CERT) volunteers. SMC Alert is used in Atherton for larger regional emergency notifications, while local emergency notifications and alerts are sent to the community via the Town of Atherton's Newsflash Alert System. Community members opt in to receive SMC Alert messages via email, cell phones, and voice messages to landline phones. Alerts are available in a wide variety of languages, including English, Spanish, Chinese, and Filipino (standardized Tagalog), as these are among the primary languages spoken in San Mateo County. The primary languages spoken in Atherton are English and Spanish. Individuals can sign up for SMC Alert via the County's website at https://www.smart911.com/smart911/ref/reg.action?pa=smcgov.

Rave Mobile Safety was adopted by the County in December 2022 as the new alerting platform for SMC Alert.

Wireless Emergency Alerts

Another alert system includes Wireless Emergency Alerts (WEAs) which are short emergency messages from authorized public alerting authorities that can be broadcast from cell towers to any WEA-enabled mobile device in a locally targeted area. Wireless providers primarily use cell broadcast technology for WEA message delivery. WEA is a partnership among FEMA, the Federal Communications Commission and wireless providers to enhance public safety.

Genasys EVAC/Zonehaven

Public safety agencies throughout San Mateo County use the Genasys Protect app (formerly known as Zonehaven) to communicate areas that are being evacuated due to fire or other emergencies. Genasys is not an alert and warning system, but Genasys EVAC provides first responders and public safety workers with tools to navigate the evacuation process, including information about when it is safe to return. Many jurisdictions within San Mateo County host evacuation plans and maps on the Genasys platform.

The Genasys platform divides the community into a number of zones to provide information tailored to impacted areas. Users of the app can choose the zone or zones for which they would like to receive alerts. The Town of Atherton currently has six evacuation zones identified within the EVAC portal.

Major Evacuation Routes

If an evacuation is necessary in Atherton, it will be conducted by members of the Atherton Police Department. They will work closely with the Menlo Park Fire Department, the San Mateo County Department of Emergency Management, and emergency responders in neighboring communities to make sure that evacuations are conducted as quickly and safely as possible.

Currently, no standard plan covers evacuations throughout San Mateo County and the Town of Atherton does not have an evacuation plan that is publicly available The City is participating in the county-wide All-Hazards Evacuation Plan, which will analyze potential evacuation scenarios across San Mateo County, identify potential evacuation routes, and recommend improvements. This work began in 2024, and is expected to finish in 2025. The Safety Element will reference this study to meet the requirements of SB 99 and AB 747. There are some major routes in Atherton that could be designated as interim evacuation routes, including Alameda de las Pulgas, Middlefield Road, Bay Road, and State Route (SR-) 82 as the major east/west routes, while Atherton Avenue, Valparaiso Avenue, Selby Lane, and Stockbridge Avenue are major north/south routes that intersect with SR-82. The Town of Atherton is also near SR-84 and between the major highways of Interstate (I-) 280 and US Highway 101. The Request for Proposals (RFP) process to select a vendor began in May 2023.

Evacuation Constraints

Under SB 99, jurisdictions updating the Housing Element of their General Plan are required to identify residential parcels with access to fewer than two evacuation routes as part of their Safety Element. Occupants and residents of these parcels within the Town of Atherton, may be unable to evacuate quickly in the event of an emergency, and are therefore more vulnerable to sudden or fast-spreading emergency conditions, such as flash floods and wildfire.

Existing Programs and Regulations

Preparedness and Response Programs

San Mateo County and the Town of Atherton use a variety of programs, plans, and initiatives to manage and guide emergency response. Resources and programs include both Town and County-operated volunteer programs and resources, as well as participation in regional mutual-aid agreements.

The Town of Atherton is required under State law to prepare and maintain a Standardized Emergency Management System (SEMS) Multi-hazard Functional Plan. The California Governor's Office of Emergency Services (CalOES) provides guidelines outlining the requirements of this plan at both the County and Town levels.

County Initiatives

San Mateo County Department of Emergency Management

DEM provides essential services that prepare and assist San Mateo County agencies in the event of a disaster or other emergency. DEM coordinates countywide preparedness, response, and protection services and activities for large-scale incidents and disasters. DEM is responsible for alerting and notifying appropriate agencies within the County's 20 cities when disaster strikes, coordinating all responding agencies, and ensuring resources are available and mobilized during disasters. DEM is responsible for developing and maintaining plans and procedures for all jurisdictions within San Mateo County. In addition to creating plans, DEM develops exercises to evaluate operational and response capabilities.

During significant incidents or emergencies, DEM is responsible for activating the County of San Mateo Emergency Operations Center to support local jurisdictions as needed. DEM coordinates and contracts to CalOES and the Federal Emergency Management Agency (FEMA) during an emergency for federal and State support.

DEM is funded in part through a Joint Powers Authority (JPA) governed by the Emergency Services Council. The Town of Atherton does not have a stand-alone emergency management department. Instead, the Town's Police Department oversees this function, with support from the Menlo Park Fire Protection District.

2021 San Mateo County Multijurisdictional Hazard Mitigation Plan

San Mateo County DEM prepared and issued the 2021 Multijurisdictional Hazard Mitigation Plan (MJHMP), a large regional and cross-jurisdictional effort to plan for the reduction of risk from natural and human-caused disasters. The MJHMP assesses vulnerabilities to hazards and identifies mitigation actions that jurisdictions will pursue to reduce the potential of injury, property damage, and community disruption as a possible result of these hazards. The MJHMP addresses both natural and human-caused hazards, including flooding, drought, wildfire, landslides, severe weather, terrorism, cyber threats, pandemic, and the impact of climate change on hazards, as well as other hazards. The MJHMP, when combined with the County's General Plan Safety Element, creates the foundation to increase the resiliency of the community, and the effectiveness of emergency response for the residents and businesses in the county. The Town of Atherton's MJHMP Annex includes specific information regarding the relevant hazards of concern and mitigation strategies specific to the Town. The MJHMP and the Atherton Annex are also used as an informative reference when developing policies for the various elements within the Town's General Plan (Safety Element, Housing Element, and Land Use Element).

San Mateo County Operational Area Emergency Services Council

The San Mateo County Operational Area Emergency Services Council is a Joint Powers Authority (JPA) composed of all local governments within the geographic area of the county, special districts, unincorporated areas, and participating nongovernmental entities. The Council is responsible for providing coordinated plans for the protection of people and property in the event of an emergency. The Council works in coordination with local government entities to review, approve, and recommend for adoption of emergency and mutual-aid plans and agreements, rules, ordinances, resolutions, and regulations by the Board of Supervisors and other legislative agencies.

Emergency Operations Plan and Center

The County's Emergency Operations Plan (EOP) establishes policies and procedures and assigns responsibilities to ensure the effective management of emergency operations within the county. The County's Office of Emergency Services (OES) implements the EOP and activates the Emergency Operations Center (EOC).

The EOC provides a central location of authority and information and allows for face-to-face coordination among personnel who make emergency decisions. The following functions are performed in the San Mateo County Operational Area EOC:

- Coordinating emergency operations
- Releasing warning information
- Developing emergency policies and procedures
- Collecting and sharing information with county, city/town, special district, State agencies, military, federal agencies, and political representatives
- Maintaining maps, information display boards, and other data pertaining to emergency operations
- Analyzing and evaluating all data pertaining to emergency operations
- Directing and coordinating support of emergency response resources
- Maintaining contact and coordination with Disaster Operations Centers, other local government EOCs, and the Coastal Region
- Providing emergency information and instructions to the public, making official releases to the news media and the scheduling of press conferences as necessary

The County's EOP is supplemented by the Town of Atherton EOP, as they work in conjunction with one another depending on the type of emergency. Any emergencies at the Town level are addressed through implementation of the Atherton EOP, such as a local fire or flood. Should these emergencies escalate or spread beyond the Town's limits or require greater capabilities then the Town can provide, San Mateo County and neighboring jurisdictions would get involved assisting with emergency response and aid.

San Mateo County Emergency Managers Association

The San Mateo County Emergency Managers Association (SMCEMA) is composed of Emergency Managers/Representatives from cities, towns, county departments, special districts, and community organizations within San Mateo County and is intended to support emergency management, training, and exercise planning.

Countywide Hazardous Materials Emergency Response Team

Hazardous materials response, mitigation, and cleanup for San Mateo County is managed by the Belmont Fire Protection District's Hazardous Materials Team through a contractual agreement between the County of San Mateo, the Emergency Services Council, and the Belmont Fire Protection District.[1]

San Mateo County Sheriff's Office Emergency Services Bureau

The Sheriff's Office Emergency Services Bureau is composed of sworn specialized units and volunteer forces to respond to emergency law enforcement activities, search and rescue missions, evidence searches, and requests for mutual aid. San Mateo County Search and Rescue (SMCSAR) is a professional volunteer force of the San Mateo County Sheriff's Emergency Services Bureau.

Disaster Debris Management Plan

Disasters can produce substantial volumes of debris, creating hazardous conditions that endanger the public and disrupt the essential daily lifestyle and economy of the community. The County of San Mateo Disaster Debris Management Plan (DDMP) provides a comprehensive framework for management of debris following a disaster. It addresses the roles and responsibilities of government organizations as well as private firms and nongovernmental organizations that might have a role in debris operations.[2] The County's Public Works Department serves as the lead department for debris management for unincorporated areas of the county.

The Town of Atherton does not have a publicly available plan for disaster debris removal at this time.

County of San Mateo Health System

The County of San Mateo Health System operates Emergency Medical Services (EMS), which provides emergency medical resources in response to 911 calls countywide. As of 2019, EMS responded to 90 percent of requests for advanced life support within 6 minutes and 59 seconds in metro and urban areas and 11 minutes and 59 seconds in suburban and rural areas. EMS responded to 90 percent of ambulance transport requests within 12 minutes and 59 seconds in metro and urban areas and 19 minutes and 59 seconds in suburban and rural areas.

The health emergency preparedness unit (HEP) strengthens the community's ability to respond to all types of public health and medical incidents. The HEP team continually collaborates with community stakeholders and organizations to facilitate response and recovery for public health and medical emergencies.

The San Mateo County Healthcare Coalition (HCC) coordinates strategic planning activities between healthcare facilities of various healthcare delivery sectors, public health agencies, other government entities, and community partners to prepare for, respond to, and recover from emergencies and other incidents that impact public health. San Mateo County Emergency Medical Services Agency uses ReddiNet as its countywide emergency communications system. ReddiNet allows the County to track hospital status, mass casualty incidents, hospital bed count, and facility assessments and to locate family members through access to the Family Reunification Center.

The Menlo Park Fire Protection District provides emergency medical services to residents and businesses in Atherton.

Mutual-Aid Agreements

In some cases, local emergency responders may not have the staff, vehicles, equipment, or other resources to fully respond to an emergency in their jurisdiction. In these instances, the local emergency commanders can request assistance from other communities. This external assistance is known as mutual aid. The California Disaster and Civic Defense Master Mutual Aid Agreement, an arrangement between State agencies and local governments, establishes a framework for mutual aid.

Mutual-aid regions are established under the Emergency Services Act. Six mutual-aid regions numbered I-VI have been established within California. The San Mateo County Operational Area is part of the Mutual Aid Region II and the Coastal Administrative Region.

Town Plans and Initiatives

Menlo Park Fire District

Fire protection for Atherton is provided by the Menlo Park Fire District; a special district that serves the cities of Menlo Park, Atherton, East Palo Alto, and portions of San Mateo County. Backup assistance for the Fire District is available through mutual-aid agreements. All fire agencies in San Mateo County have signed the California Master Mutual Aid Agreement and participate in mutual-aid operations as required. The Menlo Park Fire District also has specific mutual-aid agreements with the cities of Palo Alto and Redwood City.

The Fire District actively works to prevent structural and wildfires through its regulations, education, and training programs. Some of these programs are residential and commercial fire sprinkler requirements, plan review of new construction, periodic inspection of commercial buildings, weed abatement, defensible spaces, home ignition zones, and disaster and emergency preparedness.

There are seven stations within the Fire District's boundaries. Each station houses a fire engine staffed with a crew of three, which includes a Fire Captain, Fire Engineer, and Firefighter/Paramedic. The Town of Atherton is served by Station 3, located in Atherton on Almendral Avenue.

The Menlo Park Fire District sponsors several programs that are designed to improve emergency effectiveness and resilience.

- *Apparatus Maintenance/Fleet Maintenance* -This program's goal is to minimize the number of apparatuses that are out of service at any given time. Staff complies with the maintenance policy and procedure manual by providing regular inspections and following a preventive maintenance plan that will ensure that this goal is achieved.
- *Community Disaster Preparedness* - This program improves community disaster preparedness through training and education. This provides residents with the basic skills necessary to react to emergencies.
- *District Disaster Preparedness* - This program plans and coordinates the Fire District's emergency preparedness for all four jurisdictions that the District serves. It involves developing and updating the EOP and Resources Directory. The Division Chief of Operations will develop and manage the Fire District's Emergency Command & Communications Center and will also act as a liaison to local, county, and State agencies to plan and coordinate disaster events.

Town of Atherton Police Department

The department provides a full range of police services to the Town. The department is divided into seven divisions: Administration, Communication and Records, Investigations, K-9, Patrol, Property/Evidence, and Traffic. These departments provide the leadership and development of the department, monitor and respond to emergency calls and alarms, patrol the Town and enforce traffic laws, investigate crimes, and protect the citizens of Atherton.

Atherton Disaster and Preparedness Team (A.D.A.P.T.)

An all-volunteer group of concerned Atherton residents formed the Atherton Disaster and Preparedness Team (A.D.A.P.T.) to collaborate with Town officials, Menlo Park Fire, Atherton Police, and other professional emergency responders and the California State "Get Ready" and FEMA's/US Citizens' Corps programs to help organize, train, educate, communicate with, and aid fellow Atherton community

members in preparing for major emergencies and natural disasters. A.D.A.P.T is sponsored by the Atherton Police Department and is linked to the Menlo Park Fire Protection District's Community Crisis Management (CCM)/Community Emergency Response Team (CERT) Program.

Community Emergency Response Team Program

The CERT team is a community-based network of volunteers that assist the Town's emergency departments during public safety and health efforts in times of emergency needs and disasters. Each neighborhood within the jurisdiction has trained CERT leaders and CERT members, who have agreed to volunteer their aid during a disaster. These CERT members are contacted during an incident and asked to convene at a designated rally point, where they set up a command structure and use equipment to provide Community and Public Safety support as needed. CERT members are prepared for all forms of disaster, but focus primarily on earthquake, flood, tsunami, wildfires, and power outages. They are trained to support communications, gather information, provide basic medical services, and offer general disaster preparedness classes.

Town of Atherton Emergency Operation Plan

The Town's EOP (last updated in 2022) provides a guide for managing Town services and coordinating response in the event of an emergency. Contents of the EOP include general and specific event checklists, emergency management goals, and directions for activating the Town's EOC.

Future Conditions

Climate change is expected to affect the frequency and severity of future natural hazards in Atherton, necessitating an adapted approach to emergency preparedness and response. Please review the Atherton Vulnerability Assessment for more information about how climate change is likely to affect individual hazards.

ISSUE 2: SEISMIC HAZARDS

General Overview

The seismic hazards with the potential to affect the Town include ground shaking, ground failure, tsunami, seiche, dam failure, slope instability, land subsidence, and liquefaction.

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. This energy can be generated by a sudden dislocation of the crust or by a volcanic eruption. Most destructive quakes are caused by dislocations of the crust as stress builds up along sections of the crust. When the stress exceeds the strength of the rocks or the friction holding the halves of the fault together, the crust breaks and snaps to a new position. In the process of breaking, vibrations called "seismic waves" are generated. These waves travel outward from the source of the earthquake at varying speeds.

Geologists have found that earthquakes reoccur along faults, which are zones of weakness in the earth's crust. When a fault experiences an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake can still occur. In fact, relieving stress along one part of a fault may increase it in another part. California is seismically active because of movement of the North American Plate and the Pacific Plate to the west. The major boundary between these plates, the San Andreas Fault, runs through San Mateo County. The majority of the seismic hazards are on well-known active faults. However, inactive faults, where no displacements have been recorded, also have the potential to cause earthquakes.

The sliding movement of the surface of the earth on either side of a fault is called fault rupture. Fault rupture begins below the ground surface at the earthquake hypocenter, typically between 3 and 10 miles below the ground surface in California. If an earthquake is large enough, the fault rupture will travel to the ground surface, potentially destroying structures built across its path.

Faults are more likely to experience earthquakes if they have more rapid rates of movement, have experienced recent earthquakes, experience greater total displacements, and are aligned so that movement can relieve the accumulating tectonic stresses. Geologists classify faults by their relative hazards. "Active" faults, which represent the highest hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 11,000 years). "Potentially active" faults are those that displaced layers of rock from the Quaternary period (the last 1,800,000 years).

Earthquake Classification

Earthquakes are typically classified by the amount of energy released, measured as magnitude, or by the impact on people and structures, measured as intensity.

Magnitude

An earthquake's magnitude is a measure of the energy released at the source of the earthquake. Magnitude is commonly expressed by ratings on the moment magnitude scale (Mw), the most common scale used today.[3] This scale is based on the distance a fault moved and the force required to move it. The scale is presented in Table 1.

Table 1: Moment Magnitude Scale

Classification	Magnitude
Great	8 or greater
Major	7.0 to 7.9
Strong	6.0 to 6.9
Moderate	5.0 to 5.9
Light	4.0 to 4.9
Minor	3.0 to 3.9
Micro	Less than 3.0

Intensity

The most commonly used intensity scale is the modified Mercalli intensity scale. Ratings of the scale as well as the perceived shaking and damage potential for structures are shown in Table 2. The modified Mercalli intensity scale is generally represented visually using shake maps, which show the expected ground shaking at any given location produced by an earthquake with a specified magnitude and epicenter. The intensity of an earthquake varies depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust. A shake map shows the variation of ground shaking in a region immediately following significant earthquakes.

Table 2: Mercalli Scale and Peak Ground Acceleration Comparison

Modified Mercalli Scale	Perceived Shaking	Potential Structure Damage	
		Resistant Buildings	Vulnerable Buildings
I	Not felt	None	None
II to III	Weak	None	None
IV	Light	None	None
V	Moderate	Very Light	Light
VI	Strong	Light	Moderate
VII	Very Strong	Moderate	Moderate/Heavy
VIII	Severe	Moderate/Heavy	Heavy
IX	Violent	Heavy	Very Heavy
X to XII	Extreme	Very Heavy	Very Heavy

Fault Locations

San Mateo County is in a region of high seismicity because of the presence of the San Andreas Fault that bisects the county, the Hayward Fault across the bay to the east, and the San Gregorio Fault to the west (see Figure 1). The primary seismic hazard for the county is potential ground shaking from these three large faults. Of these three faults, Atherton is closest to the San Andreas Fault.

San Andreas Fault

The San Andreas Fault spans the boundary of the Pacific and North American plates, running 810 miles from the Gulf of California through the Mendocino fracture zone off the shore of northern California.

The San Andreas Fault has three segments. The southern segment extends from the Gulf of Mexico to Parkfield, in Monterey County. The central segment extends from Parkfield to Hollister, in San Benito County. The northern segment extends northwest from Hollister, through San Mateo County, including Daly City and San Bruno, to its junction with the Mendocino fracture zone and the Cascadia subduction zone in the Pacific Ocean. The San Andreas Fault has a 21 percent chance of generating a magnitude 6.7 or greater earthquake in the next 30 years.

A rupture along the peninsula would cause extremely violent ground shaking throughout the county. The bay margins are likely to experience liquefaction in a major earthquake. The Town is approximately 5 miles from the San Andreas Fault.

Hayward Fault

The Hayward Fault is a 45-mile-long fault that parallels the San Andreas Fault in the East Bay. The Hayward Fault extends through some of the Bay Area's most populated areas, including San Jose, Oakland, and Berkeley.

The Hayward Fault has a 31 percent chance of producing a magnitude 6.7 or greater earthquake in the next 30 years. An earthquake of this magnitude has regional implications for the entire Bay Area, as the Hayward Fault crosses numerous transportation and resource facilities, such as highways and the Hetch Hetchy Aqueduct. Disruption of the Hetch Hetchy system has the potential to severely impair water service in San Mateo County. The Hayward Fault is increasingly becoming a hazard priority throughout the Bay Area because of its increased chance for activity and its intersection with multiple highly populated areas and critical facilities. Atherton is approximately 14 miles from the Hayward Fault.

San Gregorio Fault

The San Gregorio Fault is a northwest-trending, right-lateral slip deformation near the western edge of San Mateo County, crossing briefly over uninhabited land in San Mateo County around Pillar Point at Half Moon Bay. The fault runs from southern Monterey Bay through Bolinas Bay, where its north section intersects with the San Andreas Fault offshore north of San Francisco. San Gregorio is the principal active fault west of the San Andreas Fault for the Bay Area region.

The San Gregorio Fault is one of the less studied fault lines, the result of its primary location offshore and its proximity to the better-known San Andreas Fault and Hayward Fault. Its probability of experiencing a magnitude 6.7 or greater earthquake within the next 30 years is 6 percent—significantly less than San Andreas Fault or Hayward Fault. However, the location of the fault poses a significant threat to San Mateo County. The Town is approximately 14 miles from the San Gregorio Fault.

Earthquake-Related Hazards

According to the U.S. Geological Survey (USGS) Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may affect people's normal activities. In addition to shaking and surface rupture, this can also include landslides (discussed separately), liquefaction, and tsunamis.

Ground Shaking

The primary seismic threat to the Town of Atherton is represented by the San Andreas Fault and its attendant rift valley, which lies approximately five miles to the west of the Town. This fault has a long history of earthquake activity. While there are no known active or potentially active faults within the Town, it is subject to periodic, very strong earthquakes that originate either on the San Andreas Fault or from the Hayward and Calaveras Faults in the East Bay. Most geologists agree that an earthquake of comparable magnitude to the 1906 San Francisco earthquake (7.79 Mw) may well be experienced by the current generation of Bay Area residents. According to the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3), the San Andreas Fault has a 6.5 percent chance of causing an earthquake with magnitude greater than 6.7 in northern California within the next 30 years.

The main effect of such an earthquake throughout the entire Town will be sudden strong ground shaking, which could last one minute or more during a severe earthquake. This ground shaking can damage or collapse buildings or other structures, creating a hazardous situation.

Ground Failure

Seismically induced ground failure refers to mudslides, landslides, liquefaction, or soil compaction caused by a seismic event. The California Department of Conservation has mapped areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation would be required. Mitigation in this context means those measures that are consistent with established practice and that will reduce seismic risk to acceptable levels.

Tsunami

A tsunami is a series of high-energy waves that radiate outward like pond ripples from an area where a generating event occurs, arriving at shorelines over an extended period. Tsunamis can be induced by earthquakes, landslides, and submarine volcanic explosions. Tsunamis are typically classified as local or distant, depending on the location of their source in comparison to waves.

In the open ocean, a tsunami may be only a few inches or feet high, but it can travel with speeds approaching 600 miles per hour (mph). As a tsunami enters the shoaling waters near a coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. At the shoreline, tsunamis may take the form of a fast-rising tide, a cresting wave, or a bore (a large, turbulent wall-like wave). The first wave is usually followed by several larger and more destructive waves.

The configuration of the coastline, the shape of the ocean floor, and the characteristics of advancing waves play important roles in the destructiveness of tsunami waves. At some locations, the advancing turbulent wave front will be the most destructive part of the tsunami wave. In other situations, the greatest damage will be caused by the outflow of water back to the sea between crests, sweeping away items on the surface and undermining roads, buildings, bulkheads, and other structures. This outflow action can carry enormous amounts of highly damaging debris, resulting in further destruction. Ships and boats may be forced against breakwaters, wharves, and other craft, or be washed ashore and left grounded after the withdrawal of the seawater.

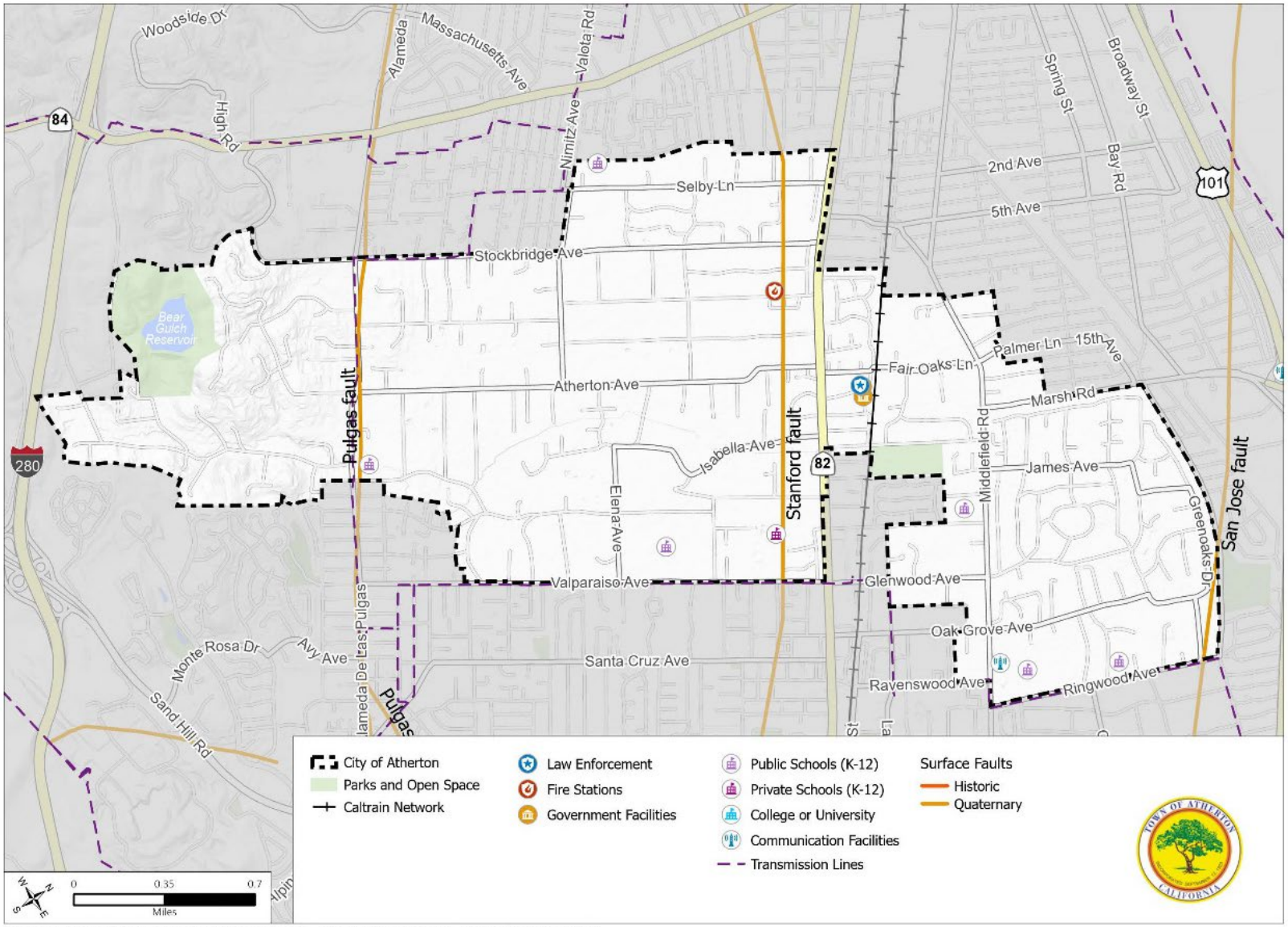
There is a tsunami warning system for the Pacific Ocean, involving 26 countries with numerous seismic stations, water level stations, and information distribution centers. The warning centers issue tsunami watches, warnings, and advisories. A watch is issued when a large earthquake has occurred far away from the region and the threat is still being determined. The warning system is activated when a Pacific basin earthquake of magnitude 6.5 occurs or an earthquake is widely felt along the North American coast.

CalOES has prepared a series of maps showing the potential inundation line for a tsunami runup along the San Francisco Bay shoreline from a number of extreme, yet realistic, tsunami sources. Under these scenarios, a runup of approximately 4 feet at Ravenswood Point (East Palo Alto) could occur, as estimated by the California Geological Survey. The inundation line runs approximately 0.5 to 1 mile northeast of the dike protecting the east Menlo Park and Redwood City industrial area. As the inundation line is approximately 1 to 1.5 miles northeast of the Atherton Town Limit along Bay Road, there appears to be little chance that a tsunami would affect land within the Town. Further since the inundation line is located approximately 0.5 to 1 mile northeast of US Highway 101 there appears to be little chance that a tsunami would affect that major evacuation route. Tsunami inundation mapping places the closest inundation line approximately 0.7 miles northeast of the Town limits on Bay Road along SR-84. This indicates that there is little chance that a tsunami would affect the Town and US Highway 101, which is a major evacuation route for the region.

Seiche

Seismic seiches (sloshing) are standing waves set up on rivers, reservoirs, ponds, and lakes when seismic waves from an earthquake pass through the area. A seiche can overflow or even erode an embankment, potentially releasing significant volumes of water that could flood and damage developed areas downstream. Bear Gulch Reservoir is the only body of water within Atherton large enough to be subject to a seiche. A potentially damaging seiche at this location could adversely impact properties and developments downstream. For additional information, refer to the dam inundation discussion.

Figure 1: Regional Faults



Source: ESRI, 2023; County of San Mateo, 2023; PlaceWorks, 2023; USGS, 2020

Landslides

Landslides include all movements of soil, rock, or debris as a result of falling, sliding, or flowing. Most landslides are a combination of two or more types of motion and/or material. Landslides are categorized according to the types of motion and material involved. They can be caused by earthquakes or saturated soil from heavy rainfalls.

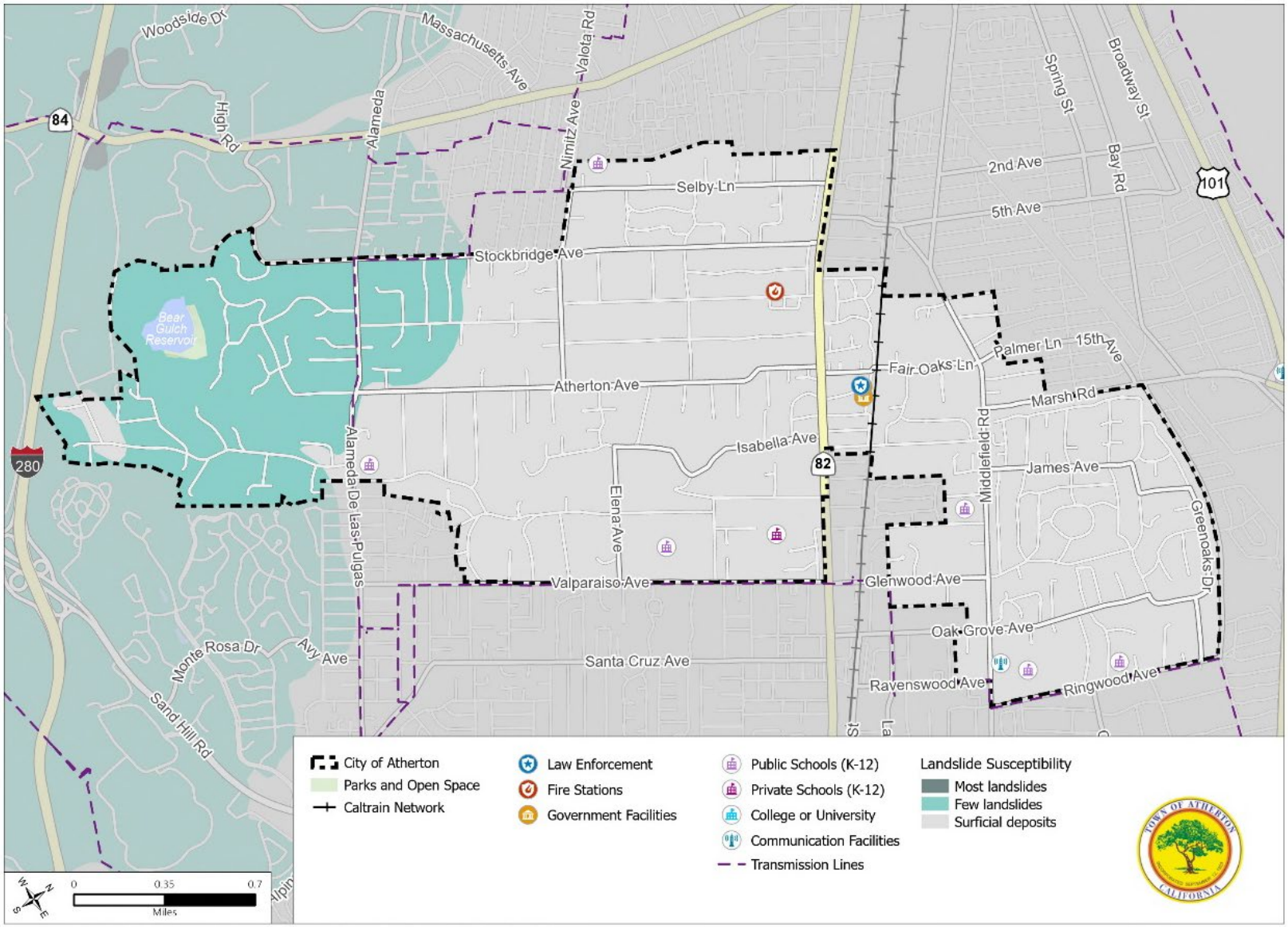
Much of the land surface in Atherton is relatively flat and not subject to slope instability. However, land west of Alameda de las Pulgas is steeper and therefore subject to slope instability. Figure 2 identifies the landslide hazard areas identified within the Town.

Liquefaction

Soil liquefaction occurs when water-saturated sands, silts, or gravelly 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 load-bearing 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.

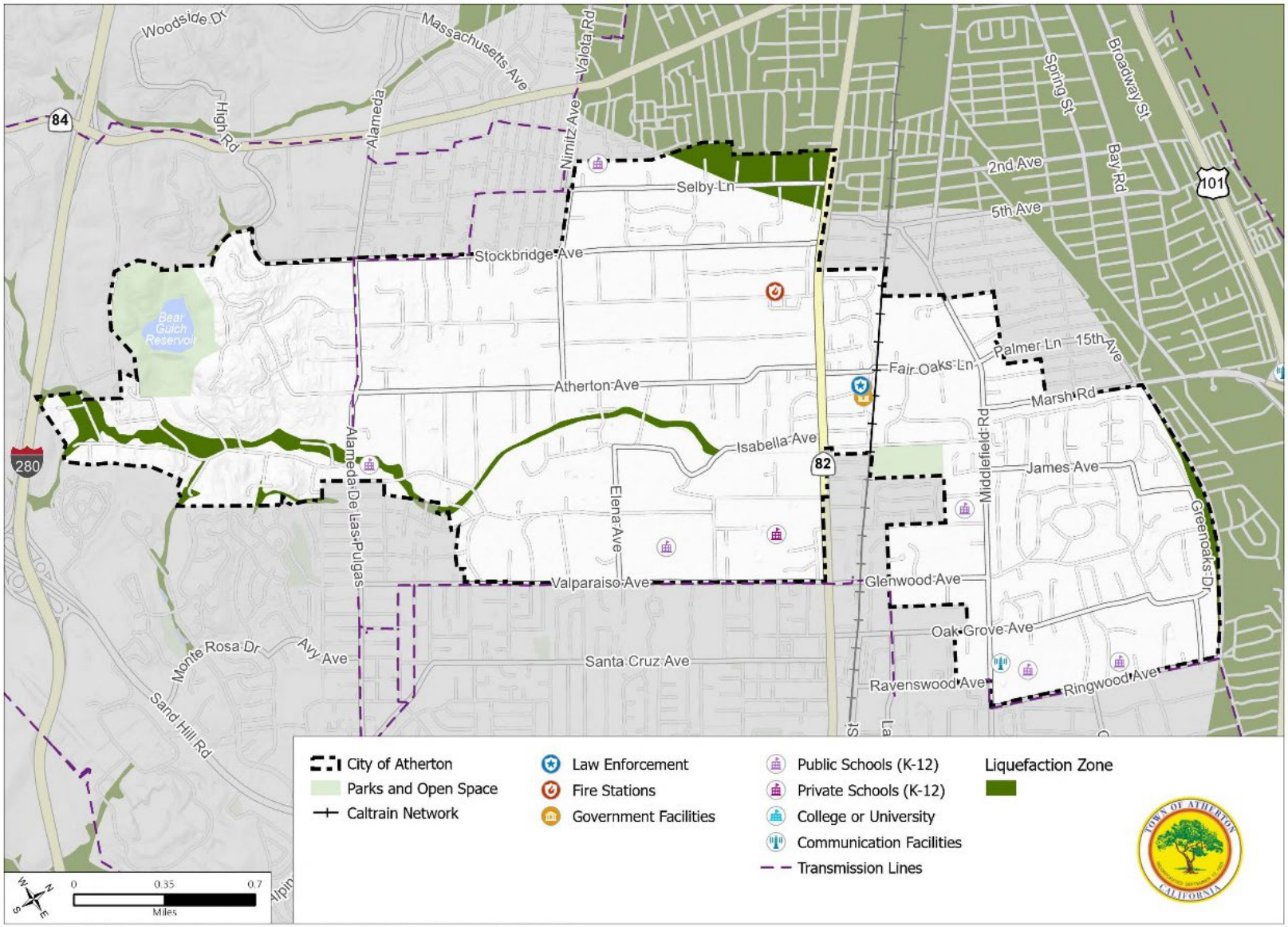
A map produced by the Association of Bay Area Governments (ABAG) identifies liquefaction susceptibility hazards in Atherton. In general, the area of Atherton northeast of a line formed by Euclid Avenue/Monte Vista Avenue/Camino por los Arboles has a “moderate susceptibility” to landslides and the narrow band of land adjacent to the Atherton Channel has a “very high susceptibility.” Most of the Town is characterized as having a “very low to low susceptibility.” Figure 3 depicts these zones within the Town.

Figure 2: Landslide Hazard Areas



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

Figure 3: Liquefaction Hazard Areas



Source: ESRI, 2023; County of San Mateo, 2023; PlaceWorks, 2023; **CGS, 2021**

Past Events

Table 3 lists recent earthquakes with a magnitude of 5.0 or greater within 100 miles of San Mateo County. The last significant (greater than magnitude 6.0) seismic event in the San Mateo vicinity was the 7.1 magnitude San Andreas Loma Prieta Earthquake in 1989, which originated 10 miles northeast of Santa Cruz. Other significant local earthquakes include the 1906 earthquake in San Francisco and the 2014 Napa earthquake. Although the 1906 earthquake is most associated with the City of San Francisco, San Mateo County was also greatly affected.

Table 3: Recent Earthquakes Magnitude 5.0 or Larger Within 100-Mile Radius of San Mateo County

Date	Magnitude	Epicenter Location
3/22/1957	5.3	Daly City
3/31/1986	5.70	12 miles east-northeast of Milpitas, CA
10/17/1989	7.1	10 miles northeast of Santa Cruz, CA
9/3/2000	5.17	8 miles northwest of Napa, CA
8/10/2001	5.50	9 miles west of Portola, CA
10/31/2007	5.6	10 miles northeast of San Jose, CA
8/24/2014	6.0	6 miles southwest of Napa, CA

Regarding landslide events, no events of significance have been identified within the Town of Atherton.

Regulatory Framework

Chapter 15.44.010 of the Town's Municipal Code, Adoption of the California Existing Building Code, establishes the code for the maintenance of existing buildings and structures throughout Atherton that are constructed of unreinforced masonry and establishing a program for the same. This seismic hazard reduction program is consistent with California Health and Safety Code Sections 19160 through 19168 and Government Code Sections 8875 through 8878. This program is designed to promote public safety by identifying those buildings in the Town of Atherton that exhibit structural deficiencies in their capacities for earthquake resistance, and by determining the severity and extent of those deficiencies in relation to their potential for causing injury or loss of life.

Title 15.04.010 contains requirements pertaining to excavation, grading, filling, and clearing. This section of the Atherton Municipal Code references the California Building Code, which is used as the primary guidance for building sites within the Town. The Town actively enforces regulations related to erosion and sedimentation control. Development projects, especially those involving grading, excavation, and vegetation removal, require preparation of erosion and sediment control plans in compliance with local and regional regulations and subject to local review.

Future Conditions

THE FREQUENCY AND SEVERITY OF FUTURE SEISMIC HAZARDS IN ATHERTON IS EXPECTED TO CONTINUE. ISSUE 3: FLOODING

General Overview

Flooding is the rising and overflowing of a body of water onto normally dry land. Flooding can be extremely dangerous, and even six inches of moving water can knock a person over in a strong current. 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. Floodwaters can damage buildings and infrastructure, carry off structures or vehicles, and bury property under sediment. Standing water can cause damage to roads, foundations, and electrical circuits, as well as spread vector-borne illnesses. Other problems connected with flooding and stormwater runoff include erosion, degradation of water quality, and loss of environmental resources.

Floods are usually caused by large amounts of stormwater, either from a period of very intense precipitation or a long period of steady precipitation. There are four types of flooding that primarily affect San Mateo County:

- Riverine flooding, the most common type of flood event, occurs when a watercourse such as a stream or creek overruns its banks.
- Stormwater flooding, sometimes called "ponding," occurs when rainfall and runoff accumulates in low-lying areas or areas with insufficient drainage, forming standing water.
- Flash floods are sudden events, typically caused by intense and localized storms. There is often little or no warning of flash floods, making them particularly dangerous.
- Coastal floods occur when the ocean inundates normally dry lands by ocean waters, often a result of storm surges, tsunamis, or extreme high tide events.

Another form of flooding, dam failure, is discussed in greater detail later in this report.

FEMA Regulatory Flood Zones

Flood hazard areas, also called floodplains, are the areas that become inundated by a flood. They are usually adjacent to rivers, creeks, or lakes, or along the ocean. Floodplains are officially mapped by FEMA, using maps called Digital Flood Insurance Rate Maps (DFIRMs). The two main floodplains of concern are the 100- and 500-year floodplain. The 100-year floodplain is the area that has a 1 percent (1 in 100) chance of being flooded in any given year, also known as a base flood. The 500-year floodplain is the area that has a 0.2 percent (1 in 500 chance) of being flooded in any given year.

There are no FEMA-identified flood hazard areas in Atherton. The Town has chosen not to participate in the National Flood Insurance Program.

The primary waterway in Atherton is the Atherton Channel. The headwaters of the Atherton Channel originate west of I-280 in the hillside area of the Town of Woodside. Just east of US Highway 101 and north of Marsh Road, the Atherton Channel converges with the Bayfront Canal near the border between Redwood City and Menlo Park and empties into San Francisco Bay through a tide-control structure not far

from Bedwell Bayfront Park. There are areas within the Town, due to their proximity to the Atherton Channel or in portions of the lower-lying Lindenwood neighborhood, which require raised finished floor elevations (typically by approximately 1 foot) during new construction, as recommended by the project engineer based on studies required by the Town during the grading and drainage plan review process.

Flooding has not presented a significant, extensive hazard in Atherton in the past, although there have been numerous recurring localized areas of flooding. The 2015 Town-wide Drainage Study, an update to Atherton's 2001 Drainage Study, identified 17 flooding complaints from building floods, saturated or clogged drywell, channel or ditch overflow, driveway and intersection floods, and storm system overflow or clog. This was a significant improvement from the 2001 Study, which identified 97 flooding complaints. By 2014, the Town had implemented 26 of the 55 improvement projects identified in the 2001 Drainage Study. The Town adopted drainage design criteria in 2013 to reduce peak stormwater flows and improve water quality

Atherton entered into a partnership with the jurisdictions of Redwood City, Menlo Park, and San Mateo County to complete the planning and construction for the Bayfront Canal/Atherton Channel Flood Protection and Restoration Project in 2022. The Atherton Channel and Bayfront Canal watersheds have experienced decades of repetitive flooding in the lower reaches of the channels, including some that have flooded 40 times over the past 70 years. The project collects stormwater runoff from the cities of Menlo Park and Redwood City, towns of Atherton and Woodside, and unincorporated parts of San Mateo County. The project is relatively small but significant and shows how beneficial these mitigation projects can be. The area did not flood during the 2023 winter storms, while a mobile-home park in Belmont that is outside of the project area and has not yet been protected had significant flooding during these storms.

The use of green infrastructure techniques and systems can help to reduce the impacts of localized flooding associated with stormwater runoff, the Atherton Channel, and Bayfront Canal, while also assisting the Town in satisfying the provisions of the Town's Municipal Regional Stormwater Permit.

Principal Flooding Sources

Natural stream channels in rural parts of San Mateo County can typically accommodate average rainfall amounts and mild storm systems. However, severe floods can occur in years of abnormally high rainfall or unusually severe storms.

Historically, the Atherton Channel, like many of the smaller creeks in the area, did not have a permanent channel extending all the way downstream to the bay. Most years, the small flows soaked into the ground, and only during floods did the flow remain on the surface all the way to the bay. Urbanization and development created impervious surfaces, which led to the need for controlled drainage facilities to dispose of stormwaters. Prior to 1958, drainage facilities were constructed along the historic floodways as development proceeded. Developers that originally subdivided the land from large estates installed many of the facilities. The Town formed the Atherton Channel Drainage District in 1958 to construct and maintain stormwater collection facilities in areas determined to be in the local stream floodplain. The District boundaries include most of the Town south of Atherton Avenue, a portion of unincorporated University Heights, and small areas of the City of Menlo Park and Town of Woodside.

Dam Failure

The Bear Gulch Reservoir Dam is the only dam in Atherton and is large enough to endanger lives and property in the event of a failure. A seismic event could cause the dam to fail and endanger an estimated population of approximately 1,000 people, according to the Atherton EOP. The floodplain that would result from catastrophic failure of this dam has been mapped by the California Water Service Company (Cal Water), which owns the dam. The map is on file with CalOES.

The California Division of Safety of Dams (DSOD, a division of the Department of Water Resources [DWR]), routinely and periodically inspects the dam for performance and problem identification. If DSOD identifies a problem that could lead to failure potential, the dam owner takes mitigating actions such as reducing the water level to avoid catastrophic loss of water or other actions specified in that dam's Emergency Action Plan.

The Atherton neighborhood most seriously threatened by dam failure is the Walsh Road neighborhood. Walsh Road, a narrow, two-lane residential street that intersects with Alameda de las Pulgas, is the only primary evacuation route for this neighborhood. Two other evacuation routes have been identified: a road at the end of Reservoir Road connecting to Moore Road with a gate that must be opened by Cal Water employees, and a pedestrian-only exit using the horse tunnel from Valley Court underneath I-280.

In the event of a fire or flood, a warning siren has been installed at the Cal Water facility on Reservoir Road. The siren can be activated by the Fire District or Police Department to advise residents that an evacuation should take place.

Past Events

Table 4 lists recent San Mateo County flood events identified in the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) Severe Storms Database (dating back to 1996), as well as previous flood events affecting the county for which federal disaster declarations were issued. For these flood events, the table identifies the number of the disaster declaration (DR-##). Several of these events affected parts of Atherton.

Table 4: History of Recent Flood Events

Date	Event	Locations
December 31, 2005	Flood	Countywide
January 20, 2010	Flood	Atherton, Countywide
February 6, 2015	Flood	Atherton, West Menlo Park
December 2015/January 2016	Flood	Countywide
February 7, 2017	Flood	Atherton
April 7, 2018	Flood	Countywide
January 16, 2019	Flood	Atherton
January 16, 2020	Flood	Atherton, Belmont, Colma, Henderson, Lomita Park, Bayshore
December 13, 2021	Flood	Countywide
January 9, 2023	Flood	Atherton, Countywide

December 31, 2005

Widespread flooding occurred throughout San Mateo County as a result of small stream overflow and poor drainage. Most damage occurred in San Bruno, East Palo Alto, the City of San Mateo, Daly City, Colma,

Brisbane, South San Francisco, and Pacifica. Approximately three inches of rain fell on the area over a 24-hour period.

January 20, 2010

A significant storm brought strong winds and heavy rain to the San Francisco and Monterey Bay areas. This storm developed over the Pacific Ocean with a strong parent low pressure based in the Gulf of Alaska. Areas of flooding occurred, causing problems mainly for vehicles. Heavy rain induced Pulgas Creek to overflow its banks and flood some classrooms at Central Middle School in San Carlos. Also, several streets were blocked off in low-lying areas just west of US Highway 101, including Taylor Avenue in San Carlos and parts of Rolison Road in Redwood City. In Atherton, officials closed March Road from Middlefield Road to Fair Oaks Avenue because a creek had begun to flood. Heavy rain caused Harbor Boulevard at the underpass of State Route 82 to flood, submerging a car to the base of its windows. The road was barricaded to stop anyone else from driving into the water. Belmont Creek flooding led to evacuation of a car repair business as 3 inches of water covered the floor.

February 6, 2015

A strong winter storm impacted California following nearly a month and a half of no rain and the driest January on record. The storm brought heavy rain, gusty winds, and damage to trees and power lines, along with some minor flooding of urban areas. Rainfall amounts were heaviest in the mountains, with 5 to 10 inches or more occurring. Heavy rain resulted in flooding of the southbound US Highway 101 offramp in Atherton.

December 2015/January 2016

A series of storms caused widespread flooding throughout San Mateo County. San Mateo County Department of Public Works and various communities set up two dozen sites where community members could pick up free sandbags to reduce the impacts of flooding.

February 7, 2017

A large winter storm caused the Atherton Channel, which flows into the Bayfront Canal, to flood and resulted in Marsh Road near the US Highway 101 exit to become inundated.

January 16, 2019

A major storm brought rain and water to Atherton and the surrounding region, which caused flooding and damage throughout the county.

December 13, 2021

An atmospheric river impacted the Bay Area on December 31, 2021, resulting in significant rainfall across the San Francisco Bay Area. During the morning, a surface low developed west of San Francisco and the river stalled over the Bay Area. This resulted in significant rainfall totals for many Bay Area communities. Most notably, downtown San Francisco received 5.46 inches of rain, which is the second-wettest day on record. The Oakland Museum received its wettest day since records began in 1970, with 4.75 inches of rain.

January 9, 2023

Week-long storms brought massive amounts of water to the Bay Area and San Mateo County. Flooding led to rescues, road closures, and more. In Atherton, downed trees damaged powerlines on Atherton Avenue and caused a road closure from Alameda de las Pulgas to Ridgeview Drive. Las Lomitas Elementary School

saw 20 indoor spaces damaged by flooding, and Menlo-Atherton High School experienced some exterior flooding.

Regulatory Framework

Flood Control Agencies and Activities

Agencies responsible for flood control in San Mateo County include the Unites States Army Corps of Engineers, San Mateo County Flood Control District, San Francisco Public Utilities Commission (SFPUC), Federal Insurance Administration, and the DWR.

Atherton participates in the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), a partnership of the City/County Association of Governments (C/CAG), each incorporated city and town in the county, and the County of San Mateo, which all share a common National Pollutant Discharge Elimination System (NPDES) permit. As required by the permit, the SMCWPPP requires activities to reduce water pollution related to construction sites, industrial sites, illegal discharges and illicit connections, new development, and municipal operations. The permit also requires a Green Infrastructure Plan, 10 public education programs, implementing targeted pollutant reduction strategies, and a monitoring program to help characterize local water quality conditions and to begin evaluating the overall effectiveness of the permit's implementation.

California Green Building Code

The Town adopted the California Green Building Code in 2022 (Section 15.19.010). The purpose of the Green Building Code is to guide the identification, implementation, tracking, and reporting of green infrastructure projects within the Town. This building code is adopted for the Town for regulating, improving public health, safety, and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact for all buildings and structures. The code provides measures such as stormwater drainage and retention systems during construction to prevent flooding of adjacent properties and prevent pollution from storm water runoff by retaining soil on-site or by providing filtration to restrict sedimentation from reaching the stormwater drainage systems and receiving water bodies.[4]

Stormwater Infrastructure

The Town has a Storm Drain Master Plan, updated in 2015, that guides the development of a comprehensive approach to storm drain facilities. The Town has a mixture of drainage facilities ranging from traditional storm drains and developed channels to dry pits that percolate storm flows. Developers that originally subdivided the land from large estates installed many of the facilities. The Town and the Flood Control District that owns and operates Atherton Channel have constructed other portions of the existing system.

Town Plans and Regulations

The Town requires that developments adhere to building codes through its Municipal Code, such as drainage requirements that protect from inundation and other flood hazards (Section 16.32.050), or height measurements and requirements for buildings to be constructed above minimum flood levels (Section 17.42.020)

Green Infrastructure Plan

The Green Infrastructure Plan guides the identification, implementation, tracking, and reporting of green infrastructure projects within the Town of Atherton in accordance with the requirements of the Town's Municipal Regional Stormwater Permit, Order No. R2-2015-0049, adopted by the San Francisco Bay Regional Water Quality Control Board on November 15, 2015. These projects are especially important when they involve the creation or modification of impervious surfaces (asphalt, concrete, rooftops) as this directly affects the ability of an area to absorb water or redirect waters into storm drain infrastructure reducing flooding in these areas. "Green infrastructure" refers to stormwater infrastructure that uses vegetation, soil, and natural processes to manage water and create healthier urban environments.

Future Conditions

Climate change is expected to affect the frequency and severity of future flood hazards in Atherton. Please review the Atherton Vulnerability Assessment Report for details.

ISSUE 4: FIRE HAZARDS

General Overview

Fire hazards include both wildfires and urban fires. The combination of complex terrain, Mediterranean climate, and productive natural plant communities, along with ample natural ignition sources, has created conditions for extensive wildfires. Historically, the fire season extended from early summer through late fall of each year during the hotter, dryer months, although it is increasingly a hazard that can occur year-round. Fire conditions arise from a combination of high temperatures, low-moisture content in the air and plant matter, an accumulation of vegetation, and high winds.

Wildfire/Wildland-Urban Interface

Wildfire is any uncontrolled fire on undeveloped land that requires fire suppression. Wildfires can occur naturally and are important to many ecosystem processes; however, most are started by people. Wildfires occur on mountains, hillsides, and grasslands. Fuel, weather, and topography are primary factors that affect how wildland fires spread. The climate of San Mateo County and the surrounding area keeps the grass dry and more readily combustible during fire season.

The WUI is an area where buildings and infrastructure mix with areas of flammable wildland vegetation, allowing wildland fires to easily spread to buildings and structures. Hundreds of homes now border major forests and brush areas in California. Human-caused fires are the leading cause of wildland fires, and with thousands of people living near and visiting wildland areas, the probability of human-caused fires is growing.

Structural Fires

Structural fires occur in built-up environments, destroying buildings and other human-made structures. These disasters are often due to faulty wiring or mechanical equipment, or combustible construction materials. The absence of fire alarms and sprinkler systems can exacerbate the damages associated with a structural fire. Structural fires are largely from human accidents, although deliberate fires (arson) may be a cause of some events. Older buildings that lack modern fire safety features may face greater risk of damage from fires. To minimize fire damage and loss, the local Fire Code, based on the State Fire Code, sets standards for building and construction. They require the provision of adequate water supply for firefighting, fire-retardant construction, and minimum street widths, among other things.

Secondary Hazards

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. Wildfires cause the contamination of reservoirs, destroy transmission lines, and contribute to flooding. They strip slopes of vegetation, exposing them to greater amounts of runoff. This in turn can weaken soils and cause failures on slopes. Major landslides can occur several years after a wildfire. Most wildfires burn hot and for long durations that can bake soils, especially those high in clay content, thus increasing the imperviousness of the ground. This increases the runoff generated by storm events, thus increasing the chance of flooding.

Past Events

While San Mateo County has a prolific fire history, few of its fires have caused sufficient damage to trigger a state or federal disaster declaration. Notable fires of record are the November 1929 fire near Montara that destroyed 25 homes, a church, and cattle, and the August 2020 CZU Lightning Complex in Santa Cruz and San Mateo Counties, caused by a reported 12,000 lightning strikes.

The CZU Lightning Complex fires burned in San Mateo and Santa Cruz Counties starting on August 16, 2020. This fire destroyed 1,490 structures, damaged 140 others, and caused one injury and one fatality. Fires burned in both Butano and Big Basin Redwoods State Parks, where several historic buildings were destroyed, including the visitor's center at Big Basin. The fire burned a total of 86,509 acres. According to the California Department of Forestry and Fire Protection (CAL FIRE), the CZU Lightning Complex fire was the 12th-most destructive California wildfire as of 2023.

Although San Mateo County has not experienced many major wildfire events, nearby Alameda County has demonstrated some worst-case scenario fires that could occur in other Bay Area counties. At the time it occurred, the October 1991 Oakland/Berkeley Hills "Tunnel Fire" was the most damaging fire (now the third-most damaging) and the second deadliest (currently the third deadliest) fire in California. This WUI fire resulted in 25 lives lost, including a fire battalion chief and an Oakland police officer, 148 people injured, and 2,900 structures destroyed. The blaze started from a grass fire in the Berkeley Hills and burned 1,600 acres. According to the Insurance Information Institute, the estimated private property loss was $1.7 billion.

While the Town has not had any significant wildfires within Town limits, it has had multiple urban and residential structural fires throughout its history.

Regulatory Framework

Wildfire Protection Responsibility Areas

Hundreds of agencies have fire protection responsibility for wildland and WUI fires in California. Local, state, tribal, and federal organizations have primary legal (and financial) responsibility for wildfire protection. In many instances, two fire organizations have dual primary responsibility for the same parcel of land—one for wildfire protection, and the other for structural or improvement fire protection. CAL FIRE designates lands into responsibility areas based on who is financially responsible for fire protection services.

Local Responsibility Areas

Local Responsibility Areas (LRAs) are areas protected by local agencies, including city and county fire departments, local fire protection districts, and CAL FIRE when under contract to local governments. LRAs may include flammable vegetation and WUI areas where the financial and jurisdictional responsibility for improvement and wildfire protection is that of a local government agency.

State Responsibility Areas

State Responsibility Areas (SRAs) include unincorporated areas and State lands where the State/CAL FIRE has financial responsibility for fire protection. CAL FIRE can also provide fire protection services by contract to cities and counties. Within the responsibility areas, CAL FIRE designates lands within Fire Hazard Severity Zones (FHSZs). CAL FIRE designates lands within SRAs as Moderate, High, and Very High FHSZs s. Previously, CAL FIRE only designates Very High FHSZs in LRAs, but will also designate Moderate and High zones in the LRA starting in 2024.

Federal Responsibility Areas

Federal Responsibility Areas (FRAs) are fire-prone wildland areas that are owned or managed by a federal agency such as the U.S. Forest Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, or U.S. Department of Defense. Primary financial and rulemaking jurisdictional authority rests with the federal land agency. In many instances, FRAs are interspersed with private land ownership or leases. Fire protection for developed private property is usually not the responsibility of the federal land management agency, as structural protection responsibility is that of a local government agency.

CAL FIRE Wildfire Mapping

CAL FIRE has modeled and mapped wildfire hazard zones using a computer model that designates moderate, high, or very high FHSZs. FHSZ ratings are derived from a combination of fire frequency (how often an area burns) and expected fire behavior under severe weather conditions. CAL FIRE's model derives fire frequency from 50 years of fire history data. Fire behavior is based fuel loads (such as the level and type of vegetation), weather conditions (temperature, wind, precipitation, humidity, etc.), slope and elevation, fire ignition patterns, and expected rate of spread. It accounts for flying ember production, which is the principal driver of the wildfire hazard in densely developed areas, as well as the relative density of vegetative fuels that can serve as sites for new spot fires within the urban core and spread to adjacent structures. The model refines the zones to characterize fire exposure mechanisms that cause ignitions to structures.

CAL FIRE periodically reviews and revises the FHSZ boundaries based on updated modeling and scientific information. Individuals should consult the most recent available mapping, available from CAL FIRE's Fire and Resource Assessment Program (FRAP) at https://frap.fire.ca.gov/.

County Fire Management and Response

Santa Cruz and San Mateo Counties updated their joint Community Wildfire Protection Plan (CWPP) in 2018. A CWPP is a tool for communities to identify landscape-scale hazards and take strategic action to reduce wildfire risk for healthier ecosystems and more resilient communities. The updated CWPP assesses hazards and priorities within the two counties, identifies at-risk communities, and provides fuel reduction recommendations for high-priority areas. The CWPP can also aid communities to apply for State and federal funding for fire prevention projects and programs. This plan is an important tool for the Town to

reduce wildfire risk to the Town and its residents, and aids in future planning endeavors when creating Town policies and mitigation actions.

Fire Hazard Areas

CAL FIRE mapping has designated portions of unincorporated county lands along the southwestern Town limits as High and Moderate FHSZs (see Figure 4). These are located in the State Responsibility Area (SRA), which means that the primary responsibility for fire response is CAL FIRE and other State agencies. The U.S. Forest Service and U.S. Department of Agriculture, Wildfire Risk to Communities Program, has designated the Town of Atherton as a community at medium risk of wildfire (higher than 58 percent of communities in the United States). This program considers the risk to homes (medium), wildfire likelihood (medium), exposure to wildfire sources (medium), and vulnerable populations (very high), when creating the risk potential score. Currently, the LRA within Atherton has not had any FHSZs identified; however, this can change as mapping is updated throughout the state. There are sections of the Town that have been identified as having an increased fire hazard potential, such as the area around Bear Gulch Reservoir as well as the Walsh Road neighborhoods adjacent to the reservoir.

The Menlo Park Fire District actively works to prevent structural and wildfires through its regulations, education, and training programs; some of which include residential and commercial fire sprinkler requirements, plan review of new construction, periodic inspection of commercial buildings, weed abatement, defensible spaces, home ignition zones, and disaster and emergency preparedness.

Town Fire Management and Response

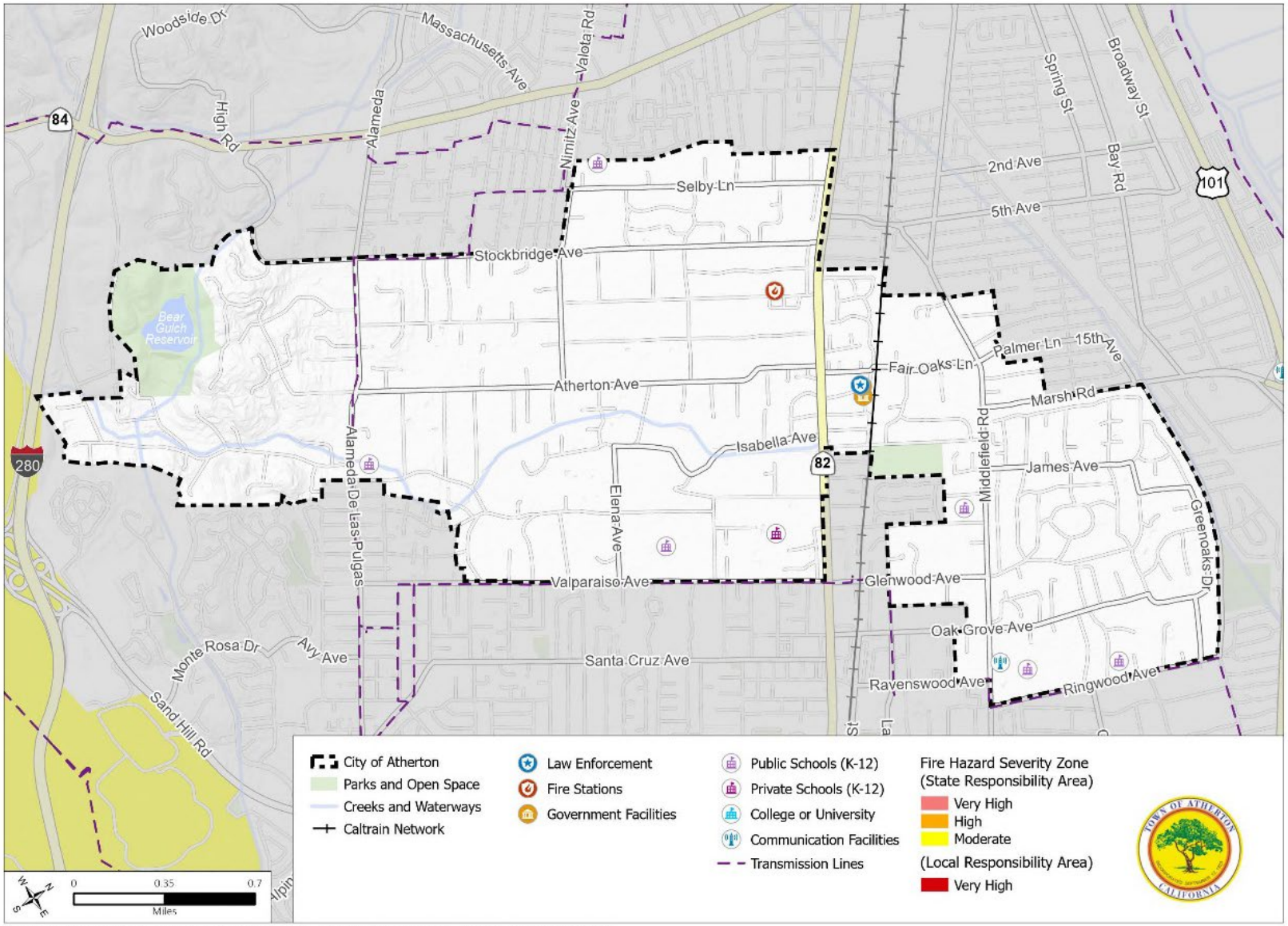
Station 3 in the Menlo Park Fire Protection District serves the Town of Atherton, along with areas that are in the unincorporated areas (county islands within the city) of Redwood City. Station 3 is manned by one captain and three firefighters, one of whom is also a licensed paramedic providing the Town an Advanced Life Support Engine (a non-standard engine that carries essential paramedic equipment and is capable of providing advanced life support services). The firefighters working at this station are also involved in managing the District's EMS Operations, including assisting the EMS Division Chief with the day-to-day operations and coordinating the restocking of all EMS supplies in the District.

Atherton Municipal Code Chapter 15.22 enacts the Menlo Park Fire Protection District Fire Prevention Code and the 2022 California Fire Code, ensuring that new development within the Town meets the latest fire code requirements, like the proper use of fire-resistant building materials, proper use of clearances around structures to reduce ignitions, and proper site design to accommodate equipment and personnel responding to fire incidents.

Future Conditions

Climate change is expected to affect the frequency and severity of future fire hazards in Atherton. Please review the Atherton Vulnerability Assessment Report for details.

Figure 4: Regional CAL FIRE Fire Hazard Severity Zones



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

ISSUE 5: SEVERE WEATHER

General Overview

Severe weather is generally any destructive weather event, but usually occurs in San Mateo County as localized storms that bring heavy rain, hail, thunderstorms, and strong winds. Severe weather is usually caused by intense storm systems, although types of strong winds can occur without a storm. The most common severe weather events that have historically impacted San Mateo County are heavy rains (usually a result of atmospheric rivers), thunderstorms, and windstorms. Utilities may temporarily turn off power to specific areas to reduce the risk of fires caused by electric infrastructure, an action called a public safety power shutoff (PSPS) event.

Atmospheric Rivers

Atmospheric rivers are long, narrow regions in the atmosphere that transport water vapor from the tropics. When the atmospheric rivers make landfall, they release this water vapor in the form of precipitation, often causing heavy rains that can lead to flooding and mudslide events. These events can cause significant injuries, disrupt travel, and damage property. However, they also play a critical role in replenishing California's water supply.

Fog

Fog forms when air close to the ground can no longer hold all the moisture it contains, causing the excess moisture to condense as a low cloud. This occurs either when air is cooled to its dew point or the amount of moisture in the air increases. Heavy fog is particularly hazardous because it can restrict surface visibility. Severe fog incidents can close roads, cause vehicle accidents and airport delays, and impair the effectiveness of emergency response. Fog in the Bay Area has different origins depending on the time of year. In the summer, the area is characterized by cool marine air and persistent coastal stratus and fog.

Public Safety Power Shutoff

Electricity utilities throughout California, including Pacific Gas and Electric Company (PG&E), have begun to occasionally "de-energize," or turn off the electricity for power lines that run through areas where there is an elevated fire risk. This is intended to reduce the risk of power lines sparking or being damaged and starting a wildfire. A PSPS event may occur at any time of the year, usually during high wind events and dry conditions. PSPS events may be limited to specific communities, or they may affect broad swaths of the state. Given the long, connected nature of power supply systems, a shutoff event targeted to a small at-risk area can affect a larger area outside the risk zone. The duration of a shutoff is related to the severe weather that triggers it. However, a shutoff typically ends within 24 hours after the severe weather has passed.

Thunderstorms

A thunderstorm is a rain event that includes thunder and lightning. According to NOAA's National Severe Storms Laboratory, a thunderstorm is classified as "severe" when it contains hail with a diameter of one inch or greater, wind gusts exceeding 57.5 mph, or tornado. Lightning can cause forest and brush fires and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. "Lightning sieges" are extreme lightning events in which lightning strikes multiple points at once. In August 2020, an estimated 12,000 lightning strikes caused a set of fires known as the CZU Lightning Complex in San Mateo and Santa Cruz Counties.

Tornadoes

A tornado is a violently rotating column of air extending between a cloud and the surface of the earth, with winds that can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long. Tornadoes can occur throughout the year at any time of day but are most frequent in the spring during the late afternoon. However, tornadoes are rare in San Mateo County as only five have been recorded since 1950.

Windstorms

Windstorms are generally short-term events involving winds or gusts of over 50 to 60 mph that are strong enough to cause property damage. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles.

Windstorms can cause significant property damage, threaten public safety, and have adverse economic impacts from business closures and power loss. Falling trees and branches can damage buildings, power lines, and other property and infrastructure. During wet winters, saturated soil causes trees to become less stable and more vulnerable to uprooting from high winds. Utility lines brought down by summer thunderstorms have also been known to cause fires, which start in dry roadside vegetation. Downed trees and power lines, and damaged property also can be major hindrances to emergency response and disaster recovery. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric service and from extended road closures.

Secondary Hazards

Major riverine or urban flooding can result from heavy rain. Rain falling on saturated soils on slopes or on areas recently burned by wildfire may lead to landslides. Lightning during thunderstorms presents a risk of starting a wildfire. Storms can also exacerbate existing areas of vulnerability, such as increasing the frequency of erosion along coastal cliffs.

Poor air quality is a secondary impact of severe weather. One type of cold wave also allows air pollution to accumulate.[5]

Past Events

Table 5 lists past severe weather events in San Mateo County as recorded by the NOAA since 1950. Several of these events affected residents and businesses within Atherton in varying degrees.

Table 5: Past Severe Weather Events in San Mateo County

Date	Type	Description
February 13, 2000	Heavy Rain	Widespread rain with 24-hour accumulations of more than 5 inches occurred over the area on Feb 13 – 14. Urban and small stream flooding occurred in most counties of the area. Many roads including Highway 1 and Highway 116 were closed. Twenty-nine people were evacuated in Pescadero due to high waters. Several houses in Daly City were abandoned and eventually destroyed due to mudslides.

Date	Type	Description
January 4, 2008	High Wind	A very strong cyclone slammed into the San Francisco and Monterey Bay areas bringing inland and coastal flooding, and winds as high as 81 mph. Thousands of residences and businesses were without power, some of which were without power for several days due to high winds toppling power lines. Millions of dollars of property damage were reported.
April 14, 2009	High Wind	High winds along the San Francisco Bay Area shoreline caused numerous power outages and downed trees. A big rig blew over in the westbound lane of the San Mateo Bridge closing the entire bridge for more than an hour. Shortly afterwards a 70-foot fishing vessel was blown into the bridge after losing power. The Redwood City Mesonet observation site reported a gust of 57.5 mph.
October 13, 2009	High Wind	Heavy rain combined with very strong wind through Northern and Central California to cause numerous trees, tree limbs, and power and telephone poles to fall. PG&E reported over 277,000 customers had lost power in the San Francisco and Monterey Bay areas with $13 million dollars in damage. Record-breaking heavy rain led to flooding and debris flows. In San Mateo County, at least 47 trees and 31 sets of power lines were knocked over. Wind also caused power outages across San Mateo County. Approximately 58,000 community members lost power during the storm.
October 13, 2009	Heavy Rain	This powerful rainstorm overwhelmed pipes and manholes in San Mateo, San Carlos, and Millbrae causing over 127,000 gallons of untreated sewage to flow into streets and creeks. Over 55,000 gallons of raw sewage spilled into San Francisco Bay.
February 15, 2011	High Wind	Strong and gusty wind developed ahead of a long wave trough. A mesonet automated weather reporting system measured a wind gust of 60 mph at midnight. Other automated observation systems around the area above 1,000 feet in elevation reported gusts up to 83 mph. Overall, more than 6,500 customers lost power in the San Francisco Bay Area.
December 21 through December 26, 2012	Heavy Rain	A series of storm systems, part of a large Atmospheric River type of pattern, impacted the area during late December 2012. From December 21 through 26, heavy rain, gusty winds, flooding, and mudslides occurred across the Bay Area in these consecutive events. Downed trees, powerlines, and flooded roadways impacted community members.
December 13, 2021	Heavy Rain	An atmospheric river impacted the Bay Area on December 31st, resulting in significant rainfall across the San Francisco Bay Area. During the morning a surface low developed west of San Francisco and the river stalled over the Bay Area. This resulted in significant rainfall totals for many Bay Area communities. Most notably, downtown San Francisco received 5.46 inches of

Date	Type	Description
		rain which is the second wettest day on record. The Oakland Museum received its wettest day since records began in 1970, with 4.75 inches of rain.

Source: National Centers for Environmental Information, 2021.

Regulatory Framework

Chapter 13.04 of the Municipal Code establishes requirements for the undergrounding of utilities. It delineates the responsibility of the utility companies, the individual property owners, and the Town. It also clarifies when exemptions to undergrounding requirements can be made, either a temporary emergency circumstance 10 days or less, or an exempted facility.

Aside from this specific code section, new developments are also expected to adhere to the Town's building code requirements, which helps to reduce impacts associated with severe weather.

Future Conditions

Climate change is expected to affect the frequency and severity of future severe weather in Atherton. Please review the Atherton Vulnerability Assessment Report for details.

ISSUE 6: DROUGHT

General Overview

Drought is a significant decrease in water supply relative to what is needed to meet typical demand, leading to a water shortage for some activity, group, or environmental sector. While drought is a normal occurrence for Mediterranean climates such as that of San Mateo County, long and severe droughts have the potential to impact ecosystems and economic activity across the entire community. Most droughts are defined based on declines in normal precipitation levels, declines in agricultural production, declines in streamflow and groundwater levels, or socioeconomic impacts from water shortages.

The severity of any given drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts. While drought does not typically directly result in loss of life or damage to structures, drought can have widespread impacts on the environment and the economy. Potential drought impacts include loss of crops, costs incurred by having to drill new wells, increased costs for water straining household finances and reducing commercial profits, reduced habitat and food supply for plants and animals, and increased risk of wildfire.

The demand that society places on water systems and supplies—such as expanding populations, irrigation, and environmental needs—contributes to drought impacts. Drought can lead to difficult decisions regarding the allocation of water, as well as stringent water use restrictions, water quality problems, and inadequate water supplies for fire suppression.

Droughts can affect groundwater storage as reserves are drawn down in anticipation of or in response to drought impacts, or as reduced precipitation causes groundwater supplies to be replenished at a slower rate. Drought affects groundwater sources more slowly than it affects surface water supplies, but groundwater supplies generally take longer to recover. This can lead to a reduction in groundwater levels

and problems such as reduced pumping capacity or wells going dry. It can take groundwater supplies years to recover from heightened use during droughts. This reduced replenishment of groundwater affects streams. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation. Reduced groundwater levels mean that even less water will enter streams during periods of low precipitation.

Drought can also increase community susceptibility to wildfire. A prolonged lack of precipitation dries out vegetation and makes plants more vulnerable to pests, both of which can increase susceptibility to wildfires.

Water to Atherton is supplied by the Bear Gulch District of the California Water Service Company (Cal Water), which also serves Portola Valley, Woodside, and portions of Menlo Park, Redwood City, and unincorporated San Mateo County. The District's water supply is mostly made up of water purchased from the City and County of San Francisco's Hetch Hetchy system (also known as the Regional Water System, or RWS), operated by the SFPUC, although it also sources approximately 9 percent of its water from Bear Gulch Creek.

The water supplied by the Bear Gulch District is stored in the 215-million-gallon Bear Gulch Reservoir before treatment distribution.

Past Events

San Mateo County and the Town of Atherton have a history of severe droughts. DWR hydrologic data from the early 1900s shows multi-year droughts from 1912 to 1913, 1918 to 1920, 1922 to 1924, and 1928 to 1934. The 1929 to 1934 drought established the criteria for designing storage capacity and yield for large Northern California reservoirs. The following sections describe the most recent prolonged droughts that have impacted the planning area.

1976 to 1977 Drought

California had a severe drought due to lack of rainfall during the winters of 1976 and 1977. 1977 was the driest period on record in California at that time, with the previous winter recorded as the fourth driest in California's hydrological history at that time. The cumulative impact led to widespread water shortages and severe water conservation measures statewide. Over $2.6 billion in crop damage was recorded in 31 counties. FEMA declared a drought emergency (Declaration 3023-EM) on January 20, 1977, for 58 California counties.

1987 to 1992 Drought

California received precipitation well below average levels for four consecutive years. While the Central Coast was most affected, the Sierra Nevada range in Northern California and the Central Valley counties were also affected. During this drought, only 56 percent of average runoff for the Sacramento Valley was received. In 1991, the State Water Project sharply decreased deliveries to water suppliers. By February 1991, all 58 counties in California were experiencing drought. Urban areas as well as agricultural areas were impacted.

2007 to 2009 Drought

The state proclaimed a statewide drought emergency on June 4, 2008, after spring 2008 was the driest spring on record. On February 27, 2009, the state proclaimed a state of emergency for the entire state as

severe drought continued. The largest court-ordered water restriction in state history (at the time) was imposed.

2012 to 2017 Drought

This drought set several records for the state. The period from 2012 to 2014 ranked as the driest three consecutive years for statewide precipitation. Calendar year 2014 set new records for statewide average temperatures and for low water allocations from the State Water Project. Calendar year 2013 set minimum annual precipitation records for many communities. Detailed executive orders and regulations addressed water conservation and management. The statewide drought emergency was lifted in April 2017.

2020 to 2023 Drought

The U.S. Department of Agriculture declared a drought disaster that included San Mateo County on April 21, 2020. By May of 2021, precipitation levels for the year to date were the third-lowest in the past 127 years.[6] In June 2021, San Mateo County was at the D3—Extreme Drought level, putting the county at risk for wildfire on a year-round basis.[7] Excessive rainfall and flooding in late December 2022 and early January 2023 alleviated some of the drought conditions. Governor Newsom officially eased drought restrictions in March 2023. As of October 2023, San Mateo County was not considered to be in a state of drought.

Since the SFPUC is the Town's main water wholesaler, the Town's water supply reliability is fundamentally linked with SFPUC's water supply reliability. According to the 2020 California Water Service, Bear Gulch District Urban Water Management Plan, during normal years the water supply totals will be adequate to meet demand. However, during single-dry years and multiple consecutive dry years, the supply totals are not anticipated to be adequate to meet projected demands. This shortfall is primarily due to significant cutbacks in the Town's supply from SFPUC, which is significantly reduced in dry years due to the Bay-Delta Plan Amendment implementation. In years with a supply shortfall, the Town can implement its Water Shortage Contingency Plan (WSCP) to reduce demands to the level of available supply.

Statewide water supply conditions, changes in groundwater levels, and actions by other agencies may impact the Town's available water supply. Water shortage conditions occur when the available supply of potable water cannot meet ordinary water demands for human consumption, sanitation, fire protection, and other beneficial uses. In some cases, the Town may foresee water shortage, but the water shortage may also be caused by an unforeseen sudden or emergency event.

Regulatory Framework

San Francisco Public Utilities Commission

The SFPUC issued its most recent Urban Water Management Plan (UWMP) in 2021. The UWMP provides an overview of water deliveries and uses, water supply sources, and water conservation programs. It also includes discussions on supply and demand projections over a 25-year planning horizon (from 2020 to 2045), available water supplies to meet existing and future demands under a range of water supply conditions, and water demand management measures, including the WSCP, to reduce long-term water demand. The SFPUC engages in a number of other water conservation activities, including groundwater monitoring and development of water recycling projects, which help support system-wide water conservation.

Bay Area Water Supply and Conservation Agency

The Town is a member of the Bay Area Water Supply and Conservation Agency (BAWSCA). BAWSCA was created on May 27, 2003, to represent the interests of the 26 cities, water districts, and private utilities in Alameda, Santa Clara, and San Mateo Counties that purchase water on a wholesale basis from the RWS. BAWSCA is the only entity having the authority to directly represent the needs of the cities, water districts, and private utilities (wholesale customers) that depend on the RWS.

Bear Gulch Urban Water Management Plan (Water Shortage Contingency Plan)

The WSCP serves as a standalone document to be engaged in the case of a water shortage event, such as a drought or supply interruption, and defines specific policies and actions that will be implemented at various shortage level scenarios. This plan ensures the Bear Gulch District (and Town of Atherton) have the necessary resources and management responses in place to protect health and human safety, minimize economic disruption, and preserve environmental and community assets during water supply shortages and interruptions. The plan includes a framework to address shortage conditions ranging from 10 to 50 percent shortage, identifies a suite of demand mitigation measures to implement at each level, and identifies procedures to annually assess whether or not a water shortage is likely to occur in the coming year.

Town of Atherton

Municipal Code

Chapter 8.32 of the Atherton Municipal Code regulates water wells and the use of groundwater. Implementation of this regulation is intended to help manage groundwater resources within the Town.

Chapter 15.48 of the Atherton Municipal Code formalizes the Town's adherence to State of California water-efficient landscaping guidelines and requirements.

Future Conditions

Climate change is expected to affect the frequency and severity of future drought hazards in Atherton. Please review the Atherton Vulnerability Assessment Report for details.

CONCLUSION

This background report provides details on the issues that are discussed at a higher level in the Town of Atherton's Safety Element, serving as a foundation for associated goals, policies, and implementation actions. It is a technical appendix to the main Safety Element document. It is not necessary to be familiar with this background report to understand or use the Safety Element, but some readers may find this supplemental information helpful. This background report also contains information that is required by the California Government Code as part of the Safety Element, but which does not need to be included in the main Safety Element document.

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