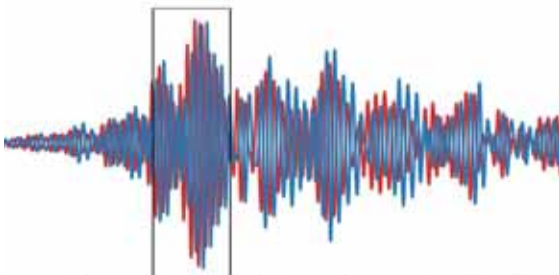


# CHAPTER 9 SAFETY



## 9.0 INTRODUCTION

This Safety Element identifies potential natural and human-caused hazards that could affect the City of Rio Vista's residents, businesses, and services. The element identifies the natural and human-caused hazards that affect existing and future development, describes present and expected future conditions, and sets policies and programs for improved public health and safety. The Rio Vista Safety Element, other General Plan elements, the Solano County Multi-jurisdiction Hazard Mitigation Plan (MJHMP), and various local regulations provide a comprehensive strategy to minimize the impacts of hazards on the community.

The Safety Element, in coordination with other General Plan elements, provides policy direction that guides land use decisions in areas prone to natural hazards and identifies safety improvements to mitigate hazards for existing development. The Land Use Element diagrams and policies are informed by the potential hazards identified in the Safety Element and the Public Facilities and Services Element addresses potential flooding issues in the community. These elements, working in tandem, protect the lives and property of Rio Vista residents.

## 9.1 SOLANO COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

The City is a participating agency in the County of Solano MJHMP. The City and other participating agencies prepared the MJHMP in accordance with the federal Disaster Mitigation Act of 2000 and the Federal Emergency Management Agency's (FEMA) hazard mitigation assistance guidance. The mitigation actions in the MJHMP 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. The current MJHMP, as approved by FEMA, is incorporated into this element by reference, as permitted by California Government Code Section 65302.6.

The MJHMP and Safety Element address similar issues, but the Safety Element provides a higher-level hazard reduction and emergency preparedness framework and set of policies that specifically pertain to the safety of the City, while the MJHMP focuses on more-specific mitigation, often short-term actions, to enable jurisdictions to better protect lives, property, and natural systems.

## 9.2 CLIMATE CHANGE VULNERABILITY ASSESSMENT

As part of this Safety Element, the City prepared a Climate Change Vulnerability Assessment to analyze Rio Vista's susceptibility to climate change hazards. Rio Vista's vulnerability assessment considers nine different climate change hazards (agricultural and ecosystem pests, drought, extreme dry heat, warm nights, human health hazards, inland flooding, landslides, sea level rise, severe weather, and wildfire and smoke), and the potential effects of these hazards on the Rio Vista community.

The Climate Change Vulnerability Assessment indicates that the community of Rio Vista is most vulnerable to inland flooding, sea level rise, and severe weather. In addition, the most vulnerable populations in the community, which include households in poverty, low-resourced households, and outdoor workers, are highly or severely vulnerable to extreme heat and warm nights, inland flooding, wildfire and smoke, and human health hazards, which directly affect health outcomes. The most vulnerable buildings and infrastructure include City Hall, the Senior/Youth and Community Center, the Promenade, the City's boat ramp and adjacent parking lot and homes along the riverfront. Economic drivers are most vulnerable to sea level rise and extreme heat, with agricultural production, and

outdoor recreation, and tourism being the most vulnerable. Public wastewater facilities along the river are the most vulnerable key facilities, with various key City services highly vulnerable to inland flooding. Rio Vista's Climate Change Vulnerability Assessment is included in the Safety Element Background Report, Appendix 1 of this General Plan.

### 9.3 PUBLIC SAFETY ISSUES

The public safety issues in Rio Vista include:

- Emergency Preparedness and Response
- Flood and Inundation Hazards
- Seismic and Geologic Hazards
- Fire Hazards
- Hazardous Waste and Materials
- Additional Climate-Related Hazards (agriculture and ecosystem pests, drought, extreme heat, human health hazards, and severe weather)

The Safety Element provides background information and relevant mapping for each of these topics. It explains what the issue is and how it affects the safety and well-being of Rio Vista, appropriate historical and regulatory context, and discussions of how safety issues may change in the future. This element is supported by the Safety Element Background Report (Appendix 1, which provides detailed information for each of the safety issues addressed in this element.

#### LOCAL EMERGENCY RESPONSE

The Rio Vista Police Department and Rio Vista Fire Department conduct local emergency preparedness activities in Rio Vista. The Rio Vista Police Department contracts with Solano County for police dispatching of its 911 calls, which are relayed to the City's Police Department. The City of Rio Vista Fire Department provides fire protection services in the city. The Delta Fire Protection District contracts for service with the City for portions of south Sacramento County—the boundaries of which are Vieira's Resort to the north, Jackson Slough Road to the east, and the Antioch Bridge to the south. The Fire Department relies largely on professional firefighters for fire protection and emergency response with strong and necessary support from volunteers who serve the Montezuma Fire Protection District.

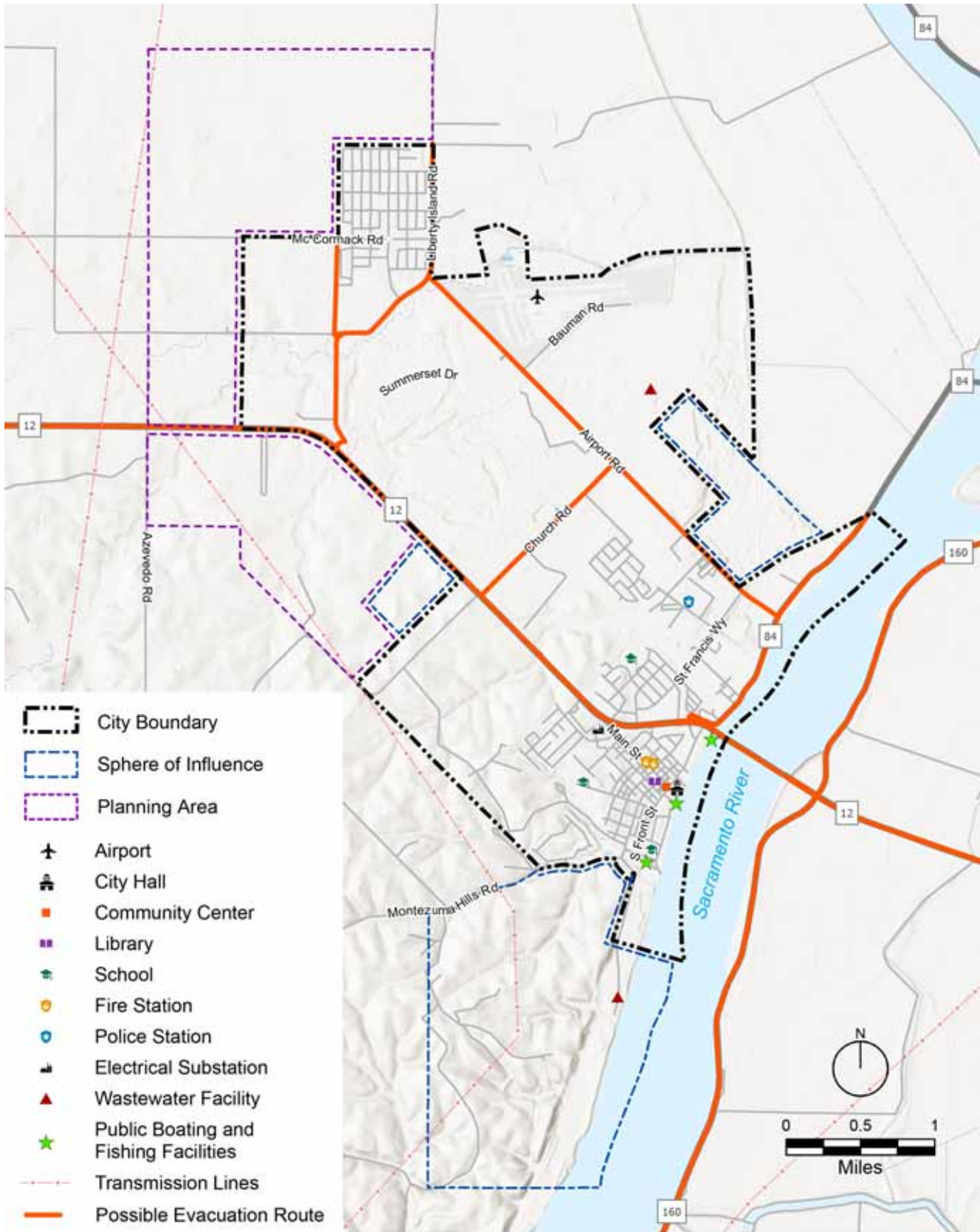
## COMMUNITY WARNING SYSTEMS

Rio Vista uses Alert Solano to notify residents and businesses in Solano County of an emergency or disaster. Alert Solano enables agencies in Solano County to provide residents with critical information quickly in a variety of situations, such as severe weather, unexpected road closures, missing persons, and evacuations of buildings or neighborhoods. Other systems include the Emergency Alert Systems and the Emergency Digital Information System. The Emergency Alert System 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. Weather-related emergency alerts are broadcast by the National Oceanic and Atmospheric Administration's National Weather Service and monitored by the City's Police Department and Solano County sheriff's dispatch.

## EMERGENCY EVACUATION

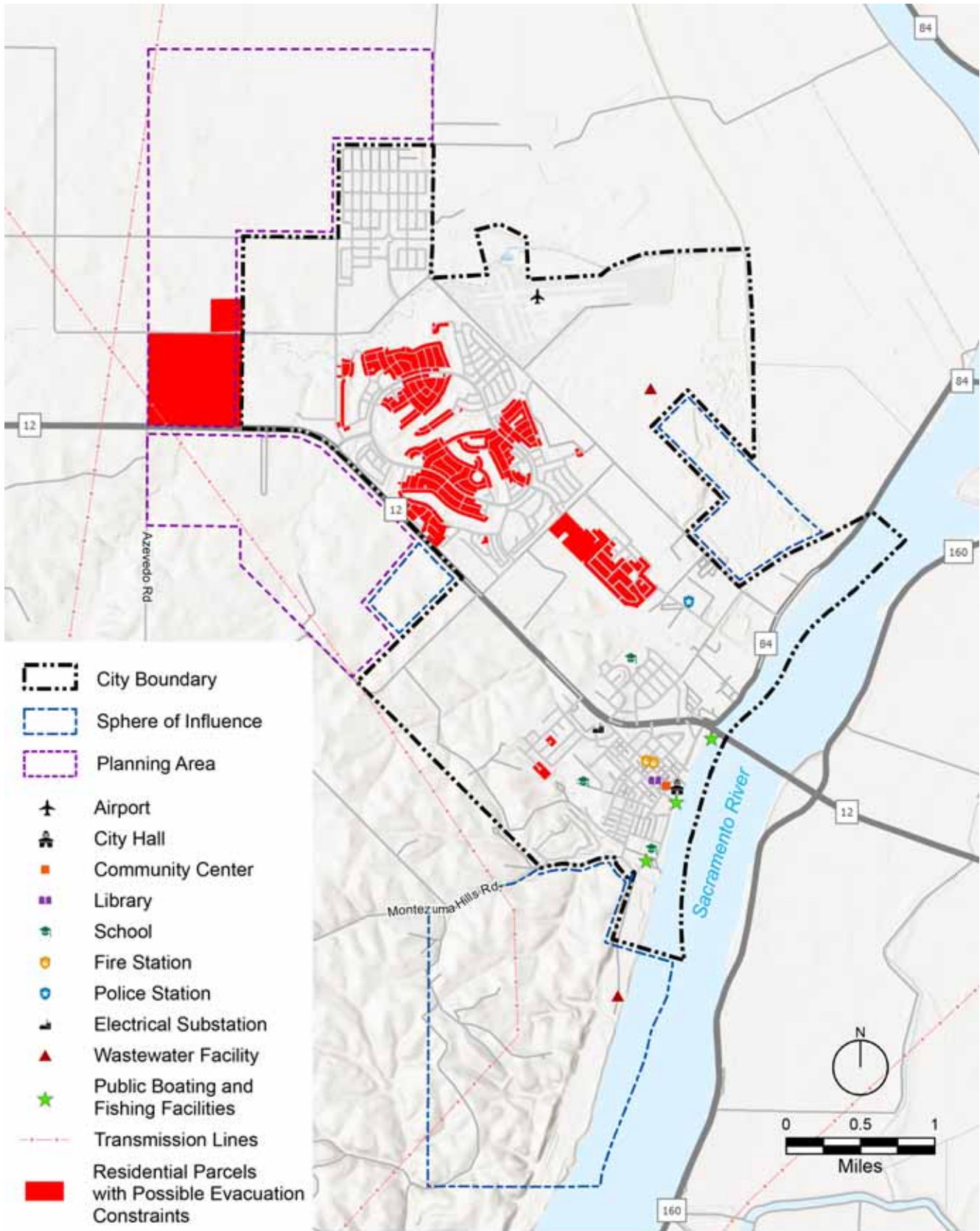
With advanced warning, evacuation can be effective in reducing injury and loss of life during a catastrophic event. Figure 9-1 shows the evacuation routes throughout the city. Primary emergency access and evacuation routes include Highway 12 and Airport Road, which bisect the city from northwest to southeast; Highway 160, located on the east side of the Sacramento River; and local roadways that connect to these primary evacuation routes. All evacuation routes in Rio Vista face a potential disruption from a flooding or earthquake event, which may block roadways, damage the roadway surface, or collapse bridges. Figure 9-2 shows residential parcels with evacuation constraints as directed by Government Code Section 65302(g)(5). All parcels with evacuation constraints are at least one-half mile from a designated evacuation route or are located on a roadway with only one access point. The lack of multiple emergency access points limits roadway access for these properties, which may create difficulties or delays if there is a need to evacuate. It should be noted that evacuation constraints for some larger undeveloped parcels would be eliminated when urban development occurs, and new street connections are constructed.

**FIGURE 9-1: Potential Evacuation Routes**



Sources: City of Rio Vista, Solano County 2021, PlaceWorks 2023

**FIGURE 9-2:** Evacuation Constrained Residential Areas



Sources: City of Rio Vista, Solano County 2021, PlaceWorks 2023

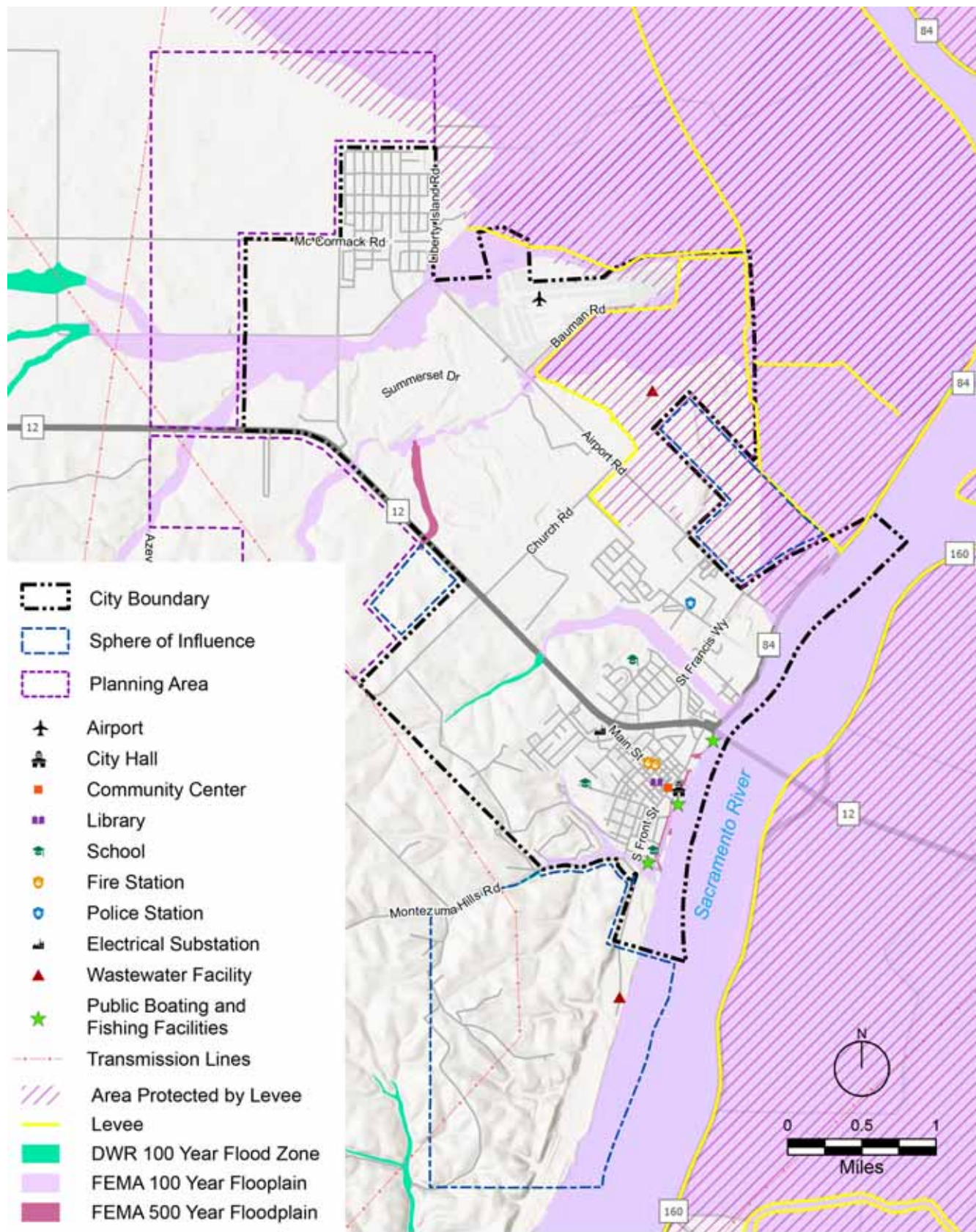
## 9.4 FLOODING AND INUNDATION HAZARDS

Historically, floods are one of the most frequent natural hazards impacting Rio Vista. Rio Vista is at risk of flooding during the winter and spring months from rising flows in the Sacramento River as well as from local storm events that generate runoff in the City that exceeds storm drain capacities.

Rio Vista is situated on the west bank of the Sacramento River, which drains the northern half of the Central Valley. Areas at an elevated risk of flooding are generally divided into 100-, 200-, and 500-year flood zones. A 100-year flood zone has a 1.0 percent chance of experiencing a major flood in any given year, a 200-year flood zone has a 0.5 percent chance of flooding in any given year, and a 500-year flood zone has a 0.2 percent chance of flooding in any given year. Most land in the city limits lies outside the 100-year flood zone and is partially protected by levees along the north side of the City. The 100- and 500-year floodplains in Rio Vista include areas along the shoreline of the Sacramento River as well as inland areas surrounding residential development. The northern portion of the city is in the 200-year flood zone, which also encompasses residential development and the wastewater facility. Figure 9-3 shows the 100- and 500-year FEMA and California Department of Water Resources (DWR) Awareness flood zones, and Figure 9-4 shows the U.S. Army Corp of Engineers (USACE) flood zones in and around Rio Vista. Climate change is expected to expand the areas of the City that are considered vulnerable to flooding, due to more frequent and severe precipitation events.

Rio Vista experiences chronic inland flooding in several places due to a lack of adequate capacity in its storm drain system. The historic core of the community, including areas around City Hall, the Edgewater neighborhood and along the Sacramento River shoreline are subject to flooding due to inadequate capacity to convey water to the Sacramento River. The City regularly deploys pumps to these neighborhoods to convey water to the Sacramento River.

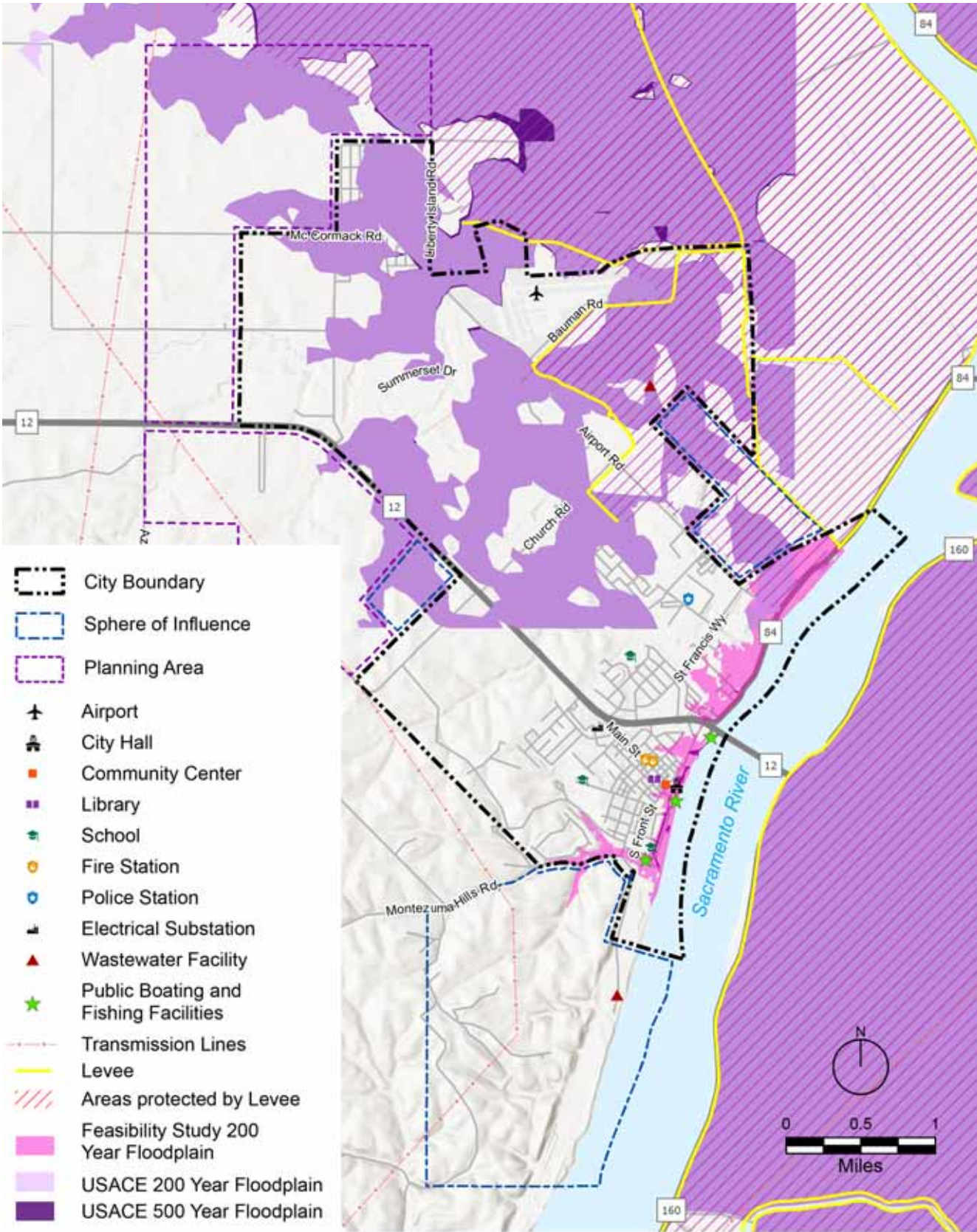
**FIGURE 9-3: FEMA and DWR Flood Hazard Areas**



Sources: NLD 2022, BAM 2021, City of Rio Vista, Solano County 2021, PlaceWorks 2023



**FIGURE 9-4: 200-year and 500-year Flood Hazard Zones**



Sources: NLD 2022, BAM 2021, City of Rio Vista, Solano County 2021, PlaceWorks 2023, Wood Rodgers 2023

## SEA LEVEL RISE

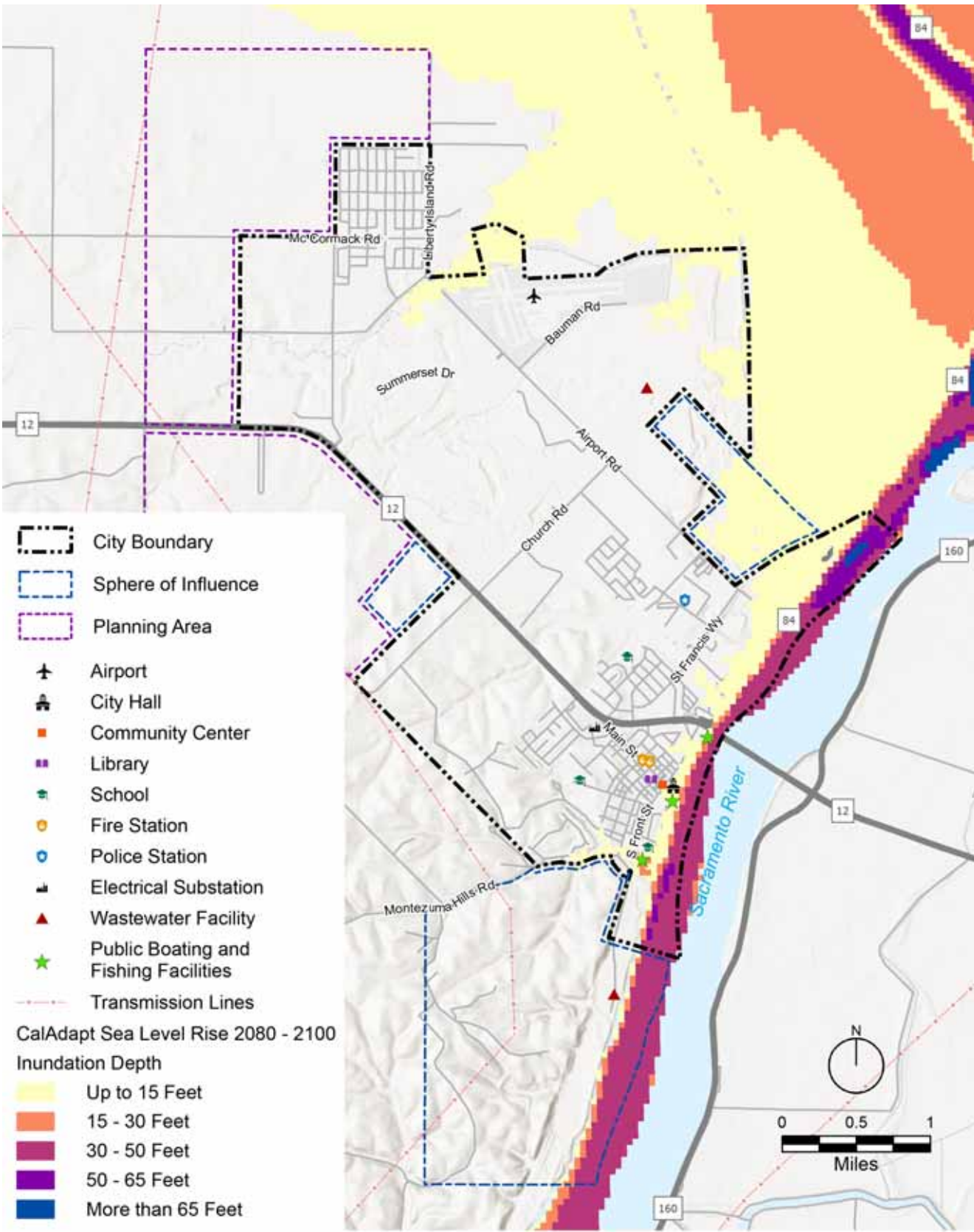
Sea level rise resulting from a changing climate has the potential to inundate homes, businesses, and infrastructure near shorelines and to cause erosion of shorelines over time. Along the Sacramento River shoreline, sea levels are projected to rise approximately 24 inches by 2050 and 84 inches by 2100. Areas projected to be inundated due to sea level rise in the late century (2080 to 2100) in Rio Vista are shown in Figure 9-5. Sea levels may increase enough by 2100 to permanently flood low-lying areas in the southern part of Rio Vista along the shoreline, including the Delta Marina and Rio Vista Pier, residential areas, and the downtown area. Rising sea levels can also cause the shoreline to flood more severely during storms or King Tide events. Sea level rise may also result in more frequent flood events in Rio Vista neighborhoods that are not currently subject to flooding.

## DAM FAILURE

A dam failure results in a sudden and uncontrolled release of water that inundates downstream lands. While dam failures are very rare, these events are not unprecedented and can result from natural disasters, such as earthquakes, landslides, extreme storms, or heavy snowmelt. Figure 9-6 illustrates areas in the City that would be affected by inundation if the dam holding Lake Oroville were to fail. In the event of a dam failure, land in the northeastern portion of the City, adjacent to the Rio Vista Municipal Airport, as well as the Rio Vista shoreline would likely flood.

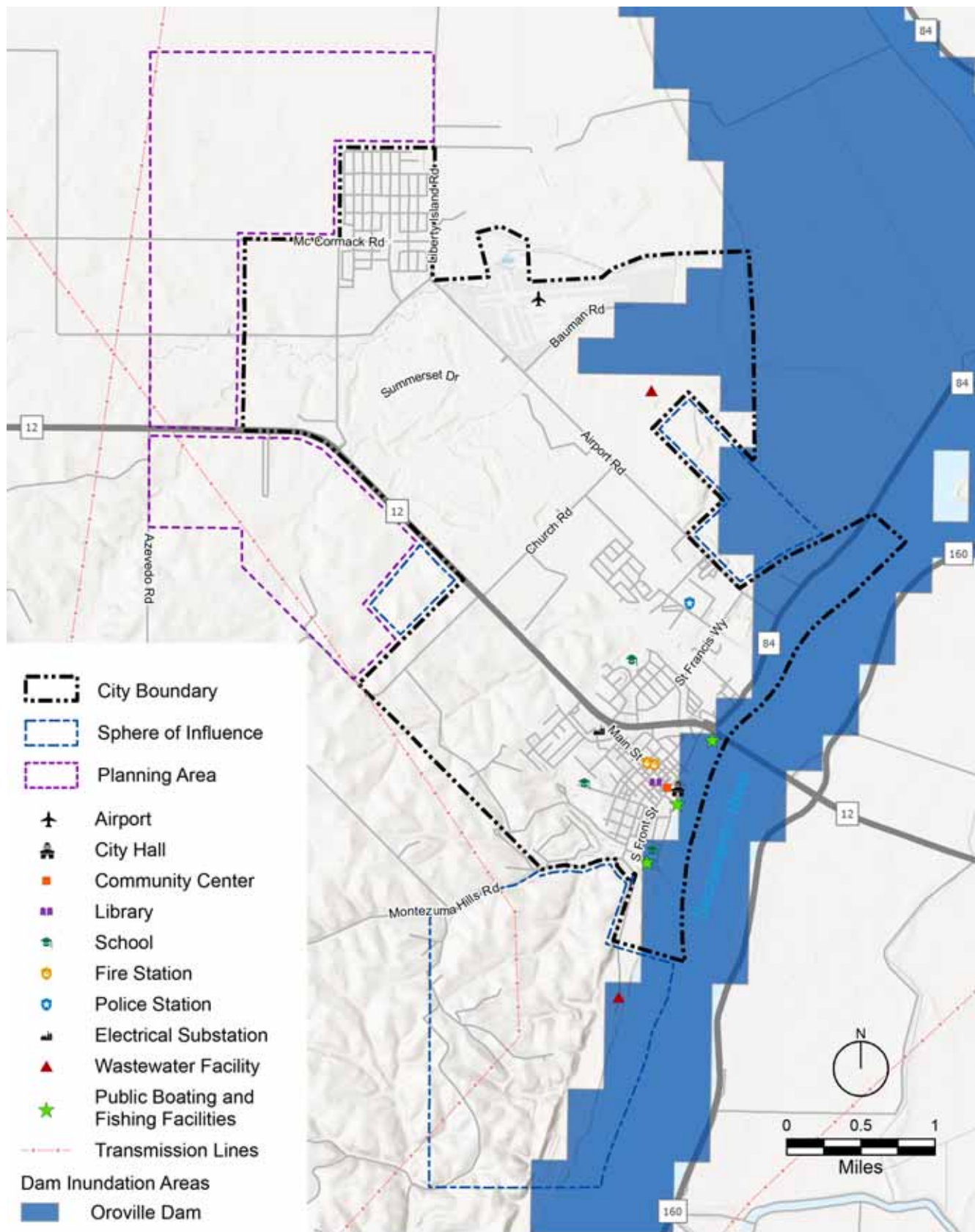


**FIGURE 9-5: Sea Level Rise 2080 to 2100**



Source: Cal-Adapt 2021, City of Rio Vista, Solano County 2021, Placeworks 2023

**FIGURE 9-6: Dam Inundation Areas**



Sources: California DWR 2021, City of Rio Vista, Solano County 2021, PlaceWorks 2023

## 9.5 SEISMIC HAZARDS

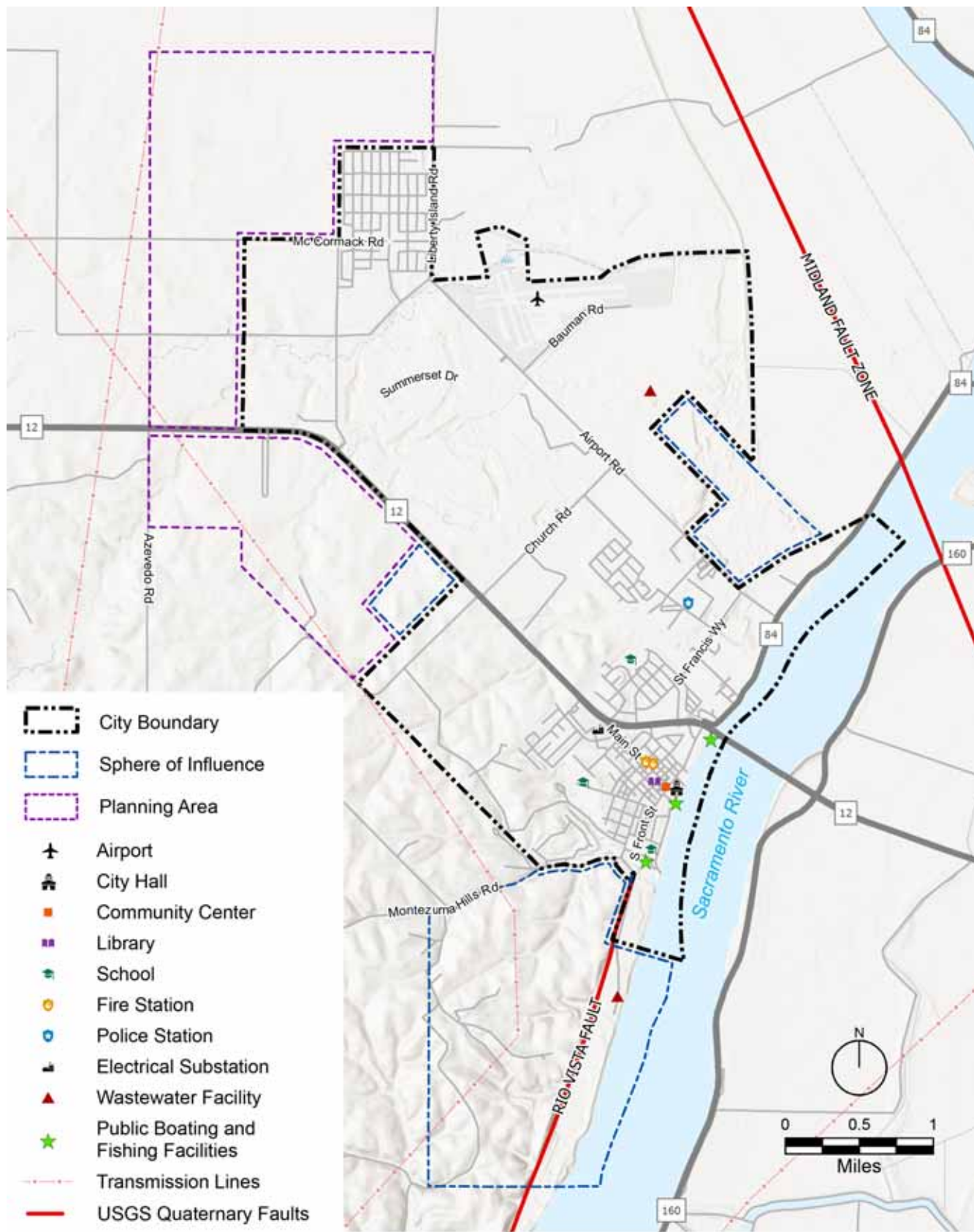
Seismic activity can result in ground shaking, surface rupture, (that displays cracks in the ground's surface), liquefaction (that causes loose soil to lose its solidity), landslides, and subsidence which cause sinks the ground's surface). Earthquakes and other seismic hazards often damage or destroy property and public infrastructure, including utility lines, and falling objects or structures pose a risk of injury or death.

### EARTHQUAKES

Earthquake risk is high in Rio Vista due to the presence of several active faults in both the San Francisco Bay Area and Delta regions. Rio Vista lies near several well-defined and active faults that can produce earthquakes of various magnitudes, all of which can affect structural stability of buildings. Figure 9-7 shows the locations of regional faults, including the Midland-Fault Zone and Rio Vista Fault. Other faults inside and outside of Solano County, such as the San Andreas, Concord, Green Valley, and Hayward Faults, may also be capable of generating significant earthquakes with damaging effects in the City. A major earthquake along any of these faults could result in substantial casualties and damage resulting from collapsed buildings, damaged roads and bridges, fires, flooding, and other threats to life and property.



**FIGURE 9-7: Fault Lines**



Sources: USGS 2017, City of Rio Vista, Solano County 2021, PlaceWorks 2023

## LIQUEFACTION

Liquefaction is a ground failure most often triggered by seismic shaking, but it can also be caused by improper grading, landslides, or other factors. Liquefaction potential is greatest along the shoreline areas of the City, including the fishing pier and the Delta Marina, and in the eastern and northern portions of the City that encompass the wastewater treatment facility, Rio Vista Municipal Airport, police station, and residential development.

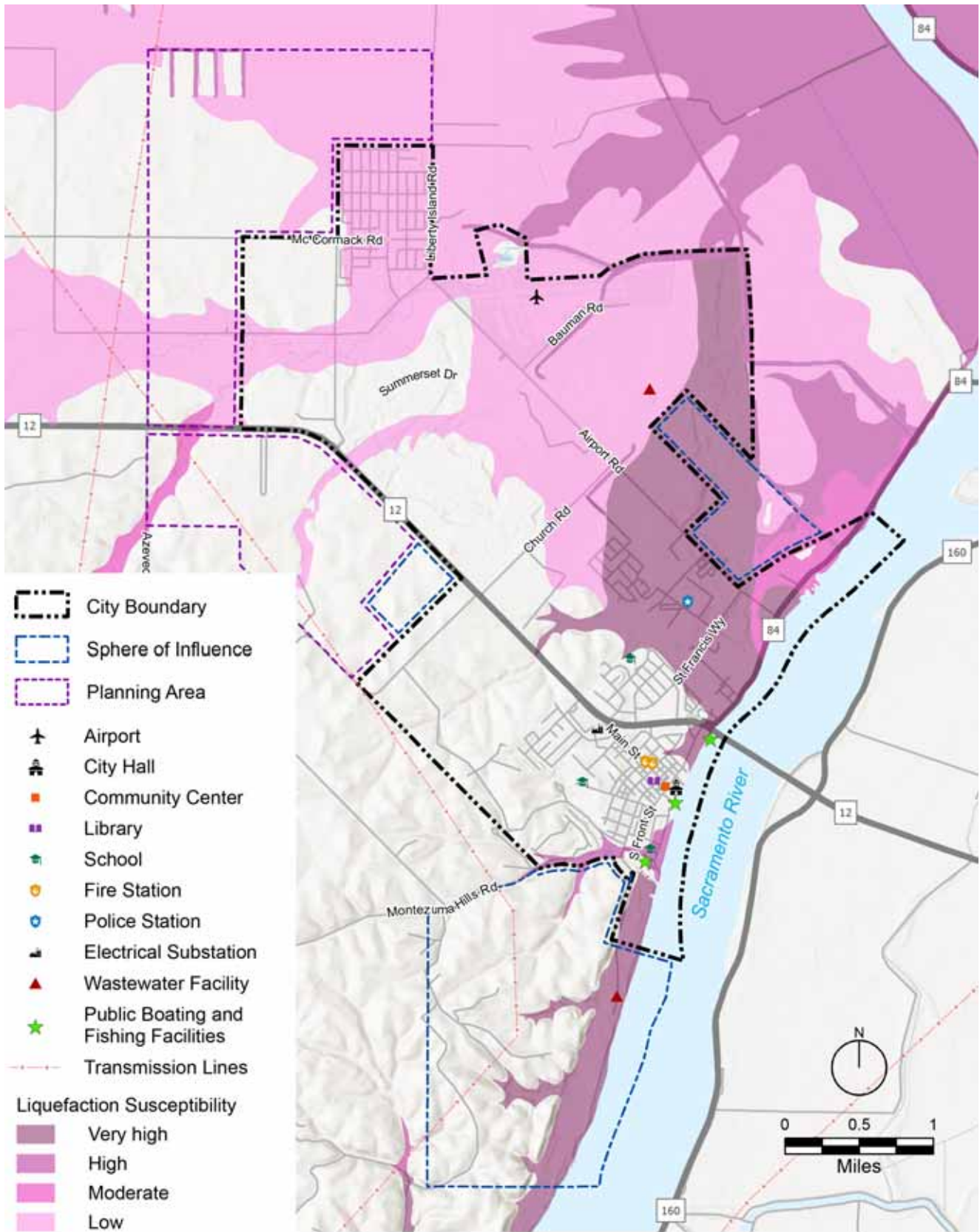
The parts of the City susceptible to liquefaction are shown in Figure 9-8. Climate change will alter precipitation patterns, including more intense and frequent rainfall events. This increased rainfall can saturate the soil, leaving the ground more prone to liquefaction during seismic events.



## GEOLOGIC HAZARDS

Geologic hazards, such as landslides and erosion, depend on the geologic composition of the area. Landslides and significant erosion in Rio Vista would most likely be associated with major storm events that generate storm flows undermining stream banks. Figure 9 illustrates the limited areas in Rio Vista that are susceptible to landslides. A majority of the City is within a low to medium landslide susceptibility class; however, there are some areas with a high landslide susceptibility class in the southwestern portion of the City, east of Highway 12. The water treatment facility, fishing pier, and school facilities are at risk for landslides and erosion. Climate change may result in precipitation extremes. While total average annual rainfall may not change significantly, rainfall may be concentrated in fewer, more intense precipitation events. Heavy rainfall could cause an increase in the erosive processes.

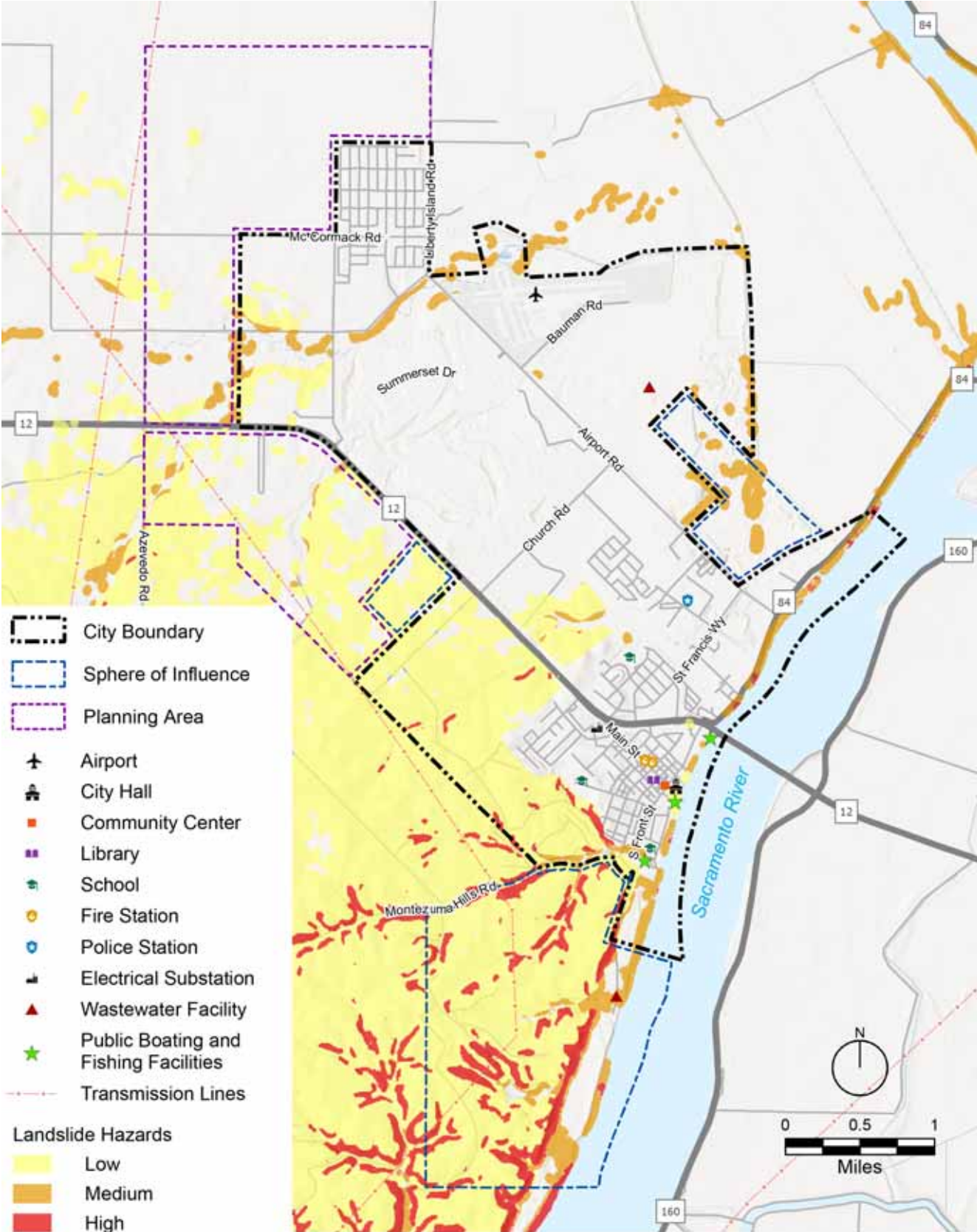
**FIGURE 9-8: Liquefaction Areas**



Sources: USGS 2019, City of Rio Vista, Solano County 2021, PlaceWorks 2023



**FIGURE 9-9: Landslide Susceptibility Areas**



Sources: City of Rio Vista 2023

## 9.6 FIRE HAZARDS

Fire hazards in Rio Vista include both wildfires and urban fires. Two types of fires are of concern to Rio Vista: (1) wildfires and (2) structural fires.

### WILDFIRES

Fuel, weather, and topography are primary factors that affect how wildfires spread. The climate of Rio Vista with dry and hot summers increases wildfire potential in the months of August, September, and October. While large areas of rural Solano County can be subject to grassland fires, lands surrounding Rio Vista are typically managed by landowners and farmers to reduce the potential for wildland fires. There are areas in the City, including areas north of the Trilogy project and northeast of Airport Road, with natural vegetation that can become flammable during summer and fall, resulting in increased potential for wildfire.

### STRUCTURAL FIRES

Structural fires occur in built environments, destroying buildings and other human-made structures. Structural fires generally result from human accidents or the failure of mechanical or electrical systems in structures, although arson might cause some events. Older buildings that lack modern fire safety features face greater risk of damage from fires. To minimize fire damage and loss, the City's Fire Department and Building Department enforce standards for building construction that minimize the risk of structural fires.

### FIRE HAZARD ZONES

The California Department of Forestry and Fire Protection (CAL FIRE) establishes Fire Hazard Severity Zones (FHSZ), designating each as moderate, high, or very high severity. Incorporated areas such as Rio Vista are considered local responsibility areas, within which CAL FIRE only designates very high FHSZs. There are no very high FHSZs in the city.

## 9.7 HAZARDOUS WASTE AND MATERIALS

Hazardous materials 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, as a consequence of other emergencies, or during transportation because of vehicle crashes. Most hazardous materials in the region are being transported on truck routes along major roadways, primarily on Highway 12. Since 1970, there have been no reported roadway hazardous materials incidents on Highway 12.

Potential and known contamination sites are monitored and documented by the Regional Water Quality Control Board and the California Department of Toxic Substances Control. A review of the leaking underground storage tank list produced by the Regional Water Quality Control Board GeoTracker database and the Department of Toxic Substances Control EnviroStor database indicates 15 leaking underground storage tanks cleanup sites with closed cases. The Department of Toxic Substances Control oversees the environmental cleanup of contaminated sites.

### NATURAL GAS WELLS

The natural gas field surrounding Rio Vista is one of the largest and oldest in California. Natural gas activities in the vicinity of Rio Vista include drilling and construction of new wells, gas well production, and transportation of gas. Natural gas wells are known to emit toxic particulate matter, carbon monoxide, nitrous oxide, ozone, and volatile organic compounds. Long-term exposure to this harmful air pollution can harm people's health, causing asthma, cognitive decline, heart disease, and preterm birth, among other conditions. Furthermore, natural gas wells pose a threat to groundwater through contamination with fracking fluids as well as with gases, including methane and volatile organic compounds. In Rio Vista, residents living near natural gas wells may be chronically exposed to higher levels of pollution. A review of natural gas wells provided by CalGEM's WellSTAR database indicates 55 natural gas wells in Rio Vista. Of these 55 natural gas wells, one is active, 21 are idle, and 33 are capped. Additional information on natural gas wells can be found at the California Department of Conservation Well Finder site here: <https://maps.conservation.ca.gov/doggr/wellfinder/>.

## 9.8 AIRPORT HAZARDS

The Rio Vista Municipal Airport is located in the northeast portion of the City along Airport Road. The facility has a helipad and two runways, one 4,200 feet long and the other 2,200 feet. The Solano County Airport Land Use Commission (ALUC) prepared Rio Vista Airport's 2018 Airport Land Use Compatibility Plan to ensure compatibility between the Airport and surrounding uses. The plan sets forth the criteria, maps, and other policies to be used by the Solano County ALUC and affected local land use jurisdictions. The policies are designed to ensure that future land uses near the airport are compatible with the realistically foreseeable and forecast aircraft activity at the Rio Vista Airport.

## 9.9 CLIMATE-RELATED HAZARDS

### DROUGHT

Drought is an extended period with precipitation levels well below normal. Drought occurs periodically in California and the western United States. Although droughts are a regular feature of California's climate, climate change will likely result in more frequent and intense droughts statewide. Drought impacts the city's groundwater supply, and in severe instances less water may be available for people, businesses, and natural ecosystems. Rio Vista relies on seven wells at various locations in the city and the City does not import or export surface water supplies currently, as the City expects to rely on groundwater through 2045.

Drought conditions increase vulnerability for populations in the City because water quality may be degraded, become more expensive, and be less available for industries that depend on this resource, such as water recreation and agriculture. Natural systems in the City, including wetland and riparian areas in Industrial Creek and along the Rio Vista shoreline, are highly vulnerable to drought conditions. Droughts can reduce freshwater flowing into and through both ecosystems, leading to algal blooms, low streamflow, higher temperatures, and increased erosion. Local ecosystems that are not well adapted to drought conditions are more easily harmed.

## EXTREME HEAT

Extreme heat is generally defined 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. In Rio Vista, the extreme heat threshold is 97.3°F and an event with five extreme heat days in a row is considered a heat wave. Warmer temperatures brought on by climate change are likely to cause an increase in extreme heat events. The state Cal-Adapt database indicates the number of extreme heat days is expected to rise from a historical annual average of 5 extreme heat days to an annual average of 24 by the middle of the century (2035 to 2064), and an annual average of 44 by the end of the century (2070 to 2099), with some years occasionally experiencing many more extreme heat days. Health impacts are the primary concern with this hazard, though economic impacts are also an issue. Exposure to extreme heat can lead to several heat-related illnesses, including heat cramps, exhaustion, and stroke. Seniors, households in poverty, small children, persons with chronic illnesses, and those on certain medications, are particularly susceptible to heat reactions.

## SEVERE WEATHER

Severe weather is generally any destructive weather event, but usually occurs in Rio Vista 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 blocked by debris, and fires sparked by lightning. Climate change is expected to cause an increase in intense rainfall, strong storm systems, and high winds. This means that Rio Vista could see more severe weather events in the coming years and decades, although such an increase may not affect all forms of severe weather.

## 9.10 SAFETY ELEMENT (SE) GOALS, POLICIES, AND IMPLEMENTATION PROGRAMS

### GOALS

**Goal SE-1:** To avoid loss of life and minimize damage to property from natural and human-caused hazards.

**Goal SE-2:** To maintain emergency response services that meet the needs of the community.

**Goal SE-3:** To increase the resilience of the community to climate change.

### POLICIES

**Policy SE-1:** The most recent version of the Solano County Multi-Jurisdictional Hazard Mitigation Plan, City of Rio Vista Annex, certified by FEMA, is hereby incorporated into this Safety Element by reference, as permitted by California Government Code Section 65302.6.

**Policy SE-2:** The City will strive to ensure that emergency preparation and response materials are available to all residents in multiple languages and in formats appropriate for people with access and functional needs.

- Coordinate with emergency responders to maintain potential evacuation routes, including roadway improvements as needed.

**Policy SE-3:** Ensure City infrastructure in 100-year, 200-year, and 500-year floodplains conform to existing 100-year and 200-year floodplain elevation standards and can adapt to increased flooding.

**Policy SE-4:** Site critical and lifeline facilities, including police and fire stations, hazardous material storage facilities, bridges, and large public assembly halls, outside of hazardous, including flood hazard zones, sea level rise hazard areas, seismic and geologic hazard areas, and adjacent to hazardous materials facilities.

**Policy SE-5:** Plan for adequate firefighting infrastructure, including water supply and pressure, road and building clearance for firefighting vehicles, and clear and legible street signage throughout the community.

**Policy SE-6:** Minimize the potential for loss of life and property resulting from wildfire through community outreach and the development review process.

**Policy SE-7:** Prohibit the location of new hazardous waste storage facilities or land uses that use hazardous materials in areas subject to flooding during 100-year and 200-year storm events.

**Policy SE-8:** When reviewing any entitlements for residential uses on lands that contain natural gas wells or facilities, require a well/facility maintenance plan and a detailed safety plan that includes emergency response procedures.

**Policy SE-9:** Incorporate shade structures, installation of green space, public drinking water facilities, and heat-resilient building techniques into public and private projects, as feasible, to ensure that key public facilities, are adequately protected and residents and visitors can prepare for extreme heat.

## PROGRAMS

**Program SE-1:** Collaborate with interested service providers and the County to update and implement the Solano County Multi-Jurisdictional Hazard Mitigation Plan every five years and ensure that it is certified by FEMA.

**Program SE-2:** Implement SB 1137 to prohibit the development of gas wells within 3,200 feet of a sensitive receptor, including but not limited to, residences, schools, and medical facilities.

**Program SE-3:** Prepare and update the Emergency Operations Plan every five years and ensure that City departments are prepared to efficiently carry out assigned functions.

**Program SE-4:** Pursue funding to retrofit City infrastructure in 100-year, 200-year, and 500-year floodplains as identified in the City of Rio Vista Annex of the Solano County Multi-Jurisdictional Hazard Mitigation Plan and in coordination with Solano County Water Agency and Solano County Reclamation and Levee Districts.

**Program SE-5:** Evaluate storm drainage culverts and bridges along designated floodplains to ensure they are designed to accommodate, at a minimum, 200-year flood volumes.







**Program SE-6:** Work with public and private property owners within mapped wildland-urban interface areas to establish and maintain fire defensible space, fire-resistant landscaping, vegetation clearance, emergency access roads, and firefighting infrastructure.

**Program SE-7:** Continue to implement fire prevention programs as follows:

- Present annual Fire Prevention Week at local schools.
- Assist businesses in preparing their fire prevention programs upon request.
- Conduct fire extinguisher demonstrations to service clubs and businesses upon request.
- Conduct fire inspections through the business license approval procedure.
- Carry out routine fire inspections to the extent possible, as feasible based on staff availability.

**Program SE-8:** Seek grant funding and other support to ensure that public facilities are resilient to climate-related hazards. Prepare plans to provide critical and lifeline facilities, including water and wastewater systems, emergency and medical services, and heating and cooling centers, with adequate backup power supplies to support operations during a severe weather or extreme heat event that disrupts power service.

**Program SE-9:** Establish a network of equitably located resilience centers throughout Rio Vista and ensure that resilience hubs are situated outside of areas at risk from hazard impacts to the extent possible, offer refuge from extreme heat and other hazardous events, and are equipped with renewable energy generation and backup power supplies. Such facilities should be in easily accessible locations and available to all community members.

**Program SE-10:** Provide the community with information about the health effects of extreme heat and severe weather and measures to minimize heat exposure, negative health effects, weatherization of homes, and damage to property.

**Program SE-11:** Seek funding to install shade structures, trees, and public drinking water facilities at public facilities, including parks and the Rio Vista Boat Launch.

**Program SE-12:** Conduct Community Emergency Response Team trainings to provide more community members with the tools to respond to disasters.