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CHAPTER

5 PUBLIC HEALTH AND SAFETY

INTRODUCTION

Health and safety within Solano County are concerns for every resident. This chapter of the General Plan presents the County's vision to protect people and property from natural and human-made hazards, promote public health, protect air quality, preserve and enhance water resources, and guide development in a sustainable manner that respects the needs of both people and the environment. The guiding vision statement developed by the General Plan Citizens' Advisory Committee specifically references a desire to protect health and safety within the county. This vision states:

> *We will use our natural habitat, farmlands, and water resources to maintain separation among our cities and unincorporated communities. These features will continue to contribute to our identity and economy and help to protect our people from flooding and other natural hazards.*
>
> *Because we value the quality of our air, soil, water, and other finite natural resources, we will continue to preserve agricultural lands and support practices that use renewable and recycled resources and reduce energy consumption and pollution as much as possible.*
>
> *We will also promote public health, safety and security, and environmental justice as part of an equitable society.*

Based on these statements, the major strategies in the Public Health and Safety chapter are:

- Maintaining distance between hazards and humans with agricultural lands and open space.
- Improving air quality on a regional scale through partnerships with other Bay Area organizations.

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- Promoting development that works with nature to slow global climate change and its impact on nature and reduces human risks associated with environmental hazards, including hazards created or increased by climate change.
- Increasing community resilience through disaster preparedness and adaptation.

Policies proposed in each section of the chapter address these general health and safety strategies. Programs to implement these policies are also presented to ensure that each policy can be conducted.

Legislative Requirements

The Public Health and Safety chapter addresses the topic of public health and safety following State requirements in Section 65302(g) of the California Government Code. State law requires that this chapter contain background information and policies to address multiple natural hazards, analyze the vulnerabilities from climate change, improve climate change resilience, and assess residential areas with evacuation constraints. The public safety issues in Solano County include emergency preparedness and response, flood and inundation hazards, seismic and geologic hazards, fire hazards, hazardous waste and materials, and climate-related hazards such as drought, extreme heat, and severe weather. The Public Health and Safety chapter identifies goals and policies for each of these hazards.

Collectively, the Public Health and Safety goals, policies, and implementation programs are designed to guide the County to a healthier and safer future. To provide a framework for this effort, the Governor's Office of Planning and Research has established guidelines for the content of general plans in California. Many of the sections in this Public Health and Safety chapter are required by State law to address specific issues. Although air quality is not required as a separate general plan chapter, State guidelines recommend that it be addressed in a local general plan, either as a separate, optional chapter or through policies in a mandatory chapter (such as Conservation).

A general plan must examine issues related to protecting the community from any unreasonable risks associated with:

- Seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure;
- Slope instability leading to mudslides and landslides;
- Subsidence, liquefaction, and other seismic hazards identified on seismic hazard maps;
- Other known geologic hazards;
- Flooding and sea level rise-related impacts; and
- Wildland and urban fires.

It must also address the following as they relate to known fire and geologic hazards:

- Evacuation routes and signage;
- Peak load water supply requirements;
- Military installations;
- Minimum road widths and turnouts; and
- Clearances around structures.

Issues to be addressed by the Noise section include:

- Major noise sources, both mobile and stationary;
- Existing and projected levels of noise and noise contours for major noise sources;
- Existing and projected land uses and their proximity to existing and projected noise sources;
- Existing and proposed sensitive receptors, including:
  - Hospitals,
  - Convalescent homes,
  - Schools,
  - Churches, and
  - Sensitive wildlife habitat, including the habitat of rare, threatened, or endangered species;
- The extent of "noise problems in the community" (survey of community to determine location and extent);
- Methods of noise attenuation and the protection of residences and other sensitive receptors from excess noise; and
- Implementation and possible solutions that address existing and foreseeable noise problems.

Issues that could be addressed in an optional Air Quality chapter or section of the general plan include:

- Meteorological conditions affecting air quality and a description of the area's current air quality attainment status;
- Ambient air quality based on data from local monitoring stations;
- Applicable federal and State standards and laws pertaining to air pollution;
- The types of sources of stationary and mobile air pollution;
- Amounts of emissions produced by different sources of air pollution;
- Reference to applicable regional or local air quality plans; and
- State, regional, and local transportation programs that affect the type and location of transportation facilities.

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Scope and Content

The public safety issues in this Public Health and Safety chapter include:

- Flood and inundation hazards
- Seismic and geologic hazards
- Fire hazards
- Hazardous waste and materials
- Emergency preparation and response
- Agriculture and ecosystem hazards
- Climate resilience
- Public health
- Air quality
- Noise

Each section contains a summary of current conditions followed by a brief overview of applicable federal; State; regional; or County agencies, plans, or programs. Policies and implementation programs specific to each topic follow this introduction and are used to ensure that public health and safety goals are accomplished.

Relationship to Other County Plans

The Solano County Public Health and Safety chapter is one of several documents that address community public safety and related topics. These other plans include other General Plan chapters, the 2022 Solano County Multi-jurisdictional Hazard Mitigation Plan (MJHMP), and the Solano County Emergency Operations Plan (EOP), among others. The Public Health and Safety chapter should be consistent with these other chapters and plans to minimize conflicts between documents and ensure that the County has a unified strategy to address public safety issues. The Public Health and Safety chapter incorporates information, technical analyses, and policies from these other documents where appropriate to help support this consistency.

Protecting residents and their property from undue harm requires the County to identify areas that are unsuitable for future development. The Public Health and Safety chapter achieves this by documenting locations of known natural hazards and areas of excessive noise. These findings will guide:

- Land use decisions minimizing human exposure to dangerous areas.
- Circulation policies informing the placement of new roads and other infrastructure, such as utility lines, oil and gas pipelines, and aqueducts.
- Housing locations protecting residences and other noise-sensitive uses from unacceptable sound levels.

The policies and implementation programs in the chapter are supported by those in the rest of the General Plan.

General Plan Chapters

Crucial relationships exist between this chapter and the others in the General Plan. How land uses are determined in areas prone to natural hazards, what regulations limit development and land uses in these areas, and how hazards are mitigated for existing development are all issues that tie the elements together. For instance, the Land Use chapter diagrams and policies must consider the potential for various hazards identified in the Public Health and Safety chapter and must be consistent with the policies to address those hazards. The Open Space section of the Resources chapter is also closely tied to the Public Health and Safety chapter. Floodplains, for example, are not only hazard areas, but often serve as sensitive habitat for threatened or endangered species or provide recreation or passive open space opportunities for residents and visitors. Therefore, flood and inundation policies balance the need to protect public health and safety with the need to protect habitat and open space. Public Health and Safety chapter policies, especially those concerning evacuation routes and critical facilities, must also be consistent with those of the Transportation and Circulation chapter.

The sections addressing noise and public safety issues in this chapter are related to the rest of the General Plan, specifically the Land Use, Transportation and Circulation, and Housing chapters.

Solano County Multi-jurisdictional Hazard Mitigation Plan

The Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) for Solano County was developed in accordance with the federal Disaster Mitigation Act of 2000 and followed the Federal Emergency Management Agency's (FEMA's) Local Hazard Mitigation Plan guidance. Solano County's MJHMP incorporates a process that identifies and profiles hazards, analyzes people and facilities at risk, and develops mitigation actions to reduce or eliminate hazard risks. The implementation of these mitigation actions, which include both short-term and long-term strategies, involve planning, policy changes, programs, projects, and other activities.

The MJHMP and the Public Health and Safety chapter address similar issues, but the Public Health and Safety chapter provides a higher-level framework and set of policies that pertain to the safety of the county, and the local hazard mitigation plan (LHMP) focuses on more specific mitigation, often short-term actions to enable jurisdictions to better protect lives, property, and natural systems. The current MJHMP, approved by FEMA, is incorporated into the chapter by reference, as permitted by California Government Code Section 65302.6. It is available online at: **https://mitigatehazards.com/solanohmp/hmp/**.

Solano County Emergency Operations Plan

The County's Emergency Operations Plan (EOP) describes planned response to extraordinary emergency situations associated with natural disasters, technological (human-caused) emergencies, and war emergency operations in or affecting Solano County. The EOP is the principal guide for the County and special districts who respond to and mitigate emergencies and disasters in Solano County. It is intended to facilitate multi-agency and jurisdictional

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emergency operations and coordination, particularly between local government and the operational area (county boundary), as well as State and federal response by request.

GOALS

The goals of the Public Health and Safety chapter address the County's desire to protect its residents, their property, and the environment from natural and human-caused hazards. They address the previously stated strategies of:

- Maintaining distance between hazards and humans;
- Improving air quality on a regional scale; and
- Promoting development that works with nature.

The following goals provide a general framework for Solano County health and safety, within which, the separate topic areas expand to provide policies and programs.

Goal HS.G-1: Minimize risk to property and protect lives from flood hazards.

Goal HS.G-2: Avoid the loss of life and injury and minimize property damage from seismic and geologic hazards.

Goal HS.G-3: Reduce the risk and threat from urban and wildland fire hazards.

Goal HS.G-4: Ensure that Solano County is safe from risks to public health that could result from exposure to hazardous materials.

Goal HS.G-5: Prepare for and respond to natural and human-caused disasters, avoiding loss of life and minimizing the impacts to health, property, and community welfare.

Goal HS.G-6: Protect the long-term viability of agricultural activities in Solano County.

Goal HS.G-7: Create a resilient community able to prepare for and adapt to climate-related hazards.

Goal HS.G-8: Prioritize and support actions that foster public health for all citizens in Solano County.

Goal HS.G-9: Maintain equitable and healthy air quality in Solano County through actions that avoid and minimize health risks from localized pollution sources and regional wildfire smoke.

Goal HS.G-10: Create a community protected from the harmful impacts of excessive noise.

Climate Change Vulnerability

Changes to the global climate system are expected to affect future occurrences of natural hazards in and around Solano County. Many hazards are projected to become more frequent and intense in the coming years and decades—in some cases, these trends have already begun. Key climate change considerations that affect Solano County include increasing temperatures, changes in precipitation, and sea level rise. Overall, precipitation levels are expected to increase only slightly; however, there are likely to be more years of extreme precipitation events and droughts that last longer and are more severe. According to California's Fourth Climate Change Assessment, Solano County can expect to experience various changes from climate-related hazard events.[1]

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. 2020. California Adaptation Planning Guide. https://resilientca.org/apg/.

Sea level rise can cause permanent and temporary flooding along coastal and shoreline areas, as well as inland areas in the watershed. Along the Solano County shoreline, sea levels are projected to rise by as much as 24 inches by 2050 and 84 inches by 2100.[2] Rising sea levels can also cause the shoreline to flood more frequently and severely during storms or king tide events. Furthermore, sea level rise can also increase Delta salinity, possibly requiring that any water withdrawn from the Delta be desalinated prior to use in agriculture or urban areas.

Floods are expected more often in Solano County, as precipitation is expected to fall in fewer, more extreme events. Climate change may expand the parts of the county that are considered prone to flood, especially in areas adjacent to the shoreline and tributaries in the southern and eastern portions of the county.

Climate change is also expected to increase the frequency and severity of **droughts**. Drought conditions will likely strain the water supplies from the State Water Project and Solano Project that meet most of Solano County's water demand, causing the water shortage contingency plan and demand-reduction actions to more frequently go into effect. Extended droughts may also reduce groundwater levels and impact shallow wells, especially for drinking water.

Severe weather events, such as lightning, hail, heavy rainfall, and high winds, may become more frequent and intense due to climate change. These events can increase the risk of other hazards, including landslides and wildfires.

Warmer temperatures are projected to cause an increase in **extreme heat events**, including days above 100 degrees Fahrenheit (°F) and nights with abnormally high temperatures. Extreme heat and warm nights pose a significant human health risk, especially to senior citizens, outdoor workers, and persons who do not have access to adequate cooling, including people experiencing homelessness. Some buildings and infrastructure systems may be damaged by very high temperatures, constraining their ability to meet community needs.

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Wildfire risk in Solano County is increasing, and hotter, drier weather because of climate change is expected to lead to an increase in wildfires across Solano County. Across the region, more frequent and intense wildfires may also create poor air quality for Solano County.

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. Several of these vector-borne diseases are linked to climate change and can be harmful to the health of Solano County community members, such as hantavirus pulmonary syndrome, Lyme disease, and West Nile fever.

Vulnerability Assessment Results

Under California law, the Public Health and Safety chapter 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 County conducted a Climate Change Vulnerability Assessment in the spring of 2022 to analyze Solano County's susceptibility to climate-related hazards. The assessment was prepared in accordance with the most recent available guidance in the California Adaptation Planning Guide. The full results of Solano County's vulnerability assessment are included in the Public Health and Safety Chapter Background Report, **Appendix F** to this Public Health and Safety Chapter.

The Climate Change Vulnerability Assessment found that Solano County's populations and assets are most vulnerable to inland flooding, severe weather, and wildfire. The most vulnerable communities include outdoor workers, immigrant communities, households in poverty, and low-resourced people of color—all of these are highly or severely vulnerable to all climate change hazards.

Climate change could affect the transportation network and associated economic activity in Solano County by creating strain on transportation infrastructure, resulting in impacts to travel behavior, goods movement, and supply chain continuity. Transportation infrastructure faces increased risk due to inland and shoreline flooding, landslides, and severe weather. Disruption of these local transportation roadways could significantly impact goods movement, the economic vitality of the community, and the ability to evacuate during an emergency.

Countywide, energy delivery is vulnerable to severe weather, extreme heat, and wildfire.

Public safety power shutoff events or other interruptions in energy service can create vulnerabilities for Solano County community members, including a loss of refrigeration and cooling (particularly dangerous during extreme heat events), loss of access to the internet or other information systems, and lack of cooking or lighting service. 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 to affect parts of the county that are considered prone to both inland and shoreline flooding due to sea level rise and stronger storm systems. Increases in damaging flood events in the county are expected to cause greater property damage, public health and safety concerns, displacement, and loss of life. Increased sea level rise and shoreline flooding may also harm segments of the local recreation industry.

The Public Health and Safety chapter includes goals, policies, and implementation actions to increase community resilience and help lower vulnerability scores, particularly for the populations and assets that received a moderate to high vulnerability score in the Vulnerability Assessment.

PUBLIC SAFETY ISSUES

The Public Health and Safety chapter provides background information and relevant mapping for each of the relevant topics. It explains what the issue is and how it affects the safety and well-being of county residents, appropriate historical and regulatory context, and discussions of how safety issues may change in the future. This chapter is supported by the Public Health and Safety Chapter Background Report (**Appendix F**), which provides detailed information for each of the safety issues addressed in this chapter. Goals, policies, and implementation actions are identified following the discussion of each hazard identified.

FLOOD AND INUNDATION HAZARDS

Planning Context

Flooding

Flooding is when the level rises in a body of water, and it overflows onto normally dry land. Historically, floods are one of the most frequent natural hazards to communities in Solano County. Floods are usually caused by large amounts of precipitation, either very intense precipitation or a long period of steady precipitation. Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide, significantly threatening the health and life of community members and causing substantial damage to structures, landscapes, and utilities. Floodwaters can 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. Objects can be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to roads, foundations, and electrical circuits. Other problems related to flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Riverine flooding, the most common type of flood event, occurs when a watercourse overruns its banks. In Solano County, riverine flooding can occur anytime during the rainy season, which is usually from November through May. Several streams in the county have long histories of seasonal flooding, often resulting in significant damage.

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Occasionally, flash flooding may occur from short-duration, high-intensity precipitation events (often during thunderstorms), even during drought conditions. Flash floods 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 ground cover with impermeable surfaces, such as roads, driveways, and parking lots.

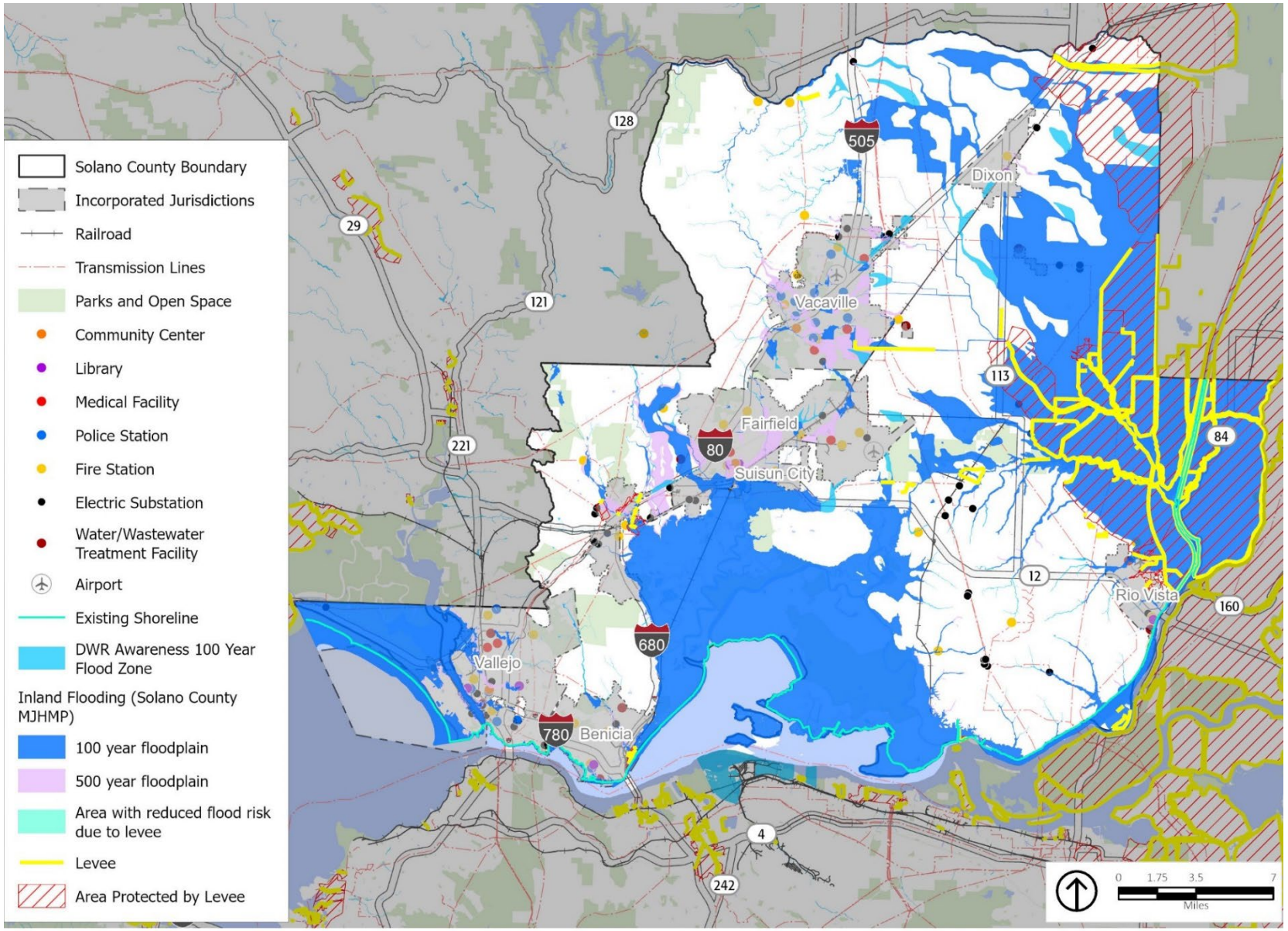
Areas at an elevated risk of flooding are generally divided into 100- and 500-year flood zones. A 100-year flood zone has a 1 percent chance (1 in 100) of experiencing a flood in any given year, and a 500-year flood zone has a 0.2 percent chance (1 in 500) of flooding in any given year. Some parts of California, including Solano County, also have 200-year flood zones. These are areas that have a 0.5 percent chance (1 in 200) of flooding in any given year. **Figure HS-1** shows the 100- and 500-year flood zones identified by FEMA, the 100-year flood zones identified by the California Department of Water Resources (DWR), and existing levees and the areas they protect. **Figure HS-2** shows the 100-, 200-, and 500-year flood zones identified by the United States Army Corps of Engineers (USACE). The 100- and 500-year floodplains in Solano County include the areas along the shoreline of the Sacramento River, Suisun Bay and Grizzly Bay, Suisun Marsh, areas around Suisun City and Fairfield, and lands in the eastern portions of the county. The 200-year floodplain is in the eastern part of Solano County, in the Sacramento-San Joaquin Delta area on unincorporated land designated for agricultural use, or land designated for agricultural, industrial, commercial, and residential uses in the City of Rio Vista Municipal Service Area.

Sea Level Rise and Shoreline Flooding

Sea level rise is an increase in the ocean's surface height relative to the land and a direct result of climate change. It affects coastal communities as well as those along the San Francisco Bay and into the Sacramento/San Joaquin Delta region. Sea level rise has the potential to inundate homes, businesses, and infrastructure near the shorelines and to erode coastal lands over time.

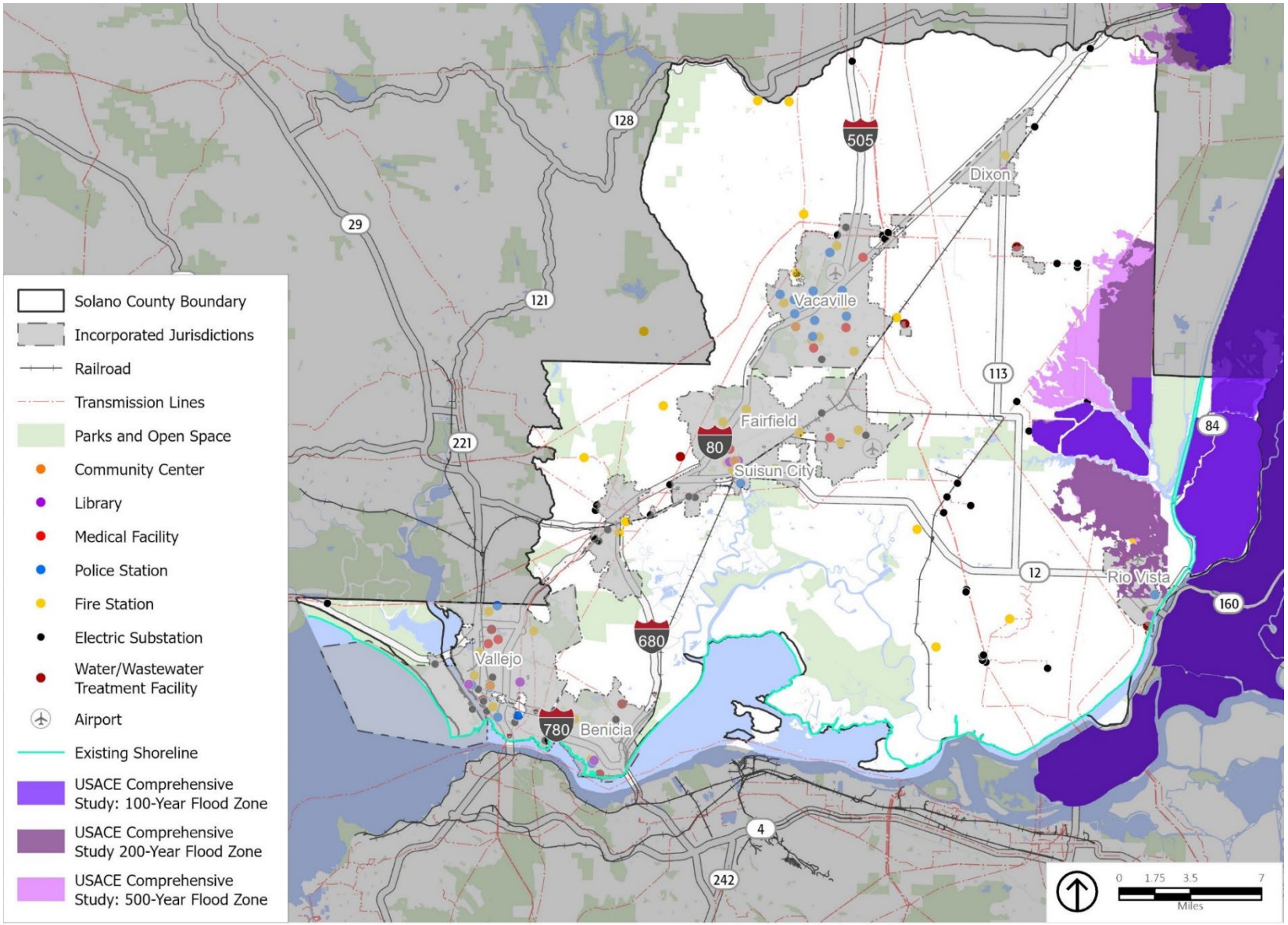
Along the Solano County shoreline, sea levels are projected to rise as much as 24 inches by 2050 (midcentury) and 84 inches by 2100 (end of century). However, it is possible that sea levels could rise faster than these projections. Sea level rise projections for the years 2050 and 2100 in Solano County are shown on **Figures HS-3** and **HS-4**, respectively. Sea levels may increase enough by 2100 to permanently flood low-lying areas in the southern part of Solano County along the shoreline, including Suisun Marsh. Rising sea levels can also cause the shoreline to flood more frequently and severely during storms or king tide events because ocean levels are higher during normal conditions. Additionally, rising sea levels can cause inland areas in the watershed to flood. Inland areas with contaminated sites are vulnerable to sea level rise as well. Sea level rise may mobilize contaminants from legacy contaminated sites. Shoreline flooding projections for the years 2050 and 2100 in Solano County are shown on **Figures HS-5** and **HS-6**, respectively.

Figure HS-1: FEMA and DWR Flood Zones and Levee Protection Zones



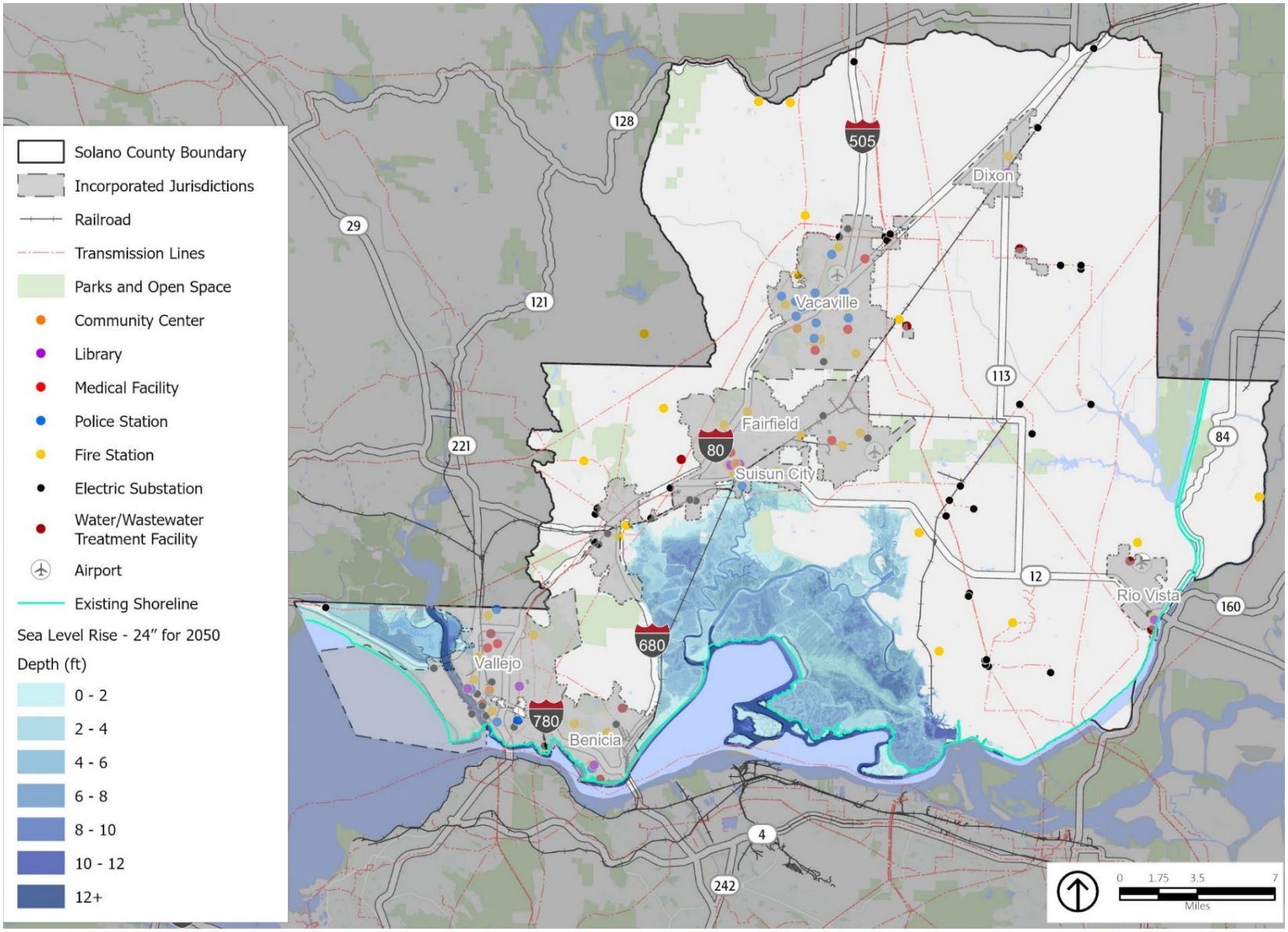
Source: National Levee Database 2021, Solano County 2021, PlaceWorks 2022, ESRI

Figure HS-2: USACE Flood Zones



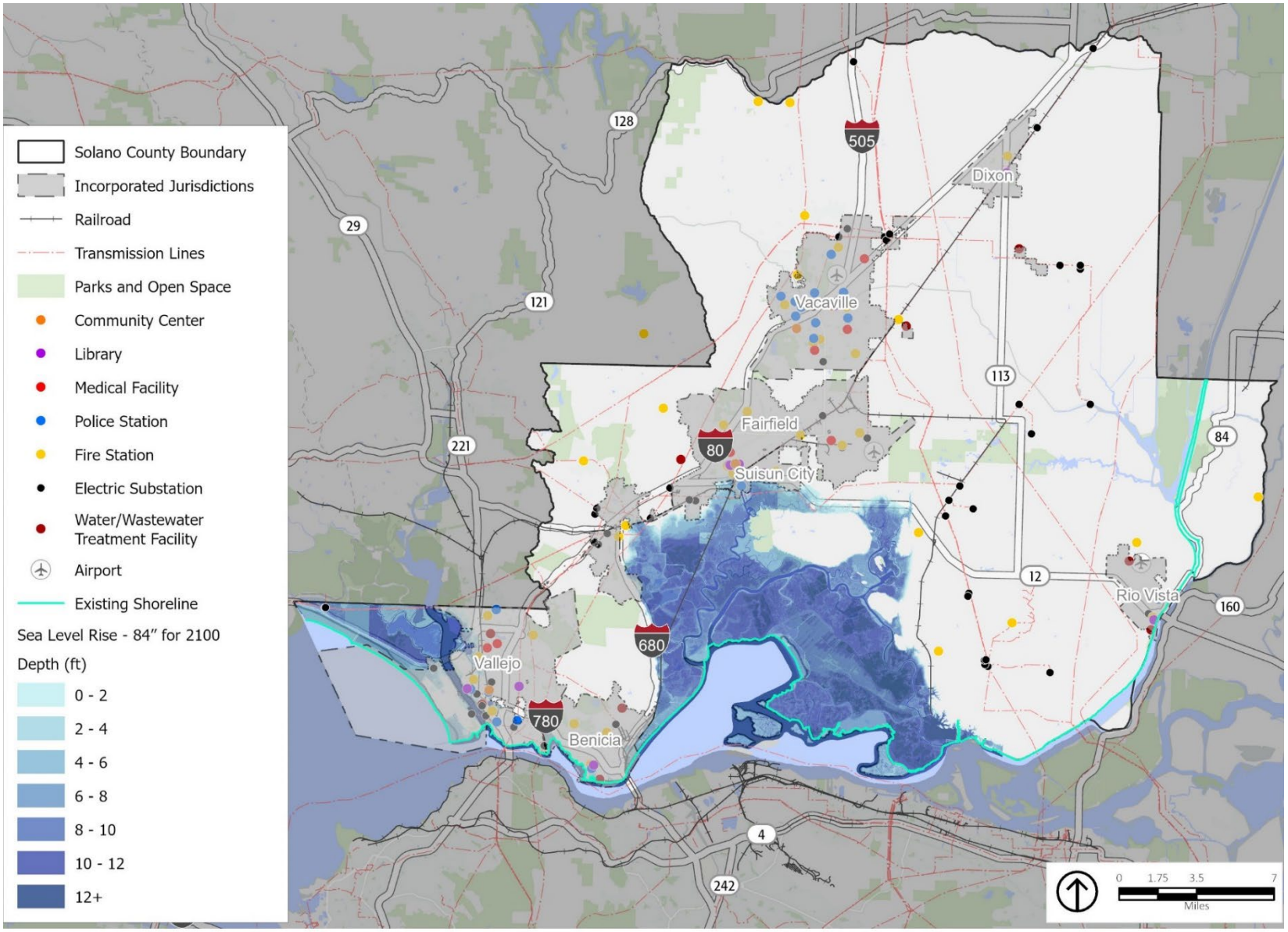
Source: USACE 2002, Solano County 2021, PlaceWorks 2022, ESRI

Figure HS-3: Sea Level Rise Projections – 2050



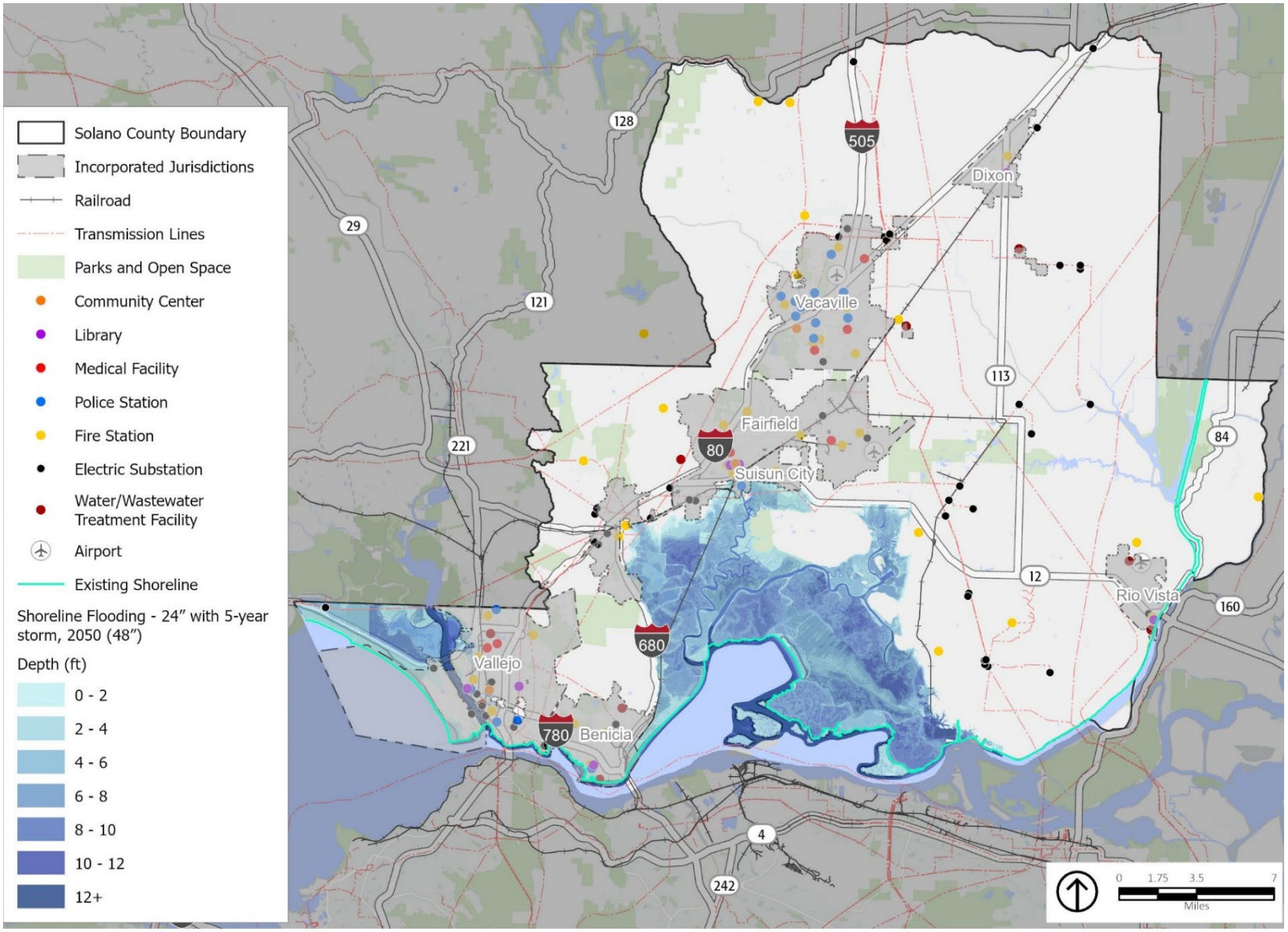
Source: Adapting to Rising Tides 2020, PlaceWorks 2022, ESRI

Figure HS-4: Sea Level Rise Projections – 2100



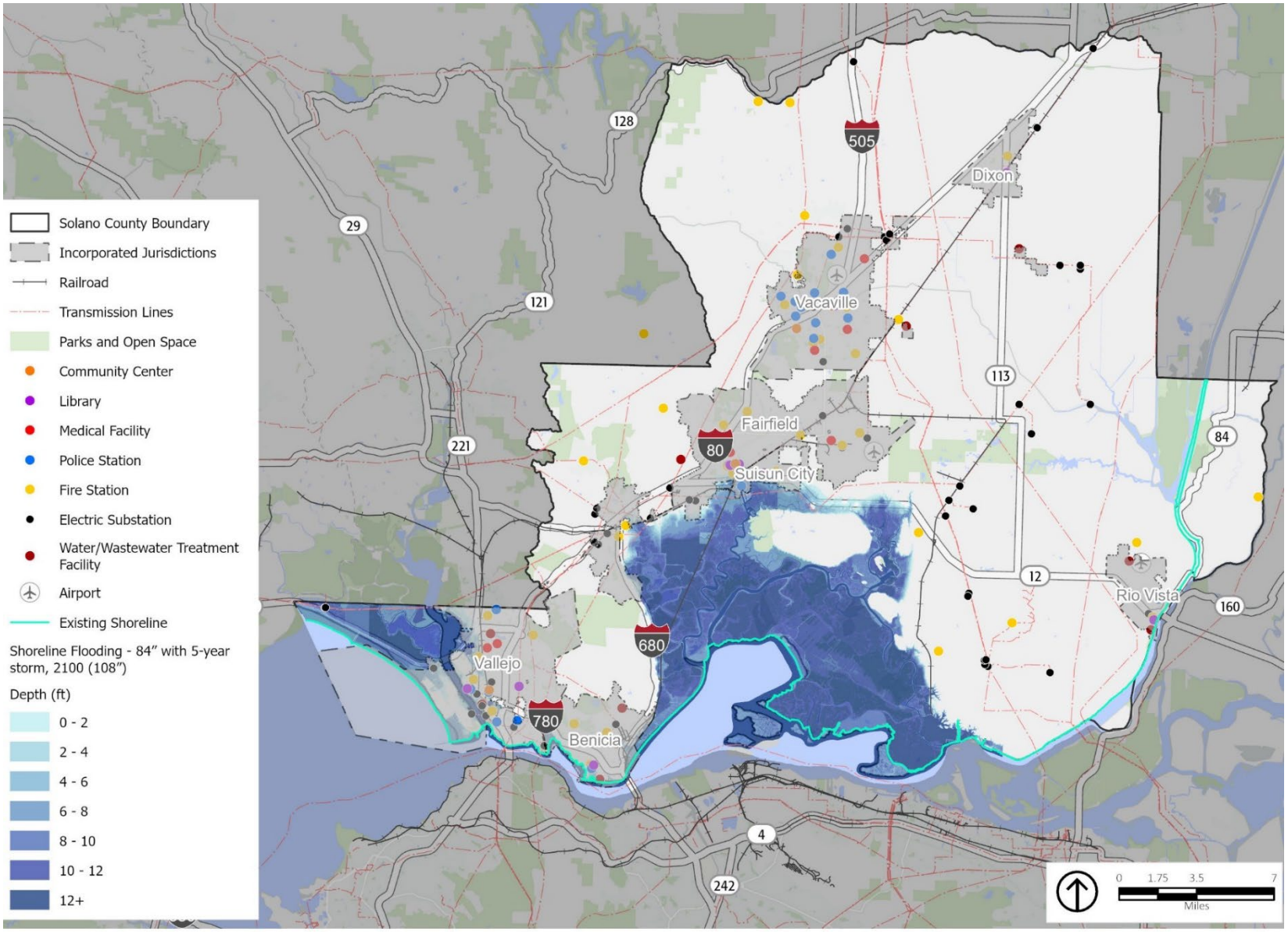
Source: Adapting to Rising Tides 2020, PlaceWorks 2022, ESRI

Figure HS-5: Shoreline Flooding Projections – 2050



Source: Adapting to Rising Tides 2020, PlaceWorks 2022, ESRI

Figure HS-6: Shoreline Flooding Projections - 2100



Source: Adapting to Rising Tides 2020, PlaceWorks 2022, ESRI

Dam 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. Dam failures can range from minor to catastrophic and can harm human life and property downstream. In addition, ecosystems and habitats are destroyed by waters flooding them. Failures are rare but not unprecedented; they can be caused by overtopping, foundation defects, piping and seepage failures, or conduit and valve failures.

Many dam failures are the secondary result of other natural disasters, such as earthquakes, landslides, extreme storms, or heavy snowmelt or runoff. The primary danger associated with dam failure is the high-velocity flooding downstream of the dam and limited warning times for evacuation.

Figure HS-7 illustrates areas in the county that would be affected by inundation in the event of a dam failure.

The Federal Energy Regulatory Commission, 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 present the potential for major flooding.

As mandated by the National Dam Inspection Act, the USACE has the authority and responsibility to conduct 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.

To reduce the likelihood of dam inundation, policies and programs in this section require an assessment of each dam's potential for earthquake-induced failure, evacuation times, inundation profiles (flood depth), and inclusion of project features that may reduce dam failure hazards.

Levee failures can be difficult to predict, since even inspected levees are prone to failure under certain conditions. Using the best available information, DWR has identified areas in the county where flood levels would be more than three feet deep if a project levee were to fail; these areas are called Levee Flood Protection Zones. These zones are shown in **Figure HS-1**. Most are in the eastern portion of the county within the Sacramento-San Joaquin Delta.

In addition to the identified Levee Flood Protection Zones, potential failure of levees as a result of liquefaction constitutes a flood hazard in much of the southern half of Solano County. Some enclosed areas lie several feet below sea level and are subsiding at a rate of up to three inches per year. Most of these diked areas are currently used for agriculture, and some lie so far below sea level that it would be economically infeasible to drain them if they were flooded because of levee failure.

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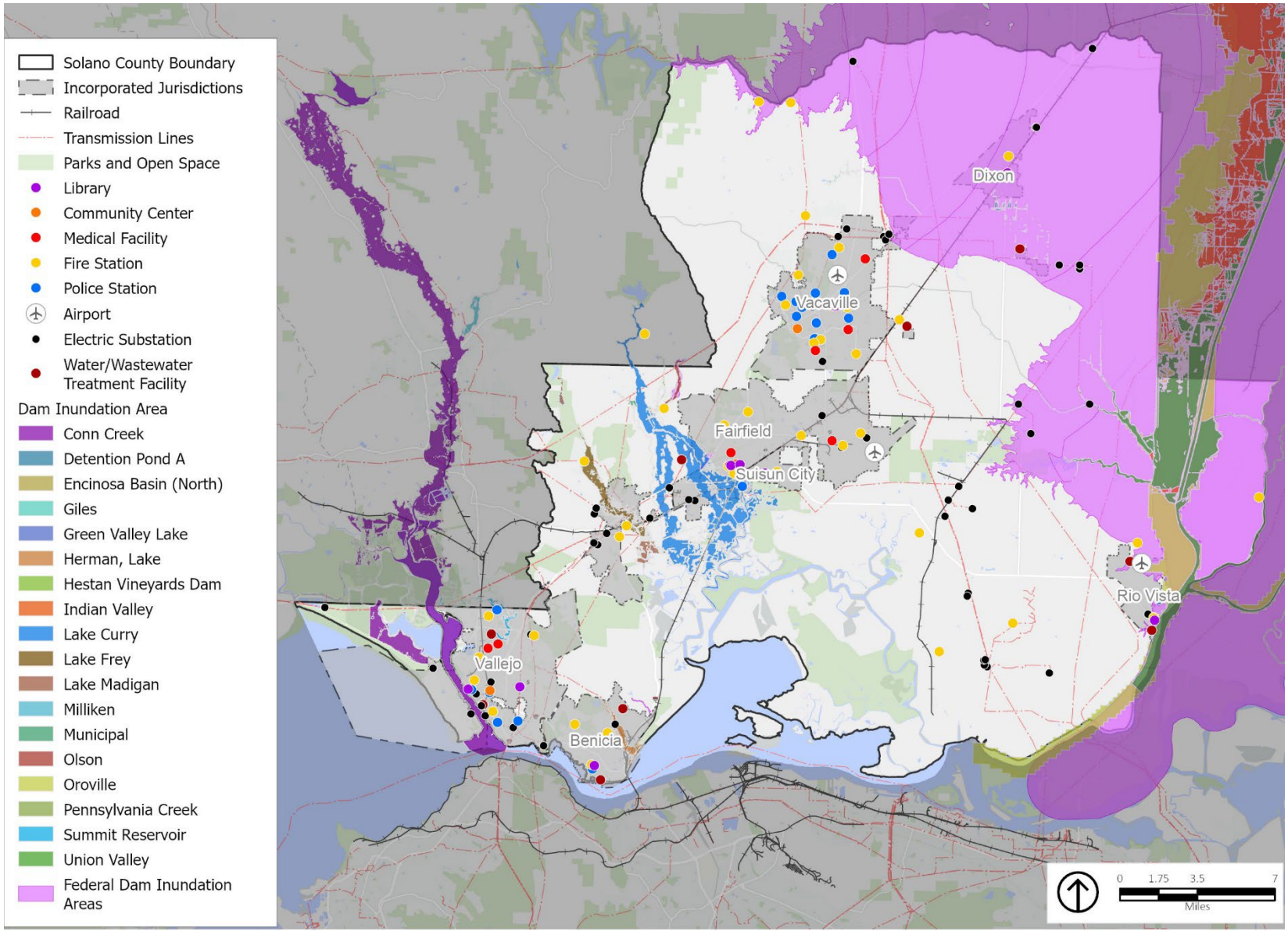
Figure HS-7: Dam Inundation



Source: DWR DSOD 2014, 2021; PlaceWorks 2022

Past Occurrences

Floods are a regular feature in California and cause the second-greatest number of disaster declarations in the state. In 2005, a series of severe winter storms in the Bay Area and Solano County were responsible for flooding, mudslides, and landslides that resulted in two deaths and approximately $100 million in damage to businesses and homes. More recently, other winter storms have caused widespread flooding throughout the area, including in early 2023.

Historical records from the San Francisco tidal gage show that the sea level in the San Francisco Bay rose eight inches from 1897 to 2006. Communities in Solano County report increased damage from king tide events, especially when paired with heavy rain.

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 Solano County. As land uses and climate conditions shift and as improvements are made to flood-control channels, the size of these flood zones is likely to change.

Regional earthquakes are likely to continue on an occasional basis and are likely to be small. Major earthquakes are rare but possible and could generate tsunamis. More likely is a tsunami triggered by a distant earthquake, which could still be large enough to cause damage in Solano County.

Sea levels have risen in the Bay and are expected to continue to rise at an accelerated rate over this century. Sea level rise will occur slowly and increase the impacts of other coastal hazards, such as shoreline erosion and tsunamis. A dam failure in Solano County is likely to remain a risk in future years, although the odds of such an event are expected to remain very low.

Climate Change and Flooding

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 Solano County, and climate change may expand the parts of the county that are considered prone to flooding, though there are no specific flooding projections for the county.

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Related Plans, Programs, and Agencies

Solano County Water Agency Flood Hazard Warning System

The Solano County Water Agency (SCWA) Flood Hazard Warning System was created in 2006 to provide up-to-date information to the community and public agencies on potential flooding in Solano County.

Solano County One Water Framework

Solano County is currently engaging stakeholders in developing a One Water Framework for water resource management for Integrated Water Resource Management. One Water is a holistic approach to water management which emphasizes that all water has value, and that water managers should maximize the benefit of all water within an integrated water system. The One Water approach promotes cooperation and partnerships across multiple agencies and water-management sectors advocating integrated solutions across systems. This includes water supply, wastewater, storm and flood protection, water quality improvements, and ecosystem enhancements. The Solano County One Water Framework is being developed to proactively plan for the County's changing landscape. The Framework will establish a One Water process toward regional solutions and multi-benefit projects, such as integrating drainage systems to recharge groundwater supplies and enhance local ecosystems. It will also provide the foundation and basis for development of a future Solano County Water Utilities Master Plan (One Water Master Plan) to support the implementation of the County's General Plan.

Federal Emergency Management Agency

FEMA's mission is to reduce the loss of life and property from natural and human-made disasters through a comprehensive, risk-based emergency management system. One of its responsibilities is to maintain flood zone maps.

California Department of Water Resources

DWR is responsible for managing and protecting California's water and works with other agencies to benefit the state's people and to protect, restore, and enhance the natural and human environments. DWR implements the California Water Code, including the Cobey-Alquist Flood Plain Management Act. DWR regulates activities in California's floodways, encourages preventative flood-control maintenance, and operates some flood-control projects.

United States Army Corps of Engineers

The USACE identifies the need for and constructs major flood-control facilities. It also develops flood- and dam-inundation maps and reports.

Solano County Water Agency

SCWA is active in flood control and drainage planning. SCWA is responsible for the management of embankments, shoreline protection structures, berms, and five miles of levees along San Pablo Bay, Carquinez Strait, and Suisun Bay. SCWA is also responsible for the operation and maintenance of two flood-control projects—the Ulatis Flood Control Project and the Green Valley Flood Control Project. FEMA and the Federal Insurance Administration delineate flood-prone areas on Flood Insurance Rate Maps and manage the National Flood Insurance Program to ensure homeowners with federally subsidized mortgages living in floodplains have flood insurance.

Assembly Bill 162 (2007)

This bill, in contrast to the regulations provided by the Cobey-Alquist Flood Plain Management Act, focuses on providing flood protection for California communities through requirements implemented by local general plans. It calls for flood-related provisions in the State-mandated land use, conservation, and safety elements of general plans. Solano County addresses these requirements in this Public Health and Safety chapter.

County of Solano Sea Level Rise Strategic Program

The County of Solano developed a Sea Level Rise Strategic Program (SLRSP) to address climate change and associated sea level rise at the local level. The SLRSP provides the County with a framework to successfully adapt to sea level rise and its anticipated effects. This document provides an overview of sea level rise and its potential effects on Solano County.

Central Valley Flood Protection Board and Plan

The Central Valley Flood Protection Board is the State regulatory agency charged with reducing the risk of catastrophic flooding to people and property in the Central Valley, which is the most flood-prone area of the state. The Central Valley Flood Protection Board developed and adopted the Central Valley Flood Protection Plan (CVFPP) in 2012 and continues to oversee the plan's implementation. The CVFPP provides conceptual guidance to reduce the risk of flooding for approximately 1.3 million people in California and $223 billion in infrastructure, homes, and businesses, with a goal of providing 200-year flood protection to urban areas and reducing flood risks to small communities and rural agricultural lands.

In 2022, the Flood Protection Board amended the CVFPP. The 2022 update evaluates progress made since passage of major State bonds in 2007 and recommends future management actions led by State, federal, and local partners to continue implementation of the CVFPP, building on the work of the previous 15 years. The 2022 CVFPP Update focuses on climate resilience, performance tracking, and alignment with other state efforts to recommend priority actions to address flood risk in the face of climate change. A robust, multi-year communications and engagement process that involved frequent discussions with State, federal, Tribal, and local partners informed the 2022 CVFPP Update.

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Flood and Inundation Hazards Goals, Policies, and Implementation Programs

Goal HS.G-1: Minimize risk to property and protect lives from flood hazards.

Policies

Policy HS.P-1: Prevent or correct current upstream land use practices that contribute to increased rates of surface water runoff.

Policy HS.P-2: Restore and maintain the natural functions of riparian corridors and water channels throughout the unincorporated county to reduce flooding, convey stormwater flows, and improve water quality.

Policy HS.P-3: Promote and consider multi-benefit flood control projects that take a holistic approach to water management

Policy HS.P-4: Advocate for watershed-scale planning by promoting cooperation and partnerships across multiple agencies on planning and integrating solutions across multiple water systems including water supply, wastewater, storm and flood protection, water quality improvements, and ecosystem enhancements

Policy HS.P-5: Advocate integrating drainage and flood control systems to recharge groundwater supplies and/or enhancement of ecosystems including the use of green infrastructure.

Policy HS.P-6: Require new developments to incorporate design and construction of on-site stormwater detention caused by a 100-year storm event and contribute to regional solutions to improve flood control, drainage, and water recharge.

Policy HS.P-7: Appropriately elevate and flood-proof development within the 100- and 200-year floodplain, and 2050 and 2100 sea level rise projections.

Policy HS.P-8: Work with federal, State, and local agencies to improve flood control and drainage throughout the county.

Policy HS.P-9: Require new development proposals in dam, canal, or levee inundation areas to consider risk from failure of these facilities and to include mitigation efforts that reduce inundation risks to a reasonable level.

Policy HS.P-10: Work with responsible parties to ensure dams, levees, and canals throughout the county are properly maintained and/or improved.

Policy HS.P-11: Resolve and identify responsible parties, their jurisdictions, and authorities over the various flood prone areas & flood protection assets.

Policy HS.P-12: Preserve open space and agricultural areas that are subject to annual flooding and are not designated for future urban growth.

Policy HS.P-13: Prohibit new permanent structures in a designated floodway where such structures could increase risks to human life or restrict the carrying capacity of the floodway.

Policy HS.P-14: Ensure that flood management policies that minimize loss of life and property also balance with environmental health and ecological considerations of the floodplain and do not cause further erosion, sedimentation, or water quality problems in the floodplain area.

Policy HS.P-15: Ensure flood protection assets have resources for long-term funding and management.

Policy HS.P-16: Increase public awareness about flooding and flood risks, and approaches to avoid and minimize flood risks on private property, using a variety of communication tools, including social media and the County website.

Policy HS.P-17: Coordinate with the San Francisco Bay Conservation and Development Commission, neighboring cities, and other relevant State or federal agencies to monitor and respond to changes in sea level.

Policy HS.P-18: Coordinate with external agencies and pursue funding to inform the public about risks pertaining to sea level rise and flooding through interactive maps, community outreach efforts, and other efforts.

Policy HS.P-19: Engage in regional collaboration with jurisdictions affected by sea level rise to seek funding, design, and implement sea level rise resiliency projects.

Implementation Programs

Funding, Physical Improvements, and Capital Projects

HS.I-1: Find funding for and establish the appropriate procedures to properly maintain dams, canals, and levees owned and operated by the County. For facilities in unincorporated Solano County that are owned by other agencies, the County will support dam, canal, and levee owners and operators to identify and obtain funding.

Related Policies: HS.P-10, TC.P-23

Agency/Department: Solano County Office of Emergency Services

Funding Source: State and federal agencies

Time Frame: Ongoing

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Development Review

HS.I-2: During discretionary project review, require the use of stormwater management techniques in developed upstream watershed areas that protect low-lying areas from flooding. As feasible, consider an integrated and multi-benefit approach to stormwater management techniques incorporating opportunities to increase water supply, improve environment, and enhance ecosystems. Incorporate appropriate measures into the proposed project design to mitigate flooding and prevent erosion.

Related Policies: HS.P-1, HS.P-2, HS.P-3, HS.P-5, HS.P-11

Agency/Department: Department of Resource Management; Planning Services

Funding Source: Private

Time Frame: Ongoing

HS.I-3: Work with the Solano County Water Agency (or successor agency) to review existing developments contributing to increased runoff and to reduce runoff wherever possible.

Related Policies: HS.P-1, HS.P-8

Agency/Department: Department of Resource Management; Building and Safety Services

Funding Source: General Fund, Development fees

Time Frame: Ongoing

HS.I-4: Through the discretionary review process, ensure new developments incorporate landscaping design practices and plants that will reduce demand on water, retain runoff, decrease flooding, and recharge groundwater. As feasible, consider a holistic and multi-benefit approach to new development incorporating opportunities to decrease flooding, increase water supply, improve environment, and enhance ecosystems in an integrated manner.

Related Policies: HS.P-1, HS.P-3, HS.P-5, HS.P-14

Agency/Department: Department of Resource Management; Planning Services

Funding Source: General Fund, development fees

Time Frame: Ongoing

HS.I-5: For significant development projects proposed within dam, canal, or levee inundation areas, require the applicant to prepare a report

describing the results of an inspection of the dam, canal, or levee by a State-registered civil engineer, including the reliability of the facility during a 100-year flood, potential for failure during seismic shaking, likely inundation area, and predicted evacuation times. The report should also include any necessary dam, levee, or canal improvements to protect life and property in the proposed development.

Related Policy: HS.P-9

Agency/Department: Department of Resource Management; Building and Safety Services

Funding Source: Development fees

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach, and Education

HS.I-6: Work with the Solano County Water Agency to create a countywide comprehensive flood management plan. The creation of a countywide comprehensive flood management plan should be part of a larger integrated effort in regional water management planning (i.e., One Water Master Planning) incorporating drought resilience, water supply and wastewater planning, and exploring synergies and nexus between drought and flood.

Related Policies: HS.P-8, HS.P-10, PF.P-35

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-7: Continue to use the Solano County Water Agency Flood Hazard Warning System, which provides information regarding potential flooding risks.

Related Policy: HS.P-15

Agency/Department: Solano County Water Agency

Funding Source: General Fund

Time Frame: Ongoing

HS.I-8: Work with the Solano County Water Agency (or successor agency) using an integrated approach to flood management in preparing a hydrological analysis of uplands, identifying the different watersheds that drain into the county, establishing flood-related objectives and priorities

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on a study area basis, and translating those into a coordinated series of flood-preventive measures for each watershed.

Related Policies: HS.P-1, HS.P-9, HS.P-14

Agency/Department: Department of Resource Management; Planning Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-9: Periodically review the 100- and 500-year floodplain maps shown in **Figure HS-1,** as well as the 100-, 200-, and 500-year floodplain maps shown in **Figure HS-2**, , to ensure that changes are noted and corresponding portions of this General Plan are revised.

Related Policies: HS.P-7, HS.P-8, HS.P-9

Agency/Department: Department of Resource Management; Planning Services, Public Works

Funding Source: General Fund

Time Frame: Annual

Coordination with Other Agencies and Organizations

HS.I-10: Investigate and pursue the creation of one regional or countywide water coordination group to provide guidance, coordination, and planning in all areas of water management including flood/drainage, drought resiliency, water supply (i.e., surface water and groundwater), sea level rise, and waste/recycled water.

Related Policies: HS.P-8, HS.P-9, HS.P-11, PF.P-36

Agency/Department: Department of Resource Management; Solano County Water Agency

Funding Source: General Fund

Time Frame: Ongoing

SEISMIC AND GEOLOGIC HAZARDS

This section describes various actions to prevent property damage and loss of life caused by earthquakes, landslides, and other geologic hazards. The County's strategy focuses on directing development away from known geologic hazards and ensuring high-quality construction in areas at risk. The more hazardous areas of the county do provide opportunity for low-intensity uses such as agriculture and recreation, concentrating development in areas with lower risk.

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.

Planning Context

Seismic Hazards

Seismic activity occurs along boundaries in the Earth's crust, called faults. Pressure along the faults builds 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.

The earthquake risk is very high in Solano County due to the presence of several active faults in the region, which are faults that have slipped and caused seismic activity in the last 10,000 years. Seismic shaking is by far the single greatest cause of earthquake damage. There is also a risk of surface displacement, which occurs when the surface of the ground moves apart during an earthquake. This could cause serious structural damage to any overlying building, transportation facility, main utility line, and/or aqueduct.

Figure HS-8 shows the locations of regional faults. The major faults in Solano County include the Green Valley fault system, running north-south through the county; the Great Valley 06 (Midland) fault zone, which extends north-south through most of the western side of the county; the Pittsburg–Kirby Hills and Gordon Valley sections of the Great Valley Fault; the Great Valley 05 Pittsburg–Kirby Hills; and the Franklin fault, which extends through the westernmost tip of the county. Other faults in and outside Solano County, such as the San Andreas and Hayward Faults, may also be capable of generating significant earthquakes with damaging effects in the county.

A major earthquake along any of these five 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.

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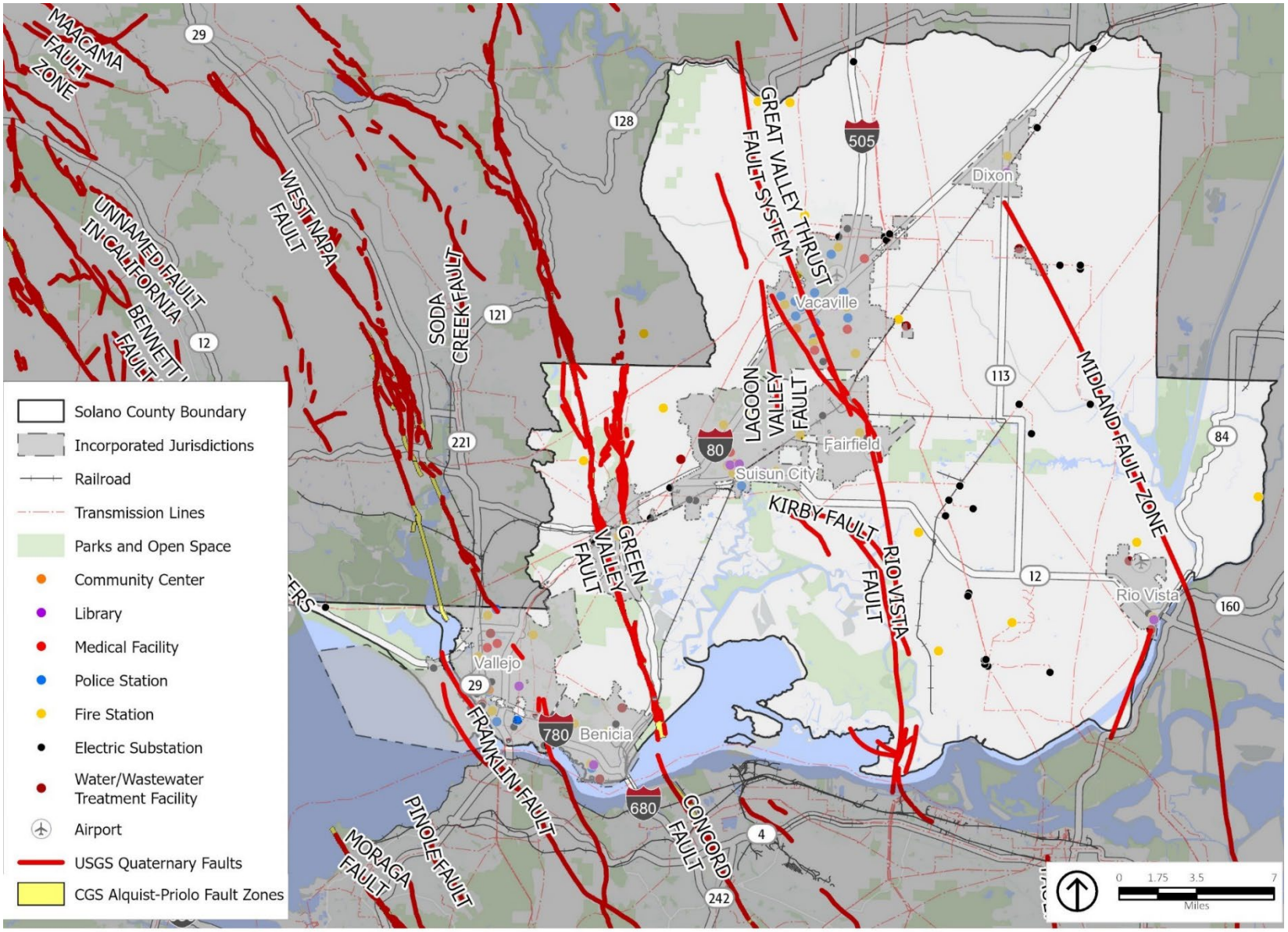
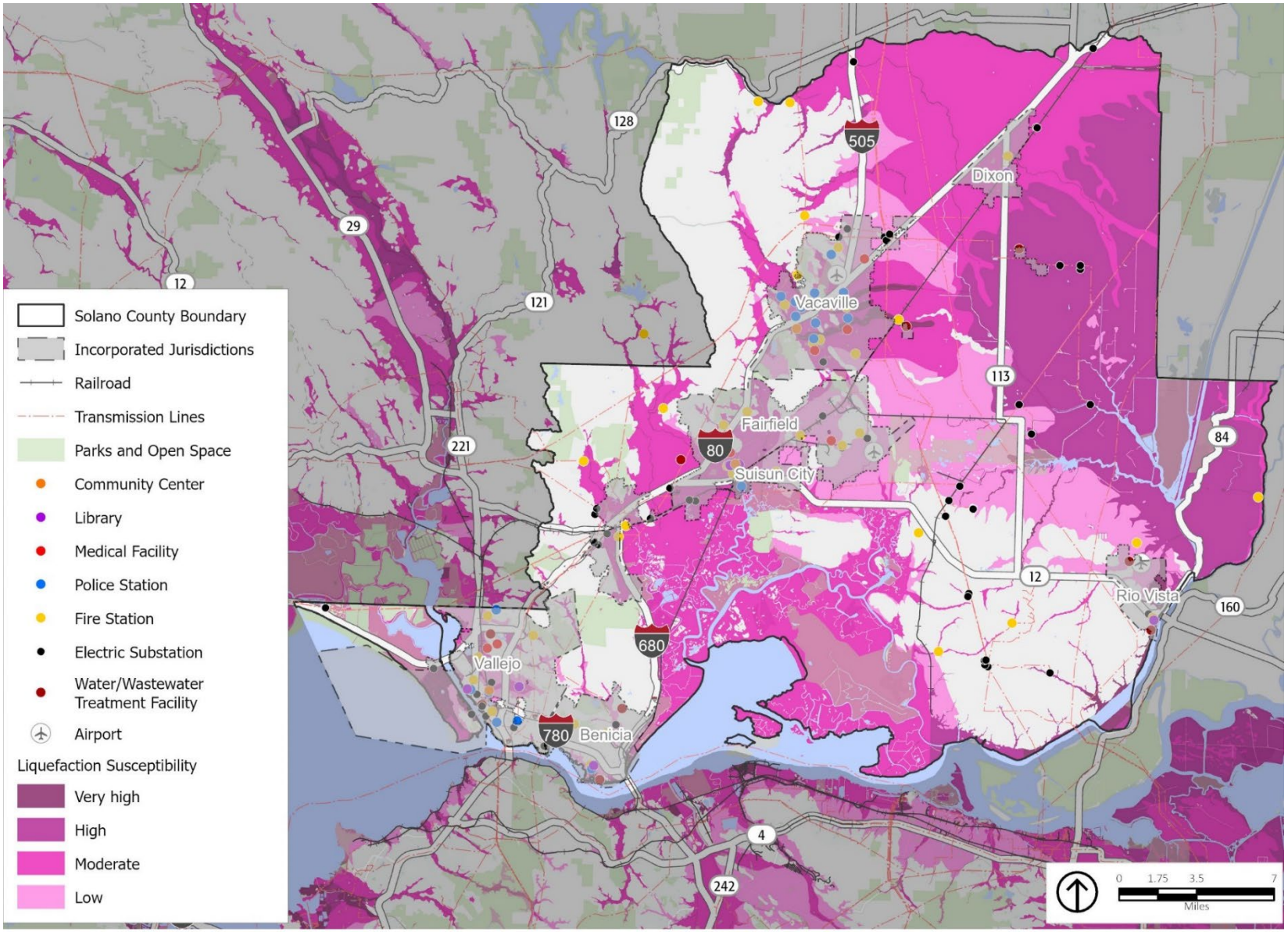
In addition to the direct physical damage that can result from the motion of the earthquake, damage can result from liquefaction. Liquefaction occurs where water-logged soils near the ground surface lose compaction during strong ground motion, causing the soils to lose strength and behave as liquid. This can cause building foundations to shift and can result in significant structural damage. Liquefaction is most often triggered by seismic shaking, but it can also be caused by improper grading, landslides, or other factors. Areas with high liquefaction potential are shown in **Figure HS-9**.

Figure HS-8: Regional Fault Lines



Source: USGS 2018, CGS 2017, PlaceWorks 2022, ESRI

Figure HS-9: Liquefaction Hazard Zones



Source: USGS 2006, PlaceWorks 2022, ESRI

A secondary hazard of earthquakes are tsunamis, which have the potential to affect the shoreline areas of Solano County. Tsunamis are typically caused by earthquakes in subduction zones—that is, areas where ocean plates are forced down into the mantle by plate tectonic forces.

Tsunamis can result in severe property damages and loss of life to affected areas near the coast. They can also disrupt emergency services and transportation routes. Also, tsunami waves can diffract around land masses, and because they are not symmetrical, the wave may be much stronger in one direction than another, depending on the source and the surrounding geography. Earthquakes with magnitudes below 6.5 are very unlikely to trigger a tsunami. Earthquakes of magnitudes between 6.5 and 7.5 do not usually produce destructive tsunamis.

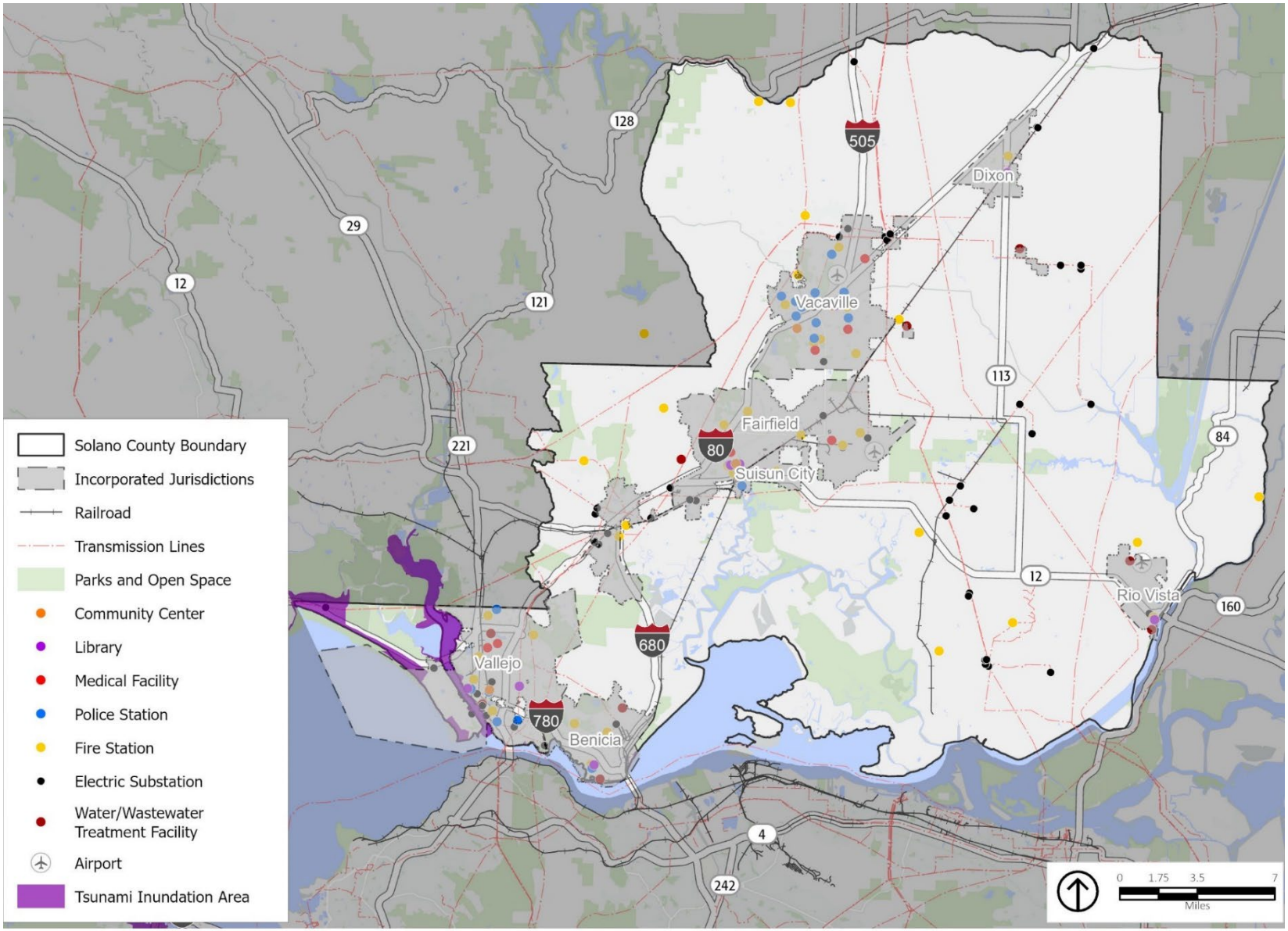
Figure HS-10 illustrates the area that may be subject to inundation from tsunamis in Solano County. The only unincorporated areas of the county that would be subject to inundation by tsunamis is along Island No. 1 southwest of State Route (SR) 37.

Geologic Hazards

Geologic hazards in Solano County include landslides and erosion. 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, and others occur very suddenly, often with disastrous results. 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.

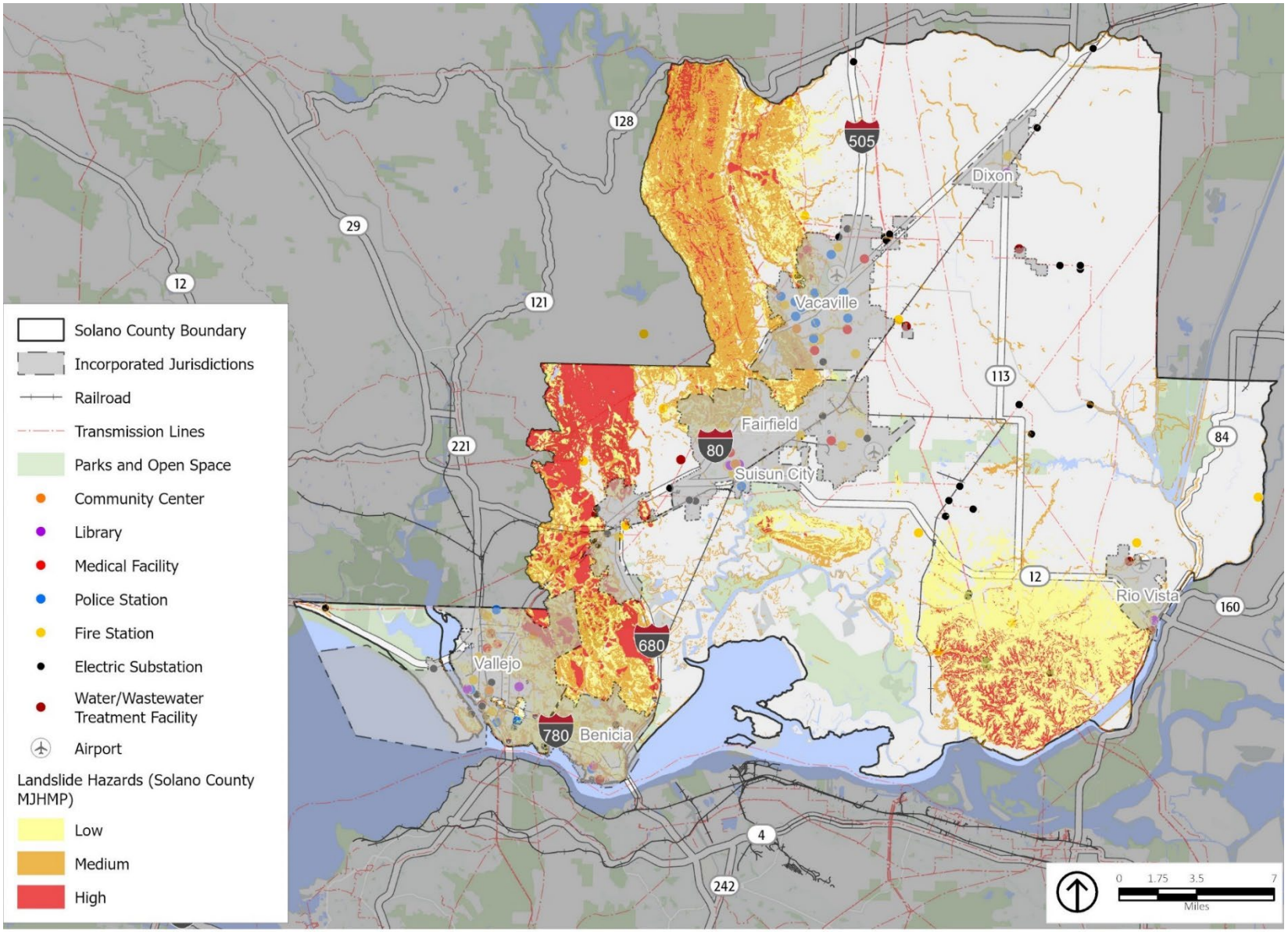
In Solano County, landslides typically occur during and after severe storms that saturate steep, vulnerable soils. While a majority of the county is within a low to medium landslide susceptibility class, several areas throughout the county are in high landslide susceptibility areas. **Figure HS-11** illustrates areas in Solano County that are susceptible to landslides.

Figure HS-10: Tsunami Inundation Area



Source: CGS 2009, PlaceWorks 2022, ESRI

Figure HS-11: Landslide Susceptibility



Source: Solano County 2021, PlaceWorks 2022, ESRI

Subsidence refers to the sudden sinking or gradual downward settling and compaction of soil and other surface material with little or no horizontal motion. Subsidence occurs when large amounts of groundwater have been excessively withdrawn from an aquifer. In Solano County, areas susceptible to subsidence are in the northeastern region, in an agricultural area that encompasses Interstate (I-) 80 and the South Fork Putah Creek, as well as the southeastern region, in an area that encompasses Rio Vista, agricultural lands, and SR-12 and SR-84. In the northeastern region, these lands are susceptible to subsidence due to groundwater pumping, whereas the southeastern region is susceptible to subsidence due to peat loss. Areas identified as susceptible to subsidence are identified on **Figure HS-12**.

Solano County is susceptible to hazards related to erosion—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. The impact of soil erosion on water quality can be significant, and highly erosive soils can damage roads, bridges, buildings, and other structures.

Shrink-swell soils contain large amounts of clay that swell when wet and shrink when dry. These clays will swell despite the heavy loads of large structures. Repetition of this shrink-swell cycle can cause building damage, including cracked foundations. **Figure HS-13** shows that a majority of the county is underlain by soils with a high shrink-swell potential.

Past Occurrences

Solano County is in a region of high seismicity with numerous local faults. Several significant (more than magnitude 4.5) earthquakes have occurred in and near Solano County over the last 16 years. The South Napa earthquake, which occurred along the West Napa Fault on August 24, 2014, was the most recent major earthquake near Solano County. Its epicenter was between Napa and American Canyon, and with a recorded magnitude (M_w) of 6.0, it was one of the largest in the Bay Area in about 25 years. The South Napa earthquake caused extensive damage through both ground shaking and surface cracking in the affected region, resulting in one death and approximately 200 injuries.

Earthquake Magnitude Scale

Magnitude 2.5 or less: Usually not felt but can be recorded by seismograph.

Magnitude 2.5 to 5.4: Often felt, but only causes minor damage.

Magnitude 5.5 to 6.0: Slight damage to buildings and other structures.

Magnitude 6.1 to 6.9: May cause a lot of damage in very populated areas.

Magnitude 7.0 to 7.9: Major earthquake causing serious damage.

Magnitude 8.0 or greater: Great earthquake that can destroy communities near the epicenter.

Source: Michigan Technological University, Earthquake Magnitude Scale, 2022, https://www.mtu.edu/geo/community/seismology/learn/earthquake-measure/magnitude/.

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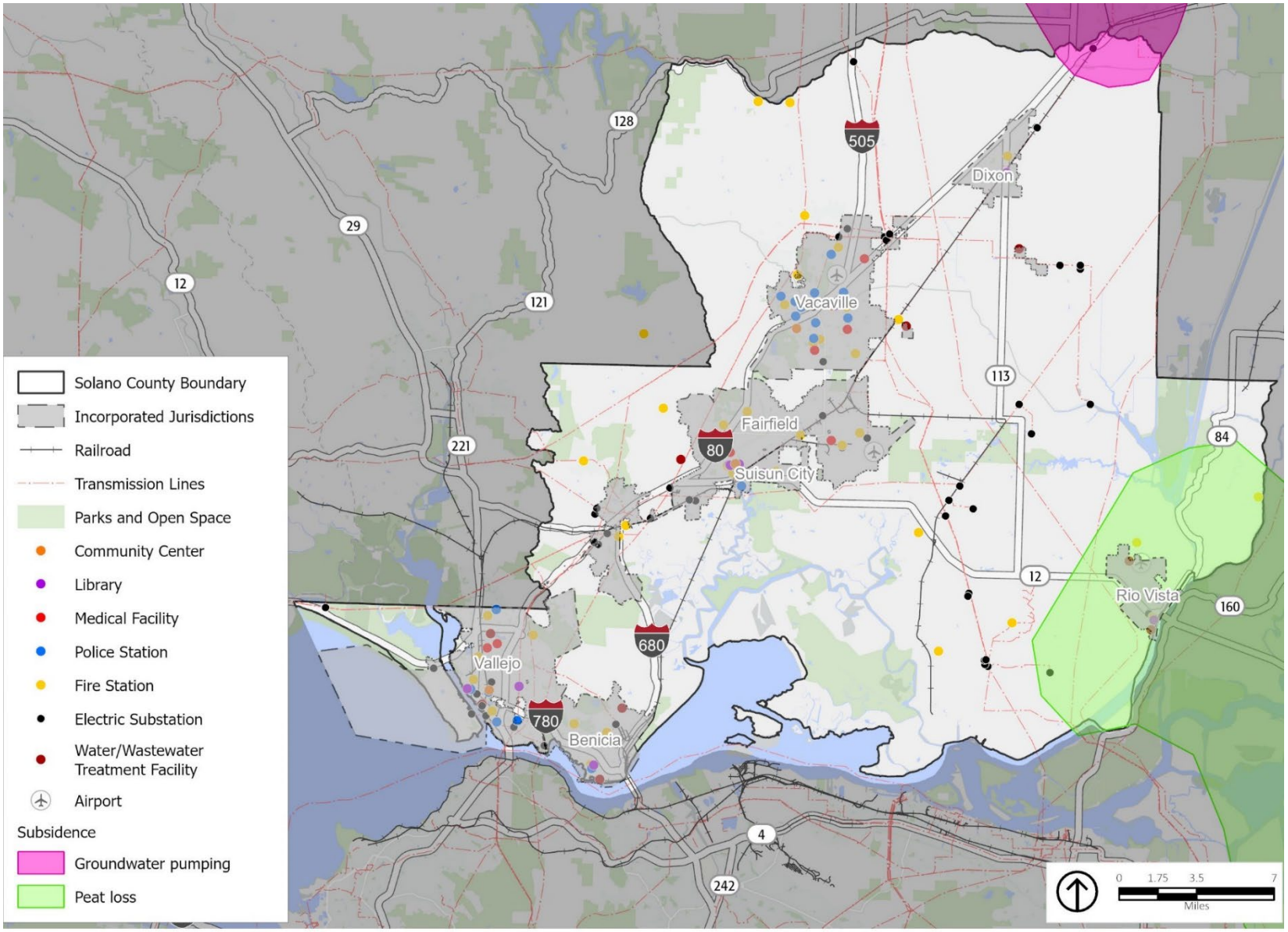
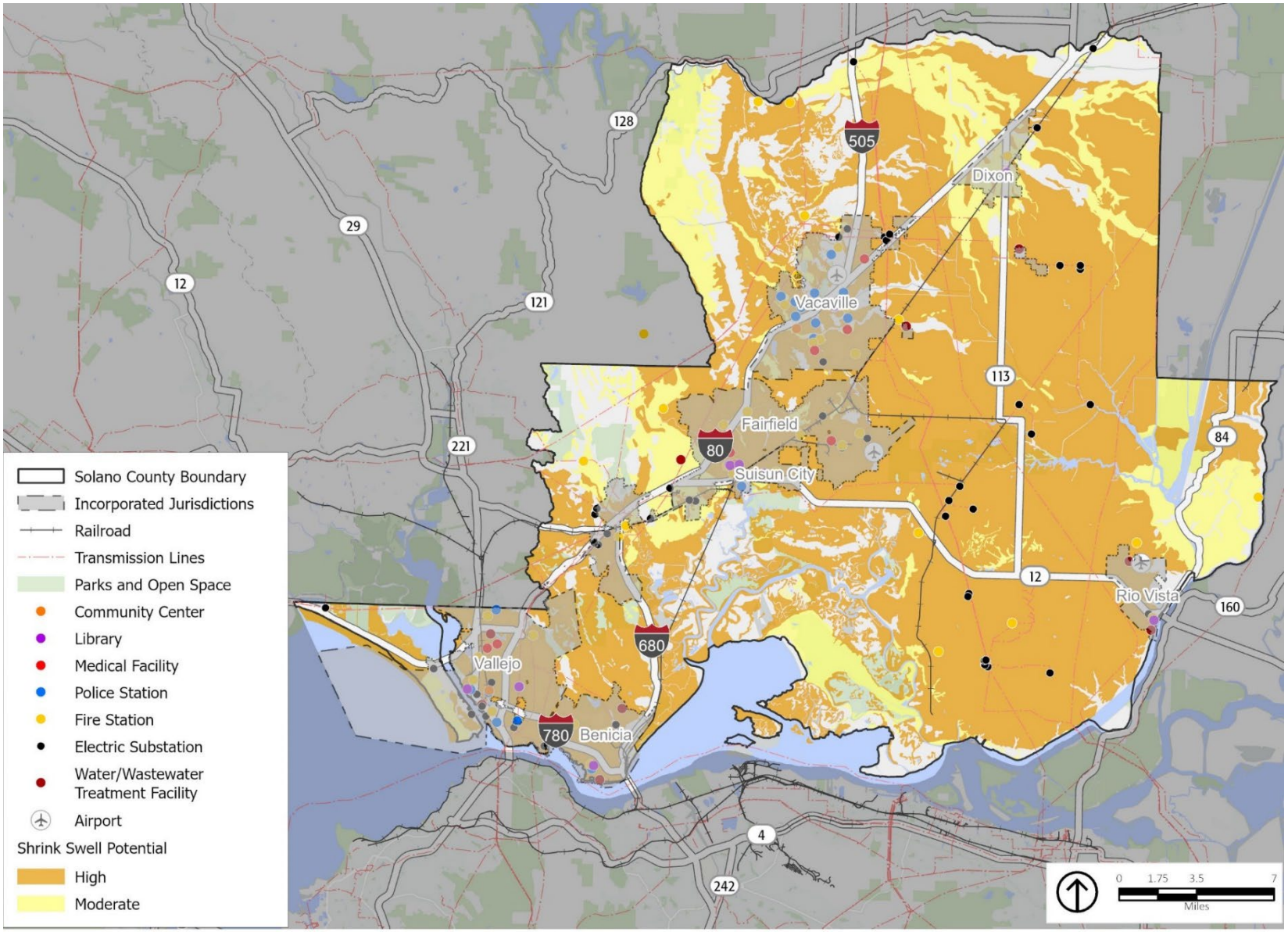
Figure HS-12: Subsidence Zones



Source: USGS 2022, PlaceWorks 2022, ESRI

Figure HS-13: Shrink-Swell Potential



Source: CASIL 1993/1996, SSURGO 2006, Solano County 2022, PlaceWorks 2022, ESRI

The 1989 Loma Prieta earthquake was a M_w 6.9 earthquake that occurred on the San Andreas fault near Mt. Loma Prieta in the Santa Cruz Mountains, roughly 70 miles south of Solano County and 10 miles northeast of Santa Cruz. Statewide, 63 people were killed, 3,757 were reported injured, and 12,053 were displaced; 18,306 houses were damaged and 963 were destroyed; and 2,575 businesses were damaged and 147 were destroyed. An earthquake equivalent of this strength in the Bay Area would produce strong shaking and ground failure throughout the region and likely cause significant damage in the area. Major earthquakes are rare in Solano County but minor earthquakes occur often. Small landslides are a common occurrence on hillsides throughout the county, generally in winter during high precipitation years.

There have been no federally declared landslide events in Solano County. Between 1968 to 2007, 51 recorded historical damaging landslide events occurred in Solano County.

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 and are likely to be small in most instances. 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 local faults could result in substantial casualties and damage, although the greatest risk in Solano County is from the Hayward-Rodger's Creek and the Concord-Green Valley Faults due to their location and high potential to cause a severe earthquake.

Based on historical data and the location of Solano County relative to active and potentially active faults, the county will likely experience a significantly damaging earthquake in the future, although such events are not expected to become more frequent.

Geologic Risk

Geologic risks, such as small landslides, are common occurrences in Solano County. With significant rainfall, additional slope 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

Though 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). The combination of a 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.

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Related Plans, Programs, and Agencies

California Building Standards Code

The State of California provides minimum standards for building design and construction through the California Building Standards Code, based on the International Building Code, which is used widely throughout the United States and has been modified for California conditions with numerous more-detailed and/or more-stringent requirements. The California Building Standards Commission is responsible for coordinating, managing, adopting, and approving building codes in the State of California. The California Building Standards Code was first established in 1953 and is updated regularly.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act requires the State Geologist to identify earthquake fault zones along traces of both recently active and potentially active major faults. Cities and counties that contain such zones must inform the public regarding the location of these zones, which are usually one-quarter mile or less in width. The main purpose of the act is to prevent the construction of buildings on the surface fault rupture.

Seismic Hazards Mapping Act

Pursuant to the Seismic Hazards Mapping Act, the State Geologist compiles maps identifying seismic hazard zones. Development in seismic hazard areas is subject to policies and criteria established by the California Geological Survey. This act addresses earthquake hazards not related to surface ruptures, including liquefaction and seismically induced landslides, and states that cities and counties must require geotechnical reports defining and delineating any seismic hazard before approval of a project in a seismic hazard zone.

The law also requires that the State Geologist establish regulatory zones (known as earthquake fault zones) around the surface traces of active faults and issue appropriate maps showing those zones. The maps are distributed to all affected cities, counties, and State agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects subject to the act include all land divisions and most structures, except single-family wood-frame and steel-frame dwellings up to two stories that are not part of a development of four units or more. At their discretion, local agencies may be more restrictive than State law requirements.

Landslide Hazard Identification Program

The Landslide Hazard Identification Program requires the State Geologist to prepare maps of landslide hazards in urbanizing areas. According to Public Resources Code Section 2687(a), public agencies are encouraged to use these maps for land use planning and for decisions regarding building, grading, and development permits.

Seismic and Geologic Hazards Goals, Policies, and Implementation Programs

Goal HS.G-2: Avoid the loss of life and injury and minimize property damage from seismic and geologic hazards.

Policies

Policy HS.P-20: Require new development in moderate or high seismic hazard areas to consider risks caused by seismic activity and to include project features that minimize these risks.

Policy HS.P-21: Review and limit the location and intensity of development and placement of infrastructure in identified earthquake fault zones.

Policy HS.P-22: Identify and minimize potential hazards to life and property caused by fault displacement and its impact on facilities that attract large numbers of people, are open to the public, or provide essential community services and that are within identified earthquake fault zones.

Policy HS.P-23: Avoid and minimize risk of infrastructure systems failure and related impacts during seismic events through standards for the construction and placement of utilities, pipelines, or other public facilities on or crossing active fault zones.

Policy HS.P-24: Require minimum setbacks for construction along creeks between the creek bank and structure, except for farm structures that are not dwellings or places of work, based on the susceptibility of the bank to lurching caused by seismic shaking.

Policy HS.P-25: Restrict the crossing of ground failure areas by new public and private transmission facilities, including power and water distribution lines, sewer lines, and gas and oil transmission lines.

Policy HS.P-26: Ensure information about soils with a high shrink-swell potential is readily available via the County's website.

Policy HS.P-27: Require proper foundation designs in areas with soils that have a high shrink-swell potential.

Policy HS.P-28: Minimize development in areas with high landslide susceptibility.

Policy HS.P-29: Minimize exposure to seismic and geologic hazards through site planning and building design for all new development, including subdivisions, new construction, and remodels or expansions of existing structures as well as critical, high-occupancy, or essential services buildings.

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Policy HS.P-30: Identify County infrastructure with seismic vulnerabilities and pursue funding to conduct appropriate seismic retrofits.

Implementation Programs

Regulations

HS.I-11: Adopt and enforce the most current versions of the International Building Codes, as modified by the California Building Standards Commission.

Related Policy: HS.P-20

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Development Review

HS.I-12: Require geotechnical investigation and recommendations for proposed development in geologic hazard areas, including landslide susceptibility areas and subsidence zones, as illustrated in **Figures HS-11** and **HS-12.** A State-certified Engineering Geologist shall produce a report examining development issues that considers:

- Soil, slope, or other geologic hazard conditions found on site;
- Potential off-site development impacts, such as increased runoff and/or slope instability; and
- Requirements of any regulations concerning the hazard area.

Related Policies: HS.P-22, HS.P-23

Agency/Department: Department of Resource Management

Funding Source: Project Applicant

Time Frame: Ongoing

HS.I-13: Require proposed development to conduct a geotechnical evaluation and incorporated recommendations into project design when located in moderate or higher-hazard areas. Such geotechnical evaluation shall analyze the potential hazards from:

- Landslides
- Liquefaction
- Expansive soils

- Steep slopes
- Erosion
- Subsidence
- Alquist-Priolo Earthquake Fault Zones or other identified fault zones
- Tsunamis
- Seiches

Require new development to incorporate project features that avoid or minimize the identified hazards. Costs related to providing or confirming required geotechnical reports will be borne by the applicant.

Related Policies: HS.P-20, HS.P-28

Agency/Department: Department of Resource Management

Funding Source: Project Applicant

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach, and Education

HS.I-14: Require owners of all existing or proposed oil, gas, water, and sewer pipelines that cross active faults to file an operations plan describing the probable effects of pipeline failure at the fault and the various emergency facilities and procedures that exist to ensure that failure does not threaten public safety.

Related Policies: HS.P-11 HS.P-25

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-15: Provide current data to the public regarding geologic hazards. Coordinate with cities to gather and periodically assess new geologic data, including fault zone activity, landslide activity, and distribution of shrink-swell soils.

Related Policy: HS.P-21

Agency/Department: Department of Resource Management

Funding Source: General Fund

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Time Frame: Ongoing

HS.I-16: Develop a geologic constraints and hazards database to be maintained in the County's geographic information system (GIS) database. The GIS shall be used to identify areas containing hazards and constraints that could potentially affect the type or level of development allowed in these areas. Make these data available to the public. Information maintained as part of the database may include:

- Active faults
- Relative seismic shaking hazards
- Relative landslide susceptibility
- Relative earthquake-induced liquefaction susceptibility
- Steep-slope constraints
- Moderate and high-erosion hazards
- Soils with high clay content indicating shrink-swell potential
- Agricultural soils and/or bay mud subject to high water levels
- Extreme, very high, and high wildfire risk using the Wildland Fire Hazard Areas map provided by the California Department of Forestry and Fire Protection.

Related Policies: HS.P-20, HS.P-21, HS.P-22, HS.P-23, HS.P-24, HS.P-25, HS.P-26, HS.P-28, HS.P-29, HS.P-30, HS.P-31

Agency/Department: Department of Information Technology

Funding Source: General Fund

Time Frame: Ongoing

FIRE HAZARDS

Planning Context

This section describes a variety of actions that can prevent property damage and loss of life caused by wildfires. The County's wildfire planning and prevention strategy focuses on techniques that reduce wildfire potential, support firefighting in rural areas, and ensure use of fire-safe building methods by:

- Directing non-farm-related development to areas with low fire risk.
- Working with fire districts during development review and enforcing fire-safe site and building design standards.
- Promoting wildfire prevention measures such as grazing, disking, or plowing of agricultural lands.
- Requiring adequate on-site water supply for buildings lacking access to public water.

The combination of complex terrain, Mediterranean climate, productive natural plant communities, and ample natural ignition sources has created conditions for extensive wildfires in and around Solano County. Wildfire is a hazard of high concern for Solano County. Historically, the fire season extended from early summer through late fall of each year, during the hotter, dryer months, although increasingly, it 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. 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.

Wildfire potential for Solano County is typically greatest in the months of August, September, and October, when dry vegetation coexists with hot, dry winds, known as Diablo winds. 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. During these times, controlling a fire becomes far more difficult.

Wildfires occur in open space areas, including forests, chaparral, and grasslands. 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 Solano County keeps the grass dry and more readily combustible during fire season. Seasonal drought conditions exacerbate fire hazards. The areas with the highest risk for wildfire are in western Solano County, in the foothills and mountainous watershed areas, as well as in grasslands throughout the county. The rugged, rural terrain in the western hills of the county makes firefighting more difficult. Wildfire is particularly dangerous when it ignites in or moves into areas where flammable vegetation is mixed with development, an area known as the wildland-urban interface (WUI).

From 2005 to 2020, there were 15 wildfires in Solano County, some of which overlapped with neighboring counties, each burning over 100 acres in the region. Some burned considerably more acreage—most notably, the 2017 Atlas Fire and the 2020 LNU Lightning Complex.

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Increasing local and regional fire frequency can lead to elevated air pollution levels as a result of smoke, leading to respiratory health effects. 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, older adults, people with chronic respiratory or cardiovascular disease, or people experiencing low socioeconomic status.

Solano County is also at risk from structural fires. Structural fires are often due to faulty wiring or mechanical equipment and combustible construction materials. The absence of fire alarms and fire sprinkler systems exacerbates the damages associated with a structural fire. Structural fires are largely from human accidents, although deliberate fires (arson) may be a cause of some events. Older buildings that lack modern fire safety features may face greater risk of damage from fires.

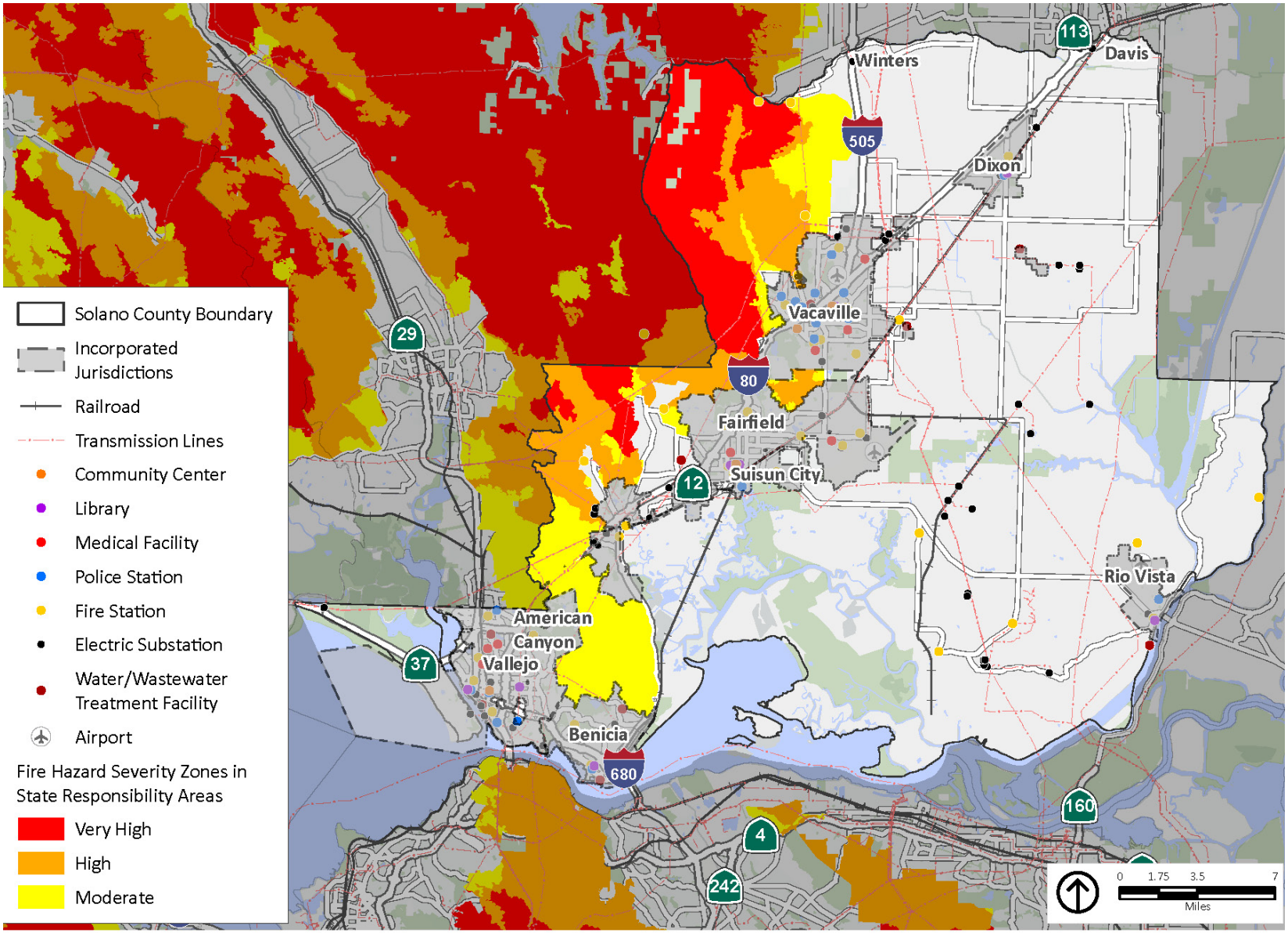
Fire Hazard Zones

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. Most unincorporated areas, such as Solano County, are considered state responsibility areas (SRAs) where CAL FIRE has responsibility for wildfire protection. CAL FIRE's Sonoma-Lake-Napa Unit is responsible for 93,820 acres of SRA lands in Solano County. All very high FHSZs in Solano County are in SRAs.

The areas currently at the highest risk for fires are in western Solano County in the foothills and mountainous watershed areas, and in grasslands throughout the county. Areas to the north of Benicia and to the west and north of Fairfield, primarily in the undeveloped hillsides, are in a moderate and high FHSZ. Additionally, areas along the Vaca Mountains, north of Fairfield and west of Vacaville, are in a moderate and high FHSZ; some of this land is in a very high FHSZ.

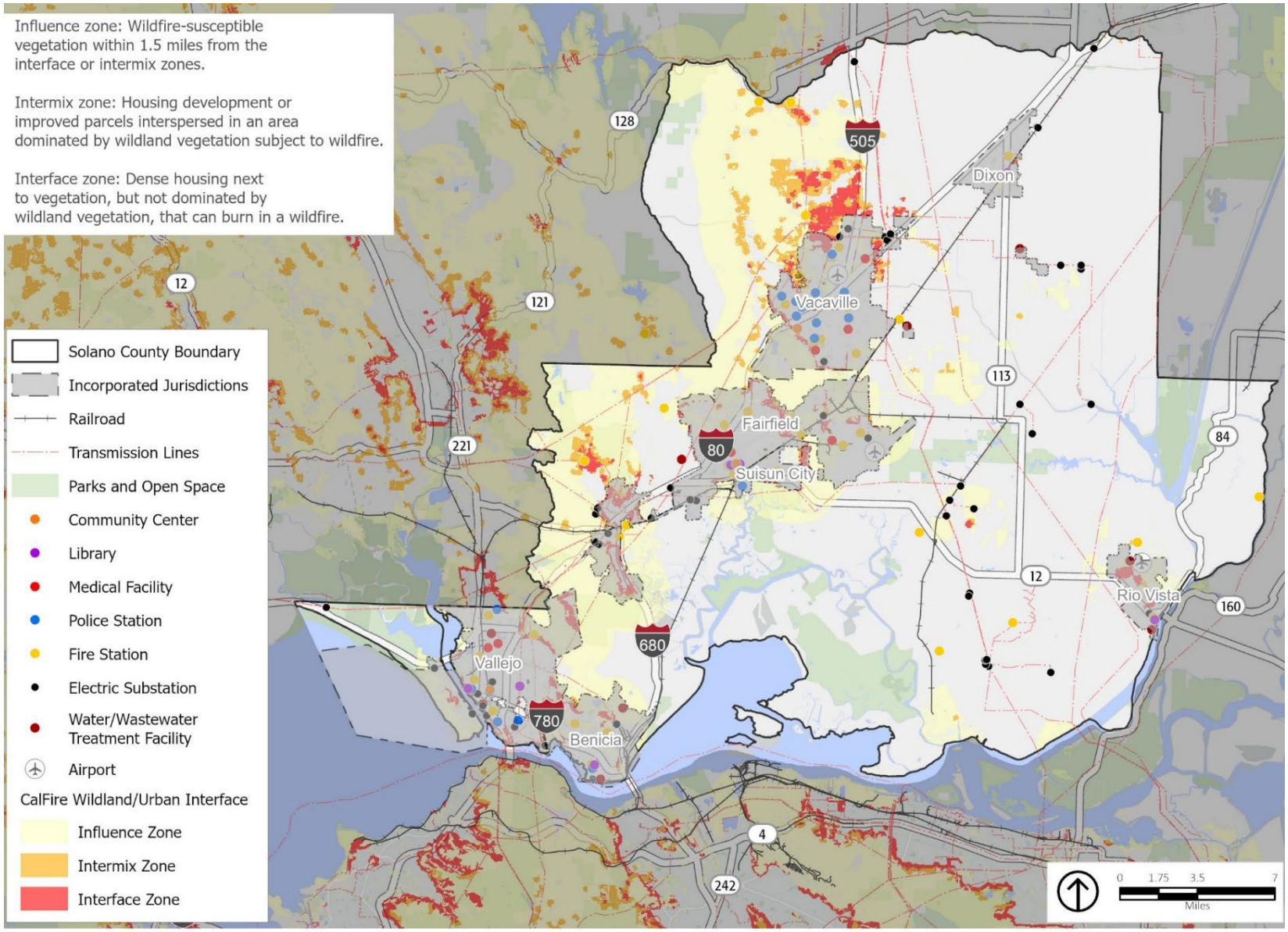
Figure HS-14 shows the wildfire hazard severity zones in and around Solano County, and **Figure HS-15** identifies the WUI. **Figure LU-1** in the Land Use Chapter of this General Plan identifies the land uses in Solano County, including those located in the SRAs and the very high FHSZs. The Land Use Chapter is available on the Planning Services section of the County's website.

Figure HS-14: Wildfire Hazard Severity Zones



Source: CalFire 2024, Solano County, PlaceWorks 2022, ESRI

Figure HS-15: Wildland-Urban Interface Zones



Source: CalFire 2015, PlaceWorks 2022, ESRI

Fire Protection

Fire protection in unincorporated Solano County is provided by six fire protection districts—East Vallejo Fire District, Cordelia Fire Protection District, Suisun Fire Protection District, Vacaville Fire Protection District, Dixon Fire Protection District, and Montezuma Fire Protection District. The service area for each of the districts is equal to its boundary area. Similarly, each of the cities provides services within its boundaries. However, all agencies participate in mutual and automatic aid agreements to provide services outside of their bounds.

Other service providers include CAL FIRE, Travis Air Force Base Fire Department, and the United States Forest Service (USFS). Travis Air Force Base Fire Department and the USFS do not overlap with the six districts mentioned previously. CAL FIRE services are focused in wildland areas defined as state responsibility areas (SRAs). Fire protection districts in Solano County contain SRAs where CAL FIRE is responsible for wildland fires. These fire protection districts include the Dixon Fire Protection District, Vacaville Fire Protection District, Suisun Fire Protection District, and Cordelia Fire Protection District. The jurisdictional boundaries for the fire protection districts are illustrated in **Figure HS-16**. CAL FIRE also provides technical support throughout the county in the form of specialized services such as fire suppression hand crews, dozers, and helicopters where necessary. No areas in unincorporated Solano County are currently lacking fire protection services.

Mutual-Aid Agreements

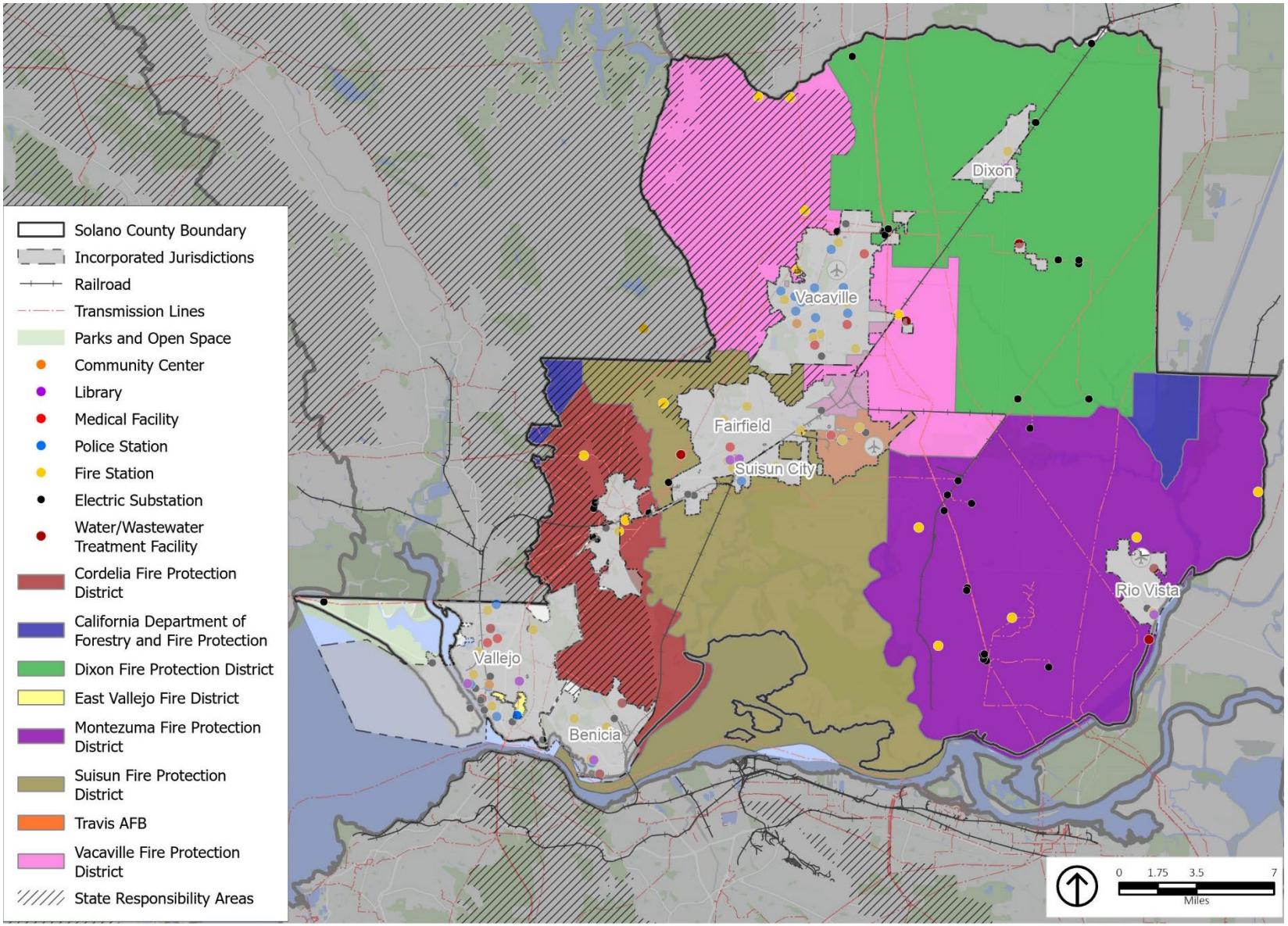
All fire protection districts and agencies are a signatory to the California Mutual-Aid Fire Protection System. This agreement was established to aid with major emergency incidents anywhere in the state. The fire protection districts maintain mutual-aid agreements with several agencies, including the City of Benicia, City of Dixon, City of Fairfield, City of Rio Vista, and City of Suisun City. When major incidents occur, fire protection districts deploy their resources and depend on mutual-aid agreements with neighboring jurisdictions.

All agencies, including CAL FIRE, the USFS, and Travis Air Force Base, participate in mutual and automatic aid agreements through which they can provide services outside of their boundaries. Mutual-aid agreements help ensure adequate response times in the outlying areas. The County also has a contract with the State Office of Emergency Services.

Past Occurrences

Four major factors that contribute to historical wildfire events include extreme vegetation diversity, diverse fire weather and fire behavior, dynamic fire history, and complex land use patterns. From 2005 to 2020, there were 15 wildfires in Solano County, some of which overlapped with neighboring counties, each burning over 100 acres in the region. Some burned considerably more acreage—most notably the 2017 Atlas Fire and the 2020 LNU Lightning Complex. According to CAL FIRE, the 2017 Atlas Fire was California's 14th most destructive fire in history as well as the state's 15th deadliest fire.

Figure HS-16: Fire Protection Districts



Source: DWR DSOD 2021, PlaceWorks 2022, ESRI

Atlas Fire
The Atlas Fire started on October 8, 2017; impacted Napa County and Solano County; and lasted approximately 123 days. The fire killed six people, damaged 783 structures, and destroyed 120 structures, including residential homes, commercial, and other structures. The fire burned approximately 51,625 acres.

LNU Lightning Complex and Hennessey Fire
The LNU Lightning Complex was a series of lightning-sparked fires that began in August and continued through October of 2020 in Northern California. The fires burned a total of 363,220 acres and were active for 47 days.

Potential Changes to Fire Risk in Future Years

Likelihood of Future Occurrence

The wildfire season in Solano County historically lasts from June through November. Generally, Solano County faces annual wildland fire threats. Wildfire will continue to be a high-risk hazard for personal safety and property damage in Solano County, and smoke impacts from local and regional wildfires are likely to continue to be problematic. The likelihood of structural fires in the county is low because these fires are usually associated with human accidents or mechanical issues in buildings that rarely happen.

Climate Change and Wildfire

Climate change is expected to increase the frequency and size of wildfires in California. Hotter, drier weather and prolonged drought will increase the accumulation of fire-prone vegetation, and stronger winds will continue to spread fires faster and farther than previously. Changing climate conditions are expected to increase the fire risk in and around Solano County. Warmer temperatures brought on by climate change are expected to begin earlier and end later in the year, exacerbating drought conditions and extending the wildfire season. Wildfires occurring later or earlier in the year are more likely to occur during Diablo wind events, which can cause wildfires to move more quickly and increase the likelihood of burning in the WUI areas.

Fire Hazards Goals, Policies, and Implementation Programs

Goal HS.G-3: Reduce the risk and threat from urban and wildland fire hazards.

Policies

Policy HS.P-31: Require that all structures or new development be built with defensible space.

Policy HS.P-32: Discourage the construction of public facilities in areas of high or very high wildfire risk.

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Policy HS.P-33: Minimize non-farm-related development and road construction for public use in high or very high fire hazard severity zones.

Policy HS.P-34: Require new developments in high or very high fire hazard severity zones to incorporate fire-safe building methods and site planning techniques into the development.

Policy HS.P-35: Work with fire districts, other agencies, and property owners to ensure consistency with related plans, including the Unit Fire Plan and the Solano County Emergency Operations Plan, and to coordinate efforts to prevent wildfires and grassfires through fire-protection measures, such as consolidation of efforts to abate fuel buildup, access to firefighting equipment, and provision of water service.

Policy HS.P-36: Conduct fire prevention and firefighting activities in a manner that preserves and enhances the County's valuable visual and natural resources.

Policy HS.P-37: Continue to encourage the consolidation of fire districts through the Local Agency Formation Commission (LAFCO) process.

Policy HS.P-38: Coordinate with fire protection districts, firesafe councils, community organizations, other relevant local agencies, and landowners to develop and maintain fuel breaks in dedicated open space and fire-access easements.

Policy HS.P-39: Require new development to provide adequate access for fire and emergency vehicles and equipment that meets or exceeds the standards. These standards are found in two parts of the California Fire Safe Regulations (California Code of Regulations, Title 14, Division 1.5, Chapter 7): Subchapter 2, Articles 1-5 (commencing with section 1270, SRA Fire Safe Regulations); and Subchapter 3, Article 3 (commencing with Section 1299.01, Fire Hazard Reduction Around Buildings and Structures Regulations).

Policy HS.P-40: Require new and existing development and infrastructure in high or very-high fire hazard severity zones to establish and maintain vegetation management practices to reduce the risk of wildfire ignition and spread. This shall include responsible site planning, vegetation management, the use of native drought-tolerant and fire-resistant species, and defensible space consistent with State, local, and fire protection district regulations.

Policy HS.P-41: Ensure public and private roadways in fire hazard severity zones are in compliance with current fire safety regulations.

Policy HS.P-42: Develop programs and provide updates, as appropriate, that ensure recovery and redevelopment after a large fire reduce future vulnerabilities to fire hazard risks through site preparation, redevelopment layout design, fire-resistant landscape planning, and fire-retarding building design and materials.

Policy HS.P-43: Require review by the Building Services Division, Planning Services Division and fire protection districts prior to the issuance of development permits for significant development projects conceptual landscaping plans in Very High Fire Hazard Severity Zones identified by CAL FIRE (see **Figure HS-14, *Wildfire Hazard Severity Zones***). Plans for proposed development in such areas shall include, at a minimum:

- Site plan to reduce the risk of fire hazards and with consideration to site conditions, including slope, structures, and adjacencies.
- Development and maintenance of defensible space.
- Points of ingress and egress that facilitate improved evacuation and emergency response, and provide fire equipment access and adequate water infrastructure for water supply and fire flow that meets or exceeds the standards in the California Fire Safe Regulations. This specifically includes two sections of Title 14 of the California Code of Regulations (CCR), Division 1.5, Chapter 7: Subchapter 2, Articles 1-5 (commencing with Section 1270, SRA Fire Safe Regulations); and Subchapter 3, Article 3 (commencing with Section 1299.01, Fire Hazard Reduction Around Buildings and Structures Regulations).
- Class A roof materials for new and replacement roofs.
- Location and source of anticipated water supply.
- A Fire Protection Plan that includes a fire risk analysis, current fire response capabilities, fire safety requirements (defensible space, infrastructure, and building ignition resistance), mitigation measures and design considerations for non-conforming fuel modification, wildfire education and limitations, wildfire prevention maintenance, and evacuation planning.

Policy HS.P-44: Develop and implement an evacuation assistance program, in coordination with Solano Transportation Authority, paratransit, and dial-a-ride agencies, to help those with limited mobility, lack of access to a vehicle, and other at-risk populations evacuate safely.

Policy HS.P-45: Coordinate with emergency responders and Caltrans to maintain potential evacuation routes to ensure adequate capacity, safety, and

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viability of those routes in the event of an emergency, including making improvements to existing roads to support safe evacuations, as needed.

Policy HS.P-46: Make available and share relevant educational and outreach materials with the public to help residents understand appropriate fire mitigation activities, such as vegetation management, defensible space, evacuation routes, and emergency evacuation procedures during a fire hazard.

Policy HS.P-47: Coordinate with the Solano County Water Agency to maintain an adequate, long-term water supply for fire suppression needs for the community.

Policy HS.P-48: Support measures that help firefighting crews and emergency response teams respond to fire hazards or work under low-visibility conditions, such as high-visibility signage for streets and building addresses that meet or exceed the standards in the California Fire Safe Regulations (Title 14 of the CCR, Division 1.5, Chapter 7, Articles 2 and 3, Sections 1273 and 1274).

Implementation Programs

Regulations

HS.I-17: All new development must comply with fire-resistant landscaping and defensible space requirements. These standards shall meet or exceed Title 14 of the California Code of Regulations (CCR). This specifically includes Division 1.5, Chapter 7, Subchapter 2, Articles 1-5 (commencing with Section 1270, SRA Fire Safe Regulations); and Division 1.5, Chapter 7, Subchapter 3, Article 3 (commencing with Section 1299.01, Fire Hazard Reduction Around Buildings and Structures Regulations). New development shall also comply with the California Public Resource Code Section 4291 (State Defensible Space Requirements), which requires the following:

- Create a defensible space of at least 100 feet around the structure.
- Remove all dead plants, grass, weeds, and other flammable vegetation from the defensible space.
- Remove tree limbs that are within 10 feet of the chimney or stovepipe of the structure.
- Trim tree limbs that are within 6 feet of the ground or within 10 feet of the structure.
- Remove all dead branches, leaves, and other debris from roofs and rain gutters.

- Create horizontal and vertical spacing between trees and shrubs to prevent the spread of fire.
- Space trees at least 10 feet apart from each other.
- Maintain the defensible space throughout the year, not just during fire season.
- Obtain any necessary permits from local fire agencies before conducting any vegetation management activities.
- Provide and maintain access to the property for emergency vehicles.

Related Policies: HS.P-40

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Funding, Physical Improvements, and Capital Projects

HS.I-18: Collaborate with fire districts to establish funding mechanisms, including impact fees to offset fire protection costs for new developments in areas of high wildfire risk.

Related Policies: HS.P-31, HS.P-34, HS.P-35

Agency/Department: Fire Protection Districts; Department of Resource Management

Funding Source: May include special assessments, mitigation fees.

Time Frame: Ongoing

Development Review

HS.I-19: Work with fire districts to ensure that new development is built to support effective firefighting, including providing adequate fire protection with regards to staffing, equipment, and supplies to meet response time standards. Continue to seek fire district input on new development projects and ensure that such projects incorporate fire-safe planning and building measures. Such measures may include clustering housing, buffering properties, creating defensible space around individual units, using fire-resistant building materials, installing sprinkler systems, and providing adequate on-site water supplies.

Related Policies: HS.P-31, HS.P-34, HS.P-35, HS.P-36

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Agency/Department: Fire Protection Districts; Department of Resource Management

Funding Source: Project Applicant

Time Frame: Ongoing

HS.I-20: Ensure access for firefighting equipment in rural areas by clustering residential units that are in areas of high fire risk and maintaining emergency access routes. These routes are designated as part of an emergency preparedness plan.

Related Policy: HS.P-34

Agency/Department: Department of Resource Management; Fire Protection Districts; Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach, and Education

HS.I-21: Identify areas of overlap between important visual and natural resources and fire hazard areas. The County will work with federal and State agencies and local fire districts to develop management plans for these lands that protect these resources while still allowing for appropriate fire maintenance.

Related Policy: HS.P-36

Agency/Department: Department of Resource Management; Fire Protection Districts

Funding Source: General Fund

Time Frame: Ongoing

HS.I-22: Identify existing public and private roadways in fire hazard severity zones that are not in compliance with current fire safety regulations, to the extent resources are available. Work at retrofitting and maintaining County-owned roadways as needed to meet current standards and encourage private property owners to do the same, to the extent feasible and given the absence of other site constraints. These standards include road standards for evacuation and emergency vehicle access, vegetation clearance, and other requirements of the California Fire Safe Regulations, Title 14 of the CCR, Division 1.5, Chapter 7; specifically, Subchapter 2, Articles 1-5 (commencing with Section 1270, SRA Fire Safe Regulations); and Subchapter 3, Article 3 (commencing with Section 1299.01, Fire Hazard Reduction Around Buildings and Structures Regulations).

Related Policy: HS.P-41

Agency/Department: Department of Resource Management; Fire Protection Districts

Funding Source: General Fund

Time Frame: Ongoing

Coordination with Other Agencies and Organizations

HS.I-23: Create fire buffers along heavily traveled roads by promoting grazing, thinning, mowing, plowing, disking, or controlled burning of roadside grass. Coordinate with the California Department of Transportation to ensure that adequate fire buffers are established along State highways. Favor those methods that have the least impact on air quality, such as grazing.

Related Policies: HS.P-35, HS.P-36

Agency/Department: California Department of Transportation; Department of Resource Management

Funding Source: Caltrans, Road Fund

Time Frame: Ongoing

HS.I-24: Increase cooperative efforts among fire districts, public agencies, and landowners. The County will continue to collaborate with the US Forest Service, CAL FIRE, fire departments of adjacent counties, city fire departments, fire districts, and property owners to prevent and manage wildland fires. Efforts may include monitoring regional fuel buildup, maintaining fuel breaks, sharing firefighting equipment, and providing necessary water supplies. The County will continue to encourage the consolidation of fire districts.

Related Policies: HS.P-35, HS.P-37

Agency/Department: Department of Resource Management; Fire Protection Districts; Solano Local Agency Formation Commission

Funding Source: General Fund; Fire District funds; Local Agency Formation Commission

Time Frame: Ongoing

HS.I-25: Work with CAL FIRE, fire protection districts, firesafe councils, community organizations, other relevant local agencies, and landowners to ensure maintenance of existing fuel breaks, vegetation clearance, and emergency access routes for effective fire suppression on public and private roads.

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Related Policies: HS.P-40

Agency/Department: Department of Resource Management; CAL FIRE; Fire Protection Districts.

Funding Source: General Fund

Time Frame: Ongoing

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HAZARDOUS WASTE AND MATERIALS

Planning Context

This section addresses actions that can be taken to prevent exposure to potentially dangerous materials during their use, storage, transportation, and disposal. Hazardous materials are used extensively everyday—from agricultural fertilizers and pesticides to household cleaning products. Hazardous materials include corrosive, toxic, reactive, or flammable materials in our homes and businesses. These materials can be harmful to people, wildlife, and the environment. In Solano County, they can be found in several products and locations, including hazardous waste sites, brownfield properties, and naturally occurring materials like asbestos, radon, and mercury.

Types of Hazardous Materials

Hazardous materials are materials from a variety of sources that pose a significant risk to public safety or human or environmental health. Some common categories are briefly discussed in this section to provide a framework for the policies and implementation programs proposed at the end of this section.

The 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. Damage to property could range from immediate destruction by explosion to permanent contamination by a persistent hazardous material.

Brownfields

Brownfields are properties that are contaminated or thought to be contaminated. Many are in urban areas and are underused because of perceived remediation costs and liability concerns. Solano County maintains a list of all the approximately 500 brownfield sites in the county and works with federal and State agencies to ensure their proper cleanup or maintenance.

Transportation of Hazardous and Toxic Materials

Land use hazards associated with the transport of hazardous cargo do exist in Solano County. A number of major, interstate transportation routes pass through the area, and a wide range of hazardous cargo is regularly transported along these routes. The most vulnerable areas are considered the on-/off-ramps and interchanges. Some potential exists for a highway or railway mishap that could cause hazardous cargo to spill, contaminating surrounding areas. Since 1970, 5 railway and 78 roadway hazardous materials incidents have occurred in Solano County.

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Agency Monitoring and Response

Hazardous materials and waste in Solano County are managed by the Certified Unified Program Agency (CUPA), a local administrative agency in the Solano County Department of Resource Management, Environmental Health Services 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's and DTSC's EnviroStor database indicates hazardous waste sites throughout the county.

As sea levels rise, low-lying coastal areas become prone to flooding. Contaminated sites located near coastlines or in flood-prone areas may become submerged, allowing water to infiltrate the site. This inundation can directly mobilize contaminants by carrying them away from the site and potentially spreading them to surrounding areas. The danger of hazardous materials/waste spills during transportation does exist and can potentially increase as transportation of these materials increases on freeways and railways. The Solano County Sheriff's Office, CAL FIRE, Solano County Office of Emergency Services, and Solano County Department of Resource Management, Environmental Health Services Division are responsible for hazardous materials accidents at all locations in the county. Depending on location, Solano County fire protection districts will also respond to hazardous materials accidents.

Potential Changes to Hazardous Materials Risk in Future Years

Likelihood of Future Occurrence

Given that 83 hazardous materials incidents have happened in transport through the county in the past 50 years, it is likely that a hazardous materials incident will occur in Solano County every year. However, according to Caltrans, most incidents are related to releases of fluids from the transporting vehicles themselves and not the cargo, so the likelihood of a significant hazardous materials release in the county is more limited and difficult to predict.

Climate Change and Hazardous Materials

Climate change is unlikely to significantly 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.

Related Plans, Programs, and Agencies

Safe Drinking Water and Toxic Enforcement Act of 1986

The Safe Drinking Water and Toxic Enforcement Act of 1986 was enacted as a ballot initiative in November 1986. It was intended to protect California citizens and the state's drinking water sources from chemicals known to cause cancer, birth defects, or other reproductive harm and to inform citizens about exposures to such chemicals. The act requires the governor to publish, at least annually, a list of chemicals known to the State to cause cancer or reproductive toxicity.

Oil Spill Contingency Plan

The Oil Spill Contingency Plan (California Government Code Section 8574.1) requires that regional and local planning agencies incorporate in their planning the State's effort to respond to marine oil spills and ensure the effective and efficient use of regional and local resources in the areas of traffic and crowd control, firefighting, boating traffic control, radio and communications control, and provision of medical emergency services.

Toxic Release Contingency Plan

The Toxic Release Contingency Plan (California Government Code Section 8574.16) requires that regional and local planning agencies incorporate within their planning the State's effort to respond to emergency toxic releases and ensure the effective and efficient use of regional and local resources in the areas of traffic and crowd control, firefighting, hazardous materials response and cleanup, radio and communications control, and provision of medical emergency services.

Hazardous Materials Release Response and Inventory Program

The Hazardous Materials Release Response and Inventory Program (California Health and Safety Code Sections 25500 to 25520) establishes business and area plans for the handling and release of hazardous materials. Basic information on the location, type, quantity, and health risks of hazardous materials handled, used, stored, or disposed of in the state and that could be accidentally released into the environment is tracked by the local CUPA in each region for the use and awareness of hazardous materials responders, firefighters, emergency care providers, regulatory agencies, and other interested persons.

California Occupational Safety and Health Administration Hazardous Substances Emergency Response Training

California Occupational Safety and Health Administration Hazardous Substances Emergency Response Training is required for all workers involved with the handling, disposal, or emergency response to hazardous materials (Title 8, Section 5192). Various training levels are required depending on organizational level and responsibility level.

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Hazardous Waste Management Plans

The Solano County Department of Environmental Management maintains hazardous materials management plans to address emergency response to incidents involving hazardous materials handled by a business over 55 gallons, 500 pounds, or 200 cubic feet of gas. These plans include an inventory of hazardous materials, which is updated annually.

The County also maintains the Hazardous Waste Management Plan (Tanner Plan) for the management of all hazardous wastes generated in the county and to address the siting of hazardous waste facilities for the disposal of those wastes. The County participates with the regional Hazardous Waste Management Facility Allocation Committee in addressing the Tanner Plan siting requirements. The Household Hazardous Waste Element of the County's Integrated Waste Management Plan addresses the safe collection, recycling, treatment, and disposal of hazardous wastes generated by households.

Certified Unified Program Agency

The Solano County Department of Resource Management is the CUPA for all cities and unincorporated areas in the county. The CUPA program was created to consolidate and make consistent the various environmental and emergency response regulations applicable in a jurisdiction to minimize the number of inspections and fees businesses must comply with. The Solano County CUPA:

- Conducts the permitting and inspection of businesses that handle certain quantities of hazardous materials/waste.
- Inspects businesses for compliance with the Hazardous Waste Control Act, in conjunction with the Hazardous Materials Business Plan Program.
- Responds to complaints of illegal disposal of hazardous waste.
- Addresses emergency response to incidents involving hazardous materials through the Hazardous Materials Management Plans.

Hazardous Waste and Materials Goals, Policies, and Implementation Programs

Goal HS.G-4: Ensure that Solano County is safe from risks to public health that could result from exposure to hazardous materials.

Policies

Policy HS.P-49: Minimize the risks associated with transporting, storing, and using hazardous materials through methods that include careful land use planning and coordination with appropriate federal, State, or County agencies.

Policy HS.P-50: Work to reduce the health risks associated with naturally occurring hazardous materials, such as radon, asbestos, or mercury.

Policy HS.P-51: Encourage the use of programs and products by businesses that will result in a reduction of hazardous waste and materials.

Policy HS.P-52: Promote hazardous waste management strategies in this order of priority: source reduction, recycling and reuse, on-site treatment, off-site treatment, and residuals disposal.

Policy HS.P-53: Locate facilities for transfer, treatment, storage, and disposal of hazardous wastes using the siting criteria described in the Hazardous Waste Management Plan. The facilities shall be developed and operated to ensure the protection of the environment and compatibility with surrounding land uses.

Policy HS.P-54: Encourage regional efforts to implement alternatives to land disposal of untreated hazardous wastes and participate in inter-jurisdictional agreements that balance the economic efficiencies of siting facilities with the responsibility of each jurisdiction to manage its fair share of hazardous wastes generated within the region.

Implementation Programs

Regulations

HS.I-26: Continue implementation of the provisions of the Tanner Plan and siting locations for new hazardous waste storage and transfer facilities through the Association of Bay Area Governments' Hazardous Waste Allocation Committee

Related Policies: HS.P-50, HS.P-52

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Development Review

HS.I-27: Follow recommended protocol from the California Department of Conservation, US Geological Survey, US Occupational Safety and Health Administration, and other applicable agencies for reducing risks associated with naturally occurring hazardous materials with new development.

Related Policies: HS.P-50

Agency/Department: Department of Resource Management

Funding Source: Project Applicant

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Time Frame: Ongoing

HS.I-28: Coordinate with the California Department of Transportation and railway operators to establish routes intended for hazardous material transportation. Limit future development of sensitive land uses (e.g., residential, schools, hospitals) along these corridors unless adequate buffers are provided.

Related Policies: HS.P-49, HS.P-53, HS.P-55

Agency/Department: Department of Resource Management

Funding Source: Project Applicant

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach, and Education

HS.I-29: Continue to support public education programs regarding health risks associated with naturally occurring hazardous materials, such as asbestos, radon, or mercury.

Related Policy: HS.P-50

Agency/Department: Department of Resource Management; Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-30: Continue implementation of the Certified Unified Program Agency program, identifying businesses that use, store, and/or transport hazardous materials in the county. Review, revise, and continue permitting and inspection practices for these businesses. Provide fire departments in the county with a list of such businesses to encourage hazardous material training before an event occurs. Continue to monitor operations of businesses that handle regulated quantities of hazardous materials. Require compliance with measures aimed at reducing associated health and environmental risks.

Related Policies: HS.P-49, HS.P-51, HS.P-52, HS.P-53, HS.P-54

Agency/Department: Department of Resource Management

Funding Source: Permit Fees and Fees for Service

Time Frame: Ongoing

HS.I-31: Encourage and promote programs and processes that reduce use of hazardous materials through implementation of the Green Business Program. Provide incentives for businesses to support "green" practices that result in less hazardous waste and the mitigation of existing waste. Such incentives might include tax breaks for brownfield redevelopment or providing environmentally friendly cleaning products at a reduced rate.

Related Policies: HS.P-49, HS.P-51, HS.P-52, HS.P-53

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

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EMERGENCY PREPARATION AND RESPONSE

Planning Context

Local Emergency Response

The Solano County Sheriff's Department and Solano County fire protection districts conduct emergency preparedness activities throughout the county. Solano County does not have its own fire department. Several individual fire protection districts serve the unincorporated county area. This includes the East Vallejo Fire District, Cordelia Fire Protection District, Suisun Fire Protection District, Vacaville Fire Protection District, Dixon Fire Protection District, and the Montezuma Fire Protection District. Certain fire protection districts may consist of full- or part-time firefighters, but most firefighters in the unincorporated county are volunteers.

Community Warning Systems

During an emergency, the County uses Alert Solano to notify residents and businesses within Solano County that are impacted by or in danger of being impacted by an emergency. The system provides basic information about incidents and what specific protective actions are necessary to protect life and health (e.g., shelter in place, lockdown, evacuate, avoid the area). 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. In the event of an emergency, public safety officials, including local police and fire, send a message to those who have registered for Alert Solano about a potential safety hazard or concern, including severe weather alerts, road closures, and natural disasters. The Alert Solano emergency notification system allows users to provide customized information for the most efficient delivery of emergency information. Alerts can be sent to all devices registered with Alert Solano, maximizing the chances of alerting users in a timely manner.

Other systems include the Emergency Alert Systems, the Emergency Digital Information System, and National Oceanic and Atmospheric Administration weather radios.

Emergency Evacuation

With advanced warning, evacuation can be effective in reducing injury and loss of life during a catastrophic event. **Figure HS-17** shows residential parcels with evacuation constraints. California Government Code Section 65302(g)(5), as codified by 2019's Senate Bill (SB) 99, requires that the Safety Element identify residential developments in hazard-prone areas that do not have at least two emergency evacuation routes. All these parcels are at least a half mile from a major roadway and have access to only one emergency evacuation route. The lack of multiple emergency access points limits roadway access for these properties, which may create difficulties if there is a need to evacuate. In the event of an emergency, people living on parcels with evacuation constraints may be trapped and unable to evacuate, which could lead to injury or death. Additionally, in the event of widespread disruption to

local evacuation routes, remaining evacuation routes may become congested, slowing down evacuation of a community or specific neighborhoods. This issue may be compounded since evacuation routes in Solano County will also likely serve as evacuation routes for various communities in the county as well as neighboring communities, and so potential disruptions may have regional effects.

Primary emergency access and evacuation routes include I-80, which runs across the county from southwest to northeast; I-680 between Benicia and Cordelia; I-505, which runs north from Vacaville; SR-12, which runs east to west across the length of the county; SR-37, which runs west from Vallejo; SR-84 and SR-113, which run north to south in the eastern region of the county; and other local roadways that connect to these primary evacuation routes. **Figure HS-18** shows the potential evacuation routes throughout the county, although the recommended evacuation routes in any given situation will depend on the specifics of the emergency.

Disaster Preparedness

The Solano County Office of Emergency Services prepares disaster plans for the county and coordinates required emergency services and facilities from all agencies and levels of government to meet emergency and disaster needs. Though this Public Health and Safety chapter and the Public Facilities and Services chapter overlap in some respects, the policies here are primarily related to disaster situations, whereas those in the Public Facilities and Services chapter address ongoing facility needs and service standards.

The Solano County Office of Emergency Services offers Community Emergency Response Team (CERT) training to residents and members of the business community to increase disaster awareness and emergency response capability. The CERT program educates volunteers about disaster preparedness for the 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.

Related Plans, Programs, and Agencies

Solano County Office of Emergency Services

The Office of Emergency Services oversees the development, establishment, and maintenance of programs and procedures to protect the lives and property of county residents from the effects of natural or human-caused disasters. The office must train for and properly respond to floods, earthquakes, major fires, storms, radiological or hazardous material incidents, aircraft accidents, mass casualty incidents, and other emergencies.

The Office of Emergency Services manages and coordinates disaster response, terrorism response, search and rescue missions, flood response, and other major emergencies within its sphere of influence. It works with City and County departments with fire suppression activities, evacuations, hazardous materials incidents, disaster exercises, planning, and use of resources through the SEMS/Incident Command System. Additionally, the Office of Emergency Services

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conducts emergency preparedness training and awareness presentations for citizens and various organizations so they better understand what they should do before, during, and after a disaster or major emergency.

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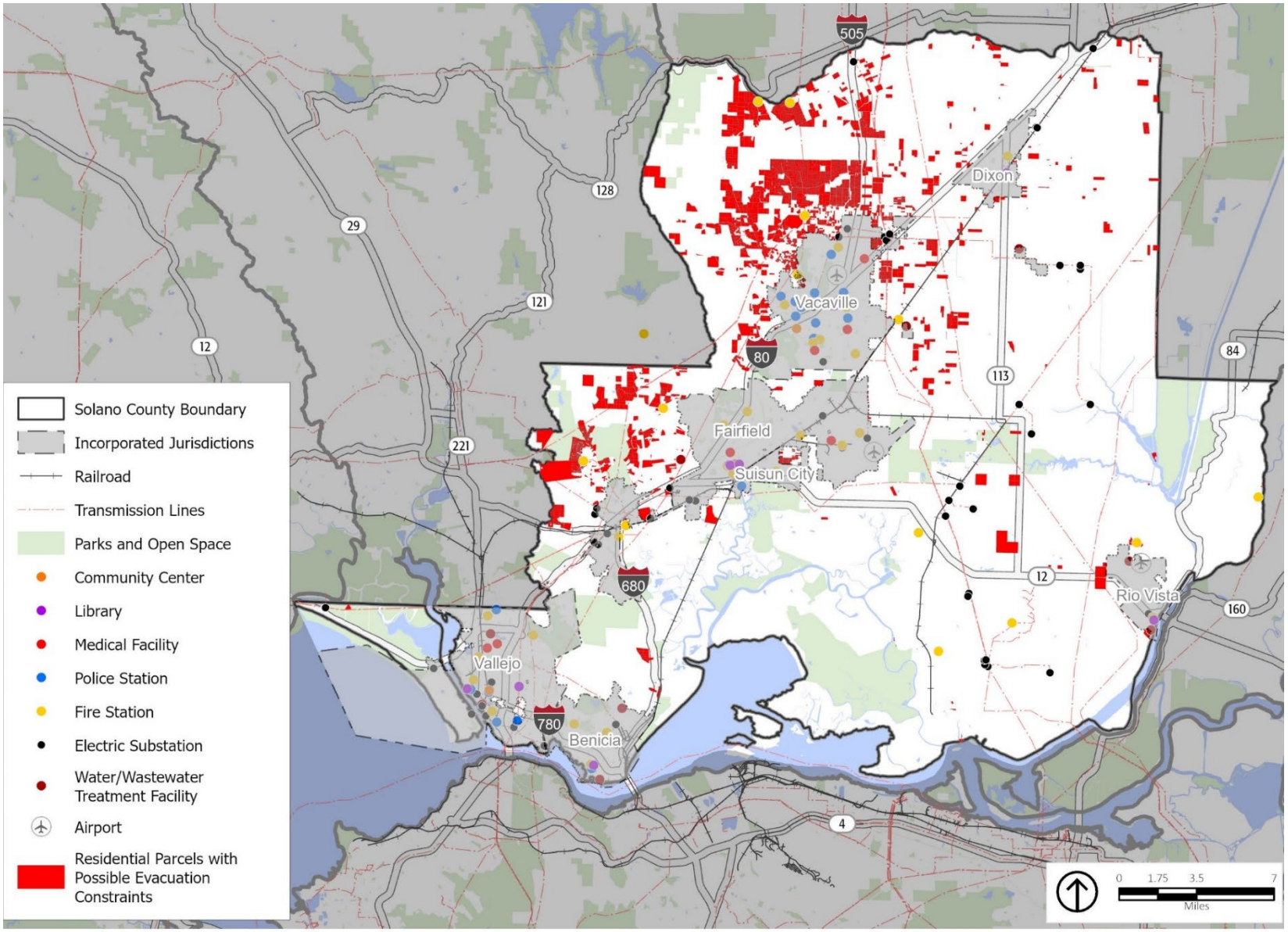
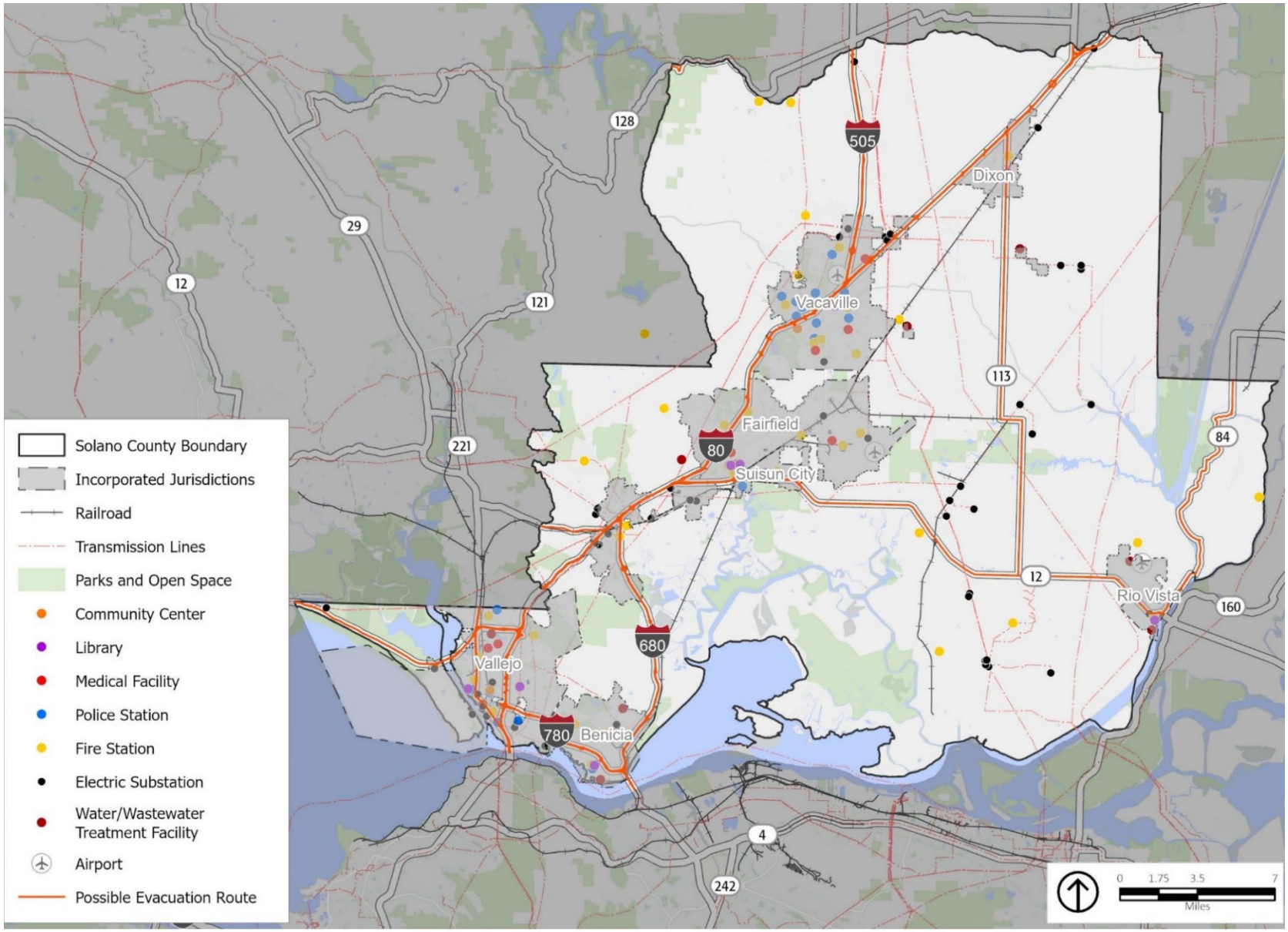
Figure HS-17: SB 99 Evacuation Constrained Parcels



Source: Solano County, PlaceWorks 2022, ESRI

Figure HS-18: Evacuation Routes



Source: Solano County 2021, PlaceWorks 2022, ESRI

Emergency Preparation and Response Goals, Policies, and Implementation Programs

Goal HS.G-5: Prepare for and respond to natural and human-caused disasters, avoiding loss of life and minimizing the impacts to health, property, and community welfare.

Policies

Policy HS.P-55: Work to ensure the adequacy of disaster response and coordination in the county and the ability of individuals to survive disasters.

Policy HS.P-56: Plan and designate evacuation and aid routes. Work to create a comprehensive circulation system that is effective in allowing emergency access to and from all parts of the county and which provides alternative routes during unexpected events such as flooding, fires, or hazardous materials accidents that require evacuation.

Policy HS.P-57: Promote public education and awareness regarding evacuation response in the event of a catastrophic disaster, such as wildfires, earthquakes, or toxic material spills. Educational and informational materials should be available in multiple languages commonly used in the county based on Census data and in formats appropriate for people with access and functional needs, such as low-income households or seniors.

Policy HS.P-58: Encourage coordination and communication between federal, State, and local agencies regarding disaster planning and preparedness.

Policy HS.P-59: Encourage cooperation with medical facilities, schools, local radio stations, nonprofit organizations, and the private sector in disaster planning and preparedness.

Policy HS.P-60: Ensure that populations requiring special assistance are included in disaster planning and preparedness.

Policy HS.P-61: Support and encourage Community Emergency Response Team (CERT) training to residents and members of the business community to increase disaster awareness and emergency response capability.

Policy HS.P-62: Incorporate the Solano County Multi-jurisdictional Hazard Mitigation Plan, as approved by the Federal Emergency Management Agency, into this Public Health and Safety Chapter by reference, as permitted by California Government Code Section 65302.6, to ensure that emergency response and evacuation routes are accessible throughout the county.

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Policy HS.P-63: Continue to cooperate with other public agencies to ensure adequate medical and other emergency services, including assessing and projecting future emergency service needs.

Policy HS.P-64: Prepare an evacuation study that identifies evacuation routes and their capacity, safety, and viability under a range of emergency scenarios. Prepare this study concurrent with or before the next update to the MJHMP.

Policy HS.P-65: Encourage communities to conduct training to plan and prepare for various emergency scenarios, and support multi-jurisdictional training efforts to promote county-wide educational programs.

Implementation Programs

Ongoing Planning Efforts, Public Outreach, and Education

HS.I-32: Maintain and update countywide emergency operations and response plans, including information on evacuation routes, inter-agency cooperation, and other specific recommendations and strategies for emergency response. Coordinate with emergency service providers (e.g., hospitals, fire departments, police, emergency shelters), schools, and radio stations to provide a network that facilitates a timely and efficient disaster response. Include specific preparation for populations requiring special assistance, including the elderly, the physically and mentally disabled, and non-English-speaking populations.

The emergency response plans should also incorporate the requirements and programs for the Oil Spill Contingency Plan, the Toxic Release Contingency Plan, the Hazardous Materials Release Response and Inventory Program, and other Hazardous Materials Management Plans.

Related Policies: HS.P-49, HS.P-55, HS.P-56, HS.P-57, HS.P-58, HS.P-59, HS.P-60, HS.P-65

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-33: Regularly assess the resources needed to effectively respond to disaster situations. Ensure proper staffing levels at emergency response agencies and update equipment and training, as necessary.

Continue to train relevant personnel using the California Occupational Safety and Health Administration Hazardous Substances Emergency Response Training. Develop the County's capability to handle mass shelters for people and pets in case of major disasters by maintaining a

list of appropriate emergency shelter locations. These sites should be geologically stable and well connected to evacuation routes.

Related Policies: HS.P-55, HS.P-57, HS.P-59

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-34: Improve public education and awareness regarding what to do in case of a catastrophe, and promote public education and awareness programs for each type of natural disaster potentially affecting the county. Education programs should reach all parts of the population through school programs, public service announcements, and sponsored events like Disaster Preparedness Week.

Related Policies: HS.P-55, HS.P-57, HS.P-60

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

Coordination with Other Agencies and Organizations

HS.I-35: Encourage full coordination, communication, and implementation between federal, State, and local governments regarding disaster planning and preparedness. Create a regional disaster preparedness plan that facilitates resource sharing among the various participating agencies. Participate in collaborative and coordinated efforts of the Delta Emergency Preparedness and Response Team consistent with the Board of Supervisor's approval of the agreement of participation, resolution of commitment, and adoption of statement of compelling need.

Related Policy: HS.P-58

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-36: Coordinate with local and State emergency management agencies using the Standardized Emergency Management System (SEMS) and

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National Incident Management System (NIMS) to facilitate multiagency emergency response.

Related Policy: HS.P-63

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-37: Maintain inter-jurisdictional cooperation and coordination, including automatic-aid agreements with fire protection and suppression agencies in Solano County.

Related Policy: HS.P-63

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-38: Continue to maintain agreements with other local, State, and federal agencies to ensure coordinated disaster response.

Related Policy: HS.P-63

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

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AGRICULTURE AND ECOSYSTEM HAZARDS

Agricultural Pests

Agriculture uses are approximately 62 percent of the land in Solano County. Half of these lands are irrigated agriculture lands. The other half is used for dryland farming in Montezuma Hills and grazing/pasture throughout the county. The county's top crop is almonds, with 18,000 acres planted in 2020. Other important crops include grapes, olives, prunes, tomatoes, and nursery products. Solano ranks as one of the top five counties in California for production of sheep and lambs, grain corn, Sudan grass hay, and safflower.

Solano County's agricultural sector is threatened by several insect pests that can cause severe economic and environmental harm under the right circumstances. Insects of concern to plants and crops include the Asian gypsy moth, rosy moth, nun moth, Siberian silk moth, Asian citrus psyllid, European grapevine moth, glassy-winged sharpshooter, Japanese beetle, Mediterranean fruit fly, melon fly, and oriental fruit fly.

Aquatic Invasive Species

The introduction of non-native species into county waters can cause significant and enduring economic and environmental impacts. One of the most widespread mechanisms for introduction of non-native species is transport of ballast water in boats.

Once introduced, invasive species are likely to become a permanent part of an ecosystem and may flourish, creating environmental imbalances and wreaking economic havoc. Invasive species of concern in Solano County include the New Zealand mud snail, zebra mussel, and quagga mussel.

Potential Changes to Agriculture and Ecosystems in Future Years

Likelihood of Future Occurrence

As long as severe weather events continue, the potential for ecosystem and agricultural losses remain an ongoing concern for Solano County. The primary causes of agricultural losses are severe weather events, such as drought, freeze, and insect infestations. These factors can also contribute to significant ecosystem loss, as can wildfire events. Due to the high number of incidents of invasive species in the Sacramento-San Joaquin Delta, it is likely that future infestation of aquatic pests will occur in Solano County.

Climate Change and Agriculture and Ecosystem Hazards

Temperatures are expected to get warmer earlier in the year and remain warmer until later in the year due to climate change, creating a wider window for pests and diseases to be active. Many crop plants, trees, and livestock may be weakened by warmer temperatures and changes in precipitation. These weaker plants and animals may not be able to fend off

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infestations or infections as well as a healthy plant or animal, causing pests and diseases to affect more of the agricultural areas or ecosystem.

Due to climate change, invasive aquatic species are expected to flourish because cold temperatures or winter hypoxic conditions are what have traditionally prevented the establishment and survival of these species in this climate.

Agricultural and Ecosystem Hazards Goals, Policies, and Implementation Programs

Goal HS.G-6: Protect the long-term viability of agricultural activities in Solano County.

Policies

Policy HS.P-66: Support efforts by local farmers and ranchers to raise crops and livestock that are better adapted to warmer temperatures, greater precipitation variability, and changes in pest regimes.

Policy HS.P-67: Establish a partnership that includes the Solano County Department of Agriculture, unincorporated local jurisdictions, University of California (UC) Cooperative Extension, agricultural groups, farmers and ranchers, and other partners to address climate change impacts to agricultural lands.

Policy HS.P-68: Coordinate with community-based organizations to ensure that all agricultural workers have adequate protection from extreme conditions, and that healthy and safe working conditions are maintained.

Policy HS.P-69: Coordinate with the UC Cooperative Extension and local agricultural groups to support and participate in ongoing agricultural education programs to help inform the agricultural community about climate-related pests and hazard conditions.

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CLIMATE RESILIENCE

Drought

A drought is an extended period when precipitation levels are well below normal, but it 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, Solano County chronically experiences drought cycles. Drought impacts the county's water supply, and in severe instances, less water is available for people, businesses, and natural systems.

The US 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 US Drought Monitor, the most intensive drought conditions in recent years were from May 2021 through the end of the year, when the county was classified in "extreme" drought. As of June 2023, Solano County was not experiencing drought conditions. According to the US Drought Monitor, drought conditions in Solano County ended in April 2023. Prior to that date, in March 2023, Solano County was classified as experiencing "abnormally dry" conditions.

During severe drought conditions, water shortages are common and water restrictions may be imposed to meet essential community needs. Solano County'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 Water Code. Pursuant to Senate Bill 552, Solano County reconvened a standing drought task force in August 2022 to facilitate drought and water shortage preparedness for state small water systems (serving 5 to 14 connections), domestic wells, and other privately supplied homes. Solano County intends to prepare a drought resilience plan to assess potential drought and water shortage risk and develop interim and long-term solutions for state small water systems and domestic wells within the county.

The County's water supply is derived from the State Water Project, Solano Project, as well as the Bay Delta (Sacramento River), local reservoirs, and groundwater. The Upper Feather River Watershed is a major source of the state's water and provides nearly all the water delivered by the State Water Project. Roughly 83 percent of Solano County's water comes from Lake Berryessa, and the remaining 17 percent is diverted from the Sacramento-San Joaquin Delta. Some municipalities and the Solano Irrigation District rely on groundwater sources for all or a portion of their water supplies, as do areas located outside of a water provider's service area.

Potential Changes to Drought in Future Years

Likelihood of Future Occurrence

Drought is different than many of the other natural hazards because 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.

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Adequate water for commercial and domestic use is the most critical issue. As the population in the county continues to grow, so will the demand for water. However, water supply is currently considered adequate to meet projected water needs through the year 2045. As demonstrated in the 2020 Urban Water Management Plan, the County shows adequate capacity to accommodate the demand through 2045 through a diversified and resilient portfolio that includes recycled water and conservation programs.

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 or even increase in some places. However, more years with extreme levels of precipitation, both high and low, are likely as a result of climate change. Climate change emissions are expected to cause more precipitation to 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. However, even under wetter climate projections, the loss of snowpack would pose potential water shortage issues and exacerbate drought conditions.

Extreme Heat

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 Solano County, the average extreme heat threshold is 100.2°F. An event with five extreme heat days in a row is called a heat wave. According to Cal Adapt, Solano County has experienced a historical annual average of 3 extreme heat days. From 1990 to 2020, Solano County has experienced 20 years with a greater number of extreme heat days than the historical annual average. The annual average of extreme heat days during this period is 6 extreme heat days per year, an increase from historic levels.

Health impacts are the primary concern with this hazard, though economic impacts are also an issue. From 2004 to 2018, studies by the US Department of Health and Human Services indicate that an average of 702 deaths annually are directly or indirectly linked to extreme heat.

Extreme heat can increase the temperature of water in lakes, streams, creeks, and other water bodies, especially during drought events 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 conditions and the potential illnesses associated with very high 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. Wildfire risk increases as vegetation dries out. Damage to roadways, bridges, and other transportation infrastructure may also occur.

The majority of homes in unincorporated Solano County are older homes, which are more likely to lack air conditioning and effective insulation. Approximately 5,230 homes, or 63 percent, were constructed prior to 1980.[3] People living in these homes, especially vulnerable populations, are at higher risk for heat-related illnesses. To help provide relief from the heat, the County opens public libraries during extreme heat days and heat waves. These air-conditioned community spaces provide essential cool spaces for vulnerable populations, especially those susceptible to heat-related illnesses.

Potential Changes to Extreme Heat in Future Years

Likelihood of Future Occurrence

Extreme heat tends to occur on an annual basis and is likely to continue occurring annually. Though the western portions of Solano County closer to San Francisco Bay generally experience cooler temperatures than the eastern portions, high temperatures in Solano County will continue to be common.

Climate Change and Extreme Heat

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 projects that the number of extreme heat days is expected to rise from a historical annual average of 3 to an average of 15 by the middle of the century (2035 to 2064) and an average of 29 by the end of the century (2070 to 2099), with some years experiencing many more extreme heat days.

Severe Weather

Severe weather is any destructive weather event, but usually occurs in Solano County as localized storms that bring heavy rain, hail, thunderstorms, and strong winds. Severe weather is usually caused by intense storm systems, although types of strong winds can occur without a storm. The 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.

Atmospheric rivers are a common weather pattern that brings southwest winds and heavy rain to Solano County. Atmospheric rivers are long, narrow regions in the atmosphere that transport most of the water vapor carried away from the tropics. When the atmospheric rivers

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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 mudslides.

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 miles per hour (mph) or greater lasting one hour or longer, or wind gusts of 58 mph or greater for any duration.[4] These winds may be part of a seasonal climate pattern or related to other severe weather events, such as thunderstorms. Solano County experiences high wind on an annual basis.

Wind events can pose several different 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. If wildfires do start, high winds can push flames quickly into new areas, contributing to the rapid spread of wildfires and making them harder to control. This can affect the air quality in Solano County and may disrupt regional infrastructure networks.

Potential Changes to Severe Weather in Future Years

Likelihood of Future Occurrence

According to historical hazard data, severe weather is an annual occurrence in Solano County. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future.

Climate Change and Severe Weather

Climate change is expected to cause an increase in intense rainfall and strong storm systems. This means that Solano County 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.

Climate Resilience-Related Hazards Goals, Policies, and Implementation Programs

Goal HS.G-7: Create a resilient community able to prepare for and adapt to climate-related hazards.

Policies

Policy HS.P-70: Ensure County policies, programs, projects, and investments consider the potential effects of climate change on Solano County's human and natural systems and include project, program, or site-specific adaptation and resilience strategies as appropriate.

Policy HS.P-71: Establish one or more equitably located community resilience center in unincorporated Solano County. Ensure that community resilience centers are not in areas at risk from hazard impacts, to the extent possible; offer refuge from extreme heat and extreme weather events as well as poor air quality and disasters; 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. Resilience centers consist of new, well-used, existing, community-serving facilities that are upgraded to provide local communities with shelter, water, and electricity during these events or disasters.

Policy HS.P-72: Work with transit, dial-a-ride, and paratransit services to provide transit services to and from resilience centers for seniors and people with disabilities in the community.

Policy HS.P-73: Prepare for a reduced long-term water supply resulting from more frequent and severe droughts, including working with regional water providers to implement extensive water conservation measures and ensure sustainable water supplies, including for fire-suppression needs.

Policy HS.P-74: Consider establishing a program that offers financial assistance to vulnerable populations without access to drinking water during severe drought conditions, including when private wells go dry.

Policy HS.P-75: Coordinate with the Solano Transportation Authority to increase shading and heat-mitigating materials on pedestrian walkways and at transit stops.

Policy HS.P-76: Promote the use of drought-tolerant green infrastructure, including landscaped areas, as part of cooling strategies in public and private spaces.

Policy HS.P-77: Use natural resources and infrastructure to absorb the impacts of climate-related hazards and associated natural hazards, as feasible.

Policy HS.P-78: Increase the resiliency of County-owned structures to severe weather events and support homeowners and business owners to increase the resilience of their buildings and properties through retrofits, weatherization, and other improvements.

Implementation Programs

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Development Review

HS.I-39: Increase the use of stormwater detention as a source of groundwater recharge as appropriate and only when increased retention does not increase groundwater levels to a point at which it increases the potential risk of liquefaction.

Related Policies: HS.P-8, HS.P-14, HS.P-75, PF.P-35

Agency/Department: Solano County Water Agency; Department of Resource Management

Funding Source: Development fees

Time Frame: Ongoing

HS.I-40: When developing water projects consider an integrated approach to water management with multi-benefit solutions as outlined in the One Water Framework planning guidelines.

Related Policies: HS.P-8, HS.P-14, HS.P-68, HS.P-75

Agency/Department: Solano County Water Agency; Department of Resource Management

Funding Source: Development fees

Time Frame: Ongoing

Regulations

HS.I-41: Facilitate drought and water shortage preparedness for state small water systems and domestic wells, and other privately supplied homes. Ensure County policies, programs, projects, and investments consider the potential effects of climate change on Solano County's human and natural systems and include project, program, or site-specific adaptation and resilience strategies as appropriate.

Related Policies: HS.P-68

Agency/Department: Solano County Drought Task Force

Funding Source: General Fund

Time Frame: Ongoing

HS.I-42: Continue to implement and monitor the measures and implementing actions contained in the Solano County Climate Action Plan adopted in 2011.

Related Policies: HS.P-68

Agency/Department: Board of Supervisors; Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-43: Continue to implement the measures and implementing actions set forth in the Sea Level Rise Strategic Program for Solano County adopted in 2011.

Related Policies: HS.P-11, HS.P-14

Agency/Department: Board of Supervisors; Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-44: Where feasible, the County shall encourage the use of existing natural features and ecosystem processes, or their restoration, when considering alternatives and adaptation projects through the conservation, preservation, or sustainable management of open space.

Related Policies: HS.P-75

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-45: Implement the solutions from the Drought Resilience Plan to address the impacts to water supply wells from drought and water shortages.

Related Policies: HS.P-71, HS.P-75

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

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PUBLIC HEALTH

This section describes the various actions the County can take to encourage an increase in public health by providing opportunities for physical activity and providing access to healthy foods and to health care. Public health professionals have become increasingly interested and involved with land use planning over the last several years. As national obesity rates and obesity-related illnesses have increased dramatically since 1990, public health professionals have turned to planning to achieve a higher level of public health in the county.

Planning Context

According to the 2023 County Health Status Profiles, **Table HS-1** shows top causes of mortality in the county and their ranking compared to other counties in 2019-2021. Of the top causes, four are obesity-related: heart disease, certain cancers, stroke, and diabetes. Obesity not only affects one's comfort and mobility, but also has serious related health consequences, including diabetes, heart disease, stroke, and several different cancers. Solano is ranked 9th among counties for heart disease as a cause of death and is the leading cause of death for residents of Solano County.

Table HS-1: Causes of Mortality in Solano County 2019-2021

Rank	Cause of Death	2019-2021 Deaths in Solano County (average per year)	Solano County Death Rate (age-adjusted)	California Death Rate (age-adjusted[1])
27	*All Causes*	3,765.3	698.9	657.1
48	*All Cancers*	835.0	148.9	124.9
9	Coronary Heart Disease	301.3	53.4	79.0
51	Stroke	256.0	46.9	37.2
43	Alzheimer's Disease	206.3	38.2	36.6
26	Chronic Lower Respiratory Disease	172.7	30.6	26.2
43	Lung Cancer	170.3	30.2	21.6
49	Diabetes	165.0	30.0	23.1
45	Colorectal Cancer	77.0	14.2	11.7
10	Chronic Liver Disease and Cirrhosis	64.7	12.5	13.8
34	Influenza/Pneumonia	64.3	12.0	11.5
50	Prostate Cancer	54.7	23.4	18.4
17	Female Breast Cancer	47.3	16.0	17.8

Source: California Department of Public Health, 2023, County Health Status Profiles.

[1] Age-adjusted death rate is a death rate that controls for the effects of differences in population age distributions.

Public health and urban planning professionals recognize that increasing individuals' physical activity is paramount for the nation's health, and that planning environments that are more conducive to active modes of transportation can have an enormous effect on increasing physical activity rates.

Current research on the relationships between transportation, land use, and public health can be distilled into a few strategies. All these strategies can increase the amount of bicycling and walking that occurs, thereby increasing physical activity levels and social networks and reducing the likelihood of obesity. Increasing the number of walking and bicycling trips also diminishes the need to drive. In turn, this reduces per-capita air pollution and the rates of diseases such as asthma that are associated with localized air pollution and decreases the stress and health risks associated with traffic collisions. Strategies for incorporating public health into land use and transportation decisions include the following:

- Integrating land uses such as retail, office, residential, open space, schools, and childcare allows people to easily accomplish basic needs using active transportation, such as bicycling or walking, rather than having to drive for every trip.
- Compact residential development allows more people to walk to parks, schools, transit, shops, and services. With more people in the same area able to reach these services, compact residential development helps provide greater demand for those services, increasing their long-term availability.
- Streets and buildings that address the street and are built at a pedestrian-scale create places that are safe, vital, and interesting for walkers, bicyclists, and transit users.
- Street and trail networks that accommodate pedestrians and bicycles and are highly interconnected reduce the time and distance needed for pedestrians and cyclists to get from one place to another and make these forms of active transportation more viable.
- Public transportation that is efficient, enjoyable, and extensive alleviates residents' reliance on the automobile, and makes combinations of transportation modes that include active means more likely.
- Parks that are easily accessible by all neighborhoods provide opportunities for active recreation.
- The provision of local healthy food establishments, including grocery stores, produce markets, fruit stands, and healthy restaurants encourages people to maintain a healthy diet.
- Removing barriers to siting health clinics and establishing programs that offer health care to uninsured and low-income people increases individuals' access to health care.

In the unincorporated area of Solano County, communities are small and agricultural land uses occupy most of the landscape. Many of the public health strategies listed here are most applicable in the incorporated areas of the county where different land uses can be located near one another and density can be modified. Consequently, it is important for the County to coordinate efforts with the incorporated cities to accomplish goals of integrating public health into planning practice. The agricultural nature of the county also presents important

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opportunities for access to healthy foods. To increase access to fresh, locally-grown produce in the county, some farms need to focus on growing produce for the local market and have a mechanism for selling their products to residents.

Each General Plan chapter's policies and implementation strategies strive to encourage active, healthy lifestyles. This section contains policies and implementation programs for issues not addressed in other parts of the General Plan. Policies and implementation programs in other sections and chapters that are important in relation to public health are not duplicated in this section but are referenced.

Related Plans, Programs, and Agencies

Solano County Health and Social Services Department

The Solano County Health and Social Services department is responsible for providing services aimed at preventing disease, injury, and premature death. These services include emergency medical services, nutrition services, dental clinic services, and public health nursing.

Health and Social Services Strategic Plan

The Health and Social Services Strategic Plan is the Health and Social Services Department's guiding planning document and focuses on the following four goals: Improve the lives of children, improve the health of those who live and work here, maintain a community that is safe and free from violence, and render quality public service.

Solano County Health Access Strategic Plan

The Health Access Strategic Plan for Solano County was completed by the Solano County Health and Social Services Department in 2006. The plan analyzes strategies for reducing the use of tobacco, alcohol, and other drugs, and increasing the access to health care for targeted low-income and uninsured populations in the county.

Public Health Goals, Policies, and Implementation Programs

Goal HS.G-8: Prioritize and support actions that foster public health for all citizens in Solano County.

Policies

Policy HS.P-79: Integrate public health concerns into land use planning and decision making.

Policy HS.P-80: Coordinate with public health agencies and groups to provide outreach and services, especially for special-needs populations.

Policy HS.P-81: Increase access to healthy foods throughout the county.

Policy HS.P-82: Ensure access to health care and social services for all residents, including the elderly and underserved populations.

Policy HS.P-83: Encourage the provision of health care and the construction of health care facilities.

Policy HS.P-84: Encourage the provision of childcare facilities, particularly near employment centers, community centers, and schools.

Implementation Programs

Regulations

HS.I-46: Promote the establishment of farmer's markets using locally grown produce. Revise the County Zoning Ordinance to allow licensed farmer's markets in unincorporated locations and fruit stands in agricultural areas. Remove barriers to siting of farmer's markets.

Related Policies: HS.P-77, HS.P-79

Agency/Department: Department of Resource Management; Department of Agriculture

Funding Source: General Fund

Time Frame: Ongoing Development Review

HS.I-47: Promote the use of healthy building materials, such as low toxicity paint and nontoxic carpeting.

Related Policy: HS.P-77

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach, and Education

HS.I-48: Conduct meetings, workshops, or public hearings to solicit input from interested individuals and organizations on opportunities and recommendations for integrating public health concerns into local land use planning.

Related Policy: HS.P-78

Agency/Department: Department of Health and Social Services; Department of Resource Management

Funding Source: General Fund

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Time Frame: Ongoing

HS.I-49: Provide an annual report to the Board of Supervisors recommending ways that the County may continue to integrate planning and public health.

Related Policies: HS.P-77, HS.P-78, HS.P-79, HS.P-80, HS.P-82

Agency/Department: Department of Health and Social Services; Department of Resource Management

Funding Source: General Fund

Time Frame: Annual, ongoing

HS.I-50: Continue implementing public health programs and services that decrease obesity rates and increase easy access to healthy foods, parks, and recreation opportunities.

Related Policies: HS.P-77, HS.P-79

Agency/Department: Department of Public Health

Funding Source: General Fund

Time Frame: Ongoing

Coordination with Other Agencies and Organizations

HS.I-51: Actively support implementation of health service strategic plans, including the Health and Social Services Strategic Plan and the Solano County Health Access Strategic Plan.

Related Policy: HS.P-78

Agency/Department: Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-52: Coordinate with public health agencies to provide public outreach and education on how lifestyle changes can affect health.

Related Policy: HS.P-77

Agency/Department: Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-53: Partner with the cities, school districts, and civic organizations to facilitate joint-use of schools and other public areas for public services, such as childcare and recreation.

Related Policy: HS.P-82

Agency/Department: Department of Health and Social Services; local school districts

Funding Source: General Fund, Service Fees

Time Frame: Ongoing

HS.I-54: Investigate strategies for increasing the number of health clinics and medical facilities and health care access for uninsured and low-income families.

Related Policies: HS.P-78, HS.P-80

Agency/Department: Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-55: Work with local community groups to initiate walking, cycling, and recreation clubs, sports leagues, and educational speakers discussing issues in public health.

Related Policies: HS.P-77, HS.P-78

Agency/Department: Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

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AIR QUALITY

Simply stated, ambient air quality is a measure of how healthy or clean is a region's air. Poor air quality can have negative health effects on residents, especially sensitive groups, such as children, the elderly, and people with pre-existing respiratory conditions. Concentrations of air pollutants, primarily generated by human activity, contribute to poor air quality. Natural factors in Solano County, such as terrain, wind, and sunlight can cause poor air quality conditions to persist even if regional emissions decline. Other factors, such as the presence of certain industries, can produce localized areas of poor air quality. The policies and implementation programs included in this section are intended to allow population and economic growth while improving the air quality in Solano County.

Planning Context

Solano County is situated on the boundary of two air basins, each under the jurisdiction of two different air quality management districts, as shown in **Figure HS-19**. The southwestern portion of Solano County is in the San Francisco Bay Area Air Basin (SFBAAB) and is managed by the Bay Area Air Quality Management District (BAAQMD). The northeastern portion of Solano County lies within the Sacramento Valley Air Basin (SVAB) and is managed by the Yolo-Solano AQMD (YSAQMD). The SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays, which alter normal wind flow patterns. In this area, the Coast Range splits, allowing air to flow out of the SFBAAB, carrying pollution into the SVAB.

In contrast, the SVAB is flat, bordered by the North Coast Mountain Range to the west and the Northern Sierra Nevada to the east. Air flows into the SVAB through the Carquinez Strait, the only break in the western mountain barrier, and moves across the Sacramento–San Joaquin River Delta. The mountains surrounding the SVAB create a barrier to airflow, which traps air pollutants when winds are calm or there is no precipitation to transport or remove them.

Regional air flow patterns affect air quality by transporting pollutants downwind of sources. Local conditions, such as moderate winds, disperse pollutants and reduce concentrations. When winds are calm, an inversion layer can develop, trapping pollutants in cooler air close to the ground with a cap of warmer air aloft. During summer mornings and afternoons, these inversions are present over much of the county. Summer sunshine then provides the energy needed for photochemical reactions to take place in the presence of precursor pollutants that form ozone.

Criteria Air Pollutants

Criteria air pollutants are the six most common air pollutants in the United States. Their sources and future trends are provided below.

Ozone is the primary component of smog. It is not directly emitted into the air, but instead is formed through photochemical reactions that combine precursor pollutants (reactive organic gases and oxides of nitrogen) in the presence of sunlight. These reactants that form ozone are byproducts of fossil fuel combustion and the evaporation of chemical solvents and fuels.

Peak ozone concentrations often occur downwind of the precursor emission sources, making ozone a pollutant of regional concern.

Emissions of ozone precursors have decreased over the past several years because of more stringent motor vehicle standards and cleaner-burning fuels. Consequently, ozone concentrations in the SVAB and SFBAAB have declined as well, though concentrations in the SVAB have not declined as rapidly as in other urban areas because of its location and population growth, making it both a generator and receptor of pollutants.

Carbon monoxide (CO) is a colorless, odorless, and poisonous gas produced by incomplete combustion of carbon in fuels. Most CO emissions are from mobile sources, such as cars and trucks. The remainder of CO emissions is attributable to stationary and area sources, such as wood-burning stoves, incinerators, and factories. The highest concentrations are associated with cold, stagnant weather conditions that occur during the winter. In contrast to ozone, which is a pollutant of regional concern, CO is a pollutant of localized concern.

Nitrogen dioxide (NO_2) is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary internal-combustion engines. Because NO_2 is created and destroyed by reactions associated with ozone, the NO_2 concentration in a particular geographical area may not be representative of the local emission sources. The severity of the adverse health effects depends primarily on the concentration inhaled rather than the duration of exposure. Acute symptoms and prolonged impairment are typically experienced in the respiratory system.

Sulfur dioxide (SO_2) is produced by stationary sources, such as coal and oil combustion, steel mills, refineries, and pulp and paper mills. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration rather than duration of exposure is an important determinant of respiratory effects.

Particulate matter (PM) with diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires, and natural windblown dust, and particulate matter formed in the atmosphere through other processes. Fine particulate matter ($PM_{2.5}$) includes a subgroup of smaller particles that have a diameter of 2.5 micrometers or less.

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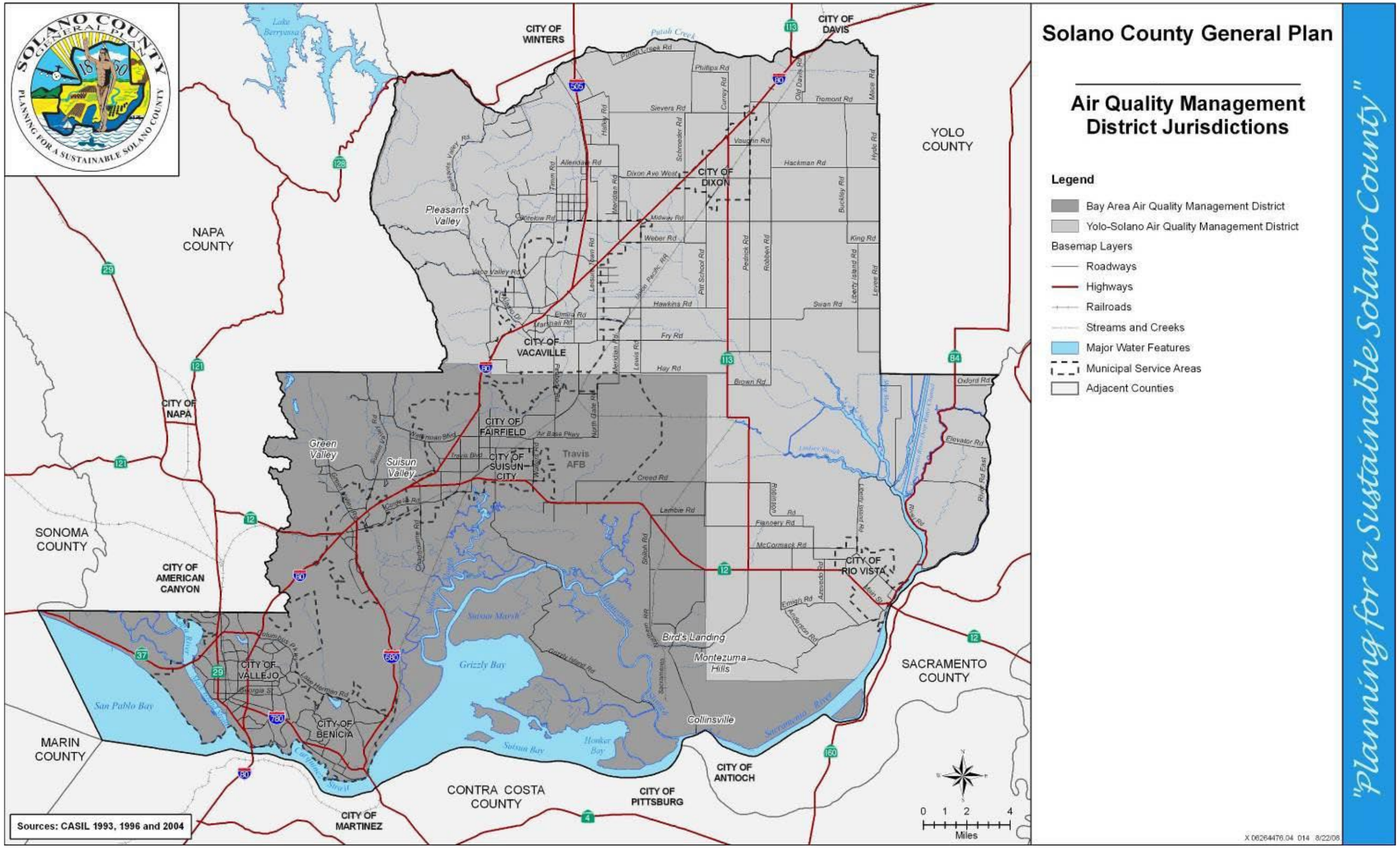
Health effects resulting from air pollution may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations to the immune system, short-term and/or long-term illness. $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and may contain substances that are particularly harmful to human health.

Direct emissions of PM increased slightly in the SVAB and SFBAAB between 1975 and 2005 and are projected to increase through 2020. These emissions come from areawide sources, primarily because of development. Direct emissions from mobile and stationary sources have remained relatively steady.

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. Since the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions. The highest levels of lead in the air are generally found near lead smelters. Other stationary sources include waste incinerators, utilities, and lead-acid battery manufacturers. In California, lead emissions and ambient lead concentrations have decreased dramatically over the past 25 years. Although the ambient lead standards are no longer violated, lead emissions from stationary sources still pose localized hazardous air quality in certain areas, and lead is classified as a toxic air contaminant (TAC) by the California Air Resources Board (CARB).

Figure HS-19: Air Quality Management Districts



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Toxic Air Contaminants

Concentrations of TACs are also used as indicators of ambient air quality conditions. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the CARB, the majority of the estimated health risk from TACs can be attributed to relatively few compounds, the most important being PM from diesel-fueled engines (diesel PM).

Planning Efforts

Several site design and planning methods can be employed to minimize exposure of sensitive receptors to excessive concentrations of air pollutants and odors. Given the nature of planning in Solano County and the emphasis on focusing development in municipal areas, many of the following methods should be encouraged within the cities or should be accomplished in coordination with cities. Methods advocated by local air quality management districts and the CARB include the following.

Abatement. Since mobile-source emissions are of great concern, development should be planned such that the use of motor vehicles is not required to meet daily needs. Minimizing vehicle miles traveled reduces mobile-exhaust pollutant emissions from the source, improving air quality, along with offering many other environmental and social benefits. Planning strategies for new or existing development to abate mobile-source air pollutant emissions include, but are not limited to, mixing of land use types (e.g., residential, office, retail, parks, and schools are within walking distance with pedestrian barriers minimized), creating a pedestrian- and bicycle-friendly environment through providing facilities and accessibility, providing convenient and efficient multi-modal transit options, and minimizing the supply of free parking at destinations.

In addition to abatement of mobile-source emissions, abatement of stationary-source emissions from utilities can occur through energy and water conservation strategies at the end use. Within the unincorporated county area, these techniques will receive more focus.

Ensure Land Use Compatibility. The CARB guidance document, Air Quality and Land Use Handbook, recommends distances from which sensitive uses should be sited relative to pollutant emissions sources and vice versa. For example, residential development should generally be set back approximately 500 feet from major roadways to reduce long-term exposure of the public to excessive concentrations of diesel PM. Similar recommendations exist for facilities that accommodate large numbers of commercial trucks, rail yards, ports, refineries, chrome platers, dry cleaning establishments, and gasoline stations.

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In addition, odor-generating facilities, including, but not limited to, landfills or other waste disposal or transfer facilities, wastewater treatment, food processing, refineries, manufacturing, rendering plant, and cattle or dairy operations should not encroach on residential or otherwise incompatible uses, and residential uses should not encroach on uses that may cause nuisance odors.

Implement Best Management Practices. Construction and agricultural activities, though typically short-term in nature, can generate large quantities of fugitive dust (PM) emissions. These emissions can cause nuisance if visible quantities of dust intrude onto neighboring property, can cause health problems, as discussed previously, if sensitive persons are exposed, and can damage neighboring crops. Standard best management practices, such as regular watering or application of non-toxic soil stabilizers, episodic control to limit activity on days with high winds or forecast poor air quality, installation of wind-breaks, and reestablishment of groundcover on inactive areas can be very effective methods for controlling PM (dust).

To minimize short-term mobile-source emissions from construction or agricultural equipment, operators of older model equipment and pumps should be encouraged to seek engine upgrades through the appropriate air quality management district or CARB incentive program. Engine idling should be minimized when equipment is not in use.

Climate Change

It has been documented by the scientific community that increasing levels of greenhouse gases (GHGs) in the earth's atmosphere are contributing to rising global average temperatures. The most abundant GHG is carbon dioxide (CO_2), which is a byproduct of fossil fuel combustion. CO_2 is removed from the atmosphere through sequestration by vegetation and dissolution into the ocean. Carbon sequestration is the absorption or removal from the air of CO_2 by plants or natural processes. These sequestration processes happen naturally, but human-generated emissions have outpaced these removal processes, resulting in excessive GHG concentrations accumulating in the atmosphere, and leading to a subsequent trend of unnatural global warming.

The planning practices noted to reduce air pollutant emissions from motor vehicles and stationary and area sources also act to minimize CO_2 emissions from the same sources. Other GHGs, such as methane and nitrous oxide, have higher global warming potential (or are more efficient at warming the climate than an equivalent mass of CO_2) but are emitted in smaller quantities. Using construction materials that sequester carbon, such as lumber, in place of more carbon-intensive materials, such as concrete, are good practices to abate GHG emissions from new development. Encouraging renewable energy technology to support the energy needs of new and existing development can also mitigate potential for increased energy demand and associated GHG emissions at the utility provider.

Since the transportation sector is responsible for the majority of GHG emissions in California and nationally, minimizing dependence on motor vehicles is a high priority. Legislation and Executive Orders on the subject of climate change in California (Assembly Bill 32 and

Executive Order S-3-05) are interpreted to regulate stationary sources of emissions and high global warming potential-producing sectors. Mobile-source emissions of GHGs that can be attributed to land use decisions are not in themselves their own emissions sector. State law mandates that total statewide emissions must be reduced to 1990 levels by the year 2020 and statewide GHG emissions must continue to be reduced in future years, with 30 years of population and economic growth in place. To achieve the goals mandated through State law, every emission sector will need to do its part to reduce total emissions, including land use planning.

Related Plans, Programs, and Agencies

Air quality in Solano County is regulated by the US Environmental Protection Agency (EPA), CARB, the YSAQMD, and BAAQMD. Each of these agencies develops rules, regulations, policies, and/or goals to comply with applicable standards. Although EPA regulations may not be superseded, both State and local regulations may be more stringent.

United States Environmental Protection Agency

The EPA is the federal agency charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments to the CAA were made by Congress in 1990. The CAA required EPA to establish national ambient air quality standards.

California Air Resources Board

CARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementation of the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required CARB to establish California ambient air quality standards (CAAQS). CARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. In most cases the CAAQS are more stringent than the national ambient air quality standards. In addition, the CAAQS incorporates a margin of safety to protect sensitive individuals.

Air Quality Management Districts

The YSAQMD attains and maintains air quality conditions in the northeastern portion, while the BAAQMD's jurisdiction includes the southwestern portion of Solano County. Both districts prepare plans and programs for the attainment of ambient air quality standards, adopt and enforce rules and regulations, and issue permits for stationary sources. The districts also inspect stationary sources, respond to citizen complaints, and monitor ambient air quality and meteorological conditions.

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Air Quality Goals, Policies, and Implementation Programs

Goal HS.G-9: Maintain equitable and healthy air quality in Solano County through actions that avoid and minimize health risks from localized pollution sources and regional wildfire smoke.

Policies

Policy HS.P-85: Support land use, transportation management, infrastructure, and environmental planning programs that reduce vehicle emissions and improve air quality.

Policy HS.P-86: Minimize health impacts from sources of toxic air contaminants, both stationary (e.g., refineries, manufacturing plants) as well as mobile sources (e.g., freeways, rail yards, commercial trucking operations).

Policy HS.P-87: Promote consistency and cooperation in air quality planning efforts.

Policy HS.P-88: Coordinate with and provide incentives to agricultural producers to minimize the impacts of operations on air quality.

Policy HS.P-89: Promote greenhouse gas emission reductions by supporting carbon-efficient farming methods (e.g., methane capture systems, no-till farming, crop rotation, cover cropping, residue farming); installation of renewable energy technologies; protection of grasslands, open space, and farmlands from conversion to other uses; and encouraging development of energy-efficient structures.

Implementation Programs

Regulations

HS.I-56: Periodically update the community greenhouse gas emissions inventory for the unincorporated county as specified in the Solano County Climate Action Plan, in accordance with the most recently established methodologies of the California Climate Action Registry or California Air Resources Board.

Related Policies: HS.P-83, HS.P-84, HS.P-85, HS.P-86, HS.P-87

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Every three years

HS.I-57: Adopt a trip-reduction ordinance and encourage employers to develop practices that reduce employees' vehicle trips. Such practices include telecommuting, provision of bicycle facilities, and provision of shuttles to public transit.

Related Policies: HS.P-83

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Development Review

HS.I-58: Require that when development proposals introduce new significant sources of toxic air pollutants, they prepare a health risk assessment as required under the Air Toxics "Hot Spots" Act (Assembly Bill 2588, 1987) and based on the results of the assessment, establish appropriate land use buffer zones around those areas posing substantial health risks.

Related Policies: HS.P-83, HS.P-84

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach, and Education

HS.I-59: Encourage agricultural best management practices regarding herbicide and pesticide use, odor control, fugitive dust control, and agricultural equipment emissions to minimize air quality impacts.

Related Policy: HS.P-86

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-60: Require the implementation of best management practices to reduce air pollutant emissions associated with the construction of all development and infrastructure projects.

Related Policies: HS.P-83, HS.P-84

Agency/Department: Department of Resource Management

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Funding Source: General Fund

Time Frame: Ongoing

HS.I-61: Require environmentally responsible government purchasing. Require or give preference to the purchase of products that reduce or eliminate indirect greenhouse gas emissions (e.g., giving preference to recycled products over products made from virgin materials).

Related Policy: HS.P-87

Agency/Department: Department Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-62: Comply with the California Air Resources Board and Bay Area or Yolo-Solano Air Quality Management District rules, regulations, and recommendations for Solano County facilities and operations. Such operations shall comply with mandated measuresto reduce emissions from fuel consumption, energyconsumption, surface coating operations, and solvent usage.

Related Policies: HS.P-83, HS.P-84, HS.P-86

Agency/Department: Department of Resource Management

HS.I-63: Encourage coordination between the Bay Area and Yolo-Solano Air Quality Management Districtsfor consistency in air quality planning efforts.

Related Policies: HS.P-85

HS.I-64: Use the guidelines presented in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Health* Perspective, or the applicable Air Quality Management District guidelines and recommendations available at the time, when establishing buffers around sources of toxic air contaminants or odorous emissions.

Related Policy: HS.P-84

HS.I-65: Assess air quality impacts using the latest version of the California Environmental Quality Act Guidelines and guidelines prepared by the applicable AirQuality Management District.

Related Policies: HS.P-84, HS.P-85, HS.P-86

Agency/Department: Department of Resource Management

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NOISE

Planning Context

This section describes actions that can be used to prevent noise conflicts between adjoining land uses. The County's noise reduction and abatement strategy focuses on preventative techniques that protect noise-sensitive land uses from noise-producing sources by:

- Developing strategies for reducing excessive noise exposure through cost-effective measures and appropriate zoning that avoids placing incompatible land uses in proximity of each other.
- Protecting existing regions of the county where noise levels are currently acceptable and locations that are deemed "noise-sensitive."
- Protecting existing noise-generating commercial and industrial uses from encroachment of new noise-sensitive developments.
- Preventing new noise-generating commercial and industrial uses in Solano County from encroaching on noise-sensitive land uses.
- Providing sufficient information regarding existing and future community noise levels so that noise may be effectively considered in land use planning.

The County's noise policies and implementation programs were created to support the County's vision to create a place where people can live, work, and play in close proximity. To successfully integrate these lifestyle needs, noise sources need to be designed, developed, and maintained in a way that does not affect residential neighborhoods, schools, hospitals, places of worship, and other noise-sensitive land uses. For the purposes of this chapter, noise-sensitive land uses include schools, hospitals, rest homes, long-term care facilities, mental care facilities, and residences. Industrial and commercial land uses may cause noise but are essential for economic growth. Through careful planning, these land uses can continue to operate and grow to support the economy of the county.

Measuring Noise

Noise is defined as unwanted sound. It can cause stress and annoyance within a community. This section provides standards for analyzing future projects that may contribute to an increase in noise levels. The proposed policies and programs outline control measures for preventing excessive noise, while still allowing necessary noise sources to exist. The primary method for meeting these two goals is by separating noise-sensitive land uses, such as housing, schools and parks, from noise-producing land uses, such as highways, airports, and industry.

Because of the ability of the human ear to detect a wide range of sound, noise levels are expressed in logarithmic units called decibels (dB) to avoid a very large and awkward range in numbers. The audible range of hearing in humans is 0 dB to 130 dB. Above 130 dB damage may occur to the ear.

Because the human ear is not equally sensitive to all audible frequencies, a frequency-dependent rating scale was devised to relate noise to human sensitivity. An A-weighted dB (dBA) scale performs this compensation by discriminating against frequencies that are more sensitive to humans. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale has been chosen by most authorities for the purpose of regulating environmental noise. Typical indoor and outdoor noise levels are presented in **Table HS-2**.

With respect to how humans perceive and react to changes in noise levels, a 1 dBA increase is imperceptible, a 3 dBA increase is barely perceptible, a 6 dBA increase is clearly noticeable, and a 10 dBA increase is subjectively perceived as approximately twice as loud. For these reasons, a noise level increase of 3 dBA or more is typically considered to be substantial in terms of the degradation of the existing noise environment.

Two 24-hour descriptors commonly used to characterize ambient noise levels include the day-night noise level (L_{dn}) and the Community Noise Equivalent Level (CNEL). L_{dn} is the 24-hour energy mean (average) noise level with a 10 dB "penalty" for noise events that occur during the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. The L_{dn} descriptor attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours. The CNEL is similar to the L_{dn} but with an additional 5 dB "penalty" added to single noise events that occur during the noise-sensitive hours between 7:00 p.m. and 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the reported CNEL is typically approximately 0.5 dB higher than the L_{dn}. Noise levels of 60 dB L_{dn}/CNEL are often used as a benchmark when assessing noise levels. Outdoor noise levels that exceed 60 dB L_{dn} /CNEL are generally considered inappropriate in residential areas.

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Table HS-2: Typical A-Weighted Sound Levels of Common Noise Sources

Loudness Ratio Level	A-Weighted Sound Level (dBA)	
128	130	Threshold of pain
64	120	Jet aircraft take-off at 100 feet
32	110	Riveting machine at operators position
16	100	Cut-off saw at operators position
8	90	Bulldozer at 50 feet
4	80	Diesel locomotive at 300 feet
2	70	Commercial jet aircraft interior during flight
1	60	Normal conversation speech at 5–10 feet
1/2	50	Open office background level
1/4	40	Background level within a residence
1/8	30	Soft whisper at 2 feet
1/16	20	Interior of recording studio

Noise Performance Standards

Daytime noise standards are typically set at noise levels that would not annoy or impede human interaction or function in outdoor activity areas. Nighttime noise standards are typically set to result in acceptable noise levels that would not interfere with sleep for most people inside a building with windows closed. In general, noise standards are designed to prevent annoyance or sleep disruption in sensitive members of the public.

Table HS-3 shows the acceptable noise levels for various land use categories and is used when determining a proposed project's noise impact.

Table HS-3: Land Use Compatibility Guidelines

Land Use Category	Community Noise Exposure (Ldn or CNEL, dBA)			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential—Low-Density Single-Family, Duplex, Mobile Home	<60	55–70	70–75	75+
Residential— Multifamily	<65	60–70	70–75	75+
Transient Lodging—Motel, Hotel	<65	60–70	70–80	80+
Schools, Libraries, Churches, Hospitals, Nursing Homes	<70	60–70	70–80	80+
Auditoriums, Concert Halls, Amphitheaters		<70	65+	
Sports Arena, Outdoor Spectator Sports		<75	70+	
Playgrounds, Neighborhood Parks	<70		67.5–75	72.5+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	<75		70–80	80+
Office Building, Business Commercial, and Professional	<70	67.5–77.5	75+	
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	

Notes:

CNEL = community noise equivalent level; dBA = A-weighted decibel; Ldn = day-night average noise level

These standards are not applicable for development within the airport compatibility review area. Development in the airport compatibility review areas are subject to standards in the applicable airport land use plan.

[1] Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

[2] New construction or development should be undertaken only after a detailed analysis of the noise-reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

[3] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.

[4] New construction or development should generally not be undertaken.

Source: State of California Governor's Office of Planning and Research 2003; EDAW 2007.

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Table HS-4 provides acceptable outdoor and interior noise levels for land uses.

Table HS-4: Noise Standards for New Uses Affected by Traffic and Railroad Noise

New Land Use	Sensitive Outdoor Area (dBA Ldn)	Sensitive Interior[1] Area (dBA Ldn)	Notes
All Residential	65	45	2
Transient Lodging	65	45	2, 3
Hospitals and Nursing Homes	65	45	2, 3, 4
Theaters and Auditoriums	–	35	3
Churches, Meeting Halls, Schools, Libraries, etc.	65	40	3
Office Buildings	65	45	3
Commercial Buildings	–	50	3
Playgrounds, Parks, etc.	70	–	
Industry	65	50	3

Notes:

dBA = A-weighted decibels; Ldn = day-night average noise level

[1] Interior-noise-level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in the closed positions.

[2] If these uses are affected by nighttime railroad passages, the potential for sleep disturbance shall be addressed.

[3] Where there are no sensitive exterior spaces proposed for these uses, only the interior-noise- level standard shall apply.

[4] Hospitals are often noise-generating uses. The exterior-noise-level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.

Table HS-5 defines noise performance standards for non-transportation noise sources. In addition, properties within an influence area surrounding Travis Air Force Base, Rio Vista Municipal Airport, or Nut Tree Airport are also subject to the more stringent noise/land use compatibility standards of the applicable Airport Land Use Compatibility Plan (ALUCP). **Figure LU-6** shows the areas in which land use proposals must comply with the standards of the applicable ALUCP. **Figures HS-20**, **HS-21**, and **HS-22** show the noise contour lines surrounding the three airports. These are provided for informational purposes only. For the appropriate standards, please see the applicable ALUCP.

Table HS-5: Non-transportation Noise Standards—Average (dBA L_{eq})/Maximum (dBA L_{max})[1] Noise

Receiving Land Use	Outdoor Area		Interior[2]	Notes
	Daytime	Nighttime	Day and Night	
All Residential	55/70	50/65	35/55	
Transient Lodging	55/75	–	35/55	3
Hospitals and Nursing Homes	55/75	–	35/55	4, 5
Theaters and Auditoriums	–	–	30/50	5
Churches, Meeting Halls, Schools, Libraries, etc.	55/75	–	35/60	5
Office Buildings	60/75	–	45/65	5
Commercial Buildings	55/75	–	45/65	5
Playgrounds, Parks, etc.	65/75	–	–	5
Industry	60/80	–	50/70	5

Notes:

Leq = equivalent or energy-averaged sound level; Lmax = Highest root-mean-square sound level measured over a given period of time

[1] The standards shall be reduced by 5 dBA for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards, then the noise level standards shall be increased at 5 dBA increments to encompass the ambient.

[2] Interior-noise-level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in the closed positions.

[3] Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.

[4] Hospitals are often noise-generating uses. The exterior-noise-level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.

[5] The outdoor activity areas of these uses (if any), are not typically used during nighttime hours.

Noise Contours

The county noise environment can be described with contours derived from monitoring and modeling major sources of noise. A noise contour is a line overlaid on a map or aerial photograph that depicts where a certain noise level occurs. Future noise contours have been estimated with information about baseline and projected land development and associated transportation activity. The contours assist in setting policies for land use planning and establishment of development standards. Contours are provided for roadway noise, railroad noise, and aircraft noise.

Roadway Noise

Figure HS-20 shows the roadway noise contours for baseline year 2006. As the figure illustrates, major highways represent the major sources of noise. **Figure HS-18** identifies the estimated roadway noise contours for the year 2030 based on future estimated traffic levels. Interstates 80, 505, 680, 780, and SR 12 are the most heavily traveled roadways in Solano County and

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therefore have the largest noise impact areas. Given the topographic complexity of Solano County, these contours should be considered conservative estimates of traffic noise exposure and not absolute lines of demarcation, to be supplemented by detailed and project-specific study as needed.

Railroad Noise

Figure HS-22 shows railroad noise contours along the Union Pacific Railroad (UPRR) tracks. Railroad activity in Solano County consists mainly of freight and passenger operations on the UPRR tracks. The UPRR tracks extend from the southwest portion to the northern portion of the county. It is difficult to predict future railroad noise exposure in Solano County without knowing if, or to what degree, railroad activity may change in the future. Therefore, **Figure HS-22** was developed using 1,200-foot distances to the 60 dB Ldn railroad noise contours for various numbers of future daily train activity in Solano County. The data assumes that railroad operations in Solano County would occur uniformly throughout day and nighttime hours.

Aircraft Noise

Estimated noise contours for Travis Air Force Base are shown in **Figure HS-23**. Travis Air Force Base is in the central portion of Solano County just east of the City of Fairfield and is home to three Air Force Command Units. The base occupies approximately 7,100 acres of land, with two 11,000-foot runways oriented northeast-to-southwest away from existing housing developments. Military aircraft are not subject to the same noise standards as commercial aircraft and often fly lower flight patterns.

Estimated noise contours for Rio Vista Municipal Airport are shown **in Figure HS-24**. Rio Vista Municipal Airport is in the southwest corner of Solano County three miles north of the City of Rio Vista.

Estimated 2025 noise contours for Nut Tree Airport are shown in **Figure HS-25**. The Nut Tree Airport is in the central portion of the county within the city limits of Vacaville.

Stationary Noise Source Control

Activities at industrial, commercial, recreational, and public service facilities can also generate noise levels that adversely affect adjacent sensitive land uses. From a land use planning perspective, stationary noise source control strategies focus on two goals: (1) preventing the introduction of new stationary noise sources near noise-sensitive areas and (2) preventing encroachment of noise-sensitive uses on existing stationary noise sources. The first goal can be achieved by applying noise performance standards to proposed stationary noise sources. The second goal can be met by requiring that new noise-sensitive uses near existing stationary noise sources include project features that ensure compliance with noise performance standards.

Noise Reduction in Land Use and Site Planning

The major noise sources in Solano County consist of I-80 and local traffic on city streets, commercial and industrial uses, active recreation areas of parks, outdoor play areas of schools, railroad operations, and aircraft overflights. To compensate for these high levels of noise, buffering can be used to mitigate noise issues by placing space between incompatible land uses. This reduces exposure by increasing the distance between a noise source and a noise-sensitive receptor. Land buffers can take many forms, including open space, frontage roads, recreational areas, and storage yards. The ability to reduce noise with this technique is limited by the surrounding land and characteristics of the noise source.

Noise reduction is approximately minus 3 to 6 dB per doubling of distance from a line and point source, respectively.

Related Plans, Programs, and Policies

California Noise Insulation Standards (Title 24)

Title 24 of the California Code of Regulations establishes standards governing interior noise levels that apply to all new multifamily residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing L_{dn} exceeds 60 dB. Such acoustical studies are required to establish mitigation measures that will limit maximum L_{dn} levels to 45 dB in any habitable room.

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Figure HS-20: Roadway Noise Contours (2006)

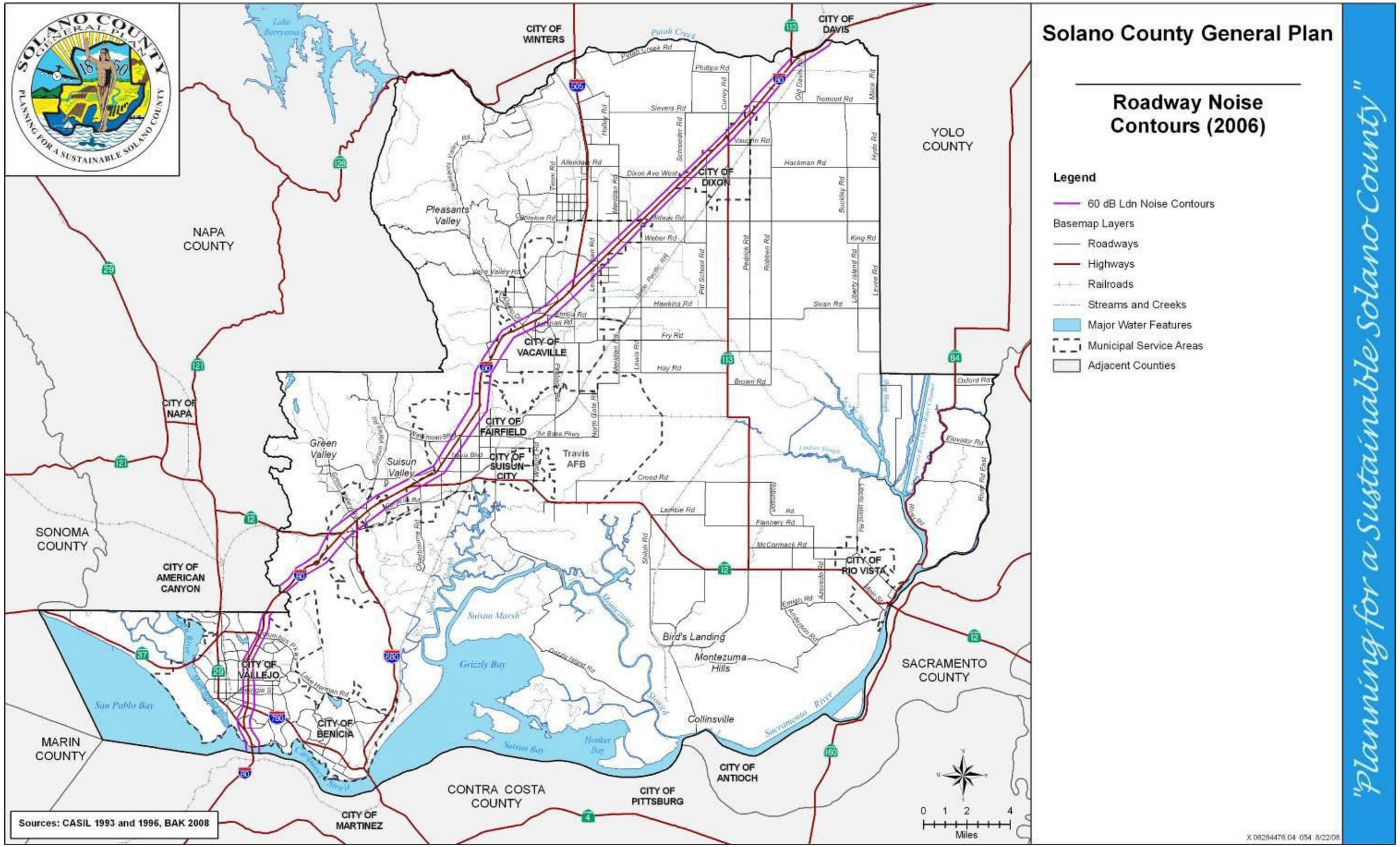

Figure HS-21: Roadway Noise Contours (2030)

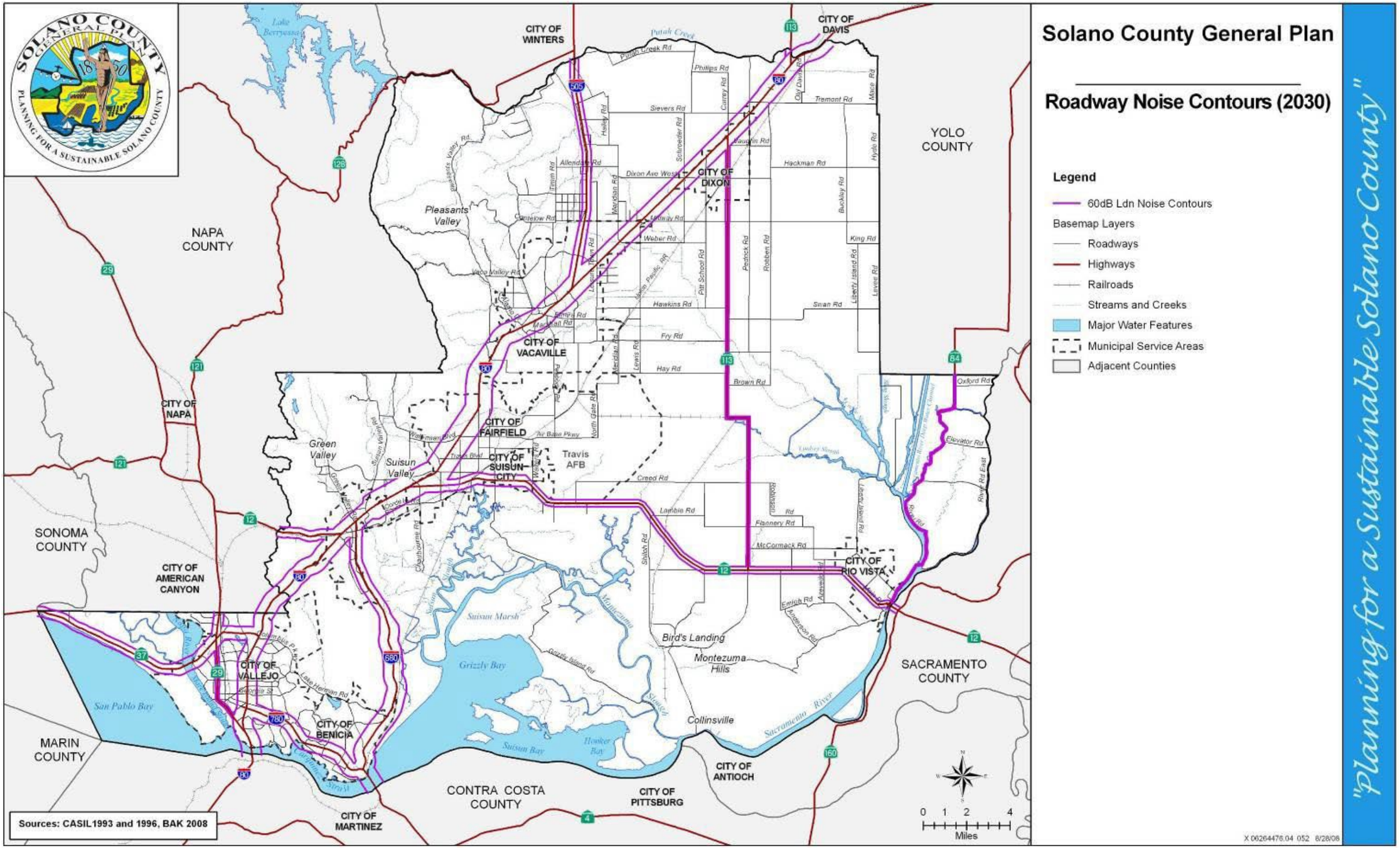

Figure HS-22: Railroad Noise Contours

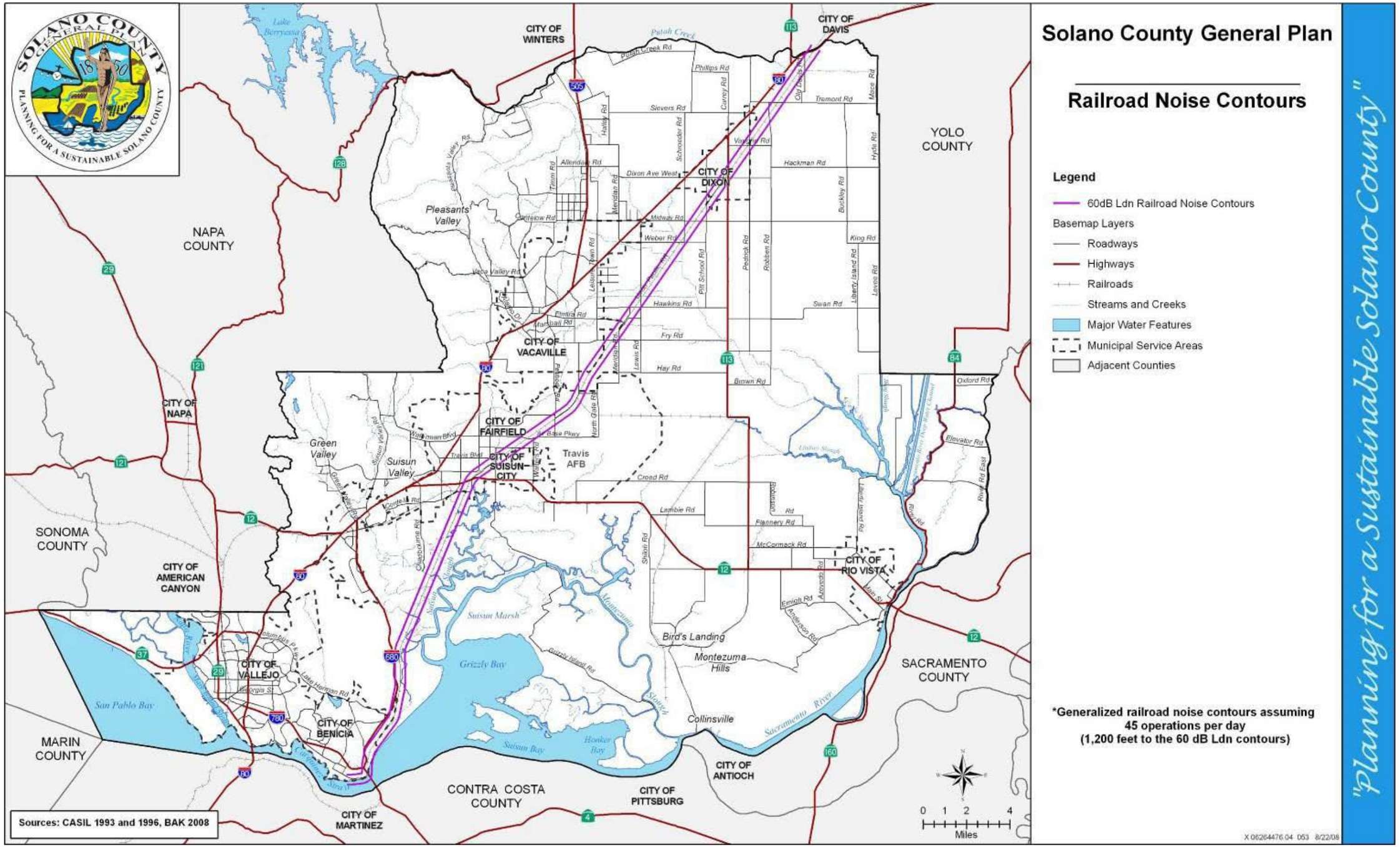

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Figure HS-23: Travis Airforce Base Noise Contours

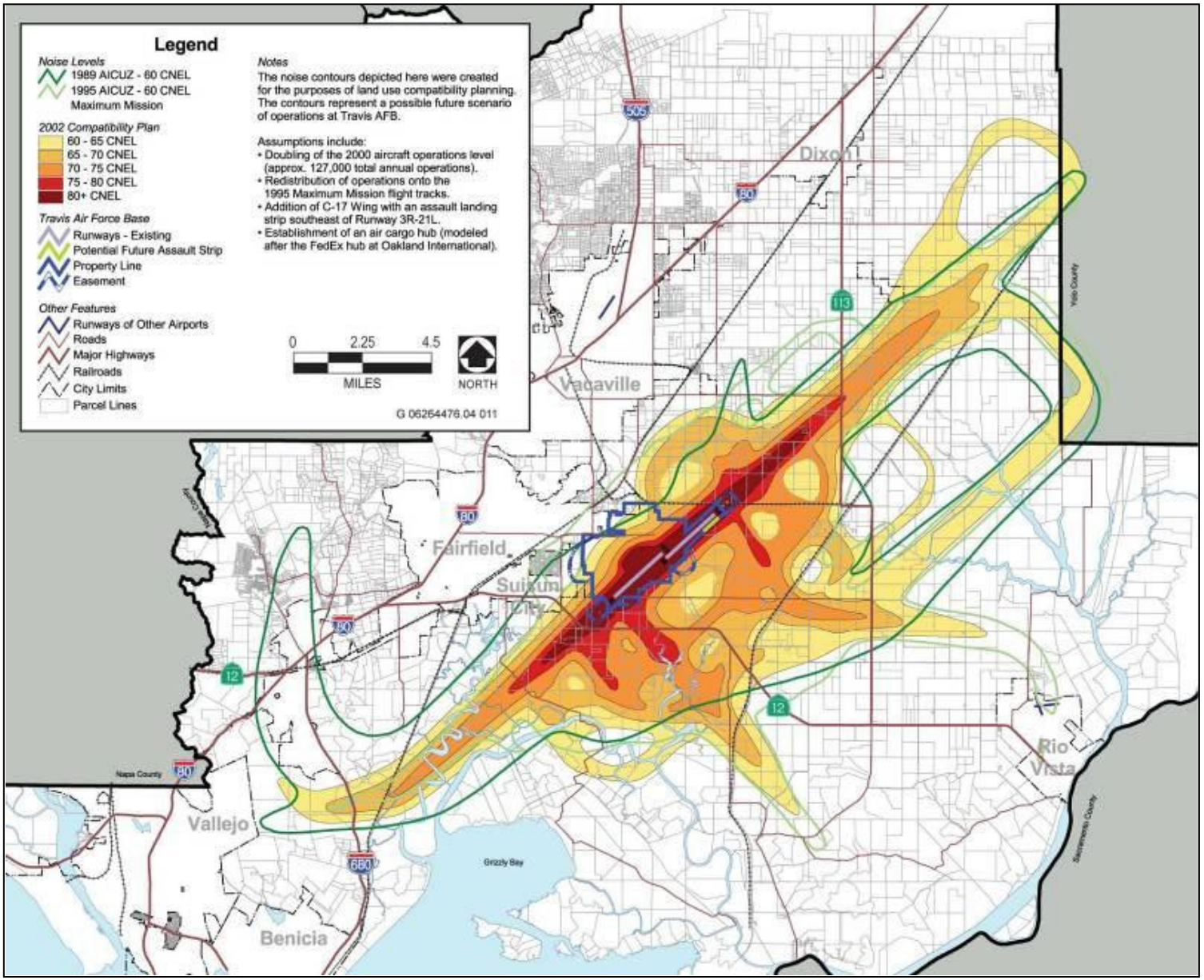

Figure HS-24: Rio Vista Municipal Airport Noise Contours

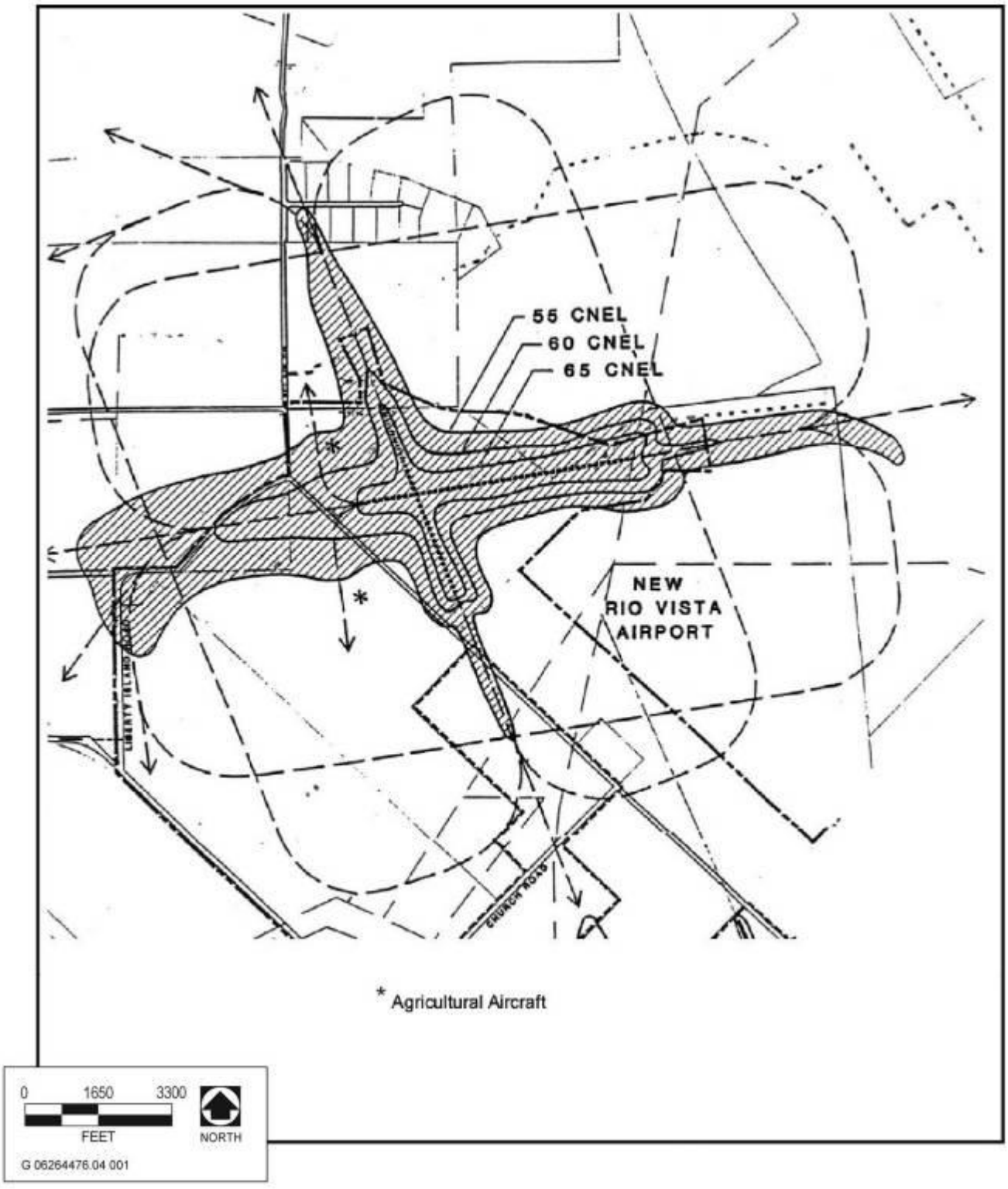

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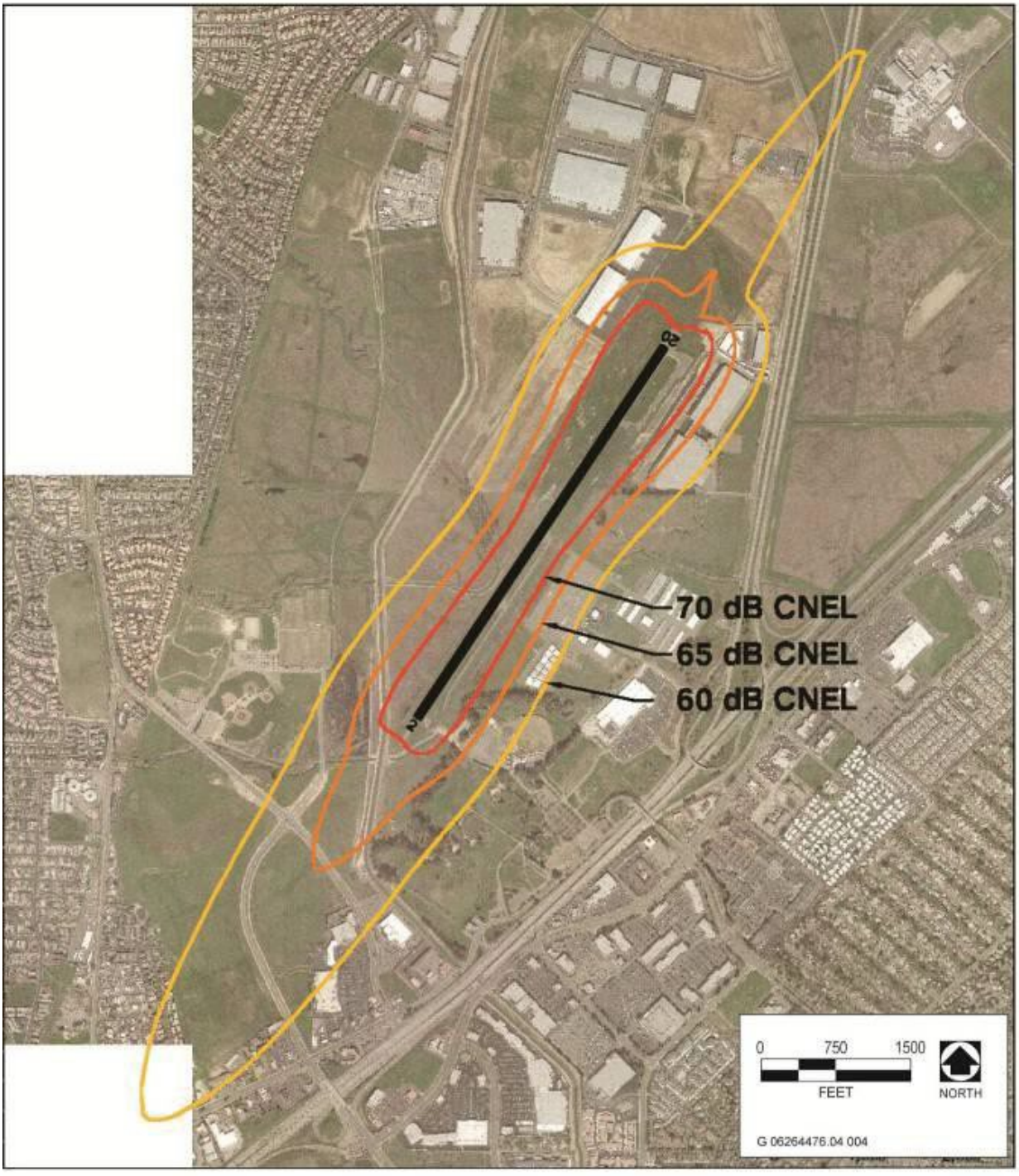
Figure HS-25: Nut Tree Airport Noise Contours



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Noise Goals, Policies, and Implementation Programs

Goal HS.G-10: Create a community protected from the harmful impacts of excessive noise.

Policies

Policy HS.P-90: Consider and promote land use compatibility between noise-sensitive[2] and noise-generating land uses when reviewing new development proposals.

Policy HS.P-91: Encourage design that minimizes negative effects of noise without compromising aesthetic values and pedestrian and auto connectivity.

Policy HS.P-92: Ensure that development in the vicinity of the Travis Air Force Base or the Rio Vista or Nut Tree airports is compatible with existing and projected airport noise levels.

Policy HS.P-93: Develop strategies with residents and businesses to reduce noise conflicts.

Policy HS.P-94: Minimize noise conflicts between current and proposed land uses and transportation networks by encouraging compatible land uses around critical areas with higher noise potential.

Implementation Programs

Funding, Physical Improvements, and Capital Projects

HS.I-66: Trucks tend to generate noise in excess of applicable standards, but goods movement by truck is necessary to support the area's economy. Thus, continue to designate and maintain established truck routes where noise conflicts with land uses are least likely to occur.

Related Policy: HS.P-92

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

[2] For the purposes of this chapter, noise-sensitive land uses include schools, hospitals, rest homes, long-term care, mental care facilities, and residences. Outdoor activity areas are considered to be the portion of a noise-sensitive property where outdoor activities would normally be expected (i.e., patios of residences and outdoor instructional areas of schools). Outdoor activity areas for the purposes of this section do not include gathering spaces alongside transportation corridors or associated public rights-of-way.

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Development Review

HS.I-67: When reviewing new development proposals:

- Require noise abatement measures to ensure that noise levels will not exceed those indicated in **Tables HS-4** and **HS-5**.
- Require buffering between noise-sensitive land uses and noise sources unless a detailed noise analysis is conducted, and noise abatement measures can be taken to reduce noise to acceptable levels, as shown on **Tables HS-4** and **HS-5.**
- Where development projects produce, or are affected by, non-transportation-related noise, require the inclusion of project features that will enable the project to achieve acceptable levels specified in **Table HS-5**, as measured at outdoor activity areas of existing and planned noise-sensitive land uses.
- Require noise mitigation to reduce construction and other short-term noise impacts as a condition of approval for development projects by applying the performance standards outlined in **Table HS-5**. The total noise level resulting from new sources and ambient noise shall not exceed the standards in **Table HS-5**, as measured at outdoor activity areas of any affected noise-sensitive land use except:
    - If the ambient noise level exceeds the standard in **Table HS-5**, the standard becomes the ambient level plus 5 dB.
    - Reduce the applicable standards in **Table HS-5** by 5 dB if they exceed the ambient level by 10 or more dB.
    - Under the conditions outlined below, require acoustical studies to be prepared as part of the development review process to ensure adequate analysis of proposed development and incorporation of noise-reducing features in project designs. Acoustical studies with appropriate noise abatement measures will be required for all discretionary projects where any of the following conditions apply:
        - The project is within the existing or future 60 dB CNEL transportation noise contours as measured at outdoor activity areas of noise-sensitive land uses.
        - The project will cause future traffic volumes to exceed 5,000 average daily trips on any roadway that fronts residential, institutional, and open space land uses or will cause traffic volume to increase by 25 percent or more, on any of these roadways.

- The project will introduce noise or vibration sources associated with mechanical equipment operations, entertainment, maintenance, and facility operations.
- The project is a proposed residential use in the vicinity of existing and proposed commercial and industrial areas.
- The project is proposed in an area where existing noise levels exceed acceptable levels in **Table HS-5,** as measured at outdoor activity areas of noise-sensitive land uses.
- Where it is not possible to reduce noise levels in outdoor activity areas to 60 dB or less using practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB may be allowed, provided that all available exterior noise level reduction measures have been implemented.

Related Policies: HS.P-88, HS.P-90, HS.P-91, HS.P-92

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-68: Refer proposed development projects within areas requiring airport land use compatibility review to the Airport Land Use Commission. Ensure that new development complies with the noise standards contained within the Airport Land Use Compatibility Plans. Maintain buffers between the airports and incompatible land uses.

Related Policies: HS.P-88, HS.P-91, HS.P-92

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-69: Promote the use of berms, landscaping, setbacks, or architectural design for noise abatement, in addition to conventional wall barriers, to enhance aesthetics and minimize pedestrian barriers. Development of noise-sensitive land uses in areas exposed to existing or projected levels of noise from transportation, stationary sources, or agricultural operations exceeding, or estimated to exceed, levels specified in **Table HS-2** shall require transportation planning, traffic-calming, site planning, buffering,

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sound insulation, or other methods to reduce noise exposure in outdoor activity areas and interior spaces to the levels specified in **Table HS-2**.

Related Policy: HS.P-89

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach, and Education

HS.I-70: Make public information readily available on noise abatement measures, the physical and psychological effects of noise on public health and welfare, and the meaning of noise levels and standards. Consider specific mailings to properties in existing or projected 60 dB contours.

Related Policy: HS.P-91

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Coordination with Other Agencies and Organizations

HS.I-71: Locate industrial and other noise-generating land uses away from noise-sensitive land uses and/or require substantial noise sources to be completely enclosed within buildings or structures.

Related Policies: HS.P-88, HS.P-91

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-72: Identify locations and work with the California Department of Transportation to mitigate freeway noise in those locations where such noise adversely affects unincorporated residential land uses.

Related Policy: HS.P-92

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

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Endnotes

[1] Louise Bedsworth, Dan Cayan, Guido Franco, Leah Fisher, and Sonya Ziaja from the California Governor's Office of Planning and Research, Scripps Institution of Oceanography, California Energy Commission and California Public Utilities Commission, 2018, "Statewide Summary Report," in California's Fourth Climate Change Assessment, publication number: SUMCCCA4-2018-013.

[2] Ocean Protection Council, 2018, *State of California Sea-Level Rise Guidance*, https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf.

[3] United States Census Bureau, 2020, "Year Structure Built," in 2016–2020 American Community Survey 5-Year Estimates.

[4] National Oceanic and Atmospheric Administration National Weather Service, 2023, "Glossary," accessed June 28, 2023, https://forecast.weather.gov/glossary.php?word=high%20wind.

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