

8 Safety and Resilience

Introduction

The Safety and Resilience Element addresses the protection of life and property from natural hazards, including earthquakes, landslides, wildfire, and flooding. It also addresses human-caused hazards including those related to hazardous materials use, storage, transport, and disposal. The Element particularly focuses on hazards that may be exacerbated by climate change, including extreme heat events, increasing wildfire frequency, more severe storms, drought, and sea level rise. This Element also addresses emergency preparedness.

An overarching goal of this Element is to reduce the economic and social dislocation associated with environmental hazards. Risks can be reduced by considering natural hazards in land use and development decisions, and by implementing policies and programs to reduce losses to life and property. While it would be impossible to remove all risks entirely, there are steps the City can take to reduce losses and make more informed decisions about land use and development. This is especially important for San Rafael's most vulnerable populations, who may find themselves in harm's way without the resources to prepare, respond, and recover. Land use planning, site design, architecture and construction decisions can significantly reduce potential hazard levels and can also facilitate recovery after a disaster.

The Safety Element has been a mandated part of the general plan in California since the 1960s. The specific requirements for the Element have evolved over time to integrate adaptation to climate change and social equity considerations, and to align the General Plan with the Local Hazard Mitigation Plan (LHMP). Since 2000, cities have been required to have an LHMP in order to qualify for disaster-related federal funds. In 2006, California passed AB 2140, which encourages local governments to integrate or incorporate the LHMP into the Safety Element of the General Plan. While San Rafael's LHMP stands on its own as an adopted City document, its policy recommendations are incorporated into this Element and inform other elements of the General Plan.

As the title of this Element implies, the concept of "resilience" is embedded in the goals, policies and programs. In the context of the General Plan, resilience is defined as the ability of communities to maintain their quality of life and adapt amidst changing conditions and challenges—including natural disasters, climate change, and public health emergencies. The Rockefeller Foundation's 100 Resilient Cities initiative defines urban resilience as "the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience."

San Rafael is committed to becoming more resilient through partnerships with its residents and businesses, collaborations with other agencies, its own operations, and long-range planning.

“ Resilience is the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience. ”

*-- Rockefeller Foundation,
100 Resilient Cities Initiative*

Goal S-1: A Safer, More Resilient City

Minimize San Rafael's vulnerability to the impacts of **environmental hazards** and **public health emergencies**.

San Rafael is susceptible to earthquakes, wildfires, landslides, floods, extreme heat, and other hazards, many of them intensified by a changing climate. The City will reduce the potential for damage and losses to property, health and human life, the economy, and the environment. It will also effectively respond to public health emergencies by minimizing disruption of critical services and providing effective communication and response.

The City of San Rafael is committed to proactively reducing risks and expenses from natural disasters through hazard mitigation planning. A Local Hazard Mitigation Plan (LHMP) was adopted in November 2017. In July 2019, the City adopted the Marin County Multi-Jurisdictional Local Hazard Mitigation Plan, which complements the City's Plan with additional programs covering a broader geographic area and wider range of hazards. Table 8-1 summarizes hazards in the Planning Area and the likelihood and extent of their impacts.

Policies under Goal S-1 express the City's commitment to maintaining an LHMP, integrating hazard data in land use planning decisions, and reducing the potential for damage to critical public facilities. The policies also address civic resilience in the wake of the **2020** COVID-19 pandemic and recognize the importance of incorporating public health emergencies in hazard mitigation planning.



Table 8-1: San Rafael Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood	Magnitude/Severity	Significance	Climate Change Impacts
Climate Change	Extensive	Highly Likely	Limited	Medium	N/A
Coastal Flooding/Sea Level Rise	Significant	Likely	Critical	Medium	High
Dam Failure	Limited	Unlikely	Negligible	Low	Medium
Drought/Water Shortage	Extensive	Likely	Critical	Medium	High
Earthquake	Extensive	Occasional/Likely	Catastrophic	High	Low
Earthquake Liquefaction	Limited	Occasional/Likely	Catastrophic	High	Low
Extreme Heat	Extensive	Highly Likely	Critical	Medium	High
Flood (100/500 yr)	Significant	Occasional/Unlikely	Critical	High	High
Flood: Localized/Stormwater	Extensive	Highly Likely	Limited	Medium	High
Landslides/Mudslides/Erosion	Significant	Likely	Limited	Medium	Medium
Levee Failure	Significant	Occasional	Limited	Medium	High
Severe Storms	Extensive	Highly Likely	Critical	Medium	Medium
Tsunami	Limited	Unlikely	Limited	Medium	High
Wildfire	Significant	Likely	Catastrophic	High	Medium
KEY TO TERMS USED IN TABLE:					
<p>Geographic Extent</p> <ul style="list-style-type: none"> Limited: Less than 10% of city Significant: 10-50% of city Extensive: 50-100% of city <p>Probability of Future Occurrences</p> <ul style="list-style-type: none"> Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years 			<p>Magnitude/Severity</p> <ul style="list-style-type: none"> Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability Limited—10-25 percent of property severely damaged, shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid <p>Significance</p> <ul style="list-style-type: none"> Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact <p>Climate Change Impact:</p> <ul style="list-style-type: none"> Low: Climate change is not likely to increase probability Medium: Climate change is likely to increase probability High: Climate change is very likely to increase probability. 		

Source: City of San Rafael LHMP, 2017

Policy S-1.1: Local Hazard Mitigation Plan (LHMP)

The San Rafael LHMP is adopted by reference into the General Plan.¹ Policies and actions throughout the General Plan shall be consistent with the LHMP and support its goals and objectives.

Program S-1.1A: LHMP Mitigation Action Plan. *Implement the Mitigation Action Plan in the LHMP. The City will consider opportunities to advance each action through operating procedures, development approvals, budgets, public education, and capital improvement projects.*

Program S-1.1B: Mitigation Program Funding. *Develop an overall funding strategy to prioritize and pursue mitigation projects, including identification and tracking of grants and regular coordination with FEMA and State hazard mitigation agencies.*

Program S-1.1C: LHMP Updates. *Periodically update the Local Hazard Mitigation Plan to reflect new data, technology, available resources, partnership opportunities, and state and federal requirements.*

Policy S-1.2: Location of Future Development

Permit development only in those areas where potential danger to the health, safety, and welfare of the community can be adequately mitigated. Land uses and densities should take environmental hazards such as earthquakes, flooding, [slope stability](#), sea level rise, and wildfires into consideration.

Program S-1.2A: Entitlement Process. *Use the entitlement process to evaluate the potential for hazards and to require appropriate mitigation measures and approval conditions.*

Program S-1.2B: Use of Hazard Maps in Development Review

Review slope stability, seismic [hazard](#), flood hazard, sea level rise, wildfire, and other environmental hazard maps when development is proposed. [Update hazard maps to include data collected during development review and other studies. Measures to adequately mitigate mapped hazards should be identified prior to project approval. Require appropriate studies and actions to ensure that hazards are identified and mitigated.](#)

See also Policy LU-1.8 on clustering. See the Conservation/Climate Change Element for policies relating to air quality and development suitability.

Policy S-1.3: Location of Public Improvements

Avoid locating public improvements and utilities in areas with high hazard levels. When there are no feasible alternatives, require effective mitigation measures to reduce the potential for damage.

Program S-1.3A: Critical Facilities in Vulnerable Areas. *Prepare a Public Facility Vulnerability Assessment to identify City buildings and other infrastructure that are susceptible to environmental hazards. Measures should be taken to avoid extraordinary maintenance and operating expenses associated with hazardous conditions and minimize damage potential and interruption of service following a disaster.*

¹ The LHMP was adopted on November 20, 2017. This policy applies to that document, including any subsequent amendments.

Policy S-1.4: Public Health Emergencies

Minimize the impact of public health emergencies, including pandemics, through effective planning, response, and recovery. The City will work with the County of Marin and other public and private partners to contain and control disease outbreaks, limit the number of illnesses and deaths, preserve the continuity of critical government functions, minimize social disruption, and reduce economic loss.

Program S-1.4A: LHMP Amendments. Amend local emergency preparedness documents as needed to address public health emergencies, including communication protocol, emergency operating procedures, and provisions for sheltering-in-place.

Program S-1.4B: Pandemic Response and Recovery. Monitor and update data to support response and recovery to the 2020-COVID-19 pandemic. Such data should consider immediate and long-term impacts on housing, jobs, equity, local retail, parks and open spaces, health care, social services, the environment, demand for City services, and other variables that shape the safety and well-being of San Rafael residents and employers. As needed, amend policies and ordinances to address pandemic impacts and facilitate recovery and resilience to future public health emergencies.

Geologic Hazards

Goal S-2: Resilience to Geologic Hazards

Minimize potential risks associated with geologic hazards, including earthquake-induced ground shaking and liquefaction, landslides, mudslides, erosion, sedimentation, and settlement.

Development proposed within geologic hazard areas shall not be endangered by, nor contribute to, hazardous conditions on- or off-site. New development should only be approved in areas of identified geologic hazard if the hazard can be appropriately mitigated.

Geologic hazards in the San Rafael Planning Area include earthquakes, landslides, mudslides, subsidence, and expansive soil. Earthquakes can produce severe ground shaking, ground rupture, liquefaction, lurching, and other forms of ground failure. All of these hazards have the potential to damage or destroy structures, streets, and utilities. The potential for hazards ~~may~~ can be reduced through engineering and special construction methods. In some cases, engineering solutions are not feasible and avoidance of the hazard may be the best way to ensure public health and safety.

Geologic and seismic hazards should be considered in determining the location, design, intensity, density, and type of land uses in a given area. Long term costs to the City, such as maintenance, liability exposure and emergency services, are potentially greater where high hazards exist. Moreover, certain land uses (such as schools, hospitals, and fire stations) may not be appropriate and are not permitted in areas with very high geologic hazard levels.

Earthquakes

The diagram on the next page shows the primary earthquake faults in the San Rafael Planning Area. San Rafael is approximately nine miles east of the San Andreas Fault and eight miles west of the Hayward Fault. Other faults in the vicinity include Rodgers Creek Fault in Sonoma County and the San Gregorio Fault on the western edge of San Mateo County. While there are no active faults within San Rafael itself, an earthquake on any of the regional faults could cause significant damage in the city. Impacts will vary depending on the proximity, magnitude, depth and intensity of the event.



San Rafael sits midway between the Hayward Fault and the San Andreas Fault

Source: UC Berkeley Seismology Lab

Additionally, the performance of structures during an earthquake varies depending on the type of construction and the characteristics of the underlying soils. In general, wood frame structures perform well, especially when their foundations are properly designed and anchored. At one time, San Rafael had a large number of unreinforced masonry buildings (URMs). These have generally been upgraded to meet current Building Code requirements. A current priority is the upgrading of “soft-story” buildings (see text box).

The US Geological Survey has estimated that there is a 62 percent probability of a magnitude 6.7 earthquake or greater in the Bay Area by 2032. The risk is 27 percent for the Hayward Fault and 21 percent for the San Andreas Fault. Figure 8-1 shows the projected ground shaking that would result in San Rafael in the event of a 7.8 magnitude earthquake on the San Andreas Fault. Most of the city would experience “strong” shaking, and areas near the shoreline would experience “very strong” shaking. Some of the shoreline areas could be subject to liquefaction, which occurs when ground shaking transforms solid material into a fluid state.



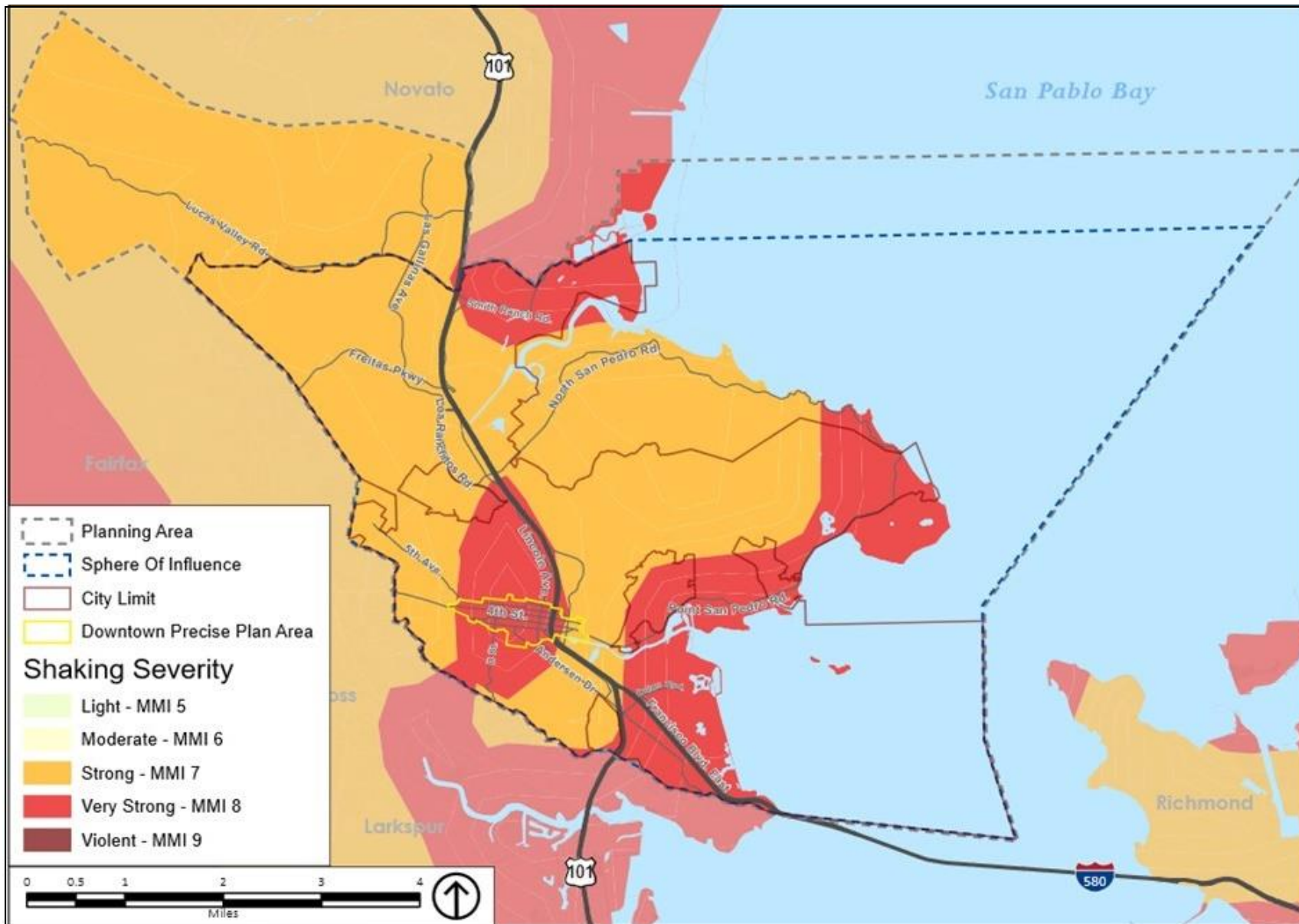
Retrofitting Soft Story Buildings

San Rafael includes a number of “soft-story” office buildings and multi-family apartments. Most of these buildings were constructed in the 1950s and 60s with “tuck under” parking on the ground floor and one to two stories of habitable space above. The design of these structures, with large openings, few internal walls on the ground floor, and slender columns supporting the weight of the upper floors, can result in inadequate lateral support during an earthquake. Installation of shear walls and bracing can improve the stability of such structures.

Landslides

Landslides are gravity-driven movements of earth materials that can include rock, soil, unconsolidated sediment, or combinations of such materials. Landslides may move rapidly or they may creep slowly for long periods of time. Some of the factors that contribute to landslide potential include slope steepness, underlying soil types, water content, vegetation coverage, and prior alteration by construction. Rain events can exacerbate these conditions.

Much of San Rafael is hilly, with slopes on many parcels exceeding 30 percent. A number of landslides have occurred in the city, generally associated with winter storms. As noted in the text box on the facing page, site-specific geotechnical investigations may be ~~are~~ required by the City to determine the potential for landslides at any given site. The City has also adopted a Hillside Development Overlay District [and Hillside Residential Design Guidelines](#) to identify and minimize hazards associated with development on steep or unstable slopes.



Source: ESRI, 2017; County of Marin, 2009; City of San Rafael, 2019; PlaceWorks, 2019.

Figure 8-1:
Ground Shaking Potential

Policy S-2.1: Seismic Safety of New Buildings

Design and construct all new buildings to resist stresses produced by earthquakes. The minimum level of seismic design shall be in accordance with the most recently adopted building code as required by State law.

Program S-2.1A: Seismic Design. *Adopt and enforce State building codes which ensure that new or altered structures meet the minimum seismic standards set by State law. State codes may be amended as needed to reflect local conditions.*

Program S-2.1B: Geotechnical Review. *Continue to require soil and geologic hazard geotechnical studies and peer review for proposed development as set forth in the City's Geotechnical Review Matrix (See Appendix F and text box at right). ~~Such~~ These studies should determine the extent of geotechnical hazards, optimum design for structures and the suitability and feasibility of proposed development for its location, the need for special structural requirements, and measures to mitigate any identified hazards. Periodically ~~R~~review and update the Geotechnical Review Matrix to ensure that it supports and implements the Local Hazard Mitigation Plan by identifying potentially hazardous areas. ~~reflects current practices and is internally consistent, and potentially remove the~~ Consider removing the procedures from the General Plan and instead adopting them as part of the Zoning Ordinance or through a separate resolution.*

Program S-2.1C: Earthquake Hazard Study. *As recommended by the Local Hazard Mitigation Plan, complete an Earthquake Hazard Study that examines geologic hazards in the city.*

Policy S-2.2: Minimize the Potential Effects of Landslides

Development proposed in areas with existing or potential landslides (as identified by a ~~registered-Certified Engineering g~~Geologist, ~~or Registered Gg~~Geotechnical ~~e~~Engineer, ~~or the LHMP~~) shall not be endangered by, or contribute to, hazardous conditions on ~~the a~~-site or adjoining properties. Landslide mitigation should consider multiple options in order to reduce potential secondary impacts (loss of vegetation, site grading, traffic, visual). The City will only approve new development in areas of identified landslide hazard if the hazard can be appropriately mitigated, including erosion control and replacement of vegetation.



Program S-2.2A: Landslide Mitigation and Repair Projects. Undertake landslide hazard mitigation and repair projects, as outlined in the LHMP. These projects include a landslide identification and management program, repair of the Fairhills Drive landslide, and repair of the Bret Harte sewer easement.

Policy S-2.3: Seismic Safety of Existing Buildings

Encourage the rehabilitation or elimination of structures susceptible to collapse or failure in an earthquake. Historic buildings shall be treated in accordance with the Historic Preservation Ordinance and Historic Building Code (see also Program CDP-5.5A).

Program S-2.3A: Seismic Safety Building Reinforcement. Enforce State and local requirements for reinforcement of existing buildings, including the city's remaining unreinforced masonry (URM) buildings.

Program S-2.3B: Soft-Story Building Mitigation Plan. Complete a citywide assessment of soft-story buildings and develop a mitigation strategy and cost-benefit analysis to modify these structures to reduce their potential to collapse during an earthquake.

Policy S-2.4: Post-Earthquake Inspections

Require post-earthquake inspections of critical facilities and other impacted buildings and restrict entry into compromised structures as appropriate. Following a major earthquake, inspections shall be conducted as necessary in conjunction with other non-City public agencies and private parties to ensure the structural integrity of water storage facilities, storm drainage structures, sewer lines and treatment facilities, transmission and telecommunication facilities, major roadways, bridges, elevated freeways, levees, canal banks, and other important utilities and essential facilities.

Program S-2.4A: Inspection List. Develop and maintain a list of facilities that would be inspected after a major earthquake, including City-owned essential or hazardous facilities. Facilities on the list should be prioritized for inspection-scheduling purposes.



Geotechnical Study Requirements in San Rafael

Appendix F of the General Plan identifies the requirements for geotechnical hazard studies for new construction in San Rafael. The requirements vary depending on the underlying geology of the area and the slope of the site. The US Geologic Survey has identified 16 different geologic units in San Rafael, shown in Figure F-1 (see Appendix F). These can be generally grouped into four categories, including bedrock, colluvium, alluvium, and bay mud. Different structural requirements are associated with each area, reflecting soil strength and seismic stability.

Policy S-2.5: Erosion Control

Require appropriate control measures in areas susceptible to erosion, in conjunction with proposed development. Erosion control measures should incorporate best management practices (BMPs) and should be coordinated with requirements for on-site water retention, water quality improvements, and runoff control.

Program S-2.5A: Erosion and Sediment Control Plans. *Require Erosion and Sediment Control Plans (ESCPs) for projects meeting the criteria defined by the Marin County Stormwater Pollution Prevention Program, including those requiring grading permits and those with the potential for significant erosion and sediment discharges. Projects that disturb more than one acre of soil must prepare a Stormwater Pollution Prevention Plan, pursuant to State law.*

Program S-2.5B: Grading During the Wet Season. *Avoid grading during the wet season due to soil instability and sedimentation risks, unless the City Engineer determines such risks will not be present. Require that development projects implement erosion and/or sediment control measures and runoff discharge measures based on their potential to impact storm drains, drainageways, and creeks.*

Program S-2.5C: Sediment Use. *Explore the use of sediment from human activities such as dredging and natural processes such as erosion for wetlands restoration and shoreline resiliency projects.*

Policy S-2.6: Septic Systems

Discourage the use of septic systems within San Rafael's Planning Area. If no other alternatives exist, then soil tests shall be required to determine if soils are suitable for a septic system or other innovative means of onsite wastewater disposal. In hillside areas, an evaluation of the impact of additional water from a septic system on hillside stability shall be required. New or improved septic systems shall be designed by a registered civil engineer that specializes in septic design.

Flooding and Sea Level Rise

Goal S-3: Resilience to Flooding and Sea Level Rise

Recognize, plan for, and successfully adapt to the anticipated effects of increased flooding and sea level rise.

San Rafael's land use patterns, transportation system, and infrastructure should be planned to anticipate the impacts of extreme weather events and global climate change, including sea level rise, rising groundwater, and potential flooding. A range of measures will be used to mitigate flood hazards along drainageways and creeks and improve resilience and flood protection in low-lying areas.

Flooding in San Rafael may occur as a result of heavy rain, blocked storm drains, rising groundwater, or bay waters coming on shore (tidal flooding). Tidal flooding includes storm surges, tsunamis, king tides, and other seismic or weather-related events, as well as longer-term impacts associated with rising sea levels and ground subsidence. Because much of coastal San Rafael sits only a few feet above sea level, it is particularly vulnerable to tidal flooding. Climate change will exacerbate this hazard in the future, making it essential to develop effective long-term strategies to reduce potential losses.

Flood-prone areas are shown in Figure 8-2. The map depicts the 100-year flood plain, a designation developed by the Federal Emergency Management Agency (FEMA) that is used for flood insurance purposes. The 100-year flood plain has a one percent chance of flooding in any given year. Areas in the flood plain include all of the Canal neighborhood, much of southeast San Rafael, Santa Venetia, Contempo Mobile Home Park, and the north shore of San Rafael Bay. Many of these areas were initially tidal flats and marshes that were filled for development in the early and mid-20th Century.

Flood control measures, including stormwater pumping stations, have been developed to reduce the potential for flooding and remove stormwater during flood events. Much of the shoreline and creek outlets are protected by levees, although the condition of these levees varies and some areas remain unprotected (see Figure 8-2). The Marin County Flood Control and Water Conservation District also maintains infrastructure to reduce the risk of flooding in susceptible areas. Certain areas within the County – including Rafael Meadows and Santa Venetia – have been designated as zones where specific flood control activities are required.

San Rafael has adopted Municipal Code provisions addressing flooding. Title 18 aims to minimize public and private losses due to flooding. This is accomplished by restricting or prohibiting uses that may worsen flood hazards, requiring uses in flood prone areas to be protected against flood damage, controlling changes to flood plains and stream channels, regulating dredging and filling, and preventing diversion of flood waters. Although development is generally allowed in flood-prone areas, new habitable space must be elevated above the 100-year flood elevation. Hydraulic studies may be required to ensure that development does not cause a rise in the base flood elevation.

Sea Level Rise

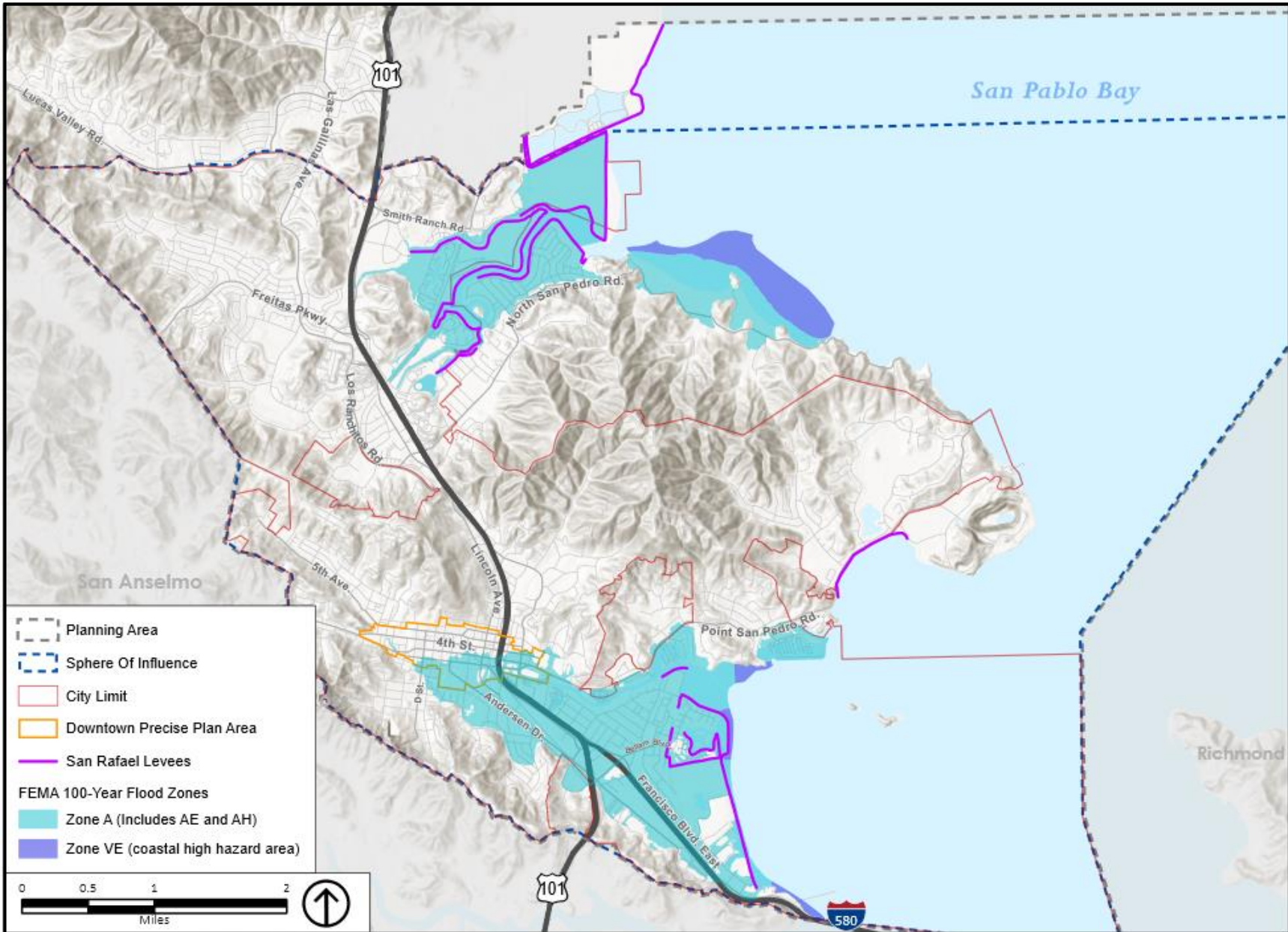
Sea level rise is a growing threat to San Rafael. Globally, sea levels have risen an average of eight inches in the last century and are projected to rise an additional seven to 24 inches by 2050. By 2100, sea level may be more than 55 inches above its current level. When combined with tidal surges from storm events, this has the potential to significantly impact neighborhoods along the shoreline and the San Rafael Canal. Among the most at-risk areas is the Canal neighborhood, home to nearly 12,000 residents many of whom are low income renters. At-risk areas also include many of the City’s employers, as well as critical transportation infrastructure, utilities, civic buildings, and wastewater treatment facilities.

Given the varying conditions and multiple uses along the San Rafael shoreline, a broad range of adaptation strategies will need to be considered. These include retreat, armoring or hardening the shoreline, elevating buildings and infrastructure, and nature-based improvements that slow wave action and restore or enhance natural systems. More detailed plans will be needed to identify these improvements, and new funding sources will be required to carry them out.

General Plan 2040 includes two appendices specifically focused on sea level rise hazards:

- **Appendix D** is a Flood Risk and Sea Level Rise Adaptation Report. This report has been prepared by the City of San Rafael to set the stage for a detailed adaptation plan. It summarizes existing data and recent studies on sea level rise and provides a menu of strategies for further consideration.
- **Appendix E** is a Sea Level Rise Adaptation Technical Guidance Study. The Appendix E report was commissioned by the Department of Public Works in order to refine flood hazard mapping and vulnerability assessments for the San Rafael shoreline and evaluate the costs and benefits of different adaptation measures in each area.

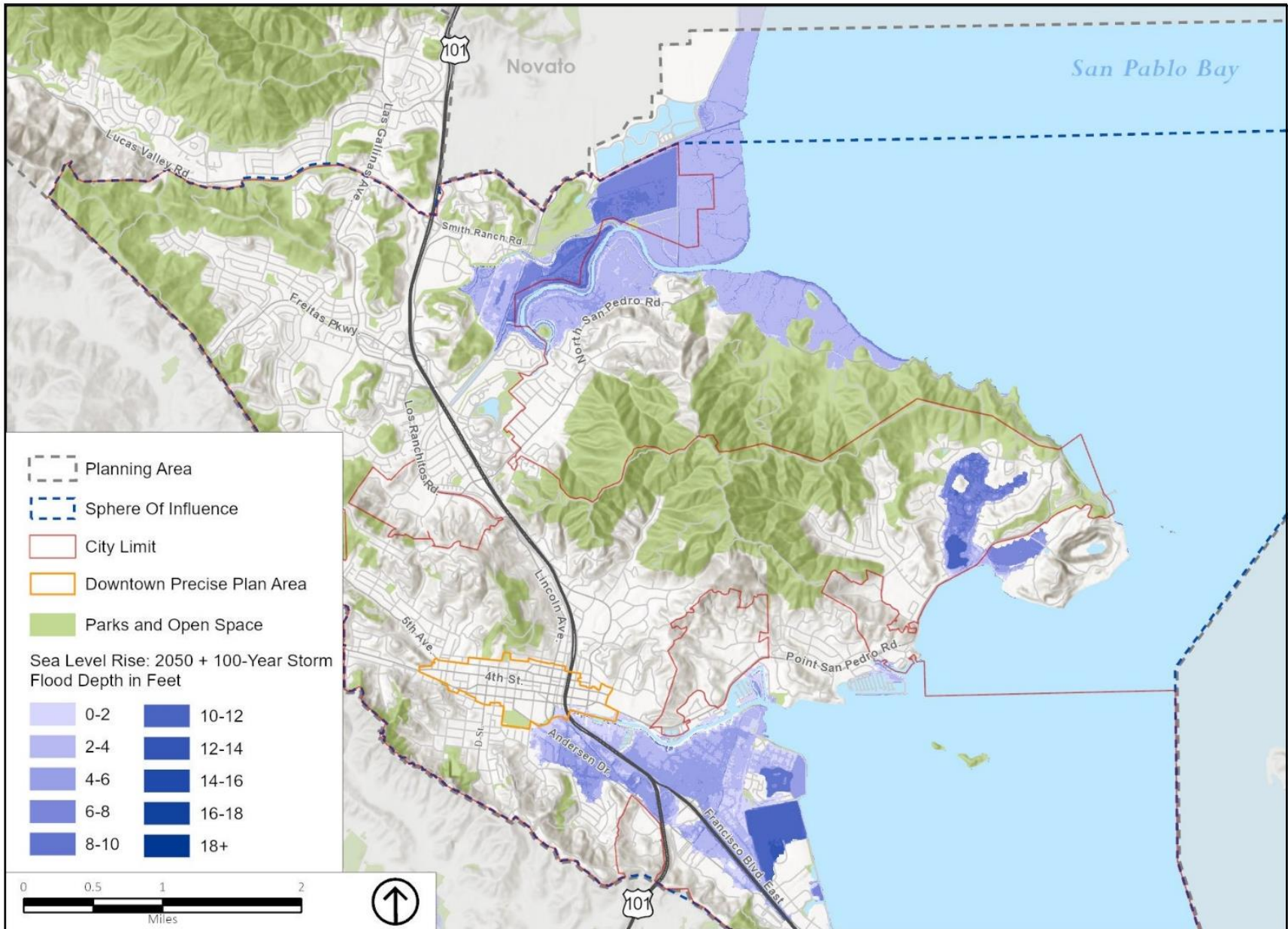
Figure 8-3 provides a “Sea Level Prediction Map” for San Rafael, identifying areas that would be flooded in the event of a 100-year storm combined with sea level rise by 2050. The outer boundary of this map also appears on the General Plan Land Use Map as a “Sea Level Rise Overlay Zone.” The policies below include provisions to reduce potential losses and focus adaptation strategies in this area.



Source: City of San Rafael, 2019; County of Marin, 2009; ESRI, 2017; FEMA, 2016; National Levee Database, 2020; PlaceWorks, 2019.

Figure 8-2:

Flood Hazard Areas



Source: City of San Rafael, 2019; CoSMoS, 2016; County of Marin, 2009; ESRI, 2017; PlaceWorks, 2019.

Figure 8-3:



Note: This map depicts projected flood depths in the Year 2050 resulting from a 100-year storm combined with projected sea level rise increases.

Sea Level Rise Prediction Map

Policy S-3.1: Sea Level Rise Prediction Map

Utilize Figure 8-3 (Sea Level Rise Prediction Map) to address flooding and sea level rise hazards. The figure should be used to:

- maximize public awareness and disclosure to property owners and the public.
- assess and address impacts to future development.
- establish a zoning “overlay zone” and building code requirements for future planning and adaptation.
- plan opportunity areas for adaptation.
- inform funding and financing decisions about short-term and long-term adaptation projects.

Program S-3.1A: Incorporate into City GIS. Incorporate the Sea Level Rise Prediction Map into the City’s Geographic Information System (GIS) map and utilize GIS as a publicly accessible tool for tracking flooding and sea level rise hazards.

Program S-3.1B: Periodic Update of Sea Level Rise Prediction Map. Review sea level rise data at least once every five (5) years to determine the need for Map updates.

Program S-3.1C: Sea Level Rise Overlay Zone. Adopt an “overlay zone” on the City Zoning Map incorporating the Sea Level Rise Projection Map. The “overlay zone” shall include land use regulations for site planning and a minimum construction elevation that reflects flooding and sea level rise data.

Policy S-3.2: Data Consistency

Ensure that the information and data related to increased flooding and sea level rise is current and consistent with the information and data utilized by the County of Marin.

Program S-3.2A: Coordination with County of Marin. Coordinate with the County of Marin on updating data related to increased flooding and sea level rise. Utilize the County of Marin Bay Waterfront Adaptation & Vulnerability Evaluation (BayWAVE) as the basis for all City-prepared documents and plans addressing and adapting to increased flooding and sea level rise.



Policy S-3.3: Awareness and Disclosure

Maximize awareness and disclosure by providing information to property owners and the public on areas subject to increased flooding and sea level rise vulnerability.

Program S-3.3A. Residential Building Resale (RBR) Reports. *Revise the RBR Report template to include a disclosure of potential property risk due to increased tidal flooding and sea level rise. Utilize the Sea Level Rise Prediction Map for confirming property vulnerability. Work with realtors and property owners to implement this requirement.*

Policy S-3.4: Mitigating Flooding and Sea Level Rise Impacts

Consider and address increased flooding and sea level rise impacts in vulnerable areas (see Figure 8-3) in development and capital projects, including resiliency planning for transportation and infrastructure systems.

Program S-3.4A: Development Projects. *Where appropriate, require new development, redevelopment projects, and substantial additions to existing development to consider and address increased flooding and sea level rise impact, and to integrate resilience and adaptation measures into project design.*

Program S-3.4B: Capital Projects and Roadways. *Prepare a guidance document to address increased flooding, sea level rise impacts, and adaptation measures into the City's capital projects and planning process. This should include strategies to identify and evaluate the costs, benefits and potential revenue sources for elevating or redesigning low-lying roadways and critical infrastructure. If the life of a public improvement in a vulnerable area extends beyond 2050, adaptation measures should be incorporated.*

Program S-3.4C. Coordination with Utilities and Services. *Coordinate with the utilities and services that have infrastructure and facilities in vulnerable areas (for example: wastewater treatment plants) to ensure that sea level rise information and goals are consistent with the City's goals, and that infrastructure/utilities projects address and plan for increased flooding and sea level rise.*

See also Policies CSI-4.6 and M-2.11 addressing sea level rise impacts on infrastructure and transportation



BayWAVE

Marin Bay Waterfront Adaptation & Vulnerability Evaluation (BayWAVE) was a multi-jurisdictional effort organized by the County of Marin in 2017. Its goal was to increase awareness and preparation for sea level rise in the County, focusing on the communities along the eastern Marin County shoreline between the Golden Gate and Novato.

BayWAVE tested six different scenarios for sea level rise, ranging from a 10-inch rise to a 60-inch rise plus a 100-year storm surge. The scenarios represent short, medium, and long-term projections, with vulnerable areas identified using a computer model. Each scenario resulted in a different projected impact in terms of the affected buildings, roads, utilities, natural resources, and other assets.

San Rafael uses BayWAVE as a foundation for sea level rise planning and adaptation, and uses the same model and scenarios in its own long-range planning.



Policy S-3.5: Minimum Elevations

For properties in vulnerable areas, ensure that new development, redevelopment, and substantial additions to existing development meets a minimum required construction elevation. Minimum elevations and other architectural design strategies should provide protection from the potential impacts of a 100-year flood (a flood with a one percent chance of occurring in any given year), the potential for increased flooding due to sea level rise, and the ultimate settlement of the site due to consolidation of bay mud from existing and new loads and other causes.

Program S-3.5A: Code Amendments for Floor Elevation. Update and adopt zoning, building and public works code requirements to establish and mandate a minimum finished floor elevation for new development, redevelopment and substantial additions to existing development. Consider adopting a minimum, finished floor elevation requirement of +3 feet above the FEMA 100-year flood elevation requirement.²

Program S-3.5B: Ground Elevation Surveys. Perform periodic ground elevation surveys in the Sea Level Rise vulnerability zone. The result of the surveys should be considered when developing projects to reduce coastal flooding potential.

Program S-3.5C: Title 18 Flood Protection Standards. Evaluate and revise Title 18 of the Municipal Code (Protection of Flood Hazard Areas) to address anticipated sea level rise, increases in rainfall intensities, and any changes related to Federal or regional flood reduction criteria.

Program S-3.5D: National Flood Insurance Program (NFIP). Continue to comply with the federal NFIP by maintaining a flood management program and flood plain management regulations. In addition, develop and periodically update a Community Rating System (CRS) to notify residents of the hazards of living in a flood area, thereby reducing local flood insurance rates.

² The + 3 feet requirement has been used in several other bayfront communities.

Policy S-3.6: Resilience to Tidal Flooding

Improve San Rafael's resilience to coastal flooding and sea level rise through a combination of structural measures and adaptation strategies.

Program S-3.6A: Sea Level Rise Adaptation Plan. Prepare and adopt an adaptation plan addressing increased flooding and sea level rise. The adaptation plan shall include the following components:

- a) Sea Level Rise Projection Map, to be used as the basis for adaptation planning.
- b) Coordination with local, county, state, regional and federal agencies with bay and shoreline oversight, major property owners, and owners of critical infrastructure and facilities in the preparation of the adaptation plan.
- c) An outreach plan to major stakeholders and all property owners within the vulnerable areas.
- d) An inventory of potential areas and sites suitable for mid- to large-scale adaptation projects (see Appendices D and E for more information)
- e) A menu of adaptation measures and approaches that could include but not be limited to:
 - o Managed retreat, especially on low-lying, undeveloped and underdeveloped sites; in areas that are permanent open space; and in areas that are environmentally constrained. Transfer of development rights from such areas should be encouraged.
 - o Innovative green shoreline protection and nature-based adaptation measures such as wetlands and habitat restoration, and horizontal levees where most practical and feasible.
 - o Hard line armoring measures (sea walls, levees, breakwater, locks, etc.) in densely developed areas to minimize the potential for displacement of permanent residents and businesses.
 - o Elevating areas, structures, and infrastructure to reduce risks.
- f) The appropriate timing and "phasing" of adaptation planning and implementation.
- g) Potential financing tools and opportunities.
- h) Coordination or incorporation into the San Rafael Local Hazard Mitigation Plan.

Program S-3.6B: Partnerships. Foster, facilitate and coordinate partnerships with the County of Marin, other effected agencies and utilities, property owners, and neighborhood groups/organizations on planning for and implementing adaptation projects.

Program S-3.6C: Countywide Agency/Joint Powers Authority. Work with the County of Marin to facilitate the formation of a centralized countywide agency or joint powers authority to oversee adaptation planning, financing and implementation.

Horizontal Levees

A horizontal levee consists of a levee with a wide expanse of natural habitat, such as a salt marsh, between the levee and open water. By moving the hardened structure away from the water's edge, the marshes provide a natural buffer that absorbs wave action and reduces the impacts of storm surge and wave action. As a result, the levee may be reduced in size compared to unbuffered levees, which reduces their overall cost. This approach also creates habitat restoration and recreational opportunities.



Photo Credit: Save the Bay

Policy S-3.7: Shoreline Levees

Improve and expand San Rafael's shoreline levee system. When private properties are developed or redeveloped, require levee upgrading as appropriate, based on anticipated high tide and flood conditions.

Program S-3.7A: Levee Improvement Plans. *Assess existing levees, berms, and flood control systems to identify reaches with the greatest vulnerability. Develop improvement plans based on existing conditions and projected needs, as documented in adaptation plans. This should include improvement studies for the Spinnaker Point levee, as recommended by the LHMP, and the Canalways levee along San Rafael Bay.*

Program S-3.7B: Financing Levee Improvements. *Coordinate with property owners; residents and businesses; federal, state, and regional agencies; utilities; and other stakeholders to evaluate potential methods of improving levees and funding ongoing levee maintenance, including assessment or maintenance districts. The cost and fiscal impacts of levee improvements should be evaluated against potential benefits and costs and consequences of inaction.*

Policy S-3.8: Storm Drainage Improvements

Require new development to mitigate potential increases in runoff through a combination of measures, including improvement of local storm drainage facilities. Other measures, such as the use of porous pavement, bioswales, and "green infrastructure" should be encouraged.

Program S-3.8A: Storm Drainage Improvements. *Consistent with Countywide and regional stormwater management programs, require new development with the potential to impact storm drainage facilities to complete hydrologic studies that evaluate storm drainage capacity, identify improvements needed to handle a 100-year storm, and determine the funding needed to complete those improvements.*

Program S-3.8B: Green Infrastructure Guidelines. *Evaluate potential measures to more sustainably manage stormwater, erosion, and improve water quality associated with urban runoff. This includes improvements such as rain gardens and permeable pavement, which attenuate flooding downstream and provide ecological benefits.*

See also Goal C-3 and Policy CSI-4.10 for related policies and programs on water quality and storm drainage

Policy S-3.9: Flood Control Improvements Funding

Pursue financing and funding opportunities to fund short-term and long-term flood control and adaptation projects. Funding tools and opportunities would include, among others tax or bond measures, assessment districts, geologic hazard abatement districts and grants. The City will also support legislation that provides regional, state, and federal funding for these projects, and will pursue such funding as it becomes available.

Program S-3.9A: Incremental Flood Control Improvements. *Where needed and possible, new development/redevelopment projects shall include measures to improve area flood protection. Such measures would be identified and required through the development review process.*

Program S-3.9B: Flood Hazard Mitigation Projects. *Undertake flood hazard mitigation projects as outlined in the Local Hazard Mitigation Plan, including sewer relocation and replacement, pump station rehabilitation, corrugated metal pipe replacement, and improvements to flood-prone streets such as Beach Drive.*

Program S-3.9C: Restoration and Dredging Projects. *Implement restoration and dredging projects that will increase stormwater drainage capacity and reduce flood hazards. As noted in the LHMP, this could include restoration of the Freitas Parkway flood channel and dredging of Gallinas Creek and the San Rafael Canal.*

See also Policy CSI-4.11 on canal dredging and Program S-2.5C on sediment use.

Policies to reduce the greenhouse gas emissions that contribute to global climate change are included in other parts of the General Plan, especially the Conservation/Climate Change Element and the Mobility Element.

Wildfire

Goal S-4: A Fire-Safe Community

Minimize injury, loss of life, and damage to property resulting from wildland fire hazards.

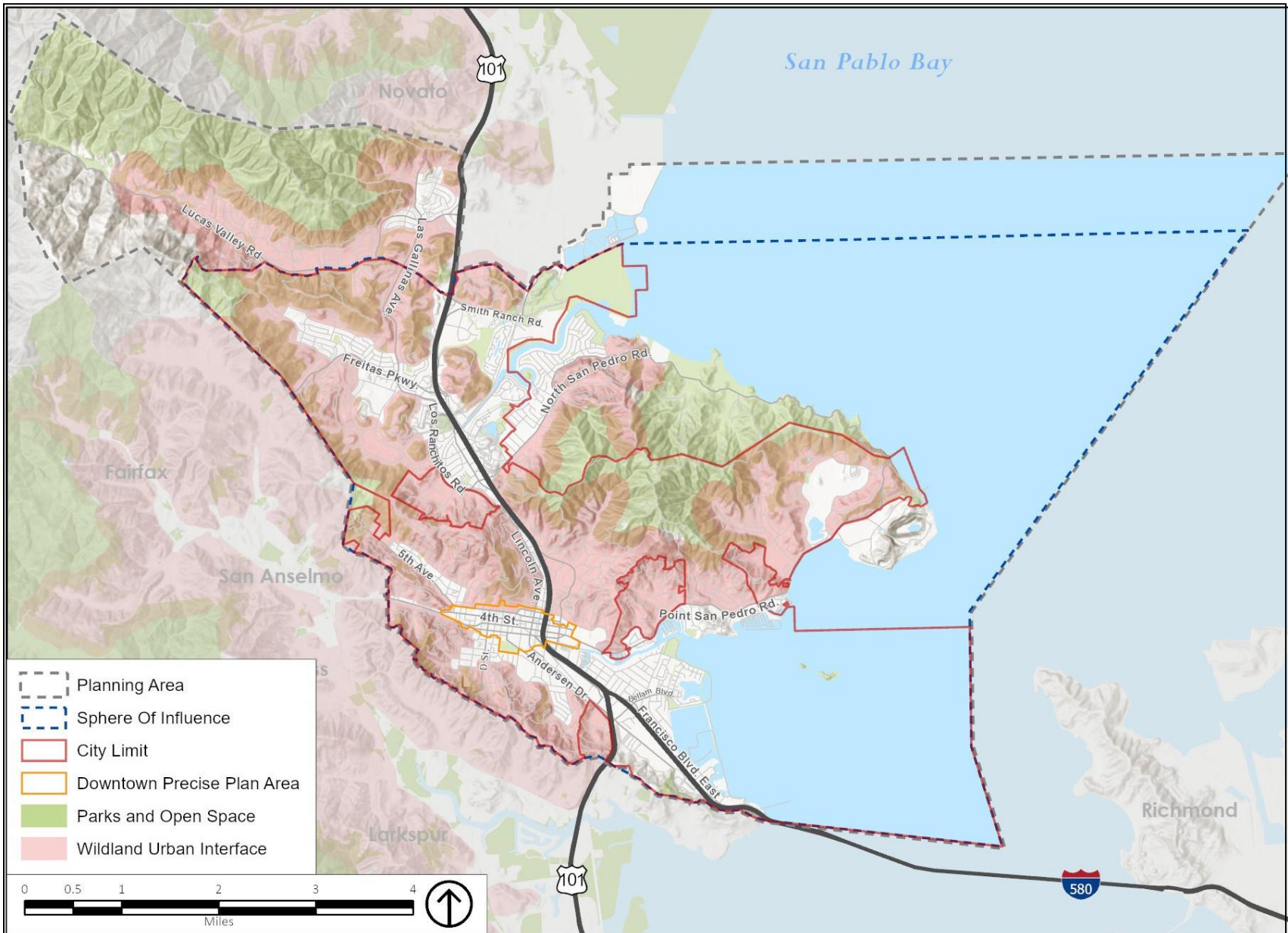
The City will continue to implement fire prevention and preparedness measures that reduce fuel loads and require development to be located, designed and constructed to minimize fire-related risks.

Wildfires are a significant concern in San Rafael. Hazard levels have increased in recent years due to drought, accumulating volumes of dense and flammable vegetation, and increased development in fire-prone areas. The threat is exacerbated by climate change, including extreme heat events, low moisture conditions, and reduced winter precipitation. There are also a larger number of people living in fire-prone areas than ever before. While wildfires were once a seasonal event, they now occur year-round. Wildfires not only threaten our open spaces and “wildland-urban interface” (WUI) areas, they can also threaten urban neighborhoods and business districts. Fires can cause injuries and death, destroy critical infrastructure, and inflict social and economic damage on communities.

Much of San Rafael’s wildfire prevention focus is in the WUI areas. These are shown on Figure 8-4 and encompass 6,000 acres of the San Rafael Planning Area. Structures in and around the WUI are at a higher risk for fire exposure and have a greater need for vegetation management and fuel reduction. Fire can spread rapidly in these areas through structures and vegetation or by ember dispersion. Property owners within the WUI have a responsibility to maintain defensible space around their homes and comply with applicable codes and ordinances.

There are a number of secondary hazards associated with wildfire. For example, smoke can also be a severe health hazard. There may also be landslides, debris flows, erosion, and other issues that can occur due to vegetation loss after a major fire.

Approximately 17 percent of San Rafael’s land area is considered to be a “High Fire Hazard Severity Zone,” and another 25 percent is considered to be a “Moderate Fire Hazard Severity Zone.” The greatest hazards tend to be associated with steeply sloping open space and areas, including San Pedro Mountain, Black Canyon, Southern Heights Ridge, San Rafael Hill, and the Terra Linda and Sleepy Hollow Open Space areas. The city has experienced a number of wildfires in the past, including fires on San Rafael Hill in 2000, 2001, and 2018.



Source: ESRI, 2017; County of Marin, 2009; City of San Rafael, 2019; PlaceWorks, 2019.

Figure 8-4:
Wildland Urban Interface Areas



Photo Credit: Florian Kainz

Policy S-4.1: Wildfire Hazards

Continue vegetation management and maintenance programs to reduce the destructive potential of wildfires.

Program S-4.1A: Wildfire Prevention and Protection Action Plan. *Implement the Wildfire Prevention and Protection Action Plan (August 2020) in a manner consistent with the direction provided by the San Rafael City Council.*

Program S-4.1B: Fire Hazard Maps. *Maintain maps identifying potential fire hazard areas in San Rafael. Use these maps for vegetation management and planning purposes.*

Program S-4.1C: Fire Protection Ordinance. *Continue to implement Municipal Code standards to reduce fire hazards in areas, including vegetation management requirements and the designation of a Wildland-Urban Interface (WUI) Zone. Periodically update these standards and the WUI map to implement Wildfire Action Plan measures and other programs to further reduce wildfire risks.*

Program S-4.1D: Wildfire Fuel Breaks. *Where necessary, create new fuel interruption zones in Wildland Urban Interface areas and maintain and expand zones that are already in place. Highly flammable exotic vegetation should be strategically removed in these areas to slow the spread of wildfire and reduce threats to homes.*

Program S-4.1E: Goat Grazing. *Continue the use of goat grazing on lands where native vegetation will not be harmed through cooperative relationships with contractors and public agencies.*

Program S-4.1F: Encampment-Related Hazards. *Work collaboratively with service providers for homeless residents and other partners to reduce fire hazards associated with illegal encampments and campfires. Consider partnerships to employ unsheltered residents in vegetation management work.*

Photo Credit: The Photo50 Project



Wildfire Prevention and Protection Action Plan

The City of San Rafael adopted a Wildfire Prevention and Action Plan in March 2019(*). The Plan recommended changes to the Municipal Code, specific projects, and a series of programs designed to reduce wildfire risks. The Plan contains 38 objectives, followed by a proposed action to be taken to meet each objective.

Adoption of the Plan set the stage for a number of Municipal Code changes, including Fire and Building Code updates, citywide standards for defensible space, and new vegetation management requirements. It also includes requirements for fuel reduction on public and private property, new outreach and education programs, additional staff, new evacuation and notification provisions, and maintenance and vegetation clearing of fire roads. Among the objectives of the Plan are eliminating fire hazards associated with shake and wooden roofs, expanding goat grazing, reducing hazards associated with homeless encampments, increasing emergency alert capability, and creating new templates for resilient landscaping. An Advisory Committee has been created to oversee Plan implementation.

(*) A re-organized version of the Plan was produced in October 2019 and accepted in early 2020.

Program 4.1G: Open Space and Forestry Management. *Develop science-based open space and forest management plans to reduce fuel loads, maintain fuel breaks, replace highly flammable species with native species, and increase the health and carbon sequestration potential of open space lands.*

See the Parks, Recreation, and Open Space Element for additional policies and programs on open space management.

Policy S-4.2: Fire Resilience in Developed Areas

Improve the resilience of neighborhoods and business districts to wildfire hazards.

Program S-4.2A: Reduction of Structure Hazards. *Implement measures to reduce wildfire hazards to existing structures, including fire-resistant landscaping and building materials, protected vents and gutters, phasing out wood shake roofs, vegetation management around structures, limits on highly flammable plant materials, restricted parking on narrow streets, and enforcement and abatement programs. Focus on measures that provide the greatest fire safety benefits relative to their costs to the City and private sector.*

Program S-4.2B: Tree Maintenance. *Undertake a tree safety maintenance program to maintain the health and safety of trees along public roadways and minimize safety impacts from trees falling in road rights of way.*

See the Conservation Element and Community Design Element for additional policies on trees

Program S-4.2C: Public Education on Fire Resilience and Response. *Improve public education and awareness about fire-safe structures and landscaping. This should include demonstration projects that help property owners understand what species to remove and what to plant, and how to make their homes more fire-resistant. Education programs also should address actions to be taken in the event a fire is approaching, including warnings, evacuation routes, shelters, and provisions for “go bags” and personal safety.*



Photo Credit: The Photos50 Project

Policy S-4.3: New Development in Fire Hazard Areas

Design new development to minimize fire hazards. Densities, land uses, and site plans should reflect the level of wildfire risk and evacuation capacity at a given location.

Program S-4.3A: Fire Hazard Mitigation in New Development. Through the development review process, require appropriate mitigation measures such as fire preventive site design, landscaping and building materials, and the use of fire suppression techniques such as interior and exterior sprinklers. Before adopting new Code standards and requirements, consider and disclose their potential costs to applicants relative to the benefits they may provide.

Program S-4.3B: Development Review for Emergency Response. Review development applications in fire prone areas to ensure adequate emergency vehicle access, and adequate water pressure and supply for fire-fighting purposes (see also Goal CSI-4).

Program S-4.3C: Wildfire Prevention Funding. Develop new partnerships, revenue opportunities, and funding avenues for wildfire prevention and hazard abatement.

[See also Program S-6.7A on additional emergency egress roads in Wildland Urban Interface areas](#)

Hazardous Materials

Goal S-5: Protection from Hazardous Materials

Protect those who live, work, and visit San Rafael from risks associated with hazardous materials.

Threats to human health will be minimized through proper hazardous materials use, storage, transport, disposal, and planning.

Hazardous materials include substances that are flammable, corrosive, explosive, radioactive, infectious, thermally unstable, and poisonous. Although these substances are usually associated with industrial land uses, they can also be found at gas stations, dry cleaners, medical offices, public buildings, retail stores, and other businesses. Hazardous materials are also used by most households, in the form of cleaning solvents, paint, motor oil, pesticides, and common household chemicals.

The proper management of hazardous materials is an important health and safety issue. The improper use, storage, transfer, and disposal of these materials has the potential to contaminate the environment. Federal and state programs have been developed to reduce health risks, and to investigate and remediate hazards when they occur. In California, the State's Environmental Protection Agency works with the State Water Resources Control Board, the Department of Toxic Substance Control, Caltrans, and the California Division of Occupational Health and Safety (Cal/OSHA) to regulate hazardous materials activities. Regional agencies such as the Bay Air Quality Management District and the Regional Water Quality Control Board are also engaged in carrying out hazardous materials laws.

The City of San Rafael supports hazardous materials management and incident response through its Fire Department, Building Department, and various provisions of the Municipal Code. Much of the responsibility for administration and enforcement is delegated to the Marin County Department of Public Works (see text box on the Certified Unified Program Agency). The State of California has developed data bases inventorying the location of hazardous materials in San Rafael, including sites requiring remediation. Collectively, these data bases include 173 sites in the San Rafael Planning Area, including 134 requiring no further action and 39 requiring remediation. The level of remediation varies in part on the types of activities that will be allowed on the site in the future.

Programs and facilities have also been developed to manage household hazard waste. The City of San Rafael and Zero Waste Marin have cooperatively sponsored a household hazardous waste collection facility on Jacoby Street since 1993. The facility is operated by the Marin Recycling & Resource Recovery Association, with the San Rafael Fire Department managing the waste that is generated. Collected materials include paint and paint-related products, e-waste, batteries, motor oil, light bulbs, cleaning and gardening products, and other flammable or poisonous products. Roughly 25,000 households in Marin County use the facility each year.

Policy S-5.1: Hazardous Waste Management

Support State, regional, countywide and local programs to responsibly manage hazardous waste consistent with protection of public health, welfare, safety and the environment.

Policy S-5.2: Hazardous Materials Storage, Use and Disposal

Enforce regulations regarding proper storage, labeling, use and disposal of hazardous materials to prevent leakage, potential explosions, fires, or the escape of harmful gases, and to prevent individually innocuous materials from combining to form hazardous substances, especially at the time of disposal.

Program S-5.2A: CUPA Program.

Continue to participate in the Certified Unified Program Agency (CUPA) program. The CUPA's responsibilities shall include overseeing the investigation and closure of contaminated underground storage tank sites.

Policy S-5.3: Protection of Sensitive Uses

Provide safe distances between areas where hazardous materials are handled or stored and sensitive land uses such as schools, public facilities, and residences. When the location of public improvements in such areas cannot feasibly be avoided, effective mitigation measures will be implemented.

Program S-5.3A: Inventory of Existing Hazards. *Work with State and County GIS data to identify existing hazardous materials permit holders near schools, evaluate relative risk levels, and determine actions in the event of an accidental release. This data should be used to evaluate risk levels and develop measures to ensure the safety of students and school staff where necessary.*

Program S-5.3B: Reducing Hazards Near Schools. *Consistent with CEQA and the California Public Resource Code 21151.4, limit activities with the potential to release hazardous materials within one-quarter mile of schools.*



CUPA in a Nutshell

Many of the routine requirements for hazardous waste and hazardous materials management in California have been bundled into what is referred to as the “Unified Program.” The Program ensures consistency across the state with respect to administration, permitting, inspection, and enforcement of hazardous materials rules. There are 83 agencies in the state that have been designed “Certified Unified Program Agencies” (or CUPAs). In San Rafael, this responsibility has been assigned to the Marin County Department of Public Works Waste Management Division (WMD).

WMD regulates and inspects approximately 850 business in Marin County that are required to comply with CUPA requirements, including preparation of hazardous materials business plans. They also issue permits for the operation of underground and above ground storage tanks storing substances such as gasoline. WMD also administers the California Office of Emergency Services Accidental Release Prevention Program and Cal EPA’s Hazardous Waste Tiered Permitting Program. Facilities that generate hazardous waste must register with WMD and submit regular reports to verify their compliance with basic regulations.

Policy S-5.4: Development on Formerly Contaminated Sites

Ensure that the necessary steps are taken to clean up residual hazardous materials on any contaminated sites proposed for redevelopment or reuse. Properties that were previously used for auto service, industrial operations, agriculture, or other land uses that may have involved hazardous materials should be evaluated for the presence of toxic or hazardous materials in the event they are proposed for redevelopment with a sensitive land use.

Program S-5.4A: Use of Environmental Databases in Development Review. *When development is proposed, use environmental and hazardous materials data bases (such as the State GeoTracker data base) to determine whether the site is contaminated as a result of past activity. As appropriate, require studies and measures to identify and mitigate identified hazards.*

Program S-5.4B: Hazardous Soils Clean-Up. *Work with appropriate agencies to require remediation and clean-up prior to development of sites where hazardous materials have impacted soil or groundwater. The required level of remediation and clean-up shall be determined by the Certified Unified Program Agency (see Program S-3.2A) based on the intended use of the site and health risk to the public.*

Program S-5.4C: Environmental Site Management Plan (ESMP). Require the preparation of an ESMP in consultation with the San Francisco Bay Regional Water Quality Control Board and/or the Department of Toxic Substance Control (DTSC), for proposed development on sites with known contamination of hazardous materials pursuant to Government Code Section 65962.5. This includes, but is not limited to, sites in the on-line DTSC EnviroStor Data Base and the State GeoTracker Data base.

Program S-5.4D: Soil Vapor Intrusion Assessment. For sites with potential residual soil or groundwater contamination that are planned for redevelopment with an overlying occupied building, a soil vapor intrusion assessment shall be performed by a licensed environmental professional. If the results indicate the potential for significant vapor intrusion into the building, project design shall include vapor controls or source removal as appropriate in accordance with regulatory agency requirements.

Policy S-5.5: Transportation of Hazardous Materials

Enforce Federal, State and Local requirements and standards regarding the transportation of hazardous materials. As appropriate, support legislation that strengthens these requirements.

Program S-5.5A: Safe Transport of Hazardous Materials. *Support California Highway Patrol's efforts to ensure the safe transport of hazardous materials.*

Program S-5.5B: Pipeline Safety. *Coordinate with regulatory agencies and utilities to ensure the safety of all fuel pipelines and ensure that maintenance and operating conditions are fully compliant with all state and federal safety regulations.*

Policy S-5.6: Hazardous Building Materials

Reduce the presence of hazardous building materials by implementing programs to mitigate lead, friable asbestos, and other hazardous materials where they exist today and by limiting the use of hazardous building materials in new construction. If such materials are disturbed during building renovation or demolition, they must be handled and disposed in a manner that protects human health and the environment.

Policy S-5.7: Household Hazardous Waste

Promote education about the safe disposal of household hazardous waste, such as motor oil and batteries, including the location of designated household hazardous waste disposal sites.

Hazardous Building Materials

Hazardous building materials are commonly found in older structures and may require special handling during demolition and renovation. Asbestos may be contained in thermal insulation, asphalt shingles, and vinyl floors installed prior to 1981, while lead compounds may be present in paints. Both lead and asbestos are known carcinogens, and measures are required to avoid the risk of inhalation when they are handled. Other items, such as electrical transformers and fluorescent light bulbs, may also contain hazardous materials. Federal, state, and local regulations have been developed to reduce risks and ensure proper disposal.

Emergency Preparedness**Goal S-6: Emergency Preparedness**

Improve disaster preparedness, resiliency, response, and recovery.

The City should enhance public outreach, awareness, education, and preparedness for all hazards to minimize losses.

Emergency preparedness is an essential part of being a more resilient city. The City of San Rafael administers programs to help residents prepare for disasters and ensure that the City itself can effectively respond to—and recover from—natural and human-caused disasters. These programs begin with basic preventive measures such as vegetation management around homes, seismic reinforcement of older structures, and flood proofing of vulnerable infrastructure. They also include community emergency response training, drills and exercises, and education about how to stay safe when disaster strikes. It is also critical to have plans in place for evacuation, shelter, food, medical care, counseling, and other needs that occur during and after an emergency.

Most of San Rafael's emergency preparedness programs are administered through the Fire Department and the City's Office of Emergency Services. The City has an Emergency Preparedness Plan, which aims to prepare both the City and its residents for possible emergencies. San Rafael also works collaboratively with the Marin County Sheriff's Office and County Office of Emergency Services, which coordinates the activities of local jurisdictions and operates a countywide Emergency Operations Center (EOC) during a major emergency or disaster.



Policy S-6.1: Disaster Preparedness Planning

Conduct disaster prevention and preparedness planning in cooperation with other public agencies and public interest organizations.

Program S-6.1A: Mutual Aid Agreements. Continue, and where feasible expand, mutual aid agreements that augment public safety personnel in times of emergency.

Program S-6.1B: Standardized Emergency Management System (SEMS). Maintain a SEMS-based emergency plan that provides direction and identifies responsibilities after a disaster. Continue to train all City employees and officials in SEMS procedures.

Program S-6.1C: Emergency Preparedness Plan. Update and publicize the City's emergency preparedness plan in conformance with State guidelines, including information on evacuation routes and shelter locations. The City's Emergency Operations Center Handbook also should be updated.

Program S-6.1D: Urban Search and Rescue Techniques. Continue to ensure that Urban Search and Rescue techniques remain current. Provide opportunities for trained volunteers to participate as appropriate.

Policy S-6.2: Neighborhood Disaster Preparedness Programs

Encourage educational outreach to promote awareness and readiness among residents regarding disaster preparedness. Outreach and education should be targeted for each hazard type and risk area, including climate-related incidents. Community involvement is an essential part of resilience and recovery, and residents play an important role in disaster response.

Program S-6.2A: Educational and Training Programs. Support educational and training programs through the Police and Fire Departments and community-based organizations. These Programs include Community Emergency Response Teams (CERT), Citizens Police Academy, Neighborhood Response Groups (NRGs), and Voluntary Organizations Active in Disaster (VOAD) among others. Neighborhood teams should supplement City resources during emergency situations and can assist in disaster preparedness and mitigation efforts.

Program S-6.2B: Neighborhood Disaster Plans. Provide technical assistance as needed to develop and update neighborhood disaster plans.

Program S-6.2C: Website Improvements. Regularly update the Fire Department's website and social media presence to provide information on disaster preparedness, resources, and links to other sites. Include printed information in City publications such as the Recreation Activities guide.

Program S-6.2D: Outreach to Vulnerable Populations. Identify vulnerable populations (such as non-English speaking residents, frail older adults, young children, and persons with disabilities) that may need assistance in times of disaster. Develop outreach programs that are geared toward these populations, including multi-lingual communications.

Program S-6.2E: Disaster Management Drills. Conduct emergency response drills to test the effectiveness of local procedures, including evacuation and emergency shelter drills in neighborhoods prone to flooding and wildfire.

See also Policies EDI-2.10 and EDI-6.5 on increasing resilience among disadvantaged communities and older adults. See Program EV-1.10A on the role of the business community in emergency preparedness.

Policy S-6.3: Improving Evacuation Capacity

Improve local evacuation capacity by identifying and improving escape routes for areas with unique hazards or at-risk populations and identifying safe assembly locations for evacuees.

Program S-6.3A: Evacuation-Related Capital Projects. Identify key capital improvements needed to facilitate the orderly evacuation of at-risk areas and the ability of designated assembly points to handle evacuees.

Policy S-6.4: Emergency Operations Centers

Maintain a centralized Emergency Operation Center to coordinate emergency responses to emergencies, complemented by other locations in the city that provide for emergency evacuation and service delivery following a major disaster.

Program S-6.4A: Evacuation Shelters. Identify locations of evacuation shelters and provide the necessary training and supplies so that these centers can function effectively during and after a disaster. This should include refuge centers for extreme heat events, power failures, and air quality emergencies.

Policy S-6.5: Post-Disaster Recovery Planning

Incorporate post-disaster recovery planning in the City's emergency management programs. Recovery planning should include measures to mitigate the potential for further damage.



Program S-6.5A: Essential Services Following Disasters. Make provisions to continue essential emergency public services during and after natural disasters and other catastrophes.

Program S-6.5B: Employee Transportation. To ensure adequate safety personnel in an emergency, explore ways to transport first responders from outlying areas when damaged infrastructure prevents them from driving to San Rafael.

Program S-6.5C: Incentives for Disaster Response and Essential Worker Personnel. Support state legislation and City initiatives that would provide incentives for staff with roles in disaster response to live in San Rafael, so they may be readily available if a disaster should occur.

Program S-6.5D: Rapid Reconstruction Ordinances. Explore model ordinances and best practices to facilitate rapid reconstruction and recovery, including issues such as temporary housing and modular construction. Reconstruction should achieve code compliance, while advancing green building practices where feasible.



CERT Training

One of the most important emergency preparedness resources for residents is the Community Emergency Response Team (CERT) Program. CERT is sponsored by the San Rafael Fire Department and includes a training program that familiarizes residents with the basics. Participants learn to:

- Size up the situation in their immediate area
- Reduce immediate dangers by turning off utilities, suppressing small fires, and evacuating hazardous areas
- Performing immediate medical triage and basic treatment of injuries
- Assessing structural integrity and performing light search and rescue
- Collecting and recording vital information to professional responders on damage, victims, and resources needed
- Providing leadership to untrained volunteers.

The City encourages all residents to participate in CERT training. A steering committee provides ongoing guidance and assists in specific projects, events, and meetings.

Policy S-6.6: Effective Communication Systems

Ensure that all City agencies with a role in emergency response are provided with effective, reliable and robust emergency communications systems and equipment. The systems and equipment should have adequate capacity and redundancy to ensure these agencies can accomplish their missions. Consideration should also be given to the communications needs of the County of Marin and other agencies that may be required to supply mutual aid to or from other jurisdictions.

Program S-6.6A: Involvement with Marin Emergency Radio Authority. Maintain active involvement with Marin Emergency Radio Authority (MERA) and pursue installation and activation of the MERA radio system.

Program S-6.6B: Emergency Alert Systems. Use emergency alerts, electronic message boards, and other notification systems to warn resident of an active threat such as a flood or wildfire. The use of emergency warning sirens and other types of mass notification alerts also should be considered.

Policy S-6.7: Emergency Connectors

Pursue the development of road connections for emergency vehicles only to improve access within San Rafael and between San Rafael and adjacent communities.

Program S-6.7A: Emergency Connectors. Maintain the following existing access routes for emergency vehicles:

- a) the existing connection between Freitas Parkway and Fawn Drive.
- b) the all-weather connections between Freitas and Fawn and between Ridgewood and Fawn.
- c) The connection between Del Ganado and Butterfield Road in Sleepy Hollow.
- d) The private portion of Sienna Way in the Dominican area.
- e) The access drive between Peacock and Biscayne.

Consider the need for additional emergency connectors, including the costs, effectiveness, impacts, and potential to use such routes for evacuation in the event of a wildfire.

Program S-6.7B: Obstruction of Evacuation Routes. Reduce obstacles for emergency vehicles and evacuation routes, including parked cars that constrict emergency vehicle passage.

Program S-6.7C: SMART Crossing. Work with SMART to explore the feasibility of an emergency vehicle rail and pedestrian/bicycle crossing at Merrydale Drive (see also Policy NH-4.10).

See the Mobility Element for policies to limit constriction of emergency access routes in future road design.

Policy S-6.8: Design of Public Safety Facilities and Utilities

Ensure that public safety facilities, critical utilities, and telecommunication facilities are designed and constructed to deliver necessary services with minimal interruption in times of disaster.

Program S-6.9A: Facility Evaluations. Regularly evaluate the need to upgrade essential public safety facilities, equipment, and technology, and identify funding mechanisms to meet these needs.

Program S-6.9B: Energy Storage Plan. Develop an Energy Storage Plan, including microgrids and expanded battery capacity, to improve reliability of the power system following a major disaster (see also Policy CSI-4.13 on energy reliability).

Policy S-6.9: Use of Technology

Leverage new technologies to reduce losses and save lives following a disaster. Implement improvements such as traffic signal pre-emption for first responders to facilitate response and recovery time.