

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, preserve air and water quality, 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, and
- promoting development that works with nature to slow global climate change and its impact on nature and reduce human risks associated with environmental hazards, including hazards created or increased by climate change.

Public Health and Safety Chapter

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

Purpose

The public health and safety goals, policies, and implementation programs are designed to guide the County toward 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. The Safety and Noise sections included in this Public Health and Safety chapter are required by state law to address specific issues. Although not required as a separate general plan element, state guidelines also recommend that air quality be addressed in a local general plan, either as a separate, optional, element or through policies in a mandatory element (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
- 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 element 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.

Scope and Content

This chapter begins by introducing the County's health and safety goals. Separate sections describing various hazards and their potential impacts on the county follow. These topics include:

- flood control

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- seismic safety and land stability
- fire safety
- hazardous materials
- disaster preparedness
- 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 General Plan Chapters

The Noise and Safety sections included in this chapter are related to the rest of the General Plan, specifically the Land Use, Transportation and Circulation, and Housing chapters.

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; and
- housing locations protecting residences and other noise-sensitive uses from unacceptable sound levels.

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

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 County health and safety, within which the separate topic areas expand to provide policies and programs.

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- HS.G-1: Minimize the potential for loss of life and property resulting from natural or human-caused hazards.**
- HS.G-2: Improve air quality in Solano County, and by doing so, contribute to improved air quality in the region.**
- HS.G-3: Protect people living, working, and visiting Solano County from the harmful impacts of excessive noise.**
- HS.G-4: Protect important agricultural, commercial, and industrial uses in Solano County from encroachment by land uses sensitive to noise and air quality impacts.**
- HS.G-5: Recognize the multiple functions of the natural environment for safety, recreation, protection from climate changes, and economic uses.**
- HS.G-6: Increase awareness of the effect humans have on the environment and encourage individuals and organizations to modify habits and operations that cause degradation to the environment and contribute to climate change.**
- HS.G-7: Prepare for and adapt to the effects of climate change.**

FLOOD CONTROL

Flooding, the submergence of land caused by water overflow, can lead to significant risk and damage to lives and property in Solano County. The policies and implementation programs proposed in this section outline measures to mitigate, prevent, and reduce flooding risks throughout the county.

Planning Context

Seasonal Flooding

In Solano County, a large portion of developed and undeveloped county lands are subject to flooding as a result of heavy seasonal rainfall, dam inundation, and canal or levee failure. A majority of these county flood-prone lands are specifically subject to inundation as a result of heavy rainfall and resulting stream overflows. **Figure HS-1** shows 100-year

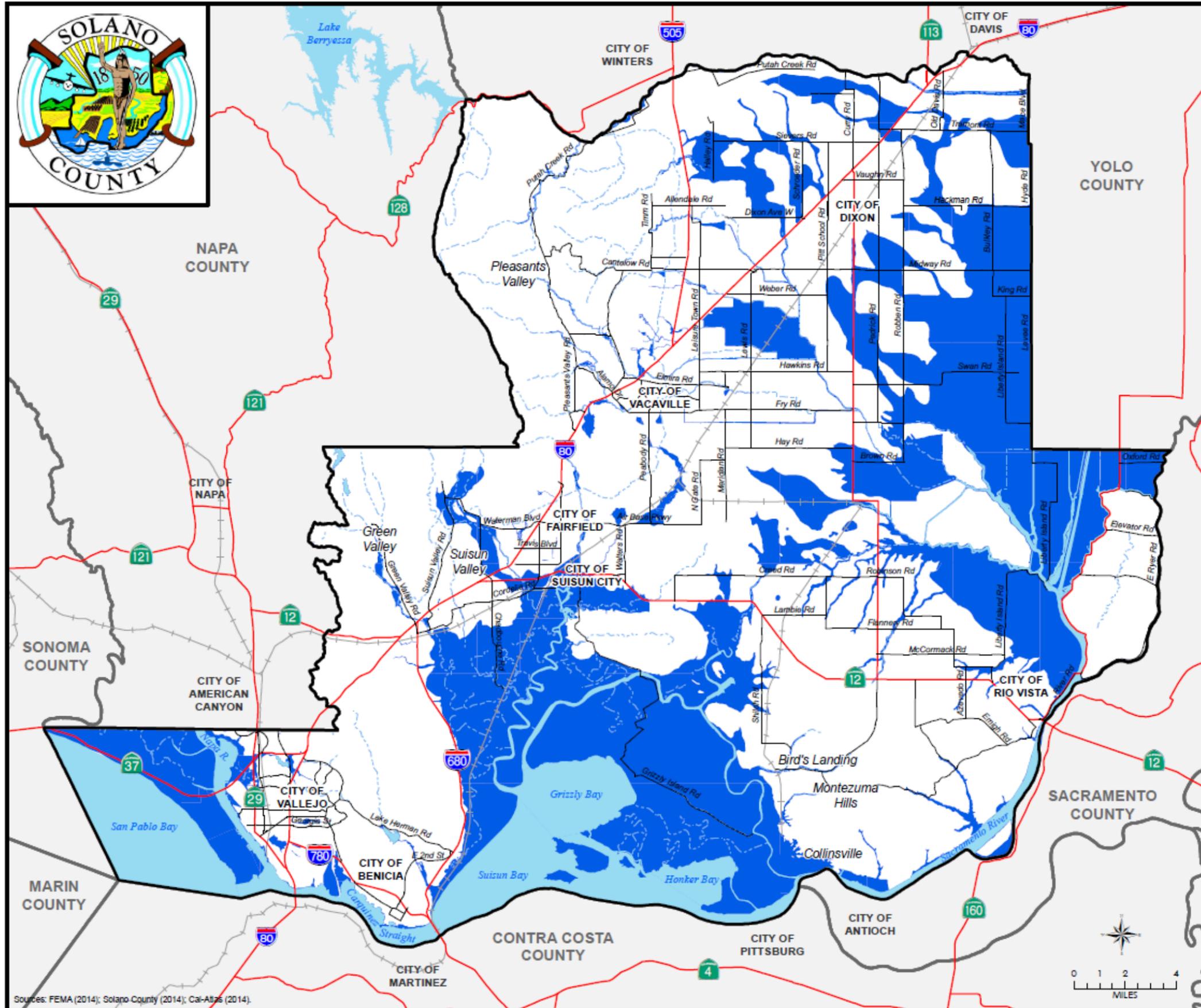
floodplain zones, which are estimated inundation areas based on a flood that has a 1 percent chance of occurring in any given year. These floodplain zones are defined by the Federal Emergency Management Agency. Heavy seasonal rainfall, which typically occurs between November and May, often results in stream overflows. A number of streams in the county have long histories of seasonal flooding, often resulting in significant damage. Flood risk is intensified in the lower stream reaches by the likelihood of coincident high tides and strong offshore winds during heavy rainfall.

Spreading urbanization is further aggravating the potential for stormwater flood damage in the county by reducing floodplain area available to absorb stormwater in low-lying areas and preventing natural absorption of stormwater in the higher land, upstream watersheds. Thus, unchecked urbanization is leading to increased rates and volumes of stormwater runoff in the county. Because of the varying conditions of watersheds in the county, each one should be individually addressed using a coordinated set of County policies that control watershed runoff and stream overflow to reduce flooding.

Agricultural land has long been used for valuable de facto flood protection. Farmers have historically allowed stormwater detention on their properties during storm events and have expressed a desire that the County recognize the positive contributions of farmland as a flood prevention and reduction measure.

Pursuant to Assembly Bill (AB) 162 (2007), the California Department of Water Resources (DWR) and Central Valley Flood Protection Board (formerly State Reclamation Board) adopted a Central Valley Flood Protection Plan (CVFPP) in 2012. AB 162 also established certain flood protection requirements for local land use decision-making based on the CVFPP. This law set a higher standard for flood protection for the Sacramento-San Joaquin Valley area, which covers the entire Delta region. It set an urban level of flood protection necessary to withstand a 1 in 200 chance of a flood occurring in any given year (200-year flood) for areas developed or planned to have a population of at least 10,000. DWR has developed 200-year floodplain maps for the Sacramento-San Joaquin Valley area, which includes a portion of eastern Solano County. The 200-year floodplain within the eastern portion of Solano County is shown in **Figure HS-2**. The area potentially affected by a 200-year flood event in Solano County is located in the Sacramento-San Joaquin Delta on unincorporated land designated for agricultural use, or within the City of Rio Vista Municipal Service Area (MSA).

As required by AB 162 Solano County has incorporated CVFPP measures into this Element of the General Plan, through inclusion of new 200-year flood, levee, and dam mapping, as well as more extensive flood risk analysis. The County will incorporate related measures into the Zoning Ordinance. Additionally, the County will continue to apply CVFPP information in the development and approval of specific projects and developments.



Solano County General Plan

Figure HS-1

100-Year Floodplain Zone

Legend

- 100-Year Floodplain
- Basemap Layers
- Roadway
- Highway
- Railroad
- Streams and Creeks
- Major Water Features
- Adjacent Counties

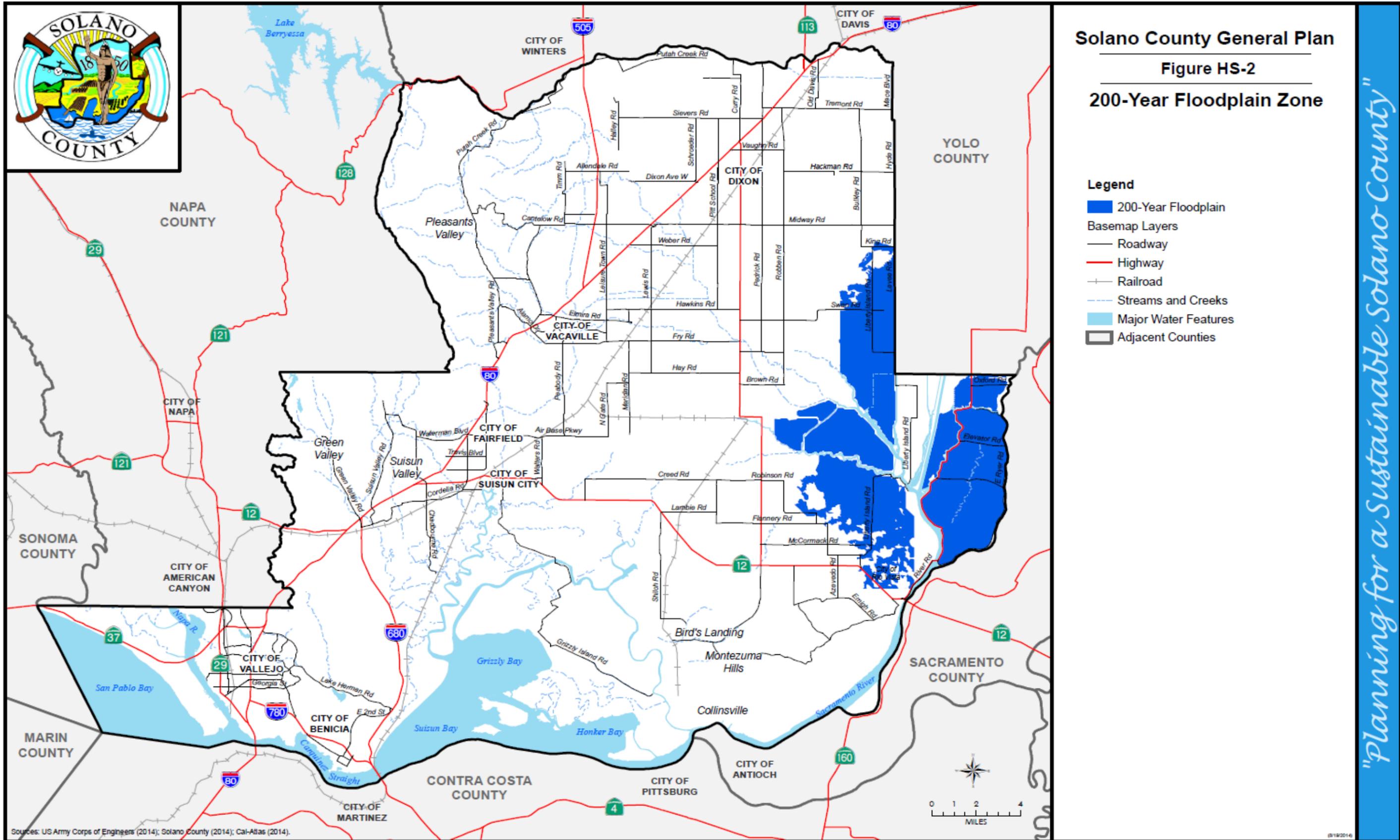
"Planning for a Sustainable Solano County"

"Planning for a Sustainable Solano County"

Sources: FEMA (2014); Solano County (2014); Cal-AHS (2014).



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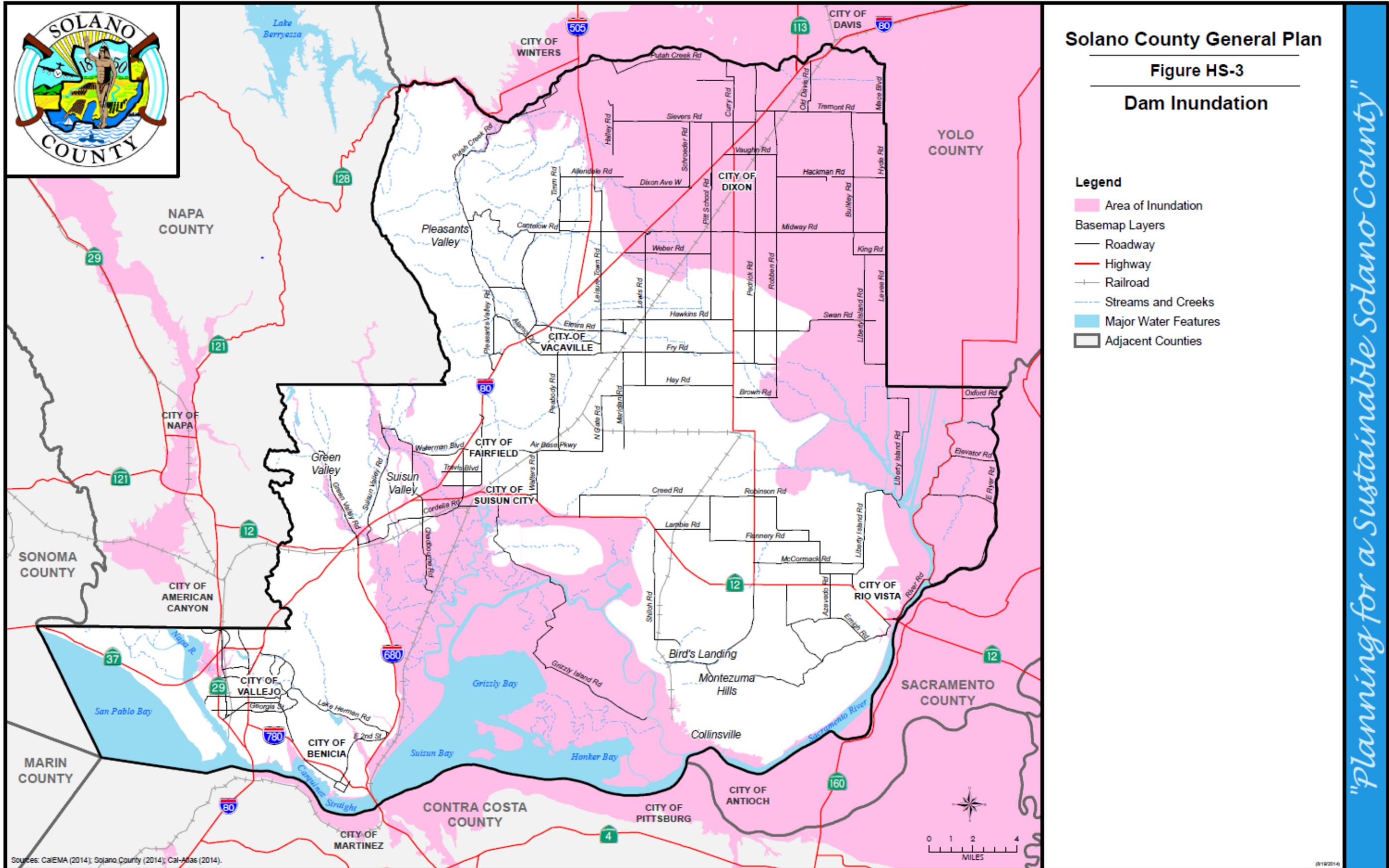
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Dam Inundation

Dam inundation occurs when a dam is not structurally sound or is unable to withstand damages resulting from seismic activity. The degree and rapidity of dam failure depends on the dam's structural characteristics. **Figure HS-3** shows inundation impacts of dam failures, as prepared by the California Office of Emergency Services (also called CalEMA).

There are 18 regulation dams in Solano County, that meet the specifications under Water Code Sections 6002-6004 (25 feet in height above the streambed, or an impounding capacity of 50 acre-feet or more). Of these dams, the State of California Office of Emergency Services has identified 10 where dam inundation has the potential to cause human injury or loss of life. To reduce the likelihood of dam inundation, policies and programs are included in this section requiring 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.



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Canal or Levee Failure

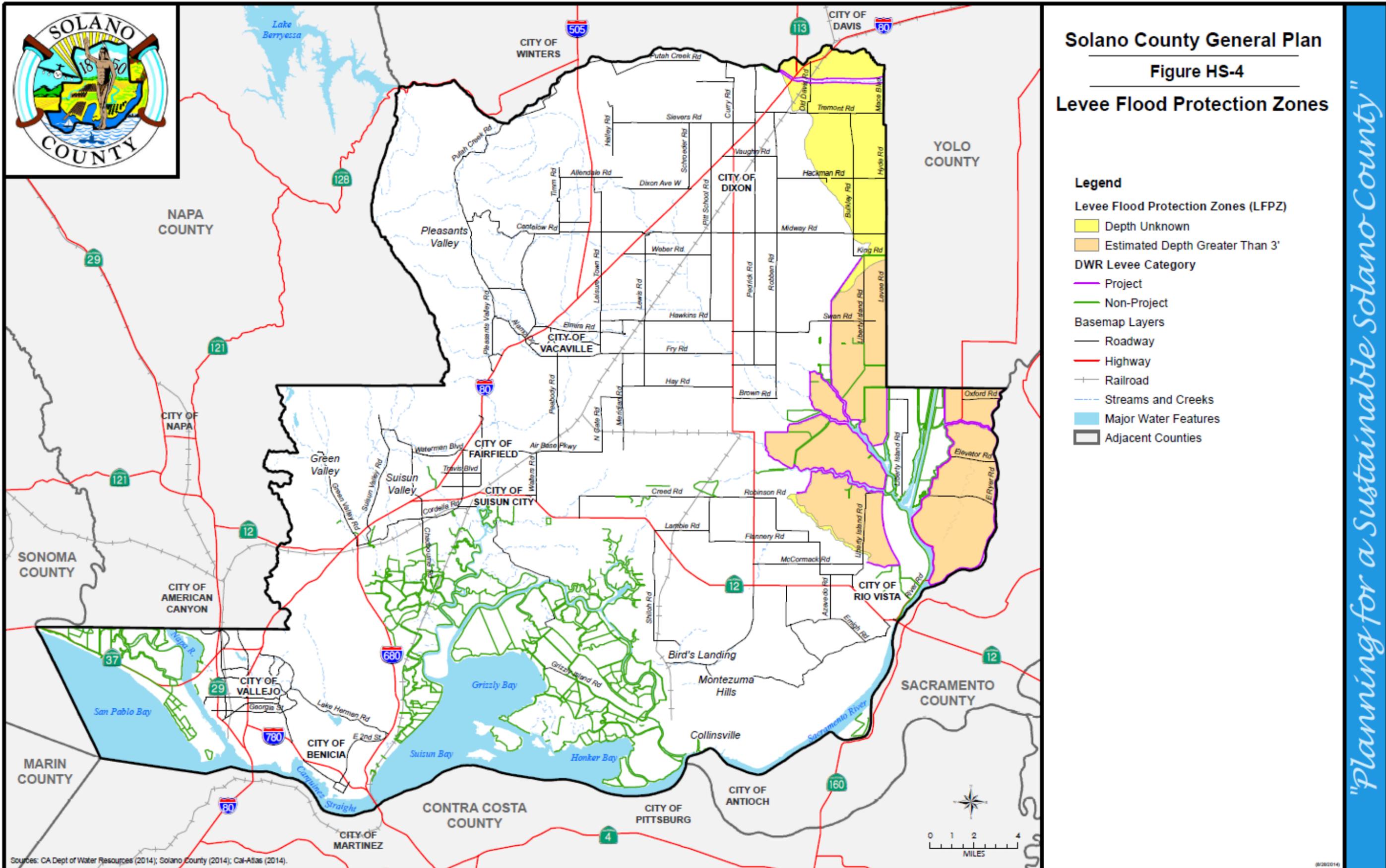
Canals or levees may fail because of earthquake-induced slumping, landslides, and liquefaction in Solano County. The existing levee system in some Solano County marshlands was initially constructed by hand labor, and later by dredging to hold back river floods and daily tides, to obtain additional lands for grazing and crop growing. Constant maintenance is necessary to hold these levees against the high tides and river floods that threaten reclaimed marsh lands. Because levees are vulnerable to peat oxidation as well as sand, silt, and peat erosion, new material is continually added to maintain them. Subsiding farmlands adjacent to levees may increase water pressure against levees, adding to the potential for levee failure. In addition, most levees are not maintained to any specified standard, which can increase the likelihood of failure and inundation.

Levee failures can be difficult to predict, since even inspected levees are prone to failure under certain conditions. DWR has, using the best available information, identified areas within the county where flood levels would be more than 3 feet deep if a project levee were to fail; these areas are known as Levee Flood Protection Zones (LFPZ). **Figure HS-4** identifies locations of LFPZs in Solano County. Most are located in the eastern portion of the county within the Sacramento-San Joaquin Delta. Figure HS-4 also identifies the location of project and non-project levees.

In addition to the identified LFPZs, 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 3 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 should they be flooded as a result of levee failure. Failure of levees protecting Collinsville could flood parts of that community, causing damage to residential areas. Roads in the Suisun Marsh and in the east county are constructed almost exclusively on levees. Thus, levee failures could also disrupt travel through these areas. These roads are primarily used by local farmers, but also serve recreational needs.

Two projects operated and maintained by the Solano County Water Agency (SCWA) use channels for flood control. Both projects include unlined earthen channels with some vegetation for slope reinforcement. The smaller of the two projects is the Ulati Flood Control Project. This project is located in the Vacaville-Elmira drainage basin, and is designed to handle a 10-year flood event. The purpose of the Ulati project is to protect agricultural land downstream of Vacaville. The bigger of the two projects is the Green Valley Flood Project, which is partially located in the unincorporated community of Cordelia and partially within the City of Fairfield. The Green Valley project consists of 6 miles of channel and is designed to handle a 40-year flood event.

SCWA has no future improvements planned for either project. However, as development in the watershed continues, SCWA must ensure capacity for additional runoff. SCWA requires the cities in Solano County to adequately mitigate the impacts of stormwater runoff from development projects. SCWA also monitors the channels at both sites to ensure adequate capacity exists to carry designated flows.



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Climate Change

The California Climate Change Center, a research arm of the California Energy Commission, has found that climate change will result in new flooding concerns throughout California. Climate change-induced sea level rise is likely to create significant impacts in the San Francisco Bay and Delta. The 2007 projections from the International Panel on Climate Change estimate that sea level will increase by 7 to 23 inches by 2100. The San Francisco Bay Conservation and Development Commission (BCDC) and other state agencies are evaluating expected impacts using these projections. While uncertainty exists regarding the extent of sea level rise, there is consensus that it will increase the frequency, duration, and magnitude of flood events in the San Francisco Bay and Sacramento–San Joaquin Delta (Bay-Delta) area. Given a 1-foot rise in sea level, as predicted in low-end sea level rise projections, the occurrence of a 100-year storm surge-induced flood event would shift to once every 10 years. In other words, the frequency of a 100-year event could increase tenfold. Sea level rise and the associated increases in flood events would place greater strain on existing levee systems and will likely expand floodplains into unprotected areas of the county.

In addition to the pressure resulting from sea level rise, climate change will result in increased severity of winter storms, particularly in El Niño years. Such weather events will result in higher levels of seasonal flooding than those currently experienced. This too will strain levees and increase floodplain areas.

Related Plans, Programs, and Agencies

Solano County Water Agency Flood Hazard Warning System

The Solano County Water Agency 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.

Federal Emergency Management Agency

The Federal Emergency Management Agency is an agency whose 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 their responsibilities is to maintain flood zone maps.

Cobey-Alquist Flood Plain Management Act

The Cobey-Alquist Flood Plain Management Act (California Water Code Section 8400 et seq.) found that land use regulations related to floodplain management are best developed at the local level. Local governments are asked to ensure no structures or other obstructions are in flood-prone areas that would impede the motion of flood waters. No specific provisions are in this act related to the General Plan.

California Department of Water Resources

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.

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.

Central Valley Flood Protection Board and Plan

This board was the Reclamation Board. It was given a new name and charter by Senate Bill 17 (2007), including an expanded membership and expertise-based seats including disciplines such as engineering, hydrogeology and flood management. The Central Valley Flood Protection Board developed and adopted the CVFPP in 2012 and continues to oversee the plan's implementation. The CVFPP provides conceptual guidance to reduce the risk of flooding for about one million people in California and \$70 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.

Policies

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|---------|--|
| HS.P-1: | Prevent or correct upstream land use practices that contribute to increased rates of surface water runoff. |
| HS.P-2: | Restore and maintain the natural functions of riparian corridors and water channels throughout the county to reduce flooding, convey stormwater flows, and improve water quality. |
| HS.P-3: | Require new developments to incorporate devices capable of detaining the stormwater runoff caused by a 100-year storm event or to contribute to regional solutions to improve flood control, drainage, and water recharge. |
| HS.P-4: | Encourage the use of stormwater detention that may also be used for groundwater recharge. |
| HS.P-5: | Appropriately elevate and flood proof developments for human occupancy within the 100-year floodplain for the profile of a 100-year flood event. |

- HS.P-6: Work with federal, state, and local agencies to improve flood control and drainage throughout the county.
- HS.P-7: Require new development proposals in dam, canal, or levee inundation areas to consider risk from failure of these facilities and to include mitigations to bring this risk to a reasonable level.
- HS.P-8: Work with responsible parties to ensure dams, levees, and canals throughout the county are properly maintained and/or improved.
- HS.P-9: Preserve open space and agricultural areas that are subject to natural flooding and are not designated for future urban growth; prohibit permanent structures in a designated floodway where such structures could increase risks to human life or restrict the carrying capacity of the floodway.
- HS.P-10: Ensure that flood management policies that minimize loss of life and property also balance with environmental health considerations of the floodplain and therefore do not cause further erosion, sedimentation, or water quality problems in the floodplain area.
- HS.P-11: Raise public awareness about flooding and flood risks.

Implementation Programs

Regulations

HS.I-1: Include appropriate CVFPP measures within the County's Zoning Ordinance update to be completed after adoption of the General Plan.

Related Policies: HS.P-3, HS.P-5, HS.P-6, HS.P-9

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Adopt Zoning Ordinance update with CVFPP measures by 2016.

HS.I-2: Revise the County Zoning Ordinance to:

- limit activities that contribute to increased rates of surface water runoff, such as overgrazing by livestock, clearing, and burning, which can reduce natural vegetative cover;

- promote recreational, open space, and agricultural uses of upstream watershed areas, where appropriate;
- limit the construction of extensive impemeable surfaces and promote the use of permeable materials for surfaces such as driveways, streets, parking lots, and sidewalks;
- require development in upstream watershed areas to follow best management practices for stomwater management, including on-site detention and retention basins, appropriate landscaping, and minimal use of impervious surfaces; and
- designate resource areas for preservation, including agriculture, wetlands, floodplains, recharge areas, riparian zones, open space, and native habitats.

Related Policies: HS.P-1, HS.P-2, HS.P-3, HS.P-4, HS.P-9, HS.P-10

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: By 2018

Funding, Physical Improvements, and Capital Projects

HS.I-3: Find funding for and establish the appropriate procedures to properly maintain dams, canals, and levees in Solano County.

Related Policies: HS.P-8, TC.P-23

Agency/Department: Solano County Office of Emergency Services

Funding Source: State and federal agencies

Time Frame: Ongoing

HS.I-4: Require periodic stream maintenance by private property owners, and undertake regular stream maintenance by the appropriate public agencies.

Related Policies: HS.P-1, HS.P-2

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

Funding Source: General Fund

Time Frame: Ongoing

HS.I-5: Continue to make regular flood control and drainage improvements as recommended by local agency plans, the U.S. Army Corps of Engineers, and the California Reclamation Board. These actions are independent of and in addition to the development review process.

Related Policies: HS.P-6, HS.P-8, TC.P-23

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

Funding Source: Capital Improvement Program, state and federal agencies

Time Frame: Ongoing

Development Review

HS.I-6: During project review, require the use of stormwater management techniques in developed upstream watershed areas that protect low-lying areas from flooding. Incorporate appropriate measures into the development review process to mitigate flooding and prevent erosion in and around county ditches.

Related Policies: HS.P-1, HS.P-2, HS.P-3, HS.P-4, HS.P-9

Agency/Department: Department of Resource Management; Planning Services

Funding Source: Private

Time Frame: Ongoing

HS.I-7: In review of new development projects, require disclosure of risk where proposed development would occur in flood risk areas. This disclosure may include notifying new residents in these areas and encouraging purchase of appropriate insurance.

Related Policies: HS.P-3, HS.P-5, HS.P-7, HS.P-9

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

Funding Source: General Fund

Time Frame: Ongoing

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HS.I-8: 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-6

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

Funding Source: General Fund, Development fees

Time Frame: Ongoing

HS.I-9: During project review, encourage the use of landscaping practices and plants that will reduce demand on water, retain runoff, decrease flooding, and recharge groundwater.

Related Policies: HS.P-1, HS.P-3, HS.P-4, HS.P-10

Agency/Department: Department of Resource Management; Planning Services

Funding Source: General Fund, development fees

Time Frame: Ongoing

HS.I-10: Where new development for human occupancy is 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-7

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

Funding Source: Development fees

Time Frame: Ongoing

HS.I-11: Increase the use of stormwater detention as a possible 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-4, HS.P-10, PF.P-35

Agency/Department: Solano County Water Agency

Funding Source: Development fees

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach and Education

HS.I-12: Work with the Solano County Water Agency to create a countywide comprehensive flood management plan.

Related Policies: HS.P-6, HS.P-8, PF.P-35

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-13: Continue to use the Solano County Water Agency Flood Hazard Warning System, which provides information regarding potential flooding risks.

Related Policy: HS.P-11

Agency/Department: Solano County Water Agency

Funding Source: General Fund

Time Frame: Ongoing

HS.I-14: Work with the Solano County Water Agency (or successor agency) in preparing a hydrological analysis of uplands, identifying the different watersheds that drain into the county, establishing flood-related objectives and priorities 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-7, HS.P-10

Agency/Department: Department of Resource Management; Planning Services

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Funding Source: General Fund

Time Frame: Ongoing

HS.I-15: Conduct an annual review of the 100-year and 200-year floodplain maps shown in **Figures HS-1** and **HS-2**, as well as those available from state and federal agencies such as the Federal Emergency Management Agency and the Department of Water Resources to ensure that changes are noted and corresponding portions of this General Plan are revised.

Related Policies: HS.P-5, HS.P-6, HS.P-7

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-16: Investigate and pursue the creation of one regional or countywide agency for flood control purposes. Investigate consolidating flood control responsibilities for the entire county into the Solano County Water Agency.

Related Policies: HS.P-6, HS.P-7, HS.P-9, PF.P-36

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

Funding Source: General Fund

Time Frame: Ongoing

SEISMIC SAFETY AND LAND STABILITY

This section describes various actions that can be taken 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. These uses act to concentrate development in areas with lower risk.

Planning Context

The unique landscape found in Solano County provides the necessary conditions for earthquakes, landslides, and other geologic dangers. These events threaten people and property within geologic hazard zones, and their unpredictability is the driving force behind the proposed policies and implementation programs. The County hopes to safeguard development from the most hazardous areas by directing it toward more secure areas.

The county is crossed by a number of active faults, where past movement in the earth's surface has caused rock fractures. Fault traces occur when these fractures become visible on the surface (see **Figure HS-5**). Fault zones are the areas surrounding active faults, where future movement is likely to occur. It is in these zones where most earthquakes originate. Surface displacement along a fault would cause serious structural damage to any overlying building, transportation facility, main utility line, and/or aqueduct. **Figure HS-6** shows the locations of active faults in Solano County, along with the areas most likely to experience significant damage from earthquake-related ground shaking. Seismic shaking is by far the single greatest cause of earthquake damage. The most common method to measure earthquakes is magnitude. Although the Richter scale is well-known as a measurement tool, most scientists now use an updated method. Magnitude is not a straight-line measurement, meaning that an increase of one in the measurement does not mean an increase of only one in an earthquake's energy. For instance, a magnitude 6.0 earthquake releases 32 times more energy than a magnitude 5.0 and nearly 1,000 times more energy than a 4.0. The measurement is for the amount of energy released and doesn't mean the ground shakes a thousand times harder in a 6.0 than a 4.0, because the energy is released over a much larger area.

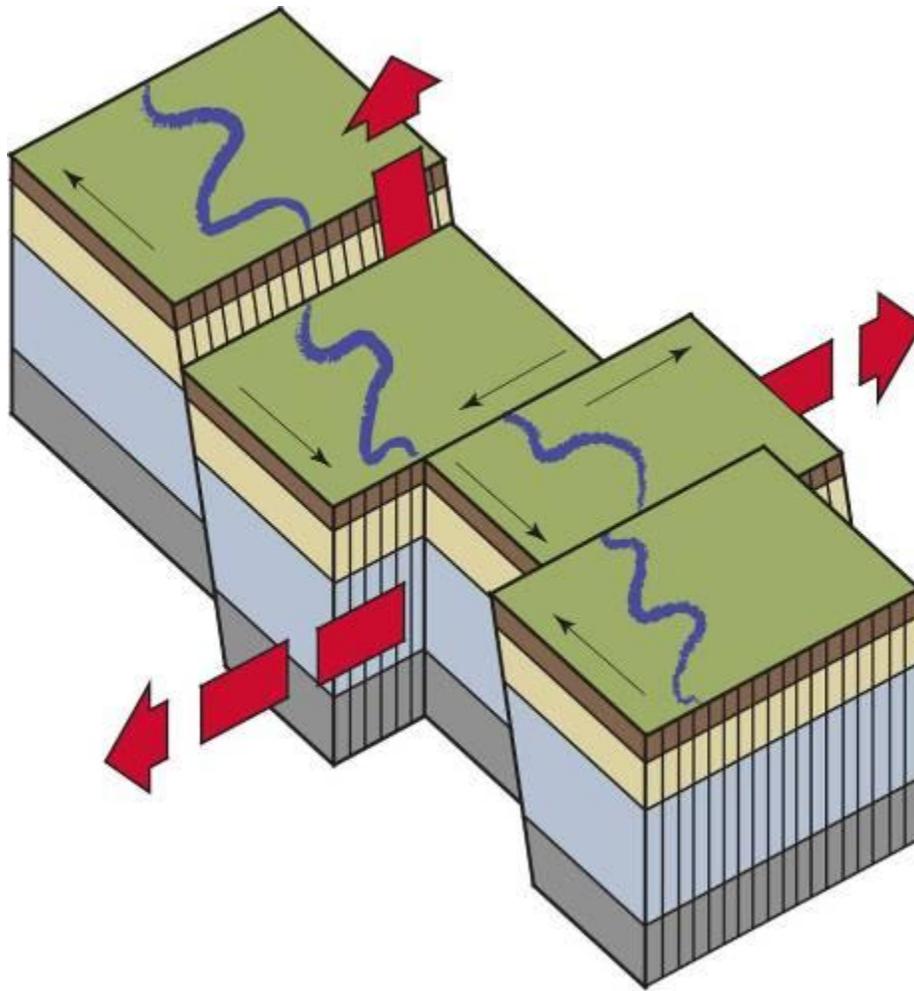


Figure HS-5
Fault Diagram

Upland areas of the county are susceptible to landslides, land slips, mudflows, and debris flows. Triggered by an earthquake, heavy rainfall, or changes in ground conditions caused by development activity, these events can send large volumes of land cascading down hillsides, destroying property along the way. **Figure HS-7** shows that the steepest slopes are found in the southeast and western portions of the county, suggesting a greater susceptibility to landslides and related hazards. Land stability has been analyzed and mapped for a portion of the county by the state Department of Conservation as shown in **Figure HS-8**. Areas 3 and 4 present areas of greatest risks.

Secondary effects of earthquake ground shaking also threaten buildings and other structures. Liquefaction is a change from solid to liquid in certain saturated soils, as a result of ground shaking. This change can cause ground failure and damage to overlying structures. Recent County efforts aimed at recharging the water table have been successful, but produced the unforeseen consequence of increasing liquefaction

potential in the central and eastern portions of the county. Areas with high liquefaction potential are shown in **Figure HS-9**. Lurching is the horizontal movement of ground next to slope faces, particularly in areas underlain by loosely consolidated soils, such as creek banks.

Coastal regions are threatened by tsunamis, which are powerful wave surges that can be caused by earthquakes and have the potential to flood lowland areas. By the time a tsunami wave reaches the Carquinez Strait, much of its energy would have already dissipated. The only areas of the county that would be subject to inundation tsunamis are the southwestern part of Mare Island and Island No. 1 located southwest of SR 37.

Nonseismic geologic hazards also exist within the county. Shrink-swell soils contain large amounts of clay that swell when wet and shrink when dry. These clays will swell despite heavy loads of large structures placed on them. Repetition of this shrink-swell cycle can cause building damage, including cracked foundations. **Figure HS-10** shows that a majority of the county is underlain by soils with a high shrink-swell potential. In most cases removing the top layer of soil and/or preconstruction design and engineering are enough to prevent the costly problems associated with these soils. Land settlement is a gradual lowering of the ground surface caused by compression of fine-textured deposits like clays and silts. Compression can be caused by removing water from the soil, through agricultural pumping for example, or by placing heavy loads on the soil. Many of the fine-textured bay mud deposits that exist in and around the Napa River Delta are susceptible to settlement and present a potential hazard for road construction and development in southern Solano County.

Related Plans, Programs, and Agencies

California Uniform Building Code

The State of California provides minimum standards for building design and construction through the California Building Standards Code (Title 24 of the California Code of Regulations). The California Building Code is based on the Uniform 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 Commission was established in 1953 by the California Building Standards Law.



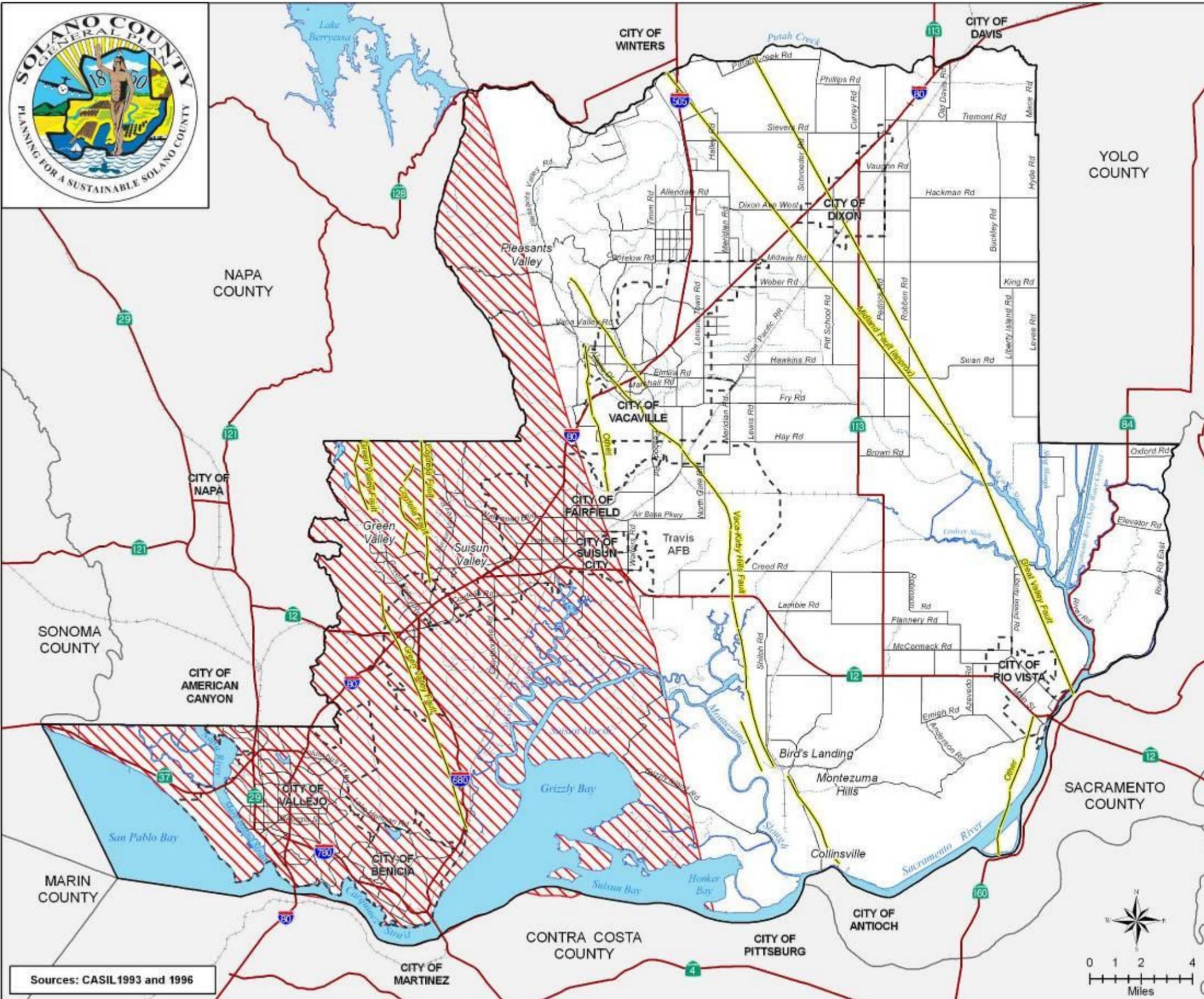
Solano County General Plan

Figure HS-3

Seismic Shaking Potential

Legend

- Fault Locations
- Highest Potential Earthquake Damage Area
- Basemap Layers
 - Roadways
 - Highways
 - Railroads
 - Streams and Creeks
 - Major Water Features
 - Municipal Service Areas
 - Adjacent Counties



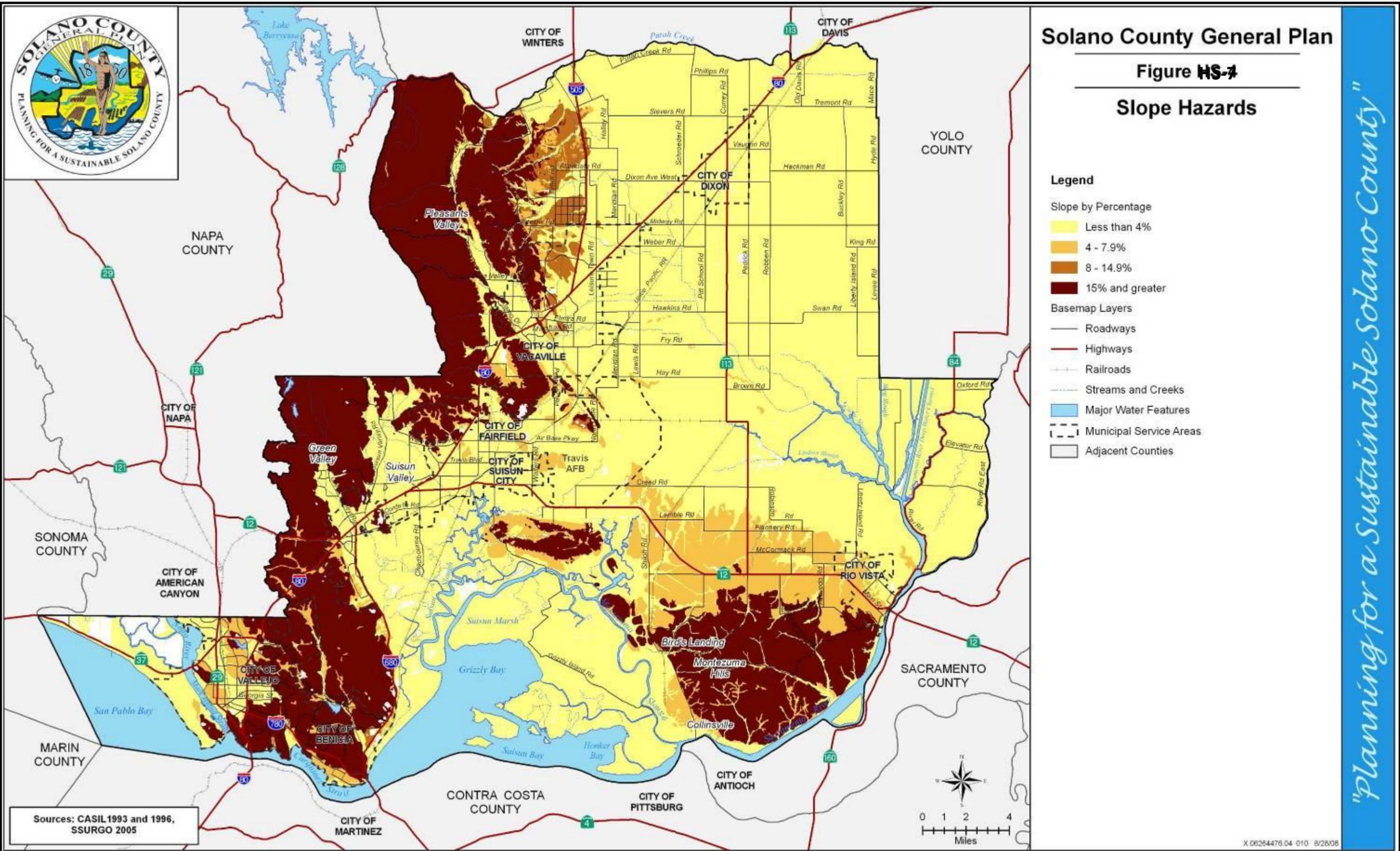
Sources: CASIL 1993 and 1996



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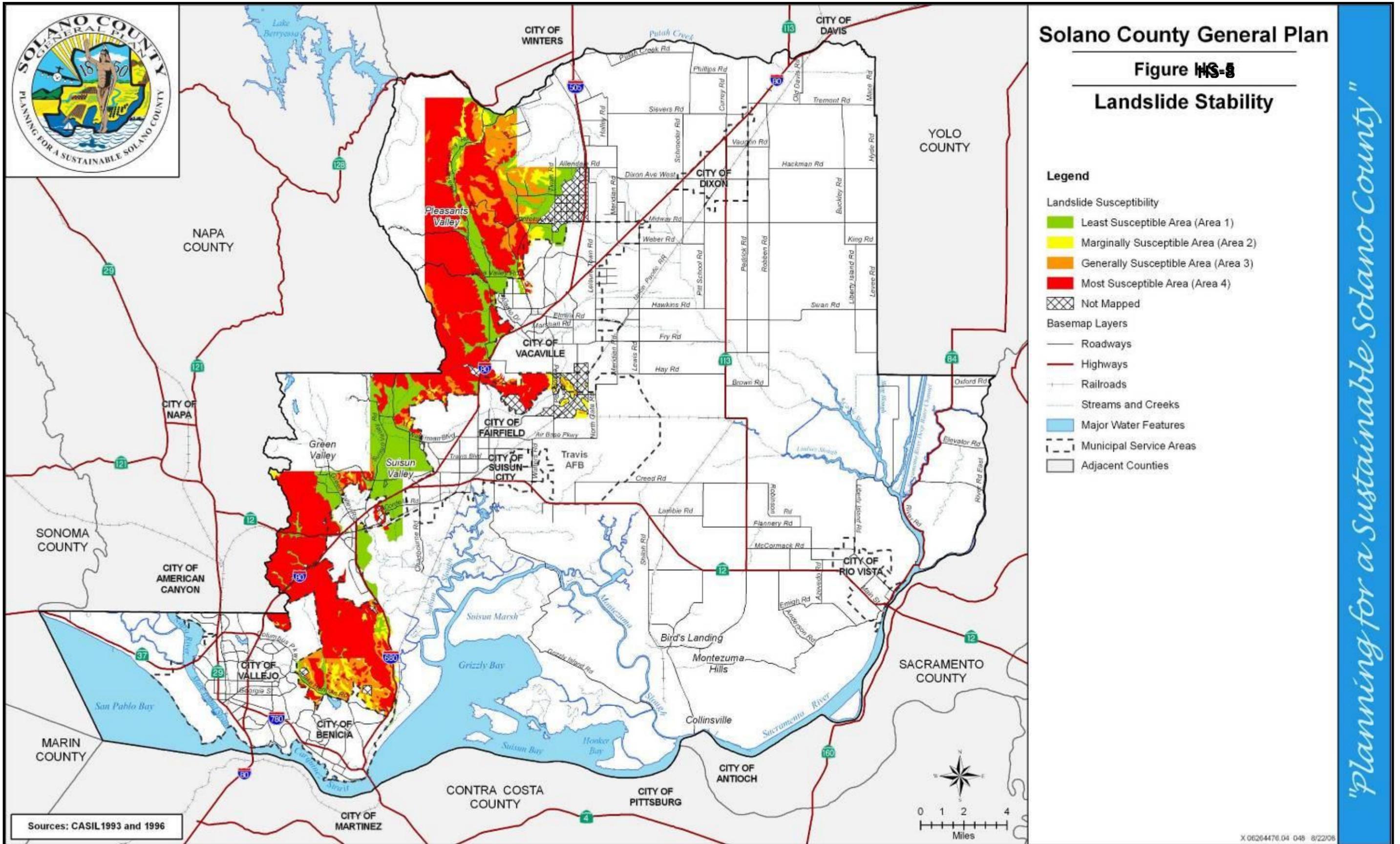
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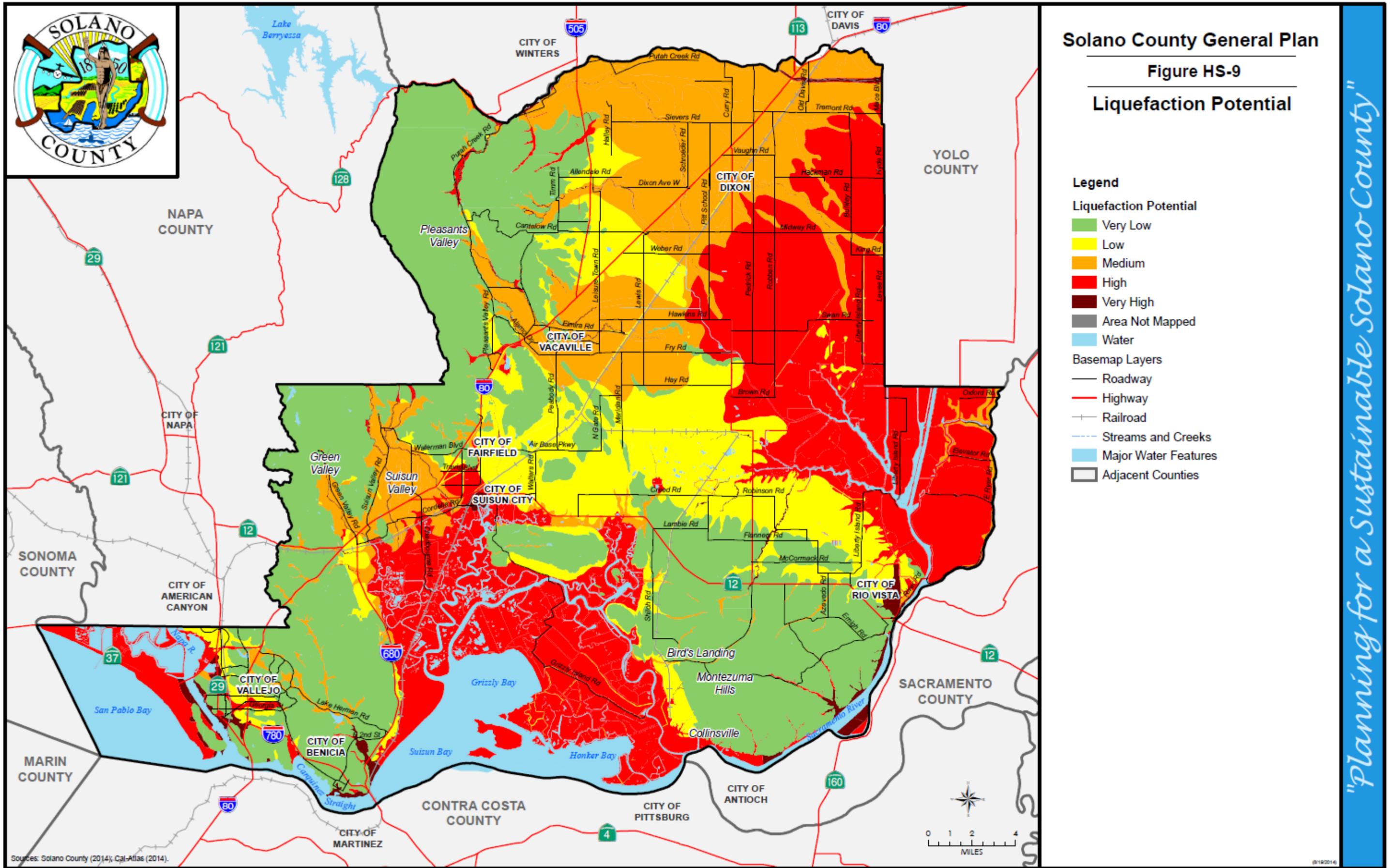
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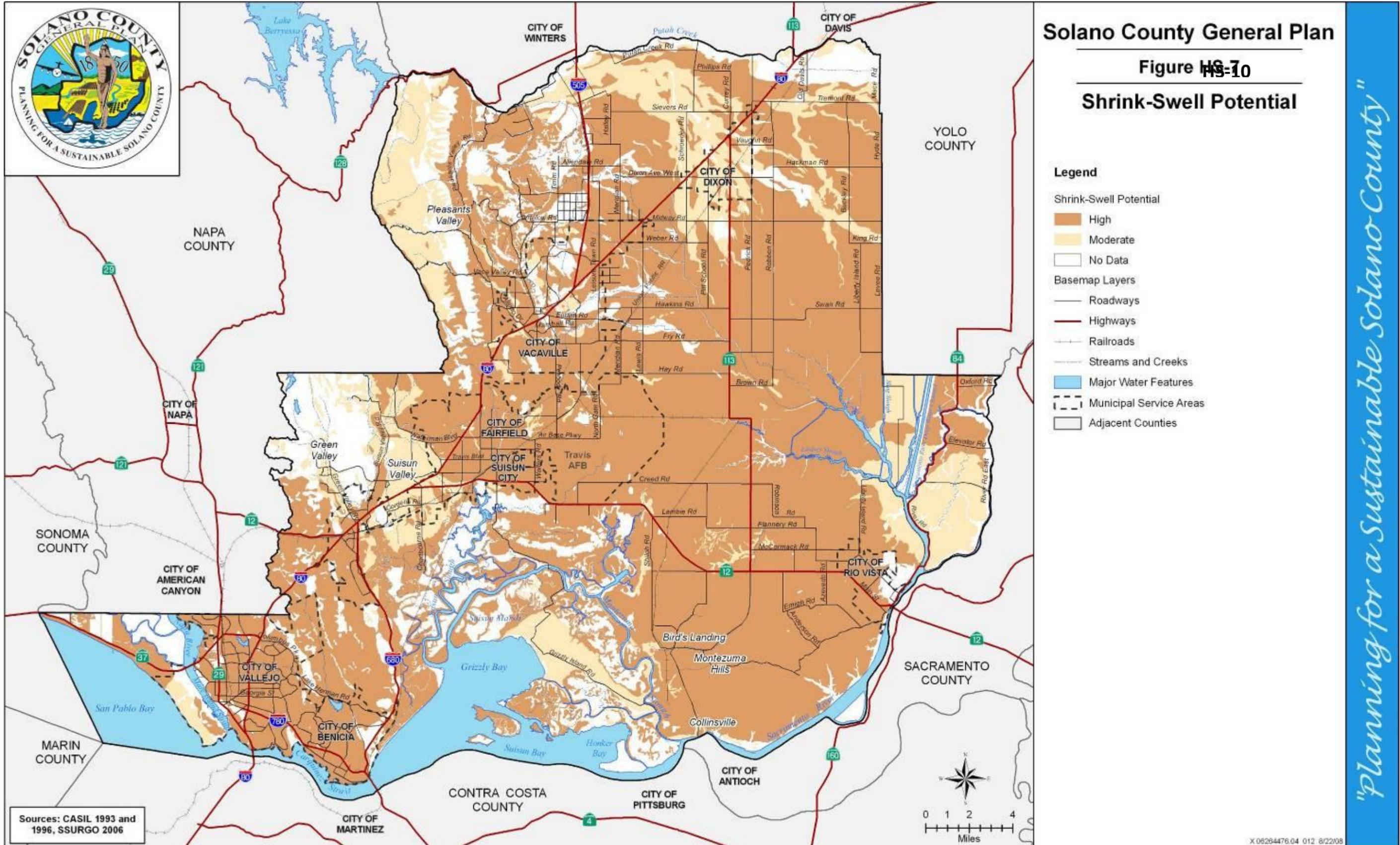


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Alquist-Priolo Earthquake Fault Zoning Act

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 used for human occupancy 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 related to non-surface fault 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 located 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 for human occupancy, 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 within 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.

Policies

-
- HS.P-12: Require new development proposals in moderate or high seismic hazard areas to consider risks caused by seismic activity and to include project features that minimize these risks.

 - HS.P-13: Review and limit the location and intensity of development and placement of infrastructure in identified earthquake fault zones.

Public Health and Safety Chapter

- HS.P-14: 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 general public, or provide essential community services and that are located within identified earthquake fault zones.
- HS.P-15: Reduce risk of failure and reduce potential effects of failure during seismic events through standards for the construction and placement of utilities, pipelines, or other public facilities located on or crossing active fault zones.
- HS.P-16: 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.
- HS.P-17: 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.
- HS.P-18: Make information about soils with a high shrink-swell potential readily available. Require proper foundation designs in these areas.
- HS.P-19: Minimize development in areas with high landslide susceptibility.

Implementation Programs

Regulations

-
- HS.I-17: Revise the County Zoning Ordinance to do the following:
- Limit development occurring in geologic hazard areas, including active fault traces and fault zones, landslide susceptibility zones, and creek banks susceptible to lurching.
 - Prohibit structures in active fault trace areas. Per the Alquist-Priolo Earthquake Fault Zoning Act, structures for human occupancy must be set back at least 50 feet from active fault traces. Further limit development intended for human occupancy within 100 feet of active fault trace areas to one-story wood-frame structures.
 - Limit development within landslide areas 3 and 4 on **Figure HS-8** to agriculture, open space, or other nonurban uses. Adopt and implement hillside slope/density and land capacity ordinances within landslide area 2.

Related Policies: HS.P-13, HS.P-14, HS.P-16, HS.P-17, HS.P-19

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Amend by 2018

HS.I-18: Adopt and enforce the most current versions of the International Building Codes, as modified by the California Building Standards Commission.

Related Policy: HS.P-12

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Development Review

HS.I-19: Require geotechnical investigation and recommendations for buildings meant for public occupancy within geologic hazard areas. 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-14, HS.P-15

Agency/Department: Department of Resource Management

Funding Source: Project Applicant

Time Frame: Ongoing

HS.I-20: Require geotechnical evaluation and recommendations before new development 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-12, HS.P-19

Agency/Department: Department of Resource Management

Funding Source: Project Applicant

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach and Education

HS.I-21: 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-15, HS.P-17

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-22: 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-13

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-23: Develop a geologic constraints and hazards database to be maintained in the County geographic information system (GIS). 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-12, HS.P-13, HS.P-14, HS.P-15, HS.P-16, HS.P-17, HS.P-18, HS.P-19, HS.P-20, HS.P-21, HS.P-22

Agency/Department: Department of Information Technology

Funding Source: General Fund

Time Frame: Ongoing

FIRE SAFETY

Planning Context

This section describes a variety of actions that can be taken to 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:



Fire trucks at the Valley Station in Suisun Valley are ready to be deployed.

- directing non-farm-related development toward 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; and
- requiring adequate on-site water supply for buildings lacking access to public water.

The County's fire safety policies and implementation programs were created to support the County's vision; specifically the desire to develop in a way that supports the needs of both humans and the environment. While promoting natural fire ecology is good for the environment, the damage it may cause can have devastating effects on people and property. The County seeks to find a sustainable balance between these outcomes by directing development away from known fire hazard areas and buffering the effects of a wildfire away from developed areas.

Potential Wildfire Areas

Solano County is threatened by both urban and rural fires with the potential to cause property damage, injury, and loss of life. Wildfires pose the greatest danger in the unincorporated county area. Topography, weather, and native vegetation provide the ingredients for destructive fires that can spread rapidly. In California, development activities within hazard areas have worsened the problem by placing people into hazard areas, disrupting natural fire processes and allowing buildup of flammable brush and vegetation. Such development has also moved the urban-wildland interface (the area where human development meets undeveloped wildlands) closer to higher-risk wildfire hazard areas, increasing the number of people and buildings at risk (**Figure HS-11**). The rugged, rural terrain found in the western hills of the county makes firefighting all the more difficult.

The desire to live in remote areas has put people and their homes at risk of wildland fires, land slides, and other natural disasters.

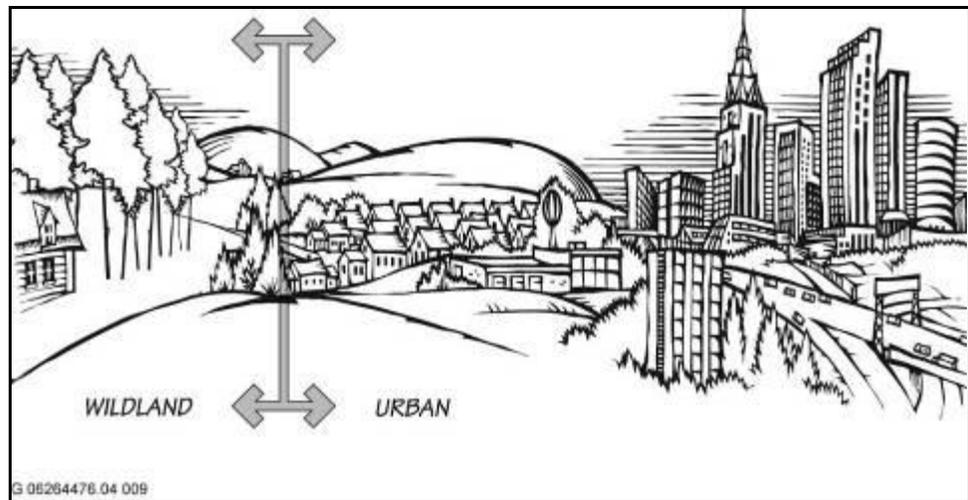


Figure HS-11
Urban-Wildland Interface

Areas at risk for extreme wildfires are designated by the California Department of Forestry and Fire Protection (CAL FIRE) as those lands where dense vegetation with severe burning potential prevails.

The highest current areas at risk for fires are found in western Solano County, in the foothills and mountainous watershed areas, and also in grasslands located throughout the county. As shown in Figure HS-12, portions of the Vaca Mountains, west of Pleasants Valley, are designated as Very High Fire Hazard Severity Zones. Before nearby lowlands were urbanized, vegetation in these mountainous areas were naturally maintained by periodic fire. As nearby lands were developed, natural wildfires were suppressed, resulting in the further buildup of fire-prone brush and woodlands. These efforts to suppress natural processes have resulted in larger, more damaging fires.

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Public Health and Safety Chapter

CAL FIRE maps identify wildfire hazards in state responsibility areas (SRA). Local jurisdictions do not have financial responsibility for wildland fire protection in SRAs. Figure HS-12 shows the location of SRAs. All very high fire hazard severity zones in Solano County are located in SRAs.

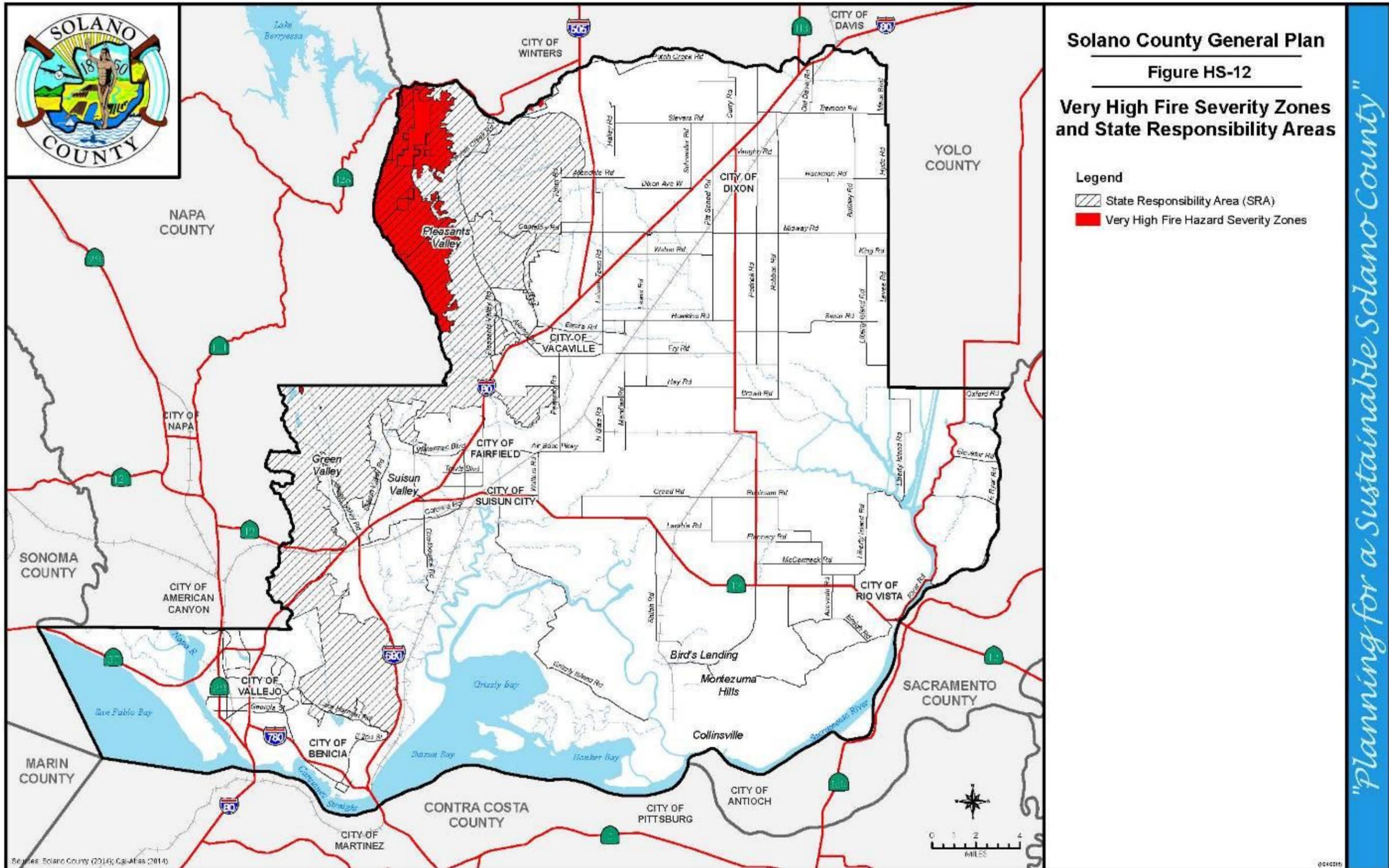


Figure HS-12 conveys two aspects of wildfire hazard: the ignition potential of high-use roads and urbanized areas and the burning potential of various types of vegetation. For example, grassland adjacent to a heavily traveled roadway has a high ignition potential because of the high probability and ease with which grass will ignite. A dense woodland canopy, on the other hand, has low ignition potential because of heavier fuels, but would burn with a much higher intensity and ultimately have a worse effect on the ecosystem. The worst fire hazard occurs where easily ignitable grass is growing with brush, which in turn serves as an extremely effective fuel link to the dense woodland canopy.

Water Pressure and Supply

Insufficient water pressure and supply also contribute to wildfire danger. Most of the higher-risk wildfire areas in the county are not served by public water. Fire districts serving these areas are typically equipped with tank trucks. Properties designated for residential use in areas without public water service are required to maintain sufficient on-site water storage and new development must show that it has sufficient water pressure for firefighting purposes.

Climate Change

Research conducted at the U.S. Department of Energy's Lawrence Berkeley National Laboratory indicates that climate change will increase the frequency and size of wildfires in California. Hotter, drier climates will promote increased accumulation of fire-prone vegetation, aided by prolonged drought, and stronger winds will continue to fan the flames spreading fires faster and farther than previously experienced. This will expand the size of the urban-wildland interface because more residential communities will be within reach of wildfire activity. An expanded urban-wildland interface will require increased resources, planning, and funding to maintain and defend.

Fire-Safe Planning

Several site design and planning methods can be employed to minimize dangers to life and property within wildfire hazard areas. Methods advocated by County policies and programs include buffering, creating fuel breaks, clustering, and fire-safe construction.

Buffering for fire safety refers to the removal of combustible vegetation around a building within a given distance, usually 30–50 feet (see **Figure HS-14**). This creates a fire defensible space, which can limit fire from spreading to nearby buildings and provides better access to the property for firefighters.

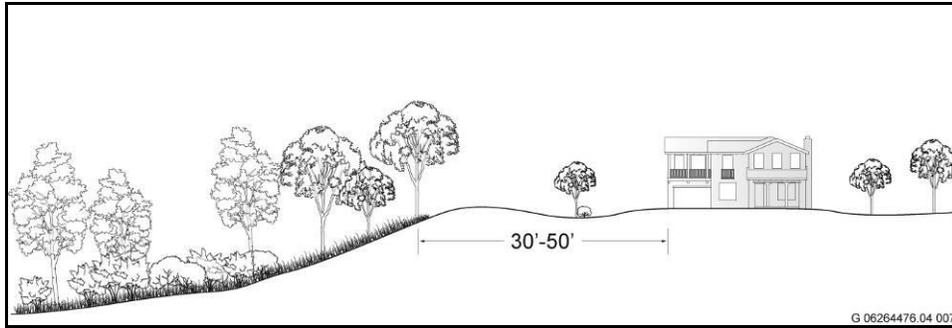


Figure HS-14
Buffering

Removing vegetation within the 30–50' buffer provides fire defensible space for homeowners. The same technique can be applied along roadways as fuel breaks to provide accessibility during wildfire events.

Similarly, fuel breaks are large-scale buffers used to prevent fire from approaching communities or blocking roadway access for firefighting equipment. To create fuel breaks, small trees and light fuels within a 50-foot strip of land are removed. These fuels would otherwise allow fire to climb up to the treetops where firefighting is more difficult.

Clustered development (**Figure HS-15**) for fire safety describes buildings that are placed closer to one another and closer to roads to decrease the amount of space fire districts must protect in the event of a wildfire and to increase access to that space (see below graphic). When homes are placed closer to one another, firefighters are able to maximize their resources, which is especially important in rural environments that lack public water sources.

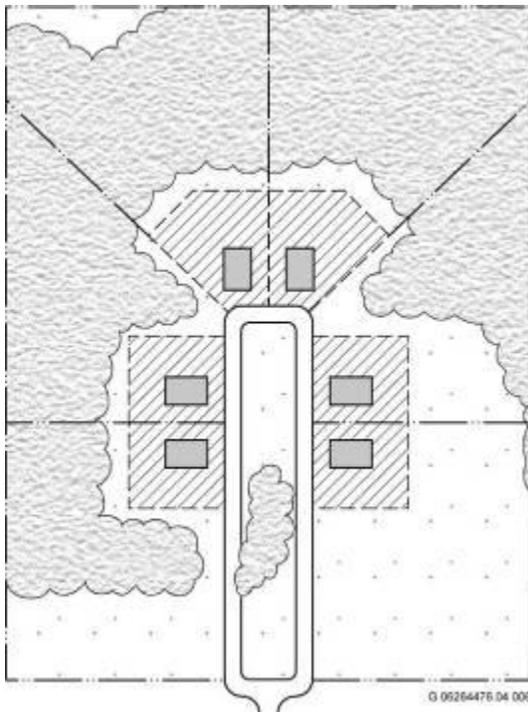


Figure HS-15
Clustering

Clustering homes within a wildfire hazard area allows fire fighters to maximize their resources by concentrating in one area rather than moving from house to house.

Fire-safe construction incorporates fire-resistant materials into various parts of a house including the roof, siding, vents, windows, and patios to minimize the risk of burning. Particular attention is given to locating propane and oil tanks in protected locations.

Related Plans, Programs, and Agencies

Local Fire Protection Agencies

Solano County does not have its own fire department. Several individual fire protection districts serve the unincorporated county area. Certain fire protection districts may consist of full- or part-time firefighters, but most firefighters in the unincorporated county are volunteers. Additional information and policies addressing fire protection agencies may be found in the Public Facilities and Services chapter of the General Plan.

California Department of Forestry and Fire Protection

CAL FIRE is a state agency responsible for protecting and maintaining privately owned wildland, providing emergency services, and responding to wildland fires throughout California. CAL FIRE provides fire protection to several unincorporated communities in Solano County including Green Valley, Vaca Valley, Lagoon Valley, and Pleasants Valley.

Policies

HS.P-20: Require that structures be built in fire defensible spaces and minimize the construction of public facilities in areas of high or very high wildfire risk.

HS.P-21: Prohibit non-farm-related development and road construction for public use in areas of extreme wildfire risk.

HS.P-22: Require new developments in areas of high and very high wildfire risk to incorporate fire-safe building methods and site planning techniques into the development.

HS.P-23: Work with fire districts including the Sonoma-Lake-Napa Fire Unit, 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.



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.

Public Health and Safety Chapter

HS.P-24: Seek an appropriate balance between preventing and fighting fires and retaining the County's valuable visual and natural resources.

HS.P-25: Continue to encourage the consolidation of fire districts through the LAFCO process.

Implementation Programs

Regulations

HS.I-24: Update the Zoning Ordinance to limit development in areas of extreme, very high, and high wildfire risk.

Development within the extreme risk area will be limited to farm-related development served by private roads.

Land divisions within the very high and high risk areas will be restricted, unless the availability of adequate water supply can be demonstrated and guaranteed; more than one access point for firefighting equipment can be provided; defensible space is permanently maintained around any buildings; and, fire-resistant materials are used in construction.

Related Policies: HS.P-20, HS.P-21, HS.P-22

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Amend by 2018

Funding, Physical Improvements, and Capital Projects

HS.I-25: 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-20, HS.P-22, HS.P-23

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

Funding Source: May include special assessments, mitigation fees

Time Frame: Ongoing

Development Review

HS.I-26: Work with fire districts to ensure that new development is built to support effective firefighting. 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-20, HS.P-22, HS.P-23, HS.P-24

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

Funding Source: Project Applicant

Time Frame: Ongoing

HS.I-27: Ensure access for firefighting equipment in rural areas by clustering residential units that are located in areas of high fire risk and maintaining emergency access routes. These routes are designated as part of an emergency preparedness plan maintained under HS.I-37 in the Disaster Preparedness section.

Related Policy: HS.P-22

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-28: 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-24

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

Public Health and Safety Chapter

Funding Source: General Fund

Time Frame: Ongoing

HS.I-29 When funding becomes available, develop a Wildfire Protection Plan that:

- Identifies, maps, and assesses potential housing units at risk;
- Identifies mitigation strategies to reduce potential risks/vulnerabilities;
- Initiates local fire safety programs such as Firewise Community Programs;
- Establishes ordinances for fire safe development and building codes within the VHFHSZ; and
- Establishes development standards for fire safety within the SRA.

Related Policy: HS.P-20, HS.P-22, HS.P-24

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

Funding Source: Grant funding

Time Frame: Adopt by 2019

Coordination with Other Agencies and Organizations

HS.I-30: 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-23, HS.P-24

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

Funding Source: Caltrans, Road Fund

Time Frame: Ongoing

HS.I-31: Increase cooperative efforts among fire districts, public agencies, and landowners. The County will continue to collaborate with the U.S. 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-23, HS.P-25

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

HAZARDOUS 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 ranging from agricultural fertilizers and pesticides to household cleaning products are used extensively every day. Hazardous materials include corrosive, toxic, reactive, or flammable materials which can be found in our homes and businesses. These materials can be harmful to people, wildlife, and the environment. Within Solano County they can be found in a number of products and locations, including hazardous wastes, brownfield properties, and naturally occurring materials like asbestos, radon, and mercury.

Types of Hazardous Materials

Hazardous materials come from a variety of sources within the county. Some common categories are briefly discussed below to provide a framework for the policies and implementation programs proposed at the end of this section.

Hazardous waste includes household and industrial products that cannot be safely disposed of in the trash or poured down sinks or storm drains. This includes items such as used motor oil, batteries, solvents, poisons, chemicals, oil- and latex-based paints, and automotive fluids. Hazardous waste is subject to storage time limits, disposal requirements, and labeling requirements on containers. Most hazardous waste may be stored for only 90 days with exceptions made for businesses that generate small quantities under certain circumstances. Hazardous wastes used by businesses are reported in an annual inventory of hazardous materials required by the *Solano County Hazardous Materials Management Plan*.

Naturally occurring hazardous materials in Solano County such as asbestos, radon, and mercury are also found throughout California. Asbestos is a naturally occurring mineral composed of long, thin, fibrous crystals. It is often found in a type of rock located in Solano County; serpentine. It has been used often in building materials because of its resistance to heat, chemical, or electricity damage. Inhaling asbestos fibers may cause various health issues, including lung cancer. For this reason, Asbestos is being removed from building materials and studies are continuing to investigate the correlation between naturally occurring asbestos and health of nearby residents.

Mercury is a chemical element found in Solano County as a result of both natural processes and human activities. Natural sources of mercury include volcanoes, hot springs, and natural mercury deposits. Sources related to human activities include coal combustion and certain industrial and mining activities. Mines with mercury producing ore are located in the Sulfur Springs Mountain Range east of the City of Vallejo. Human exposure most often occurs through consumption of fish that has been exposed to methyl mercury.

Radon is a gas that forms during the decay of uranium that is naturally found in rock, water, and soil. It migrates to the surface through cracks or fractures in the earth's crust. Breathing air with elevated levels of radon gas may result in an increased risk of developing lung cancer. Radon hazards are generally low in Solano County, although some tests near Vacaville did have significant results.

The County will continue to keep informed of these hazardous materials and will inform and educate residents on how to avoid the risks associated with them. Other sources of hazardous material in Solano County include agricultural spraying, such as herbicides and pesticides, leaking underground storage tanks, and airports, specifically Travis Air Force Base.

Brownfields

Brownfields are properties that are contaminated, or thought to be contaminated. Many are located in urban areas and are underused because of perceived remediation costs and liability concerns. Redeveloping brownfield properties optimizes the use of existing infrastructure, saving tax dollars and protecting natural resources. It also preserves agricultural and green spaces by slowing their conversion to residential, commercial, and industrial uses. Solano County maintains a list of all of the approximately 500 brownfield sites located within 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. Types of hazardous cargo regularly transported out of, into, and through Solano County by freeway or railroad include flammable liquids, corrosive materials, compressed and/or poisonous gases, explosives, and flammable solids.

Tanker trucks carry numerous types of hazardous materials on public roadways throughout Solano County.



Some potential exists for a highway or railway mishap that could cause hazardous cargo to spill, contaminating surrounding areas. If flammable liquids were to ignite, they could quickly spread fire and poisonous fumes that could cause human casualties and/or property damage. Spilled liquids could also drain into nearby streams or drainage facilities, spreading the effects of an accident over a much larger area.

The County recognizes that the possibility of an accident involving hazardous cargoes is present, and has established policies and implementation programs to minimize the likelihood and extent of such accidents. Certain provisions included in the General Plan, primarily in

response to noise and air quality issues, will also have a secondary effect of protecting developed lands near freeways and railroad alignments from casualties or property damage caused by hazardous cargo accidents. These provisions generally include increased development setbacks and berm techniques.

Related Plans, Programs, and Agencies

Safe Drinking Water and Toxic Enforcement Act of 1986

The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65), was enacted as a ballot initiative in November 1986. The proposition was intended by its authors 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 within 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 25500–25520) establishes business and area plans for the handling and release of hazardous materials. Basic information on the location, type, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the state, which could be accidentally released into the environment, is tracked by the local Certified Unified Program Agency (CUPA) within 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.

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 within 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 in the county.

Certified Unified Program Agency

The Solano County Department of Resource Management is the CUPA for all cities and unincorporated areas within the county. The CUPA program was created to consolidate and make consistent the various environmental and emergency response regulations applicable within 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; and
- addresses emergency response to incidents involving hazardous materials through the Hazardous Materials Management Plans.

Policies

- HS.P-26: 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.
- HS.P-27: Work to reduce the health risks associated with naturally occurring hazardous materials such as radon, asbestos, or mercury.
- HS.P-28: Encourage the use of programs and products by businesses that will result in a reduction of hazardous waste and materials.
- HS.P-29: Promote hazardous waste management strategies in this order of priority: source reduction, recycling and reuse, on-site treatment, off-site treatment, and residuals disposal.
- HS.P-30: 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.
- HS.P-31: 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-32: 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-27, HS.P-29

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Development Review

HS.I-32: Follow recommended protocol from the California Department of Conservation, Geologic Survey, U.S. 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-27

Agency/Department: Department of Resource Management

Funding Source: Project Applicant

Time Frame: Ongoing

HS.I-34: 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. These buffers shall match those that are created under HS.I-63 in the Air Quality section.

Related Policies: HS.P-26, HS.P-30, HS.P-32

Agency/Department: Department of Resource Management

Funding Source: Project Applicant

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach and Education

HS.I-35: 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-27

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

Funding Source: General Fund

Time Frame: Ongoing

HS.I-36: 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-26, HS.P-28, HS.P-29, HS.P-30, HS.P-31

Agency/Department: Department of Resource Management

Funding Source: Permit Fees and Fees for Service

Time Frame: Ongoing

HS.I-37: 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-26, HS.P-28, HS.P-29, HS.P-30

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

DISASTER PREPAREDNESS

Planning Context

Disaster preparedness refers to coordinated efforts to respond to both natural and human-caused disasters. The Solano County Office of Emergency Services (OES) 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. While this section and the Public Facilities and Services chapter overlap in some respects, the policies contained here are primarily related to disaster situations, whereas those in the Public Facilities and Services chapter address ongoing facility needs and service standards.

Related Plans, Programs, and Agencies

Solano County Office of Emergency Services

OES oversees the development, establishment, and maintenance of programs and procedures to protect lives and property of county residents from the effects of natural or human-caused disasters. Those disasters to which the County is subject and for which the office must train and properly respond include:

- floods;
- earthquakes;
- major fires;
- storms;
- radiological or hazardous material incidents;
- aircraft accidents;
- mass casualty incidents; and
- any other emergency-related function.

OES 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, OES 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.

Policies

-
- | | |
|----------|--|
| HS.P-32: | Work to ensure the adequacy of disaster response and coordination in the county and the ability of individuals to survive disasters. |
| HS.P-33: | 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. |
| HS.P-34: | Promote public education and awareness regarding what to do, where to go, and how to evacuate in the event of a |

catastrophic disaster, such as wildfires, earthquakes, or toxic material spills.

HS.P-35: Encourage full coordination and communication between federal, state, and local agencies regarding disaster planning and preparedness.

HS.P-36: Encourage full cooperation with medical facilities, schools, local radio stations, nonprofit organizations, and the private sector in disaster planning and preparedness.

HS.P-37: Ensure that populations requiring special assistance are included in disaster planning and preparedness.

Implementation Programs

Ongoing Planning Efforts, Public Outreach and Education

HS.I-38: 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-26, HS.P-32, HS.P-33, HS.P-34, HS.P-35, HS.P-36, HS.P-37

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-39: 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.

Public Health and Safety Chapter

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-32, HS.P-34, HS.P-36

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-40: 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-32, HS.P-34, HS.P-37

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

Coordination with Other Agencies and Organizations

HS.I-41: 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-35

Department/Agency: Office of Emergency Services

Funding Source: General Fund

Time Frame: Ongoing

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 as a means to achieve a higher level of public health in the county.

Planning Context

According to the 2014 County Health Rankings and Roadmaps program, Solano County is ranked 31st in the State for overall health of residents. Obesity is one of the most prevalent health concerns for the county. The 2012 California Health Institute Survey indicates that more than a third (36%) of adults are obese, a 10% increase from the previous decade; in 2001, 23% of adults were obese. Obesity rates are also higher than the state overall; by comparison, only 25% of adult Californians were obese in 2012. Obesity not only affects one's comfort and mobility, but also has serious related health consequences, including diabetes, heart disease, stroke, and a number of different cancers. **Table HS-1** shows top causes of mortality in the county and their ranking compared to other counties in 2010-2012. Of the top causes, four are obesity related: heart disease, certain cancers, stroke, and diabetes. Solano is ranked 13th among counties for heart disease as a cause of death, and nearly 10% of residents have been diagnosed with diabetes.

Table HS-1
Causes of Mortality in Solano County 2010-2012

Rank	Cause of Death	2010-2012 Deaths (average)	Solano County Death Rate	California Death Rate
27	All Causes	2,872.7	705.7	641.5
47	All Cancers	735.7	175.6	153.3
13	Coronary Heart Disease	331.3	81.2	106.2
58	Alzheimer's Disease	186.0	48.5	30.5
47	Lung Cancer	184.0	44.1	34.8
30	Chronic Lower Respiratory Disease	171.0	43.3	36.2
25	Stroke	146.7	37.0	36.6
12	Accidents	115.0	27.6	27.3
49	Diabetes	98.3	24.1	20.4
49	Prostate Cancer	37.3	23.8	20.5
49	Breast Cancer	54.7	23.4	20.9
49	Pneumonia	76.3	19.0	16.1

Source: California Department of Public Health, County Health Status Profiles 2014.

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 of these strategies can increase the amount of bicycling and walking that occurs, thereby increasing physical activity levels and social networks and reducing 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 crashes. 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 child care 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 above 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 opportunities for access to healthy foods. In order 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 local residents.

Each 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 plan guiding 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.

Policies

-
- HS.P-38: Integrate public health concerns into land use planning and decision making.
- HS.P-39: Coordinate with public health agencies and groups to provide outreach and services, especially for special needs populations.
- HS.P-40: Increase access to healthy foods throughout the county.
- HS.P-41: Ensure access to health care and social services for all residents, including the elderly and underserved populations. Encourage the provision of health care and the construction of health care facilities.
- HS.P-42: Encourage the provision of child care facilities, particularly near employment centers, community centers, and schools.

Implementation Programs

Regulations

-
- HS.I-42: 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-38, HS.P-40

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

Funding Source: General Fund

Time Frame: Ongoing

Development Review

-
- HS.I-42: Promote the use of healthy building materials such as low toxicity paint and nontoxic carpeting.

Related Policy: HS.P-38

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach and Education

HS.I-43: 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-39

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

Funding Source: General Fund

Time Frame: Ongoing

HS.I-44: 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-38, HS.P-39, HS.P-40, HS.P-41, HS.P-42

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

Funding Source: General Fund

Time Frame: Annual, ongoing

HS.I-45: 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-38, HS.P-40

Agency/Department: Department of Public Health

Funding Source: General Fund

Time Frame: Ongoing

Coordination with Other Agencies and Organizations

HS.I-46: Actively support implementation of health service strategic plans, including the *Health and Social Services Strategic Plan* and the *Solano County Health Access Strategic Plan*.

Public Health and Safety Chapter

Related Policy: HS.P-39

Agency/Department: Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-47: Coordinate with public health agencies to provide public outreach and education on how lifestyle changes can affect health.

Related Policy: HS.P-38

Agency/Department: Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-48: Partner with the cities, school districts, and civic organizations to facilitate joint-use of schools and other public areas for public services such as child care and recreation.

Related Policy: HS.P-42

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

Funding Source: General Fund, Service Fees

Time Frame: Ongoing

HS.I-49: Investigate possible 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-39, HS.P-41

Agency/Department: Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

HS.I-50: 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-38, HS.P-39

Agency/Department: Department of Health and Social Services

Funding Source: General Fund

Time Frame: Ongoing

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-16**. The southwestern portion of Solano County is located 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 relatively flat, bordered by the North Coast Mountain Range to the west and the Northern Sierra Nevada Mountains 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 as a result 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. The majority of 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 generally 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 (NO₂) is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO₂ are combustion devices, such as boilers, gas turbines, and mobile and stationary internal-combustion engines. Because NO₂ is created and destroyed by reactions associated with ozone, the NO₂ 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.

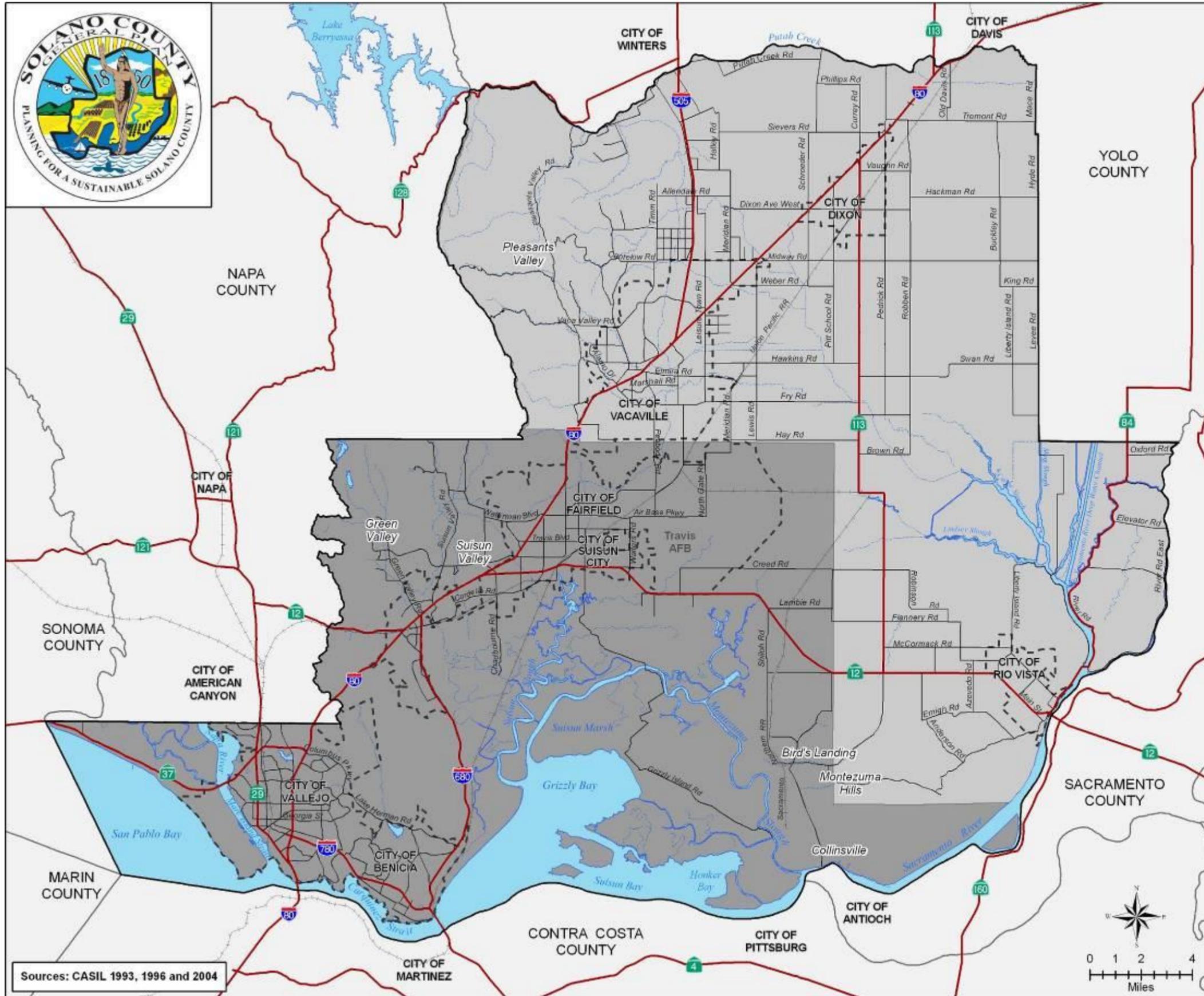
Sulfur dioxide (SO₂) is produced by stationary sources such as coal and oil combustion, steel mills, refineries, and pulp and paper mills. The major adverse health effects associated with SO₂ exposure pertain to the upper respiratory tract. On contact with the moist mucous membranes, SO₂ produces sulfurous 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 PM₁₀. PM₁₀ 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.

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 largely 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 by the California Air Resources Board (ARB).



Solano County General Plan

Figure HS-13

Air Quality Management District Jurisdictions

Legend

- Bay Area Air Quality Management District
- Yolo-Solano Air Quality Management District
- Basemap Layers**
- Roadways
- Highways
- Railroads
- Streams and Creeks
- Major Water Features
- Municipal Service Areas
- Adjacent Counties

Sources: CASIL 1993, 1996 and 2004



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Toxic Air Contaminants

Concentrations of toxic air contaminants (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 ARB, 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 ARB include:

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 in order 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 ARB guidance document *Air Quality and Land Use Handbook* recommends distances from which sensitive uses should be cited relative to pollutant emissions sources and visa-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.

In addition, odor-generating facilities, including, but not limited to, landfills or other waste disposal or transfer facilities, waste water 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 above, 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 ground cover 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 ARB 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 (CO₂), which is a byproduct of fossil fuel combustion. CO₂ 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 carbon dioxide 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 above to reduce air pollutant emissions from motor vehicles and stationary and area sources also act to minimize CO₂ 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 CO₂) 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 (AB 32 and S-3-05) are interpreted to regulate stationary sources of emissions and high GWP-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. In order 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 Policies

Air quality in Solano County is regulated by the U.S. Environmental Protection Agency (EPA), ARB, 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.

U.S. 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

ARB 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 ARB to establish California ambient air quality standards (CAAQS). ARB 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 incorporate 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.

Policies

-
- HS.P-43: Support land use, transportation management, infrastructure and environmental planning programs that reduce vehicle emissions and improve air quality.
- HS.P-44: 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).
- HS.P-45: Promote consistency and cooperation in air quality planning efforts.
- HS.P-46: Coordinate with and provide incentives to agricultural producers to minimize the impacts of operations on air quality.
- HS.P-47: Promote GHG 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-51: 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-43

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Development Review

-
- HS.I-52: 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 (AB 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-43, HS.P-44

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach and Education

HS.I-53: 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-46

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-54: 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-43, HS.P-44

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-55: 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-47

Agency/Department: Department Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Coordination with Other Agencies and Organizations

HS.I-56: 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 measures to reduce emissions from fuel consumption, energy consumption, surface coating operations, and solvent usage.

Related Policies: HS.P-43, HS.P-44, HS.P-46

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-57: Encourage coordination between the Bay Area and Yolo-Solano Air Quality Management Districts for consistency in air quality planning efforts.

Related Policies: HS.P-45

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-58: 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-44

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-59: Assess air quality impacts using the latest version of the California Environmental Quality Act Guidelines

and guidelines prepared by the applicable Air Quality Management District.

Related Policies: HS.P-44, HS.P-45, HS.P-46

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

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 also locations that are deemed "noise-sensitive";
- protect existing noise-generating commercial and industrial uses from encroachment of new noise-sensitive developments;
- prevent new noise-generating commercial and industrial uses in Solano County from encroaching on noise-sensitive land uses; and
- provide 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} described above, but with an additional 5 dB "penalty" added to single noise events that occur during the noise-sensitive hours between 7:00 p.m. to 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.

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

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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 Noise Compatibility Guidelines**

Land Use Category	Community Noise Exposure (L _{dn} 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+

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Land Use Category	Community Noise Exposure (L _{dn} or CNEL, dBA)			
	Normally Acceptable ¹	Conditionally Acceptable ²	Normally Unacceptable ³	Clearly Unacceptable ⁴
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; L_{dn} = day-night average noise level

- ¹ Specified land use is satisfactory, based upon 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.
- ⁵ 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.

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

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 L _{dn})	Sensitive Interior ¹ Area (dBA L _{dn})	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; L_{dn} = 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 nontransportation noise sources. In addition, properties located 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-17, HS-18, and HS-19** show the noise contour lines surrounding the three airports. These are provided here for informational purposes only. For the appropriate standards, please see the applicable ALUCP.

**Table HS-5
Nontransportation Noise Standards—
Average (dBA L_{eq})/Maximum (dBA L_{max})¹**

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:

L_{eq} = equivalent or energy-averaged sound level; L_{max} = 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 utilized 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.

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Roadway Noise

Figure HS-17 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 year 2030 based upon future estimated traffic levels. Interstates 80, 505, 680, 780 and SR 12 are the most heavily traveled roadways in Solano County and 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-19 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-19** was developed using 1,200-foot distances to the 60-dB L_{dn} railroad noise contours for various numbers of future daily train activity in Solano County. The data assume 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-20**. Travis Air Force Base is located 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-21**. Rio Vista Municipal Airport is located in the southwest corner of Solano County 3 miles north of the City of Rio Vista.

Estimated 2025 noise contours for Nut Tree Airport are shown in **Figure HS-22**. The Nut Tree Airport is located 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 Interstate 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

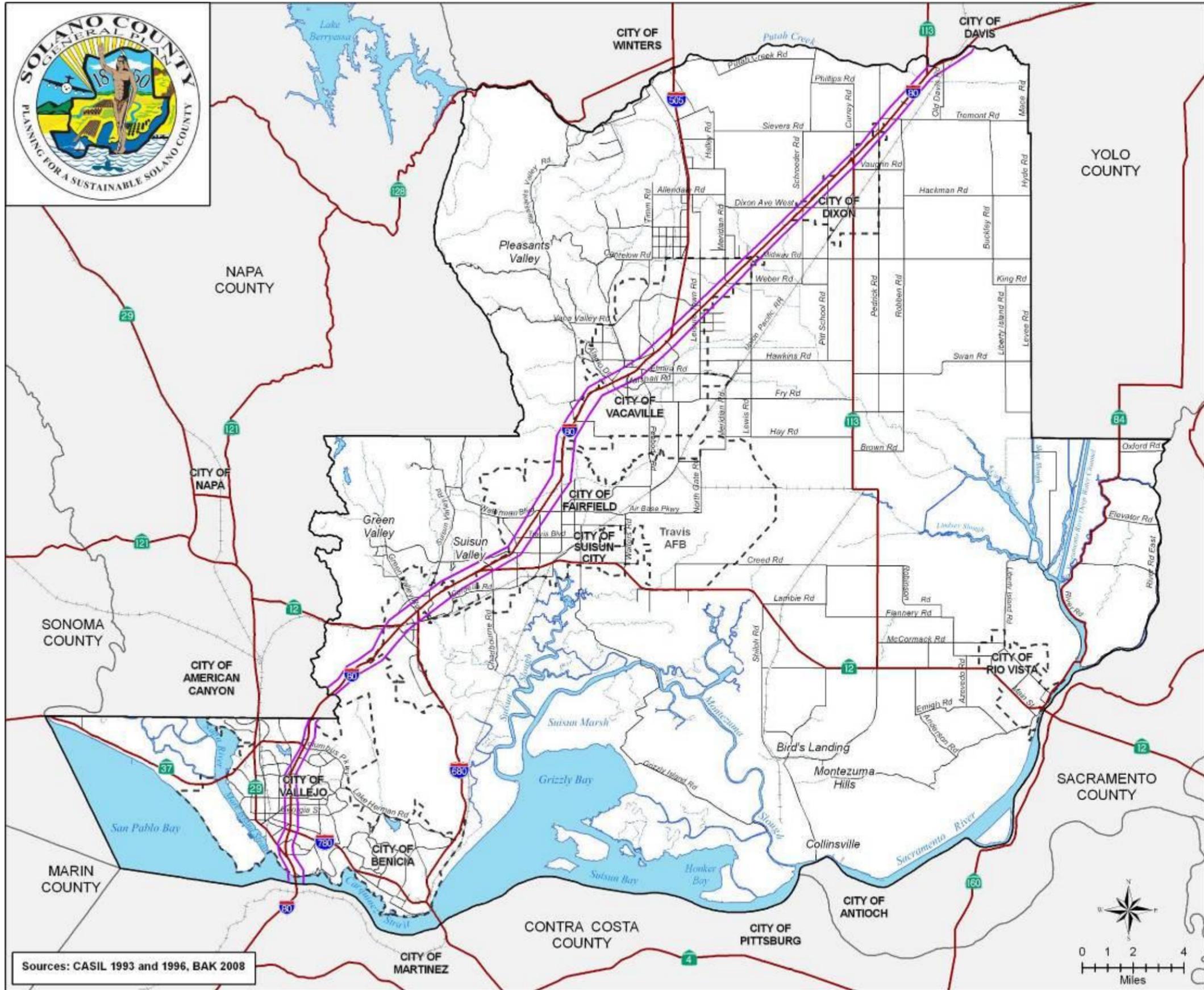
California Noise Insulation Standards (Title 24)

Title 24 of the California Code of Regulations establishes standards governing interior noise levels that apply to all new multi-family 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.

Policies

-
- HS.P-48: Consider and promote land use compatibility between noise-sensitive¹ and noise-generating land uses when reviewing new development proposals.
- HS.P-49: Encourage design that minimizes negative effects of noise without compromising aesthetic values and pedestrian and auto connectivity.

¹ 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.



Solano County General Plan

Figure **HS-17**

Roadway Noise Contours (2006)

Legend

- 60 dB Ldn Noise Contours
- Basemap Layers**
- Roadways
- Highways
- + Railroads
- Streams and Creeks
- █ Major Water Features
- Municipal Service Areas
- Adjacent Counties

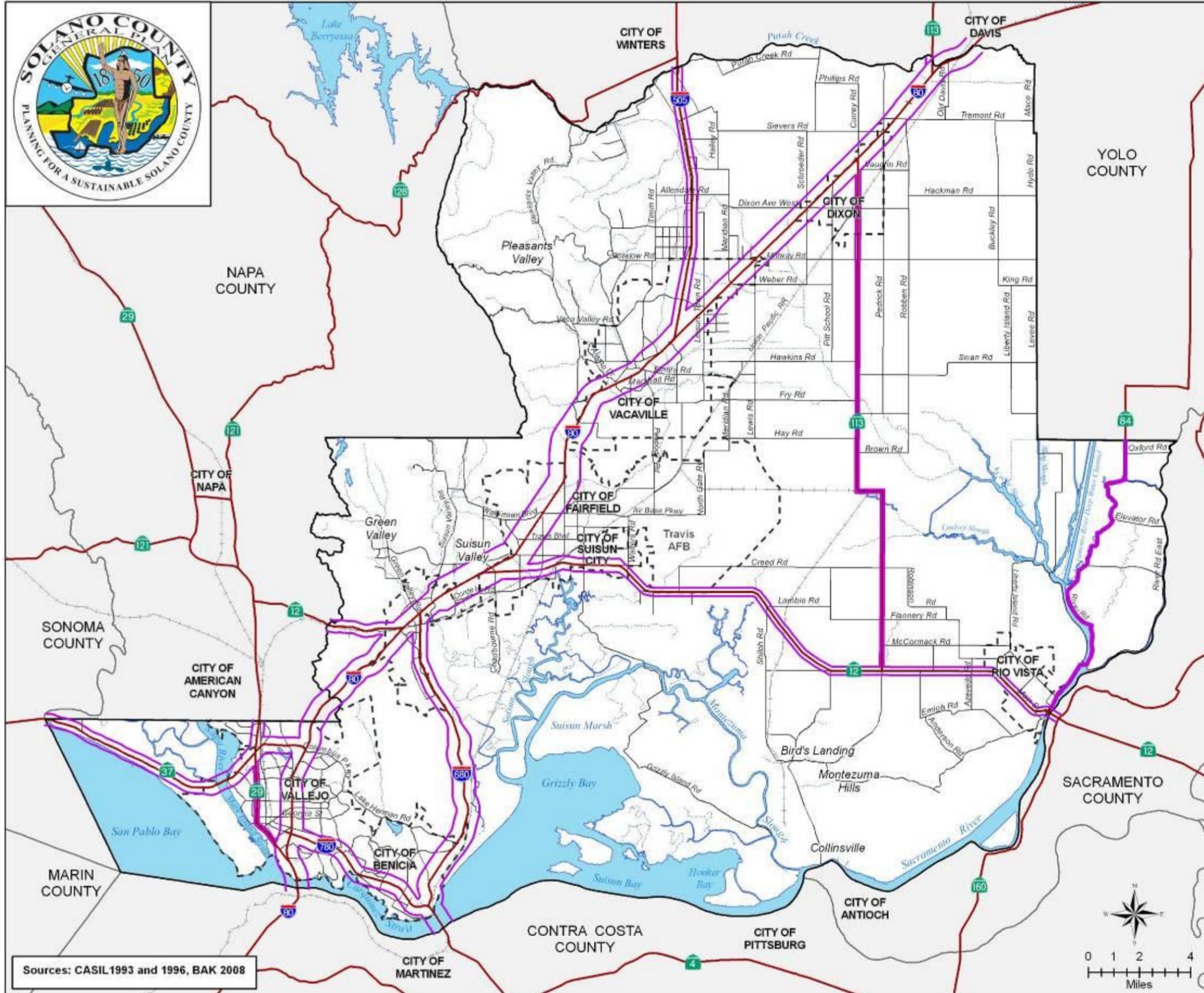
Sources: CASIL 1993 and 1996, BAK 2008



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Solano County General Plan
Figure HS-16
Roadway Noise Contours (2030)

- Legend**
- 60dB Ldn Noise Contours
 - Basemap Layers**
 - Roadways
 - Highways
 - Railroads
 - Streams and Creeks
 - Major Water Features
 - Municipal Service Areas
 - Adjacent Counties

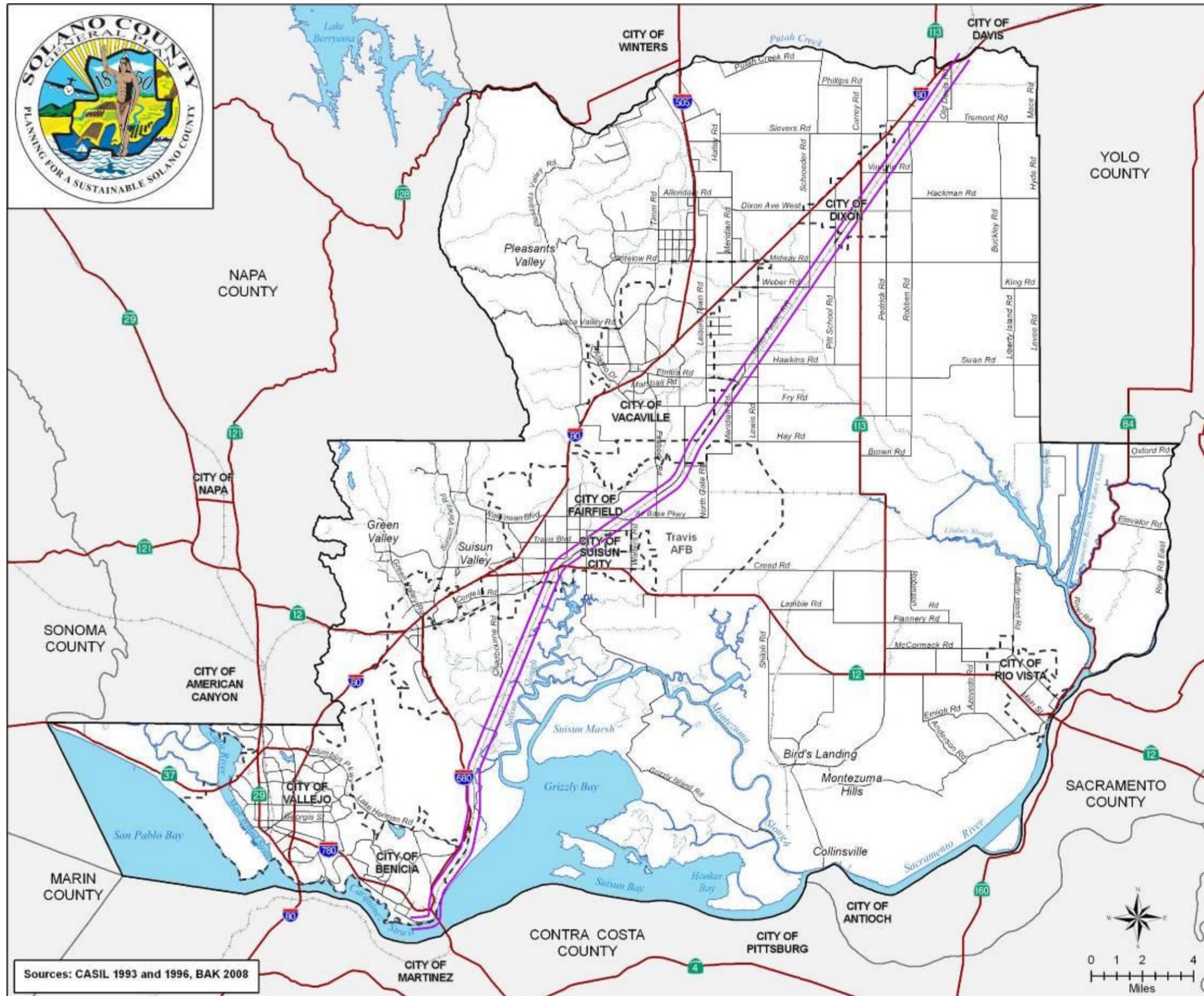
Sources: CASIL1993 and 1996, BAK 2008



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Solano County General Plan

Figure HS-16

Railroad Noise Contours

Legend

- 60dB Ldn Railroad Noise Contours
- Basemap Layers
- Roadways
- Highways
- + Railroads
- Streams and Creeks
- █ Major Water Features
- █ Municipal Service Areas
- █ Adjacent Counties

*Generalized railroad noise contours assuming
 45 operations per day
 (1,200 feet to the 60 dB Ldn contours)



Sources: CASIL 1993 and 1996, BAK 2008

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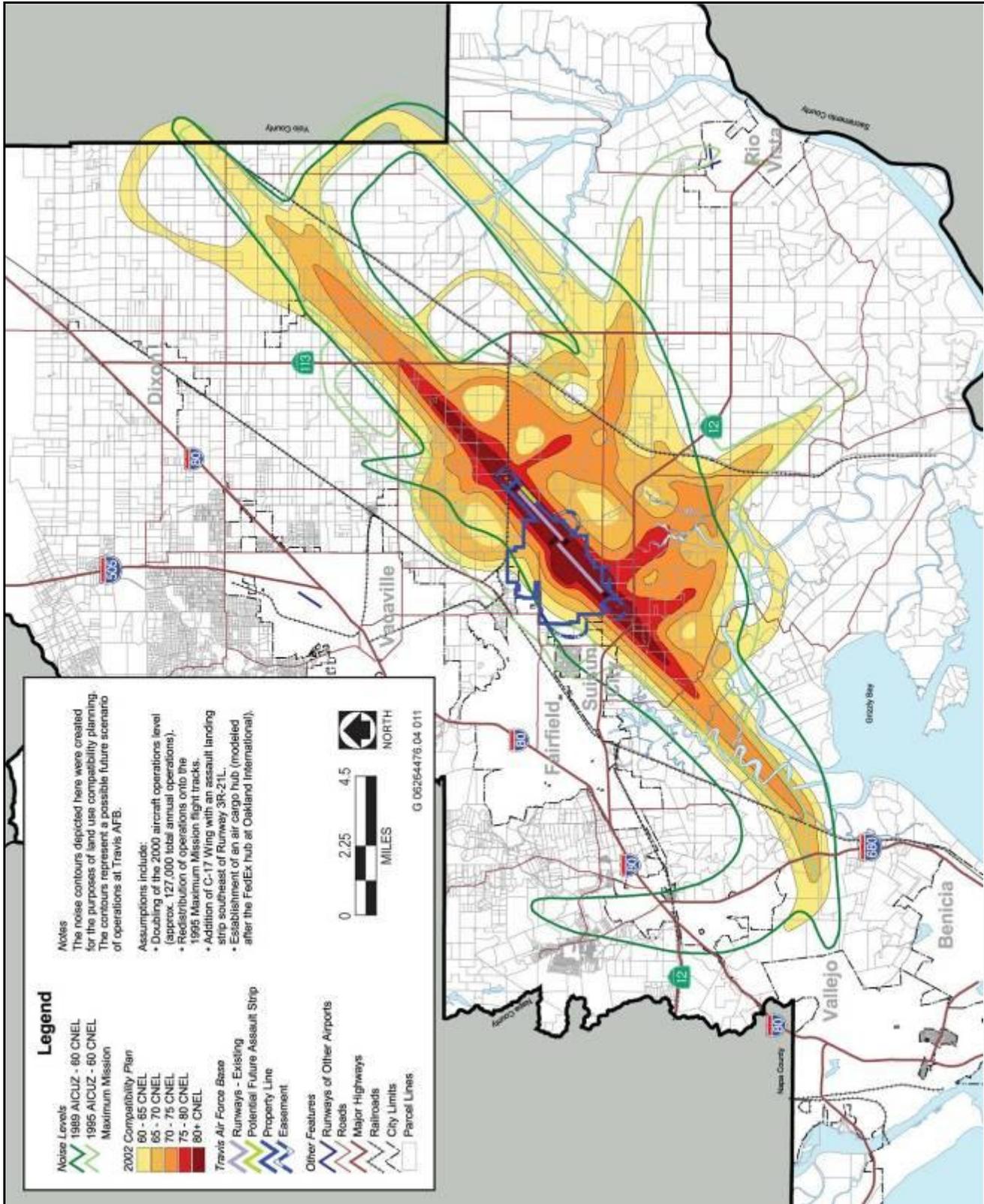


Figure HS-20
 Travis Air Force Base Noise Contours

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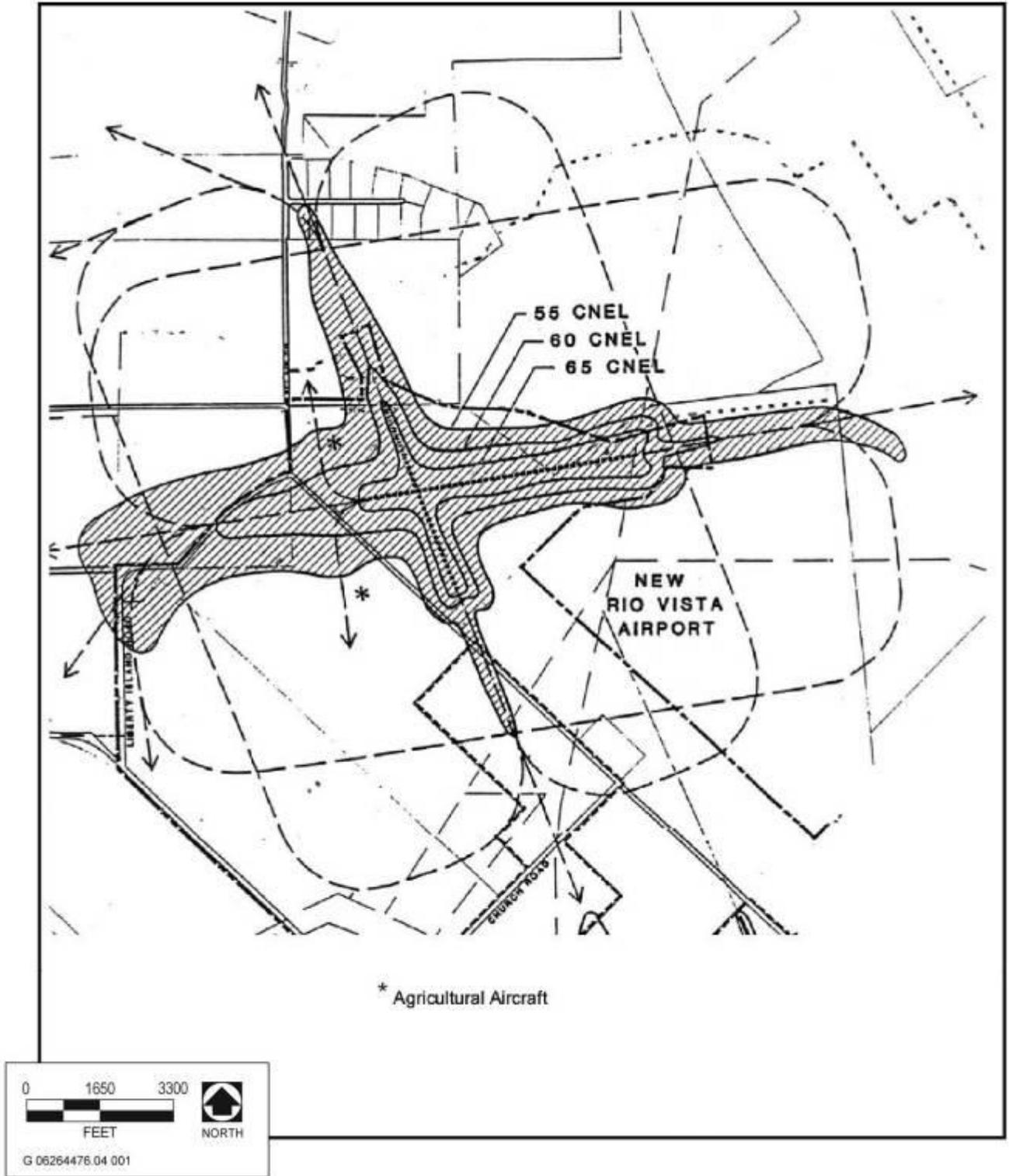


Figure HS-21
Rio Vista Municipal Airport Noise Contours

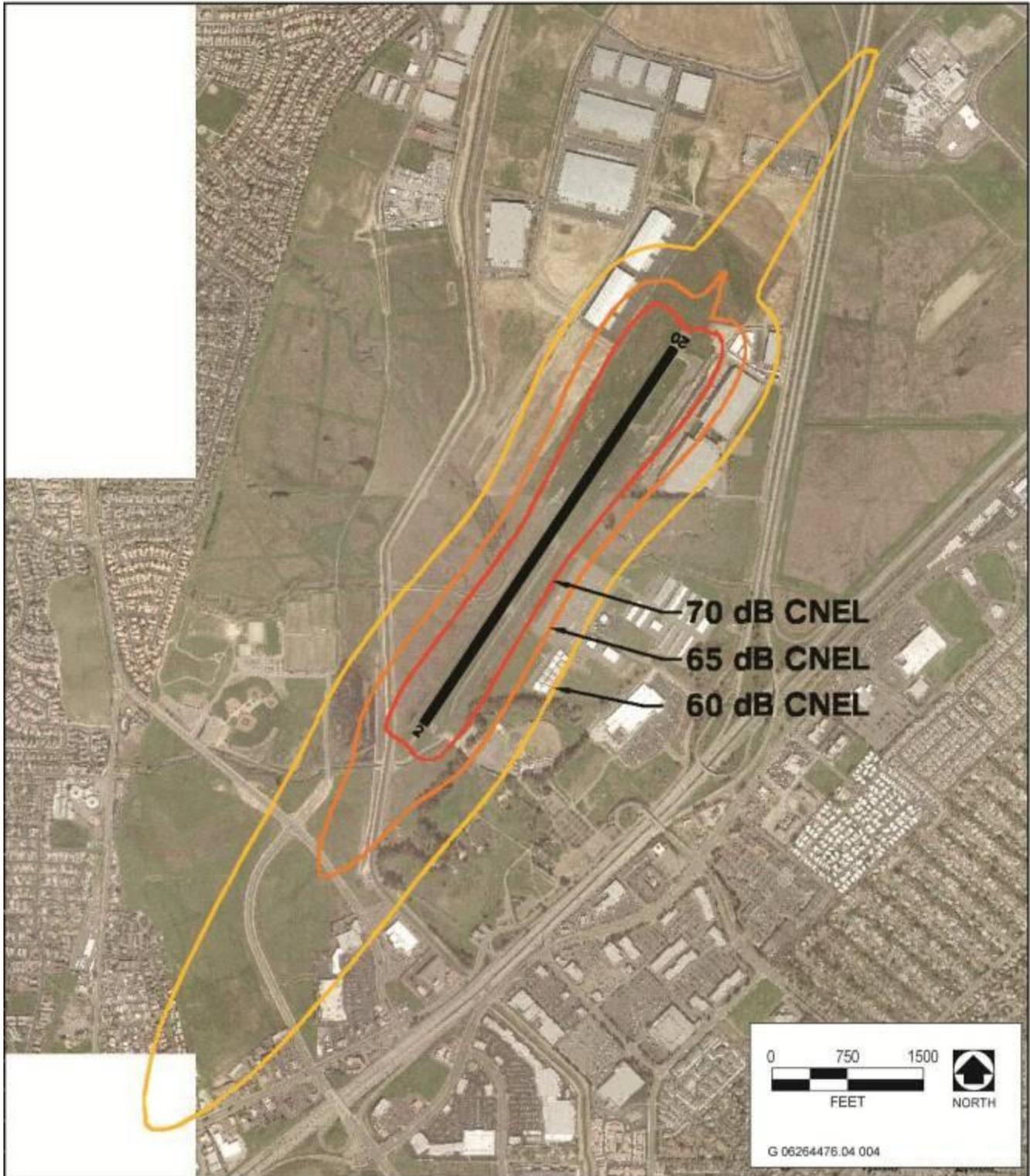


Figure HS-22
Nut Tree Airport Noise Contours

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Public Health and Safety Chapter

- HS.P-50: 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.
- HS.P-51: Develop strategies with residents and businesses to reduce noise conflicts.
- HS.P-52: 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

Regulations

HS.I-60: Develop, adopt and implement a County noise ordinance that includes:

- performance standards and exemptions;
- restrictions on noise-emitting construction activities based on standards for construction equipment;
- regulations for mobile or single event types of noise emissions or noise generated by added equipment including truck loading and unloading, operation of construction equipment, and amplified music;
- standards to ensure that the County personnel charged with enforcing such an ordinance are properly trained and equipped for on-site measurement techniques and other necessary tasks; and
- standardized, broadly accepted documented procedures for noise measurement collection to ensure that field measurements are conducted in a consistent manner.

Related Policy: HS.P-51

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Adopt by 2016

Funding, Physical Improvements, and Capital Projects

HS.I-61: 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-52

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Development Review

HS.I-62: When reviewing new development proposals,

- Require noise abatement measures to ensure that noise levels will not exceed those indicated in Tables HS-3 and HS-4.
- 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-3 and HS-4.
- Where development projects produce, or are affected by, nontransportation-related noise, require the inclusion of project features that will enable the project to achieve acceptable levels specified in Table HS-4, 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-4. The total noise level resulting from new sources and ambient noise shall not exceed the standards in Table HS-4, 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-4, the standard becomes the ambient level plus 5 dB.
 - Reduce the applicable standards in Table HS-4 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:

Public Health and Safety Chapter

- The project is located 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-4 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-48, HS.P-50, HS.P-51, HS.P-52

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-63: 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-48, HS.P-51, HS.P-52

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-64: 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, 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-49

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Ongoing Planning Efforts, Public Outreach and Education

HS.I-65: 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 located in existing or projected 60 dB contours.

Related Policy: HS.P-51

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

Coordination with Other Agencies and Organizations

HS.I-66: 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-48, HS.P-51

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

HS.I-67: 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-52

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Ongoing

CLIMATE CHANGE

Climate change refers to a change in the state of the climate that persists for an extended period, due to natural processes or human-caused changes in the composition of the atmosphere or land use. According to the United Nations Intergovernmental Panel on Climate Change², the scientific authority on the subject of climate change, certain findings are widely accepted by the scientific community:

- Greenhouse gases (GHGs) such as CO₂, when introduced to the atmosphere, have a warming effect on the earth;
- Human activities have increased the levels of GHGs in the atmosphere since pre-industrial times; and
- The global climate has warmed by an average of 1.0–1.7 degrees Fahrenheit from 1906–2005.

Greenhouse gases are gases that trap heat in the atmosphere. GHGs include CO₂, methane, nitrous oxide, and fluorinated gases. The human activities during which these gases are emitted include burning, manufacturing, and transportation-related combustion of fossil fuels. Livestock and solid waste emissions also contribute to the build-up of GHGs.

The effects of climate change include increased global average temperature, subsequent altered precipitation patterns, thermal expansion of the ocean, and loss of polar and global sea ice extent. In Solano County, these changes would translate to sea level rise with possible coastal flooding, water and energy supply issues, and increased risk of wildfire. Global average temperature rise and indirect impacts associated with climate change could increase distribution of diseases or cause other public health problems; increase hazards such as flooding, storms, and wildfires; cause habitat loss and species endangerment and extinction; and negatively affect agricultural operations.

Responding to climate change requires a two-pronged approach. On one hand, the County must adapt to change and prepare for the already-foreseeable effects of global warming that has already occurred and, on the other hand, the County must coordinate with agencies, residents, and businesses to modify behavior to decrease the countywide contribution to greenhouse gas emissions and associated impacts on the climate.

The California Global Warming Solutions Act of 2006 (AB 32) was created by the state legislature to address the threat global warming poses to the state's "economic well-being, public health, natural resources, and the environment". The Act directs ARB to "adopt a statewide greenhouse gas emissions limit

² IPCC 2007; *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC*. Cambridge University Press. Cambridge, UK.

equivalent to the statewide greenhouse gas emissions levels in 1990 to be achieved by 2020." This requires maintaining an inventory of emission levels as well as taking action to decrease emission levels to 1990 levels.

All jurisdictions in California have a responsibility to contribute to this effort with changes in operations, technology, and policies that enable residents and businesses to follow suit. This General Plan provides the framework for Solano County's approach to climate change and GHG emission reduction. The types of policies that deal with climate change and GHG emissions are far ranging.

Climate change has been recognized as a threat that could alter social, economic, and ecological conditions in Solano County. Concentrations of GHGs have dramatically increased in the atmosphere due to the use of fossil fuel-based energy sources. Additionally, the earth's capacity to capture and store GHGs has been reduced due to extensive deforestation and the conversion of grasslands and other carbon rich natural communities, as well as saturation of the ocean with dissolved CO₂. Rigorous scientific analysis conducted by the Intergovernmental Panel on Climate Change, the National Research Council of the National Academies, and other agencies indicates that increased concentrations of GHGs have already begun to result in significant warming, and will lead to changes in precipitation patterns, sea level rise, and more frequent extreme weather events. Other effects could include constrained water and energy availability, more frequent flooding, health impacts related to increases in vector borne diseases, air pollution, and habitat loss.

State and local governments will play a critical role in addressing this important issue. California's climate change legislation has generally been interpreted to apply to stationary sources of GHG emissions. However, the County believes that in order to achieve the emission reductions mandated in AB 32, each sector must do its fair share to reduce total emissions, and local action is needed to manage and measure activity within each sector as it relates to land use planning. For this reason Solano County has established a GHG emissions reduction goal of 20 percent below 2005 levels by 2020, which exceeds guidance provided in the ARB Scoping Plan and BAAQMD CEQA Guidelines. To achieve this goal, the General Plan has developed a broad spectrum of policies and implementation programs. These policies and programs have been integrated throughout the relevant General Plan chapters, as detailed in **Table HS-6**.

**Table HS-6
Climate Change-Related Policies and Programs**

Issues	Topic	Policies or Programs
Community Form		LU.P-1
	Compact development	LU.I-14
		PF.P-6
		PF.P-7
	Commercial use locations	LU.P-21

Public Health and Safety Chapter

Issues	Topic	Policies or Programs
		ED.P-3
		ED.I-1
	Industrial use locations	LU.P-26
		LU.P-27
		ED.P-3
		ED.I-1
	Live-work uses	LU.P-39
	Access to employment centers	TC.P-2
	Floodplain and open space management	HS.P-9
		HS.P-10
		HS.I-2
		HS.I-7
	Wildfire safety	HS.P-20
		HS.P-22
HS.P-23		
HS.I-26		
Satellite office centers	ED.P-14	
Economic adaptation to climate change	ED.P-15	
County Operations	Solano County as model	RS.P-51
	Alternative fuel County vehicles	RS.I-42
		TC.I-1
Ecosystems	Wildlife migration	SS.P-3
		RS.P-5
		RS.I-9
	Habitat Management	RS.P-2
		RS.P-12
	Tree protection and planting	RS.P-6
		RS.I-3
RS.I-5		
Energy Efficiency	Energy efficient technology	RS.I-8
		RS.P-48
Green Building	Exceed Title 24 requirements	RS.I-38
	LEED certification standards	RS.I-46
	Public education	RS.I-59
	Energy efficient appliances	RS.I-47
	Construction materials	RS.I-48
	Efficient infrastructure systems	PF.P-3
Renewable Energy	Incentives and requirements	RS.P-49
		RS.P-50
		RS.I-51
	Reduced fossil fuel reliance	RS.P-54

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Public Health and Safety Chapter

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Issues	Topic	Policies or Programs	
	Public education	RS.P-56	
	Municipal use	RS.I-40	
	Solar streetlights	RS.I-57	
	Protecting renewable resources	RS.I-58	
Transit	Adequate transit to employment centers	TC.P-17	
	Systems along major corridors	TC.P-14	
	Expanded passenger rail service		TC.P-16
			TC.I-20
			TC.I-13
			TC.I-14
	Non-motorized transportation		TC.P-24
			TC.P-26
			TC.I-18
			TC.I-19
			TC.I-20
	Transit-supporting facilities		TC.I-10
		TC.I-11	
Transportation	Shorten travel distances	TC.P-3	
	Technical solutions	TC.P-6	
	Roadway maintenance and design	TC.P-12	
Agricultural Practices	Incentives and BMPs to improve habitat and air quality	AG.P-19	
		AG.P-25	
		AG.I-20	
	Health and Safety	HS.P-45	
Carbon sequestration and sustainable farming methods	AG.P-21		
	AG.I-21		
Air Quality	Off-road vehicles	RS.I-47	
	Reduce vehicle emissions	HS.P-43	
			HS.I-53
	GHG emission reduction strategies		HS.P-47
			HS.I-56
			HS.I-57
			HS.I-58
Water Management	Water use efficiency and reduced consumption	PF.P-10	
		PF.P-11	
		PF.P-20	
		PF.I-16	
		PF.I-17	
		PF.I-18	
	PF.I-9		

Issues	Topic	Policies or Programs
Waste Reduction	Waste management and recycling	PF.P-27
		PF.I-28
		PF.I-29
	Solid waste reuse	PF.P-28

Related Plans, Programs, and Policies

Primary among the County's strategies to address climate change are implementation of the Solano County Climate Action Plan (CAP) and Sea Level Rise Strategic Program (SLRSP) adopted by the Board of Supervisors in 2011. Together, the policies and programs contained in the General Plan and the additional measures and implementing actions in the CAP and SLRSP will allow Solano County to take a leadership role in responding to this critical issue. Achieving the targeted reductions and successful adaptation to the impacts of climate change will demand genuine effort from civic leaders, residents, and businesses.

Solano County Climate Action Plan

The CAP addresses both GHG emissions from activity within the county (residential, commercial, industrial, transportation, and agricultural sectors) and the emissions specifically from County operations. The CAP provides a GHG emissions inventory for the base year 2005 and a forecast of GHG emissions for the year 2020 assuming no action is taken at the state or local level. The CAP determines the quantity of emissions to be reduced to meet the reduction target of 20 percent below 2005 levels.

The CAP establishes measures and implementing actions necessary to achieve the County's reduction target. General Plan policies and programs related to GHG reductions are referenced in the CAP. The CAP includes provisions to track countywide progress and make necessary changes to facilitate achievement of the goal.

Solano County Sea Level Rise Strategic Program

The SLRSP summarizes the potential effects of sea level rise on Solano County, identifies properties and resources susceptible to sea level rise in order to prioritize management strategies, and develops protection and adaptation strategies to meet the county's and region's goals. The SLRSP was prepared in 2011 with the cooperation of regional partners including the San Francisco Bay Conservation and Development Commission (BCDC) and the Bay-Delta Authority. The program also prioritizes impacts of sea level rise in the county based on a cost-benefit analysis using BCDC's regional prioritization process.

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Policy

HS.P-53: Evaluate the potential effects of climate change on Solano County's human and natural systems and prepare strategies that allow the County to appropriately respond and adapt.

Implementation Program

Regulations

Program HS.I-68: 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-53 and those identified in Table HS-6

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

Funding Source: General Fund

Time Frame: Ongoing

HS.I-69: Periodically update the greenhouse gas emissions inventory 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-43, HS.P-44, HS.P-45, HS.P-46, HS.P-47

Agency/Department: Department of Resource Management

Funding Source: General Fund

Time Frame: Every three years, beginning in 2015

HS.I-70: 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-9, HS.P-10

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

Funding Source: General Fund

Time Frame: Ongoing

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