City of Lafayette

Safety Element Background Report

Adopted August 28, 2023

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1.1 PURPOSE AND CONTENT

The Safety Element is a State-mandated General Plan element that must identify potential natural and human-caused hazards that could affect the City of Lafayette's (City's) residents, businesses, and services. The purpose of the Safety Element is to establish a framework that anticipates these hazards and prepares the community to minimize exposure to these risks.

The Safety Element conveys the City's goals, policies, and actions to minimize the hazards to safety in and around Lafayette. It identifies the natural and human-caused hazards that affect existing and future development, describes present and expected future conditions, and sets policies and standards for improved public safety. This includes efforts to minimize physical harm to the buildings and infrastructure in and around Lafayette to reduce damage to local economic systems, community services, and ecosystems.

The Safety Element serves the following functions:

- Develops a framework by which safety considerations are introduced into the land use planning process.
- Facilitates the identification and mitigation of hazards for new development, and thus strengthens existing codes, project review, and permitting processes.
- Presents policies directed at identifying and reducing hazards in existing development.
- Strengthens earthquake, flood, dam inundation, and wildfire preparedness planning and post-disaster reconstruction policies.
- Identifies how natural and climate-related hazards are likely to increase in frequency and intensity in the future and provides policies to increase community resilience through preparedness and adaptation.

Section 65302(g) of the California Government Code requires that the Safety Element contains background information and policies to address multiple natural hazards, analyze the vulnerabilities from climate change, contain policies to improve climate change resilience, and assess residential areas with evacuation constraints. The high-level public safety issues in Lafayette include emergency preparedness and response, flood and inundation hazards, seismic and geologic hazards, fire hazards, hazardous waste and materials, as well as other climate-related hazards, such as drought, extreme heat, and severe weather. The Safety Element identifies goals and policies for each of these hazards. The policies in the Safety Element are intended to be high-level policies that provide a framework for safety efforts and guide decision making. These policies are carried out by corresponding implementation measures, which are policies, actions, procedures, programs, or techniques.

1.2 RELATIONSHIP TO OTHER LOCAL PLANS AND CODES

The Lafayette Safety Element does not exist in a vacuum but is instead one of several plans that address community safety and related topics. These other plans include other General Plan elements, the Contra Costa County Local Hazard Mitigation Plan, the Contra Costa Countywide Community Wildfire Protection Plan, and various local regulations. The Safety Element should be consistent with these other plans to minimize conflicts between documents and ensure that the City has a unified strategy to address

public safety issues. The Safety Element incorporates information, technical analyses, and policies from these other documents where appropriate to help support this consistency.

1.2.1 General Plan Elements

The Lafayette General Plan was adopted in 2002. It includes an introduction and eight chapters:

- Land Use
- Circulation
- Open Space and Conservation
- Parks, Trails, and Recreation
- Housing
- Safety
- Noise
- Growth Management

The Safety Element provides policy direction and designs safety improvements that complement the intent and policies of other General Plan elements. Crucial relationships exist between the Safety Element and the other General Plan elements. How land uses are determined in areas prone to natural hazards, what regulations limit development in these areas, and how hazards are mitigated for existing development, are all among issues that tie the elements together. For instance, the Parks, Trails, and Recreation Element must consider how hazards will affect the park and recreation infrastructure and facilities in Lafayette, but also recognizes that parks can provide strategies to reduce hazard risks throughout the city. The Housing Element is also closely tied to the Safety Element. Future potential development in the city must be protected from hazards and able to adapt to climate change hazards to ensure homes and the people living in them remain safe. Safety Element policies, especially those concerning evacuation routes and critical facilities, must also be consistent with those of the Circulation Element. State Route (SR-) 24 is Lafayette's primary evacuation route, supported by routes designated as arterials in the City's Circulation Element. This Safety Element is consistent with the other elements of the Lafayette General Plan.

1.2.2 Contra Costa County Local Hazard Mitigation Plan

In collaboration with the City and other local agencies and special districts, Contra Costa County prepared the 2018 Local Hazard Mitigation Plan (LHMP) in accordance with the federal Disaster Mitigation Act of 2000 and the Federal Emergency Management Agency's (FEMA's) LHMP guidance. Contra Costa County's LHMP is a plan that assesses hazard vulnerabilities from natural and human-caused hazards, including risk to people and facilities, and identifies mitigation actions to reduce or eliminate hazard risks in Contra Costa County, including in incorporated communities. The LHMP includes a dedicated annex for Lafayette, which discusses Lafayette's characteristics and history, development trends, hazard mitigation capabilities, integration with other hazard mitigation planning efforts, and vulnerabilities of specific facilities and infrastructure. The mitigation actions in the LHMP include both short-term and long-term strategies, and involve planning, policy changes, programs, projects, and other activities. These mitigation actions are identified based on assessments of hazards, vulnerabilities, and risks and the participation of a wide range of stakeholders and the public in the planning process. Local governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance.

The LHMP and Safety Element address similar issues, but the Safety Element provides a higher-level, long-term framework and set of policies that pertain to the safety of the city, while the LHMP focuses on more specific mitigation, often short-term actions, to enable jurisdictions to better protect lives, property, and natural systems. The LHMP, as its name implies, focuses on mitigation-related actions, while the Safety Element also includes policies related to emergency response, recovery, and preparation activities. LHMPs form the foundation for a community's long-term strategy to reduce disaster losses and

break the cycle of disaster damage, reconstruction, and repeated damage. The current LHMP, as certified by FEMA, is incorporated into this Safety Element by reference, as permitted by California Government Code Section 65302.6. It is available online at: https://www.contracosta.ca.gov/6415/Local-Hazard-Mitigation-Plan.

1.2.3 Contra Costa Countywide Community Wildfire Protection Plan

In collaboration with the Contra Costa County Fire Chiefs Association, Hills Emergency Forum, and stakeholder committee members, the Diablo Fire Safe Council prepared and published the 2019 Contra Costa Countywide Community Wildfire Protection Plan (CWPP). The Contra Costa Countywide CWPP is the result of an area-wide planning effort. It provides a snapshot of current wildfire protection challenges and capabilities, identifies, and prioritizes areas for hazardous fuel reduction, and recommends types and methods of vegetation management that may help protect the affiliated communities from wildfire losses. The goal of the plan is to reduce hazards through increased information and education about wildfires, hazardous fuels reduction, actions to reduce structure ignitability, and other recommendations to assist emergency preparedness and fire-suppression efforts. Most notably, it is intended to help facilitate a coordinated effort between the various stakeholders. The Contra Costa Countywide CWPP complements local agreements and existing plans for wildfire protection for a coordinated effort in determining appropriate fire management actions. The fire protection agencies in Contra Costa County are predominately responsible for implementing the CWPP.

1.2.4 California Fire Code

The California Fire Code contains regulations related to the construction, operation, and demolition of buildings and other structures to minimize the risk of fire and explosion. It is consistent with nationally recognized and accepted practices for safeguarding life and property from the hazards of fire and explosion; reducing dangerous conditions arising from the storage, handling, and use of hazardous materials and devices; and minimizing hazardous conditions in the use or occupancy of buildings or premises. The California Fire Code also contains provisions to assist emergency response personnel. Every three years, new editions of the state codes are published. The new codes and local amendments reflect changes in technology, fire safety techniques, and the building industry. Title 14, Division 1.5, Chapter 7 of the California Code of Regulations establishes state responsibility areas (SRAs), Very High Fire Hazard Severity Zones (FHSZs) in local responsibility areas (LRAs), and Fire Safe Regulations for these areas. These regulations constitute the basic wildland fire protection standards of the California Board of Forestry and establish minimum wildfire protection standards in conjunction with building, construction, and development in SRAs and Very High FHSZs. The California Fire Code (and Building Code) is required to be renewed every three years.

Fire Responsibility Areas

Local Responsibility Area (LRA): *Incorporated communities are financially responsible for wildfire protection.*

State Responsibility Area (SRA): *CAL FIRE and contracted counties are financially responsible for wildfire protection.*

Federal Responsibility Area (FRA): *Federal agencies are responsible for wildfire protection.*

1.2.5 Fire Prevention Efforts by Other Agencies

Contra Costa County Fire Protection District

Contra Costa County Fire Protection District (Con Fire), the agency responsible for providing fire protection services to Lafayette, manages the Wildfire Mitigation Program. This program is funded by the county-wide Measure X sales tax and offers Contra Costa residents the opportunity to identify and apply for projects that will reduce the county's overall exposure to wildfire risk. The program is designed to fund existing projects and programs, such as community chipping days, Firewise USA Community Strategic Plan Projects, Home Hardening Outreach Program, removal of dead trees, shaded fuel breaks, and vegetation management and fuel reduction.

Every year, Con Fire helps to remove dead trees in common or open spaces that are endangering structures at the request of residents. Con Fire supports community chipping days that are available to Firewise Communities (a program administered by the National Fire Protection Association to help communities reduce wildfire risks) or neighborhoods with at least 10 homes participating in these fuel-reduction efforts. Shaded fuel breaks are used to reduce dangerous fuels that spread wildfire. Trees in the areas of a shaded fuel break are maintained to reduce the potential spread of fire while the tree canopy reduces future growth of brush and other vegetation. Con Fire also actively engages in vegetation management and fuel reduction activities that focus on treating, clearing, or reducing debris and other types of combustible fuels to prevent or slow the spread of fire.

East Bay Municipal Utilities District

Every year in preparation for the fire season, the East Bay Municipal Utilities District (EBMUD) plans vegetation management and weed abatement activities around their facilities and along their rights-of-way. These activities include mowing, weeding, pruning, trimming, chipping, the use of goats, and herbicide application. EBMUD also leases some of their watershed lands for cattle and horse grazing, which provides additional vegetation management.

If a Public Safety Power Shutoff (PSPS) event occurs, the power outage may affect any of EBMUD's water facilities. Outages are expected to last up to two days; however, depending on weather conditions and power restoration efforts, some outages may last longer. A PSPS event could force EBMUD to switch to backup generators and pumps to power pumping plants, water treatment plants, and other key facilities to keep water flowing, maintain storage and fire flow, and keep water distribution lines pressurized. In advance of a PSPS event, EBMUD places portable generators and pumps at designated key facilities, fills water tanks to near-maximum capacity, and works to keep generators fueled during peak demand periods.

East Bay Regional Park District

The East Bay Regional Park District (EBRPD) has been implementing fuel management practices for decades. As EBRPD's fuels management activities have expanded, the Stewardship Department has played an increasingly large role in the fuel management program, which includes:

- Clearing heavy underbrush and thinning dense park forests.
- Reducing vegetation with cattle, goat, and sheep grazing.
- Removing hazardous trees.
- Monitoring effects on habitat and wildlife populations.

Each year, EBRPD thins and removes hazardous vegetation on over 1,000 acres to reduce fire hazards. In 2022, EBRPD received fire hazard reduction grant funding from FEMA.

Pacific Gas and Electric Company

The Pacific Gas and Electric Company's (PG&E's) 2022 Wildfire Mitigation Plan outlines its program to reduce wildfires. Key strategies in this plan include:

- **Undergrounding utility lines:** PG&E has a program to underground 10,000 circuit miles of distribution lines in areas of high fire threats, eliminating the ignition risk for these power lines.
- **Increased safety settings:** Configuring electrical equipment on power lines to automatically shut off power if an object comes into contact with a distribution line.
- **Vegetation management:** Continuing vegetation management activities.
- **Enhanced inspections:** Providing more frequent and detailed inspections of power lines.

PG&E is undergrounding power lines in areas with the greatest impact on reducing wildfire risk and outages for their customers. In Contra Costa County, PG&E completed six miles of undergrounding in 2022 and is planning to complete approximately three miles of undergrounding this year.

1.3 COMMUNITY PROFILE

The City of Lafayette is in the western portion of Contra Costa County, covering approximately 15.4 square miles. The topography in Lafayette varies from low-lying valleys to rolling hills. Lafayette is situated between Walnut Creek, Moraga, and Orinda, and, together with the latter two towns, is considered locally as part of "Lamorinda." The city is bisected by State Route (SR-) 24 and the Bay Area Rapid Transit (BART) tracks.

Lafayette is home to approximately 26,638 residents and 9,535 households and supports about 10,545 jobs.[1] The Lafayette School District is the largest employer in the city with about 389 employees. The Lafayette School District operates four elementary schools, which include Burton Valley Elementary, Happy Valley Elementary, Lafayette Elementary, and Springhill Elementary, as well as one middle school, Stanley Middle School. Lafayette High School is in the Acalanes Unified School District.

In 2020, the median age of all people in Lafayette was 45.5.[1] The largest ethnic groups in Lafayette are White (Non-Hispanic) (75.2%); Asian, Asian Pacific Islander (Non-Hispanic) (11.2%); Hispanic or Latinx (8.6%); and other races or multiple races (Non-Hispanic) (4.4%).[1]

Lafayette has a Mediterranean climate, with rain in the winters and hot, dry summers. Hot and dry Diablo winds occur in the fall and spring. Winter rains fall from November to April. On average, annual high temperatures in Lafayette range from 57 degrees Fahrenheit (°F) in January to 82°F in August. Low temperatures range from 41°F in January to 56°F in August.[2] The city receives an average of approximately 27.5 inches of precipitation annually.[3] Most precipitation falls during the winter months with rare occurrences of summer storms.

Lafayette's primary transportation access is from SR-24, which connects Lafayette to SR-13, the City of Oakland, and Alameda County to the west, and Walnut Creek and Interstate 680 to the east. Other major roadways include Mt. Diablo Boulevard, Moraga Road, Pleasant Hill Road, and Taylor Boulevard. County Connection provides local bus transit options and BART provides regional rail transit services.

1.4 CLIMATE CHANGE VULNERABILITY

Changes to the global climate system are expected to affect future occurrences of natural hazards in and around Lafayette. Many hazards are projected to become more frequent and intense in coming years and decades, and in some cases, these trends have already begun. Key climate change considerations that affect Lafayette include increasing temperatures and changes in precipitation. Overall, precipitation levels are expected to decrease slightly, with more years of extreme precipitation events and droughts that last longer and are more intense. According to California's *Fourth Climate Change Assessment,* Lafayette can expect to experience various changes to climate-related hazard events.[4]

What is vulnerability?

Vulnerability is 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 a capacity to adapt.

Source: California Governor's Office of Emergency Services. 20202. California Adaptation Planning Guide.

Wildfire risk in Lafayette is and will continue to be high. Climate change is expected to lead to an increase in wildfires in the surrounding area and across Contra Costa County due to hotter and drier conditions. Dry conditions are anticipated earlier in the year, leaving most of the region in moderate to extreme drought conditions prior to summer. These continued dry conditions with above-normal temperatures through spring will leave fuel moisture levels lower than normal, increasing the potential for wildfire activity. Diablo wind events will result in more erratic fire behavior, making fires harder to control. Furthermore, an extended wildfire season increases the likelihood that Diablo wind events coincide with wildfires, which can allow wildfires to spread more rapidly. Across the region, more frequent and intense wildfires may also create poor air quality for Lafayette.

Warmer temperatures are projected to cause an increase in extreme heat events. The number of extreme heat days, defined in Lafayette as a day when the high temperature is at least 93.9°F, is expected to rise from a historical annual average of 4 days to 17 days by the middle of the century (2035 to 2064), and an average of 29 days by the end of the century (2070 to 2099). In addition to the increases in extreme heat events, Lafayette is expected to see an increase in the average daily high temperatures. The number of warm nights, defined in Lafayette as a day in April through October when the minimum temperature is above 59.6°F, is expected to rise from a historical annual average of 6 to 47 nights by the middle of the century (2035 to 2064), and to an average of 107 nights by the end of the century (2070 to 2099).

Both droughts and floods are expected to become more frequent as rainfall is expected to occur in fewer, more intense storms due to climate change. Although Lafayette is likely to experience minimal change in overall annual precipitation levels from climate change, the region is also expected to see an increase in the number of extreme precipitation events. As a result, floods are expected to occur more often in Lafayette, primarily along creeks, and climate change may expand the parts of the city that are considered prone to flood. Increased flooding along creeks is likely to result in increased creekbank erosion and sedimentation of waterways. Climate change is expected to also increase the frequency and severity of droughts that cause soil to dry out and condense. When precipitation does return, dry ground means that more water runs off the surface rather than being absorbed into the ground, which can lead to floods and result in debris flows along slopes and hillsides.

Severe weather events, such as strong storms and high winds, may become more frequent and intense due to climate change. Climate change is expected to cause an increase in intense rainfall, which is usually associated with strong storm systems. Heavy rainfall may also contribute to an increased risk of landslides

in the hills around Lafayette. In Lafayette, most severe weather consists of atmospheric rivers, heavy rains, or thunderstorms. The types of dangers posed by severe weather vary widely and include injuries or deaths, damage to buildings and structures, fallen trees, roads blocked by debris, and fires sparked by lightning.

Climate change can increase the rates of infection for various diseases because many of the animals that carry diseases are more active during warmer weather. There are a number of diseases linked to climate change and can be harmful to the health of Lafayette community members, such as hantavirus pulmonary syndrome, Lyme disease, and West Nile fever. Many of these diseases are carried by animals, such as mice and rats, ticks, and mosquitos, which are usually seen as pests even if they do not cause infections. Warmer temperatures earlier in the spring and later in the winter can cause these animals to be active for longer periods, increasing the time that these diseases can be transmitted.

1.4.1 Vulnerability Assessment Results

Under California law, the Safety Element is required to include a vulnerability assessment that looks at how people, buildings, infrastructure, and other key community assets may be affected by climate change. The City conducted a Climate Change Vulnerability Assessment in the winter of 2022 to analyze Lafayette's susceptibility to climate-related hazards. Lafayette's vulnerability assessment, prepared in accordance with the most recent available guidance in the *California Adaptation Planning Guide*, assesses how seven different climate-related hazards (drought, extreme temperatures, flooding, human health hazards, landslides, severe storms, and wildfire and smoke) may affect 39 different population groups and community assets. Each population or asset received a score of V1 (minimal vulnerability) to V5 (severe vulnerability) for each climate-related hazard. The Climate Change Vulnerability Assessment indicates that Lafayette's populations and assets are most vulnerable to wildfire and smoke, severe storms, and landslides. Overall, populations in Lafayette tend to be most vulnerable to wildfire and smoke, extreme temperatures, human health hazards, and flooding, which directly affect health outcomes. The most vulnerable communities include households in poverty, low-resourced people of color, persons with chronic illness and/or disabilities, and seniors. Young children (under 10 years of age) also face an elevated risk from climate change-related hazards. They are particularly likely to face greater health risks from extreme heat or illnesses.

Citywide, energy delivery and communication infrastructure and services are vulnerable to multiple hazards, including severe storms, such as high winds that can trigger Public Safety Power Shutoff (PSPS) events, extreme heat that reduces the capacity and strains the systems, and wildfires that damage the systems, ultimately disrupting energy and communication services. Furthermore, energy delivery services, specifically electricity delivery, is subject to harm during extreme heat events. Extreme heat can lead to power outages by causing mechanical failure of grid equipment, heat damage to power lines, and by creating a high demand for electricity to power air conditioners, all of which place stress on the network. This is likely to lead to greater service disruptions. These conditions can damage communication infrastructure, decreasing network capacity. There may be a higher demand for communication services during severe storms, potentially putting stress on the network and increasing the risk of service interruptions.

PSPS events or interruptions in energy service can create vulnerabilities for Lafayette community members. A loss of electricity can cause a loss of refrigeration for food and medical supplies, limit cooking, cause loss of cooling (particularly dangerous during extreme heat events), lighting, and limited or no access to the Internet or other information systems. Many businesses are forced to close during a power outage, causing economic hardships and depriving community members of important services, such as

grocery stores, gas stations, and banks/ATMs. Power outages may also be harmful to people who depend on electrically powered medical devices.

Climate change is also expected in the parts of the city that are considered prone to flooding. As a result, transportation infrastructure within and adjacent to the 100-year floodplain will likely experience an increase in the frequency and magnitude of flood events in future years. Increases in damaging flood events in the city are expected to cause greater property damage, public health and safety concerns, displacement, and loss of life. The City's public transit services may be impacted by flood events, which may damage, interrupt service, or prevent community members from taking transit.

Climate change could affect the transportation network and associated economic activity within Lafayette by creating strain on transportation infrastructure, resulting in impacts to travel behavior, goods movement, and supply chain business continuity. Transportation infrastructure, such as roadways, bridge supports, and BART, are all potentially at increased risk due to severe storms, floods, higher temperatures, landslides, and increased wildfire risk. When parts of the transportation infrastructure network fail, typical travel routes for both passenger travel and goods movement may be affected, including SR-24 and other major roadways. Disruption of these local transportation roadways due to hazards such as flooding, landslides, or wildfire could significantly impact the transportation of goods and services provided in the city, the economic vitality of the community, and the livelihood of many businesses. Similarly, residents that rely on BART as a means of transportation for work could be greatly impacted by disruptions in the operation of the railway.

The Safety Element includes goals, policies, and implementation actions to increase community resilience and help lower vulnerability scores, particularly for the populations and assets that received a score of V4 or V5 in the Vulnerability Assessment. A description of the Vulnerability Assessment process, items included, and a list of the results can be found at the end of this Background Report in Section 3, Vulnerability Assessment Results.

2. PUBLIC SAFETY ISSUES

This section outlines the existing and likely future hazardous conditions and other public safety issues in Lafayette and policy responses to these issues. The public safety issues in Lafayette that are covered in the following sections include:

- Section 2.1: Emergency preparation and response
- Section 2.2: Flood and inundation hazards
- Section 2.3: Seismic and geologic hazards
- Section 2.4: Fire hazards
- Section 2.5: Hazardous waste and materials
- Section 2.6: Climate change resilience (drought, extreme temperatures, flooding, severe weather, and human health hazards)

This section provides details pertaining to probable locations each hazard or issue is likely to occur (per availability of data), past notable events in and around Lafayette, agencies responsible for providing protection from these public safety issues, and other background information required by California Government Code Section 65302(g)(4).

The results of the Vulnerability Assessment are integrated into the hazards and other public safety issues previously mentioned.

Of particular concern to Lafayette, as in many other communities, is the possibility of cascading and compounding hazard events. These are instances where one hazard event triggers one or more others, which may occur over a very short timeframe (minutes or hours), or weeks or months apart. These linked events are often the most damaging because of the wider range of impacts. When cascading and compounding events occur closely together, emergency response operations must be flexible enough to respond to rapidly-changing conditions and have access to sufficient resources to meet the range of community needs. Examples of cascading and compounding events include a heavy rainstorm that causes flooding and mudslides, or a drought that leads to wildfires.

2.1 EMERGENCY PREPARATION AND RESPONSE

2.1.1 Local Emergency Response

The Lafayette Police Department and Con Fire conduct emergency preparedness activities in Lafayette. Local police services are provided by contract with the Contra Costa County Sheriff's Department. The Moraga-Orinda Fire District provides Community Emergency Response Team (CERT) Program trainings, also referred to as Lamorinda CERT for the Lamorinda community. Lamorinda CERT educates people about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. ConFire considers all parts of Lafayette, including those in the areas with the greatest wildfire risk, to have sufficient emergency service.

In recent years, the County of Contra Costa has expanded its emergency preparedness planning. The County of Contra Costa is required under state law to prepare and maintain a Standardized Emergency Management System (SEMS) Multi-hazard Functional Plan. The SEMS Multi-hazard Functional Plan is a comprehensive emergency management plan that outlines the roles, responsibilities, and procedures for responding to various hazards and emergencies in a given jurisdiction. The plan is designed to be flexible,

scalable, and adaptable to the needs of the community and the hazards it faces. The California Governor's Office of Emergency Services has extensive guidelines outlining the requirements of the Contra Costa County SEMS.

The State of California similarly requires all state, regional, and local agencies, including PG&E and EBMUD, to maintain their own emergency plans relating to the infrastructure which they install and maintain. In the event of an emergency, the City would rely on these agencies to implement their emergency plans, with the City supporting as needed. In the case of school safety, the Lafayette School District also maintains its own safety plan, which the Lafayette Police Department reviews; coordinated trainings are held annually. When an incident occurs anywhere in Lafayette, the Police Department and/or ConFire is typically the first to arrive at the scene, where they secure the area and then determine which other agencies need to be involved.

2.1.2 Community Warning Systems

Lafayette uses the Contra Costa County Community Warning System (CWS) to notify residents and businesses within Contra Costa County that are impacted by, or are in danger of being impacted by, an emergency. The Contra Costa County CWS is designed to provide residents with real-time information about incidents and events that may impact their safety and well-being, such as natural disasters, fires, chemical spills, and other public safety incidents. The system is also used to provide important information about road closures, evacuations, and other emergency response efforts. The CWS is a partnership of the Contra Costa County Office of the Sheriff, the Contra Costa County Health Services Department, other government agencies, industry, news media, and the nonprofit Community Awareness and Emergency Response organization. Depending on the urgency, severity, and certainty of the threat, some combination of the following alerting devices may be activated to registered users with as much as notice as possible:

- Sirens in special safety zones
- Nixle
- Emergency Alert System (EAS) on television and radio (KCBS 740 AM)
- Lafayette Community Information and Emergency Radio Station (1670 AM)
- Telephone Emergency Notification System
- Cell phone alerts
- National Oceanic and Atmospheric Administration (NOAA) weather radios
- Twitter, NextDoor, Instagram, and Facebook

Alerts are distributed via voice, text, and email messages through the CWS Telephone Emergency Notification System. This computerized system makes telephone calls to the known telephone numbers in the vicinity of the hazard based on the incident-specific issues.

The City operates the Community Information and Emergency Radio Station, which transmits information 24 hours a day, seven days a week, at AM 1670. During normal conditions, the radio station transmits news and information. During emergencies, such as wildfires and power outages, the station will provide important updates on emergency conditions and evacuations. Community members can also listen to the radio station online at: https://bit.ly/LafayetteRadio1670AM.

Other systems include the Emergency Alert Systems (EAS) and the Emergency Digital Information System (EDIS). The EAS is a national public warning system commonly used by state and local authorities to deliver important emergency information, such as weather and AMBER alerts, to affected communities. EAS participants include radio and television broadcasters, cable systems, satellite radio and television

providers, and wireline video providers. FEMA, the Federal Communications System (FCS), and the NOAA's National Weather Service (NWS) work collaboratively to maintain the EAS and Wireless Emergency Alerts, which are the two main components of the national public warning system and enable authorities at all levels of government to send urgent emergency information to the public. The EDIS is a wireless emergency and disaster information service operated by the State of California Governor's Office of Emergency Services (Cal OES) and is an enhancement to the EAS. These systems are available in multiple languages.

2.1.3 Emergency Evacuation

With advanced warning, evacuation can be effective in reducing injury and loss of life during a catastrophic event. Figure S-1 shows residential parcels with evacuation constraints, which are parcels that have access to only a single ingress and egress route. There are 4,361 parcels in Lafayette with evacuation constraints, or approximately 45% of all parcels in the city. These constraints can make it difficult for community members to quickly and safety leave the area in the event of an evacuation, as well as posing access challenges for emergency responders. Hilly topography and suburban cul-de-sac design throughout the city, can make these potential constraints worse, especially in the rural areas of Lafayette. Some of these neighborhoods in rural areas are adjacent to open space and within, or close proximity to the wildland-urban interface (WUI). Given these conditions, wildfire is a serious threat to neighborhoods in rural areas which may limit evacuation access points and procedures.

As a result, access can easily be compromised during an emergency. Primary emergency access and evacuation routes include SR-24, which intersects the city from west to east, as well as Upper Happy Valley Road, Happy Valley Road, Mt. Diablo Boulevard, Pleasant Hill Road, Reliez Valley Road, St. Mary's Road, Acalanes Road, and Moraga Road. As described in the General Plan Emergency Evacuation Analysis, there are 17 zones in the community also referred to as "Tactical Zones," for purposes of evacuations. These zones are Lafayette Police-designated zones that differ from the zones in the Zonehaven Aware system, which are designated by the County. Each of these Tactical Zones has its own primary emergency evacuation route, listed here:

Zone 1: Upper Happy Valley Road
Zone 2: Mount Diablo Boulevard
Zone 3: Happy Valley Road
Zone 4: Pleasant Hill Road
Zone 5: Reliez Valley Road
Zone 6: Peasant Hill Road
Zone 7: Pleasant Hill Road
Zone 8: Pleasant Hill Road
Zone 9: Pleasant Hill Road
Zone 10: Mt. Diablo Boulevard
Zone 11: St. Mary's Road
Zone 12: Mount Diablo Boulevard
Zone 13: Acalanes Road
Zone 14: Moraga Road
Zone 15: St. Mary's Road
Zone 16: Reliez Station Road
Zone 17: St. Mary's Road

All evacuation routes in Lafayette face a potential disruption from wildfire, flooding, or earthquake, which may block roadways, damage the roadway surface, or collapse bridges and overpasses. In the event of widespread disruption to local evacuation routes, remaining evacuation routes may become congested, slowing down evacuation of the community or specific neighborhoods. This issue may be compounded since evacuation routes for Lafayette will also likely serve as evacuation routes for surrounding communities, and so potential disruptions may have regional effects.

The City or ConFire would need to open these roadways to provide access during an emergency evacuation event. In preparation for wildfires and other disasters, the City uses Zonehaven Aware, which

is a comprehensive evacuation support system supported by the Contra Costa County CWS. Zonehaven Aware provides the community with critical evacuation updates, resources, and latest updates on active incidents. In the event of a wildfire or an emergency, the Lafayette Police Department and ConFire can issue evacuation warnings or evacuation orders for impacted areas. These notices are issued for a zone with an evacuation status. The Zonehaven Aware zones are based on the City's 17 tactical zones.

The County's website has an interactive evacuation map lookup tool that enables residents with the ability to find possible evacuation routes based on their address and respective zone. Figure S-2 shows the evacuation routes and Zonehaven Aware zones throughout the city.

2.1.4 Evacuation Study

In 2022, the City prepared a General Plan Emergency Evacuation Assessment to analyze evacuation routes and their capacity, safety, and viability under different emergency situations. The assessment looked at three different wildfire scenarios to determine who in Lafayette may need to evacuate and how long an evacuation may take, and to recommend actions the City and its partners can take to improve evacuation conditions. Recent changes to State law require that communities prepare these studies under Assembly Bill 747.

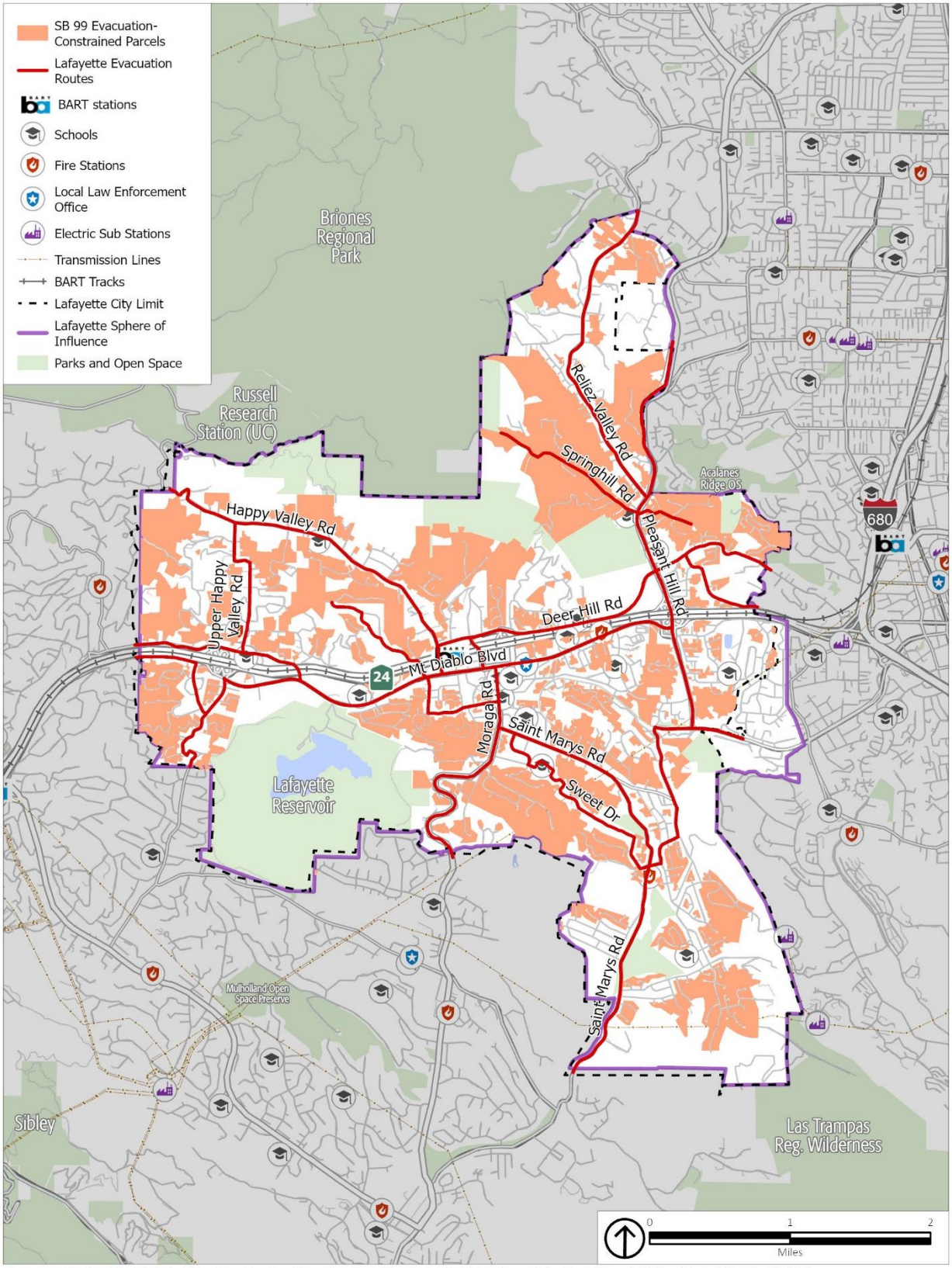
The first wildfire scenario analyzed a wildfire beginning in Briones Regional Park on a weekday afternoon and spreading southeast toward Lafayette. This fire would require evacuating all of Lafayette north of SR-24, including over 5,000 households, more than 500 workers, and approximately 2,400 students and school staff. Under these conditions, the study estimated that community members would require between 0.92 hours and 1.63 hours (55 to 98 minutes) to fully evacuate these neighborhoods

The second wildfire scenario considered a wildfire starting at the Lafayette Reservoir park on a weekday afternoon and moving east. This fire would require evacuating over 4,300 households, more than 6,100 workers, over 1,400 students and school staff, and approximately 300 visitors to the reservoir in southwest Lafayette (including downtown) and parts of Moraga. This scenario has the longest evacuation times of the three scenarios, varying by neighborhood between 1.34 and 3.77 hours (80 to 226 minutes).

The third wildfire scenario assesses a wildfire beginning in Hunsaker Canyon late at night. This would require evacuating close to 1,500 households and about 400 workers from the Hunsaker Canyon area in southeast Lafayette. Under this scenario, the affected neighborhoods would require 0.78 to 1.64 hours (47 to 98 minutes) to fully evacuate.

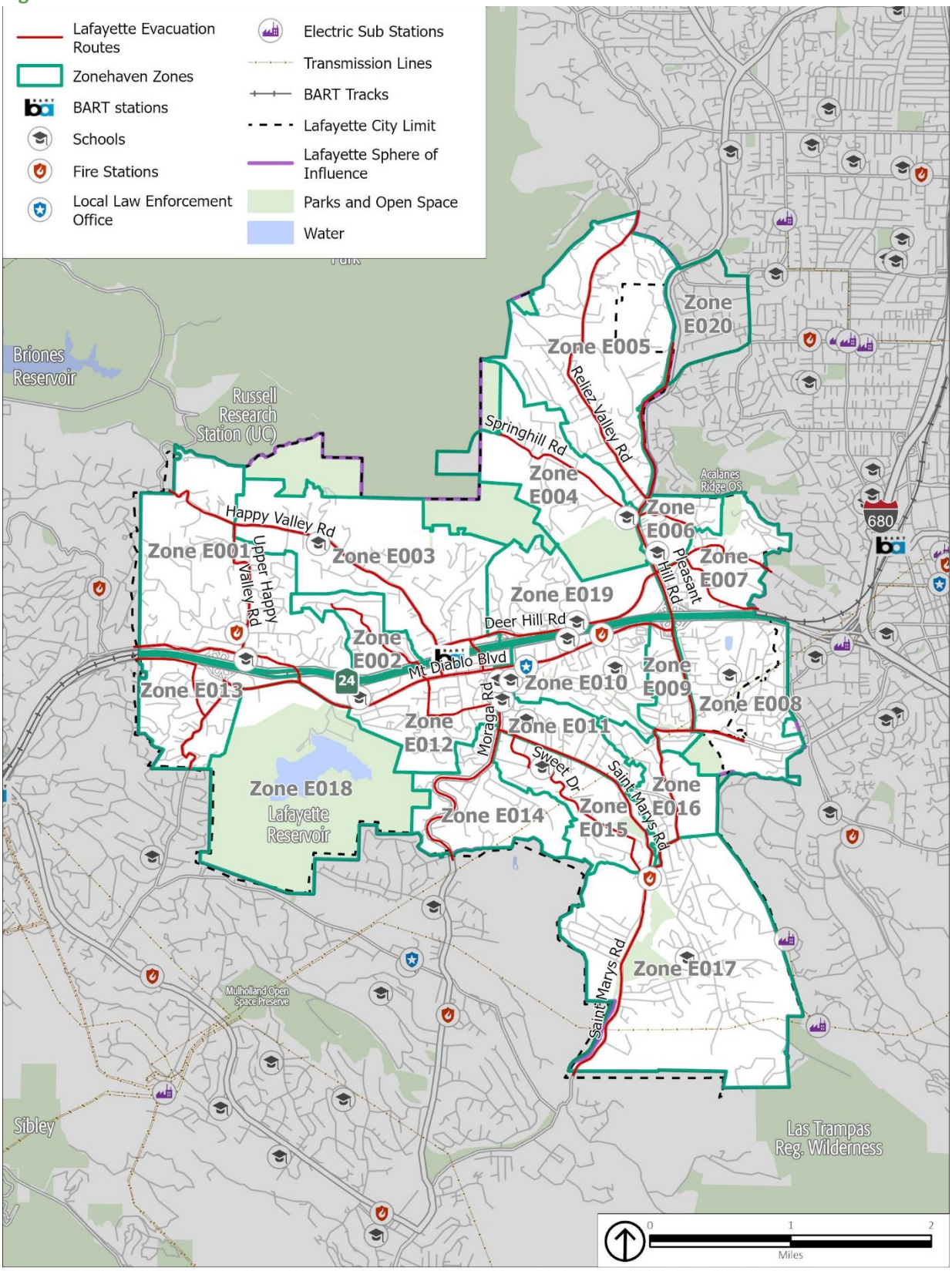
The full results of the evacuation study are available at https://tinyurl.com/tacd5k9a.

Figure S-1 Evacuation-Constrained Residential Parcels



Source: Cal OES, 2021; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

Figure S-2 Evacuation Routes and Zonehaven Aware Zones



Source: Cal OES, 2021; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

2.1.5 Cyber-Attack

A cyber-attack is an intentional and malicious crime that compromises the digital infrastructure of a person or organization, often for financial or terror-related reasons. Such attacks vary in nature and are carried out using websites, social media platforms, online advertising, or emails. The impact of a cyber-attack depends on its scale, sophistication, target, and the attacker's motives. Cyber-attacks can result in financial losses, data breaches, disruption of operations, reputational damage, privacy violations, or health and safety risks. They can cause disruptions in key services by interrupting important infrastructure or communication systems. In most cases, attacks last minutes to days, but large-scale events and their impacts can last much longer. As information technology continues to grow in capability and interconnectivity, cyber-attacks become increasingly frequent and destructive.

Types of threats include tricking someone into sharing their login credentials or other sensitive information with attackers (phishing), using viruses to erase entire systems, breaking into systems and altering files, using someone's personal computer to attack others, or stealing confidential information. Cyber-attacks pose a threat to governmental operations in Contra Costa County, including the City of Lafayette. In the past, the Contra Costa County Library, Con Fire, and Contra Costa County Health Services Departments have experienced cyber-attacks.

The primary concern resulting from a cyber-attack is damage to the City's infrastructure and IT systems. An attack on the City's infrastructure may result in disruptions in essential services, compromising public safety, and causing economic damage. This could include disruptions to the power grid, transportation system, communication infrastructure outages, emergency services impairment, or critical infrastructure damage. With regards to IT systems, a cyber attack could have serious implications for managing and delivering essential services to its residents and businesses.

All populations who directly use a computer or receive services from automated systems are vulnerable to cyber-terrorism. While all individuals in the city are vulnerable to an attack, certain types of attacks would impact specific segments of the population. For example, if the cyber-attack targeted the City's power grid, individuals with medical needs could be impacted the greatest. These populations are most vulnerable because many of the life-saving systems they rely on require power. Additionally, if an attack occurred during months of extreme heat, those 65 years of age and older would be vulnerable to the effects of the lack of climate control. These individuals might require an air-conditioned shelter operating on a back-up generator.

Cyberattacks can cause physical damage if real assets or end consumers are affected by service disruption. This might occur if cyber-attacks target industries related to utilities, life support, transportation, human services, or telecommunications. In many cases, attacks on these systems are initially thought to be system failure rather than a deliberate attack, hindering an effective response.

Additionally, a cyber-attack on communication systems can have severe implications for emergency response efforts, potentially leading to chaos, delays in assistance, and even loss of life. The cyber-attack may target the infrastructure that supports communication systems, such as cellular networks, internet service providers, or radio towers. This could lead to widespread outages, making it difficult for emergency services to communicate with each other and coordinate their efforts. Moreover, communication breakdowns caused by the cyber-attack can result in delayed response times. Emergency personnel may not receive critical information promptly, leading to slower reaction times and potentially exacerbating the impact of the emergency.

2.2 FLOOD AND INUNDATION HAZARDS

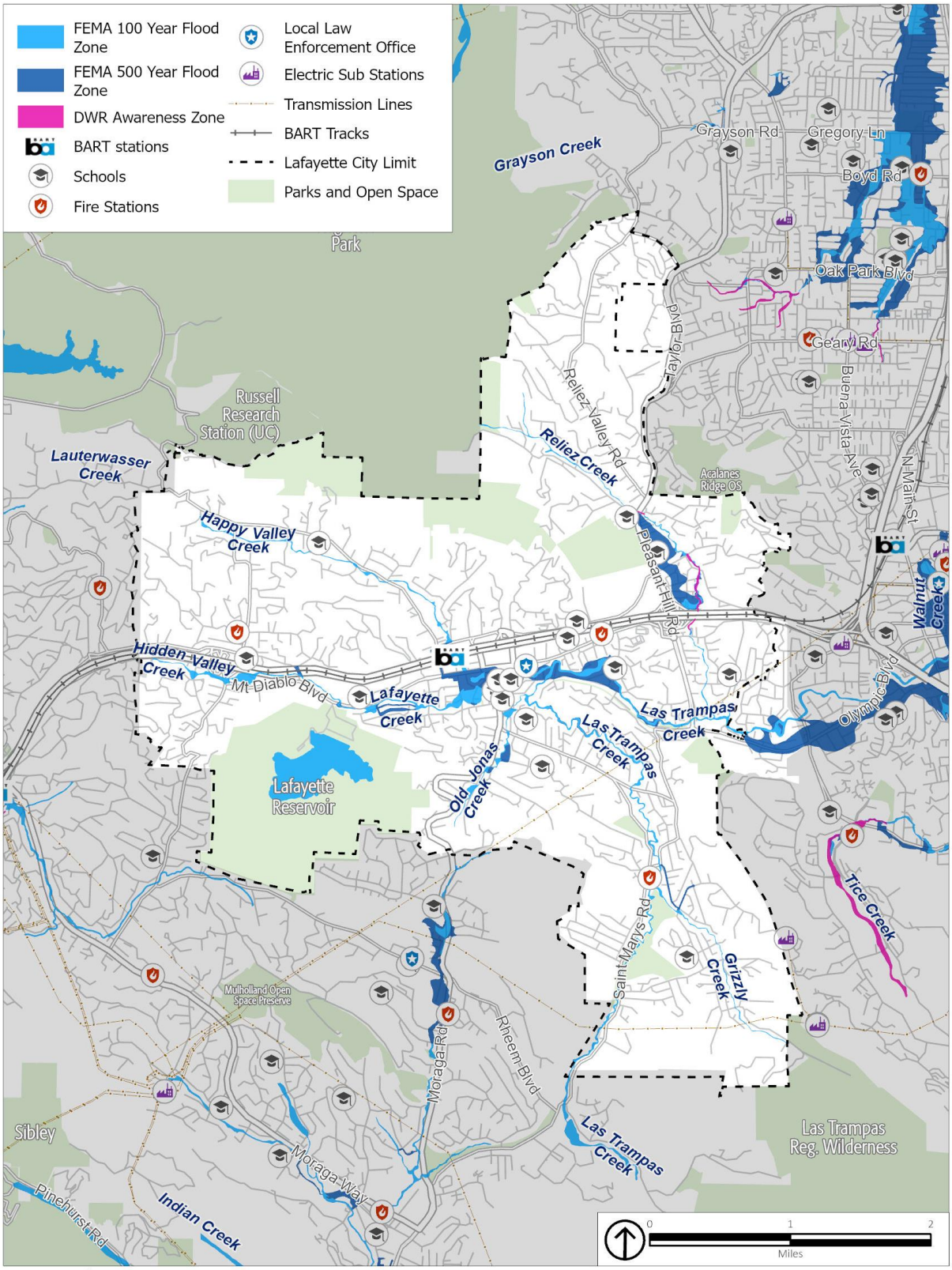
Flooding is the rising and overflowing of a body of water onto normally dry land. Floods are one of the most frequent natural hazards impacting Contra Costa County and among the costliest natural disasters in terms of human hardship and economic loss nationwide, causing substantial damage to structures, landscapes, and utilities, as well as life-safety issues. Flooding can be extremely dangerous, and even six inches of moving water can knock a person over given a strong current. Floodwaters can transport large objects downstream, which can damage or remove stationary structures, such as dam spillways. Ground saturation can result in instability, collapse, or other damage that breaks utility lines and interrupts services. Objects can also be buried or destroyed through sediment deposition from heavy flooding. 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 losses 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. Historically, Lafayette has been at risk of flooding primarily during the winter and spring months when stream systems swell with heavy rainfall. This type of flood results from prolonged, heavy rainfall and is characterized by high peak flows of moderate duration and a large volume of runoff. Flooding is more severe when prior rainfall has saturated the ground. Flooding in Lafayette primarily occurs along Las Trampas Creek and Lafayette Creek, which both run west to east through the city, as well as smaller-scale ponding and flash flood issues throughout the community.

Occasionally, flash flooding from short-duration, high-intensity precipitation events (often during atmospheric river events) may occur. Atmospheric rivers are a relatively common weather pattern that brings southwest winds and heavy rain to California. Atmospheric rivers are long, narrow regions in the atmosphere that transport most of the water vapor carried away from the tropics. These columns of vapor move with the weather, carrying large amounts of water vapor and strong winds. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow, often causing heavy rains that can lead to flooding and mudslide events. Flash floods can occur even during a drought. Such events can tear out trees, undermine buildings and bridges, and scour new channels. In urban areas, flash flooding is an increasingly serious problem due to removal of vegetation and replacement of groundcover with impermeable surfaces such as roads, driveways, and parking lots. The greatest risk from flash floods is occurrence with little to no warning.

Areas at an elevated risk of flooding are divided into 100- and 500-year flood zones. A 100-year flood zone has a 1-percent chance of experiencing a major flood in any given year and a 500-year flood zone has a 0.2-percent chance of flooding in any given year. The 100-year floodplain in Lafayette is primarily along Las Trampas Creek, Lafayette Creek, Grizzley Creek, the Lafayette Reservoir Recreation Area, as well as drainage areas from the northeast to the southeast portion of the city. The 500-year floodplain includes areas around Las Trampas Creek and Lafayette Creek, the downtown area, areas near the BART station and SR-24, as well as areas around Acalanes High School. In addition to the designated floodplains are Awareness Zones designated by the California Department of Water Resources. The Awareness Zones do not have the same regulatory force as the 100- and 500-year floodplains (for example, homebuyers with federally-backed mortgages do not need to buy flood insurance for properties in the Awareness Zones), but indicate additional areas that face an elevated risk of flooding. During heavy rainfall events, the city is subject to flooding of residential and commercial areas, especially areas in the vicinity of Las Trampas Creek and Lafayette Creek. Figure S-3 shows the 100- and 500-year flood zones and the Awareness Zones in and around Lafayette.

Figure S-3 Flood Hazard Zones



Source: Cal OES, 2021; Contra Costa County, 2022; DWR, 2022; Esri, 2022; FEMA, 2022; City of Lafayette, 2022; PlaceWorks 2023.

Agencies responsible for flood control in Lafayette include the Unites States Army Corps of Engineers, Contra Costa County Flood Control and Water Conservation District, East Bay Municipal Utilities District, Federal Insurance Administration, and the California Department of Water Resources.

- United States Army Corps of Engineers (USACE) identifies the need for and constructs major flood-control facilities. It also develops flood and dam inundation maps and reports.
- Contra Costa County Flood Control and Water Conservation District (FC District) covers all of Contra Costa County, including its cities, and owns property throughout the county for the purpose of constructing and maintaining regional flood-control facilities, including approximately 79 miles of channels, creeks, and other drainage and 30 detention basins and dams. The FC District works to reduce flood risk, promote stormwater quality, and restore and enhance natural resources in an environmentally sensitive manner for the communities throughout Contra Costa County.
- East Bay Municipal Utilities District (EBMUD) supplies water for Contra Costa County and is the owner of the Lafayette Reservoir, although the reservoir does not store water for flood control.
- Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP), providing insurance to the public in communities that participate in the program. FEMA is the main federal government agency contact during natural disasters and publishes the Flood Insurance Rate Maps (FIRM), which identify the extent of flood potential in flood-prone communities based on a 100-year flood (or base flood) event.
- Federal Insurance Administration (FIA) is the primary agency that delineates potential flood hazard areas and floodways through the FIRMs and the Flood Boundary and Floodway Map. Flood insurance is required of all homeowners who have federally subsidized loans.
- California Department of Water Resources (DWR) is responsible for managing and protecting California's water. DWR works with other agencies to benefit the state's people, and to protect, restore, and enhance the natural and human environments. DWR also works to prevent and respond to floods, droughts, and catastrophic events that would threaten public safety, water resources and management systems, the environment, and property. DWR is responsible for inspecting the Lafayette Dam on an annual basis to ensure it is safely operating.

Floodplains can change over time; the floodplain and watercourse of a stream can also be affected by human activities, such as land development and replacing permeable surfaces with hardscapes, the construction of bridges or culverts, or the creation of levees or other impoundment structures that control the flow in the watercourse.

2.2.1 Dam and Pipeline Failure

A dam failure is an uncontrolled release of water from a reservoir through a dam because of structural failures or deficiencies in the dam, usually associated with intense rainfall or prolonged flooding. Water pipeline or aqueduct failures can create a similar sudden flood. Dam and pipeline failures can range from minor to catastrophic and can potentially harm human life and property downstream from the failure. In addition, ecosystems and habitats can be destroyed by fast-moving floodwaters, debris, and sedimentation from inundation. Although dam and pipeline failures are very rare, these events are not unprecedented. There are four major causes of failures:

- **Overtopping:** These failures occur when a reservoir fills too high with water, especially in times of heavy rainfall, leaving water to rush over the top of the dam. Other causes of this type of failure include settling of the crest of the dam or spillway blockage.

- **Foundation defects:** These failures occur as a result of settling in the foundation of the dam, instability of slopes surrounding the dam, uplift pressures, and seepage around the foundation. All of these failures result in structural instability and potential dam failure.
- **Piping and seepage failures:** These failures occur as a result of internal erosion caused by seepage and erosion along hydraulic structures such as the spillways of a dam, or failures in the walls of a water pipeline. Erosion may also be caused by animal burrows and cracks in the dam structure.
- **Conduit and valve failure:** These failures occur as a result of problems with valves and conduits in a dam or pipeline's systems.

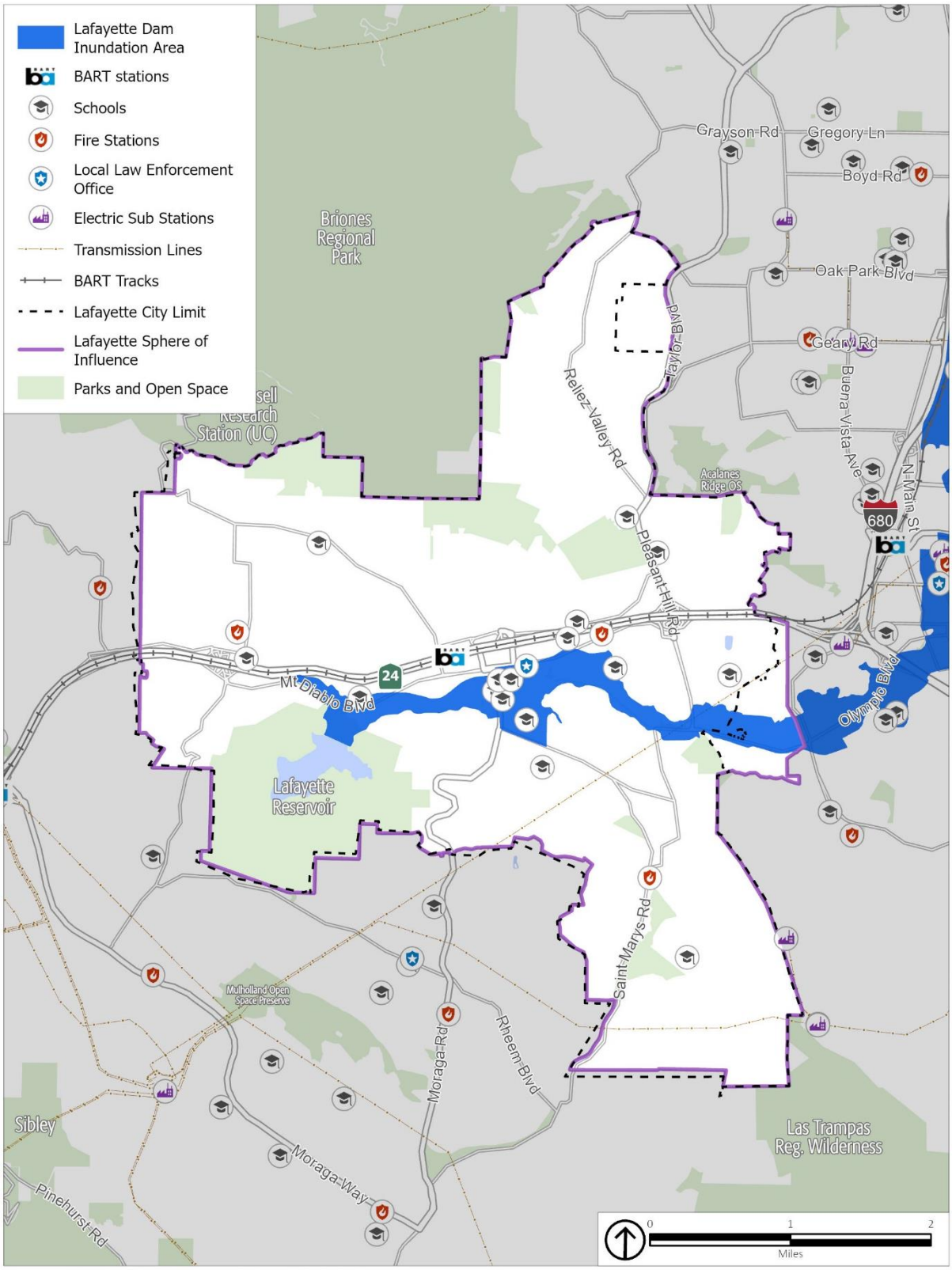
Many dam and pipeline failures are also the secondary result of other natural disasters, such as earthquakes, landslides, and extreme storms. Other causes include equipment malfunction, structural damage, and sabotage. Dams are constructed with safety features known as "spillways" that allow water to overtop the dam if the reservoir fills too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential. In a dam failure scenario, the greatest threat to life and property typically occurs in those areas immediately below the dam since flood depths and discharges generally decrease as the flood wave moves downstream. The primary danger associated with dam failure is the high-velocity flooding downstream of the dam and limited warning times for evacuation.

EBMUD has a comprehensive Dam Safety Program, which includes proactive inspection of upgrades and improving its dams and water supply structures as needed and in consultation with regulatory agencies. Engineers monitor dams using instruments, monthly visual inspections, and periodic dam safety reviews to prevent loss of life, personal injury, and property damage from the failure of dams. The safety of each dam is re-evaluated with advances in geotechnical, structural, and earthquake engineering and if there is evidence of seepage or ongoing ground movement.

The Federal Energy Regulatory Commission (FERC), as required by federal law, has reviewed and approved comprehensive emergency action plans (EAPs) for each of these dams. The EAP minimizes the threat to public safety and the response time to an impending or actual sudden release of water from project dams. The EAP is also designed to provide emergency notification when floodwater releases may present the potential for major flooding.

The Lafayette Reservoir, owned by EBMUD, is within the city. In the event of a dam failure at the Lafayette Reservoir, land surrounding Lafayette Creek and Las Trampas Creek would flood, including the downtown and residential areas. Figure S-4 illustrates areas in the city that would be affected by inundation if this dam failed.

Figure S-4 Dam Inundation Areas



Source: California DWR - DSOD 2022; Cal OES, 2021;
Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

Dam failure poses a significant risk to EBMUD's Mokelumne Aqueduct System. The aqueduct carries water from Pardee Reservoir in the Sierra Nevada foothills to the Walnut Creek Water Treatment Plant near Lafayette. A series of other pipelines, including some that pass through Lafayette, carry water from the aqueduct to other treatment plants and to EBMUD customers. In the event of a dam failure along the aqueduct or its connected pipelines, a sudden and massive release of water downstream can generate a high-pressure wave or surge, which has the potential to rupture the aqueduct and other infrastructure in its path. The surge of water can create a force that exerts pressure on the walls of the aqueduct. The rupture can cause a breach in the aqueduct, which would allow water to escape and flood the surrounding area. Although EBMUD's Mokelumne Aqueduct System is designed to withstand normal flow rates, the sudden surge of water could cause it to rupture. Aqueducts that are old or in poor condition are generally more vulnerable to damage.

As mandated by the National Dam Inspection Act, the USACE has the authority and responsibility for conducting inspections of all dams. The purpose of these inspections is to check the structural integrity of the dam and associated appurtenant structures, ensuring protection of human life and property. Periodic inspections disclose conditions that might disrupt operation or dam safety. The National Dam Inspection Act requires all states to establish dam safety programs and sets minimum standards for dam design, construction, maintenance, and inspection. In response to this federal mandate, the California Dam Safety Program was established to oversee the inspection, operation, and maintenance of all dams within the state. The California Dam Safety Program is responsible for implementing the National Dam Inspection Act in California and ensuring that all non-federal dams in the state comply with the federal safety standards set forth by the National Dam Inspection Act. The program also works to promote dam safety awareness, provides technical assistance to dam owners and operators, and conducts regular inspections and evaluations of California's dams.

DWR's Division of Safety of Dams (DSOD) oversees the California Dam Safety Program that regulates approximately 1,250 dams in California. DSOD inspects dams on an annual basis to ensure they are safe and are performing as intended. DSOD also conducts independent reviews of applications for dam construction, removal, alteration, or repair, has inspection oversight over dam construction projects, and periodically reviews the stability of dams and their critical related structures in light of improved design approaches and requirements. DSOD works closely with dam owners to identify and correct issues on an ongoing basis.

2.2.2 Past Occurrences

Floods are a regular feature in California and are the cause of the second-greatest number of disaster declarations in the state. A series of storms from December 17, 2005, to January 12, 2006, caused extensive flooding throughout Northern California. Widespread county flooding occurred after 2 to 4 inches of rain fell on the area in about 24 hours. Urban flooding-initiated landslides contributed to the damage and small streams and creeks overflowed their banks. Much of the damage was done in Walnut Creek, Richmond, San Pablo, Martinez, and Orinda. In total across the county, flooding resulted in approximately $22 million in property damage. Included in the damages were schools, park areas, and several government structures. In all of Contra Costa County, community members filed approximately 165 claims for personal assistance due to flooding.

In 2012, a series of significant winter storms affected the county during late November and early December. The first storm arrived November 28, followed by three more winter storms. Each brought strong and gusty winds, heavy rainfall, and flooding to the region. The second storm happened on the first and second of December, with the third and final storm on December 5th.

On March 1, 2018, the City of Lafayette experienced a widespread storm event causing localized flooding, strong winds, lightning, and hail measuring approximately 0.5 inches.

In January 2023, the City of Lafayette proclaimed a State of Emergency amid severe storms that caused flooding and mudslides during a storm on December 31, 2022. A series of atmospheric rivers struck California during the first week of 2023, causing floods, landslides, power outages, and more across the state. Storm-related damage cost approximately $43 million in response and recovery efforts throughout all of the cities and unincorporated areas of Contra Costa County.

2.2.3 Potential Changes to Flood Risk in Future Years

Likelihood of Future Occurrence

Historically, extended heavy rains have resulted in floodwaters that exceed normal high-water boundaries and cause damage in Lafayette. Flooding has occurred both within the 100- and 500-year floodplains and localized in other areas throughout the city. As land uses and climate conditions shift, and improvements are made to flood-control channels, the size of these flood zones is likely to change. The potential for a dam failure event in Lafayette is likely to remain a risk in future years, although the odds of such events are expected to remain very low.

Climate Change and Flooding

Floods are among the most damaging natural hazards in Contra Costa County, and climate change is expected to make flood events worse. Although climate change may not change average precipitation levels significantly, scientists expect that it will cause more years with extreme precipitation events. This means that more years are likely to see particularly intense storm systems that drop enough precipitation over a short enough period to cause flooding. Because of this, floods are expected to occur more often in Lafayette and climate change may expand the parts of the city that are considered prone to flood. Although there are no specific flooding projections for the city, flood events are expected to become more frequent, and it is possible that the areas subject to flooding will expand. There are some indirect effects of climate change that may also increase flooding in the city. Climate change is expected to increase the frequency and severity of droughts that cause soil to dry out and become hard. When precipitation does return, more water runs off the surface than is absorbed into the ground, which can lead to floods.

While the risk and associated short- and long-term impacts of climate change are uncertain, experts in this field tend to agree that among the most significant impacts include those resulting from increased heat and precipitation events that cause increased frequency and magnitude of flooding. Increases in damaging flood events will cause greater property damage, public health and safety concerns, displacement, and loss of life. Displacement of residents can include both temporary and long-term displacement, increase in insurance rates, or restriction of insurance coverage in vulnerable areas.

2.3 SEISMIC AND GEOLOGIC HAZARDS

Seismic and geologic hazards are risks caused by the movement of different parts of the Earth's crust, or surface. Seismic hazards include earthquakes and hazardous events caused by them. Geologic hazards are other hazards involving land movements that are not linked to seismic activity and are capable of inflicting harm to people or property.

2.3.1 Seismic Hazards

Seismic activity occurs along boundaries in the Earth's crust, called faults. Pressure along the faults build over time and is ultimately released, resulting in ground shaking that we refer to as an earthquake. Earthquakes can also trigger other hazards, including surface rupture (cracks in the ground surface), liquefaction (causing loose soil to lose its strength), landslides, and subsidence (sinking of the ground surface). Earthquakes and other seismic hazards often damage or destroy property and public infrastructure, including utility lines, and falling objects or structures pose a risk of injury or death.

Earthquakes

While Lafayette is at risk from many natural and human-caused hazards, the event with the greatest potential for loss of life or property and economic damage is an earthquake. This is true for most of the San Francisco Bay Area region, since damaging earthquakes affect widespread areas and trigger many secondary effects that can overwhelm the ability of local jurisdictions to respond. The Bay Area region lies within the active boundary between the Pacific and the North American tectonic plates. The Pacific Plate is constantly moving northwest past the North American Plate at a rate of about 2 inches per year. Earthquakes in the Bay Area region result from strain energy constantly accumulating across the region because of the motion of the Pacific Plate relative to the North American Plate. The San Andreas Fault is the major plate boundary and has the potential to cause the strongest earthquakes.

Earthquake risk is very high in Contra Costa County, including the City of Lafayette, due to the presence of several active faults in the region, the Calaveras North Fault, Concord-Green Valley Fault, Greenville Fault, Hayward Fault, and Mount Diablo Fault. Active faults are defined by their current movement and deformation and their potential to cause earthquakes or other types of ground deformation in the future.

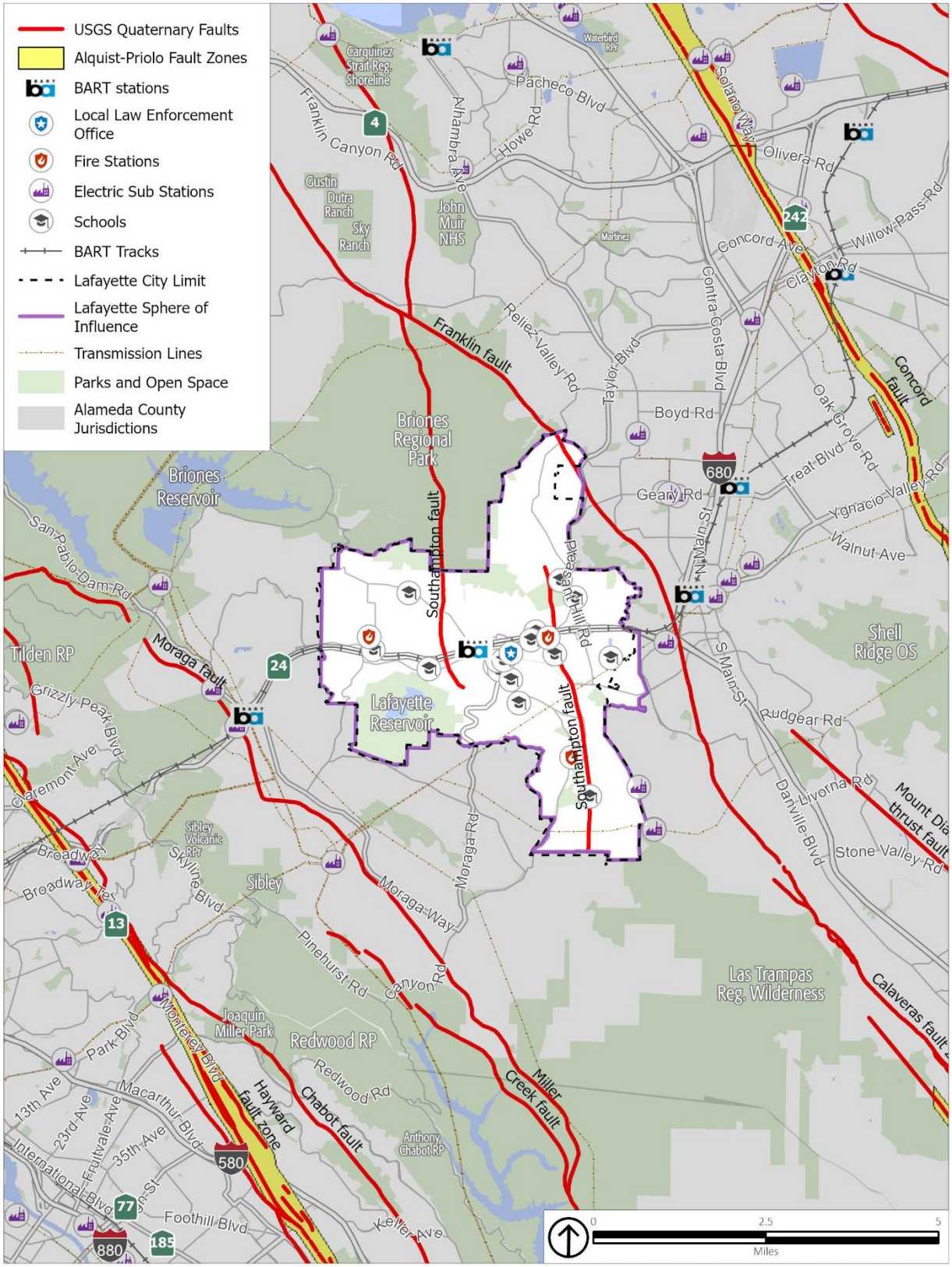
Alquist-Priolo Earthquake Fault Zones are California Geologic Survey-designated zones in California that are subject to special regulations for development and construction in the presence of certain active faults. These are faults that have surface traces, or a line on the Earth's surface defining a fault. During an earthquake, the surface of the ground can move along these traces, damaging buildings or other structures built on top of them. However, no Alquist-Priolo Earthquake Fault Zones[1] are in the city. The nearest Alquist-Priolo Earthquake Fault Zone is along the Concord Fault, approximately five miles northeast of the city. Figure S-5 shows the location of regional faults, which are Quaternary faults. A Quaternary fault is a geological fault that has been recognized at the surface and that has moved in the past 1.6 million years. This places fault movement during the Quaternary Period, which spans from 2.6 million years ago to the present. Quaternary faults can pose a significant seismic hazard, as their movement can cause earthquakes and other types of ground deformation. However, not all Quaternary faults are active faults. In addition to the mapped active and potentially active faults shown in Figure S-5, there are other potentially active faults in the area that could result in an earthquake. These potentially active faults are referenced in a report prepared by Lettis & Associates for BART in 2006. This includes the other faults of the Contra Costa Shear Zone, which runs through eastern Lafayette and western Walnut Creek, approximately between Brown Avenue in Lafayette and Main Street in Walnut Creek, although the

exact locations of these faults are not identified. Along with the mapped Southampton Fault, the shear zone also includes the Reliez Valley, Lafayette, Franklin, and other faults not shown on the map.

The following faults are considered active faults within the region:

- **Calaveras Fault (North Central):** The Calaveras (North Central) Fault is a major branch of the San Andreas Fault. It extends 76 miles from the San Andreas Fault near Hollister to Danville at its northern end, approximately three miles from Lafayette. The Calaveras Fault is one of the most geologically active and complex faults in the Bay Area.[5] According to the 2018 Contra Costa County LHMP, the probability of experiencing a magnitude 6.7 or greater earthquake along the Calaveras Fault in the next 30 years (beginning from 2018) is 26 percent.[6]
- **Concord-Green Valley Fault:** The Concord-Green Valley Fault, named for being located under the City of Concord, is connected to the main Green Valley Fault. The fault extends from Mount Diablo to the Carquinez Strait, about five miles from Lafayette at its closest point. It is under high stress and has a 16-percent probability of experiencing a magnitude 6.7 or greater earthquake in the next 30 years (beginning from 2018).
- **Greenville Fault:** The Greenville Fault zone extends from northwest of Livermore Valley along the Marsh Creek and Clayton Faults toward Clayton Valley. It is about eight miles from Lafayette at its closest point.
- **Hayward Fault:** The Hayward Fault is an approximately 45-mile-long fault that runs through some of the Bay Area's most populated areas, including San Jose, Oakland, and Berkeley. It is approximately six miles from Lafayette at its closest point. The Hayward Fault is increasingly becoming a hazard priority throughout the Bay Area because of its increased chance for activity and its intersection with highly populated areas and critical infrastructure. The probability of experiencing a magnitude 6.7 or greater earthquake along the Hayward Fault in the next 30 years (beginning from 2018) is 33 percent. An earthquake of this magnitude has regional implications for the entire Bay Area, as the Hayward Fault crosses transportation and resource infrastructure, such as multiple highways and the Hetch-Hetchy Aqueduct.
- **Mount Diablo Fault:** The Mount Diablo Thrust Fault runs from Walnut Creek to Livermore, approximately two miles from Lafayette at its closest point. It plays a role in the continued uplift of Mount Diablo.

Figure S-5 Regional Fault Lines



Source: Cal OES, 2021; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023; USGS, 2022.

Other Seismic Hazards

In addition to the direct physical damage that can result from the motion of an earthquake, damage can result from liquefaction. Liquefaction is the complete failure of soils, occurring when soils lose shear strength and flow horizontally. Liquefaction occurs primarily in saturated, loose, fine- to medium-grained soils in areas where the groundwater table is within approximately 50 feet of the surface. Shaking causes the soils to lose strength and behave as liquid. Excess water pressure is vented upward through fissures and soil cracks and can result in a water-soil slurry flowing onto the ground surface. This subsurface process can lead to near-surface or surface ground failure that can result in property damage and structural failure. Groundwater that is less than 10 feet to the surface can cause the highest liquefaction susceptibility, with lower groundwater levels causing lower liquefaction risks.

Soils susceptible to liquefaction are typically found in areas of low-lying, current, or former floodplains. Portions of the city near the floodplains of Lafayette Creek, Las Trampas, and Grizzley Creek are areas likely to face liquefaction during an earthquake event. Figure S-6 shows the areas facing an elevated liquefaction risk in Lafayette.

Site-specific geotechnical studies are the only practical and reliable way of determining the specific liquefaction potential of a site. However, a determination of general risk potential can be provided based on soil type and depth of groundwater. In most cases, proper design and construction of subgrade soils and building foundations provides a mechanism to mitigate the risk of seismic hazards to an acceptable level in conformance with the California Building Code. The representation of areas having a liquefaction potential is only intended as notification to seek further site-specific information and analysis of this potential hazard as part of future site development. It should not be solely relied upon, without site-specific information and analysis, for design or decision-making purposes.

Seismic seiches are waves that can occur in a body of water as a result of seismic shaking. Seismic seiches can occur in reservoirs, such as the Lafayette Reservoir. When an earthquake occurs, the ground shakes, and this can cause the water in a reservoir to slosh back and forth, creating standing waves that can cause significant damage to the reservoir and the surrounding area. The likelihood of a seismic seiche occurring in a reservoir during an earthquake depends on several factors, including the size and shape of the reservoir, the amount of water in the reservoir, the strength and frequency of the seismic waves, and the soil and rock conditions around the reservoir. Seismic seiches can also occur in wastewater storage tanks, particularly if the tanks are large and filled with a significant amount of water.

Earthquake-induced landslides pose a significant risk due to the presence of landslide prone areas and proximity of earthquake faults. Ground shaking from seismic activity can cause rocks, debris, and hillside soils to loosen and fall downslope, harming facilities and infrastructure in its path. Sinkholes, which are depressions or holes in the ground that form when the surface collapses into an underground space, are also a hazard in Lafayette. They can be formed by natural processes, such as earthquakes or subsidence, which is when the ground's surface sinks as a result of underlying soil or rock being compressed, compacted, or eroded. Sinkholes can occur suddenly and can be very dangerous if they form underneath buildings, roads, or other structures. They can also cause damage to natural ecosystems.

2.3.2 Geologic Hazards

Geologic hazards, such as landslides and erosion, depend on the geologic composition of the area. Landslides and rock falls may occur in sloped areas, especially areas with steep slopes, and usually in areas of loose and fragmented soil. Landslides, rockfalls, and debris flows occur continuously on all slopes; some processes act very slowly, while others occur very suddenly, often with disastrous results. There are predictable relationships between local geology and landslides, rockfalls, and debris flows. Slope stability

is dependent on many factors and interrelationships, including rock type, pore water pressure, slope steepness, and natural or human-made undercutting.

Landslides are often triggered by other natural hazards, such as earthquakes, heavy rain, floods, or wildfires, so landslide frequency is often related to the frequency of these other hazards. In Contra Costa County, landslides typically occur during and after severe storms, so the risk of landslides often rises during and after sequential severe storms that saturate steep, vulnerable soils. According to the National Centers for Environmental Information's storm event database, Contra Costa County has been impacted by severe storms at least once every three years. Landslides and mudslides are a common occurrence and have caused damage to homes, public facilities, roads, parks, and sewer lines in particular.

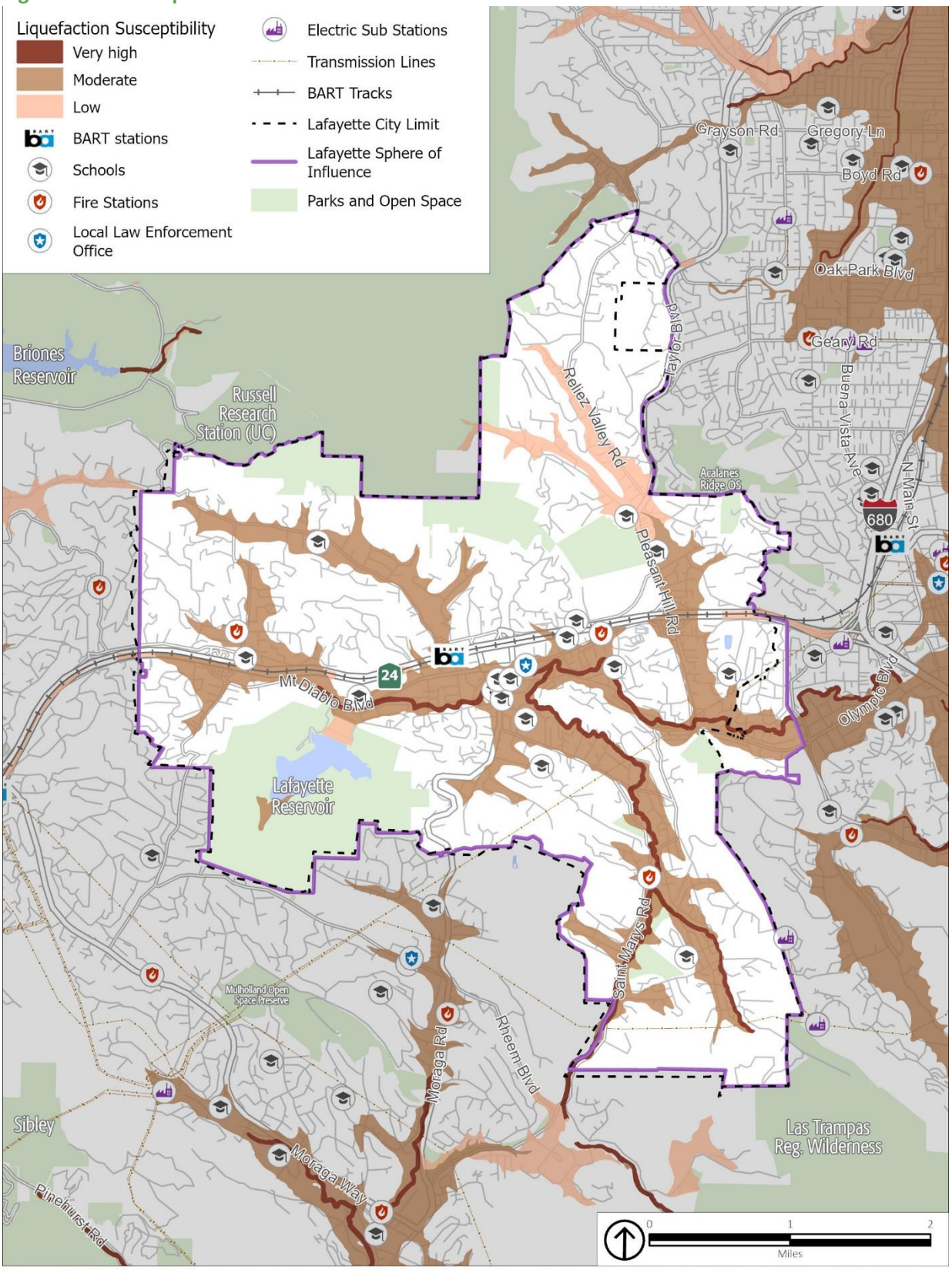
Due to the hilly terrain, a majority of the city is within a very high landslide susceptibility class. Lafayette is historically subject to landslides; in fact, landslides are the primary physical process that shapes the topography in the local area. Landslides occur on hillsides throughout the city and generally occur in winter during high precipitation years. Multiple critical communication, power, water, wastewater, bridges, fire district, and school facilities are at moderate to high risk for landslide. Figure S-7 illustrates areas in Lafayette that are most susceptible to landslides.

Lafayette is also susceptible to hazards related to erosion, or the geological process in which earthen materials are worn away and transported by natural forces, such as water or wind, causing the soil to deteriorate. Eroded topsoil can be transported into streams and other waterways. Water erosion is the removal of soil by water and transportation of the eroded materials away from the point of removal. The severity of water erosion is influenced by slope, soil type, soil water storage capacity, nature of the underlying rock, vegetation cover, and rainfall intensity and period. The impact of soil erosion on water quality becomes significant, particularly as soil surface runoff. Highly erosive soils can damage roads, bridges, buildings, and other structures. Sinkholes can also be formed by the erosion of soil or sediment by water flowing through the ground. This can happen in areas with sandy or porous soils, or in areas with a high water table. Sinkholes can pose a hazard to infrastructure and human safety. They can cause damage to buildings, roads, and other structures, and can also pose a risk to people and animals if they are not properly identified and managed.

2.3.3 Past Occurrences

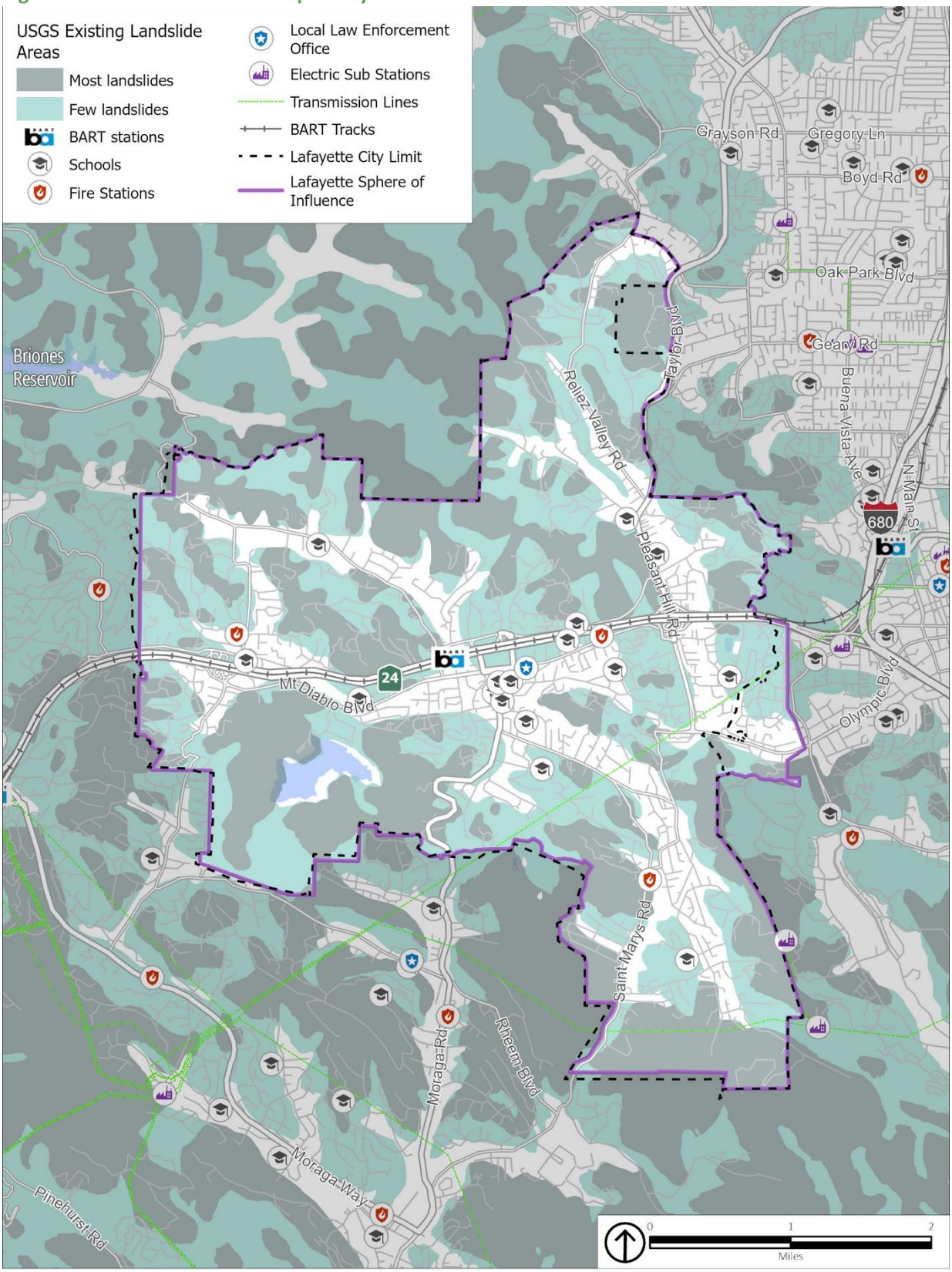
Lafayette is in a region of high seismicity with numerous local faults nearby. While major earthquakes are rare in Lafayette, minor earthquakes occur more often. The San Andreas Fault, the fastest-slipping fault along the Pacific and North American Plate boundary, has caused earthquakes of magnitude 7.8 and 7.9 in the past, including the 1906 San Francisco earthquake. In 1989, the Loma Prieta earthquake, which also originated along the San Andreas Fault, produced a magnitude 7.2 earthquake. The earthquake caused extensive damage and created a seven-county major disaster area, including Contra Costa County. Landslides have occurred on hillsides throughout the city and generally occur in winter during high precipitation years.

Figure S-6 Liquefaction Areas



Source: Cal OES, 2021; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023; USGS, 2006.

Figure S-7 Landslide Susceptibility Areas



Source: Cal OES, 2021; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023; USGS, 1997.

2.3.4 Potential Changes to Geologic and Seismic Risk in Future Years

Likelihood of Future Occurrence

Seismic Risk

Earthquakes are likely to continue to occur on an occasional basis. Most are expected to cause no substantive damage and may not even be felt by most people. Major earthquakes are rare, but a possibility in the region. A major earthquake along any of the nearby faults could result in substantial casualties and damage, although the greatest risk in Lafayette is from the Calaveras Fault or Mount Diablo Fault due to their proximity and high potential to cause a severe earthquake. A major earthquake on the Hayward Fault could damage or destroy transportation infrastructure, such as the BART railway, SR-24, or bridges, limiting access in and out of the community.

Based on historical data and the location of Lafayette relative to active and potentially active faults, the city will likely experience a significantly damaging earthquake. If serious shaking does occur, newer construction is in general more earthquake resistant than older construction because of improved building codes.

Geologic Risk

Geologic risks, such as landslides, are common occurrences in Lafayette. With significant rainfall, additional failures are likely in the community's landslide hazard areas and minor to moderate landslides will likely continue to impact the area when heavy precipitation occurs, as they have in the past.

Climate Change and Geologic and Seismic Hazards

While climate change is unlikely to increase earthquake frequency or strength, the threats from seismic and geologic hazards are expected to continue. Climate change may result in precipitation extremes (i.e., wetter rainfall periods and drier dry periods). While total average annual rainfall may not change significantly, rainfall may be concentrated in more intense precipitation events. Heavy rainfall could cause an increase in the number of landslides or make landslides larger than normal. Increased wildfire frequency can destabilize hillsides due to loss of vegetation and change soil composition, which can contribute to greater runoff and erosion. The combination of a generally drier climate in the future, which will increase the chance of drought and wildfires, and the occasional extreme downpour, is likely to cause more mudslides and landslides. Impacts from these conditions would compound landslide potential for the most susceptible locations.

2.4 FIRE HAZARDS

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. Wildfire is a hazard of very high concern for Lafayette. 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.

Three types of fires are of concern to Lafayette: (1) wildfires, (2) wildland-urban interface fires, and (3) structural fires.

2.4.1 Wildfires

Wildfires occur on mountains, hillsides, and grasslands. Fuel, weather, and topography are primary factors that affect how wildland fires spread. In and around Lafayette, grassland and woodland habitat provide highly flammable fuel that is conducive to wildfires. These plant species are capable of regeneration after a fire, making periodic wildfires a natural part of the ecology of these areas. The climate of Lafayette and the surrounding area keeps the grass dry and more readily combustible during fire season.

Wildfire potential for Contra Costa County is typically greatest in the months of August, September, and October, when dry vegetation coexists with hot, dry winds, known as Diablo winds. Diablo winds come from the north and northeast, carrying extremely dry air at a high velocity, usually in the San Francisco Bay Area. The name "Diablo wind" refers to the fact that the wind blows into the inner Bay Area from the direction of Mount Diablo in Contra Costa County. These hot, dry winds can quickly desiccate vegetation and other combustible materials and can push a fire down or up a slope at very high speeds. These winds often occur during the spring and fall but are especially dangerous in the driest months of late summer and fall. During these times, controlling a fire becomes far more difficult. Areas adjacent to the city that are susceptible to wildfires are also of concern as these conditions could exacerbate vulnerabilities within the city. These areas include State Responsibility Area (SRA) lands in the Las Trampas Regional Wilderness, the hillsides around the San Pablo and Briones Reservoirs, and the Briones Regional Park, as well as Local Responsibility Area (LRA) lands in the open space areas of Orinda and Moraga.

ConFire's Wildfire Mitigation Program

ConFire provides several programs throughout the county to reduce wildfire risks. These include the following programs:

- *Community chipping days*
- *Evacuation route cleanups*
- *Firewise USA Community Strategic Plan Projects*
- *Removal of dead trees*
- *Shaded fuel breaks*
- *Vegetation management and fuel reduction*
- *Home hardening outreach programs*
- *Low-income exterior hazard control program*

Because areas of the city with natural vegetation are extremely flammable during late summer and fall, wildfire is a serious hazard in undeveloped areas and on large-lot home sites with extensive areas of unirrigated vegetation. Grassland fires are easily ignited, particularly in dry seasons. These fires are relatively easily controlled if they can be reached by fire equipment, although after a fire, the burned slopes are highly subject to erosion and gullying. While brush-lands are naturally adapted to frequent light fires, fire suppression in recent decades has resulted in heavy fuel accumulation on the ground. Wildland fires, particularly near the end of the dry season, tend to burn fast and very hot, threatening homes and leading to serious destruction of vegetative cover. In woodland and forested areas, a wildland fire can generate a destructive crown fire, which is a fire that burns materials at the top of trees, spreading from treetop to treetop. They can be very intense and difficult to contain.

Many species of oaks are relatively tolerant to fire and are known to be part of California's fire-dependent ecosystem. In general, oak woodlands are well adapted to periodic fire in the landscape. However, fire suppression in the twentieth century has led to an increase of ton per acre of various fuel types. The buildup of dense understories and higher density of small trees enhance the risk of high-severity fires under hot, dry, and windy conditions. The combustibility of the fuel depends on its moisture content, physical structure, and chemical content. The drier the fuel, the more flammable it will be. Regardless, all vegetation in the region reaches some degree of combustibility during the dry summer

months and, under certain conditions, during the winter months. Invasive and non-native tree species that are not well-adapted to California's fire regime, such as eucalyptus, are highly flammable and can exacerbate the spread of wildfires.

In addition, tree mortality due to drought, sudden oak death, and forest pest (beetles) have increased densities of dead fuels and contributed to higher fire risk in the Bay Area. Under moderate drought conditions, oak woodlands generally present low fire risk, and treatments that remove ground fuels further reduce risk of high-severity fire. High-intensity fires increase the likelihood of a fire growing and spreading quickly. Furthermore, the production of burning embers carried through the wind can lead to spot fires, which occur beyond the immediate perimeter, and these are often the primary cause of ignition for structures. In Lafayette, an oak woodland wildfire has the potential to spread rapidly due to the community's steep topography, fuel load, and climatic conditions during the summer and fall make fire suppression challenging.

Wildfire Smoke

Increasing statewide fire frequency can create recurring air quality degradation events leading to respiratory health effects. Wildfire smoke consists of a mix of gases and fine particulate matter from burning vegetation and materials. The pollutant of most concern from wildfire smoke is fine particulate matter ($PM_{2.5}$). $PM_{2.5}$ from wildfire smoke is damaging to human health due to its ability to deeply penetrate lung tissue and affect the heart and circulatory system. Although wildfire smoke presents a health risk to everyone, sensitive groups may experience more severe acute and chronic symptoms from exposure to wildfire smoke, such as children (particularly younger children), older adults, people with chronic respiratory or cardiovascular disease, or people experiencing low socioeconomic status.

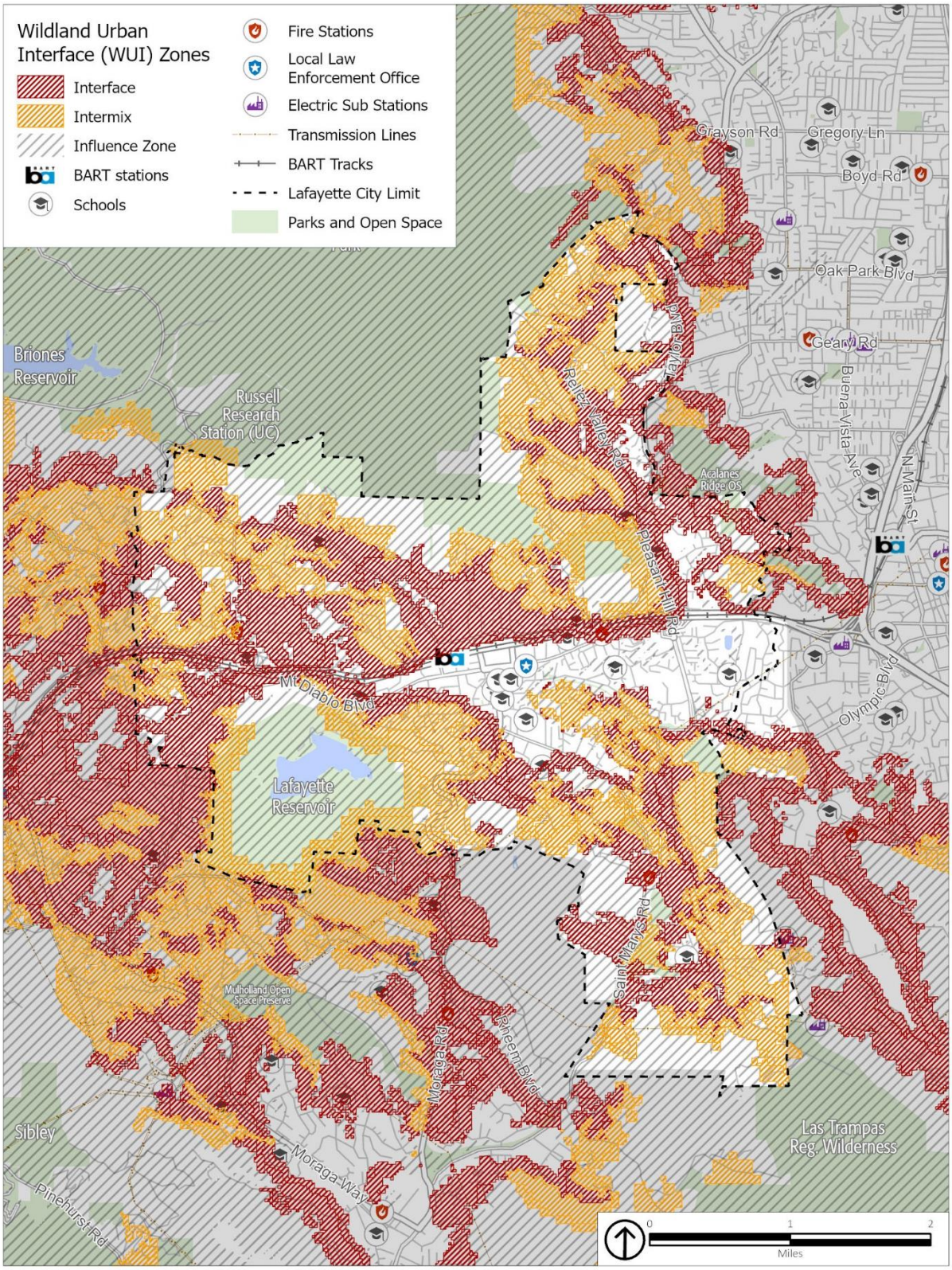
2.4.2 Wildland-Urban Interface Fires

The wildland-urban interface (WUI) is an area where buildings (e.g., schools) and infrastructure (e.g., cell towers and water supply facilities) mix with areas of flammable wildland vegetation, allowing wildland fires to easily spread to buildings and structures. Figure S-8 identifies the WUI in and around Lafayette.

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.

In the WUI, efforts to prevent ignitions and limit wildfire loss hinge on hardening structures and creating defensible space through a multifaceted approach, which includes engineering, enforcement, education, emergency response, and economic incentive. Multiple strategies in the WUI help to limit the spread of fire and reduce the risk to people and property.

Figure S-8 Wildland-Urban Interface Zones



Source: CAL FIRE, 2022; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

There are three distinct zones in the WUI.

1. The intermix zone contains housing development or improved parcels interspersed in an area dominated by wildland vegetation subject to wildfire. There are 1,949 residential parcels and 8 nonresidential parcels in the intermix zone, for a total of 1,957 (approximately 20% of all community parcels).

2. The interface zone contains dense housing next to vegetation that can burn in a wildfire but is not dominated by wildland vegetation. There are 4,159 residential parcels and 93 nonresidential parcels in the interface zone, for a total of 4,252 (approximately 44% of all parcels in Lafayette).

3. The influence zone contains wildfire-susceptible vegetation within 1.5 miles from the WUI or wildland-urban intermix zones. In the WUI, efforts to prevent ignitions and limit wildfire loss hinge on hardening structures and creating defensible space through a multifaceted approach, which includes engineering, enforcement, education, emergency response, and economic incentive.

2.4.3 Structural Fires

Lafayette is also at risk from structural fires. These fires occur in built-up environments, destroying buildings and other human-made structures. Structural fires are often due to faulty wiring, mechanical equipment, or combustible construction materials. The absence of fire alarms and fire sprinkler systems often exacerbate the damage 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 City's Fire Code, based on California Code of Regulation Title 24, sets standards for building and construction. It requires the provision of adequate water supply for firefighting, fire-retardant construction, and minimum street widths, among other things. The Fire Prevention Division of ConFire is tasked with providing the highest level of fire prevention through public education, inspection, code enforcement, and detailed plan review. Under the direction of the Fire Marshal, Con Fire's Fire Prevention Division personnel strive to provide the public with the most updated information available to safely protect their home or place of business from fire and hazards.

2.4.4 Fire Hazard Zones

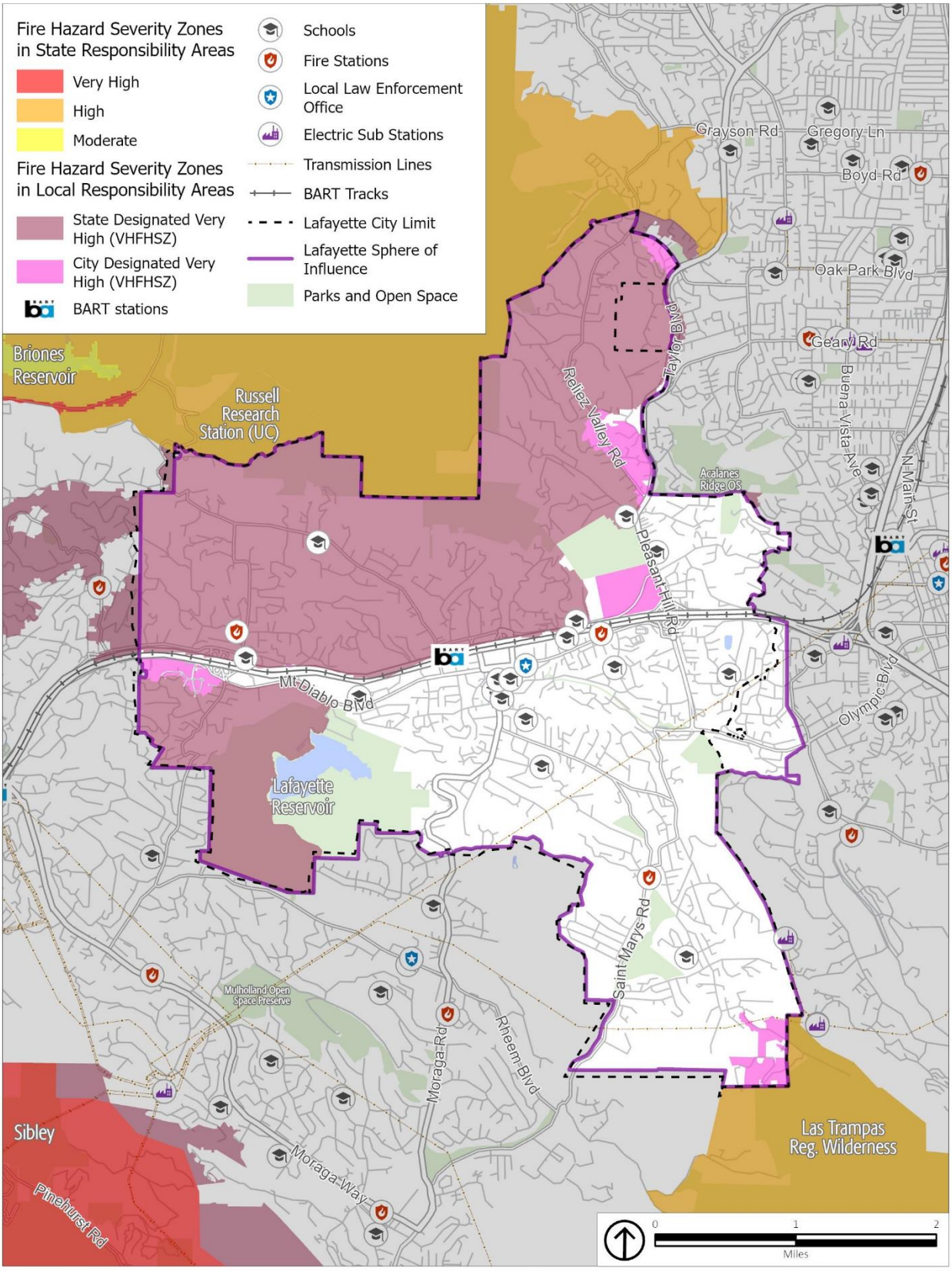
CAL FIRE establishes Fire Hazard Severity Zones (FHSZs) designating each as moderate, high, or very high severity. Lafayette has also adopted additional Very High FHSZs in 2013, mostly bordering the State-designated Very High zones. Figure S-9 shows the wildfire hazard severity zones in and around Lafayette. Areas in the northern, northwest, and western portion of the city are within a Very High FHSZ, while City-designated Very High FHSZ are in five distinct areas throughout Lafayette. Many of these high-risk areas are also the most difficult to access, as they are at the end of winding roads bordering undeveloped hillsides. Furthermore, areas adjacent to the city that are susceptible to wildfires are also of concern as these conditions could exacerbate vulnerabilities within the city.

Residential development in the WUI, the introduction and proliferation of exotic plant species, accumulated fuel because of wildfire suppression efforts, and climate change-driven compression of the historic rainy season, exacerbates the fire problem. Taken together, these factors result in more people, property, critical infrastructure, and natural resources in harm's way on a more frequent basis. While large-scale wildfires do not occur every year, wildfire incidents driven by extreme weather conditions have repeatedly been difficult to contain. Most of the land in Lafayette's Very High FHSZ is used for low-density

residential development and open space. Figure S-10 shows the land uses in the Very High FHSZ. There are 2,968 parcels of land in the State-designated. Very High FHSZ used for residential purposes, and another 91 parcels that are designated as open space. There are an additional 295 residential parcels in the City-designated VHFHSZ. In total there are 3,354 parcels in the VHFHSZ, or approximately 35% of all parcels in Lafayette.

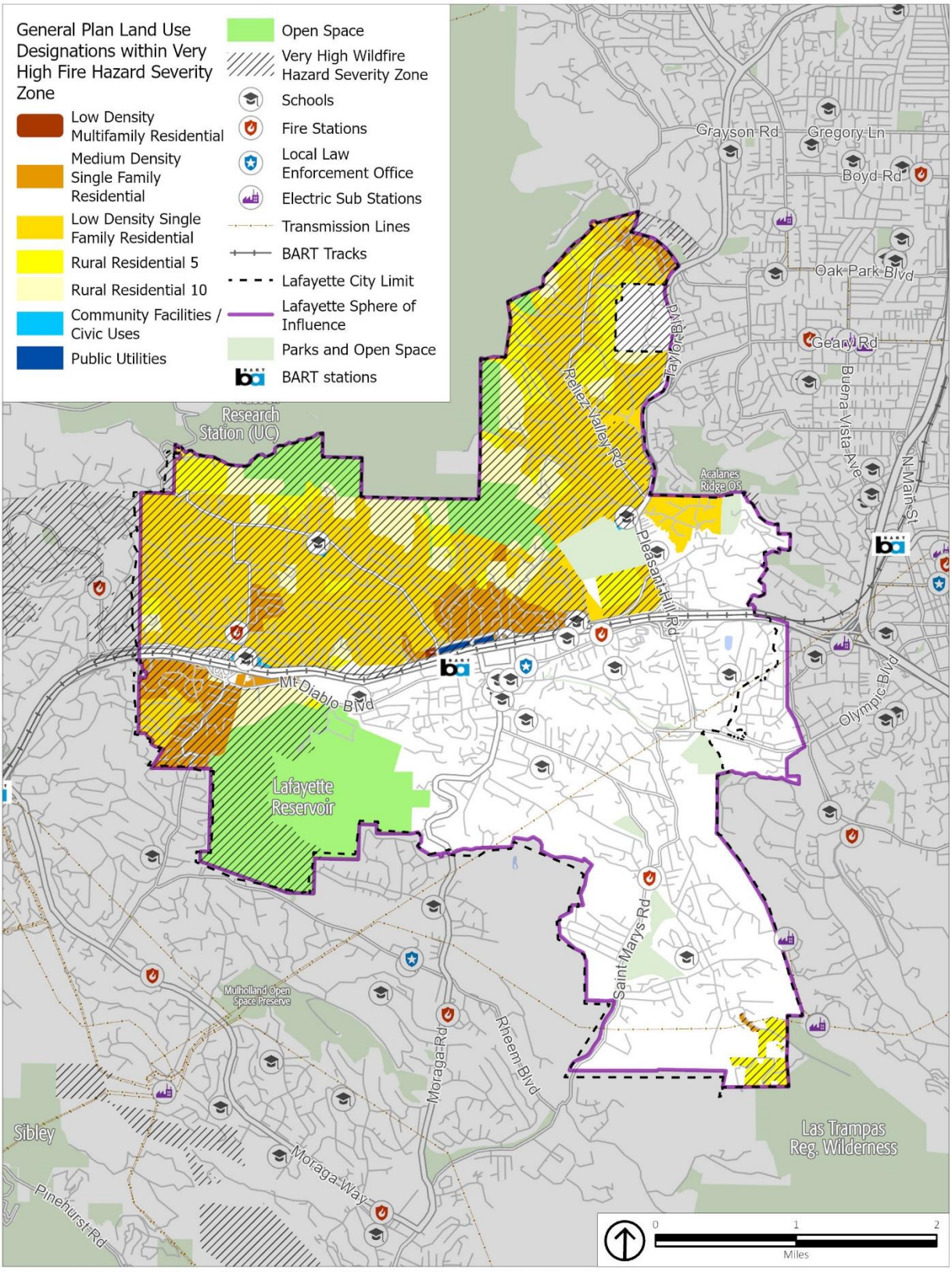
A combination of factors, including weather, topography, and vegetation creates a higher risk of wildfire hazards, particularly in the Very High FHSZ and the WUI. CAL FIRE periodically reviews and revises the FHSZ boundaries based on updated modeling and scientific information. Individuals should consult the most recent available mapping, available from CAL FIRE's Fire and Resource Assessment Program (FRAP) at https://frap.fire.ca.gov/. Future updates to the Safety Element will incorporate new mapping data as it becomes available.

Figure S-9 Fire Hazard Severity Zones



Source: Current map from CAL FIRE Fire and Resource Assessment Program;
Cal OES, 2021; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

Figure S-10 Land Uses in Very High Fire Hazard Severity Zones



Source: Current map from CAL FIRE Fire and Resource Assessment Program;
Cal OES, 2021; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

2.4.5 CPUC Fire Threat Zones

Power lines have become a significant cause of wildfires in California. Several major wildfires in recent history, including the 2018 Camp Fire (the deadliest and most destructive in the state's recorded history) the 2021 Dixie fire (the second-largest in the state's recorded history), and several highly-damaging 2017 wildfires to power lines. The California Public Utilities Commission (CPUC) has identified areas that are at risk from wildfires associated with overhead power lines. Two of these designations are present in and around Lafayette. CPUC Tier 2 zones identify areas at an "elevated" risk of power line-associated wildfires, while Tier 3 zones are those that face an "extreme" risk. According to the CPUC, the Tier 3 zones differ from Tier 2 because they have the highest chance of power lines causing wildfires that would harm people and property, and where the strictest regulations are needed to reduce the risk.

There are 3,142 residential parcels and 22 nonresidential parcels in the Tier 2 zone, or 3,434 parcels in total (35% of all parcels in Lafayette). Additionally, there are 363 residential parcels and 9 nonresidential parcels in the Tier 3 zone, or 372 parcels in total (4% of all parcels in Lafayette). Overall there are 3,806 parcels in CPUC fire threat zones, or 39 percent of all parcels in Lafayette. Figure S-11 shows the CPUC fire threat zones in and around Lafayette.

2.4.6 Fire Protection

As described in Section 1.2, fire protection in Lafayette is provided by ConFire. ConFire operates three fire stations in Lafayette:

- **Fire Station 15** at 3338 Mt Diablo Boulevard
- **Fire Station 16** at 4007 Los Arabis Drive
- **Fire Station 17** at 620 St Mary's Road

There are additional ConFire fire stations outside the city's boundaries in Pleasant Hill and Walnut Creek that can assist in emergencies as needed. As development continues in Lafayette, the City and ConFire will continue to monitor the changing fire protection needs in the community.

Firewise Program

Firewise is a national program helping neighbors work together with their local fire jurisdiction to protect their communities from wildfire danger. In the Contra Costa County Fire Protection District, this program is administered by ConFire's Community Risk Reduction Unit of the Fire Prevention Bureau. The Firewise program emphasizes a community-based approach to wildfire preparedness. It encourages homeowners to work together to create defensible space around their homes by reducing the amount of flammable vegetation, debris, and other materials in the surrounding area.

The Firewise program provides homeowners and communities with a range of resources and tools to help them reduce the risk of wildfire damage. These resources include educational materials, training courses, and online tools to help homeowners assess their property's risk and develop a plan to reduce their vulnerability to wildfire. The program also offers recognition to communities that have taken steps to reduce their wildfire risk. Communities that meet certain criteria can become recognized as a Firewise Community, which demonstrates their commitment to wildfire preparedness and can help them qualify for grants and other resources to support their efforts.

2.4.7 Past Occurrences

There is limited information on historic fires in the Lafayette area. However, in 1998, the Sibley Fire 2 burned approximately 200 acres in the southwestern area of Orinda. The fire began in the Sibley Volcanic Regional Preserve, encroaching on the hillsides of Orinda, approximately five miles from Lafayette. This fire was the result of arson, and no injuries or deaths were reported.

In 1991, the Oakland Hills west of Lafayette suffered one of the worst WUI firestorm disasters to ever strike the United States. This wildfire resulted in 25 deaths, 150 injuries, and destruction of 2,900 structures, causing losses in excess of $1.5 billion. In total, the Oakland Hills Tunnel Fire burned approximately 1,622 acres. It remains the third-deadliest and third-most destructive wildfire in California's recorded history. In September 2019, electrical equipment ignited a wildfire near Camino Diablo that burned 7 acres and destroyed three structures, including the Lafayette Tennis Club; high winds enabled the fire to cross Highway 24 and spread to the south before being contained. Residents in the area near Acalanes High School were evacuated and ConFire managed to control the fire within hours. Figure S-12 shows the areas burned by past wildfires near Lafayette. Due to limitations in how historical wildfire data is collected, this 2019 wildfire is not shown in Figure S-12.

2.4.8 Potential Changes to Fire Risk in Future Years

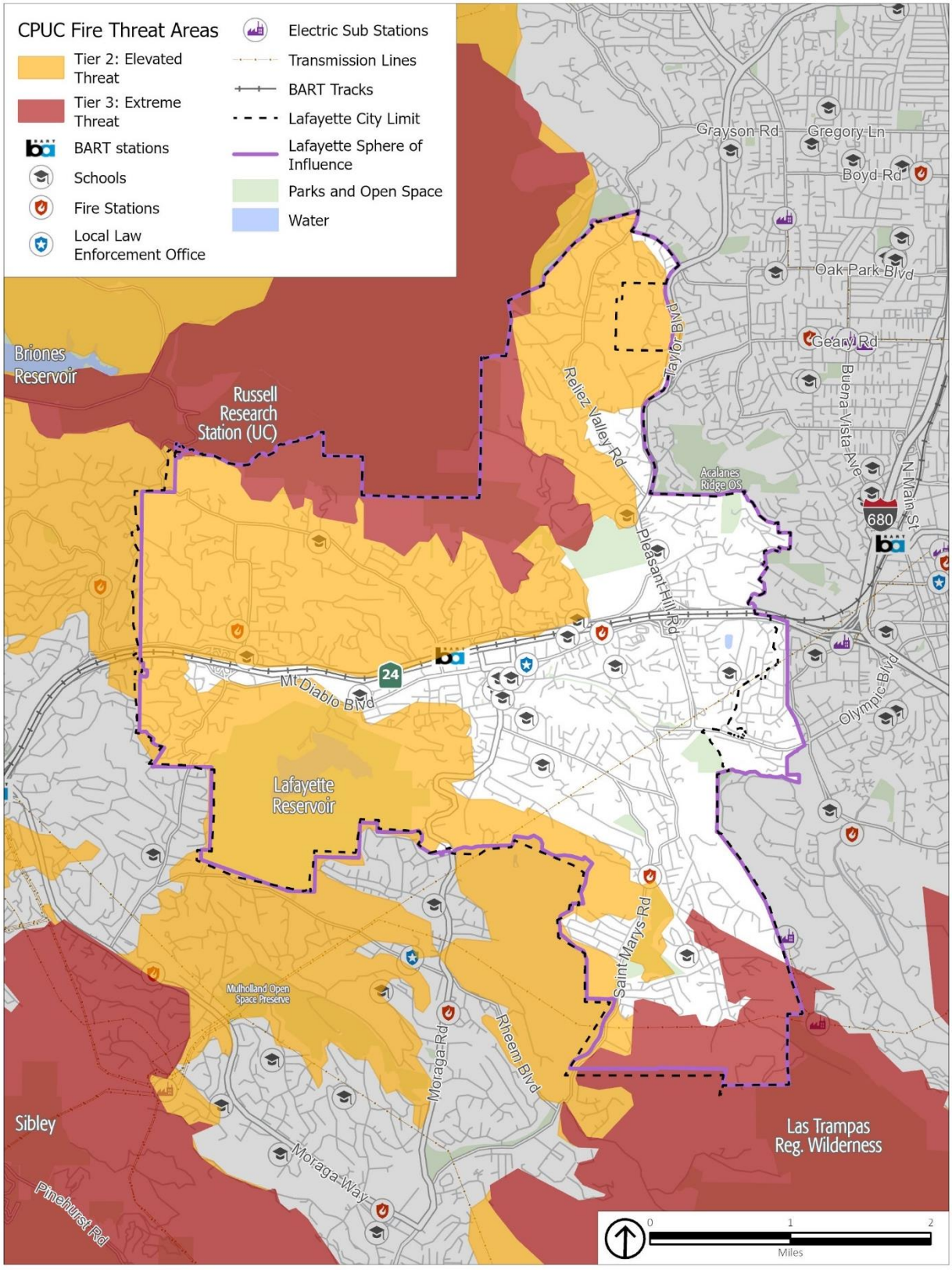
Likelihood of Future Occurrence

As noted previously, the risk of wildfires in Contra Costa County is highest in late summer and fall. Extreme weather conditions during periods of low humidity, low fuel moisture, and high winds contribute to the severity of any potential wildfires. Fires occurring during these times typically burn hot and fast and are difficult to control unless initial suppression occurs immediately. Wildfire for Lafayette is a great concern given its Very High FHSZ and WUI designations, as well as the area's unique ecology – particularly the topography, climate, and vegetation – which provides the setting for recurrent catastrophic wildfires. Moreover, the community consists of, and is surrounded by, undeveloped hillsides, which makes these areas high risk for wildfire. Wildfire will continue to be a high-risk hazard for personal safety and property damage in Lafayette and smoke impacts from local and regional wildfires are likely to continue to be problematic. The likelihood of structural fires occurring in the city is low since these fires are usually the result of human accidents or mechanical issues in buildings. New developments are required to incorporate fire protection measures under the Fire Code, including enhanced requirements for structures in the Very High FHSZ.

Climate Change and Wildfire

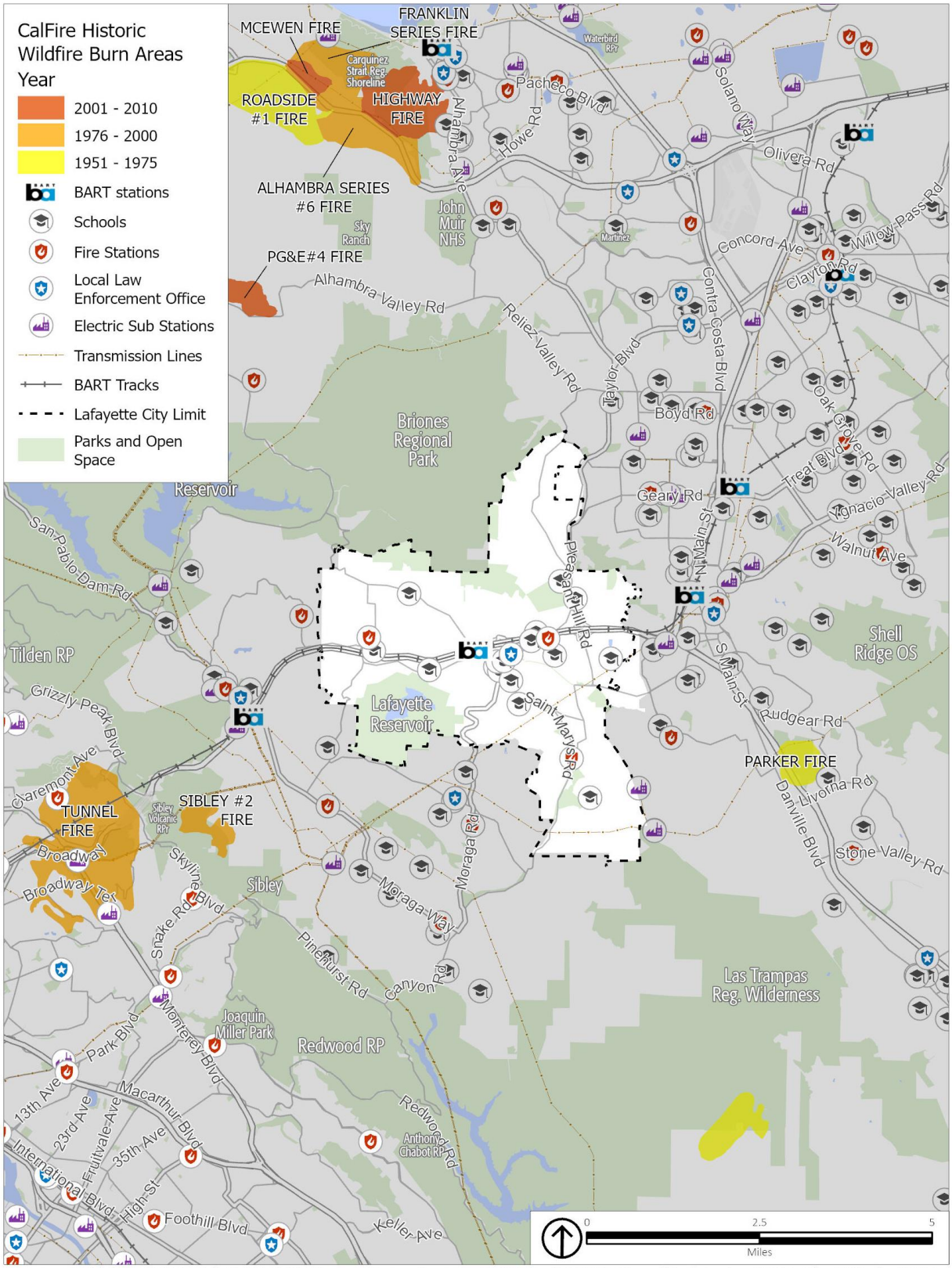
Changing climate conditions are expected to increase the fire risk in and around Lafayette. Warmer temperatures brought on by climate change can exacerbate drought conditions. Droughts can kill or dry out plants, creating more fuel for wildfires. Warmer temperatures are also expected to increase the number of pest outbreaks, such as the bark beetle, creating more dead trees and increasing the fuel load. Hot, dry spells may also increase disease and insect infestations resulting in higher fuel loads. Increased winds will result in more erratic fire behavior, making fires harder to contain. Warmer temperatures are also expected to occur later in the year, extending the wildfire season, which is likely to begin earlier in the year and extend later than it has historically. Diablo wind events can also exacerbate the wildfire risk in and around Lafayette.

Figure S-11 CPUC Fire Threat Zones



Source: CPUC, 2021; Contra Costa County, 2022;
Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

Figure S-12 Historical Wildfire Burn Areas



Source: CAL FIRE, 2021; Cal OES, 2021; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

Due to data limitations, smaller fires (including the 2019 Lafayette fire near Camino Diablo) are not shown in this map.

2.5 HAZARDOUS WASTE AND MATERIALS

Hazardous materials are materials that pose a significant risk to public safety or human or environmental health. These include toxic chemicals, flammable or corrosive materials, petroleum products, and unstable or dangerously reactive materials. They can be released through human error, malfunctioning or broken equipment, or as an indirect consequence of other emergencies (e.g., if a flood damages a hazardous material storage tank). Hazardous materials can also be released accidentally during transportation, as a consequence of vehicle accidents.

A release or spill of bulk hazardous materials could result in fire, explosion, toxic cloud, or direct contamination of water, people, and property. The effects may involve a local site or many square miles. Health problems may be immediate, such as corrosive effects on skin and lungs, or gradual, such as the development of cancer from a carcinogen. Damage to property could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material.

Most hazardous materials in the region are being transported on truck routes along major roadways, such as SR-24 that pass through Lafayette. The most vulnerable areas along this route are considered the on-/off-ramps and interchanges. Since 1970, there have been no reported roadway hazardous materials incidents in Lafayette. However, in 1982, a fire in the Caldecott Tunnel west of Lafayette, killed seven people and spilled gasoline into the environment.

Several natural gas pipelines run through Lafayette, providing natural gas service to community members. These pipelines are operated by PG&E. Ruptures in natural gas pipelines can happen as a consequence of other natural disasters, such as wildfires or earthquakes, or as a result of infrastructure failure. When this happens, flammable natural gas is released and can ignite, causing fires or explosions. While these incidents have not happened in Lafayette, they have occurred regionally in the past. In 2010, a natural gas pipeline exploded in San Bruno, killing 8 people and injuring another 58. During the 1989 Loma Prieta earthquake, breaks in natural gas pipelines caused fires in San Francisco. Figure S-13 shows the major natural gas pipelines in Lafayette.

Hazardous materials and waste within Lafayette are managed by the Certified Unified Program Agency (CUPA), a local administrative agency within the County of Contra Costa Environmental Health Division. The CUPA consolidates, coordinates, and makes consistent the regulatory activities of several hazardous materials and hazardous waste programs, including Hazardous Materials Management, California Accidental Release Prevention, Hazardous Waste Management, Underground Storage Tanks, Aboveground Storage Tanks, and Emergency Response.

Several state agencies monitor hazardous materials/waste facilities. Potential and known contamination sites are monitored and documented by the Regional Water Quality Control Board (RWQCB) and the California Department of Toxic Substances Control (DTSC). A review of the leaking underground storage tank (LUST) list produced by the RWQCB and the DTSC EnviroStor database indicates one non-operating school cleanup site within the city, which is the Lafayette Elementary School Expansion (former Lafayette Library), at 952 Moraga Road, and 26 other LUST cleanup sites with closed cases.

If a hazardous material spill poses an imminent public health threat, the City will support local regulating agencies in notifying the public. The transport of hazardous materials/wastes and explosives through the city is regulated by the California Department of Transportation (Caltrans). SR-24 is open to vehicles carrying hazardous materials/wastes; however, state law prohibits transporting many types of hazardous materials through the Caldecott Tunnel except between 3 am and 5 am. Transporters of hazardous wastes are required to be certified by the United States Department of Transportation and manifests are required to track the hazardous waste during transport. The danger of hazardous

materials/waste spills during transport does exist and will potentially increase as transportation of these materials increases on SR-24. ConFire, Contra Costa County Emergency Services Division, and Contra Costa County Division of Environmental Health are responsible for hazardous materials accidents at all locations within the city.

2.5.1 Potential Changes to Hazardous Materials in Future Years

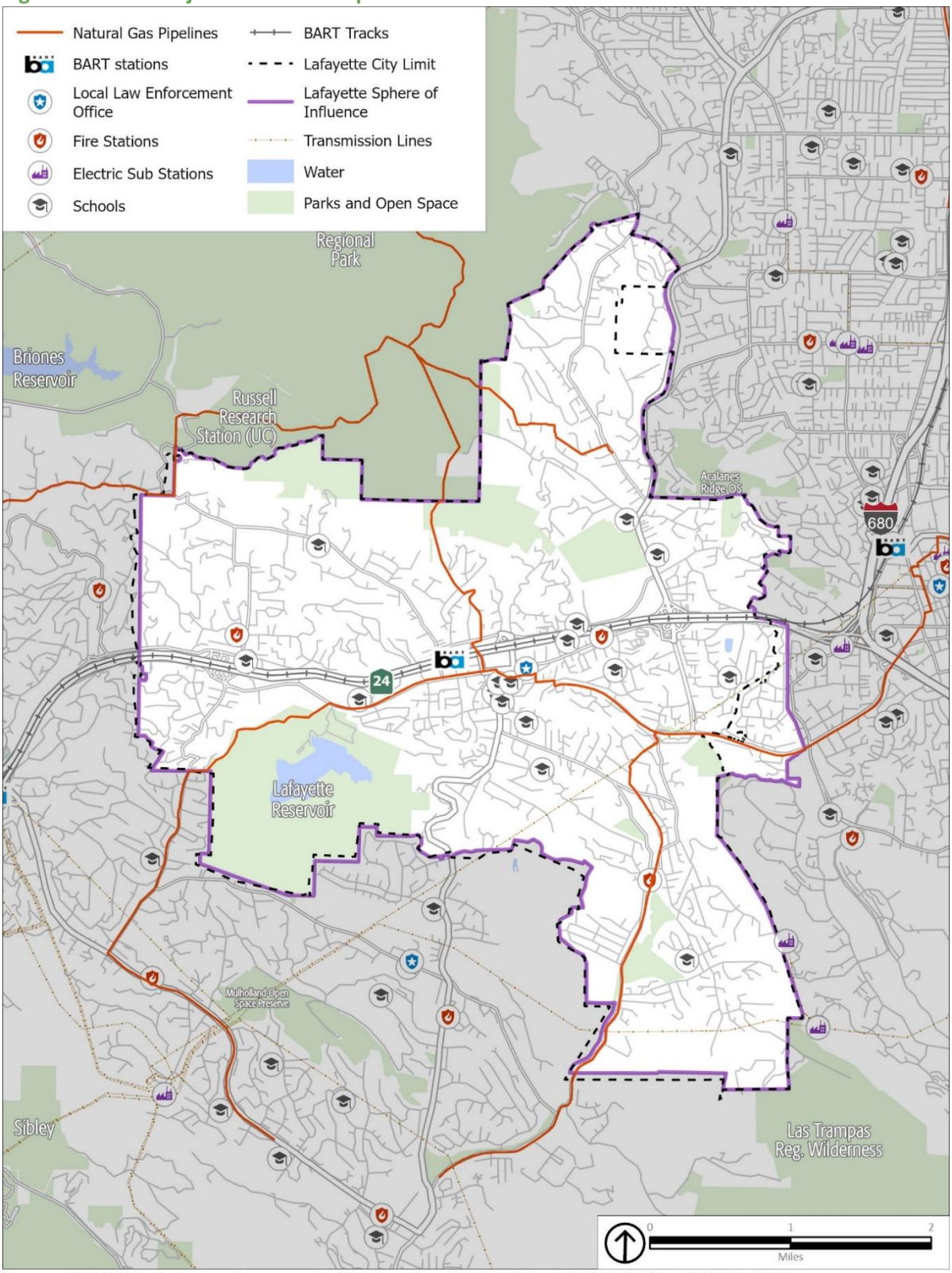
Likelihood of Future Occurrence

Given that there have been no hazardous materials incidents in transport through the city in the past 52 years and land use activities that would require hazardous materials are not likely to increase in the future, it is unlikely a hazardous materials incident will occur in Lafayette on a frequent basis. Moreover, according to Caltrans, most incidents are related to releases of fluids from the transporting vehicles themselves and not the cargo, thus the likelihood of a significant hazardous materials release within the city is more limited and difficult to predict.

Climate Change and Hazardous Materials

Climate change is unlikely to substantially affect hazardous materials transportation incidents. However, increases in the frequency and intensity of hazards, such as floods, landslides, and severe storms, may create a greater risk of hazardous materials releases during these events.

Figure S-13 Major Natural Gas Pipelines



Source: CEC GIS Unit, Energy Assessments Division, PennWell, NPMS, PG&E, SoCalGas, SDG&E, 2012; Contra Costa County, 2022; Esri, 2022; City of Lafayette, 2022; PlaceWorks 2023.

2.6 CLIMATE CHANGE RESILIENCE

2.6.1 Drought

A drought is an extended period when precipitation levels are well below normal. Drought is a normal part of the climate cycle. Drought may cause losses to agriculture; affect domestic water supply, energy production, public health, and wildlife; or contribute to wildfire. Like most of California and the western United States, Lafayette chronically experiences drought cycles. Drought impacts the city's water supply, which may in severe instances, ultimately make less water available for people, businesses, and natural systems.

Less snow falling in mountainous areas causes water levels in lakes and reservoirs to drop, which can affect recreation activities. Local ecosystems that are not well adapted to drought conditions can be more easily harmed by it. During drought events, the flow of water in creeks and streams is reduced, creating more slow-moving or standing water. This can concentrate sediment and toxins in the low water levels, causing harm to plants and animals. Droughts can also indirectly lead to more wildfires, stressing plants and making them more susceptible to pests and diseases.

The U.S. Drought Monitor recognizes a five-point scale for drought events: D0 (abnormally dry), D1 (moderate drought), D2 (severe drought), D3 (extreme drought), and D4 (exceptional drought). According to the U.S. Drought Monitor, the most intensive drought conditions in recent years occurred during most of 2014, when all of Contra Costa County was classified as being in "extreme" drought. More recently, in 2022, from January through the end of the year, the county was also classified as being in "severe" drought. As of January 2023, Contra Costa County, including Lafayette, was classified as being in "moderate" drought. During severe drought conditions, water shortages are common and water restrictions may be imposed to meet essential community needs. EBMUD's 2020 Water Shortage Contingency Plan contains actions to implement and enforce regulations and restrictions for managing a water shortage when it declares a water shortage emergency under the authority of the California Water Code.

Lafayette's water supply comes from imported water. The Lafayette Water Treatment Plant is connected to the EBMUD water distribution system, delivering water to Lafayette. EBMUD's water supply begins at the Mokelumne River watershed in the Sierra Nevada and extends 90 miles to the East Bay, passing through the Sacramento-San Joaquin Delta. The Mokelumne Aqueducts convey the Mokelumne River supply from Pardee Reservoir, upstream of Camanche Dam, across the Sacramento-San Joaquin River Delta (Delta) to local storage and treatment facilities in the East Bay. After treatment, water is distributed to the incorporated cities and unincorporated communities in Alameda and Contra Costa Counties that EBMUD serves. Snowmelt in the Sierra Nevada accounts for approximately 90 percent of EBMUD's drinking water supply. Approximately 10 percent of the water supply originates as runoff from the protected watershed lands in the East Bay area.

Potential Changes to Drought in Future Years

Likelihood of Future Occurrence

Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically, affecting different sectors in different ways and with varying intensities. Adequate water is the most critical issue for commercial and domestic use. As the population in the city continues to grow, so will the demand for water. However, water supply is currently considered adequate to meet projected water needs through the year 2050. As demonstrated in the 2020 Urban Water Management Plan, EBMUD shows adequate

capacity to accommodate the demand through 2050 through a diversified and resilient portfolio that includes recycled water and conservation programs.

Based on historical information, the occurrence of drought in California, including Contra Costa County, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts is often extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on comparing observed precipitation with what is normal (climatologic), comparing soil moisture and crop conditions with what is normal (agricultural), or by looking at how much water is contained in snow, the level or flow rate of moving water, water in reservoirs, or groundwater levels (hydrologic). However, how individuals recognize drought depends on the ways in which it affects them. The impacts from drought include reduction in water supply and an increase in dry fuels.

Climate Change and Drought

Although droughts are a regular feature of California's climate, scientists expect that climate change will lead to more frequent and intense droughts statewide. Overall, precipitation levels are expected to stay similar to historic levels in Lafayette, potentially increasing by the end of the century. However, there are likely to be more years with extreme levels of precipitation, both high and low, as a result of climate change. This is expected to cause more frequent and intense droughts, compared to historical norms, that cause soil to dry out and become hard. When precipitation does return, more water runs off the surface than is absorbed into the ground, which can lead to floods. Higher air temperatures are expected to increase evaporation, causing more water loss from lakes and reservoirs, exacerbating drought conditions. 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, including the imported water supply for Lafayette. Continued decline in the Sierra Nevada snowpack volume is expected, which may lead to lower volumes of available imported water. Depending on the location and emissions levels, the state Cal-Adapt database indicates the snowpack (i.e., snow water equivalent) for the Tahoe-Sierra Integrated Regional Water Management Region in the spring is expected to decline from a historical average of 16.1 inches to an average of 7.8 inches (a 52 percent decrease) by the middle of the century (2035 to 2064), and an average of 2.9 inches (an 82 percent decrease) by the end of the century (2070 to 2099).

If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. How much snowpack will be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under wetter climate projections, the loss of snowpack would pose challenges to water managers and hamper hydropower generation.

2.6.2 Extreme Temperatures

Another likely impact from climate change will be more dramatic variation of temperatures, both towards extreme heat and extreme cold. While there is no universal definition of extreme heat, California guidance documents define extreme heat as temperatures that are hotter than 98 percent of the historical high temperatures for the area, as measured between April and October of 1961 to 1990. Days that reach this level are called extreme heat days. In Lafayette, the extreme heat threshold is 93.9°F. An event with five extreme heat days in a row is called a heat wave. Extreme cold refers to temperatures that are well below average or well below freezing. Extremely cold temperatures often accompany winter storms. Wind chill, which measures the combined effect of wind and temperature on the human body, can also play a role in determining the severity of extreme cold events.

Health impacts are the primary concern with these hazards, though economic and service impacts are also an issue. The Center for Disease Control and Prevention (CDC) recognizes extreme heat as a substantial public health concern. Historically, NOAA data indicates that about 175 Americans succumb to the demands of summer heat, although this number has increased in recent years. From 2004 to 2018, studies by the U.S. Department of Health and Human Services indicate that there is an average of 702 deaths annually that are directly or indirectly linked to extreme heat. Extreme cold weather-related conditions may also lead to serious health problems. Cold weather can exacerbate symptoms of chronic illnesses such as arthritis, asthma, and heart disease, leading to increased pain and discomfort. Individuals with chronic illnesses or disabilities may have decreased physical activity levels, making them more susceptible to hypothermia.

In 2019, Contra Costa County reported an extreme heat event from June 9th to the 11th. The combination of high pressure and strong offshore flow resulted in an early season heat wave across the Bay Area. Multiple daily records were broken across the region due to the heat. Three fatalities were reported during the heat event; one person died as a direct result of heat-related illness, while two others drowned while attempting to cool down during the heat wave.

In 2021, Contra Costa County reported an extreme heat event from July 9th to the 11th. Daytime highs rose above 100°F with locations across the East Bay up to 110°F. Overnight lows remained warm, particularly across higher elevations where temperatures were between 70°F and 80°F in the early mornings. There were no reported fatalities as a result of this heat event.

Extreme heat events are dangerous because people exposed to extreme heat can suffer a number of heat-related illnesses, including heat cramps, heat exhaustion, and (most severely) heat stroke. As reflected in the Vulnerability Assessment, seniors, persons with chronic illnesses and/or disabilities, persons experiencing homelessness, outdoor workers, low resourced people of color, immigrant/linguistically isolated communities, and households in poverty are the most vulnerable to extreme temperatures. Additionally, those on certain medications or drugs and persons with weight and alcohol problems are particularly susceptible to heat or cold reactions. Nursing homes and adult care facilities are especially vulnerable to extreme temperatures if power outages occur and air conditioning or heating is not available. In addition, households in poverty may be at increased risk to extreme temperatures if use of air conditioning and heating is not affordable, or if they live in a structure that lacks effective insulation. Areas with lower extreme heat thresholds are not necessarily at lower risk, as persons and community assets used to cooler temperatures may be less prepared for extreme heat events.

A majority of homes in Lafayette are older homes and were constructed over 40 years ago. Given that approximately 84.7 percent of all housing in the city was constructed prior to 1980, some of these homes are unlikely to have air conditioning and may lack effective insulation to regulate indoor temperatures. During extreme heat or extreme cold days, temperatures in poorly insulated homes may reach unhealthy temperatures. Therefore, people living in these homes, especially vulnerable populations, are at higher risk for heat and cold-related illnesses from extreme temperature events.

Oak trees are predominant throughout Lafayette and provide shade for much of the residential areas in the community. Streets and sidewalks are also well-shaded throughout many parts of the city, including some areas of downtown. Trees and vegetation in urban forests are most useful as a mitigation strategy when planted in strategic locations around buildings or to shade pavement in parking lots and on streets. Trees and vegetation in the natural and urban environment help to lower surface and air temperatures by providing shade and through evapotranspiration. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2°F to 9°F.[7, 8]

Extreme temperatures can harm plants and animals that are not well adapted to these events, including natural ecosystems. Extreme heat can increase the temperature of water in lakes, streams, creeks, and other water bodies, especially during drought conditions when water levels are lower. In some cases, water temperatures may exceed comfortable levels for several plants and animals, causing ecological harm. Outdoor workers in construction or landscaping are also much more exposed to the elements than most people, so they are more susceptible to extreme heat and extreme cold conditions and the potential illnesses associated with extreme temperatures.

Indirectly, extreme heat puts more stress on power lines, causing them to run less efficiently. The heat also causes more demand for electricity (usually to run air conditioning units), and in combination with the stress on the power lines, may lead to brownouts and blackouts. Extreme cold can cause decreased electrical conductivity, conductor sag, and ice buildup. Cold temperatures can decrease the electrical conductivity of the transmission line materials, reducing the efficiency of power transmission. In rare cases, extreme cold can also cause power outages and equipment damage.

Potential Changes to Extreme Temperatures in Future Years

Likelihood of Future Occurrence

Extreme heat tends to occur on an annual basis and is likely to continue occurring annually. Due to Lafayette's inland location on the east side of the East Bay Hills and relatively low elevation, high temperatures will continue to be a more common occurrence than cold temperatures.

Climate Change and Extreme Temperatures

The warmer temperatures brought on by climate change are likely to cause an increase in extreme heat events. Depending on the location and emissions levels, the state Cal-Adapt database indicates the number of extreme heat days is expected to rise from a historical annual average of 4 to 17 days by the middle of the century (2035 to 2064), and an average of 29 days by the end of the century (2070 to 2099). While extreme cold weather events may occur more frequently in some regions, climate projections show increasingly warmer temperatures and more frequent extreme heat events and heat waves.

Overall, Lafayette is expected to see an increase in the average daily high temperatures. Depending on the future severity of climate change, the state Cal-Adapt database indicates the annual average maximum temperature is expected to increase from a historical annual average of 68.5°F to an average of up to 73.1°F by the middle of the century (2035 to 2064), and an average of up to 76.2°F by the end of the century (2070 to 2099). Although the temperature increases may appear modest, the projected high temperatures are substantially greater than historical norms. These increases also make it more likely that an above-average high temperature will cross the extreme heat threshold. As temperatures increase, Lafayette will face increased risk of death from dehydration, heat stroke, heat exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

2.6.3 Severe Weather

Severe weather is generally any destructive weather event, but usually occurs in Lafayette 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 types of dangers posed by severe weather vary widely and may include injuries or deaths, damage to buildings and structures, fallen trees, roads and railways blocked by debris, and fires sparked by lightning. Severe weather often produces high winds and lightning that can damage structures and cause power outages. Lightning from these storms can ignite wildfires and structure fires that can cause damage to buildings and endanger people. Objects such as vehicles, unprotected structures (e.g., bus stops, car ports), fences, telephone poles, or trees can also be struck directly by lightning, which may result in an explosion or fire.

A relatively common weather pattern that brings southwest winds and heavy rain to California is often referred to as an atmospheric river. Atmospheric rivers can be associated with severe weather in the following ways:

- **Heavy precipitation:** Atmospheric rivers can bring large amounts of moisture to a region, which can lead to heavy precipitation and flooding. This can be especially problematic in areas with steep terrain or poor drainage, where the water can accumulate quickly and cause damage.
- **Landslides:** Heavy precipitation associated with atmospheric rivers can also increase the risk of landslides and debris flows in areas with steep terrain. This is because the excess water can saturate the soil and destabilize slopes, leading to landslides or rockfalls.
- **High winds:** In addition to heavy precipitation, atmospheric rivers can also be associated with strong winds. This is because the strong temperature contrast between the warm, moist air in the atmospheric river and the cold air surrounding it can lead to the formation of strong low-pressure systems and high winds.

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 one or more of the following: hail with a diameter of one inch or greater, wind gusts exceeding 57.5 miles per hour (mph), or tornado. However, tornadoes are uncommon in Contra Costa County; only four have been recorded in the county since 1950. On March 1, 2018, the City of Lafayette experienced a widespread storm event causing localized flooding, strong winds, lightning, and hail measuring approximately 0.5 inches.

High winds, often accompanying severe storms, can cause significant property damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds, as defined by the National Weather Service, are sustained wind speeds of 40 mph or greater lasting one hour or longer, or wind gusts of 58 mph or greater for any duration. These winds may occur as part of a seasonal climate pattern or in relation to other severe weather events, such as thunderstorms. Contra Costa County experiences high wind on an annual basis. On January 4, 2008, Contra Costa County reported 110 mph winds in the East Bay Hills and Diablo Range. During this high wind event, a very strong cyclone slammed into the San Francisco and Monterey Bay areas, bringing rain, high winds, record high surf, and coastal flooding. Hundreds of thousands of residences and businesses were without power, some for several days due to high winds toppling power lines. Millions of dollars in property damage were reported due to falling trees hitting cars and structures as well as damage to roads due to heavy rain. On December 11, 2014, Contra Costa County reported 83 mph winds. This atmospheric river event brought heavy rain and gusty winds with a strong winter storm that impacted the Bay Area for several days in mid-December.

Beginning in late December 2022 and extending through mid-January 2023, a series of storms brought a wide variety of hazardous weather to the Bay Area, including Lafayette. The result of these storms produced hazardous weather over a three-week period, which included wind gusts over 100 mph, as well as widespread flooding, gusty thunderstorm outflow winds, small hail, and several reported shallow landslides.

All wind events pose several different types of threats. By themselves, the winds pose a threat to the health of people and structures in the county. Dust and plant pollen blown by the wind can create breathing problems. The winds can blow roofs off buildings and cause tree limbs to fall on structures. High winds also increase the threat of wildfires. Winds may dry out brush and forest areas, increasing the fuel load in fire-prone areas. Winds may spark wildfires by knocking down power lines or causing them to arc, creating sparks. If wildfires do start, high winds can push flames quickly into new areas, contributing to rapid spread of wildfires and making them harder to control.

Public Safety Power Shutoff Events

Electricity utilities throughout California, including 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. As previously described, these activities, called PSPS events, result in a loss of power for customers served by the affected power lines. 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. In October 2019, PG&E conducted one large-scale PSPS event, shutting off power to approximately 740,000 customers in 35 counties across the state, including customers in Lafayette. Several PSPS events also occurred in 2020 during widespread wildfires across northern California. While PSPS events have been smaller and less frequent recently, these events still pose a risk to PG&E customers across Contra Costa County, including Lafayette.

PSPS events can impact emergency management activities. A loss of power can make it more difficult for homes or businesses to receive emergency notifications. PSPS events can also create vulnerabilities for community members that lack backup power supplies and depend on electricity for heating or cooling homes and buildings, medical devices, lighting, and internet. Additionally, community members may be faced with economic hardships and be deprived of important services, such as grocery stores, gas stations, and banks/ATMs. Traffic lights and other traffic-control systems may not work, which can complicate any evacuation needs and may hinder emergency response. Although critical public health and safety facilities often have backup generators, the loss of power may also disable other key infrastructure systems.

Potential Changes to Severe Weather in Future Years

Likelihood of Future Occurrence

According to historical hazard data, severe weather is an annual occurrence in Contra Costa County. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrences in the county. Wind and lightning often accompany these storms and have caused damage in the past. However, actual damage associated with the primary effects of severe weather have been limited. It is the secondary hazards caused by severe weather, such as floods and fire that have had the greatest impact on the county. In general, any severe storm that affects Contra Costa County has local effects in Lafayette as well. Thunderstorms, high winds, and lightning can each have localized impacts on infrastructure, properties, and public safety.

Climate Change and Severe Weather

Climate change is expected to cause an increase in intense rainfall and strong storm systems, which is usually associated with strong storm systems. This means that Lafayette could see more intense weather resulting from these storms in the coming years and decades, although such an increase may not affect all forms of severe weather. While average annual rainfall may increase only slightly, 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.

2.6.4 Human Health Hazards

Human health hazards are bacteria, viruses, parasites, and other organisms that can cause diseases and illness in people. Some of these diseases may cause only mild inconvenience, but others are potentially life threatening. These diseases can be and often are carried by animals, such as mice and rats,

ticks, and mosquitos. Warmer temperatures and high levels of precipitation can lead to increased populations of disease-carrying animals, creating a greater risk of disease and increased rates of infection.

Populations most vulnerable to human health hazards are those who spend a disproportionate amount of time outdoors (such as outdoor workers or persons experiencing homelessness), those with fragile immune systems or existing illnesses (which may include persons with chronic illnesses and seniors), and those who may live in sub-standard housing or not have access to health insurance and medical care (households in poverty, low-resourced people of color, immigrant/linguistically isolated communities, and cost-burdened/low-income/overcrowded households). These persons may be living in conditions that increase their chances of catching vector-borne illnesses, lack the ability to fight off infections that may occur, or lack the financial resources to seek timely medical care.

According to the 2018 LHMP,[9] past occurrences of human health hazards in Contra Costa County include the following:

- West Nile Virus: Since 2005, 39 people have been diagnosed with the virus and two people have died. In 2022, there was one case of West Nile Virus in the county.
- Lyme Disease: From 2011 to 2015, there were 18 cases of Lyme disease in the county. In 2020, there were two cases on Lyme disease in Contra Costa County.
- Hantavirus: From 2011 to 2015, there was one case of hantavirus in the county.

Potential Changes to Human Health Hazards in Future Years

Likelihood of Future Occurrence

Human health hazards have occurred in the past and therefore will likely occur in the future at various scales and levels of severity.

Climate Change and Human Health Hazards

Increases in average temperature and changes in precipitation patterns favoring larger precipitation events may facilitate the growth and activity of disease-carrying vectors. Many of the vector-carrying organisms thrive in warmer and wetter conditions. Overall risk of human health hazards is thus expected to increase.

3. VULNERABILITY ASSESSMENT RESULTS

The table below shows the results of the Vulnerability Assessment prepared for Lafayette, in accordance with the requirements of Senate Bill 379. For each population or asset that may be vulnerable to each climate-related hazard, the population or asset is scored on a scale of zero to five:

0: Not vulnerable

V1: Minimal vulnerability

V2: Low vulnerability

V3: Moderate vulnerability

V4: High vulnerability

V5: Severe vulnerability

The vulnerability scores reflect both the severity of climate-related impacts and the ability of populations and assets to resist and recover from these effects. Refer to the "Climate Change" and "Vulnerable Populations and Assets" sections of the Safety Element for additional details on the Vulnerability Assessment method.

Populations & Assets	Hazards						
	Drought	Extreme Temperature	Flooding	Human Health Hazards	Landslides	Severe Storms	Wildfire
Populations							
Children (under 16)	-	V4	V3	V3	V4	V3	V4
Cost-burdened/low-income/overcrowded households	V3	V3	V3	V3	V3	V4	V3
Households in poverty	V3	V5	V5	V5	V4	V4	V5
Households with animals (pets and livestock)	V1	V3	V3	V2	V3	V3	V4
Immigrant/linguistically isolated communities/low-resourced people of color	V3	V5	V4	V5	V3	V4	V5
Outdoor workers	V3	V5	V3	V4	-	V3	V5
Persons experiencing homelessness	V3	V5	V4	V5	-	V5	V5
Rural populations	-	-	V4	V2	V4	V4	V5
Persons with chronic illnesses and/or disabilities	V3	V5	V4	V5	V4	V4	V5
Persons without access to lifelines	V2	V3	V4	V3	V3	V3	V4
Renters	V1	V2	V3	V2	V3	V3	V3
Seniors (65+)	V1	V5	V4	V5	V5	V4	V5
Unemployed persons	V2	V3	V3	V3	V2	V3	V3
Buildings and Infrastructure							
Government and community facilities	-	V1	V3	-	V3	V2	V3
Commercial centers	-	V2	V3	-	V3	V3	V3
Energy and communication infrastructure	-	V4	-	-	V4	V4	V5
Flood control and stormwater infrastructure	-	-	V4	-	V3	V3	V1
Vehicle fuel stations	-	V2	V2	-	V1	V2	V2
Hazardous materials sites	-	-	-	-	-	V3	-
Transportation Infrastructure	-	V2	V4	-	V5	V3	V4
Medical care and assisted living facilities	-	V2	V2	-	V3	V3	V3
Homes and residential structures	-	V3	V3	-	V3	V4	V4

Populations & Assets	Hazards						
	Drought	Extreme Temperature	Flooding	Human Health Hazards	Landslides	Severe Storms	Wildfire
Parks, Open Space, and Trails	V4	V3	V2	-	V4	V3	V3
Public safety buildings	-	V1	-	-	V3	V3	V2
Schools	-	V3	-	-	V4	V3	V3
Water and wastewater infrastructure	-	-	-	-	V4	V2	V3
Economic Drivers							
Major employers	-	V2	V3	V4	V3	V3	V3
Recreation and tourism	-	V5	V3	V2	-	V3	V4
Ecosystems and Natural Resources							
Oak woodlands	V4	V3	V2	-	V2	V3	V5
Grassland	V4	V3	V2	-	V2	V2	V3
Riparian areas, creeks, and wetlands	V4	V3	V3	-	V3	V4	V4
Scrub and chaparral	V3	V3	V2	-	V2	V3	V4
Wildlife corridors	-	-	V4	-	V3	V3	V5
Key Services							
Education services	-	V3	V3	V3	V3	V2	V3
Emergency services	-	V3	V3	V3	V3	V2	V2
Energy delivery and communication services	-	V5	V3	-	V4	V5	V5
Government administration & community services	-	V1	V2	V2	V1	V2	V2
Public transit access	-	V3	V4	V2	V3	V4	V4
Solid waste removal	-	-	V3	-	V3	V3	V3
Water and wastewater	V3	V3	V2	-	V4	V3	V5

END NOTES

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