

City of Santa Rosa

General Plan Safety Element Assessment Version 3

June 12, 2014

Board of Forestry and Fire
Protection



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Purpose and Background: The State Board of Forestry and Fire Protection (BOF/Board) is required to review and make recommendations for the fire safety element of general plan updates in accordance with Government Code (GC) §65302.5. The review and recommendations apply to those general plans with State Responsibility Area (SRA) (Public Resources Code 4125) or Very High Fire Hazard Severity Zones (VHFHSZ) (GC 51175).

The statutory requirements for the Board review and recommendations pursuant to GC 65302.5 (a)(1) and (2), and (b) are as follows:

- *“The draft elements...to the fire safety element of a county’s or a city’s general plan...shall be submitted to the Board at least 90 days prior to... the adoption or amendment to the safety element of its general plan [for each county or city with SRA or VHFHSZ].”*
- *“The Board shall... review the draft or an existing safety element and report its written recommendations to the planning agency within 60 days of its receipt of the draft or existing safety element....”*
- *“Prior to adoption of the draft element..., the Board of Supervisors... shall consider the recommendations made by the Board... If the Board of Supervisors...determines not to accept all or some of the recommendations..., the Board of Supervisors... shall communicate in writing to the Board its reasons for not accepting the recommendations.”*

Methodology for Review and Recommendations: The Board established a standardized method to review the safety element of general plans. The methodology includes 1) examining the general plan for inclusion of factors that are important for mitigation of fire hazard and risks, and 2) making recommendations related to these factors. The evaluation factors and recommendations were developed using CAL FIRE technical documents and input from local fire departments.

Enclosed is a series of recommendations directed at communities that include:

- Some Very High Fire Hazard Severity Zone acreage and/or State Responsibility Area acreage or abut VHFHSZ/SRA
- Limited financial or physical resources
- Low community support
- Little to no previous wildfire protection planning efforts

The General Plan Safety Element of each jurisdiction that fits those criteria will be assessed based on the recommendations below.

Review Process and Timeline

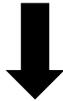
The county, local jurisdiction, and local fire unit will receive and review technical guidance documents, the BOF checklist, and other relevant information from the Governor's Office of Planning and Research and CAL FIRE.



The county or local jurisdiction will work closely with the local fire unit during the development of the general plan and the safety element in particular.



90 days prior to the adoption or amendment of the General Plan: The county or local jurisdiction will submit the safety element to the local fire unit for review.



No more than 30 days later: The unit will submit to the BOF their findings and recommendations.



No more than 60 days later: The Board will consider the fire unit's recommendations and will approve or approve with amendments the recommendations at the next Board meeting.

Standard List of General Plan Safety Element Recommendations

Please click on the appropriate box to “check” whether the plan satisfies each point. Standard recommendations are included in the checklist but please highlight or add additional comments as necessary.

1.0 General Wildfire Protection Planning

- 1.1 General Plan references and incorporates County or Unit Fire Plan: Yes Partial No

Recommendation: Identify, reference or create (if necessary) a fire plan for the geographic scope of the General Plan. General Plan should incorporate the general concepts and standards from any county fire plan, fire protection agency (federal or state) fire plan, and local hazard mitigation plan. Identify or reference the local Unit Fire Plan and, if applicable, the Community Wildfire Prevention Plan.

Priority: High Medium Low N/A

Recommendation: Ensure fire plans incorporated by reference into the General Plan contain evaluations of fire hazards, assessment of assets at risk, prioritization of hazard mitigation actions, and implementation and monitoring components.

Priority: High Medium Low N/A

- 1.2 Map or describe existing emergency service facilities and areas lacking services, specifically noting any areas in SRA or VHFHSZs. Yes Partial No

Recommendation: Include descriptions of emergency services including available equipment, personnel, and maps of facilities.

Priority: High Medium Low N/A

Recommendation: Initiate studies and analyses to identify appropriate staffing levels and equipment needs commensurate with the current and projected emergency response environment.

Priority: High Medium Low N/A

Recommendation: Establish goals and policies for emergency service training that meets or exceeds state or national standards.

Priority: High Medium Low N/A

- 1.3 Inter-fire service coordination preparedness/mutual aid and multi-jurisdictional fire service agreements. Yes Partial No

Recommendation: Adopt the Standardized Emergency Management Systems for responding to large scale disasters requiring a multi-agency response. Ensure and review mutual aid/automatic aid and other cooperative agreements with adjoining emergency service providers.

Priority: High Medium Low N/A

Additional Wildfire Protection Planning Recommendations:

Back in 2007, I think Santa Rosa adopted their own Very High Zone using CAL FIRE's recommendation (http://www.fire.ca.gov/fire_prevention/fhsz_maps_sonoma.php). Charles Hanley was the lead on this project for the City and I think they wanted more "Very High" than what was shown by CAL FIRE's model/recommendation. Prior to 2007, I think they had an "original" 1985 Bates Bill Very High zone based upon an opinion rather than a GIS based model. The map shown as Figure 12-5 is, I think, from 2007 and they place more emphasis on their Wildland-Urban Interface (WUI) Zone than the recommended LRA Very High area. I/we have no issues with the WUI designated and most of this area is then part of the Mutual Threat Zone where they get a CAL FIRE response. Interesting to note is that they do not show the adjacent SRA FHSZ ranking to the City Limits (in the planning area boundary) which would show SRA Very High as the "real threat" to the City east of Oakmont and in the planning area boundary.

They mention "four types of fire hazard zones..." on the top of page 12-13. CAL FIRE did not provide four types of fire hazard severity zones for the LRA. We did model three zones for the SRA. Their map does not show four types, just very high and their WUI designated area. Where are their other two zones/types?

NS-G-5 references "high" fire hazard zones. Should this be "Very High" or "WUI" Zones. Where is high?

2.0 Land Use Planning:

2.1 Disclosure wildland urban interface hazards including Fire Hazard Severity Zones designations and other vulnerable areas as determined by CAL FIRE or fire prevention organizations. Describe or map any Firewise Communities or other firesafe communities as determined by the National Fire Protection Association, Fire Safe Council, or other organizations. Yes Partial No

Recommendation: Discuss and/or include local fire hazard maps.

Priority: High Medium Low N/A

Recommendation: Adopt CAL FIRE recommended Fire Hazard Severity Zones including model ordinances developed by the Office of the State Fire Marshal for establishing VHFHSZ areas. Include a map of the zones that clearly indicates any area designated VHFHSZ.

Priority: High Medium Low N/A

2.2 Goals and policies include mitigation of fire hazard for future development. Yes Partial No

Recommendation: Create fire safe development codes used as standards for fire protection for new development in State Responsibility Area (SRA) within the entity's jurisdiction that meets or exceed statewide standards in 14 California Code of Regulations Section 1270 et seq. Have the codes certified by the Board of Forestry.

Priority: High Medium Low N/A

Recommendation: Establish goals and policies for specific ordinances addressing evacuation and emergency vehicle access; water supplies and fire flow; fuel modification for defensible space; and home addressing and signing.

Priority: High Medium Low N/A

Recommendation: Consider mitigation of previously developed areas that do not meet Title 14 California Code of Regulations Section 1270 et seq. or equivalent local ordinance.

Priority: High Medium Low N/A

- 2.3 The design and location of new development provides for adequate infrastructure for the safe ingress of emergency response vehicles and simultaneously allows civilian egress during an emergency: Yes Partial No

Recommendation: Specify the local ordinances, code sections, or regulations addressing the above standards, particularly any ordinances that address right-of-way, easement, and other reasonable offsite and onsite improvements for a division of land which qualifies for a Parcel Map rather than a Tentative/Final Map under the Subdivision Map Act.

Priority: High Medium Low N/A

Recommendation: Develop pre-plans for fire prone areas that address civilian evacuations to temporary safety locations.

Priority: High Medium Low N/A

- 2.4 Geographic specific fire risk reduction mitigation measures. Yes Partial No

Recommendation: Include policies and recommendations that incorporate fire safe buffers and greenbelts as part of the development planning. Ensure that land uses designated near high or very fire hazard severity zones are compatible with wildland fire protection strategies/capabilities.

Priority: High Medium Low N/A

3.0 **Housing:**

- 3.1 Incorporation of current fire safe building codes and fire engineering features for structures in VHFHSZ. Yes Partial No

Recommendation: Adopt building codes for new development in State Responsibility Areas or incorporated areas with VHFHSZ that are based on those established by the Office of the State Fire Marshal in Title 19 and Title 24 CCR, referred to as the "Wildland Urban Interface Building Codes."

Priority: High Medium Low N/A

Recommendation: Ensure new development proposals contain specific fire protection plans, actions, and codes for fire engineering features for structures in VHFHSZ. Examples include codes requiring automatic sprinklers in VHFHSZ.

Priority: High Medium Low N/A

Recommendation: Ensure residential areas have appropriate fire resistant landscapes and discontinuous vegetation adjacent to open space or wildland areas.

Priority: High Medium Low N/A

3.2 Consideration of diverse occupancies and their effects on wildfire protection.

Yes Partial No

Recommendation: Ensure risks to uniquely occupied structures, such as seasonally occupied homes, multiple dwelling structures, or other structures with unique occupancy characteristics, are considered for appropriate and unique wildfire protection needs.

Priority: High Medium Low N/A

3.3 Fuel modification around homes. Yes Partial No

Recommendation: Establish ordinances in SRA or VHFHSZ for vegetation fire hazard reduction around structures that meet or exceed the Board of Forestry and Fire Protection's Defensible Space Guidelines for SRA and the Very High Fire Hazard severity zones, including vacant lots.

See http://www.bof.fire.ca.gov/pdfs/Copyof4291finalguidelines9_29_06.pdf

Priority: High Medium Low N/A

Recommendation: Reduce fuel around communities and subdivisions, considering fuels, topography, weather (prevailing winds and wind event specific to the area), fire ignitions and fire history.

Priority: High Medium Low N/A

3.4 Identification and actions for substandard fire safe housing and neighborhoods relative to fire hazard area. Yes Partial No

Recommendation: Identify plans and actions to improve substandard housing structures and neighborhoods. Plans and actions should include structural rehabilitation, occupancy reduction, demolition, reconstruction, neighborhood –wide fuels hazard reduction projects, community education, and other community based solutions.

Priority: High Medium Low N/A

Recommendation: Identify plans and actions for existing residential structures and neighborhoods, and particularly substandard residential structures and neighborhoods, to be improved to meet current fire safe ordinances pertaining to access, water flow, signing, and vegetation clearing.

Priority: High Medium Low N/A

3.5 Assessment and projection of future emergency service needs. Yes Partial No

Recommendation: Ensure new development includes appropriate facilities, equipment,

personnel and capacity to assist and support wildfire suppression emergency service needs. Future emergency service needs should be:

- Established consistent with state or national standards.
- Developed based on criteria for determining suppression resource allocation that includes elements such as identified values and assets at risk, ignition density, vegetation type and condition, as well as local weather and topography.
- Local Agency Formation municipal services reviews for evaluating level of service, response times, equipment condition levels and other relevant emergency service information.

Priority: High Medium Low N/A

4.0 Conservation and Open Space:

4.1 Integration of open space into fire safety effectiveness. Yes Partial No

Recommendation: Establish goals and policies for incorporating systematic fire protection improvements for open space. Specifics policies should address facilitation of safe fire suppression tactics, standards for adequate access for firefighting, fire mitigation planning with agencies/private landowners managing open space adjacent to the General Plan area, water sources for fire suppression, and other fire prevention and suppression needs.

Priority: High Medium Low N/A

4.2 Identification of critical natural resource values relative to fire hazard areas. Yes Partial No

Recommendation: Identify critical natural resources and other “open space” values within the geographic scope of the General Plan.

Priority: High Medium Low N/A

Recommendation: Evaluate and resolve existing laws and local ordinances which conflict with fire protection requirements. Examples include conflicts with vegetation hazard reduction ordinances and listed species habitat protection requirements.

Priority: High Medium Low N/A

4.3 Inclusion of resource management activities to enhance protection of open space and natural resource values. Yes Partial No

Recommendation: Develop plans and action items for vegetation management that provides fire damage mitigation and protection of open space values. Plans should address protection of natural resource financial values, establishment of fire resilient natural resources, protection of watershed qualities, and protection of endangered species habitats. Actions should consider prescribed burning, fuel breaks, and vegetation thinning and removal

Priority: High Medium Low N/A

Recommendation: Establish goals and policies for reducing the wildland fire hazards within the entity’s boundaries and, with the appropriate partners, on adjacent private wildlands, federal lands, vacant residential lots, and greenbelts with fire hazards that threaten the entity’s

jurisdiction.

Priority: High Medium Low N/A

5.0 **Circulation:**

- 5.1 Adequate access to high hazard wildland/open space areas. Yes Partial No

Recommendation: Establish goals and policies for adequate access in Very High Fire Hazard Severity Zones that meet or exceed standards in Title 14 CCR 1270 for lands with no structures, and maintain conditions of access in a suitable fashion for suppression access or public evacuation.

Priority: High Medium Low N/A

- 5.3 Incorporate a policy that provides for a fuel maintenance program along roadways in the agency having jurisdiction. Yes Partial No

Recommendation: Develop an adaptive vegetation management plan that considers fuels, topography, weather (prevailing winds and wind event specific to the area), fire ignitions and fire history.

Priority: High Medium Low N/A

6.0 **Post Fire Recovery and Maintenance:**

The post fire recommendations address an opportunity for the community and landowners to re-evaluate land uses and practices that affect future wildfire hazards and risk.

- 6.1 Reevaluate hazard conditions and provide for future fire safe conditions. Yes Partial No

Recommendation: Incorporate goals and policies that provide for reassessment of fire hazards following wildfire events. Adjust fire prevention and suppression needs commensurate for both short and long term fire protection needs.

Priority: High Medium Low N/A

Recommendation: Develop burn area recovery plans that incorporate strategic fire safe measures developed during the fire suppression, such as access roads, fire lines, safety zones, and fuelbreaks, and helispots.

Priority: High Medium Low N/A

- 6.2 Evaluation of redevelopment. Yes Partial No

Recommendation: In High and Very High Hazard areas, ensure redevelopment utilizes state of the art fire resistant building and development standards to improve past 'substandard' fire safe conditions.

Priority: High Medium Low N/A

- 8.6 Long term maintenance of fire hazard reduction mitigation projects. Yes Partial No

Recommendation: Provide polices and goals for maintenance of the post-fire-recovery projects, activities, or infrastructure.

Priority: High Medium Low N/A

8.7 Post fire life and safety assessments. Yes Partial No

Recommendation: Identity flood and landslide vulnerability areas related to post wildfire conditions.

Priority: High Medium Low N/A

Recommendation: Establish goals and policies that address the intersection of flood /landslide/post fire burn areas into long term public safety protection plans. These should include treatment assessment of fire related flood risk to life, methods to control storm runoff in burn areas, revegetation of burn areas, and drainage crossing maintenance.

Priority: High Medium Low N/A

Additional Recommendations:

Firebreaks is used both as one word and two words. Is it better to use "fuel breaks?" Also, "hazard" is missing from "fire hazard zone" language.

- Reference CAL FIRE for the modeling that is the basis for their maps
- Mention evacuation routes, centers, procedures as a goal and policy.
- Include a reference to Chapter 7A in NS-G-2 on page 12-19. Suggested wording: "...utilize fire-resistant building materials pursuant to Chapter 7A."
- More emphasis on defensible space then fire breaks. It is mentioned in NS-G-2 as vegetation management plans which is what I think the City enforces for new development.
- NS-G-2 has "fire retardant landscaping." Should it be "fire resistant," and maybe include mention of a second goal to be drought resistant?
- Mention their City weed abatement ordinance and code enforcement more

12

NOISE AND SAFETY

This element presents an overview of the environmental and man-made hazards affecting Santa Rosa. Noise generation, geology and seismicity, flooding, hazardous materials, and wildland fires are all addressed.

12-1 VISION

Santa Rosa has safe and livable neighborhoods, shopping areas, workplaces, and recreation facilities in 2035. Noise levels along highways and regional/arterial streets are reduced through improved levels of service and noise attenuation measures, such as wide setbacks, landscaping, and traffic control signals. Noise along Highways 101 and 12 is buffered through construction of attractive sound walls adjacent to residential neighborhoods.

All new rehabilitated structures are constructed according to the California Building Code to ensure safety. Geologic hazards are considered in site and building design, and storm water improvements ensure that development along creek corridors is protected from flooding hazards. New structures built within downtown or along the Rodgers Creek Fault Zone are designed to withstand seismic activity. Potential for wildland fires is addressed through site and landscaping design. Education about safety in the event of disaster continues, to ensure that Santa Rosa residents are well prepared for earthquakes, floods, and fires.

12-2 DISASTER PREPAREDNESS

The Santa Rosa Emergency Operations Plan addresses how the city will respond to extraordinary events or disasters, from preparation through recovery. It includes a comprehensive assessment of potential hazards and threats, and sets forth policies and procedures pertaining to emergency planning, organization, and response. The plan is based on the principles and functions of the Standardized Emergency Management System (SEMS). Additionally, in 2006 the city adopted a Local Hazard Mitigation Plan. The plan's overall goal is to make Santa Rosa a disaster resistant community by reducing the potential loss of life, property damage, and environmental degradation from natural disasters while accelerating economic recovery. The Sonoma County Fire and Emergency Services Department is the lead agency for the Sonoma Operational Area and the City is one of nine incorporated

cities within the organizational boundary.

12-3 NOISE

Noise is defined as unwanted sound. In most of Santa Rosa, noise can be characterized as routine background sounds, and unusual or intermittent events. Cars, trucks, buses, trains, air conditioning systems, and aircraft generate background city noise. Intermittent, and sometimes excessive, noise can come from leaf blowers, helicopters, train whistles (at grade crossings), chain saws, un-muffled motor vehicles, and similar sources. Excessive noise can cause annoyance, health problems, economic loss, and ultimately hearing impairment.

Sound waves, traveling outward from a source, exert a sound pressure level usually measured in decibels (dB). Environmental noise is usually measured in A-weighted decibels; a metric corrected for the human ear's response to various frequencies (some animals can hear sounds outside the human range). This plan describes noise in A-weighted scale. Most people can detect a change in sound level at about 3 dB. An increase of 10 dB is perceived as a doubling of loudness.

PROJECTED NOISE SOURCES

The major sources of noise in Santa Rosa throughout the General Plan timeframe include:

U.S. Highway 101 and State Highway 12. Widening Highway 101 to six lanes through the city may increase noise levels as traffic is attracted from alternate routes (i.e. Petaluma Hill Road). Noise is created by tire interaction with the roadbed, and truck engines. In terms of sound energy, noise from one truck is equivalent to 20 autos.

Regional/Arterial streets. Major regional/arterial streets with substantial noise levels include Fulton Road, Guerneville Road, Bellevue Avenue, Stony Point Road, Mendocino Avenue, Fountaingrove Parkway, Calistoga Road, Summerfield Road, and College Avenue. In general, auto traffic volumes will increase by 2035, along with greater noise levels.

Railroad operations. When freight service resumes and passenger rail commences on the Northwestern Pacific Railroad, a number of large trucks and some vehicles may be removed from travel on Highway 101. Railroad noise will be most noticeable from horn soundings at grade crossings.

Emergency medical helicopters and vehicles. Emergency medical vehicles with sirens create intermittent but significant noise. Helicopter operations can affect a large population; the city has received complaints regarding the medical helicopter operations at Memorial and Sutter hospitals.

Landscaping equipment. Landscaping equipment, such as gasoline powered leaf blowers, generate noise and are regulated by the city's Noise Ordinance.

Charles M. Schulz-Sonoma County Airport. Operation of the Charles M. Schulz-Sonoma County Airport is addressed in the Sonoma County Transportation Element and the Airport Land Use Plan. The city regulates the type of development permitted on a small portion of land within the noise-shed of the airport runways.

Industrial and commercial facilities. To a lesser extent, industrial and commercial facilities are sometimes the sources of noise, particularly auto wrecking and commercial loading operations. The city receives infrequent complaints about noises occasionally generated by these businesses.

The noise standards used by the City of Santa Rosa include the Land Use Compatibility Standards for Community Noise environment (Figure 12-1), State of California Noise Insulation Standards (California Code of Regulations, Title 24, Part 2), and applicable standards in the City of Santa Rosa Noise Ordinance. General Plan policies address noise attenuation along major regional/arterial streets through location of land uses, site design, architectural standards, barriers, and street materials.

Figure 12-2 illustrates projected noise contours. A larger, separate fold-out map illustrating projected 2020 noise contours, along with data tables specifying projected distances to 2020 noise contours, is available from the Santa Rosa Community Development Department.

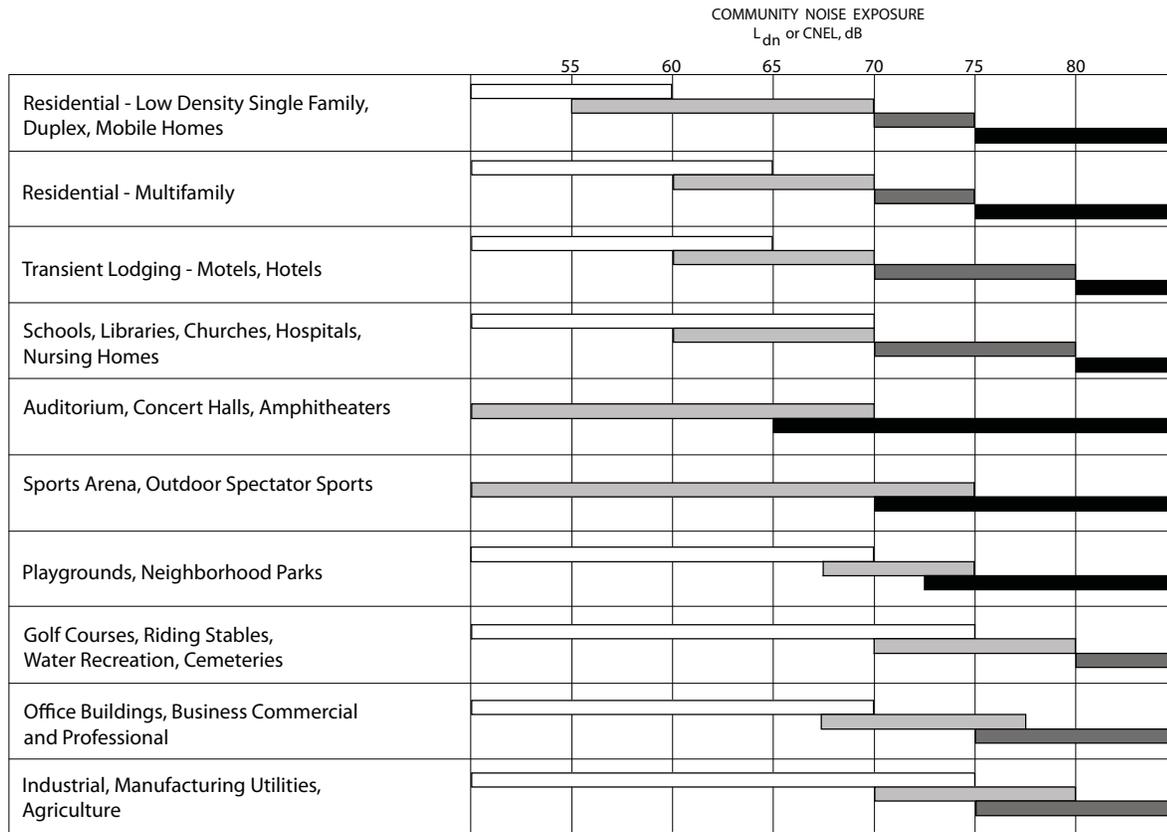
12-4 GEOLOGY AND SEISMICITY

Santa Rosa is within the natural region of California known as the Coast Ranges geomorphic province. The geology of Santa Rosa can vary from bedrock uplands to alluvial flatlands. Because of this varied geology, geologic hazards that could affect the City of Santa Rosa include:

- *Expansive soils.* Expansive soils possess a “shrink-swell” characteristic (cyclic change in volume due to the increase or decrease in moisture content) that occurs in fine-grained clay sediments. Expansion and contraction over the long term causes structural damage, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils.
- *Landsliding.* A landslide is a mass of rock, soil, and debris displaced down-slope by sliding, flowing, or falling. Steep slopes and down-slope creep (slow downward slope movement) of surface materials characterize areas most susceptible to landsliding. The landslide hazard is increased with steep slopes located close to the Rodgers

Figure 12-1

Land Use Compatibility Standards



LEGEND:



NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements.



CONDITIONALLY ACCEPTABLE
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.



NORMALLY UNACCEPTABLE
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.



CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: Environmental Science Associates, 2001

Figure 12-2
Noise Contours

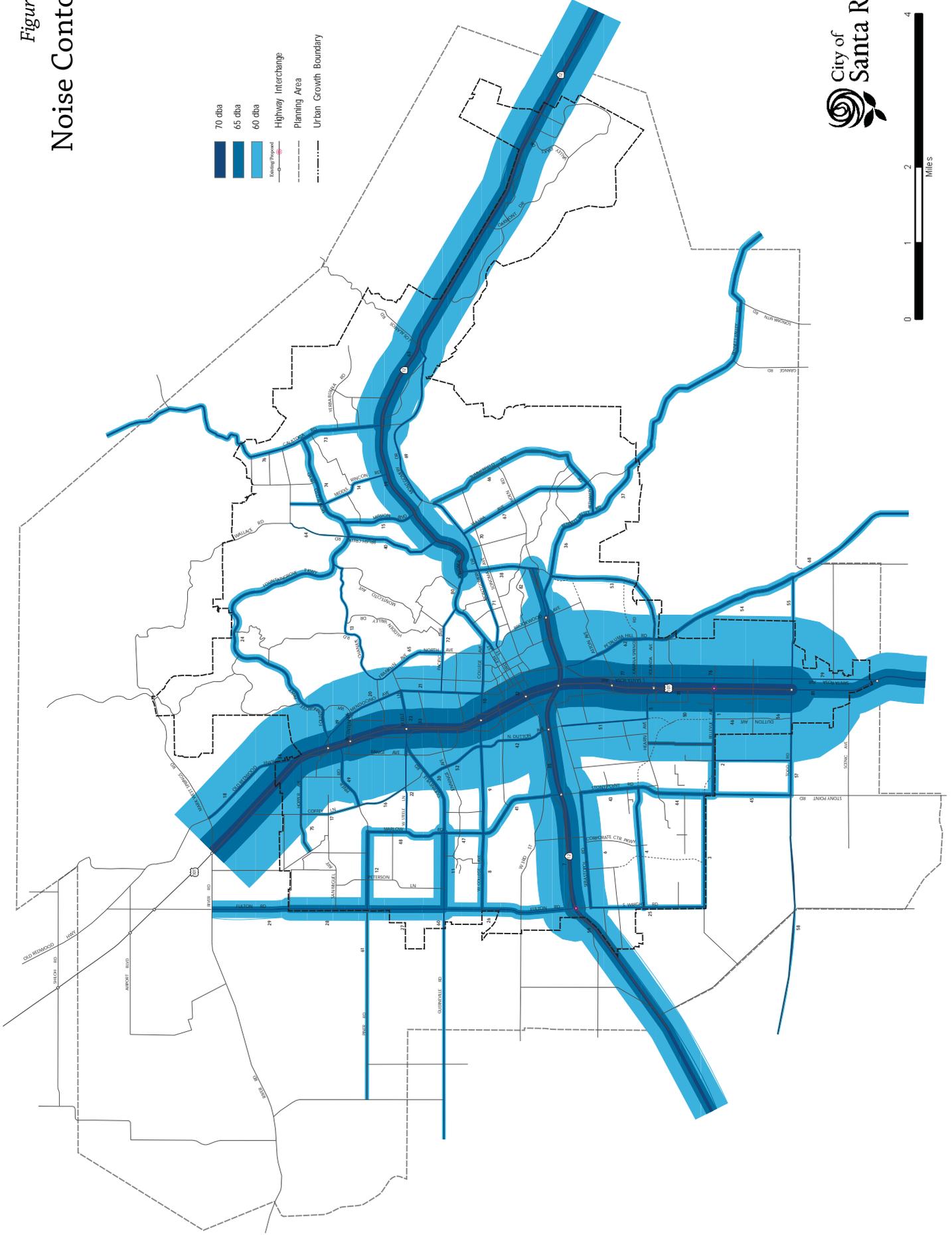
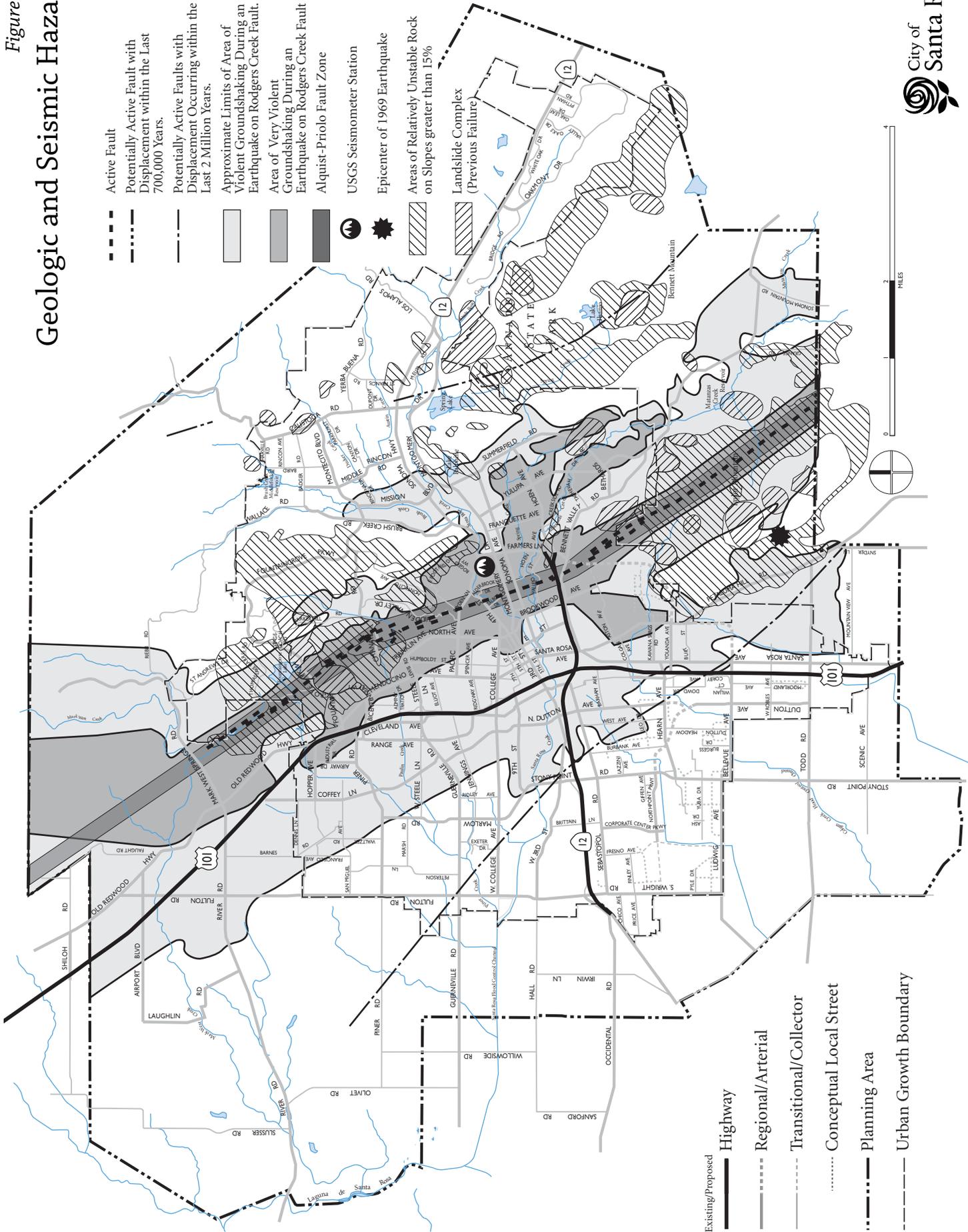


Figure 12-3

Geologic and Seismic Hazards



- Active Fault
- Potentially Active Fault with Displacement within the Last 700,000 Years.
- Potentially Active Faults with Displacement Occurring within the Last 2 Million Years.
- Approximate Limits of Area of Violent Groundshaking During an Earthquake on Rodgers Creek Fault.
- Area of Very Violent Groundshaking During an Earthquake on Rodgers Creek Fault
- Alquist-Priolo Fault Zone
- USGS Seismometer Station
- Epicenter of 1969 Earthquake
- Areas of Relatively Unstable Rock on Slopes greater than 15%
- Landslide Complex (Previous Failure)

- Existing/Proposed Highway
- Regional/Arterial
- Transitional/Collector
- Conceptual Local Street
- Planning Area
- Urban Growth Boundary

Creek Fault Zone.

SEISMICITY

Earthquakes pose especially high risks to Santa Rosa because of the city's proximity to active faults, as shown in Figure 12-3. The Rodgers Creek Fault Zone, approximately eight miles southeast of the Maacama Fault Zone, and 20 miles northeast of the San Andreas Fault Zone runs through the central part of Santa Rosa. The Rodgers Creek and San Andreas faults are the two principally active, Bay Area "strike-slip" faults and have experienced movement within the last 150 years--strike-slip faults primarily exhibit displacement in a horizontal direction. The San Andreas Fault Zone is a major structural feature in the region. Other principal faults capable of producing ground shaking in Santa Rosa include the Hayward, San Gregorio-Hosgri Fault Zone, the Calaveras fault, and the Concord-Green Valley fault.

Santa Rosa could experience a major Rodgers Creek Fault Zone earthquake or an earthquake on any one of the active or potentially active faults in the greater San Francisco Bay Area. General Plan policies seek to ensure that the new structures are built with consideration of the four major hazards associated with earthquakes.

- *Surface Fault Rupture.* Surface fault rupture, displacement at the earth's surface resulting from fault movement, is typically observed close to or on the active fault trace. The Rodgers Creek Fault Zone extends beneath downtown and has the highest potential for significant fault rupture.
- *Ground Shaking.* Santa Rosa could be affected by strong ground shaking caused by a major earthquake during the next 30 years. Ground shaking can be described in terms of peak acceleration, peak velocity, and displacement of the ground. Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments such as artificial fill. Ground shaking may affect areas hundreds of miles away from the earthquake's epicenter.
- *Liquefaction and Ground Failure.* Liquefaction is the process by which water-saturated soil materials lose strength and fail during strong seismic ground shaking. The shaking causes the pore-water pressure in the soil to increase, thus transforming the soil from a solid to a liquid. Liquefaction has been responsible for ground failures during almost all of California's great earthquakes.
- *Earthquake-Induced Landslides.* Seismically induced landsliding is typical of upland areas with slopes greater than 25 percent. Earthquake groundshaking can trigger slope movements such as earth flows and rotational landslides, or dislodge fractured bedrock material resulting in a rockfall.

12-5 FLOODING

Flooding hazards may be considered in two categories: natural flooding and dam inundation. Natural flooding hazards are those associated with major rainfall events, which result in the flooding of developed areas due to overflows of nearby waterways, or inadequacies in local storm drain facilities. In the City of Santa Rosa, most of the annual precipitation falls between the months of November and April. The Federal Emergency Management Agency (FEMA) has identified a several 100-year and 500 year flood zones; approximately 7 square blocks in area, at the confluence along portions of Spring Creek, and Matanzas Creek, Colgan Creek, Naval Creek, Roseland Creek, and Kawana Springs Creek in Santa Rosa. Figure 12-4 illustrates areas subject to flooding and dam inundation.

Major creeks in Santa Rosa have the potential to cause flooding during a large storm event and historically flooding has occurred in areas near creeks. In northern Santa Rosa, the number and geographic distribution of creeks, combined with favorable topography creates a condition in which flooding risks are expected to remain minimal during the planning period. In southern Santa Rosa, drainage conditions are less favorable due to flat topography and the limited number of drainageways (creeks and conduits) that are available for storm water disposal. Currently, the majority of collected storm water in southern Santa Rosa is channeled into Colgan and Roseland creeks. Limited capacity and concentrated discharge place these creeks at the greatest risk of flooding during a 100-year storm event. Drainage improvements to both creeks will be necessary to minimize flooding risks in the future.

To reduce flood risk within the community, the City of Santa Rosa complies with National Flood Insurance Program regulations which apply to all areas of special flood hazard within the city. Flood hazard maps indicate the level of risk for flooding within various watersheds and provide a foundation from which to make key decisions for future developments and projects.

Dam inundation hazards are those associated with the downstream inundation that would occur given a major structural failure in a nearby reservoir. A major earthquake could potentially cause damage or failure to a dam structure, and cause localized flooding. Although dam failure is unlikely due to current state regulations for design, maintenance, and monitoring of dams, Santa Rosa is exposed to the hazard of inundation from failure of local dams such as Lake Ralphine.

Improvements to the storm drain system consistent with expansion or intensification of urban development is essential to protecting Santa Rosans from flooding hazards. Additionally, General Plan policies require provision of open space areas for storm water retention and infiltration and opportunities for groundwater recharge. Monitoring urban runoff resulting

from planned development will allow for controlled stormdrain discharge into existing creeks while also adding to groundwater supply in order to replenish existing aquifers. Limiting the amount of stormwater runoff discharged into the city stormdrain system will help reduce flooding events. The city will maintain and monitor the city hydraulic corridors in order to prevent future hazards associated with flooding.

12-6 HAZARDOUS MATERIALS

Hazardous materials are used in the city for industrial, commercial, and household purposes, and are regulated by federal, state, and local government agencies. These regulations are intended to protect both the environment and public health and safety from improper use, handling, storage, and transport of hazardous materials and waste. For example, the U.S. Department of Transportation (DOT) regulates transportation of hazardous materials. The North Coast Regional Water Quality Control Board has jurisdiction over water quality issues, including groundwater contamination. The Santa Rosa Fire Department has been designated by the State of California as a Certified Unified Program Agency (CUPA) for hazardous materials regulatory enforcement. The Fire Prevention Bureau is responsible for hazardous materials, hazardous waste program management, hazardous materials enforcement and oversight of contaminated soils remediation, including Sonoma County Hazardous Materials Division and Santa Rosa City Fire Department oversee underground and aboveground storage tanks containing hazardous materials and petroleum products. The Santa Rosa City Fire Department Hazardous Materials Response Unit responds to hazardous materials spills.

Potential environmental and health and safety risks associated with hazardous materials in Santa Rosa include automobile accidents involving vehicles transporting hazardous materials or wastes (particularly along the Highway 101 corridor), accidental spills or leaks associated with seismic events, and improper use, handling, storage, transport, and disposal of hazardous materials.

Santa Rosa strictly adheres to federal, state, and local regulations to prevent chemical storage and handling activities associated with industrial and commercial uses. These regulations ensure that underground storage tanks do not release hazardous materials such as petroleum products into the soil and groundwater. Public education efforts reduce improper disposal of household-generated hazardous waste such as used motor oil, paints, and solvents which can impact local waterways and drinking water supplies.

12-7 WILDLAND FIRES

Hillside residential neighborhoods located in the northern and eastern portions of the city are subject to risk of wildland fire, and historically have been the site of such fires. Open areas and slopes covered with tall grasses and/or chaparral provide fuels to feed wildfires, once started. The City has identified a Wildland Urban Interface (WUI) zone that encompasses

Figure 12-4

Flood Zones

- Dam Inundation Areas
- 100 Year FEMA Flood Areas
- 500 Year FEMA Flood Areas

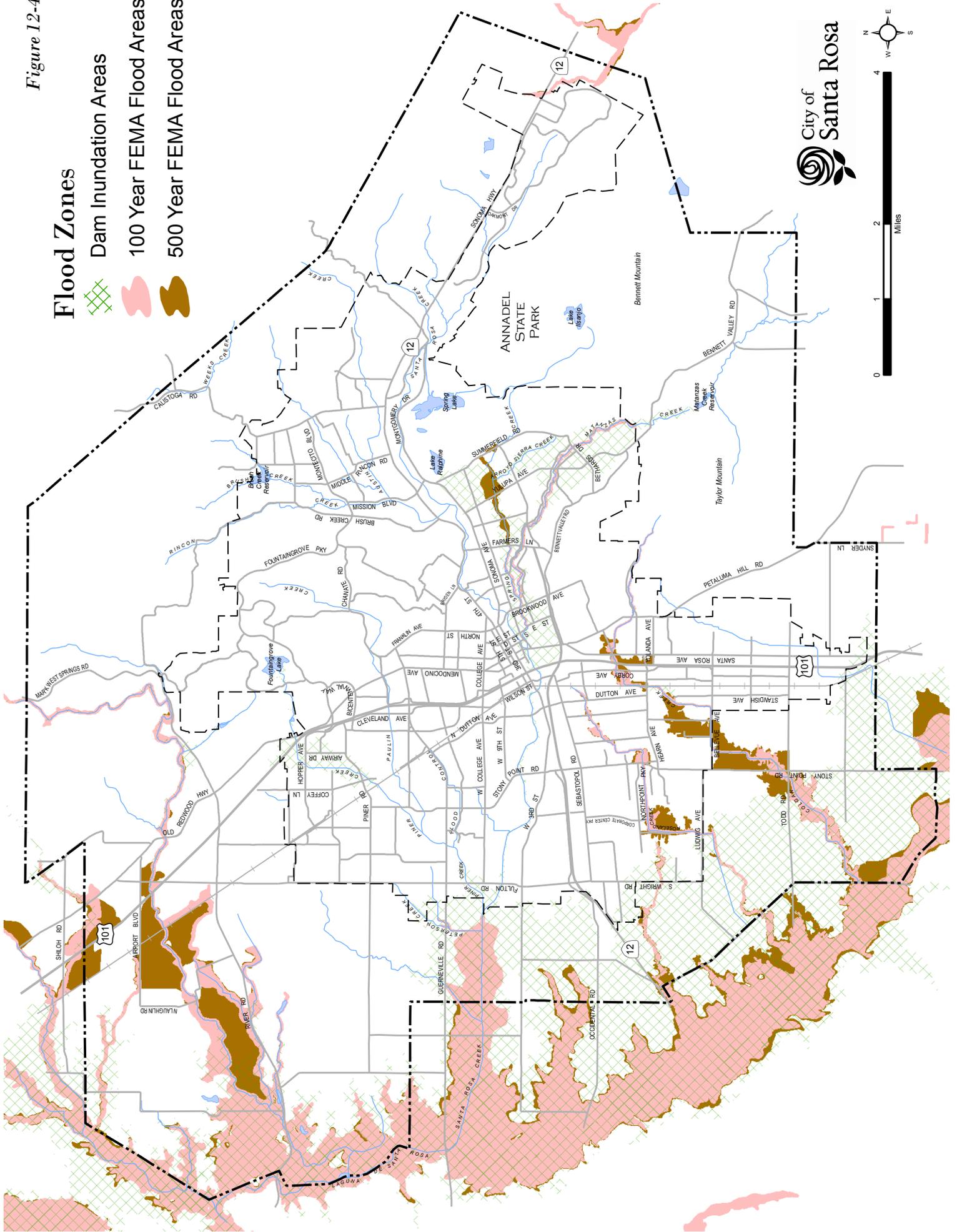
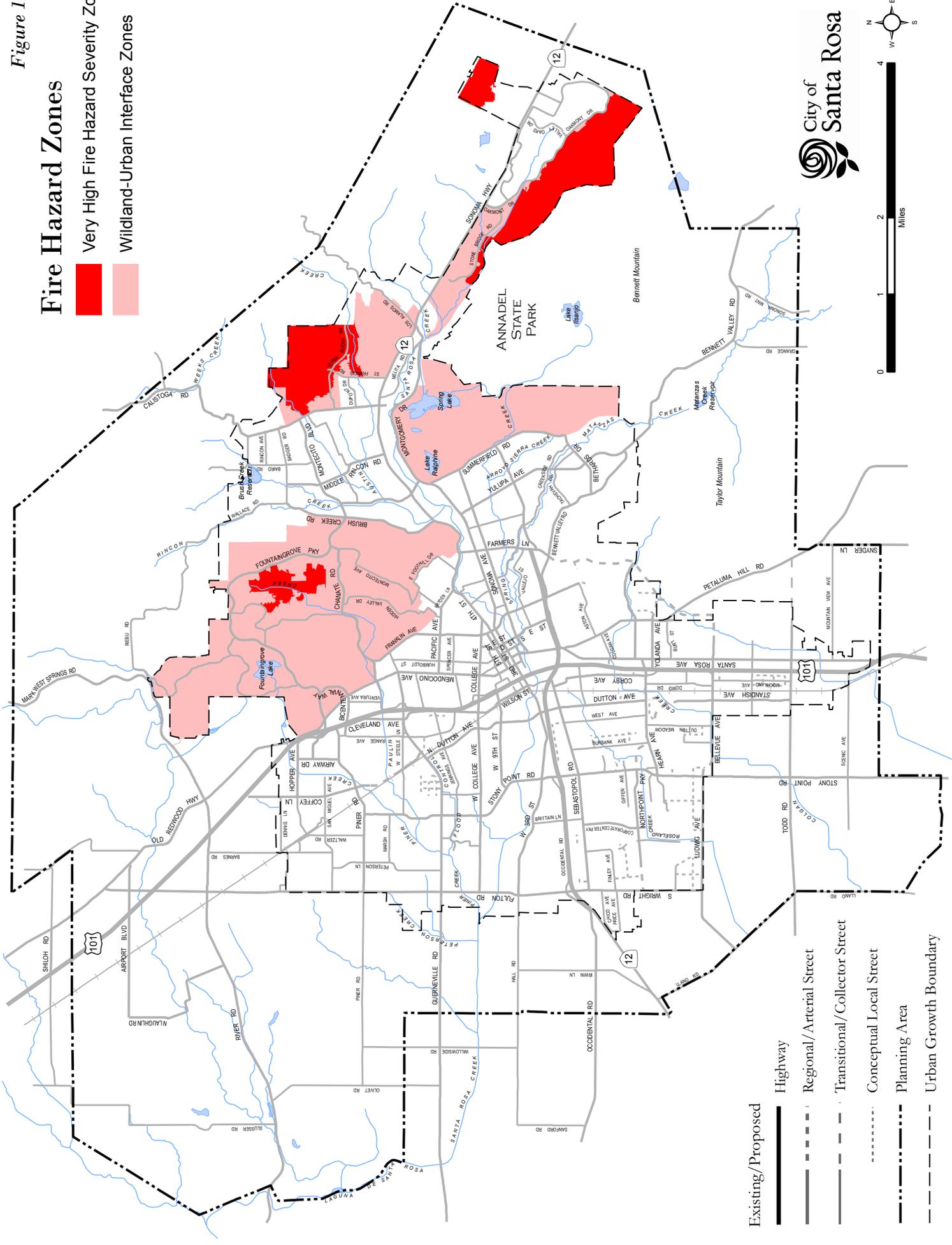


Figure 12-5

Fire Hazard Zones

- Very High Fire Hazard Severity Zones
- Wildland-Urban Interface Zones



- Existing/Proposed
- Highway
- Regional/Arterial Street
- Transitional/Collector Street
- Conceptual Local Street
- Planning Area
- Urban Growth Boundary

four types of fire hazard zones: moderate, high, very high, and mutual threat. Approximately 30 percent of Santa Rosa is located within the WUI zone. Figure 12-6 depicts the WUI zone and the location of very high fire hazard severity zones within the WUI zone. While the Santa Rosa Fire Department has primary responsibility for fire protection within City limits, the City is aided by California Department of Forestry and Fire Protection and other surrounding fire departments such as Rincon Valley Fire Protection District, Bennett Valley Fire Department, Kenwood Fire Department, Rohnert Park Department of Public Safety, Windsor Fire Department, and Sebastopol Fire Department. Fire-resistant building materials and landscaping contribute to prevention of damage to residences in case of a wildfire. General Plan policies requiring adequate fire flows and community fire breaks in residential subdivisions also minimize potential for fire damage.

12-8 GOALS AND POLICIES

NS-A *Prepare for disasters.*

- NS-A-1 Maintain the Emergency Operations Plan as the city's disaster-response plan. Work with Sonoma County to update joint-emergency response and disaster response plans, as needed.
- NS-A-2 Continue to promote the Citizens Organized to Prepare for Emergencies (COPE) public awareness program on the nature and extent of natural hazards in the Planning Area, and ways of minimizing the effects of disasters.
- NS-A-3 Establish community programs which train volunteers to assist police, fire, and civil defense personnel during and after disasters.
- NS-A-4 Implement the Local Hazard Mitigation Plan to better prepare Santa Rosa for disaster.
- The Local Hazard Mitigation Plan is an adopted "implementation appendix" to this Safety Element. It can be viewed on the City of Santa Rosa website.*
- NS-A-5 Locate essential public facilities, such as hospitals and clinics, emergency shelters, emergency command centers, and emergency communications facilities, outside of high fire risk area, flood hazard zones, and areas subject to dam inundation.

NOISE

NS-B *Maintain an acceptable community noise level to protect the health and comfort of people living, working and/or visiting in Santa Rosa, while*

maintaining a visually appealing community.

NS-B-1 Do not locate noise-sensitive uses in proximity to major noise sources, except residential is allowed near rail to promote future ridership.

NS-B-2 Encourage residential developers to provide buffers other than sound walls, where practical. Allow sound walls only when projected noise levels at a site exceed land use compatibility standards in Figure 12-1.

In some established neighborhoods and subdivisions, sound walls may provide the only alternative to reduce noise to acceptable community standards. The Design Review process shall evaluate sound wall aesthetics and landscaping to ensure attractiveness along with functionality.

NS-B-3 Prevent new stationary and transportation noise sources from creating a nuisance in existing developed areas. Use a comprehensive program of noise prevention through planning and mitigation, and consider noise impacts as a crucial factor in project approval.

The Land Use Compatibility Standards specify normally acceptable levels for community noise in various land use areas.

NS-B-4 Require new projects in the following categories to submit an acoustical study, prepared by a qualified acoustical consultant:

- All new projects proposed for areas with existing noise above 60dBA DNL. Mitigation shall be sufficient to reduce noise levels below 45 dBA DNL in habitable rooms and 60 dBA DNL in private and shared recreational facilities. Additions to existing housing units are exempt.
- All new projects that could generate noise whose impacts on other existing uses would be greater than those normally acceptable (as specified in the Land Use Compatibility Standards).

NS-B-5 Pursue measures to reduce noise impacts primarily through site planning. Engineering solutions for noise mitigation, such as sound walls, are the least desirable alternative.

NS-B-6 Do not permit existing uses to generate new noises exceeding normally acceptable levels unless:

- Those noises are mitigated to acceptable levels; or
- The activities are specifically exempted by the City Council on the basis of community health, safety, and welfare.

- NS-B-7 Allow reasonable latitude for noise generated by uses that are essential to community health, safety, and welfare. These include emergency medical helicopter and vehicle operations, and emergency vehicle sirens.
- NS-B-8 Adopt mitigations, including reduced speed limits, improved paving texture, and traffic controls, to reduce noise to normally acceptable levels in areas where noise standards may be exceeded (e.g., where homes front regional/arterial streets and in areas of mixed use development.)
- NS-B-9 Encourage developers to incorporate acoustical site planning into their projects. Recommended measures include:
- Incorporating buffers and/or landscaped earth berms;
 - Orienting windows and outdoor living areas away from unacceptable noise exposure;
 - Using reduced-noise pavement (rubberized-asphalt);
 - Incorporating traffic calming measures, alternative intersection designs, and lower speed limits; and
 - Incorporating state-of-the-art structural sound attenuation and setbacks.
- NS-B-10 Work with private enterprises to reduce or eliminate nuisance noise from industrial and commercial sources that impact nearby residential areas. If progress is not made within a reasonable time, the city shall issue abatement orders or take other legal measures.
- NS-B-11 Work with CalTrans to assign a high priority to traffic noise mitigation programs. Support construction of attractive sound walls, as necessary along Highway 101 and Highway 12.
- NS-B-12 Cooperate with Santa Rosa Memorial Hospital, Sutter Medical Center, and other hospitals proposing helipads. Minimize the noise and safety impacts of medical emergency helicopters through location and design of landing pads, regulation of flight times and frequency and, if necessary, sound attenuating alterations to nearby residences.
- NS-B-13 Prohibit new helipads in developments of industrial, commercial, office, or business park uses. The city may make an exception if the helipad will provide a significant benefit for community health, safety, and welfare.
- NS-B-14 Discourage new projects that have potential to create ambient noise levels more than 5 dBA DNL above existing background, within 250 feet of sensitive receptors.

GEOLOGY AND SEISMICITY**NS-C *Prohibit development in high-risk geologic and seismic hazard areas to avoid exposure to seismic and geologic hazards.***

NS-C-1 Prior to development approval, require appropriate geologic studies to identify fault trace locations within active fault zones as designated by the provisions of the Alquist-Priolo Earthquake Fault Zoning Act. California registered geologists or engineers must conduct these studies and investigation methodologies must comply with guidelines set forth by the Alquist-Priolo Earthquake Fault Zoning Act.

Compliance with the Act would insure proper setback or appropriate design to minimize the potential hazards resulting from fault movement and surface displacement.

NS-C-2 Require comprehensive geotechnical investigations prior to development approval, where applicable. Investigations shall include evaluation of landslide risk, liquefaction potential, settlement, seismically-induced landsliding, or weak and expansive soils. Evaluation and mitigation of seismic hazards, including ground shaking, liquefaction, and seismically-induced landslides, shall comply with guidelines set forth in the most recent version of the California Division of Mines and Geology (CDMG) Special Publication 117.

The level of investigation would depend on physical site location, local or regional geologic or seismic hazards, and recommendations by a consulting engineer.

NS-C-3 Restrict development from areas where people might be adversely affected by known natural or manmade geologic hazards. Hazards might include unstable slopes, liquefiable soils, expansive soils or weak poorly engineered fills, as determined by a California registered geologist or engineer.

NS-C-4 Restrict development of critical facilities--such as hospitals, fire stations, emergency management headquarters, and utility lifelines, including broadcast services, sewage treatment plants, and other places of large congregations--in areas determined as high-risk geologic hazard zones (e.g. Rodgers Creek Fault zone, liquefiable soils, areas of slope instability).

NS-C-5 Require identification and evaluation of existing structural hazards related to unreinforced masonry, poor or outdated construction techniques, and lack of seismic retrofit. Abate or remove any structural hazard that creates an unacceptable level of risk, including requiring post-earthquake buildings that are not currently retrofitted and are located within areas determined to experience

strong ground shaking during an earthquake.

- NS-C-6 Require appropriate and feasible seismic retrofit, as determined by a registered structural engineer, of commercial, industrial, and public buildings that are not currently retrofitted and are located within areas determined to experience strong ground shaking during an earthquake.
- NS-C-7 Require inspection for structural integrity of water storage facilities, water conveyance facilities, electricity transmission lines, roadways, water detention facilities, levees, and other utilities after a major seismic event, especially on the San Andreas or Rodgers Creek faults.
- NS-C-8 Adopt mandatory, minimum erosion control measures for current properties and those under construction that exhibit high erosion potential, are in areas of steep slopes, or have experienced past erosion problems. Control measures shall reduce soil erosion from primary erosional agents, including wind, construction operations, and storm water runoff.

FLOODING

NS-D *Minimize hazards associated with storm flooding.*

- NS-D-1 Ensure flood plain protection by retaining existing open areas and creating new open areas needed to retain stormwater, recharge aquifers, and prevent flooding.
- Creek beds that are dry most of the year provide flood retention needed for public safety.*
- NS-D-2 Maintain current flood hazard data, and coordinate with the Army Corps of Engineers, FEMA, Sonoma County Water Agency, and other responsible agencies to coordinate flood hazard analysis and management activities.
- NS-D-3 Require that new development incorporate features that are consistent with the ~~Standard Urban Storm Water Mitigation Plan (SUSMP)~~ Storm Water Low Impact Development Technical Design Manual into site drainage plans that would reduce impermeable surface area, increase surface water infiltration, and minimize surface water runoff during storm events. Such features may include:
- Additional landscape areas;
 - Vegetated swales with bioretention;
 - Infiltration trench;

- Rain gardens; and
- Pervious pavement.
- Parking lots with bio-infiltration systems;
- Permeable paving designs; and
- Stormwater detention basins.

NS-D-4 Incorporate features and appropriate standards that reduce flooding hazards, as described in Policy NS-D-3 into the city’s design standards.

NS-D-5 Apply design standards to new development that help reduce project runoff into local creeks, tributaries, and drainage ways.

~~NS-D-6 Locate new essential public facilities such as hospitals and fire stations outside of flood areas or areas subject to dam inundation.~~

~~NS-D-6 Evaluate flood hazards prior to approval of development projects within a Federal Emergency Management Agency (FEMA) designated flood zone. Ensure that new development within flood zones is designed to be protected from flooding without negatively affecting adjacent areas.~~

NS-E Provide protection of public and private properties from hazards associated with dam inundation.

 NS-E-1 Support efforts to conduct periodic inspections of local dams to ensure all safety measures are in place.

HAZARDOUS MATERIALS

NS-F Minimize dangers from hazardous materials.

NS-F-1 Require remediation and cleanup, and evaluate risk prior to reuse, in identified areas where hazardous materials and petroleum products have impacted soil or groundwater.

NS-F-2 Require that hazardous materials used in business and industry are transported, handled, and stored in accordance with applicable federal, state, and local regulations.

NS-F-3 Restrict siting of businesses, including hazardous waste repositories, incinerators or other hazardous waste disposal facilities, that use, store, process, or dispose large quantities of hazardous materials or wastes in areas subject to seismic fault

rupture or very violent ground shaking.

NS-F-4 Where applicable, identify and regulate appropriate regional and local routes for transportation of hazardous materials and hazardous waste. Require that fire and emergency personnel can easily access these routes for response to spill incidences.

NS-F-5 Require commercial and industrial compliance with the Sonoma County Hazardous Materials and Waste Management Plan.

NS-F-6 Generate and support public awareness and participation in household waste management, control, and recycling through county programs including the Sonoma County Household Hazardous Waste Management Plan.



WILDLAND FIRES



NS-G *Minimize the potential for wildland fires.*

NS-G-1 Require proposed developments in ~~high or medium fire hazard areas~~ the Wildland Urban Interface zone, including the Very High Fire Hazard Severity zone, to investigate a site’s vulnerability to fire and to minimize risk accordingly.

NS-G-2 Require new development in Wildland Urban Interface areas ~~of high wildfire hazard~~ to utilize fire-resistant building materials. Require the use of on-site fire suppression systems, including enhanced automatic sprinklers systems, smoke and/or detection systems, buffers and fuel breaks, and fire retardant landscaping. Require development and ongoing implementation of vegetation management plans to reduce the risk of wildland fires and to help prevent fires from spreading.

NS-G-3 Prohibit untreated wood shake roofs in Wildland Urban Interface areas ~~of high fire hazard.~~

NS-G-4 Continue monitoring water fire-flow capabilities throughout the city and improving water availability at any locations having flows considered inadequate for fire protection.

NS-G-5 Require detailed fire prevention and control measures, including community firebreaks, for development projects in high fire hazard zones.

NS-G-6 Minimize single-access residential neighborhoods in development areas near

open space, and provide adequate access for fire and other emergency response personnel.

NS-H ***Prepare for climate changes***

NS-H-1 Participate in regional efforts to prepare for the impacts of climate change.

NS-H-2 Engage the community in preparing for climate change through the promotion of Climate Action Plan measures, distribution of information, and through local schools.