

LAGUNA BEACH GENERAL PLAN

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# SAFETY ELEMENT

DRAFT





CITY OF LAGUNA BEACH

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# SAFETY ELEMENT

ADOPTED BY CITY COUNCIL ON

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# CITY OF LAGUNA BEACH

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## SAFETY ELEMENT

REVISED 2021

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## I. EXECUTIVE SUMMARY

### A. CONDITIONS IN LAGUNA BEACH AND FOCUS OF THE SAFETY ELEMENT

Laguna Beach is a coastal hillside community that is surrounded by open space. Its physical characteristics include prominent ridgelines, steep hillsides with gullies, arroyos, rugged canyon bottoms, and low-lying coastal areas, which create a variety of hazardous conditions that can impact the community. Laguna Beach faces serious risks that could detrimentally impact overall community safety, which include, and are not limited to: wildfire and urban fire events, earthquakes, instability from geologic conditions, and flooding from both stormwater runoff or tidal conditions. The City has experienced these specific events on several different occasions throughout the years. To compound matters, the impact of a changing climate is likely to intensify many of these risks. Drier and hotter weather will likely increase fire risk and potentially impact water supplies. Wetter and more intense winter storms could inundate parts of Laguna Beach that have never experienced flooding or could exacerbate slope instability causing landslides within the City's hillsides. This Safety Element focuses on identifying these safety risks and identifying policies, goals, and implementation actions to address and prepare for them. The Safety Element also strives to align with other general plan elements, as required by state law, including (1) Housing, (2) Land Use, (3) Transportation, Circulation and Growth Management, and (4) Open Space and Conservation. Laguna Beach has also developed and adopted a Local Hazard Mitigation Plan (LHMP) on August 8<sup>th</sup>, 2018, which allows for federal grant funding eligibility to mitigate many of the natural hazards identified in the City.



*View of Laguna Beach looking south.*

### B. PURPOSE OF SAFETY ELEMENT

The Safety Element is one of seven mandatory elements of the General Plan. Its primary purpose is to identify potential risks within the City that could endanger the community's public health, safety, and welfare. Periodic updates of the Safety Element ensure that goals and policies are relevant and responsive to community needs. California Government Code Section 65302(g)(1) identifies the following list of safety risks that, at a minimum, be examined in each Safety Element:

- seismically induced surface rupture
- **ground shaking\***
- **ground failure\***
- **flooding\***
- **tsunami\***
- seiche
- dam failure
- **slope instability leading to mudslides and landslides\***
- subsidence
- **liquefaction (areas with shallow groundwater [<50 feet]) \***
- other seismic hazards identified under Chapter 7.8 (commencing with Section 2690) of Division 2 of the Public Resources Code
- other geologic hazards known to the legislative body
- **wildland and urban fires\***
- **climate change\***

Items denoted by an \* are potential hazards relevant to the City of Laguna Beach



Each Safety Element must also geographically identify each safety risk's location and potential extent using maps, primarily those risks about seismicity, flooding, and fires.

## C. MOVING FORWARD

The City of Laguna Beach reaffirms the importance of protecting the community from potential natural hazard risks. The City's location and history with hazards make it likely that Laguna Beach will experience risks from seismic, flooding, and wildfire events in the future. Laguna Beach can also expect that some of these risks will worsen as climate change accelerates. With this in mind, the Safety Element, in conjunction with the LHMP, is the best avenue to understand and address natural hazard risks within the community.

# II. INTRODUCTION

## A. PURPOSE

The City of Laguna Beach takes pride in its responsibility to safeguard the well-being of its community members. Among other things, this includes adequately anticipating potential emergencies caused by natural and human-made hazards and planning response strategies in an emergency. This element provides the necessary context to understand the hazards that threaten the community and outlines policies and practices that take tangible steps toward ensuring the community's continued prosperity.

## B. SCOPE

The Laguna Beach Safety Element addresses the relevant planning hazards mandated by California Government Code Section 65302(g). Under state planning law, this element identifies and discusses the following hazards as they relate to the City:

- Seismic and geologic hazards such as seismic shaking, liquefaction, landslides, and mudslides caused by slope instability
- Fire hazards
- Flood hazards
- Climate adaptation and resiliency strategies
- Shoreline protection

The element also identifies and addresses the following safety issues, as permitted by law:

- Disaster and emergency preparedness, including evacuation
- Hazardous materials and waste



## C. ELEMENT ORGANIZATION

This element is organized to be consistent with the other General Plan Elements. The goals, policies, and implementation programs provide declarative statements setting forth the City's approach to safety-related issues. A definition of these key terms is provided below:

**Goal:** A general statement of the desired community outcome. It is denoted as Goal S-X in this element.

**Policy:** Policies are actions that a community will undertake to meet the goals. They are denoted as Policy S-X.X in this element.

**Implementation Action/Programs:** A list of recommended programs and future actions necessary to achieve element goals and policies; implementing actions are discussed in Section IV.

Many of the previous elements' policies have been incorporated into this element either as a new policy or an implementation action. Modifications to the previous text language occurred to ensure new goals, policies, and implementation actions meet City needs and best practice standards.

## D. CONSISTENCY WITH OTHER ELEMENTS

Integrating safety considerations throughout the General Plan creates a consistent framework that prioritizes the well-being of the community. The Laguna Beach Safety Element is an essential component of the General Plan and works in tandem with other elements to guide these efforts.

### Land Use

The Land Use Element is particularly responsive to natural hazards. Understanding the natural and human-made hazards that threaten a community can help reduce the possibility of disaster by avoiding the designation of sensitive land uses in hazard-prone areas. Several goals within the Land Use Element are focused on protecting and enhancing the community as part of the development and entitlement process.

### Transportation, Circulation and Growth Management

Coordination between the Transportation, Circulation, and Growth Management Element and the Safety Element is an important component of comprehensive planning. The Transportation, Circulation, and Growth Element can influence public health and safety by addressing traffic congestion on roads designated as evacuation routes during emergencies and by redefining truck routes to avoid residential and other heavily populated areas.

### Housing

The Housing Element is more closely associated with land use and incorporates many safety considerations into its goals and objectives. Building practices and codes addressed in the Housing Element contribute to community safety by improving the built environment's resiliency to natural and human-caused hazards. Additionally, the Housing Element can help identify vulnerable populations and inform the Safety Element to ensure that proper protections are in place.



## Open Space Conservation

The Open Space Conservation Element focuses on open space protection and ecosystem services for flood risk reduction and habitat preservation. The City's open space resources possess important aesthetic and recreational value and provide vital wildlife and vegetative habitats. The undeveloped hillsides contribute greatly to the community identity that distinguishes Laguna Beach from surrounding communities. The City strives to carefully balance maintaining the open space, while utilizing progressive open space management techniques to help mitigate wildfire and landslide hazards. Thereby reducing the need for additional city services.

## E. CONSISTENCY WITH LOCAL HAZARD MITIGATION PLAN

The Local Hazard Mitigation Plan (LHMP), approved and adopted on 08/08/2018, serves three primary purposes: 1) it provides a comprehensive analysis of the natural and human-caused hazards that threaten the City, with a focus on mitigation; 2) it keeps the City of Laguna Beach eligible to receive additional federal and state funding to assist with emergency response and recovery, as permitted by the federal Disaster Mitigation Act of 2000 and California Government Code Sections 8685.9 and 65302.6; and 3) it complements the efforts undertaken by the Safety Element. The LHMP complies with all requirements set forth under the federal Disaster Mitigation Act of 2000 and received approval from the Federal Emergency Management Agency (FEMA) in 2018. Sections of the Safety Element are supplemented by the LHMP, incorporated by reference in this element, as allowed by California Government Code Section 65302(g). To access, visit the City's website ([www.lagunabeachcity.net](http://www.lagunabeachcity.net)).

## F. CONSISTENCY WITH THE LOCAL COASTAL PROGRAM

The Laguna Beach Local Coastal Program (LCP) was adopted on February 18th, 1992, by Council Resolution 92.014. On January 13th, 1993, the LCP was certified by the California Coastal Commission, allowing the City to regulate development within the coastal zone. The City's LCP is not a distinct, separate document but instead consists of a mix of certain general plan elements, specific plans, municipal code sections, informational guidelines, and adopted resolutions. While the Safety Element is a mandatory element of the General Plan, it is not a component of the City's LCP. To ensure effective implementation, the Safety Element is consistent with the LCP and references fuel modification guidance and requirements identified in Resolution 89.104, which is a component of the City's LCP. This resolution becomes the basis for key fuel modification guidelines, fuel breaks, and geological requirements that will be superseded in the future by any LCP amendments adopted by the City.

## G. REGULATORY ENVIRONMENT

### California Government Code 65302(g)(1)

California Government Code Section 65302(g)(1) establishes the legislative framework for California's safety elements. This framework consolidates the requirements from relevant federal and state agencies, ensuring that all cities are compliant with the numerous statutory mandates. These mandates include:

- Protecting against significant risks related to earthquakes, tsunamis, seiches, dam failure, landslides, subsidence, flooding, and fires as applicable.
- Including maps of known seismic and other geologic hazards.



- Addressing evacuation routes, military installations, peak-load water supply requirements, and minimum road widths and clearances around structures as related to fire and geologic hazards, where applicable.
- Identifying areas subject to flooding and wildfires.
- Avoiding locating critical facilities within areas of high risk.
- Assessing the community's vulnerability to climate change.
- Including adaptation and resilience goals, policies, objectives, and implementation measures.

### **California Government Code Sections 8685.9 and 65302.6**

California Government Code Section 8685.9 (also known as Assembly Bill 2140 or AB 2140) limits California's share of disaster relief funds paid out to local governments to 75 percent of the funds not paid for by federal disaster relief efforts. However, if the jurisdiction has adopted a valid hazard mitigation plan consistent with DMA 2000 and has incorporated the hazard mitigation plan into the jurisdiction's General Plan, the State may cover more than 75 percent of the remaining disaster relief costs. All cities and counties in California must prepare a General Plan, including a Safety Element that addresses various hazard conditions and other public safety issues. The Safety Element may be a standalone chapter or incorporated into another section as the community wishes. California Government Code Section 65302.6 indicates that a community may adopt an LHMP into its Safety Element as long as the LHMP meets applicable state requirements. This allows communities to use the LHMP to satisfy state requirements for Safety Elements. As the General Plan is an overarching long-term plan for community growth and development, incorporating the LHMP into it creates a stronger mechanism for implementing the LHMP.

### **California Government Code 65302 (g) 3 adopted through SB 1241 (2012)**

California Government Code Section 65302 (g) 3 requires the Safety Element to identify and update mapping, information, and goals and policies to address wildfire hazards. As part of this requirement, any jurisdiction that includes State Responsibility Areas or Very High Fire Hazard Severity Zones in the Local Responsibility Areas (LRA), as defined by the California Board of Forestry and Fire Protection (Board), is required to transmit the updated element to the Board for review and approval.

### **California Government Code 65302 (g) 4 adopted through SB 379 (2015)**

California Government Code Section 65302 (g) 4 requires the Safety Element to address potential impacts of climate change and develop potential strategies to adapt/mitigate these hazards. Analysis of these potential effects should rely on a jurisdiction's Local Hazard Mitigation Plan or an analysis that includes data and analysis from the State of California's Cal-Adapt website.

### **California Government Code 65302 (g) 5 adopted through SB 99 (2019)**

California Government Code Section 65302 (g) 5 requires the Safety Element to identify evacuation constraints associated with residential developments, specifically focused on areas served by a single roadway.

### **National Flood Insurance Program**

The National Flood Insurance Program (NFIP) was created in 1968 to help communities adopt more effective floodplain management programs and regulations. The Federal Emergency Management Agency is responsible for implementing the NFIP and approves the floodplain management plans for participating cities and counties. Laguna Beach participates in the NFIP and uses Title 25, Chapter 25.38 of the Laguna Beach Municipal Code to administer flood management regulations throughout the City.



### Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (California Public Resources Code [PRC], Chapter 7.5, Section 2621-2699.6) was intended to reduce the risks associated with surface faults and requires that the designated State Geologist identify and map "Earthquake Fault Zones" around known active faults. Per PRC Section 2623 a, cities and counties shall require a geologic report defining and delineating any hazard of surface fault rupture before the approval of a project. If the jurisdiction finds no undue hazard of that kind exists, the geologic report on the hazard may be waived, with the State Geologist's approval. For a list of project types, please refer to PRC Section 2621.6. There are no Alquist-Priolo Earthquake Fault Zones that run through Laguna Beach; therefore, it is not a topic of concern addressed in this document.

### Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (California Public Resources Code, Chapter 7.8, Section 2690-2699.6) created a statewide seismic hazard mapping and technical advisory program in 1990 to help cities and counties more effectively address the effects of geologic and seismic hazards caused by earthquakes. Under PRC 2697, cities and counties shall require a geotechnical report defining and delineating any seismic hazard before approving a project located in a seismic hazard zone. If the jurisdiction finds that no undue hazard of this kind exists based on information resulting from studies conducted on sites near the project and of similar soil composition to the project site, the geotechnical report may be waived. After a report has been approved or a waiver granted, subsequent geotechnical reports shall not be required, provided that new geologic datum, or data, warranting further investigation is not recorded. Each jurisdiction shall submit one copy of each approved geotechnical report, including the mitigation measures to be taken, if any, to the State Geologist within 30 days of its approval of the report. For a list of project types, please refer to PRC Section 2693.

### Cortese List

Government Code Section 65962.5 (typically referred to as the "Cortese List") identifies sites that require additional oversight during the local permitting process as well as compliance with the California Environmental Quality Act (CEQA). The list is generally a compilation of properties and businesses that generate, store, and/or have been impacted by the presence of hazardous materials/wastes. Many properties identified on this list may be undergoing corrective action, cleanup, or abandoned and in need of these activities. The City of Laguna Beach does not have any properties or businesses identified on this list.

## III. HAZARDS / TRENDS

### A. EMERGENCY PREPAREDNESS

The ability to anticipate, evaluate, and mitigate potential risks posed by natural and human-caused hazards is paramount to a city's longevity. Although this element specifically addresses natural and human-caused hazards, emergency preparedness involves many more considerations beyond identifying the hazards themselves. The Emergency Preparedness section consolidates and briefly describes the City of Laguna Beach's hazard prevention and response strategies.



## Emergency Operations Plan

The Emergency Operations Plan (EOP) is primarily responsible for informing the City of Laguna Beach's emergency management strategies. These strategies are typically organized under four categories: mitigation, preparedness, response, and recovery.

### Mitigation

The EOP, in conjunction with the LHMP, identifies and assesses the natural and human-caused hazards that threaten the City and recommends proactive policy and procedural actions that reduce the risks associated with these hazards. This preemptive planning is intended to decrease the probability of emergency situations and minimize the effects should one occur. Examples of hazard mitigation and prevention can be found in many city policies, but they are most prominently displayed in the numerous codes regulating construction and development.



*Example of overhead powerlines*

### Preparedness

Emergency preparedness focuses on activities that prepare a community for a disaster. These activities typically involve preparation of plans addressing life safety, emergency response, and evacuation; purchase and storage of emergency supplies; and training and exercises to practice response activities. As part of the City's preparedness initiatives, an Evacuation Analysis has been prepared that identifies the routes used for evacuation purposes. These potential constraints may affect evacuation activities and potential improvements to improve future evacuation efforts. **Figure S-1A** depicts the impaired access roadways identified by the City. **Figure S-1B** depicts the residential developments with a single ingress/egress route.

### Response

Emergency response activities typically focus on actions necessary to save lives and prevent further property damage during an emergency/disaster. Many of these activities are conducted in tandem with the Laguna Beach Police and Fire Departments' standard emergency response procedures. To guide response activities, the City will rely on implementing the Emergency Operations Plan and work closely with volunteer organizations such as the Community Emergency Response Team (CERT), which helps orchestrate internal and external communications, logistics, and assistance during large-scale emergencies. If City resources become overwhelmed, the City will request support through the Operational Area using automatic aid and mutual aid agreements currently in place. However, the City recognizes that mutual aid resources are dependent on availability and may be limited during a large regional incident. Therefore, consideration for strengthening self-sufficiency should be a priority.

### Recovery

Recovery activities typically occur after an emergency/disaster event. These activities focus on reestablishing services to impacted areas, repair and/or reconstruct damaged buildings and infrastructure, and assistance to residents and businesses with permitting and approvals of building plans. Depending on the scale and type of incident, recovery could occur in specific community locations and/or require specialized expertise to address the issues created. Cleanup of hazardous wastes shall be considered part of the recovery from a major disaster event (fire or flood).



## **GOAL S-1: PROMOTE A CULTURE OF PREPAREDNESS AMONG ALL LAGUNA BEACH COMMUNITY MEMBERS THROUGH COMPREHENSIVE EMERGENCY MANAGEMENT PRACTICES.**

### **Policies / Implementation Actions**

<p><b>S-1.1</b></p>	<p><b>Periodically review and continuously update the Laguna Beach Emergency Operations Plan (EOP) to incorporate the region's latest information and best practices.</b></p> <p>S-1.1a – Promote public awareness of emergency preparedness, and hazard mitigation conducted by the City through public outreach and engagement activities.</p> <p>S-1.1b – Periodically update the Laguna Beach EOP to incorporate updated information regarding evacuation, mass care and sheltering, continuity of operations, and disaster recovery.</p> <p>S-1.1c – Coordinate with key stakeholders (OCFA, OCSD, OCTA, American Red Cross) regarding evacuation resources and capabilities within the City.</p> <p>S-1.1d – Annually conduct NIMS/SEMS compliant trainings and exercises with City staff on emergency preparedness and response.</p> <p>S-1.1e – Ensure the EOP identifies up-to-date information regarding continuity of operations and continuity of government.</p> <p>S-1.1f – Develop an all-hazards Post Disaster Recovery Framework for use after a major incident or event.</p>
<p><b>S-1.2</b></p>	<p><b>Periodically participate in Operational Area trainings and exercises when appropriate, including City Staff and stakeholders (EDPC, Water Agencies Laguna Beach Unified School District, Mission Hospital Laguna Beach, etc.).</b></p> <p>S-1.2a – Coordinate with neighboring jurisdictions on focused trainings and exercises specific to local community issues and concerns.</p> <p>S-1.2b - Develop and implement periodic training and exercises for all non-sworn City staff that are considered disaster service workers.</p>
<p><b>S-1.3</b></p>	<p><b>Require that any new street providing access to a residential development(s) meet the minimum standard of two contiguous, unobstructed, 10-foot-wide paved travel lanes.</b></p>
<p><b>S-1.4</b></p>	<p><b>Periodically update the City's Evacuation Analysis and EOP to better identify constraints to emergency access and evacuation.</b></p> <p>S-1.4a – Continuously evaluate State Fire Safe Regulations regarding emergency access and evacuation.</p> <p>S-1.4b – Identify deficient roadways and require upgrade/modification to meet emergency access and evacuation needs.</p> <p>S-1.4c – Identify additional evacuation routes using unpaved trails and privately maintained roads, where possible.</p> <p>S-1.4d – Periodically update the Impaired Access and Single Ingress/Egress mapping throughout the City as new data and information becomes available.</p>
<p><b>S-1.5</b></p>	<p><b>Require upgrades to road widths considered substandard, where feasible as part of new developments/major remodels to ensure adequate evacuation and</b></p>



**emergency vehicular access is available. For existing building sites, improvements will be limited to the property frontage only.**

S-1.5a – Conduct a feasibility study that identifies potential mitigation funding sources and strategies to upgrade existing substandard roadways. This study should also identify mitigation fees for new development to help pay for Citywide evacuation roadway deficiencies.

S-1.5b – Establish and maintain no parking/tow-away zones along critical evacuation routes and turn around locations to ensure effective emergency vehicle access and evacuation. Coordinate this with the City's impaired access and evacuation planning efforts.

S-1.5c – Conduct a feasibility study to analyze access improvements beyond new development/major remodels in impaired access neighborhoods and locations with single ingress/egress concerns.

### **S-1.6**

**Limit residential development to 24 building sites when a single means of ingress and egress or a cul-de-sac is proposed and require two means of ingress/egress where emergency equipment deployment and evacuation traffic are in excess of the design capacity of a single ingress/egress route. Limit a single means of ingress and egress or cul-de-sac to a maximum length of 750 feet. Private driveways shall not exceed 150 feet in length without providing a turnaround, loop circulation, or secondary emergency access.**

S-1.6a – Any existing parcel that is considered a legal building site shall be exempt from this policy standard for the purposes of development on the parcel as one building site but shall be required to observe the S-1.6 requirement to create new or additional building sites on the parcel.

S-1.6b – If the secondary emergency access route uses a public access easement on private property, the route must be paved, may be restricted to emergency access uses only, and must be certified as a functional access route during an emergency by the Fire Department.

S-1.6c – The City shall not approve a variance from Policy S-1.6 and Actions S-1.6a and S-1.6b unless findings are made that:

1. The Fire Department has reviewed the variance application and certified that long-term public health and safety has been established for emergency access through the provision of additional safeguards, including but not limited to adequate fire flow and hydrants, requiring sprinklers, additional street width, additional turnarounds, and maintained fuel modification zones; and
2. The road leading up to any road or driveway extension complies with City access standards regarding width and grade.
3. The proposed structure does not rely on impaired roadways, as identified in the City's evacuation plan.

### **S-1.7**

**Update the City's Local Hazard Mitigation Plan every five years pursuant to FEMA approval, and through this process, evaluate the location of critical facilities concerning hazard exposure.**

S-1.7a – Relocate critical facilities outside of recognized hazard zones. If alternate locations are not available or feasible, retrofit these facilities to reduce vulnerability to potential hazards.

S-1.7b – Continuously update the seismic vulnerability assessment of the LHMP as new data and information become available from CGS and USGS.

S-1.7c – Incorporate updated risk assessment information from the LHMP into the City's Capital Improvements Program.



	S-1.7d – Review and update the maps associated with the LHMP and included within the Safety Element (Figures S-1 through S-8) as necessary to keep them current with State regulations and City specific conditions.
<b>S-1.8</b>	<b>Locate new critical facilities outside of identified hazard areas.</b>
<b>S-1.9</b>	<b>If new facilities cannot be located outside of identified hazard areas, design these facilities to exceed federal, state, and local standards to ensure functionality during and after a hazard event.</b>
<b>S-1.10</b>	<p><b>Inform utility companies of potential conflicts between the location of their facilities and identified hazard areas.</b></p> <p>S-1.10a – Encourage utility companies to program the relocation or undergrounding of facilities potentially impacted by hazards, especially along designated primary emergency routes.</p> <p>S-1.10b – Continue to pursue relocation and/or to underground utility infrastructure that serves local emergency services within the City. This effort should include exploring potential future funding sources to help pay the City's fair share costs.</p>
<b>S-1.11</b>	<p><b>Underground utilities throughout the City.</b></p> <p>S-1.11a – Encourage undergrounding utilities in existing developed areas of the City where overhead powerlines are located.</p> <p>S-1.11b - Require any new development/major remodels to underground overhead utilities to reduce future fire threats.</p> <p>S-1.11c – Leverage state and federal funding sources to develop incentives and streamlining opportunities for utility undergrounding throughout the City.</p>
<b>S-1.12</b>	<p><b>Develop an all-hazards oriented public awareness effort that identifies relevant information for residents and businesses regarding emergency preparedness, hazard mitigation, and tips and tools for homeowners and businesses within the City.</b></p> <p>S-1.12a – Identify topics and themes for the public awareness effort that coincide with national and state outreach campaigns (i.e., Great Shakeout) on emergency management and hazard mitigation topics.</p> <p>S-1.12b – Develop earthquake preparedness outreach materials that integrate the latest earthquake mitigation information from the California Earthquake Authority.</p> <p>S-1.12c – Continue efforts on developing educational information on ways to protect lives and properties from flood hazards.</p> <p>S-1.12d – Develop outreach materials for residents and businesses focused on wildfire preparedness and evacuation.</p>



## B. FIRE HAZARDS

### Wildfires

The most common type of natural hazards in California are wildfires, which can burn large areas of undeveloped or natural land in a short amount of time. They often begin as smaller fires caused by lightning strikes, downed power lines, or unattended campfires but may rapidly expand in size if conditions are dry and/or windy. The recent trend toward more prolonged periods of drought increases the likelihood of a wildfire occurring. Typically, wildfires pose minimal threat to people and buildings in urban areas, but increasing human encroachment into natural areas increases the likelihood that bodily harm or structural damage will occur. This encroachment occurs in areas called the wildland-urban interface, which is considered an area within the high and very high fire hazard severity zone, as defined by the California Department of Forestry and Fire Protection (Cal FIRE). Significant wildfires have occurred in Laguna Beach in the past and pose a significant threat to people and property. Natural, undeveloped hillsides border the community, and the developed areas are very narrow. Much of the community is very close to these hillsides. All the canyon and hillside areas in Laguna Beach and some coastal terrace areas are classified within the Very High Fire Hazard Severity Zones (VHFHSZ), which is the highest wildfire risk classification designated by Cal FIRE. **Figure S-2** depicts the VHFHSZs mapped throughout Laguna Beach, which covers nearly 90% of the City. The LHMP identifies these hazard zones in relation to developed areas of the City and the location of critical facilities and infrastructure. In addition, the Fire Department conducts strategic planning on a regular basis to ensure fire response capabilities and personnel can adequately address current service needs throughout the City and identifies potential issues to be addressed by the Department. This Strategic Plan was last completed in 2019.



*Steep hillside areas of Laguna Beach with natural vegetation*

### Urban Fires

The possibility of an urban fire confronts every city. Many urban fires begin as isolated incidents caused by a faulty electrical appliance, absentminded cooking mishap, or industrial malfunction but can spread to other buildings if conditions permit. Many factors contribute to an urban fire's severity and extent, but modern building codes and practices have helped reduce their effects. Despite these improvements, it is important to acknowledge the risks associated with fires in urban areas. No matter its size, any fire can cause people severe harm and can damage buildings and other structures.



*Structure fire that occurred in Laguna Beach*

### Water Supply

Water service in Laguna Beach is provided by the South Coast Water District (serving South Laguna) and Laguna Beach County Water District (serving the rest of the City). According to both Districts' Urban Water Management



Plans, adequate water supplies are available to meet customer demands within the City. This is especially important for ensuring adequate supplies are available for fire suppression needs within the City. While adequate water supplies are available, parts of the City continue to experience infrastructure challenges associated with water pressure and flow. While this condition is known, it is not fully understood by the public or development community. As a standard practice, new developments and major remodels are required to conduct water pressure / flow testing and mitigate issues if it is inadequate. Some areas of the City experience limited reservoir capacity issues, which can impact water pressure and flow if water pumps are unable to convey water for prolonged fire suppression activity.

## **GOAL S-2: REDUCE THE THREAT OF WILDFIRE HAZARDS FOR LAGUNA BEACH RESIDENTS, BUSINESSES, AND VISITORS.**

### **Policies / Implementation Actions**

<p><b>S-2.1</b></p>	<p><b>Ensure that the City maintains adequate facilities and fire service personnel in conformance with the Fire Department Strategic Plan.</b></p> <p>S-2.1a – Review and periodically update the Fire Department Strategic Plan to identify needed staffing levels, upgrades to equipment and facilities, and improvements to standards of care and response.</p> <p>S-2.1b – Conduct an evaluation of Fire Department suppression staffing levels in accordance with acceptable professional standards, and consider implementation of report recommendations.</p>
<p><b>S-2.2</b></p>	<p><b>Maintain and regularly update the City's vegetation management practices to be consistent with Resolution 89.104, State regulations, and regionally appropriate practices while recognizing the importance of landscaping to the character of the City.</b></p> <p>S-2.2a – Periodically update the Wildfire Mitigation and Fire Safety Report and incorporate recommended updates into the City's vegetation management practices.</p> <p>S-2.2b – Coordinate with adjacent jurisdictions and stakeholders regarding vegetation management practices and projects.</p> <p>S-2.2c – Coordinate with neighborhood associations regarding strategies and projects associated with the City's vegetation management practices.</p> <p>S-2.2d – Develop long-term sustainable funding sources to fund and expand the City's vegetation management practices.</p> <p>S-2.2e – Educate residents and businesses on the City's vegetation management practices, including fire safety, landscaping installation and maintenance, and fire hazard reduction strategies.</p> <p>S-2.2f – Locate access roads, trails, or fire roads within vegetation management areas where feasible to minimize native vegetation removal.</p>
<p><b>S-2.3</b></p>	<p><b>Work with governmental jurisdictions and agencies on the cooperative, integrated implementation of the Orange County Report of the Wildland/Urban Interface Task Force's recommendations and Resolution 89.104.</b></p> <p>S-2.3a - Coordinate with state and local jurisdictions and stakeholders on strategic fire plans in and around the City.</p>
<p><b>S-2.4</b></p>	<p><b>Promote development outside of the VHFHSZ, where applicable and allow for transfer of development rights into lower risk areas, if feasible.</b></p>



<p><b>S-2.5</b></p>	<p><b>Promote development within the VHFHSZ's to incorporate fire-resistive construction and defensible space management strategies consistent with State requirements, municipal regulations, and requirements identified in Policy S-2.3</b></p> <p>S-2.5a – All new development and major remodels, in applicable areas, will be responsible for preparation of a Fire Protection Plan, the creation, maintenance, and rehabilitation of fuel modification zones, which will include a recorded deed restriction acknowledging the fire hazard potential and maintenance responsibility by the developer or his successors and assigns.</p> <p>S-2.5b – Require property owners to create defensible space surrounding their homes, including providing access for firefighters, maintaining plantings and outdoor areas, and minimizing combustible structures.</p> <p>S-2.5c – Require the use of fire-safe planting, especially in landscaped areas located within the VHFHSZ.</p> <p>S-2.5d – Conduct a feasibility study to develop permit expediting options such as permit fee reductions for the voluntary inclusion of fire safety mitigation actions incorporated into development projects.</p>
	<p><b>Fire Protection Plans</b></p> <p>A Fire Protection Plan (FPP) approved by the fire code official is required for all new development within the Very High Fire Severity Zones. FPPs are required to include mitigation strategies that take into consideration location, topography, geology, flammable vegetation, sensitive habitats/species, and climate of the proposed site. FPPs must address water supply, access, building ignition and fire resistance, fire protection systems and equipment, proper street signage, defensible space, vegetation management, and long-term maintenance. All required FPPs must be consistent with the requirements of the current adopted versions of the California Building Code Chapter 7A, California Fire Safe Regulations, and the City of Laguna Beach Fire Code.</p>
<p><b>S-2.6</b></p>	<p><b>Periodically update local codes and requirements to be consistent with Resolution 89.104 and the current adopted State Building Codes and Fire Codes.</b></p> <p>S-2.6a– Create and implement a Defensible Space Ordinance and Fire Protection Plan guidelines within one year of Safety Element Adoption.</p>
<p><b>S-2.7</b></p>	<p><b>Ensure that existing and new developments have adequate water supplies and conveyance capacity to meet daily demands and firefighting requirements.</b></p> <p>S-2.7a – Coordinate with water districts to identify issues that may affect water supply and delivery.</p> <p>S-2.7b – Require new developments to expand water infrastructure capacity in areas where current improvements do not meet Fire Code requirements.</p> <p>S-2.7c – Map water pressure and capacity characteristics of the water infrastructure throughout the City to identify potential areas requiring upgrade and enhancement to meet future daily, peak, and fire flow requirements.</p>
<p><b>S-2.8</b></p>	<p><b>Develop a fire-perimeter prevention signage program with adjacent cities and jurisdictions to alert the public of wildfire dangers.</b></p>
<p><b>S-2.9</b></p>	<p><b>Coordinate with Southern California Edison and San Diego Gas and Electric on electrical infrastructure that may be impacted by wildfires and/or Public Safety Power Shutoff events.</b></p>
<p><b>S-2.10</b></p>	<p><b>Coordinate with Caltrans, Orange County, and neighboring communities on vegetation management and brush clearance along all roadways in the VHFHSZs.</b></p>



## C. SEISMIC AND GEOLOGIC HAZARDS

Seismic and geologic hazards are traditionally addressed together because they both involve the movement of the Earth's surface. Although some geologic events (landslide, subsidence, erosion, etc.) can and do happen independently, the primary catalyst for their occurrence is often a seismic event, commonly referred to as an earthquake. This section identifies four common seismic and geologic hazards that threaten Laguna Beach and establishes policies and procedures meant to protect the community when an event occurs. A key consideration for seismic and geologic hazards is the potential for cascading effects resulting from an event. When an earthquake occurs, the seismic shaking can cause natural gas and water/sewer pipelines to rupture, which can cause other impacts like flooding, erosion, or fires. The goals, policies, and actions throughout this element are designed to work together to reduce both the individual and collective risk of these hazards.

### Seismic Hazards

Southern California is no stranger to earthquakes, and their frequent occurrence is widely accepted as a fact of life. Laguna Beach is prone to seismic hazards due to its location in a seismically active region. These hazards can be divided into three categories, each with unique characteristics and implications for planning.

### Surface Rupture

The Earth is covered in tectonic plates, which are large sections of the Earth's crust that are constantly shifting and moving closer together, further apart, or past one another. The movement of two plates past one another frequently causes friction resulting in plates that "stick." When this occurs, the same forces that push the plates past each other are now concentrated in certain areas. In time, friction can no longer hold the plates together, and the plates suddenly shift, releasing the massive build-up of energy (i.e., earthquake). This rapid movement and release of energy can cause the Earth to fracture and displace the land around it, resulting in an earthquake fault. Some faults are buried beneath the surface, and others are at the surface of the Earth. Surface rupture of a fault is especially dangerous if structures are built on top of the fault or infrastructure crosses the fault, because these facilities could be damaged by fault movement. If a surface rupture occurs, the movement could break pipelines, damage roads and bridges, rendering them useless after the event. Areas of known surface rupture hazard in California are identified in Alquist-Priolo Special Study Zones. Laguna Beach does not currently have any Alquist-Priolo Special Study Zones at this time. Fortunately, many seismic events do not cause surface ruptures and instead disperse the energy exclusively in the form of seismic shaking.

### Seismic Shaking

Seismic shaking is the recognizable movement caused by the energy released from an earthquake. The same mechanism that creates a surface rupture is also responsible for seismic shaking and can produce an equally devastating effect. Buildings and other structures may be destroyed because of violent shaking. Infrastructure such as roads, pipelines, and power lines are also susceptible to damage and pose additional safety concerns. Unlike surface rupture, seismic shaking consequences are not restricted to the area immediately surrounding the fault. Energy resonating through the ground can travel hundreds of miles and cause damage in many locations simultaneously. The closer to the earthquake's source (epicenter), the stronger the shaking will be. Seismic shaking is of particular concern for the City of Laguna Beach due to the proximity to active faults that can generate significant earthquakes. The Laguna Beach LHMP identifies a 1% to 25% probability of a magnitude 6.7 or greater event to occur along numerous faults within southern California in the next 30 years. The highest probability (25%) is projected for the San Andreas fault, located approximately 52 miles from the City. While the closest fault (Newport Inglewood) is approximately 2 miles from the City and estimated to have a 1% probability



of generating a 6.7M earthquake or greater. **Figure S-3** depicts the Seismic Shaking anticipated from a strong earthquake along the Newport Inglewood Fault.

## Liquefaction

Liquefaction is a phenomenon that occurs when intense vibrations from an earthquake cause saturated soil to lose stability and act more like a liquid than a solid. This poses significant problems for buildings and other structures in areas where liquefaction can occur, as the ground may give way under the weight of the structure and its foundation. In addition, underground structures are vulnerable to liquefaction. Multiple Laguna Beach areas are at risk of liquefaction, primarily the beaches and the canyon areas. The soils in these areas are sandy or loose sediment washed down the canyons by floods and creeks, and such material is prone to liquefaction. According to the LHMP, specific risk areas are where the Pacific Coast Highway crosses below Emerald Canyon and the roads and properties of Laguna, Bluebird, and Aliso Canyons. **Figure S-4** depicts the areas of the City susceptible to liquefaction.

## Geologic Hazards

Although seismic events, such as earthquakes, often trigger geologic hazards, this is not always the case. Therefore, understanding and preparing for these hazards as standalone events is equally important.

## Landslides and Mudflows

A landslide is the movement of earth materials down slopes and areas of steep topography. Although earthquakes often cause them, landslides can occur when any sloped surface can no longer support the material contained within or sitting above it. This instability can be caused by the sheer weight of the loose material or can be aided by other events such as heavy rain. When rain causes a slope to fail, the movement of earth materials is typically referred to as a mudslide. Both landslides and mudslides move with great force and pose a



*Aftermath of a massive landslide in Bluebird Canyon in 2005*



*Remediation work from the 2005 Bluebird Canyon Landslide.*

significant danger to buildings and other structures. In some circumstances, these events may cause bodily harm if bystanders cannot move out of its path in time. Anticipating the risk of landslides in the areas identified by **Figure S-5** will be essential for protecting the community members who reside there. The parts of Laguna Beach at risk of landslides are the areas at the bottom of canyons and along the canyon slopes. According to studies of landslide susceptibility in Orange County, areas facing high or very high risk of sliding under normal conditions include the slopes on either side of Laguna, Bluebird, and Aliso canyons; the area north of the Temple Hill



neighborhood; and many of the coastal bluffs. Additional areas face a high risk of landslides in the event of an earthquake, including the hills above Irvine Cove, Boat Canyon, and the Skyline Drive neighborhood.

### **GOAL S-3: REDUCE THE THREAT OF GEOLOGIC HAZARDS FOR LAGUNA BEACH RESIDENTS, BUSINESSES, AND VISITORS.**

#### **Policies / Implementation Actions**

<p><b>S-3.1</b></p>	<p><b>Require the preparation of a geotechnical investigation for applicable development projects as specified in the Municipal Code.</b></p> <p>S-3.1a – Require onsite borings or subsurface investigations for (applicable) proposed developments in areas of the City where geologic hazards may be a concern.</p> <p>S-3.1b – Continue to require that all geotechnical investigations within the City be prepared by a Geotechnical Engineer or Certified Engineering Geologist and be peer-reviewed by the City's on-call geotechnical consultant.</p> <p>S-3.1c – As above, require that applicable grading activities be monitored by qualified geotechnical personnel.</p> <p>S-3.1d – Continue to file, reference, and index geotechnical mapping and data within the City's Geographic Information System.</p>
<p><b>S-3.2</b></p>	<p><b>Enforce bluff and hillside protection measures that control runoff and erosion.</b></p> <p>S-3.2a – Develop guidance for bluff and hillside protection that should include but not be limited to effective vegetation management, access control, site planning for new development and major remodels, direct water to areas with adequate storm drainage infrastructures, and compliance with blufftop setbacks, consistent with Resolution 89.104.</p>
<p><b>S-3.3</b></p>	<p><b>Restrict development projects that will cause hazardous geologic conditions or expose existing developments to an unacceptable level of risk until the causative factors are mitigated.</b></p>
<p><b>S-3.4</b></p>	<p><b>Ensure all drainage facilities are free of obstructions, maintained adequately, and mitigate storm flows on hillsides and bluffs.</b></p> <p>S-3.4a – Conduct periodic inspections on drainage facilities to ensure adequate operations and maintenance.</p> <p>S-3.4b – Annually notice owners of private drainage infrastructure about maintenance and operation needs.</p> <p>S-3.4c – Within 18 months of Safety Element adoption:</p> <ol style="list-style-type: none"> <li>1. Identify all private terrace drain infrastructure in landslide prone areas and determine specific responsibility for maintenance;</li> <li>2. Determine the City's inspection and enforcement options and develop an inspection/enforcement plan;</li> <li>3. Identify potential funding sources available for public and private drainage infrastructure improvements (.e.g. Geologic Hazard Abatement Districts); and</li> <li>4. As soon as possible, implement the inspection/enforcement plan, initially focused on at-risk areas with a documented history of significant landslide activity.</li> </ol>
<p><b>S-3.5</b></p>	<p><b>Require drought-resistant vegetation with deep root systems where appropriate in new developments and major remodels to reduce over-irrigation in areas of the City prone to slope instability.</b></p>



	<p>S-3.5a – Encourage the use of drought-resistant vegetation throughout the City through public education efforts.</p> <p>S-3.5b – Map areas of the City with steep hillsides to identify areas of potential slope instability that may require stabilization using vegetation or engineered solutions.</p>
<b>S-3.6</b>	<b>Prohibit the location of critical facilities (hospitals, fire and police stations, emergency operations centers, infrastructure) in geologically hazardous areas unless no feasible alternative is available and the hazard can be effectively mitigated.</b>
<b>S-3.7</b>	<b>Enhance current siting, design, and construction standards for new critical facilities to ensure building functionality after a seismic event.</b>
<b>S-3.8</b>	<p><b>Evaluate long-term risks and costs associated with retrofit and mitigation of critical facilities versus relocation when located in hazardous areas.</b></p> <p>S-3.8a – Relocate critical facilities when it is cost-effective to do so compared to mitigating hazard conditions.</p> <p>S-3.8b – Conduct a feasibility study identifying funding mechanisms to pay for mitigation enhancements to existing critical facilities identified within geologic hazard areas.</p> <p>S-3.8c – Conduct a structural evaluation of existing critical facilities to determine needed improvements.</p>
<b>S-3.9</b>	<b>Coordinate with public and private utility providers and agencies (Caltrans, South Coast Water District, Laguna Beach County Water District, SCE, The Gas Company) on seismic enhancement and mitigation of infrastructure within the City.</b>
<b>S-3.10</b>	<p><b>Encourage seismic retrofits for existing homes within the City. Consistent with the current California Building Code and recommendations from the California Earthquake Authority.</b></p> <p>S-3.10a – Identify funding opportunities to assist homeowners with seismic retrofit improvements.</p>

## D. FLOOD HAZARDS

Flooding is caused by the accumulation of water on the ground surface. This typically occurs after heavy rainfall but can also result from water delivery infrastructure failures such as pipes and storage containers. Worsening drought conditions caused by climate change may exacerbate the effects of flooding, as surfaces that typically absorb water can quickly dry out and become less permeable. Flooding presents multiple dangers to people and structures alike. Standing water may be deep enough to cause drowning, and even shallow water can easily damage buildings and property. Fast-moving water is more hazardous, as it may sweep people downstream or cause extensive damage to structures. Flooding is a recurring event in Laguna Beach. Although flood control channels and drainage systems help reduce flooding, existing flood control infrastructure cannot always meet the community's needs. Most of the storm drains in Laguna Beach are built to handle a 25-year flood event and could be overwhelmed in more severe events, leading to ponding. Storm drains at Boat and Bluebird canyons



*Flooded streets and buildings in Laguna Beach*



can accommodate a 100-year flood, although debris from flood events can reduce their capacity. The flood control channel in Laguna Canyon can only handle between 5 and 43 percent of the water from a 100-year flood at various points. **Figure S-6** illustrates the FEMA flood zones within Laguna Beach. While flooding by itself is a significant hazard, often flooding can coincide with other hazards like landslides and mudslides, which are often exacerbated by wildfires.



*Large amount of mud and debris deposited on Coast Highway in downtown Laguna Beach, after being carried there by a major storm and the subsequent flooding.*

## **GOAL S-4: REDUCE FLOOD IMPACTS AND ADAPT TO CHANGING FLOOD CONDITIONS WITHIN LAGUNA BEACH.**

### **Policies / Implementation Actions**

<b>S-4.1</b>	<p><b>Ensure drainage infrastructure protects properties, conveys flood waters adequately, and enhances the built environment.</b></p> <p>S-4.1a – Use natural watercourses as primary flood control channels whenever feasible and safe to do so.</p> <p>S-4.1b – Minimize the threat of mudflows through the use of effective erosion control methods</p>
<b>S-4.2</b>	<p><b>Require new developments and major remodels to retain onsite storm flows at or below existing conditions.</b></p> <p>S-4.2a – Onsite drainage improvements shall be consistent with the requirements of the Laguna Beach Municipal Code.</p> <p>S-4.2b – Encourage properties that generate excessive storm flows to implement mitigation activities to reduce offsite flows through the use of detention, retention, and/or recharge strategies.</p>
<b>S-4.3</b>	<p><b>Design drainage infrastructure to meet 100-year flood protection at a minimum.</b></p> <p>S-4.3a – Identify existing storm drains that require modification/retrofit to meet 100-year flood protection standards.</p> <p>S-4.3b – Expand flood control capacity to accommodate impacts projected by sea-level rise.</p>
<b>S-4.4</b>	<p><b>Prioritize natural drainage channels to promote beach sand nourishment/replenishment along the Laguna Beach coastline.</b></p>
<b>S-4.5</b>	<p><b>Improve the flood control capacity in Laguna Canyon.</b></p> <p>S-4.5a – Promote flood protection measures like stream restoration, private property improvements, floodproofing, retention/detention basins, and other strategies that reduce flood impact.</p> <p>S-4.5b – Adhere to flood management requirements within the Laguna Beach Municipal Code.</p>



	S-4.5c – Continue the City's annual inspection program for public and private drainage facilities in the Canyon.
<b>S-4.6</b>	<b>Coordinate with local, state, and federal agencies on watershed management programs and projects.</b> S-4.6a – Update the City's Storm Drain Master Plan. S-4.6b – Integrate projects from the Storm Drain Master Plan into the City's Local Hazard Mitigation Plan and Capital Improvements Program. S-4.6c – Track and monitor development activity and its impact on the City's watersheds. S-4.6d – Conduct proactive maintenance and monitoring activities leading up to storm events and the start of the rainy season.

## E. CLIMATE ADAPTATION

Although climate change is not a hazard, variations in environmental conditions can impact some of the natural hazards affecting Laguna Beach. Projections of future conditions include increased temperatures, increased extreme heat days, changes in precipitation, more prolonged droughts, and changes in the size and frequency of wildfire incidents. **Table S-1** identifies the current/historical conditions and projected conditions within Laguna Beach projected from climate change.

Increasing temperatures associated with climate change can act as a hazard multiplier. By the end of the century, annual mean temperatures are projected to increase between four and seven degrees, impacting city residents and businesses. These increases are also anticipated to increase the number of extreme heat days, increasing from two days per year to between 9 and 21 days. These potential temperature increases may impact residents living in poorly insulated structures or do not meet current code requirements.

**Table S-1 – Potential Climate Change Effects for Laguna Beach**

Historic Annual Mean (1961-1990)	70.1° F
Future Annual Mean (2070-2099)	74.0 to 76.9° F
Current Extreme Heat Days (88.1° F)	2 days per year
Future Extreme Heat Days (2070-2099)	9 to 21 days per year
Current Annual Mean Precipitation	12.5 inches
Future Annual Mean Precipitation (2070-2099)	12.0 to 12.5 inches
Current Annual Average Area Burned	43.8 acres
Future Annual Average Area Burned (2070-2099)	32.0 to 32.7 acres
<b>Source:</b> <a href="https://cal-adapt.org/">https://cal-adapt.org/</a>	

While temperatures are anticipated to increase in the coming decades, climate change projections also suggest that annual mean precipitation may slightly decrease. While an annual decrease is projected, it is anticipated that future rain events may be more intense than what is currently experienced within the City, which could increase flooding within the City. With changes in future precipitation, it is expected that changes to local vegetation may occur, which could impact drainages and increase the need for wildfire management activities.

Increased rainfall could increase the amount of flooding within the community or introduce flooding into areas that have not experienced flooding before. With greater and more intense precipitation, the City could also experience an increase in landslides/mudslides. Extreme precipitation events could de-stabilize hillsides and drainages, resulting in more landslides/mudslides and/or erosion along stream courses, impacting neighboring properties/structures.



With future temperature increases coupled with relatively similar precipitation amounts experienced today, future wildfire impact is projected to decrease by the end of the century. This projection is based on the overall reduction in small and moderate precipitation events in place of large or extreme events, suggests that vegetation growth will experience an overall reduction. A reduction in vegetation could reduce future wildfire vulnerability due to reduced fuel reductions in vegetation density. The City currently experiences an annual average of 43.8 acres burned, projected to decrease to 32.0 to 32.7 acres by the end of the century.

While climate change is projected to exacerbate many of the hazards already affecting the City, many of these hazards may interact with each other. Increased temperatures can affect both water supplies and vegetation growth. With drier conditions, vegetation growth may be reduced, which can reduce wildfire vulnerability, however if dry conditions persist for long periods, the reduced vegetation may be drier than normal. These two conditions may result in the same or greater risk for wildfires.

## **GOAL S-5: ENSURE THAT LAGUNA BEACH IS READY TO ADDRESS THE IMPACTS ASSOCIATED WITH CLIMATE CHANGE.**

### **Policies / Implementation Actions**

<b>S-5.1</b>	<b>Coordinate with regional, state, and federal agencies to monitor the indicators and impacts of climate change.</b>  S-5.1a – Annually monitor king tide inundation and average high tide measurements to track inundation patterns.  S-5.1b – If inundation from king tide and high tide conditions begin to migrate further inland, identify thresholds for requiring new sea-level rise analyses and potential mitigation actions.
<b>S-5.2</b>	<b>Periodically review and update the City's Local Hazard Mitigation Plan to incorporate new information related to climate change, as necessary.</b>
<b>S-5.3</b>	<b>Monitor flooding conditions that occur outside of the 100-year floodplain to identify new areas of risk as future conditions change.</b>
<b>S-5.4</b>	<b>Monitor wildfire mapping and hazard conditions for changing future conditions as a result of climate change.</b>
<b>S-5.5</b>	<b>Improve city staff understanding of how climate change may disproportionately affect vulnerable community members, including senior citizens, low-income persons, and persons with disabilities.</b>
<b>S-5.6</b>	<b>Develop incentive programs to encourage property owners to retrofit their homes/businesses against climate-related hazards such as extreme weather, flooding, wildfire, etc.</b>
<b>S-5.7</b>	<b>Prepare and periodically update a Climate Action Plan that integrates climate adaptation and hazard mitigation information and analysis.</b>



## F. SHORELINE PROTECTION

### Coastal Erosion

Coastal erosion is the gradual or sudden wearing away of coastal bluffs and beaches by wind, rain, high surf, tides, and other events. If buildings and facilities on a beach or bluff have poor drainage, this can make erosion worse. Bluff erosion weakens the edges of the coastal terraces and causes parks or yards built on top of the bluffs to shrink over time. Erosion also weakens or hollows out areas under any structures, leading to a partial or complete collapse of the structure if the erosion progresses far enough. If the risk of collapse is high enough, the structure may be closed to prevent a potential disaster. Beach erosion causes beaches to become narrower, which can decrease their recreational use or limit coastal access. A narrower beach is also less able to act as a buffer from wave action and coastal flooding, so beach erosion can increase the risk to beachfront properties or increase the rate of bluff erosion when the beach is at the cliff's base. The entire shoreline of Laguna Beach—both beach and bluffs—is subject to coastal erosion. Depending on the orientation of the shoreline and composition of the coastal geology, erosion occurs at different rates in different locations along the coast. Erosion is often worse during the rainy season when severe storms can cause substantial erosion.



*Erosion of a sea cliff face in Laguna Beach*

### Sea-Level Rise

Sea-level rise is the increase in the ocean's height and is driven by changes in Earth's climate. Global temperatures are increasing and causing land ice (i.e., glaciers) to melt. The meltwater runs into the oceans, raising the sea-level surface. Warmer temperatures also cause the water in the oceans to expand (like many other materials, water expands when warmed), further raising surface heights. Although it occurs globally, various forces and changes in the ocean's composition, causing sea-level rise at different rates in different locations. Sea-level rise can happen naturally at the end of an ice age, although current sea-level rise is very likely (at least a 90 percent chance) due to human-caused climate change. Sea-level rise is not a direct threat, but it exacerbates various coastal flooding hazards, such as storms, high surf, or exceptionally high tides. Sea-level rise makes beaches narrower and less effective as buffers between the ocean and waterfront development. As a result, when coastal flooding occurs, floodwaters can advance farther inland. Higher ocean levels can also increase the rate of erosion of beaches and bluffs. In the long term, ocean levels may rise high enough to permanently or semi-permanently flood low-lying coastal areas. All beaches in Laguna Beach are at risk of sea-level rise. Coastal bluffs are high enough to protect most community development from sea level rise, but Main Beach Park and



*King Tide conditions along the Laguna Beach coastline*



buildings with their lower levels at or close to beach level may be exposed to sea-level rise in the future. **Figure S-7** depicts areas of the City that would be inundated by 66 inches of sea-level rise, expected by 2100.

## Tsunami

A tsunami is a type of sea wave typically created by a geologic event underwater or along the shore. Earthquakes are the most common cause of tsunamis, but they may also be triggered by landslides, volcanic eruptions, and—in rare instances—meteor strikes. A large and sudden change in atmospheric pressure can also trigger a rare tsunami-type called a meteotsunami. Tsunamis can inundate low-lying coastal areas, causing widespread flooding, and the force of the water can cause significant damage. A typical tsunami event involves multiple waves of varying heights, and the initial wave is not always the tallest. Part of the danger of tsunamis is that they can cause damage far away from the event that triggers them. Although tsunamis weaken as they travel and typically do the most significant damage near the displacement event, large ones can retain enough energy to be destructive hundreds or thousands of miles away. A tsunami could inundate all beaches in Laguna Beach. In the low-lying coastal areas near Main Beach, the water from a tsunami could reach inland between Broadway and Forest Avenue, as far as the current Wells Fargo Bank building. A tsunami could also travel up Aliso Creek as far as The Ranch at Laguna Beach (formerly the Laguna Beach Country Club). Approximately 0.13 square miles of Laguna Beach is in the potential tsunami inundation area. **Figure S-8** depicts the tsunami inundation hazard areas that could affect the City.

## GOAL S-6: PROTECT SHORELINE ENVIRONMENTS AND ADAPT TO CHANGING CONDITIONS ALONG THE LAGUNA BEACH COASTLINE.

### Policies / Implementation Actions

<b>S-6.1</b>	<p><b>Prohibit the construction of buildings and other human-made structures on the beach's sandy portion unless necessary for public health and safety.</b></p> <p>S-6.1a – Shoreline construction shall meet the <i>Guidelines for Shoreline Protection</i> criteria, including the effects of beach encroachment, wave reflection, reduction in sea cliff sand contribution, and aesthetic criteria.</p> <p>S-6.1b – Periodically update and monitor the City's Guidelines for Shoreline Protection to include the latest guidance and best practices from the California Coastal Commission.</p>
<b>S-6.2</b>	<p><b>Prohibit shoreline protective devices that may negatively affect sand supply or cause an adverse impact to shoreline processes.</b></p> <p>S-6.2a – Allow for shoreline protective devices under an emergency basis if an existing principal structure(s) is in imminent danger from erosion and is designed to mitigate adverse impacts on local shoreline sand supply.</p> <p>S-6.2b – Explore beach sand replenishment opportunities as an alternative to the construction of hard shoreline protection devices.</p> <p>S-6.2c – Consider the impacts of flood control improvements on beach sand replenishment.</p> <p>S-6.2d – Repair of damaged shoreline protection devices must be consistent with prevailing zoning regulations and general plan policies.</p> <p>S-6.2e – Continue to require Coastal Development Permits consistent with the City's Local Coastal Program.</p>



<b>S-6.3</b>	<b>Enforce building setback standards on local beaches to prevent or minimize exposure to waves.</b>
<b>S-6.4</b>	<b>Prevent shoreline development that exposes structures to wave attack or degrades natural means of shoreline protection.</b>
<b>S-6.5</b>	<b>Require that stormwater and drainage are contained, controlled, and discharged appropriately within coastal areas.</b>
<b>S-6.6</b>	<b>Require shoreline developments to conduct a sea-level rise analysis and mapping to identify areas where potential inundation may occur consistent with prevailing zoning regulations and general plan policies.</b>

## G. HAZARDOUS MATERIALS AND WASTES

Natural hazards are not the only threat to a community's safety. Human-caused dangers, such as various hazardous materials and wastes, are often found throughout a community and can pose significant risks. Generally speaking, hazardous materials are identified as being toxic, flammable, explosive, corrosive, infectious, radioactive, or a combination of these characteristics. Hazardous wastes are categorized similarly but are identified separately from materials because they no longer serve a meaningful use.

### In the Community

Although common household chemicals pose little threat to the community at large, hazardous materials and wastes used by business and industry present a greater risk. Mechanical dealerships, repair shops, gasoline, diesel fuel stations, and dry cleaners are examples of businesses that regularly use and store chemicals or other hazardous materials. Pipelines and tanks within the City also transport and store chemicals that could pose a risk if failure occurs. These releases are anticipated to be isolated to properties where storage occurs. Releases also tend to involve the transportation of raw materials and their byproducts either by pipeline or truck. Regulation of the use, storage, and transportation of hazardous materials and wastes rests on state and federal agencies; however, cities play a large role in minimizing the risks and impacts of exposure through careful planning and preparation. The City's main truck routes include Highways 1 and 133, which allow for the transport of chemicals and materials into and out of the City.

### In the Home

Exposure to hazardous materials is not uncommon, as many household cleaning products contain chemicals that can harm both humans and the environment. Through proper use, however, the health risks associated with these hazardous materials can largely be avoided. The proper storage of household cleaning products and other common hazardous materials, such as those used in automotive and home repair, is also an important component of responsible management. Following the manufacturer's instructions on the packaging and keeping products out of the reach of children are two simple steps that can help reduce the risk of exposure.



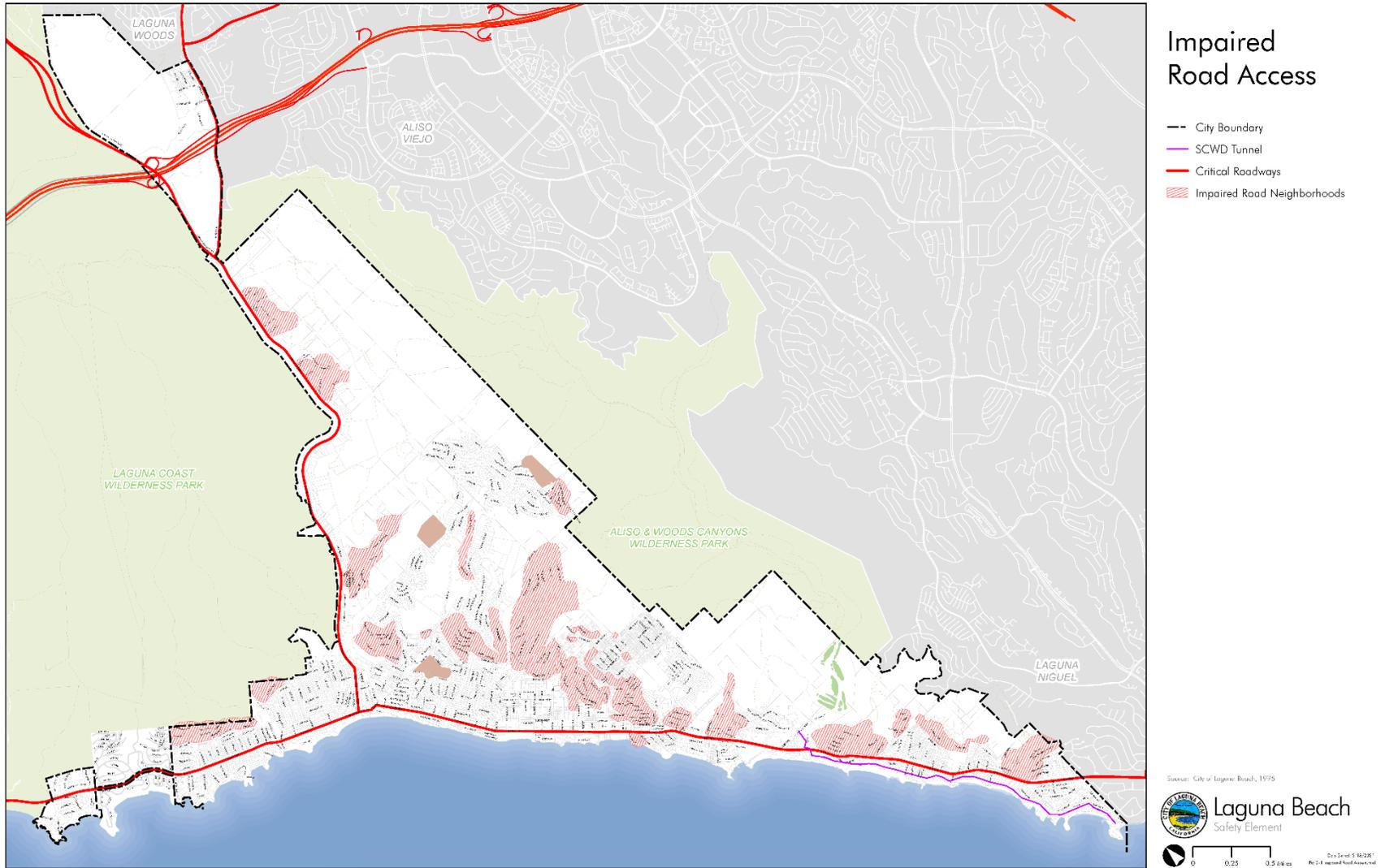
## **GOAL S-7: REDUCE THE THREAT OF EXPOSURE TO HAZARDOUS MATERIALS FOR LAGUNA BEACH RESIDENTS, BUSINESSES, AND VISITORS.**

### **Policies / Implementation Actions**

<p><b>S-7.1</b></p>	<p><b>Coordinate with Federal, State, and County agencies to protect the public health, safety, and welfare of the City's built and natural environments from the release of hazardous materials.</b></p> <p>S-7.1a – Continue the City's Household Hazardous Waste (HHW) program that includes the use of County drop-off locations and door-to-door collections.</p> <p>S-7.1b – Continue to promote the City's HHW programs that include residential door-to-door collections, Small Business Program collections, and the use of County of Orange HHW Collection Centers for proper disposal of hazardous materials.</p> <p>S-7.1c – Conduct a feasibility study to see if a local disposal location is appropriate and if a fee should be established to construct a permanent location.</p>
<p><b>S-7.2</b></p>	<p><b>Promote the use of non-toxic alternatives for cleaning and pest management in the home and yard.</b></p>
<p><b>S-7.3</b></p>	<p><b>Facilitate coordinated, effective responses to hazardous materials emergencies in the City to minimize health and environmental risks.</b></p>
<p><b>S-7.4</b></p>	<p><b>Coordinate with applicable County agencies on inspections of businesses that generate, use, store, or dispose of hazardous materials and monitor locations within the City that could cause public health and/or safety issues.</b></p>
<p><b>S-7.5</b></p>	<p><b>Promote the implementation of the programs identified in the County's hazardous materials programs.</b></p>
<p><b>S-7.6</b></p>	<p><b>Prevent sewage flow into City storm drains by properly separating this infrastructure per state and local requirements.</b></p> <p>S-7.6a – Separate sewer and storm drain infrastructure through construction upgrades and operation and maintenance activities that eliminate cross-contamination of the two systems.</p>
<p><b>S-7.7</b></p>	<p><b>Coordinate with local water and wastewater agencies to eliminate sewer discharges and non-point source pollution into Aliso and Laguna Canyon Creeks.</b></p>



**FIGURE S-1A – IMPAIRED ACCESS ROADWAYS (VERSION: 1993)**





**FIGURE S-1B – SINGLE EMERGENCY EVACUATION ROUTE RESIDENTIAL DEVELOPMENTS (VERSION: 2021)**

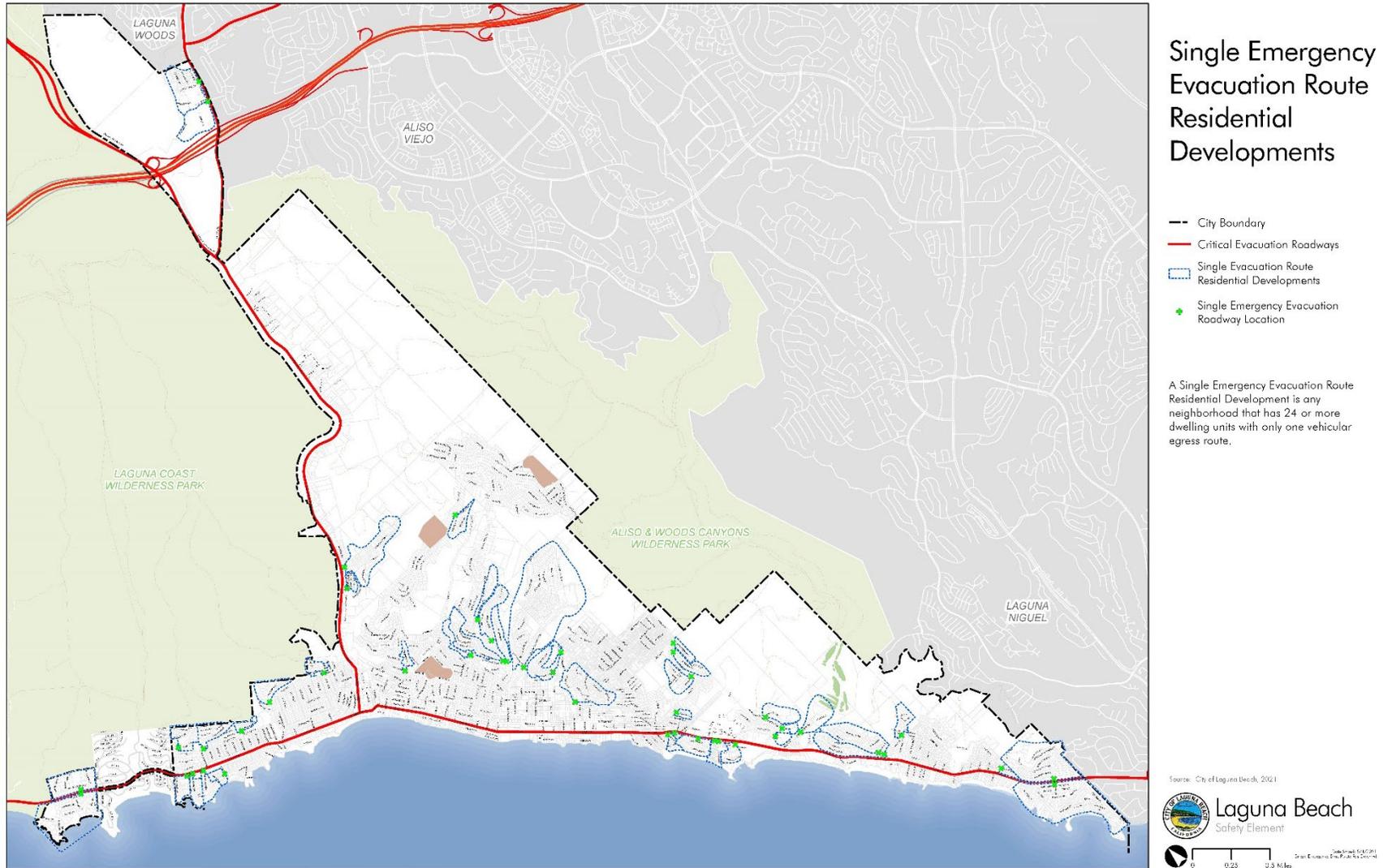




FIGURE S-2 – FIRE HAZARDS

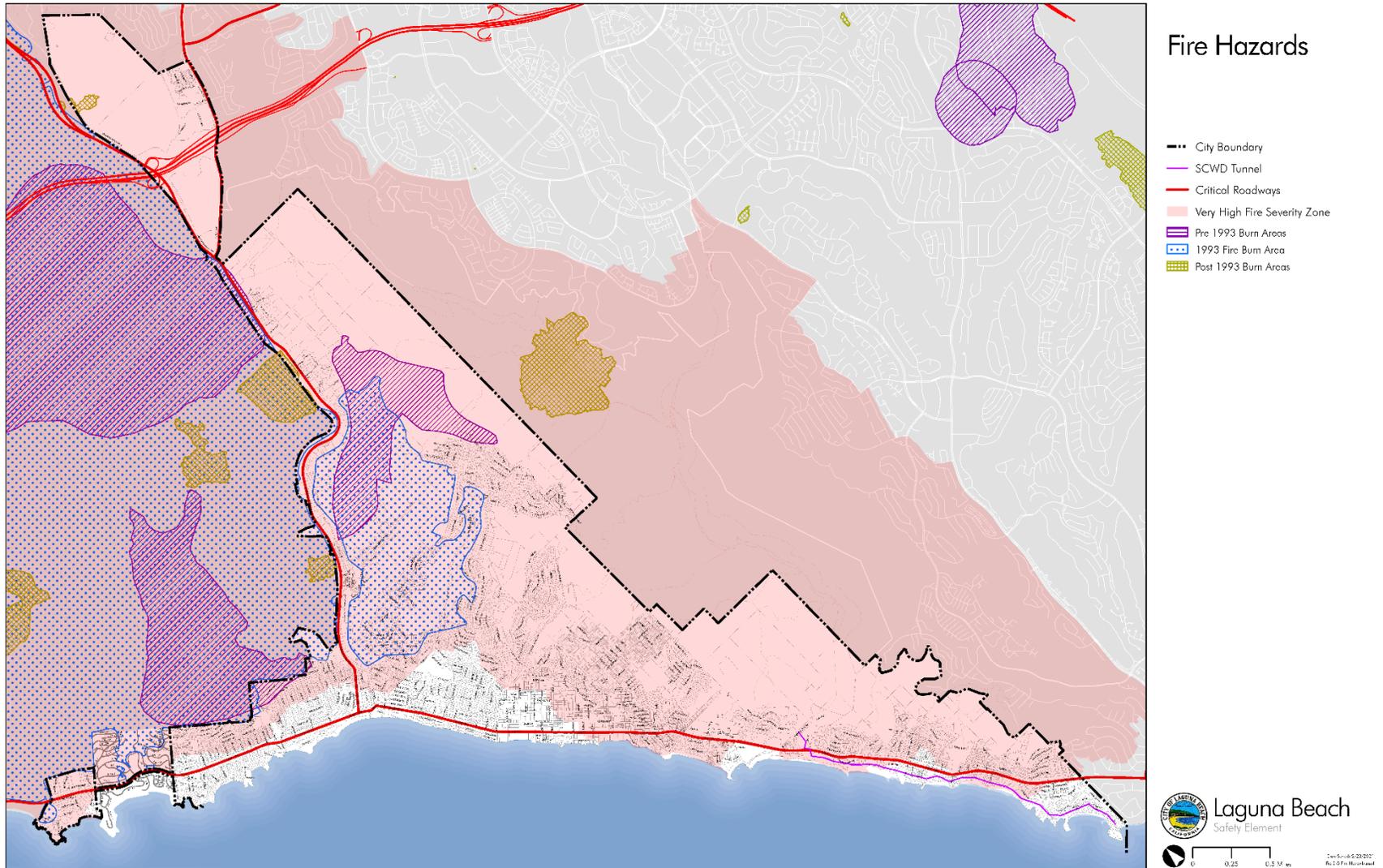




FIGURE S-3 – SEISMIC HAZARDS

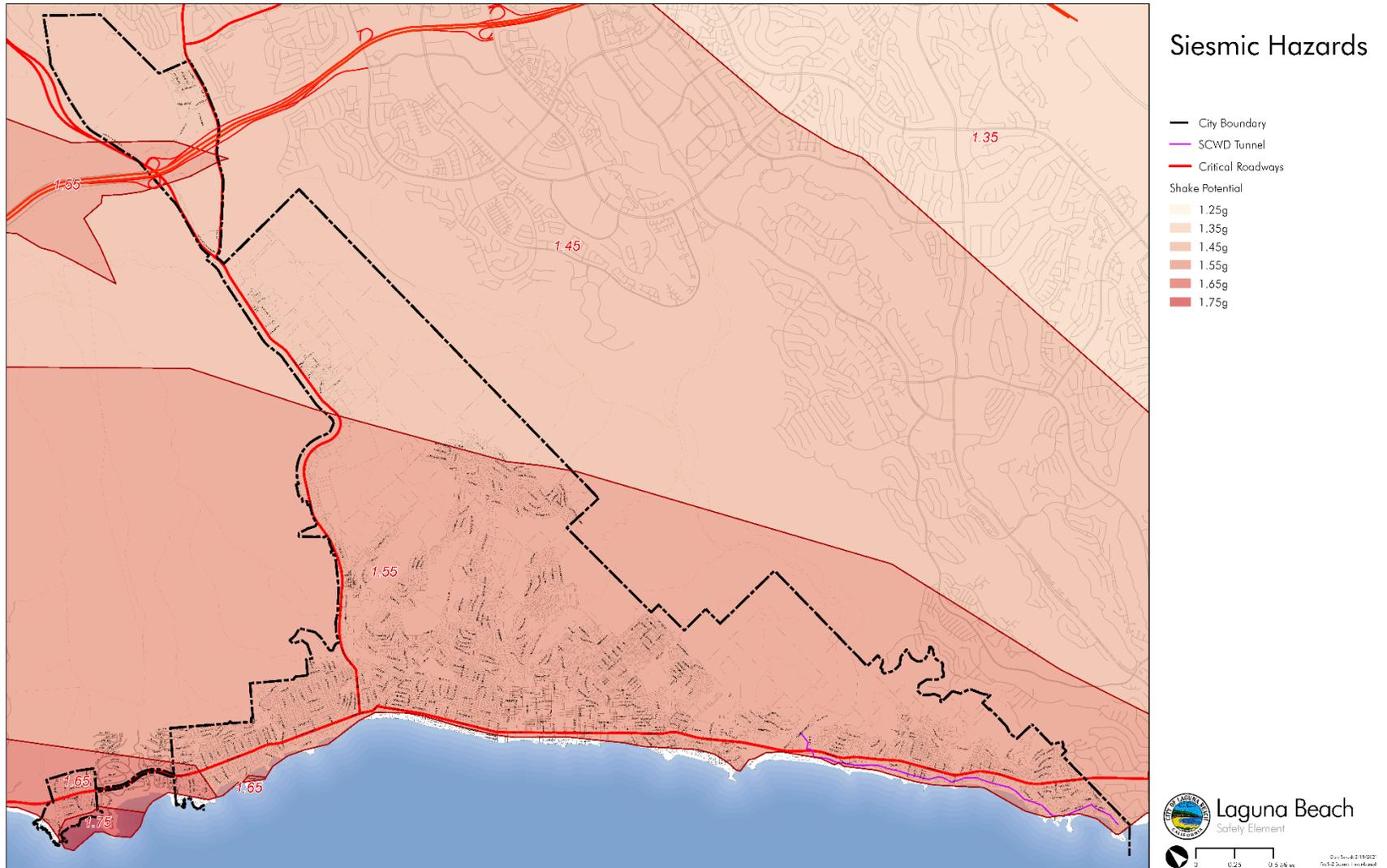




FIGURE S-4 – LIQUEFACTION PRONE AREAS

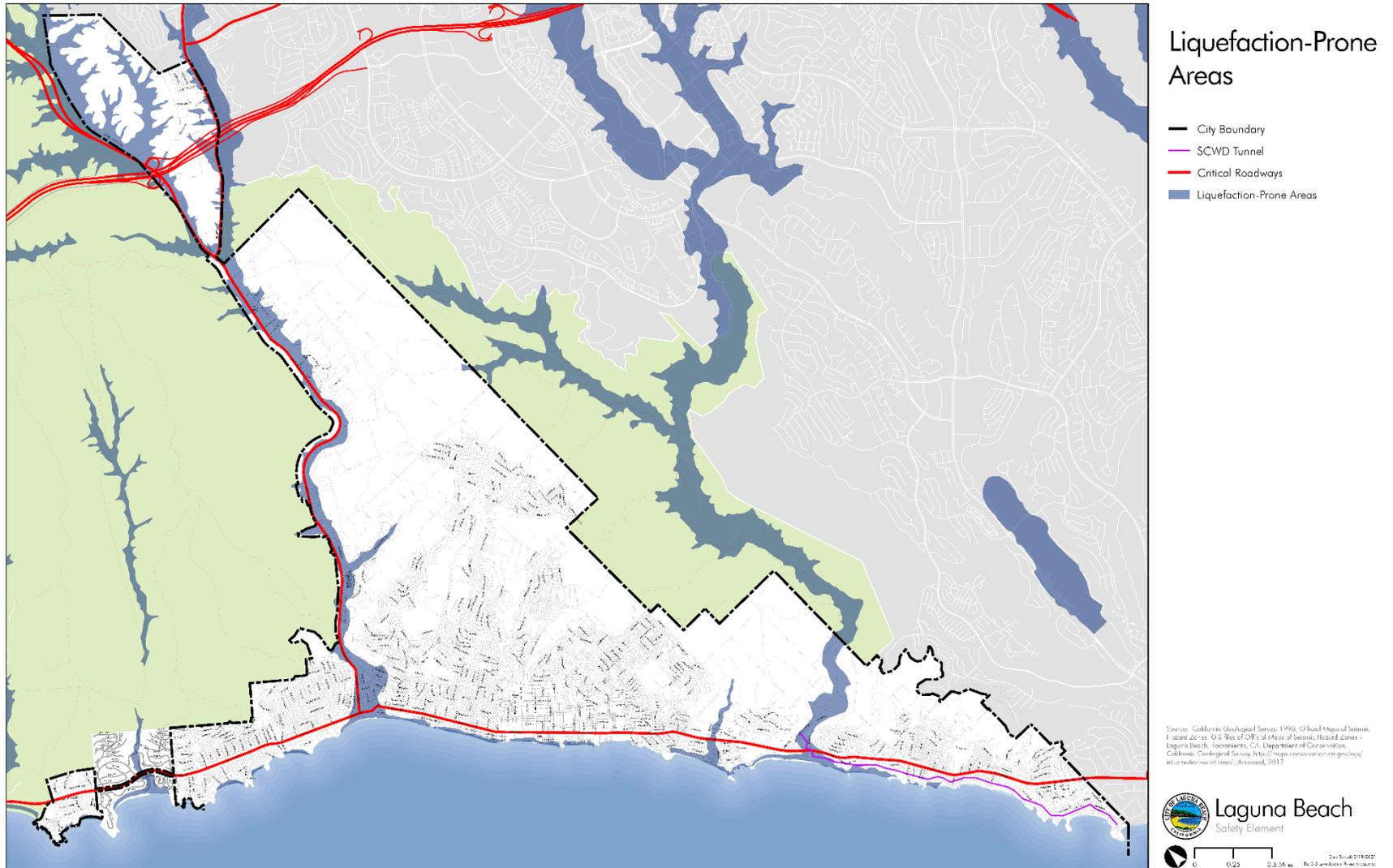
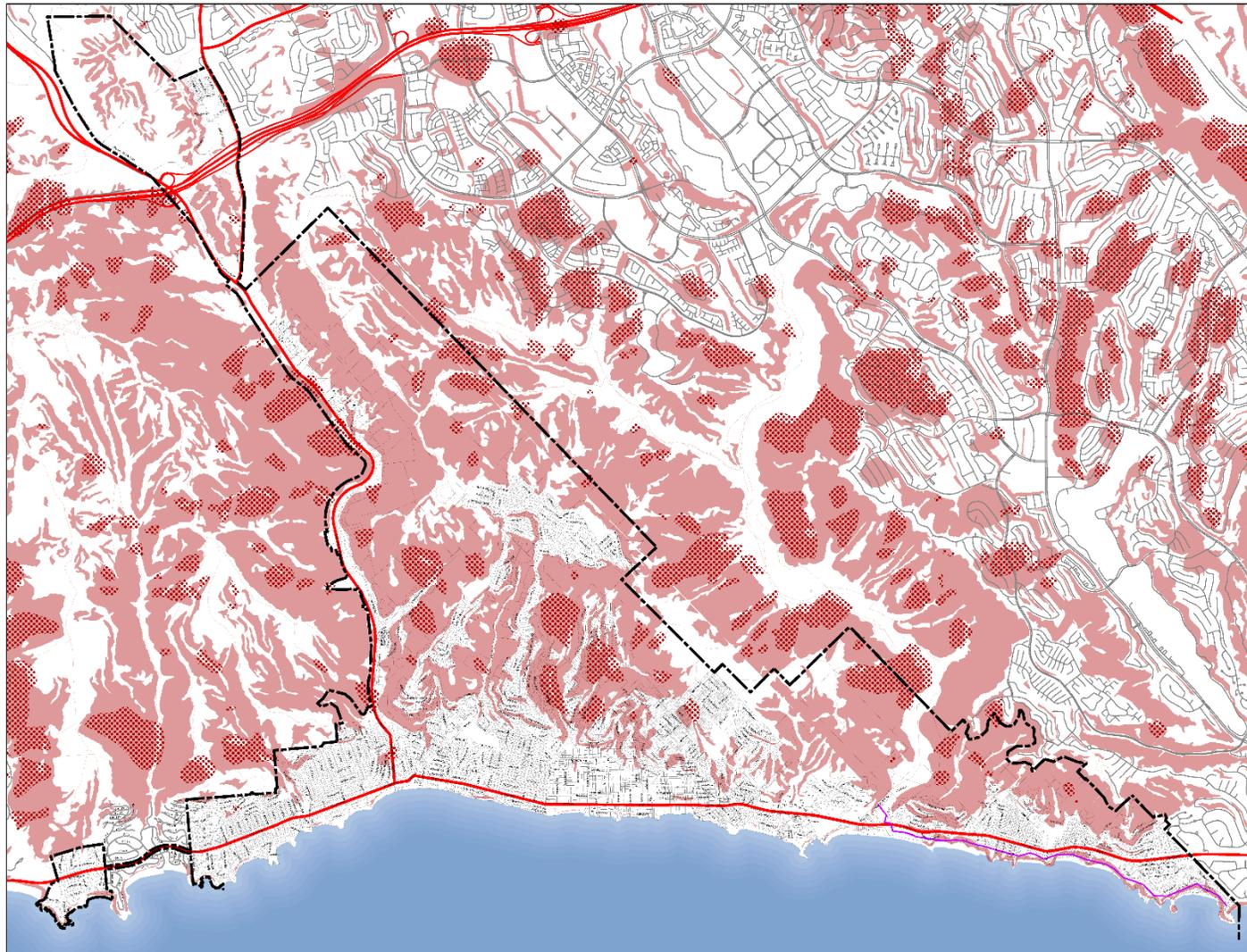




FIGURE S-5 – LANDSLIDE PRONE AREAS



Landslide-Prone Areas

- City Boundary
- SCWD Tunnel
- Critical Roadways
- Existing Landslides
- Earthquake-Induced Landslide Zones

Source: California Geological Survey, 1998, Office of Ocean and Coastal Resources, 1983, and California Geological Survey, 1998, Laguna Beach, Sacramento, CA, Department of Conservation, California Geological Survey, <http://maps.consrvation.ca.gov/cgi-bin/interactiveviewer.pl?Area=1>

Laguna Beach  
Safety Element

0 0.25 0.5 Miles

Scale: 1:25,000  
Date: 8/21/2021  
File: S-5-1818-Final.mxd



FIGURE S-6 – FLOOD HAZARDS

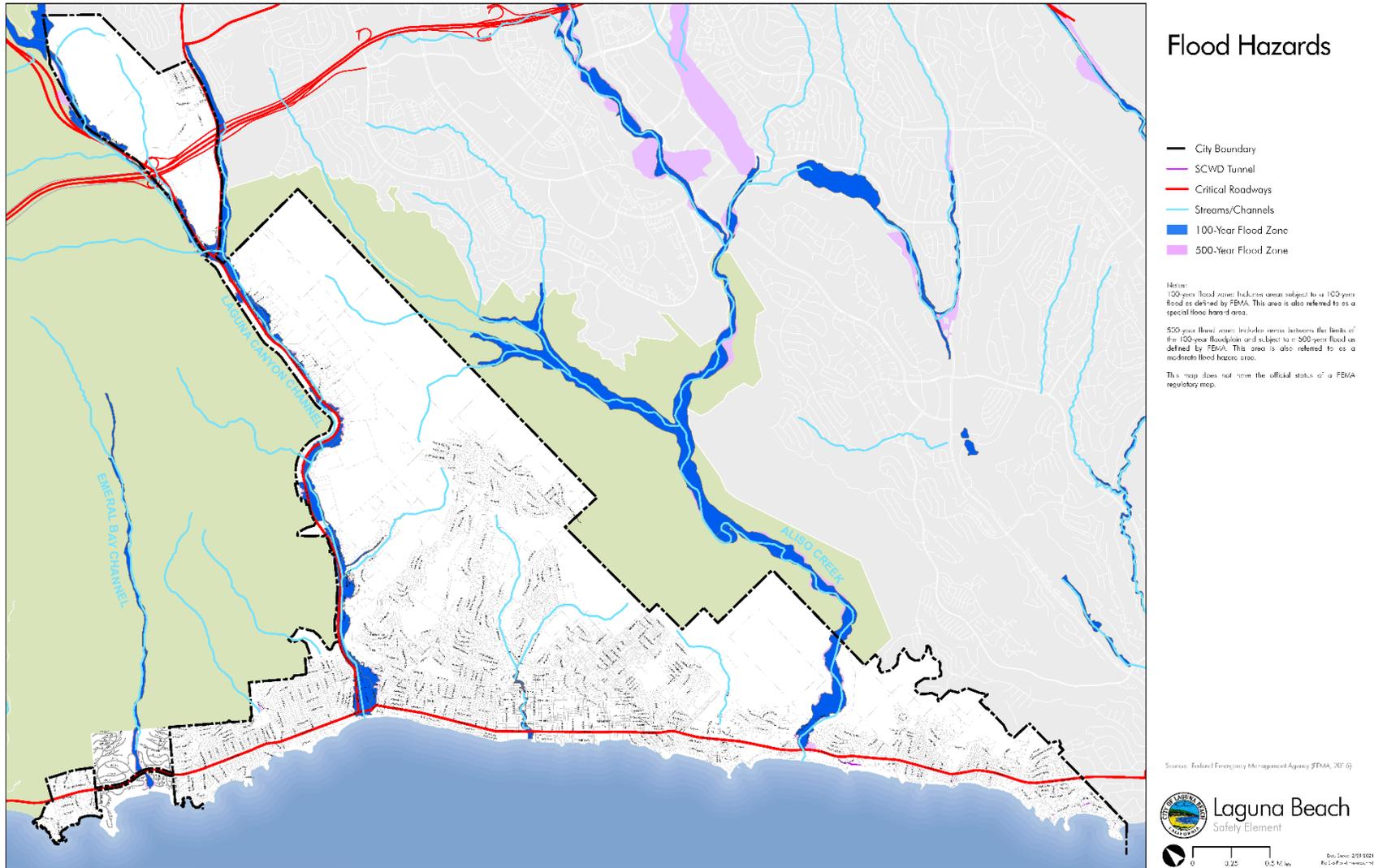




FIGURE S-7 – SEA LEVEL RISE

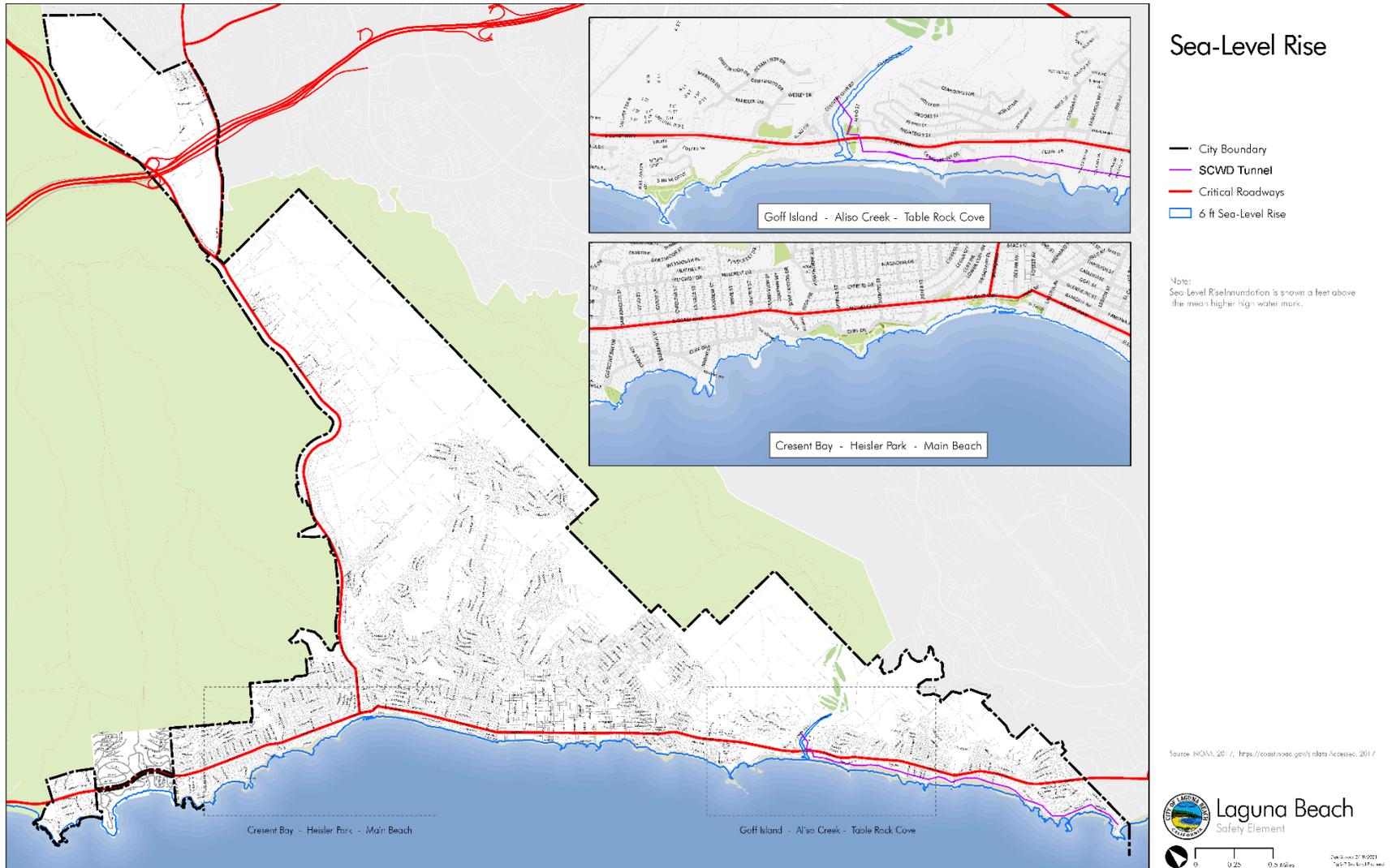
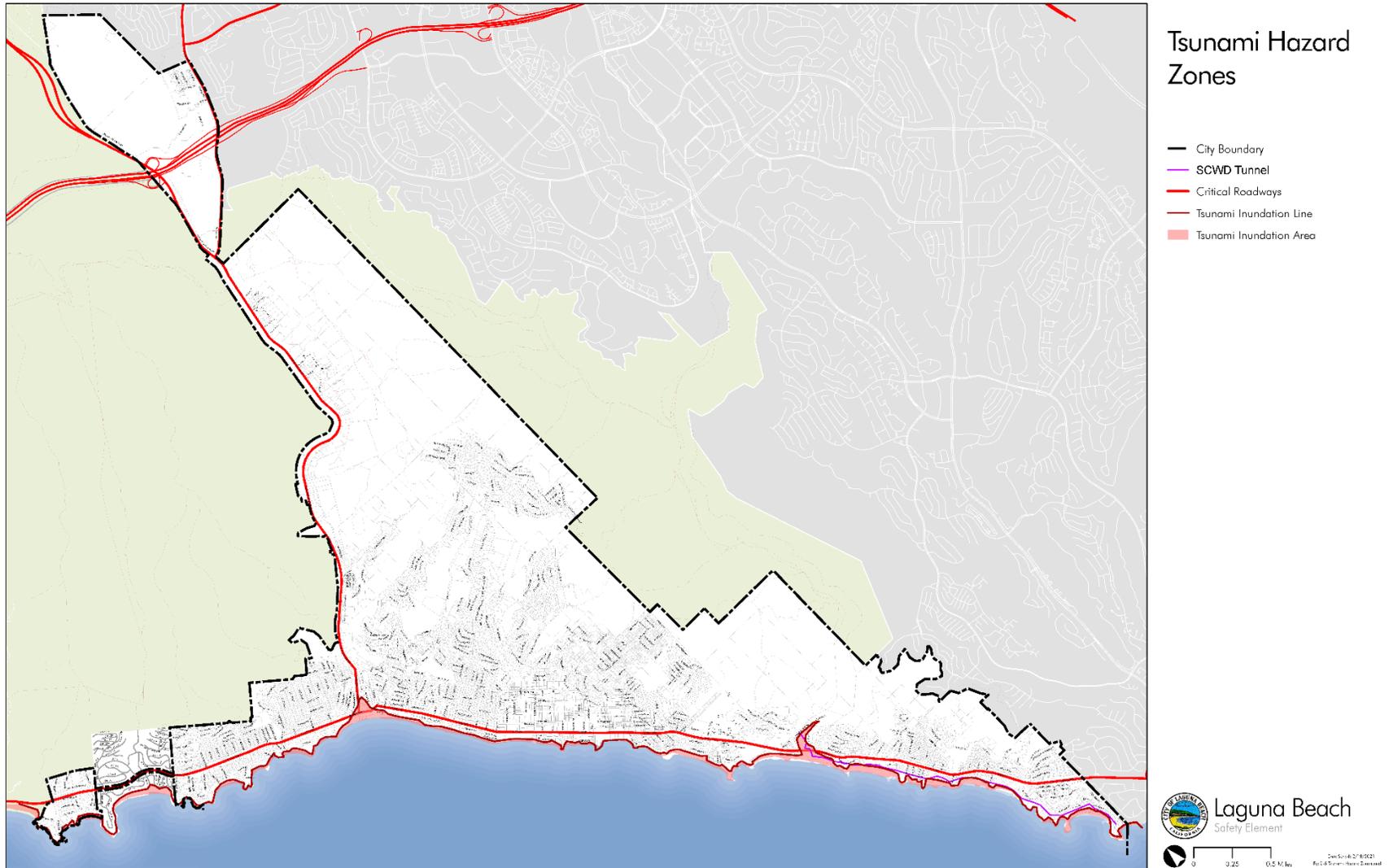




FIGURE S-8 – TSUNAMI INUNDATION AREAS





## IV. IMPLEMENTATION PROGRAMS / ACTIONS

The implementation programs and actions provide the City with flexibility to consider staffing levels, economic conditions, funding constraints, capital improvement projects, and manmade or natural physical events. Some of the programs and actions are ongoing and may recommend further analyses be conducted. The City must continue to monitor the relevance of these programs and actions regarding their implementation progress and will provide a status update annually to the Emergency and Disaster Preparedness Committee upon the adoption of the Safety Element. An annual progress report shall be prepared by the Emergency and Disaster Preparedness Committee to the City Council. The City Council will review the progress report to set new safety objectives based upon changing conditions, new information, and revised City priorities.

### A. EMERGENCY PREPAREDNESS

**S-1.1a** – Promote public awareness of emergency preparedness, and hazard mitigation conducted by the City through public outreach and engagement activities.

**S-1.1b** – Periodically update the Laguna Beach EOP to incorporate updated information regarding evacuation, mass care and sheltering, continuity of operations, and disaster recovery.

**S-1.1c** – Coordinate with key stakeholders (OCFA, OCSD, OCTA, American Red Cross) regarding evacuation resources and capabilities within the City.

**S-1.1d** – Annually conduct NIMS/SEMS compliant trainings and exercises with City staff on emergency preparedness and response.

**S-1.1e** – Ensure the EOP identifies up-to-date information regarding continuity of operations and continuity of government.

**S-1.1f** – Develop an all-hazards Post Disaster Recovery Framework for use after a major incident or event.

**S-1.2a** – Coordinate with neighboring jurisdictions on focused trainings and exercises specific to local community issues and concerns.

**S-1.2b** - Develop and implement periodic training and exercises for all non-sworn City staff that are considered disaster service workers.

**S-1.4a** – Continuously evaluate State Fire Safe Regulations regarding emergency access and evacuation.

**S-1.4b** – Identify deficient roadways and require upgrade/modification to meet emergency access and evacuation needs.

**S-1.4c** – Identify additional evacuation routes using unpaved trails and privately maintained roads, where possible.

**S-1.4d** – Periodically update the Impaired Access and Single Ingress/Egress mapping throughout the City as new data and information becomes available.

**S-1.5a** – Conduct a feasibility study that identifies potential mitigation funding sources and strategies to upgrade existing substandard roadways. This study should also identify mitigation fees for new development to help pay for Citywide evacuation roadway deficiencies.

**S-1.5b** – Establish and maintain no parking/tow-away zones along critical evacuation routes and turn around locations to ensure effective emergency vehicle access and evacuation. Coordinate this with the City's impaired access and evacuation planning efforts.



**S-1.5c** – Conduct a feasibility study to analyze access improvements beyond new development/major remodels in impaired access neighborhoods and locations with single ingress/egress concerns.

**S-1.6a** – Any existing parcel that is considered a legal building site shall be exempt from this policy standard for the purposes of development on the parcel as one building site but shall be required to observe the S-1.6 requirement to create new or additional building sites on the parcel.

**S-1.6b** – If the secondary emergency access route uses a public access easement on private property, the route must be paved, may be restricted to emergency access uses only, and must be certified as a functional access route during an emergency by the Fire Department.

**S-1.6c** – The City shall not approve a variance from Policy S-1.6 and Actions S-1.6a and S-1.6b unless findings are made that:

1. The Fire Department has reviewed the variance application and certified that long-term public health and safety has been established for emergency access through the provision of additional safeguards, including but not limited to adequate fire flow and hydrants, requiring sprinklers, additional street width, additional turnarounds, and maintained fuel modification zones; and
2. The road leading up to any road or driveway extension complies with City access standards regarding width and grade.
3. The proposed structure does not rely on impaired roadways, as identified in the City's evacuation plan.

**S-1.7a** – Relocate critical facilities outside of recognized hazard zones. If alternate locations are not available or feasible, retrofit these facilities to reduce vulnerability to potential hazards.

**S-1.7b** – Continuously update the seismic vulnerability assessment of the LHMP as new data and information become available from CGS and USGS.

**S-1.7c** – Incorporate updated risk assessment information from the LHMP into the City's Capital Improvements Program.

**S-1.7d** – Review and update the maps associated with the LHMP and included within the Safety Element (Figures S-1 through S-8) as necessary to keep them current with State regulations and City specific conditions.

**S-1.10a** – Encourage utility companies to program the relocation or undergrounding of facilities potentially impacted by hazards, especially along designated primary emergency routes.

**S-1.10b** – Continue to pursue relocation and/or to underground utility infrastructure that serves local emergency services within the City. This effort should include exploring potential future funding sources to help pay the City's fair share costs.

**S-1.11a** – Encourage undergrounding utilities in existing developed areas of the City where overhead powerlines are located.

**S-1.11b** - Require any new development/major remodels to underground overhead utilities to reduce future fire threats.

**S-1.11c** – Leverage state and federal funding sources to develop incentives and streamlining opportunities for utility undergrounding throughout the City.

**S-1.12a** – Identify topics and themes for the public awareness effort that coincide with national and state outreach campaigns (i.e., Great Shakeout) on emergency management and hazard mitigation topics.



**S-1.12b** – Develop earthquake preparedness outreach materials that integrate the latest earthquake mitigation information from the California Earthquake Authority.

**S-1.12c** – Continue efforts on developing educational information on ways to protect lives and properties from flood hazards.

**S-1.12d** – Develop outreach materials for residents and businesses focused on wildfire preparedness and evacuation.

## B. FIRE HAZARDS

**S-2.1a** – Review and periodically update the Fire Department Strategic Plan to identify needed staffing levels, upgrades to equipment and facilities, and improvements to standards of care and response.

**S-2.1b** – Conduct an evaluation of Fire Department suppression staffing levels in accordance with acceptable professional standards, and consider implementation of report recommendations.

**S-2.2a** – Periodically update the Wildfire Mitigation and Fire Safety Report and incorporate recommended updates into the City's vegetation management practices.

**S-2.2b** – Coordinate with adjacent jurisdictions and stakeholders regarding vegetation management practices and projects.

**S-2.2c** – Coordinate with neighborhood associations regarding strategies and projects associated with the City's vegetation management practices.

**S-2.2d** – Develop long-term sustainable funding sources to fund and expand the City's vegetation management practices.

**S-2.2e** – Educate residents and businesses on the City's vegetation management practices, including fire safety, landscaping installation and maintenance, and fire hazard reduction strategies.

**S-2.2f** – Locate access roads, trails, or fire roads within vegetation management areas where feasible to minimize native vegetation removal.

**S-2.3a** – Coordinate with state and local jurisdictions and stakeholders on strategic fire plans in and around the City.

**S-2.5a** – All new development and major remodels, in applicable areas, will be responsible for preparation of a Fire Protection Plan, the creation, maintenance, and rehabilitation of fuel modification zones, which will include a recorded deed restriction acknowledging the fire hazard potential and maintenance responsibility by the developer or his/her successors and assigns.

**S-2.5b** – Require property owners to create defensible space surrounding their homes, including providing access for firefighters, maintaining plantings and outdoor areas, and minimizing combustible structures.

**S-2.5c** – Require the use of fire-safe planting, especially in landscaped areas located within the VHFHSZ.

**S-2.5d** – Conduct a feasibility study to develop permit expediting options such as permit fee reductions for the voluntary inclusion of fire safety mitigation actions incorporated into development projects.

**S-2.6a** – Create and implement a Defensible Space Ordinance and Fire Protection Plan guidelines within one year of Safety Element Adoption.

**S-2.7a** – Coordinate with water districts to identify issues that may affect water supply and delivery.



**S-2.7b** – Require new developments to expand water infrastructure capacity in areas where current improvements do not meet Fire Code requirements.

**S-2.7c** – Map water pressure and capacity characteristics of the water infrastructure throughout the City to identify potential areas requiring upgrade and enhancement to meet future daily, peak, and fire flow requirements.

## C. SEISMIC AND GEOLOGIC HAZARDS

**S-3.1a** – Require onsite borings or subsurface investigations for (applicable) proposed developments in areas of the City where geologic hazards may be a concern.

**S-3.1b** – Continue to require that all geotechnical investigations within the City be prepared by a Geotechnical Engineer or Certified Engineering Geologist and be peer-reviewed by the City's on-call geotechnical consultant.

**S-3.1c** – As above, require that applicable grading activities be monitored by qualified geotechnical personnel.

**S-3.1d** – Continue to file, reference, and index geotechnical mapping and data within the City's Geographic Information System.

**S-3.2a** – Develop guidance for bluff and hillside protection that should include but not be limited to effective vegetation management, access control, site planning for new development and major remodels, direct water to areas with adequate storm drainage infrastructures, and compliance with blufftop setbacks, consistent with Resolution 89.104.

**S-3.4a** – Conduct periodic inspections on drainage facilities to ensure adequate operations and maintenance.

**S-3.4b** – Annually notice owners of private drainage infrastructure about maintenance and operation needs.

**S-3.4c** – Within 18 months of Safety Element adoption:

1. Identify all private terrace drain infrastructure in landslide prone areas and determine specific responsibility for maintenance;
2. Determine the City's inspection and enforcement options and develop an inspection/enforcement plan;
3. Identify potential funding sources available for public and private drainage infrastructure improvements (e.g., Geologic Hazard Abatement Districts); and
4. As soon as possible, implement the inspection/enforcement plan, initially focused on at-risk areas with a documented history of significant landslide activity.

**S-3.5a** – Encourage the use of drought-resistant vegetation throughout the City through public education efforts.

**S-3.5b** – Map areas of the City with steep hillsides to identify areas of potential slope instability that may require stabilization using vegetation or engineered solutions.

**S-3.8a** – Relocate critical facilities when it is cost-effective to do so compared to mitigating hazard conditions.

**S-3.8b** – Conduct a feasibility study identifying funding mechanisms to pay for mitigation enhancements to existing critical facilities identified within geologic hazard areas.

**S-3.8c** – Conduct a structural evaluation of existing critical facilities to determine needed improvements.

**S-3.10a** – Identify funding opportunities to assist homeowners with seismic retrofit improvements.

## D. FLOOD HAZARDS

**S-4.1a** – Use natural watercourses as primary flood control channels whenever feasible and safe to do so.



**S-4.1b** – Minimize the threat of mudflows through the use of effective erosion control methods.

**S-4.2a** – Onsite drainage improvements shall be consistent with the requirements of the Laguna Beach Municipal Code.

**S-4.2b** – Encourage properties that generate excessive storm flows to implement mitigation activities to reduce offsite flows through the use of detention, retention, and/or recharge strategies.

**S-4.3a** – Identify existing storm drains that require modification/retrofit to meet 100-year flood protection standards.

**S-4.3b** – Expand flood control capacity to accommodate impacts projected by sea-level rise.

**S-4.5a** – Promote flood protection measures like stream restoration, private property improvements, floodproofing, retention/detention basins, and other strategies that reduce flood impact.

**S-4.5b** – Adhere to flood management requirements within the Laguna Beach Municipal Code.

**S-4.5c** – Continue the City's annual inspection program for public and private drainage facilities in the Canyon.

**S-4.6a** – Update the City's Storm Drain Master Plan.

**S-4.6b** – Integrate projects from the Storm Drain Master Plan into the City's Local Hazard Mitigation Plan and Capital Improvements Program.

**S-4.6c** – Track and monitor development activity, and its impact on the City's watersheds.

**S-4.6d** – Conduct proactive maintenance and monitoring activities leading up to storm events and the start of the rainy season.

## E. CLIMATE ADAPTATION

**S-5.1a** – Annually monitor king tide inundation and average high tide measurements to track inundation patterns.

**S-5.1b** – If inundation from king tide and high tide conditions begin to migrate further inland, identify thresholds for requiring new sea-level rise analyses and potential mitigation actions.

## F. SHORELINE PROTECTION

**S-6.1a** – Shoreline construction shall meet the *Guidelines for Shoreline Protection* criteria, including the effects of beach encroachment, wave reflection, reduction in sea cliff sand contribution, and aesthetic criteria.

**S-6.1b** – Periodically update and monitor the City's Guidelines for Shoreline Protection to include the latest guidance and best practices from the California Coastal Commission.

**S-6.2a** – Allow for shoreline protective devices under an emergency basis if an existing principal structure(s) is in imminent danger from erosion and is designed to mitigate adverse impacts on local shoreline sand supply.

**S-6.2b** – Explore beach sand replenishment opportunities as an alternative to the construction of hard shoreline protection devices.

**S-6.2c** – Consider the impacts of flood control improvements on beach sand replenishment.

**S-6.2d** – Repair of damaged shoreline protection devices must be consistent with prevailing zoning regulations and general plan policies.



**S-6.2e** – Continue to require Coastal Development Permits consistent with the City's Local Coastal Program.

## G. HAZARDOUS MATERIALS AND WASTES

**S-7.1a** – Continue the City's Household Hazardous Waste (HHW) program that includes the use of County drop-off locations and door-to-door collections.

**S-7.1b** – Continue to promote the City's HHW programs that include residential door-to-door collections, Small Business Program collections, and the use of County of Orange HHW Collection Centers for proper disposal of hazardous materials.

**S-7.1c** – Conduct a feasibility study to see if a local disposal location is appropriate and if a fee should be established to construct a permanent location.

**S-7.6a** – Separate sewer and storm drain infrastructure through construction upgrades and operation and maintenance activities that eliminate cross-contamination of the two systems.