

**Sonoma County  
Local Coastal Plan**

**PUBLIC SAFETY ELEMENT  
PRELIMINARY DRAFT**

**JUNE 2015**

**Sonoma County Permit and Resource Management Department  
2550 Ventura Avenue  
Santa Rosa, CA 95403**

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# PUBLIC SAFETY ELEMENT

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## 1. INTRODUCTION

### Purpose

The Sonoma County Coast is home to over 3,200 residents and, due to its outstanding natural beauty and recreational opportunities, hosts millions of visitors every year. However, many areas of the Coastal Zone are exposed to hazards related to earthquakes, geologic instability, flooding, sea level rise, tsunamis, coastal bluff erosion, wildland fire, and hazardous materials. The Public Safety Element establishes goals, objectives, and policies to protect the coastal residents and visitors from unreasonable risks from these hazards.

The 1976 California Coastal Act directs that new development minimize risks to life and property from environmental hazards and to avoid substantial alteration of natural land forms. Below is Section 30253, the applicable section of the Coastal Act. Coastal Act Sections 30610 and 30611, applicable to shoreline protection structures, are listed in Section 2.2 (Geologic Hazards, Regulatory Setting); and Section 30623 applicable to flood control projects is listed in Section 3.2 (Flood and Inundation Hazards, Regulatory Setting) of this Public Safety Element.

***30253. Minimization of adverse impacts.***

*New development shall do all of the following:*

- (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
- (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluff and cliffs.*
- (3) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Control Board as to each particular development.*
- (4) Minimize energy consumption and vehicle miles traveled.*
- (5) Where appropriate, protect special communities and neighborhoods that, because of their unique characteristics, are popular visitor destination points for recreational uses.*

The Public Safety Element establishes goals, objectives, and policies to minimize potential human injury and property damage by guiding future development to reduce the exposure of persons and property to the above hazards. The policies in this Element are intended to avoid development which would result in unacceptable risks to the residents, visitors, private property, and public facilities and infrastructure in the Coastal Zone; and to minimize risks for existing development already located in hazard areas. Acceptable levels of risk are based on the nature of each hazard, the frequency of exposure, the number of persons exposed, and the potential damage.

The policies in the Public Safety Element are intended to avoid development which would adversely affect existing and future residents, visitors, and property; and to not place an undue financial burden on property owners and the taxpayer by allowing development in hazard areas

which may have unusually high costs for public services and disaster relief. The Public Safety Element is based on the best available science and information and official data sources to delineate areas potentially at risk from various hazards. It includes maps of known high hazard areas to not only guide development but also to increase awareness of inhabitants and aid in disclosure of potential hazards in real estate transactions.

The Public Safety Element is only one part of a comprehensive approach to address hazards that also includes emergency response plans, pre-disaster preparation and training, pre-disaster mitigation, design and construction standards, and education.

## **Relationship to Other Elements**

The natural hazards addressed in the Public Safety Element and the sensitivity of various land uses have been considered in preparing the Land Use Element. The Land Use Element limits the range of land uses allowed in high hazard areas in order to reduce the number of people and buildings exposed to risk. The Public Safety Element policies are also coordinated with the policies of the Open Space and Resource Conservation, Public Facilities and Services, Circulation and Transit, and Housing Elements.

## **Relationship to Other Plans and Regulations**

The Local Coastal Plan and the Coastal Zoning Ordinance that implements it are not the only means by which the risks to public safety and property from natural hazards would be minimized in the Coastal Zone. They are intended to be complementary to a number of existing federal, state, and local laws, regulations, and plans that impose siting and design or other regulatory requirements to minimize risks from natural hazards to public safety and property and increase community resilience to these hazards. Implicit in the Public Safety Element is the assumption that the County will continue to comply with these laws, regulations, and plans.

## **Sonoma County Hazard Mitigation Plan**

The Federal Disaster Mitigation Act of 2000 requires local governments to adopt and implement a local hazard mitigation plan in order to be eligible for various types of pre-disaster and post-disaster community aid and grant programs from the Federal Emergency Management Agency (FEMA). Unlike an emergency response plan, a hazard mitigation plan focuses on identifying mitigation actions that can be taken before natural disasters occur to reduce the level of property damage, personal injury, and community disruption that might otherwise result. It is based on the premise that many of the losses that could result from hazards could be avoided, prevented, or minimized through better planning, construction, design, and education beforehand.

In October 2011 the County adopted the Sonoma County Hazard Mitigation Plan (SCHMP) to help reduce the level of injury and/or property damage resulting from earthquakes, landslides, flood, and wildfire hazards. The SCHMP includes hazard maps and identifies community policies, actions, and tools for implementation to reduce the public's exposure to these hazards, minimize property damage and community disruption, and reduce or avoid the costs of disaster

relief. The hazard mapping, analysis, and recommended measures are incorporated into this Public Safety Element where applicable.

## **California Environmental Quality Act**

Under the California Environmental Quality Act (CEQA), prior to any action on a discretionary project subject to CEQA, the lead agency must prepare an analysis of the impacts of the proposed project that includes an assessment of whether it would expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure; landslide; flooding in the 100-year floodplain; inundation by a seiche, tsunami, or mudflow; or hazardous materials. The assessment must identify potential mitigation measures and project revisions or alternatives which may be considered to reduce the risks from such hazards to a level of less than significant.

## **Other Laws and Regulations**

A number of other state and federal legislative acts complement the Local Coastal Plan's public safety intent by establishing specific siting constraints, study requirements, and building standards for specific types of development such as fire and law enforcement stations, dams, schools, hospitals, power plants, pipeline and transmission lines, and water supply and water treatment facilities. In addition, a number of state and federal regulations have been adopted to minimize risks to public safety and property associated with geologic and seismic hazards, flooding and wildland fires, and hazardous materials exposure relative to new construction. For example, new construction in the Coastal Zone must comply with and meet the applicable standards of the California and Sonoma County Building Codes to increase resistance to or reduce risks from seismic events, geologic hazards, flooding, fires, and hazardous materials. The County will continue to apply and enforce all applicable design and siting requirements established by state and County Codes to increase the safety and disaster resistance of new or existing buildings whether private or public through the permit review process.

## **Scope and Organization**

Goals, objectives, and policies applicable to risks from all type of hazards in general are in Section 2, followed by sections on the specific hazard types – Geologic Hazards (Section 3), Flood and Inundation Hazards (Section 4), Sea Level Rise Hazards (Section 5), Wildland Fire Hazards (Section 6), and Hazardous Materials (Section 7). Each of these sections summarizes the extent of the hazard and the risk to public safety and property; and includes goals, objectives, and policies to reduce the exposure of persons and property to the hazard.

## **Determination of Acceptable Risks**

Acceptable levels of risk are based upon the nature of each hazard, the frequency of exposure, the number of persons exposed, and the potential damage. The County is not able to guarantee that any particular development will not, at some time in the future, be adversely affected by the hazards identified in this Element because such hazards, by their nature, defy precise prediction.

In those instances where there is a significant factual question about whether a particular development has had risks from natural hazards mitigated to an "acceptable" level and the property owner wishes to proceed in the face of such factual question, the County may require the owner of the property to provide indemnification to the County, insurance or other security, and a recorded notice which will protect the interests of the County and provide notice of the potential problem to future purchasers.

Although there are significant regulatory requirements and controls to regulate the location and design of new construction or development and minimize the hazard risks to acceptable levels, it may not be possible to reach the same level of hazard avoidance or risk reduction for existing development, which has already been located in hazard areas and/or has already been constructed prior to the enactment of applicable building and zoning codes designed to minimize hazard risk and vulnerability.

Even with adequate planning, regulation, and mitigation, natural hazards and disasters cannot be prevented from occurring and the risk of impacts of such events cannot be eliminated altogether. Natural hazards and disasters will continue to occur. The County is not able to guarantee that any particular development will not, at some time in the future, be adversely affected by the hazards identified in this Element because such hazards, by their nature, defy precise prediction. Although the County will take actions to guide future development, much development has already occurred in areas subject to hazards. Although the County will increase public and private readiness to respond to such events and plan accordingly to reduce the potential for harm and damage from such events, the potential for significant harm and damage arising from natural hazards and disasters remains.

There is a real prospect that developability of parcels may be lost as a result of natural hazards and disasters. There is no obligation on the part of the County to compensate property owners for their losses or to allow rebuilding and development on parcels which cannot meet current day building and zoning standards.

## 2. GENERAL HAZARDS POLICY

**Goal C-PS-1:** **Prevent unnecessary exposure of people and property to risks of injury or damage from earthquake, geologic, flood, inundation, and wildland fire hazards and hazardous materials.**

**Objective C-PS-1.1:** Comply with all applicable land use, building, and development regulations codified by federal, state, and local government to minimize risks of personal injury and property damage from hazard events.

**Objective C-PS-1.2:** Make fully-informed decisions on land use, development, and real estate regarding hazards through the use and dissemination of the best available science, information, and analysis.

**Objective C-PS-1.3:** Implement pre-disaster mitigation actions identified in the Sonoma County Hazard Mitigation Plan to help reduce the level of risk and the level of personal injury and property damage that could result from hazards.

**Objective C-PS-1.4:** Minimize public costs for development in high hazard areas with high costs for public services and disaster relief.

**Policy C-PS-1a:** Continue to apply, update, and enforce all applicable design, siting, and construction requirements and standards established by federal, state, and County government to increase the safety and natural disaster resistance of new or existing public or private buildings through the permit review process. **(New/GP2020 Revised)**

**Policy C-PS-1b:** The following activities shall be carried out to ensure that adequate and up-to-date data, information, and maps on natural hazards are available and used by building and design professionals, land developers, real estate agents, property owners, prospective buyers, hearing bodies, and the general public to guide land use, development, and real estate decisions that affect risks to public safety and property from natural hazards:

- (1) Make natural hazard maps available for review at appropriate public locations, including County websites; and update maps as necessary to reflect any changes made by various responsible agencies including the Federal Emergency Management Agency (FEMA), United States Geological Survey (USGS), California Geologic Survey and /or California State Geologist, National Oceanic and Atmospheric Administration (NOAA), and California Department of Forestry and Fire Protection (CAL FIRE). Provide locally generated hazard area data and information to these agencies where they have a bearing on hazard mapping.
- (2) Provide natural hazard maps and tools to aid compliance with hazards disclosure requirements for real estate and financing transactions. Post notices at the offices of the Sonoma County Recorder, Sonoma County Assessor, and Sonoma County Planning Agency that identify the location of these maps and tools.
- (3) Provide internet access to educational information which identifies ways for the general public to reduce the potential for personal injury and/or property damage from all types of natural hazards.
- (4) Provide information to building and design professionals, land developers, real estate agents, property owners, prospective buyers, and others regarding the development regulations, restrictions, and standards that apply or are recommended in each type of natural hazard area. **(New/GP2020 Revised)**

**Policy C-PS-1c:** Use and consider available natural hazard data, maps, analyses, and impact and vulnerability assessments from appropriate agencies; and require preparation of additional site-specific or project-specific hazards analyses when necessary to ensure full consideration of risks from natural hazards in the design and development review processes. **(New/GP2020 2020 Revised)**

**Policy C-PS-1c:** Amend the Public Safety Element as necessary to incorporate new, best available science from responsible federal and state agencies which significantly changes the natural hazard assessments or mapping contained therein. **(GP2020)**

**Policy C-PS-1d:** Increase the County's capability to respond to and recover from natural hazard events and disasters affecting the Sonoma Coast by improving the ability of public infrastructure and facilities to withstand and remain functional after hazard events by incorporating appropriate siting, design, and/or construction standards which minimize their vulnerability into proposed project plans and specifications; and/or undertaking retrofit, replacement, or relocation of existing infrastructure and facilities where necessary to avoid unreasonable risks from hazards. **(New)**

**Policy C-PS-1e:** Continue to use the *Sonoma County Hazard Mitigation Plan* as the primary planning document to assesses the Sonoma Coast's vulnerability to natural hazards; and obtain and use priority mitigation actions to reduce the level of personal injury, property damage, and community and economic disruption that might result from hazard events.

The SCHMP shall be updated every five years to maintain County eligibility for pre-disaster and post-disaster funding assistance from the Federal Emergency Management Agency (FEMA) and/or the State Office of Emergency Services (OES). The mitigation actions identified in the Sonoma County Hazard Mitigation Plan as having high priority shall be given priority for implementation based on the availability of funding. The Sonoma County Department of Emergency Services shall be the lead agency responsible for monitoring and reporting on implementation of Hazard Mitigation Plan mitigation actions. **(New)**

~~1. Anticipate the effects of, and develop a plan in response to a major earthquake generated along the San Andreas fault zone. **(Existing LCP)**~~

**Policy C-PS-1f:** Where new hazard data or information, analyses, or maps become available as a result of agency research, database updates, and/or more detailed site specific analyses which conflict with the Public Safety Element, the best available science and information shall be used and considered consistent with the Local Coastal Plan even if it departs from the hazard maps and policies adopted with the Local Coastal Plan. **(New)**

**Policy C-PS-1g:** Where there is a significant factual question about whether a particular development has had risks from natural hazards mitigated to an "acceptable" level, and the property owner wishes to proceed in the face of such factual question, require the property owner to provide indemnification to the County, insurance or other security, and a recorded notice which will protect the interests of the County and provide notice of the potential problem to future purchasers of the property. **(New/GP2020 Revised)**

**Policy C-PS-1h:** Property owners shall be responsible for conducting their own due diligence to research, determine, and understand the vulnerability of and risks to their real estate investments from natural hazard events. Property owners shall be encouraged to develop an emergency response plan and mitigation plan to address those hazards before emergency conditions occur, and to carry their own hazards insurance. **(New)**

**Policy C-PS-1i:** Where existing development is already located in a natural hazard area and is destroyed by a hazard event, there is no inherent public obligation to allow redevelopment or rebuilding which cannot meet current health and safety Codes and standards or to compensate the owner for the loss of their investment. **(New)**

**Policy C-PS-1j:** Encourage resource, open space, and/or recreational uses ~~where suitable~~ on lands which ~~are hazardous~~ contain significant risks to development and other uses of personal injury or property damage from hazards. **(Existing LCP Revised)**

### 3. GEOLOGIC HAZARDS POLICY

#### Background

Geologic hazards result from large scale seismic events as well as more localized occurrences of expansive soils, slope instability, landslides, mudslides, subsidence, and coastal bluff erosion.

#### Seismic Hazards

Earthquakes are usually caused by sudden movement along geologic faults. Sonoma County has four active or potentially active earthquake faults within its boundaries identified by the state Alquist-Priolo Earthquake Fault Maps. The known geologic faults, including the San Andreas Fault, within the 10 SubAreas of the Coastal Zone are shown on **Figures C-PS-1a-c**.

While a seismic event along any fault in the county could result in noticeable impacts along the Sonoma County Coast, a seismic event along the Northern Segment of the San Andreas Fault would be expected to have the greatest potential impact in the Coastal Zone. As shown on **Figures C-PS-1a-c**, this fault lies off the west coast of the County, crosses land at Bodega Bay, goes out to the ocean, then crosses the County again at Fort Ross where it runs northward, past The Sea Ranch community, and continues north along the coast. Analysis of seismic data indicates that 8.5 magnitude earthquakes can be expected along the San Andreas Fault, and that earthquakes of 8.0 or more along this fault can be expected every 50 to 200 years.

The adverse effects of earthquakes result from the physical effects of groundshaking, surface fault rupture, liquefaction, and earthquake-induced landslides; or secondary effects such as fires, tsunamis, seiches, dam failure, and hazardous materials releases. Each of these effects is briefly discussed below and in greater depth in the *Sonoma County Hazard Mitigation Plan*.

**Groundshaking.** Groundshaking from earthquakes affects the most people and can cause the most damage of any geologic hazard. According to the *California Hazard Mitigation Plan*, damage due to groundshaking produces over 98 percent of all building losses in a typical earthquake. During an earthquake, the ground can shake for a few seconds or over a minute. The amount (strength and duration) of groundshaking is affected by many factors. Distance from the fault is the most significant factor. However, geologic conditions and the direction, magnitude, and depth of the fault rupture are also critical. Shaking, particularly horizontal shaking, causes most earthquake damage because structures often have inadequate resistance

to this type of motion. Unconsolidated and poorly consolidated alluvium and terrace deposits will undergo greater groundshaking than consolidated bedrock formations. Landslides also may undergo greater groundshaking, increasing the risk of ground failure. **Figures C-PS-1a-c** show groundshaking hazard areas on the Sonoma County Coast based on maps produced by the California Geological Survey.

**Ground Failure.** Earthquake magnitude is a major factor in ground failure, but other conditions such as slope, ground moisture, and type and content of bedrock are also factors. Groundshaking on gentle and moderate slopes in poorly consolidated surface deposits can result in differential compaction and settlement and liquefaction. Damage from groundshaking can be increased by liquefaction and landslides. Liquefaction changes water-saturated soil to a semi-liquid state, removing support from foundations and causing buildings to sink. The most hazardous areas are valleys and tidal marshes with high water tables and sandy soils. Landslides, mudflows, and rock falls can result from groundshaking and may occur in areas of gentle slopes due to liquefaction of subsurface materials.

**Ground Displacement Along Faults.** Surface fault ruptures can result from large magnitude earthquakes. Surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Structures located within the fault rupture zone are subjected to excessive force. Most structures are not designed to withstand such large deformations and experience major damage. Pipelines crossing the fault zones can also be damaged by ground failure. During the 1906 earthquake, horizontal displacement along the San Andreas Fault averaged 15 feet in Sonoma County. Hazards from surface fault ruptures are generally avoided or minimized by limiting development in active fault zones in compliance with the Alquist-Priolo Earthquake Fault Zoning Act discussed in Section 3 (Geologic Hazards, Regulatory Setting).

**Secondary Effects of Earthquakes.** Earthquakes can result in additional property damage and/or human injury from the secondary effects of earthquakes. Some earthquakes can result in large tsunami waves along the ocean shoreline or seiches on lakes which can cause damage by their force as well as by inundation of low-lying developed areas adjacent to the shoreline. Tsunamis and seiches are discussed in greater detail in Section 4 (Flood and Inundation Hazards). In addition, damage to utilities and other public facilities can produce disastrous secondary effects. Much of the destruction from the 1906 earthquake in Sonoma County was from fires that could not be put out due to broken water lines, damaged roads, and lack of communications. In addition, seismic events could trigger slope failure which results in landslides which block or damage roads and infrastructure; and dam failure which results in downstream flooding. These secondary effects of earthquakes can be reduced by various methods, but larger facilities and population growth within the higher hazard areas increase the potential damage.

## Other Geologic Hazards

While the Sonoma County Coast does not have beach sand erosion issues like some coastal counties, it has other geologic hazards in addition to those arising from seismic events, which include expansive soils; slope instability, which can result in landslides; and coastal bluff erosion. Each of these hazards is discussed below.

**Expansive Soils.** Buildings, utilities, and roads can be damaged by soils rich in clay that swell each winter and shrink each summer depending on the rainfall. This is a less obvious geologic hazard than earthquakes or landslides, but the gradual cracking, settling, and weakening of older buildings could be significant.

**Slope Instability.** Slope instability includes landslides and other shallow soil slippage events that involve various forms of mass earth and rock movement downslope. The most common type of slope instability in Sonoma County is landslides. Landslide potential is generally greater on areas of steeper slope and can be triggered by heavy rainfall; earthquakes; road cuts; and construction activities such as grading and filling, placing culverts, and installing septic tanks. Logging, grazing, and removing vegetation may also adversely affect slope stability. Landslides and shallow soil slippage are prevalent in the Coastal Zone. **Figures C-PS-2a-c** show the areas on the Sonoma County Coast subject to slope instability.

Landslides and coastal bluff erosion play a role in threatening development along the Sonoma County coastline. Development of homes, septic systems, landscape irrigation, and drainage as well as heavy rainfall and tidal action impacts the rate of coastal erosion. Intensive grazing, tilling of slopes, and road construction have resulted in extensive erosion on the Sonoma County Coast through shallow slippage, gulying, sheet wash, and wind action. This erosion, combined with extensive landsliding, has contributed greatly to historic sedimentation of Bodega Harbor, the Estero Americano, and other water bodies. State Highway 1 on the North Coast has had major landslides and erosion to the extent that the road is frequently closed for repair.

**Coastal Bluff Erosion.** As a result of plate tectonics, more than 95 percent of the Sonoma County coastline is elevated above sea level and characterized by dramatic coastal bluffs. The bluffs are subject to erosion from winter storms, wave action, wind, and stormwater runoff and can become unstable. A unique characteristic of coastal bluffs is that they are also subject to erosion at the base of the slope, which can undermine the bluff by removing the footing for the upslope area and/or creating sea caves, which may ultimately cause bluff collapse. Bluff erosion or retreat is typically measured in inches or feet per year. However, bluff retreat may occur suddenly and catastrophically through slope failure due to heavy rain, high wave action, high tides, or a combination.

The ability of coastal bluffs to withstand the continuous erosive forces over time depends on the relative resistance of the shoreline rocks. The factors which determine rock resistance are the type of rock, extent of shearing and fracturing, and inclination of the rock layers. Coastal bluffs which are comprised of native materials from the Franciscan and/or Merced Geologic Formations are the most affected by erosion. The Sonoma County coastline west of the San Andreas Fault is characterized by points and coves which reflect the relative resistance of the rocks.

According to the National Academy of Sciences (2012), most of the damage along the California coast is caused by storms, particularly by the confluence of large waves, storm surges, and high astronomical tides during a strong El Niño event; and a rising sea level would magnify the impacts of high waves and storm surges on the coastline. Storms and sea level rise are causing California coastal bluffs, beaches, and dunes to retreat at rates from a few centimeters to several meters per year. Coastal bluff erosion could increase abruptly from an episodic event

such as a tsunami or an unusually severe winter storm. The National Academy of Sciences (2012) projects that California coastal bluffs could retreat more than 30 m (about 100 feet) by 2100.

Coastal bluff erosion is threatening existing development in some areas west of State Highway 1, such as Gleason Beach, where dwellings and septic systems were built on or near the edge of coastal bluffs and on steep slopes which are eroding. Landslides, in conjunction with wave action, failure of shoreline protection structures, and changes in drainage have resulted in severe erosion, bluff failure, and loss of blufftop area that threaten the development on many Gleason Beach lots. Some houses had to be demolished and removed because they posed a public safety risk, several houses have been damaged to the extent that they are no longer habitable, and other houses are threatened. Caltrans investigations in 1998 and 2003 determined that coastal erosion at this location was advancing approximately 1 foot per year and is threatening the stability and safety of State Highway 1. As of July 2013, Caltrans was in the preliminary design and environmental investigations phase of a proposed project to relocate State Highway 1 further inland at Gleason Beach.

In addition to the risk to existing development, public safety during access to and from the beach would also be at risk from coastal bluff erosion. If official or prescriptive paths or trails to the beach are eroded, people may decide to use unofficial or non-prescriptive routes over unstable bluffs to reach the beach and then return.

**Shoreline Protection Structures.** Seawalls and other shoreline protection structures are hardened structures installed in some locations to provide a physical barrier which armors and stabilizes the shoreline landward of the structure from the erosive forces of wave action. Potential drawbacks of shoreline protection structures are they: 1) are frequently used unnecessarily in low energy environments; 2) often exacerbate erosion seaward of the hardened structure; 3) lead to loss of beach and intertidal habitat and other significant impacts on biological resources; 4) interfere with and alter shoreline and water dynamics; 5) have a significant impact on cultural resources and interfere with visual enjoyment of and access to the shoreline; and 6) may have a short life-span before they fail.

Despite the significant cost of shoreline protection structures, there are instances where the performance of such structures has been inadequate and the erosion and damage they were installed to prevent or reduce still occurs. Based on these instances, shoreline protection structures designed to protect a single residential property are considered unlikely to have long-term success because the erosive forces of wave action are substantial, the financial resources of private property owners to fund engineering and construction of shoreline protection structures is generally limited, and wave action and erosion occurring on adjacent lots can cause erosion and undermining of these structures. Remnants of failed shoreline protection structures and collapsed private buildings degrade the natural beauty of the Sonoma County coastline. Clean-up of these structures on the beach can pose a problem if owners do not have the financial resources to fund full clean-up or equipment access to the beach is limited.

Section 30235 of the California Coastal Act allows seawalls and other shoreline protection structures only to protect existing development or public beaches or to serve coastal-dependent uses, and only in certain situations. Section 30610 allows reconstruction of a shoreline

protection structure destroyed by a disaster without a coastal permit under certain conditions, including where the replacement structure is no more than 10 percent larger than the destroyed structure. Section 30611 allows, in the case of a disaster or other emergency, work to protect life and public property not including permanent erection of structures, valued at more than \$25,000 without a permit.

***30235. Construction altering natural shoreline.***

*Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fishkills should be phased out or upgraded where feasible.*

***30610 (In part) Developments authorized without permit.***

*Notwithstanding any other provision of this division, no coastal development permit shall be required pursuant to this chapter for the following types of development and in the following areas:*

*(g) (1) The replacement of any structure, other than a public works facility, destroyed by a disaster. The replacement structure shall conform to applicable existing zoning requirements, shall be for the same use as the destroyed structure, shall not exceed either the floor area, height, or bulk of the destroyed structure by more than 10 percent, and shall be sited in the same location on the affected property as the destroyed structure.*

*(2) As used in this subdivision:*

*(A) "Disaster" means any situation in which the force or forces which destroyed the structure to be replaced were beyond the control of its owner.*

*(B) "Bulk" means total interior cubic volume as measured from the exterior surface of the structure.*

*(C) "Structure" includes landscaping and any erosion control structure or device which is similar to that which existed prior to the occurrence of the disaster.*

***30611. Emergencies; waiver of permit.***

*When immediate action by a person or public agency performing a public service is required to protect life and public property from imminent danger, or to restore, repair, or maintain public works, utilities, or services destroyed, damaged, or interrupted by natural disaster, serious accident, or in other cases of emergency, the requirements of obtaining any permit under this division may be waived upon notification of the executive director of the commission of the type and location of the work within three days of the disaster or discovery of the danger, whichever occurs first. Nothing in this section authorizes permanent erection of structures valued at more than twenty-five thousand dollars (\$25,000).*

Avoidance is the preferred method for minimizing the risk to and vulnerability of development from coastal bluff erosion. In cases where existing development is threatened, the first priority should be to evaluate the feasibility of relocating the development. The second priority should be to consider less environmentally damaging alternatives than shoreline protection structures.

Only when all other options are deemed infeasible should shoreline protection structures be considered.

New development along the coast should be set back from the coastal bluff face such that it will not be threatened by coastal bluff erosion or retreat over the life of the structure or infrastructure improvements. By appropriately siting new development, the need for a seawall, revetment, or other shoreline protection structure or alteration to the coastal bluff may be avoided. The setback of new development will generally require site-specific analysis on a case by case basis. Setback of development from the bluff edge should be calculated considering the site specific geologic conditions; projected rates of beach erosion, coastal bluff erosion/retreat, and sea level rise; the effects of large waves and storm surges; and the expected lifespan of the structure and infrastructure improvements.

The assumed life expectancy of a house or similar building ranges from 50-100 years, the most common being 75 years. However, for the purpose of calculating the setback of new development from the edge of a coastal bluff, the assumed life expectancy of structures and infrastructure is 100 years. Although the economic life of some houses may be less than 100-years, public policy should err on the side of public safety and assume and plan for a longer economic life of 100 years. Such an approach is considered prudent given that some houses are in use for that period of time, and sea level rise is expected to accelerate the rate of coastal bluff erosion, necessitating a larger setback.

If a bluff is determined to be stable, the setback from the top of the bluff should be calculated by the bluff retreat times the life expectancy of the house or building to be protected. However, a minimum setback from the top of the bluff would be appropriate in all cases. If the bluff is determined to be unstable, a buffer should be added as a safety factor to the setback from the top of the bluff. The buffer should be calculated through a quantitative slope stability analysis that incorporates historic data. However, due to the unpredictability of episodic erosion, a minimum buffer from the setback from the top of the bluff would be appropriate in all cases.

## Regulatory Setting

### Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface fault rupture by preventing the construction of buildings used for human occupancy on the surface trace of active faults. It does not address hazards associated with earthquakes such as groundshaking, landslides, or liquefaction.

State law requires counties to designate Alquist-Priolo Earthquake Fault Zones where movement of the earth's surface has taken place during the last 11,000 years; and to require a geologic report for projects proposed within these Fault Zones. The State Geologist has identified active faults and mapped Earthquake Fault Zones around the surface traces of the faults. The maps are provided to local agencies which must regulate development projects within the Fault Zones. In Sonoma County Earthquake Fault Zones have been designated along four faults, including the San Andreas Fault. **Figures C-PS-1a-c** show the Earthquake Fault Zones on the Sonoma County Coast.

## **Seismic Hazards Mapping Act**

The 1991 Seismic Hazards Mapping Act seeks to protect the public from the hazards caused by earthquakes. The Act requires the State Geologist to delineate and designate areas subject to strong groundshaking, landslides, and liquefaction as “Seismic Hazard Zones;” and for the California Geological Survey to prepare maps of these Hazard Zones. Counties must regulate certain types of development projects and withhold the development permits for sites within Seismic Hazard Zones until the geologic and soil conditions of the project site are investigated and appropriate mitigation measures, if any, are incorporated into the project plans. Counties must also take these Seismic Hazard Zones into account when adopting and revising land use planning and permitting ordinances and reviewing building permits. California Civil Code Sections 1103-1103.14 require disclosure through a Natural Hazard Disclosure Statement in real estate transactions if the property is located in an Earthquake Fault Zone or Seismic Hazard Zone.

## **Other Regulations**

The 1973 Alfred E. Alquist Hospital Seismic Safety Act requires all hospitals built after 1973 to be built to higher seismic standards so they can be reoccupied and remain functional after major earthquakes.

The 1979 Beverly Act authorizes creation of a Geologic Hazard Abatement District (GHAD) as a means to reduce geotechnical problems associated with development in geologically active areas such as erosion and failure of coastal bluffs. A GHAD is an independent public entity (public agency) formed as a Board of Directors which oversees the prevention, mitigation, and abatement of geologic hazards. Funding of a GHAD is through supplemental property tax assessments. A GHAD increases the recognition of long-term weathering and erosion issues and the inability to eliminate all geotechnical risk, reduces the need for large-scale visually offensive remedial grading, is an alternative to costly and time-consuming litigation, and works in the absence of availability of insurance coverage for earth movement. A GHAD was proposed for shoreline protection and bluff stabilization for the Gleason Beach community in 2003, but was not adopted.

The 1986 Essential Services Building Seismic Safety Act requires that essential services buildings be designed and constructed to be capable of providing essential services to the public after a disaster.

The 1933 Field Act and Other School Seismic Safety Legislation require thorough reviews of plans, strict inspections, and quality control standards for school construction.

The 1968 Geologist and Geophysicist Act requires geologic or seismic assessments to be carried out by qualified geologists and geophysicists.

The 1986 Unreinforced Masonry Building Act requires local jurisdictions to address the life safety risks posed by Unreinforced Masonry (URM) buildings that were constructed before the adoption of seismic-resistant building codes.

**Goal C-PS-2:** **Prevent unnecessary exposure of people and property to risks of injury or damage from earthquakes, landslides, coastal erosion, and other geologic hazards.**

**Objective C-PS-2.1:** Regulate new development to reduce the risks of human injury and property damage from existing and anticipated geologic hazards, including coastal bluff erosion, to acceptable levels.

**Objective C-PS-2.2:** Minimize the risks for existing development of human injury and property damage from existing and anticipated geologic hazards.

**Objective C-PS-2.3:** Minimize the need to construct seawalls or other shoreline protection structures to reduce impacts to natural shoreline processes, cultural and biological resources, views, and coastal access.

**The following policies, in addition to those in this Public Safety Element and the Open Space and Resource Conservation, Water Resources, and Land Use Elements shall be used to achieve these objectives:**

### *Seismic Hazards*

**Policy C-PS-2a:** Adopt, upon approval by the International Code Council (ICC) and the State of California, revisions to the California Building Code which increase resistance of structures to groundshaking and other geologic hazards; and update building ordinances to reflect these revisions. **(GP2020)**

~~4. Design and construct all structures for human occupancy, including mobile homes, in accordance with Zone 4 standards of the Uniform Building Code. **(Existing LCP)**~~

~~5. Enforce the geologic provisions of Chapter 70 of the Uniform Building Code. **(Existing LCP)**~~

**Policy C-PS-2b:** Encourage strong enforcement of seismic safety requirements and regulations for design and construction of buildings and facilities subject to state and federal standards, such as bridges, dams, powerplants, hospitals, schools, and essential services buildings. **(GP2020)**

**Policy C-PS-2c:** Dynamic analysis of structural response to earthquake forces shall be required prior to County approval of building permits for structures whose irregularity or other factors prevent reasonable load determination and distribution by static analysis. **(GP2020)**

**Policy C-PS-2d:** For the purpose of mapping groundshaking hazards according to the Modified Mercalli Index (MMI), assume a magnitude 8.0 earthquake on the San Andreas Fault in the Coastal Zone. **(New)**

**Policy C-PS-2e:** Structures intended for human occupancy (or defined as a "project" in the Alquist-Priolo Special Studies Zones Act and related Administrative Code provisions) shall be

prohibited within 50 feet of the surface trace of any fault in Earthquake Fault Zones.  
**(GP2020)**

~~1. Enforce the requirements of the Alquist-Priolo Special Studies Zone Act for protection from fault rupture hazard. (Existing LCP)~~

### *Other Geologic Hazards*

**Policy C-PS-2f:** Adopt an ordinance requiring strengthening and/or reinforcement of Unreinforced Masonry Buildings, except residential structures, considering the cost of the work and the value, frequency of use, and level of occupancy of the buildings. **(GP2020)**

**Policy C-PS-2g:** Where geologic hazards threaten multiple properties in the same vicinity and all would benefit from a unified, coordinated response to minimize risks, consider the formation of a Geologic Hazard Abatement District (GHAD) as a means to reduce geotechnical problems associated with development in geologically active areas. A GHAD is an independent public entity (public agency) which oversees the prevention, mitigation, and abatement of geologic hazards. Funding of the GHAD is through supplemental property tax assessments. **(New)**

**Policy C-PS-2h:** Encourage resource uses where suitable on lands which ~~are hazardous to~~ contain significant risks to development and other uses of damage or injury from geologic hazards. **(Existing LCP Revised)**

### *Geologic Hazard Area Zoning*

**Policy C-PS-2i:** Update the Geologic Hazard Area Combining Zoning District to include regulations for the permissible types of uses, intensities, and development standards in the following hazard areas:

- (1) Alquist-Priolo Earthquake Fault Zones
- (2) Areas of Very Violent (X), Violent (IX), and Very Strong (VIII) groundshaking under the Modified Mercalli Index (MMI)
- (3) Areas of Very High and High Liquefaction Potential
- (4) Areas of Very High and High Slope Instability
- (5) Areas of Expansive Soils
- (6) Coastal Bluffs **(New)**

**Policy C-PS-2j:** A site-specific geologic hazards report prepared by a licensed Geotechnical Engineer, Engineering Geologist, or Geophysicist shall be required for development projects proposed within "Geologic Hazard Areas", and areas where a site evaluation conducted for a Coastal Permit, building permit or grading permit application has identified such a report is required. The geologic hazards report shall include the following information:

- (a) Description of the types and locations of the geologic hazards on the project site.
- (b) Analyses of the risks of human injury and property damage from geologic hazards associated with the proposed development, including but not limited to site preparation, grading, installation of septic systems, installation of drainage and road improvements, construction of foundations, and construction of buildings and structures.
- (c) Design, siting, and construction mitigation measures for the proposed development to reduce the risks of human injury and property damage from geologic hazards to an acceptable level.
- (d) Certification from the Geotechnical Engineer, Engineering Geologist, or Geophysicist that the risks of human injury and property damage from geologic hazards associated with the proposed development have been mitigated to an acceptable level.
- (e) Indemnification or insurance from the Geotechnical Engineer, Engineering Geologist, or Geophysicist or the project applicant to minimize County exposure to liability for human injury and property damage from geologic hazards on the project site. **(New)**

~~6. Require engineering geologic reports in accordance with the Permit and Resource Management Department geologic review procedure. (Existing LCP)~~

**Policy C-PS-2k:** Development projects proposed within “Geologic Hazard Areas” shall be evaluated to determine whether they meet regulations for the permissible type and intensity of uses and development standards. **(New)**

### ***Public Facilities and Infrastructure***

**Policy C-PS-2l:** Incorporate measures to mitigate to an acceptable level identified geologic hazards for all County road, public facility, and other projects. **(GP2020)**

**Policy C-PS-2m:** The following criteria shall be used in the siting and design of essential service buildings and facilities, particularly those of high public occupancy:

- (1) To the extent feasible, such buildings and facilities shall not be sited in areas subject to a Modified Mercalli Index (MMI) Groundshaking Intensity Level of Very Violent (X), Violent (IX), and Very Strong (VIII) as shown on **Figures C-PS-1a-c**.
- (2) Where such buildings and facilities must be located in the above areas, they shall be designed and constructed to the highest feasible safety standard in accordance with the Essential Services Building Seismic Safety Act, Field Act, and Alfred E. Alquist Hospital Seismic Safety Act. **(GP2020)**

**Policy C-PS-2n:** Develop a Strategic Plan for damage assessment and recovery of essential service buildings and facilities, particularly those of high public occupancy, as part of the County's emergency response planning, focused in areas subject to an MMI Groundshaking Intensity Level of Very Violent (X), Violent (IX), and Very Strong (VIII). **(GP2020)**

**Policy C-PS-2o:** The following definitions shall be used for “bluff”, “bluff edge”, “bluff top”, “embankment”, and “blufftop redevelopment”:

**Bluff:** A high bank or bold headland with a broad, precipitous, sometimes rounded cliff face overlooking a plain or body of water. A bluff may consist of a steep cliff face below and a more sloping upper bluff above.

**Bluff Edge:** The line of intersection between the steeply sloping bluff face and the flat or more gently sloping bluff top; or the upper termination of a bluff, cliff, or seacliff. In cases where the top edge of the bluff is rounded away from the face of the bluff as a result of erosion processes related to the presence of the steep bluff face, the bluff line or edge shall be defined as that point nearest the bluff beyond which the downward gradient of the surface increases more or less continuously until it reaches the general gradient of the bluff. In a case where there is a steplike feature at the top of the bluff face, the landward edge of the topmost riser shall be taken to be the bluff edge. Bluff edges typically retreat landward due to coastal erosion, landslides, development of gullies, or by grading (cut). In areas where the bluff top or bluff face has been cut or notched by grading, the bluff edge shall be the landward most position of either the current or historic bluff edge. In areas where fill has been placed near or over the historic bluff edge, the original natural bluff edge, even if buried beneath fill, shall be taken to be the bluff edge.

**Bluff Top:** The upper surface of a bluff or cliff.

**Embankment:** A man-made ridge, bank, mound, or dike of earth, gravel, or stone that carries a road or railway or confines or holds back water in a waterway.

**Blufftop Redevelopment:** Structures located between the sea and the inland extent of the sea and the first public road paralleling the sea (or lagoon) that consist of additions, exterior and/or interior renovations, or demolition of an existing blufftop home or other principal structure which result in:

- (1) Alteration of 50% or more of an existing structure, including but not limited to, alteration of 50% or more of the roof, foundation, exterior walls, interior load-bearing walls, or a combination of both types of walls, or a 50% increase floor area; or
- (2) Demolition, renovation or replacement of less than 50% of an existing structure where the proposed remodel would result in cumulative alterations exceeding 50% or more of the existing structure from the date of California Coastal Commission certification of the Sonoma County Local Coastal Plan (December 2, 1981). **(New)**

**Policy C-PS-2p:** The shoreline erosion rate, critical to the accurate calculation of the setback of new development on coastal bluff property, shall be reviewed as part of a public hearing at least every ten years; and more often if warranted by physical circumstances such as major weather events and possible changes in coastal dynamics due to, among others, climate change and projected future changes in sea level based on the most up-to-date science. If warranted, the erosion rate shall be adjusted by the County with input from a licensed Civil or Geotechnical

Engineer or Engineering Geologist based on data that accurately reflects a change in the rate of erosion of the bluff. Any change in erosion rate shall be subject to a public hearing and vote of the Board of Supervisors. **(New)**

**Policy C-PS-2q:** Applications for new development or redevelopment on coastal bluff property shall be required to include a site-specific coastal bluff erosion hazards report from a licensed Geotechnical Engineer, Engineering Geologist, or Geophysicist that establishes a geologic setback line for proposed new structures and infrastructure (e.g., roads, driveways, water lines, drainage improvements, and septic systems and leachfields). This setback line shall be no less than 100 feet and shall establish where on the bluff top stability can reasonably be assured for the economic life of the development (no less than 100 years). All new structures and infrastructure located on a bluff top shall be setback to the geologic setback line to ensure that it will not be endangered by coastal bluff erosion, retreat, and collapse; and thereby avoid the need for shoreline protection devices during the economic life of the development. The effect of any existing shoreline protective devices shall not be factored into the required stability analysis.

The coastal bluff erosion hazards report shall take the following factors into account in establishment of the geologic setback line:

- (1) Proposed extent of grading and site preparation.
- (2) Proposed plans for construction of roads, driveways, foundations, water lines, drainage improvements, and septic systems and leachfields.
- (3) Maximum coastal bluff retreat projected to occur within the economic life of the development (100 years). The projected coastal bluff retreat shall be calculated considering the specific geologic and hydrologic conditions on the site; historic coastal bluff retreat data; projections for future sea level rise according to the most up-to-date science; and existing and projections for changes in storm or El Nino event frequency, magnitude, and duration according to the most up-to-date science (i.e., frequency and duration of large waves, high storm surges, and astronomical high tides). **(New)**

~~2. Prohibit development within 100 feet of a bluff edge or within any area designated unstable to marginally stable on Hazards maps unless a registered engineering geologist reviews and approves all grading, site preparation, drainage, leachfield and foundation plans of any proposed building and determines there will be no significant impacts. The engineering geologist report shall contain, at a minimum, the information specified in the Coastal Administrative Manual.~~  
**(Existing LCP)**

**Policy C-PS-2r:** Adopt amendments to the Coastal Zoning Ordinance and Sonoma County Building Code which regulate new development and redevelopment on coastal bluffs. **(New)**

**Policy C-PS-2s:** Where existing development is threatened by coastal bluff erosion, the first priority shall be to evaluate the feasibility of relocating the development. The second priority shall be to consider the feasibility of less environmentally damaging alternatives than shoreline protection structures. Only when all other options are deemed infeasible should shoreline protection structures be considered. **(New)**

**Policy C-PS-2t:** Where, as a result of coastal erosion, it is no longer feasible based on size and environmental conditions for a parcel to meet the minimum requirements for development under the Sonoma County Code, the development potential of the parcel may be considered lost due to the forces of nature. There shall be no obligation on the part of the County to restore the development potential of such parcels through Code variances, lot line adjustments, transfer of development rights, or other means. **(New)**

**Policy C-PS-2u:** Encourage the owners of property on a coastal bluff top to incorporate only native, drought-tolerant plants (require little or no irrigation to become established and survive) to reduce the potential for erosion of the bluff top. **(New)**

### *Coastal Redevelopment*

**Policy C-PS-2v:** Coastal redevelopment shall be consistent with all applicable Local Coastal Plan policies. The following definition shall be used for “coastal redevelopment”:

**Coastal Redevelopment:** Development that is located on a bluff top or at or near the ocean and land interface and/or at very low-lying elevations along the shoreline that consists of alterations including: 1) additions to an existing structure; 2) exterior and/or interior renovations; and/or 3) demolition of an existing bluff top home or other principal structure, or portions thereof, which results in:

- (1) Alteration of 50% or more of major structural components including exterior walls, floor and roof, and foundation; or a 50% increase in floor area. Alterations are not additive between individual major structural components; however, changes to individual major structural components are cumulative over time from the date of California Coastal Commission certification of the Sonoma County Local Coastal Plan (December 2, 1981).
- (2) Demolition, renovation, or replacement of less than 50% of a major structural component where the proposed alteration would result in cumulative alterations exceeding 50% or more of a major structural component, taking into consideration previous alterations approved on or after the date of California Coastal Commission certification of the Sonoma County Local Coastal Plan (December 2, 1981); or an alteration that constitutes a less than 50% increase in floor area where the proposed alteration would result in a cumulative addition of greater than 50% of floor area, taking into consideration previous additions approved on or after the date of California Coastal Commission certification of the Sonoma County Local Coastal Plan (December 2, 1981).

### *Shoreline Protection Structures*

**Policy C-PS-2w:** The construction, reconstruction, expansion, and/or replacement of a shoreline protective device, including seawalls, revetments, breakwaters, groins, bluff retention devices, deep piers/caissons and other shoreline protection structures for coastal erosion control and hazards protection shall be allowed only if all of the following criteria of the California Coastal Commission and County of Sonoma are met:

- (1) The structure would serve or protect only an existing principle permitted use, public road, or public beach.

- (2) The siting and design of the proposed structure takes into account projected future changes in sea level based on the most up-to-date science and agency guidance.
- (3) The design of the proposed structure would not significantly alter the natural landform on which it is placed, and would not impact local sand supply.
- (4) The proposed structure would not have any of the following environmental effects:
  - (a) Impede lateral beach access.
  - (b) Reduce public access to the coastal environment.
  - (c) Significant impacts on cultural and paleontological resources.
  - (d) Significant impacts on marine habitats and resources.
- (5) A certified engineering geologist report is prepared which:
  - (a) Demonstrates that the primary structure is in imminent risk from coastal erosion.
  - (b) Contains at a minimum an alternatives analysis which includes the alternatives of: 1) no action 2) relocating or demolishing the primary structure subject to the hazards, or 3) other non-structural alternatives such as sand replenishment or managed retreat; and concludes that a non-structural alternative is not feasible and that the device is the least environmentally damaging feasible alternative.
  - (c) Provides evidence that the proposed protection structure is designed and can be constructed and maintained to withstand the specific range of coastal conditions which can be expected to occur, including sea level rise.
  - (d) Includes measures which ensure that the protection structure can and will be maintained through its design life.
- (6) A deed restriction or other legally binding document is recorded on the property which requires the following:
  - (a) Owner is to be responsible, including financially, for monitoring and maintaining the shoreline protection structure.
  - (b) Owner is to be responsible, including financially, for removing the shoreline protection structure if it fails or has an adverse effect on other properties which cannot be mitigated; the use it protects is abandoned; or the County, State Lands Commission, or Coastal Commission determines the structure should be removed.
- (7) The owner posts a cash bond with the County in an amount equal to the total cost plus inflation of removing the shoreline protection structure to guarantee that the money is available for that purpose.

- (8) The shoreline protective device shall be regularly monitored by an engineer or engineering geologist familiar and experienced with coastal structures and processes. Monitoring reports to the County and the Coastal Commission shall be required every five years from the date of coastal permit issuance until the coastal permit expiration, which shall evaluate whether or not the shoreline protective device is still required to protect the existing structure it was designed to protect. **(New)**

**Policy C-PS-2x:** A permit for a shoreline protection structure shall expire 20 years after approval of the Coastal Permit, and a new Coastal Permit must be obtained in order to retain the structure. The Coastal Permit application shall include a reassessment of the need for the structure and an analysis of the potential for removal of the structure. The Coastal Permit shall evaluate changed geologic site conditions relative to sea level rise and the age, condition, and economic life of the principal structure, including whether it was an existing structure on January 1, 1977 (prior to implementation of the Coastal Act). Every 20 years prior to expiration of the Coastal Permit, the property owner shall apply for a Coastal Permit to either remove or retain the shoreline protection structure. No permit shall be issued for retention of a shoreline protection structure unless the County finds that the structure is still required to protect principal structure in existence prior to January 1, 1997, will avoid further alteration of natural landforms, and adequate mitigation for impacts to the public beach has been provided. **(New)**

**Policy C-PS-2y:** Expansion or alteration of a legally permitted shoreline protection structure shall include a reassessment of the need for the structure and any modifications to the structure warranted to eliminate or reduce any adverse impacts it has on coastal resources or public access, including but not limited to, a condition for reassessment and reauthorization of the modified structure in 20 years. **(New)**

**Policy C-PS-2z:** Adopt amendments to the Coastal Zoning Ordinance and Sonoma County Building Code which regulate construction, repair, and removal of shoreline protection structures. **(New)**

**Policy C-PS-2aa:** A shoreline protection device shall only be authorized until such time when the existing structure that is protected by such a device: 1) is no longer present; 2) no longer requires armoring; or 3) is redeveloped pursuant to the definition in this Public Safety Element. The permittee shall submit an application for a Coastal Permit to remove the authorized shoreline protection device within six months of a determination that the shoreline protection device is no longer authorized to protect the structure it was designed to protect because the structure is no longer present or no longer requires armoring. In the case of coastal redevelopment, removal of the authorized shoreline protection device shall be required prior to construction of the redeveloped structure. **(New)**

## 4. FLOOD AND INUNDATION HAZARDS POLICY

### Background

Flooding along rivers and creeks on the Sonoma County Coast is a natural, annual phenomenon. Many smaller creeks and drainages along the Coast drain smaller areas directly into the ocean without causing the flooding problems that occur on larger watershed basins or river systems. Floods on small streams usually peak and recede quickly, while floods on larger systems like the lower Russian River may not peak for two days or more after the start of a storm and may exceed flood stage for four days or more. In larger drainage basins, streams overflow banks when runoff from the watershed exceeds the capacity of the stream channel to carry it. Therefore, most of the flood waters draining to the ocean originate from inland areas outside the Coastal Zone.

Flooding can move, destroy, or damage buildings, roads, infrastructure, and personal property, not only by inundation but also by the force of flowing waters. Flood damage may weaken building materials and increase mildew, mold, bacteria and other disease vectors. Floods can result in human injury and pose a threat to life. Floods can wash away soil, erode banks, destroy crops, and transport loose objects and flood debris downstream; and may end up degrading Sonoma County beaches or offshore marine habitats.

Although floods are primarily associated with the overflow of rivers and creeks, damage from flooding and inundation can also result from dam failure, tsunamis, seiches, ocean surges and higher waves during storms, and sea level rise. Localized flooding can also occur from blocked or undersized storm water conveyance channels and infrastructure.

### **Stream and River Flooding**

Flooding is most often associated with an overflowing stream or river. The “floodplain” is the area adjacent to the watercourse that is subject to recurring inundation from floods. Streams overflow banks when runoff from the watershed exceeds the capacity of the stream channel to carry it.

Floods are usually described in terms of their statistical frequency which varies by location. However, the more frequent and universal way of describing flood magnitudes is by their projected recurrence level. The bigger the flood, the more years that would typically be expected to pass statistically before it reoccurs.

When discussing the magnitude of floods, they can be described in terms of cubic feet per second (cfs), their height above a defined datum, and/or by the areal extent which they cover. However, the more frequent and universal way of describing flood magnitudes is by their projected recurrence level - the bigger the flood, the more years that would typically be expected to pass statistically before it reoccurs. For instance, a flood level that would occur on the average once every two years is referred to as the 2-year flood, and it would statistically have a 50% chance of occurring in any given year. A 10-year flood has a 10 percent chance, a 50-year flood has a 2 percent chance, a 100-year flood has a 1 percent chance, and a 500-year flood has a 0.2 percent chance of occurring in any given year. Although the recurrence level is based on statistical averages, the actual occurrence of flood events varies and could occur at shorter intervals or even within the same year.

Storms are described in the same way - as the storm event of such a magnitude (amount of rainfall during a specified length of time) that it has a certain percent chance of occurring in any given year. For instance, the 100-year flood is the storm event of such a magnitude that it has

a 1 percent chance of occurring in any given year. Similarly, the 10-year storm is the storm event of such a magnitude that it has a 10 percent probability of occurring in any given year.

Floodplains or flood zones are described with reference to the associated flood – as the areal extent of land that would be covered by the flood event of such a magnitude that it has a certain percent chance of occurring in any given year. For instance, the 100-year floodplain is the area that would be covered by the 100-year flood. Similarly, the 10-year floodplain is the area that would be covered by the 10-year flood.

The Federal Emergency Management Agency (FEMA) and Federal Insurance Administration have assessed flood hazards for most major streams in Sonoma County. These assessments are periodically updated to reflect new data from flood studies and actual flood events. The FEMA maps show the 100-year floodplain and are commonly used as the primary source of flooding information for planning and development review and floodplain management. Where the subject river or stream has been studied by detailed hydrologic and hydraulic methods, FEMA may also designate a “floodway” within the 100-year floodplain. According to FEMA, the floodway is “where the water is likely to be deepest and fastest - the area of the floodplain that should be reserved (kept free of obstructions and development) to allow floodwaters to move downstream.” The floodway is generally considered to be the area where the flood risk is highest and the vulnerability of development would be greatest.

Currently the Russian River is the only river on the Sonoma County Coast for which the 100-year flood plain has been mapped by FEMA, shown on **Figures C-PS-3f-ii to C-PS-3j-ii**. Portions of the older unincorporated communities of Duncans Mills and Jenner lie within the 100-year flood zone of the Russian River in the Coastal Zone.

Within the area covered by the 100-year floodplain of the Russian River, the risk of human injury and property damage from flooding increases with the topographic depth, frequency of flooding, and force of the flood current. Properties within the floodway (approximate 10-year floodplain) would be subject to a greater depth and frequency of flooding and greater magnitude of cross currents than properties within the 25-year or 50-year floodplains. Development is prohibited within the river’s floodway because the risk of human injury and property damage in this area is unacceptable.

The greatest threat to public safety and property exists where development is located in areas subject to recurring flooding. The Russian River has the highest frequency of flooding and greatest flood hazards in the Coastal Zone due to the size of its drainage basin and the amount of historic development in the floodplain. The Coastal Zone contains only about 237 of the 1,485 square miles (16 percent) of the Russian River Watershed. Therefore, most of the flood waters from the Russian River draining to the ocean originate from inland areas outside the Coastal Zone.

## **Dam Failure Inundation Zones**

Flooding can also result from dam failure. The area potential inundated by the failure of a specific dam is designated as the “Dam Failure Inundation Zone” for that dam. The current mapping of dam failure inundation zones in the Coastal Zone shows that the areas which could be inundated by dam failure are already included in the 100-year flood zone.

## Coastal Flooding and Storm Surge

Areas designated as the “VE” Zone on FEMA’s Flood Insurance Rate Map (FIRM) are considered to be in a “Coastal High Hazard Area” subject to high velocity waters from coastal flooding, tidal inundation, and tsunamis. However, FEMA has not designated all potential Coastal High Hazard Areas, and is in the process of updating its mapping of these areas.

## Tsunamis

A tsunami is a series of traveling ocean waves, generated by a distant or near-shore undersea earthquake or landslide, that decrease in speed and increase in height as they enter shallow coastal waters. If these waves are much larger than usual, they can become a threat to human life and property by the force of the wave as well as by inundation. Following arrival of the first wave, subsequent waves may increase in height and arrive minutes to hours later. Factors influencing the size and speed of a tsunami include the source and magnitude of the triggering event, water depth, offshore topography, onshore topography, and coastline shape.

The National Oceanic and Atmospheric Administration (NOAA) heads the National Tsunami Mitigation Program, a federal and multi-state initiative to address tsunami hazards in the United States. One facet of the Program is to develop tsunami inundation and evacuation maps for at-risk communities. As part of the Mitigation Program, NOAA, the California Emergency Management Agency (CalEMA), California Geological Survey (CGS), and University of Southern California have conducted systematic analyses of all historic and possible tsunami hazards along the coast of California for the purpose of mapping tsunami run-up zones from nearshore events for at-risk communities. Based on a comparison of historic tsunami events along the west coast of California and consideration of bathymetry (underwater topography), fault locations, size of seismic events, and tidal fluctuations, a maximum tsunami wave height of 21 feet along the Sonoma County Coast as measured from mean high water could be created by a large seismic event. The projected maximum tsunami wave of 21 feet is based on a number of extreme, yet realistic tsunami scenarios. However, given the limits of available data, and the possibility that future events may differ from historic events, it is possible that the actual inundation from a tsunami could be greater than currently projected.

For the purposes of this Local Coastal Plan and the *Sonoma County Operational Area Tsunami Response Plan and Evacuation Plan* (part of the *Sonoma County Hazard Mitigation Plan*), a conservative approach was assumed and a maximum tsunami wave height of 25 feet (7.6 meters) along the Sonoma County Coast and 5 feet (1.5 meters) in San Pablo Bay were used to identify potential tsunami inundation areas.

Tsunami inundation maps for the Sonoma County Coast and San Pablo Bay were released in 2009. The tsunami inundation zone on the Sonoma County Coast is shown on **Figures C-PS-3a-k**; it includes areas up to 100 feet (30.48 meters) above mean sea level. Not all tsunamis will inundate all areas in the potential inundation zone. Some tsunamis may be only a few inches or a few feet and affect only a portion of the potential tsunami inundation zone.

Since most of the County coastline is elevated, many areas along the Coast are considered safely out of reach of a potential tsunami wave. However, the low-lying coastal communities

along the southern Sonoma County Coast extending from Jenner to Bodega Bay have significant exposure and risk of human injury and property damage because they contain low-lying public beaches, parks, and infrastructure; and residential and commercial development. Although there are no known recorded deaths from a tsunami in Sonoma County, there were small impacts from tsunamis in 1946 and 1960.

Tsunamis occur less frequently than river flooding. When a large seismic event occurs that could trigger a tsunami affecting the California coast, the Pacific Tsunami Warning Center and the West Coast and Alaska Tsunami Warning Centers issue tsunami warnings and watches to potentially affected communities. The warnings include information on the estimated time of arrival of the expected waves. This effective system of warnings allows local governments to issue further warnings to individuals residing in or visiting potential impact areas. However, the greatest risk is from a tsunami generated by a near-shore seismic event or underwater landslide that may occur without sufficient time to issue warnings or evacuation orders. In those cases, local officials must rely on public awareness and education efforts to ensure the population reacts appropriately. Therefore, it is important to limit development in the tsunami inundation zone and to increase public awareness of the risks of tsunamis and the appropriate preparations and responses.

At the time this Local Coastal Plan was in preparation, FEMA had initiated the California Coastal Analysis and Mapping Project and the Open Pacific Coast Study to provide better topographical mapping and delineation of the areas potentially impacted from coastal flooding, tsunamis, storm surges, and sea level rise. This project is expected to result in improved mapping of flood hazard areas over the next several years. As this information becomes available it should be incorporated into the Sonoma County Local Coastal Plan and *Hazard Mitigation Plan*.

Under the California Coastal Analysis and Mapping Project (CCAMP), FEMA is initiating flood studies/mapping projects in coastal areas as a result of Congressional appropriations for flood hazards mapping. These efforts will address gaps in required engineering and mapping for high flood risk areas impacted by coastal flooding. The Open Pacific Coast (OPC) Study is a component of CCAMP that involves detailed coastal engineering analysis and mapping of the Pacific coast of California. Results from the OPC Study will be used to remap the coastal flood risk and wave hazards for fifteen California counties, including Sonoma County.

## **Flood Prevention and Control**

Constructing man-made dams, levees, dikes, and other structures to detain or confine flood flows is one way to reduce flood and inundation hazards. Flood levels in the Russian River basin have been reduced by Coyote and Warm Springs Dams constructed by the U.S. Army Corps of Engineers. However, dams and structural improvements are costly, take a long time to complete, increase sediment buildup, have impacts on the stream channel environment, and may give a false sense of security to residents of the flood plain or inundation zone.

## **Floodplain Management**

The preferred and primary method of reducing the risk of hazards and impacts from flooding is through floodplain management. Floodplain (100-year) management avoids, reduces, or minimizes the exposure to flood hazards and the risk of human injury or property damage from

flooding through several means. In addition to mapping flood hazards and special zoning of properties in flood hazard zones, floodplain management may include restrictions on the type and location of land uses and development in the floodplain - land uses which can sustain periodic flooding and decrease flood hazards downstream would be encouraged. It may also include establishing development and construction standards that minimize vulnerability to flood hazards, such as requiring the first floor of structures to be one foot above the base flood elevation; and requiring construction standards to make structures less vulnerable to flood and inundation damage. Floodplain management may also include increased retention of stormwater runoff in the watershed, acquisition of property in flood hazard zones, public education and outreach, and other methods which reduce the need for costly construction projects and disaster relief.

Floodplain management is required by federal and state law. Various incentives such as flood insurance, loans, and State funding of flood control projects are offered if flood management practices are followed. In Sonoma County, floodplain management has reduced flood damage primarily by limiting the kind and extent of new construction in flood hazard areas and by elevating existing structures above the base flood elevation. However, property damage from flooding is still a major and persistent problem along the Russian River, which has resulted in Sonoma County having the highest rate of repetitive property losses from flooding in California; and which indicates that a more proactive approach is needed. In the Russian River basin, development of a long-term plan for reducing repetitive property losses would focus efforts on those existing structures most vulnerable to damage. While most of the areas prone to repetitive property losses from Russian River flooding lie further inland outside the Coastal Zone, the coastal community of Duncans Mills has experienced repeated river flooding and has several repetitive flood loss properties.

The floodplain policies of this Local Coastal Plan are intended to limit development within 100-year flood plain areas; require compliance with siting, development, and construction standards to minimize the risk of flood hazards for new development; and collaborating and participating in the County's multi-strategy approach to reduce repetitive flood loss properties and minimize the risks for existing development.

## Regulatory Setting

The Purpose section of this Public Safety Element lists Section 30253 of the 1976 California Coastal Act, which directs that new development minimize risks to life and property in areas of high geologic, flood, and fire hazard. Section 30236 addresses the situations in which rivers and streams may be substantially altered for flood control projects – only where no other method for protecting existing structures in the floodplain is feasible, and where such protection is necessary for public safety or to protect existing structures:

***Section 30236. Water supply and flood control.***

*Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (1) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the flood plain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.*

Chapter 26C of the Sonoma County Code sets forth the Coastal Zoning Ordinance. Articles XX and XXI are the regulations that apply to properties within the Floodway (F1) and the Floodplain (F2) Combining Districts, respectively. These zoning districts correspond to the floodway and 100-year floodplain delineations shown on FEMA's Flood Insurance Rate (FIRM) Maps.

The Sonoma County Code sets forth the regulations for preventing flood damage to new structures and rebuilding of existing structures, including the requirements for elevation of new structures and existing structures with substantial alterations in the 100-year floodplain at least one foot above the base flood elevation, and no net fill in the 100-year floodplain.

California Civil Code Sections 1103-1103.14 require disclosure through a Natural Hazard Disclosure Statement in real estate transactions if the property is located in a Special Flood Hazard Area (any type Zone "A" or "V") designated by FEMA or an area of potential flooding shown on a dam failure inundation map.

**Goal C-PS-3:**                    **Prevent unnecessary exposure of people and property to risks of human injury and property damage from flooding and other types of inundation hazards**

**Objective C-PS-3.1:**        Regulate new development to reduce the risks of human injury and property damage from existing and anticipated flood hazards to acceptable levels.

**Objective C-PS-3.2:**        Minimize risks of human injury and property damage for existing development within flood hazard areas with an emphasis on reducing repetitive property losses.

**The following policies, in addition to others in this Public Safety Element and those in the Open Space and Resource Conservation, Water Resources, and Land Use Elements, shall be used to achieve these objectives:**

### *Agency Coordination*

**Policy C-PS-3a:** Coordinate flood hazard analysis and floodplain management activities with the U.S. Army Corps of Engineers (ACOE), Federal Emergency Management Agency (FEMA), State Office of Emergency Services (State OES), Sonoma County Fire and Emergency Services Department, Sonoma County Water Agency (SCWA), and other responsible agencies.  
**(GP2020)**

### *Hazard Area Zoning*

**Policy C-PS-3b:** Establish a new Flood Hazard Area Combining Zoning District to include regulations for the permissible types of uses, intensities, and development standards in the following flood and inundation hazard areas:

- (1) 10-Year Base Flood Zones
- (2) 100-Year Base Flood Zones
- (3) Areas at Risk From Sea Level Rise by 2100 – Flooding
- (4) Areas at Risk From Sea Level Rise by 2100 – Landward Limit of Erosion High Hazard Zone
- (5) Areas at Risk From Tsunami of Up to 25 Feet **(New)**

### ***Mapping Flood Hazard Areas***

**Policy C-PS-3c:** Any area that would be inundated by a 100-year flood event shall be considered to be a flood hazard zone. The Flood Insurance Rate Maps (FIRMs) adopted by the Federal Emergency Management Agency (FEMA) shall be used as the official source of flood elevation data and flood hazard zone mapping and the 100-year flood and to support the National Flood Insurance Program (NFIP) and associated flood insurance studies. Land use planning and development review shall be based on the FIRMs except where more detailed parcel-specific and site-specific analyses of flood elevations and flood hazard zones based on scaled interpretations of the FIRMs are available. Where local analyses indicate flood elevations and/or flood hazard zones which differ from the adopted FIRMs, such data shall be provided to FEMA so that the FIRMs may be amended. **(New/GP2020 Revised)**

**Policy C-PS-3d:** Encourage the Federal Emergency Management Agency (FEMA) to update its flood insurance studies and Flood Insurance Rate Maps (FIRMs) to show the following information. This mapping would allow regulations and mitigation efforts to focus on the areas at the highest risk of flood hazards, and allow flood insurance premiums to be more reflective of the actual flood hazard risks on specific properties.

- (1) Flood elevations and flood hazard zones which reflect inundation hazards unique to the Coastal Zone such as sea level rise and greater ocean surges and larger waves during storms based on the most up-to-date data and science, including data developed under the California Coastal Analysis and Mapping Project (CCAMP) and Open Pacific Coast Study (OPC Study); and
- (2) Detailed mapping of the 100-year floodplain to delineate the 10-year, 25-year, and 50-year floodplains. **(New)**

### ***Floodplain Management***

**Policy C-PS-3e:** Floodplain management shall be given priority over flood control structures for preventing property damage from flooding, except where the intensity of development requires a high level of protection, justifies the costs of a shoreline protection structure, and such structure complies with requirements of the California Coastal Act and Policy C-PS-2u of this Public Safety Element and. **(GP2020)**

**Policy C-PS-3f:** Encourage increased stormwater retention and decreased stormwater runoff both within and outside of the Coastal Zone to reduce flooding within the Coastal Zone. Floodplain storage capacity shall be preserved by avoiding fill in areas outside of the Federal Emergency Management Agency (FEMA) 100-year flood hazard zones which retain or could retain flood waters. **(GP2020)**

### *Development Siting, Design, and Construction*

**Policy C-PS-3g:** New development, water diversion, vegetation removal, and grading shall be regulated to minimize any increase in flooding and related human injury and property damage. **(GP2020)**

**Policy C-PS-3h:** Siting, design, and construction requirements of the Sonoma County Code shall be enforced to reduce the risks of human injury and property damage from flooding and inundation resulting from existing and new development to an acceptable level, and to implement and ensure compliance with the National Flood Insurance Program (NFIP). **(New)**

**Policy C-PS-3i:** Drainage facilities shall be designed to minimize off-site drainage and flooding impacts according to Sonoma County Water Agency's *Flood Control Design Criteria*. Design and construction of drainage facilities shall be reviewed and approved by the Sonoma County Permit and Resource Management Department (PRMD). Alternative bio-engineered drainage designs (e.g., low impact development techniques) may be proposed where they provide adequate capacity and performance to handle expected stormwater flows. The cost of drainage facilities required to handle stormwater runoff from new development shall be the responsibility of the new development. **(GP2020)**

**Policy C-PS-3j:** Consider developing regulations that require the use of low impact development techniques to reduce stormwater runoff from new development. **(GP2020)**

**Policy C-PS-3k:** ~~Prohibit~~ Construction of structures within 100 feet of the top of any natural or manmade embankment which defines a channel shall be prohibited, except where the Sonoma County Permit and Resource Management Department (PRMD) finds the flood hazard has been found to be remote in review by the Sonoma County Water Agency to be less than significant. Where this policy conflicts with ~~General Plan Public Safety Policy C-PS-3h of this Public Safety Element~~, the more restrictive of the two shall apply. **(Existing LCP Revised)**

**Policy C-PS-3l:** Reductions to building setbacks in 100-year floodplains shall be avoided. **(GP2020)**

### *Development Review*

**Policy C-PS-3m:** The permit and project review process and/or the California Environmental Quality Act (CEQA) environmental review process shall be used to assess the potential on-site and off-site flood and inundation hazards from a proposed development on a case by case basis to determine: 1) whether the proposed development complies with regulations for the permitted types of uses and intensities and development standards in flood and inundation hazard zones; and 2) whether siting and/or design changes to the proposed development or other mitigation measures are necessary to reduce exposure to these hazards and the risk of

human injury and property damage to an acceptable level. Such assessments shall consider flood or inundation hazards from river and creek flooding, dam failure, storm surge and high waves during storms, sea level rise, and undersized or blocked stormwater facilities. **(New)**

~~3. Prohibit new dwellings within designated Tsunami Hazard Zones. (Existing LCP)~~

**Policy C-PS-3n:** Where additional data and information is necessary to adequately assess the on-site and off-site flood and inundation hazards from a proposed development, to develop mitigation measures to reduce these hazards to an acceptable level, or to determine compliance of an existing or proposed development with the Sonoma County Code, a supplemental site-specific flood and inundation hazards analysis shall be required. The site-specific analysis may include but is not limited to:

- (1) Topographic mapping.
- (2) Analysis of the influence of sea level rise on flood elevations and flood and inundation hazards and zones.
- (3) Delineation of flood and inundation hazard zones.
- (4) Calculation of expected flood elevations.
- (5) Calculation of expected flood velocity.
- (6) Analysis of the impacts on on-site and off-site flooding, drainage, and stormwater runoff.
- (7) Using construction details and specifications, analysis of compliance with the Sonoma County Code.
- (8) Using cost and appraisal data, analysis of when reconstruction, rehabilitation, additions, or other improvements to structures would constitute a “substantial improvement” under the Sonoma County Code.
- (9) Development of mitigation measures to reduce flood and inundation hazards to an acceptable level. **(New)**

**Policy C-PS-3o:** Tentative and final subdivision maps and approved site plans shall show areas subject to flooding as designated on the Flood Insurance Rate Maps (FIRMs) adopted by the Federal Emergency Management Agency (FEMA). **(GP2020)**

### ***Russian River Basin***

**Policy C-PS-3p:** Work with the Sonoma County Community Development Commission (CDC), Sonoma County Fire and Emergency Services Department, responsible agencies, public, and other stakeholders to develop and implement a long-term plan for reducing repetitive property losses from flooding in the Russian River basin that includes the following:

- (1) Systematic collection of flood data and damage by geographic location.
- (2) Consideration of acquisition of properties in flood hazard areas.
- (3) An ongoing Flood Elevation Program.
- (4) Implementation of the Sonoma County Hazard Mitigation Plan.
- (5) Participation in the Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance (FMA) Program.
- (6) Possible participation in the NFIP Community Rating System.
- (7) Use of grant funds and other funding sources to supplement FEMA grant funds in reducing repetitive flood losses.
- (8) Consideration of permit fee reductions for elevation of structures in flood hazard areas and outreach to inform property owners in flood hazard areas about various options for coverage under the National Flood Insurance Program, including Increased Cost of Compliance (ICC) coverage. **(GP2020)**

**Policy C-PS-3q:** Pursue implementation of strategies and mitigation measures identified in the Sonoma County Hazard Mitigation Plan and future long-term plan pursuant to Policy C-PS-3q of this Public Safety Element for reducing repetitive property losses from flooding in the Russian River basin. **(New)**

**Policy C-PS-3r:** Evaluate potential flood and inundation hazards for development projects proposed in the Russian River basin relative to potential repetitive property loss, and incorporate mitigation measures to reduce the potential for human injury and property damage to a level of less than significant. **(GP2020)**

### *Dams*

**Policy C-PS-3s:** Where the map of Dam Inundation Areas (Figure 2-3) in the *Sonoma County Hazard Mitigation Plan* indicates dam or levee failure could result in loss of life, human injury, or property damage, coordinate with the corresponding responsible party to investigate levee or dam stability and management and identify rehabilitative maintenance needs as appropriate. **(GP2020)**

### *Public Education*

**Policy C-PS-3t:** Educate the public about the areas subject to inundation from a tsunami, where to go in the event of an earthquake, and evacuation routes in the event of a tsunami by distributing educational materials to parcel owners within the tsunami run-up zone and by erecting signage specified by the Sonoma County Operational Area Tsunami Response Plan. **(New)**

## 5. SEA LEVEL RISE HAZARDS POLICY

### Background

A changing sea level is not a new phenomenon. Sea level rise has been taking place since the end of the last Ice Age, about 20,000 years ago before the beginning of human history. Recent studies indicate that sea level rise as a result of global climate change is anticipated to accelerate during the coming decades and increase significantly over the next 100 years. There are many uncertainties in future estimates of global sea level rise. A major unknown is the future generation of greenhouse gases, which is related to both global politics and societal behavior. The other unknowns are related to the physical processes that result in sea level rise.

Sea level rise has been recognized as a significant threat to low-lying coastal areas around the world since the issue of global climate change influenced by human activities emerged in the 1980s. Recent studies demonstrate the potential impacts of continued sea level rise are substantial. People and property and biotic resources in low lying coastal area may face a gradual, long-term threat from inundation as a result of sea level rise. Although sea level rise is not an immediate the potential consequences of sea level rise would be dramatic and significant. Sea level rise will affect and threaten coastal communities and infrastructure through more frequent flooding and gradual inundation. The higher ocean level would also increase creek and river flooding, coastal bluff and shoreline erosion, and the impact of tsunamis.

This flooding and erosion will affect transportation facilities; utility systems; storm water systems; ports and harbors; large wetland areas; and coastal development, including homes and businesses. Much is at stake from sea level rise, and in order to minimize damage and losses, California's coastal communities must make adaptation to sea level rise a priority.

Section 30006.5 of the California Coastal Act identifies sea level rise as one of the topics for which additional scientific and technical analysis and recommendations are necessary to aid coastal planning, conservation, and development decisions. One of the main reasons for this update of the Local Coastal Plan is to begin to address the long-term issue and potential impacts of sea level rise along the Sonoma County Coast.

Policies to address risks from sea level rise will enhance the safety of residents and visitors in potentially hazardous areas, while providing a framework for consideration and permitting of coastal development projects. The Local Coastal Plan acknowledges the threat of sea level rise and supports appropriate responses, while recognizing that sea level rise is a global rather than a purely local issue. The impacts of sea level rise will vary according to local factors, such as shoreline characteristics, land movement driven by plate tectonics, and local wind patterns. Strategies to reduce impacts are most appropriately designed and implemented at the local level.

### California Coast Sea Level Rise

Although global sea level rise has been fairly gradual, coastal California has experienced the noticeable effects of sea level rise for at least the past century. According to the *2009 California*

*Climate Adaptation Strategy* (California Natural Resources Agency 2009), sea level has risen by an average of about 7 inches along California's 1100-mile coastline during the past century.

**Pacific Institute Report.** Assessments of sea level rise along the California coast, published in 2008 by the California Energy Commission's Public Interest Energy Research (PIER) Climate Change Research Program, and in 2009 by the Pacific Institute (*The Impacts of Sea-Level Rise on the California Coast*, Heberger et al. 2009) project that under medium to medium high levels of greenhouse gas emissions, the mean sea level along the California Coast will rise from 1.0 to 1.4 meters (3.3 to 4.7 feet) by year 2100.

**State of California Interim Guidance Document.** In November 2008 the California Governor issued Executive Order S-13-08 that, in part, directed State agencies to consider a range of sea level rise scenarios for the years 2050 and 2100 to assess project vulnerability, reduce expected risks, and increase resiliency to sea level rise. The order also directed agencies to request that the National Academy of Sciences convene an independent panel to prepare a report on sea level rise in California. In advance of the report in 2010, senior staff from 16 state agencies of the Coastal and Ocean Working Group of the California Climate Action Team reached agreement on a Sea-Level Rise Interim Guidance Document which recommends that state agencies use the ranges of sea level rise presented in a table in Vermeer and Rahmstorf (2009). These estimates project that under medium and high levels of greenhouse gas emissions, the mean sea level along the California Coast will rise 1.0 to 1.7 meters (3.3 to 5.6 feet) and 1.2 to 1.9 meters (3.9 to 6.2 feet) by year 2100, respectively.

**National Academy of Sciences Report.** The most up-to-date science and guidance on sea level rise is in *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (National Academies of Science 2012, NAS Report). The NAS report clarifies that variation in land motion complicates the issue of sea level rise, because in the immediate future, it is relative sea level rise at any particular location along the West Coast, combined with short-term increases in sea level during storms and high tides that matter to individual communities, rather than global sea level rise alone.

The NAS Report found a steep change in projected sea level rise at Cape Mendocino, which "reflects the transition from land subsidence in California, which effectively increases sea level rise, to land uplift in Oregon and Washington, which effectively decreases sea level rise." The report states that much of the land on the coast north of Cape Mendocino is rising about 1.5 to 3.0 mm (.06 to 0.1 inches) per year, whereas the land on the coast south of Cape Mendocino is sinking at an average rate of about 1 mm (.04 inches) per year. For that reason, relative sea level north of Cape Mendocino has been falling over the past six to ten decades, whereas relative sea level south of Cape Mendocino has been rising. The report explains that the combination of land uplift and gravitational and deformational effects reduces the threat of future sea level rise for Oregon and Washington.

The NAS Report projects that sea level along the California coast south of Cape Mendocino, which includes the Sonoma County Coast, will rise 4 to 30 cm (2 inches to 1 foot) by 2030 relative to 2000, 12 to 61 cm (5 inches to 2 feet) by 2050, and 42 to 167 cm (16 inches to 5.5 feet) by 2100.

**Storms and Sea Level Rise.** Storms and flooding in California occur during the winter from November to April and are influenced by several climate patterns, most prominently the El Niño Southern Oscillation. Every two to seven years, the El Niño Southern Oscillation alternates between two phases, La Niña and El Niño. In contrast to La Niña, “El Niño years” generally result in persistently low air pressure, greater rainfall, and high winds. Most of the damage along the California, Oregon, and Washington coasts is caused by storms, particularly the confluence of large waves, storm surges, and high astronomical tides during a strong El Niño event (NAS Report). The water levels reached during these large, short-term events have exceeded mean sea levels projected for 2100, so understanding their additive effects is crucial for coastal planning.

Low air pressure during a storm causes an instantaneous rise in sea level above predicted tides, referred to as storm surge. It also increases wind activity, generating erosive waves on top of the already high sea level. This combination of factors during an El Niño event in the winter of 1982-83, caused over \$500 million in damage in the San Francisco Bay Area (ABAG 2006). As sea level rises, flooding from storms will become more frequent and more hazardous to public health and safety. Over the recent period of accelerated sea level rise (1993 to 2003), there has been an increase in both the number of storm surge events and high tides exceeding previously observed extremes. This increase in storm activity and extreme tides is projected to continue into the future (Cayan et al. 2008, Bromirski and Flick 2008).

However, the NAS Report indicates that while climate change has been hypothesized to induce changes in storm frequency, magnitude, and direction (storminess), to date there is no consensus among climate model simulations about whether the number and severity of storms will change in the northeast Pacific. Several observational studies have reported that the largest waves have been getting higher in the northeastern Pacific over the past few decades, but interpretation of these trends is controversial. If some or all of the increase represents a long-term trend, the frequency and magnitude of extremely high coastal wave events will likely increase. Even if storminess does not increase in the future, sea level rise will magnify the adverse impact of storm surges and high waves on the coast. A model using the National Research Council sea level projections predicts that the incidence of extreme high water events in the San Francisco Bay area will increase substantially with sea level rise, from less than 10 hours per decade today to a few hundred hours per decade by 2050, and to several thousand hours per decade by 2100.

Although shoreline protection structures can make the shoreline more resistant to wave attack, they prevent beaches from migrating landward and will eventually be overwhelmed by sea level rise. Shoreline protective structures also have negative impacts on recreational beach uses, scenic resources, and the natural supply of sand to other shoreline areas. Marshes and mudflats protect inland areas by storing flood waters and damping wave height and energy. To continue providing these functions as sea level rises, marshes must be able to maintain their elevation relative to sea level and to move inland in places where they are subject to erosion at the seaward edge. For 2100, marshes will need room to migrate, a high sediment supply, and uplift or low subsidence to survive the projected sea level rise (NAS Report).

**Impacts.** Rising sea levels resulting from global climate change is a natural hazard in addition to storms and extreme high tides which result in flooding and erosion that poses a threat to communities along the California coast. Rising seas increase the risk of coastal flooding, storm

surge inundation, bluff and coastal erosion and shoreline retreat, and wetland loss. The net result of storms and sea level rise is coastline retreat, with rates ranging from a few centimeters per year for bluffs made of resistant bedrock to several meters per year for beaches and dunes, which consist primarily of unconsolidated sand. These rates will increase with rising sea level and are likely to further increase if waves become higher (NAS Report).

According to Hegeberger et. al. (2009), nearly half a million Californians will be at risk from future sea level rise along bay and coastal areas. California has the nation's largest ocean economy, valued at about \$47 billion/year, with the majority of this economy connected to coastal recreation and tourism as well as shipping and ports. Many of the facilities and much of the infrastructure which support these industries, as well as the state's many miles of public beaches, are within just a few feet of present sea level. Sea level rise will affect and threaten California coastal communities and infrastructure through more frequent flooding and gradual inundation, as well as increased bluff, dune, and shoreline erosion. This flooding and erosion will affect transportation facilities; utility systems; storm water systems; ports and harbors; large wetland areas; and coastal development, including homes and businesses.

## Sonoma County Coast Sea Level Rise

The policies for protection from sea level rise hazards are intended to begin to address the risks from and adaptation to sea level rise on the Sonoma County Coast. In addition, Sonoma County has received grant funding from the Ocean Protection Council (OPC) to continue to research on how to ensure the resiliency of the County's natural and built infrastructure against sea level rise and storm surge. The California Coastal Commission's *Draft Sea Level Rise Guidance* requires that Local Coastal Plans use the best available science on sea level rise, which the Commission considers to be the National Academies of Science 2012 report *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (NAS Report). The NAS Report indicates that Sonoma County can expect a range of sea level rise, depending on climate scenarios, by 2100. Sea level is expected to rise 1.5 to 12 inches in a low greenhouse gas emission scenario; 5 to 24 inches for a medium greenhouse gas emission future; and from 17 to 66 inches if high levels of greenhouse gas emissions continue. These values would be revised based on the evolving best available science for periodic updates of Local Coastal Plan policies, County Codes, and County Permit and Resource Management Department standards and procedures.

The Pacific Institute Report (Heberger et al. 2009) contains a series of maps for the entire California Coast which demonstrate the extent of the areas at risk from flooding and erosion as a result of sea level rise during a 100-year storm event by year 2100. They show the current coastal base flood (approximate 100-year flood event), the sea level rise scenario (coastal base flood + 1.4 meters), and the landward limit of the erosion high hazard zone. **Figures C-PS-1a-k** show the areas along the Sonoma County Coast at risk from erosion, and **Figures C-PS-3a-k** show the areas at risk from flooding as a result of sea level rise during a 100-year storm by year 2100 based on the Pacific Institute Report.

Sonoma County Planning staff examined the digital data from the Pacific Institute Report used to prepare **Figures C-PS-3a-k**. **Table C-PS-1a** shows the public roads, public facilities, and private commercial properties and facilities of the Sonoma County Coast potentially flooded as a result of sea level rise and the 100-year storm event by year 2100. Based on these projections,

the areas of the Sonoma County Coast that would have the greatest extent of flooding as a result of sea level rise during a 100-year coastal storm are Duncans Mills (SubArea 7, **Figure C-PS-3g-i**) and State Beach/Bodega Bay (SubArea 9, **Figure C-PS-3i-i**).

**Duncans Mills.** A majority of the private commercial properties in the commercial area and most of the residentially zoned properties along Freezeout Road would be at risk of flooding. Public facilities at risk of flooding include the Duncans Mills River Access, Rancho del Paradiso - Freezeout River Access, Steelhead Boulevard River Access, and Willow Creek - Freezeout Access facilities of Sonoma Coast State Park (**Table C-PS-1a**).

**State Beach/Bodega Bay.** Private properties at risk of flooding as a result of sea level rise include the commercial properties of Bodega Harbour Golf Course, Bodega Harbour Yacht Club, Lucas Wharf, Tides Wharf, and other commercial properties around Bodega Harbor; and all of the commercial boat storage/marina facilities and some of the residential properties of Porto Bodega. Public facilities at risk of flooding include the Sonoma County Doran Regional Park, Mason's Marina, Spud Point Marina (onshore facilities), and Westside Regional Park; and the State facilities of Bodega Dunes Campground and Salmon Creek Beach of Sonoma Coast State Park (**Table C-PS-1a**).

The SubAreas of the Sonoma County Coast with the next greatest extent of flooding as a result of sea level rise by 2100 are Highcliffs/Muniz/Jenner (SubArea 6, **Figure C-PS-3f-i**) and Pacific View/Willow Creek (SubArea 8, **Figure C-PS-3h-i**).

**Highcliffs/Muniz/Jenner.** Private properties at risk of flooding as a result of sea level rise include the commercially zoned parcels on the north side of State Highway 1, many of which contain single-family dwellings; and the few commercially zoned properties in Jenner Gulch. Public facilities at risk of flooding include the State facilities of the California Coastal Trail, Jenner River Access, and Russian River Access – Highway 1 Bridge to Sawmill Gulch; and North Jenner Beach, Jenner Beach, and Russian Gulch of Sonoma Coast State Park (**Table C-PS-1a**).

**Pacific View/Willow Creek.** Private properties at risk of flooding as a result of sea level rise include the Bridgehaven Trailer Park and adjacent property. Public facilities at risk of flooding include the State facilities of the California Coastal Trail and Kortum Trail and the following Sonoma Coast State Park facilities: Arched Rock Beach; Blind Beach; Duncans Cove, Point, and Landing; Goat Rock Beach; Mann Beach; Monte Rio to Willow Creek Trail; No Name Beach; North Portuguese Beach; Penny Island; Portuguese Beach; Willow Creek Environmental Campground - Russian River Access, and Wrights Beach (**Table C-PS-1a**).

**Highways and Roads.** State Highway 1 in the above four SubAreas and State Highway 116 in Highcliffs/Muniz/Jenner and Duncans Mills are at risk of flooding as a result of sea level rise. Other public roads at risk of flooding in these SubAreas include Burke Avenue, Pacific Avenue, and Willig Drive in Highcliffs/Muniz/Jenner; B Street, Freezeout Road, Main Street, Moscow Road, and Steelhead Boulevard in Duncans Mills; Emery Road, Willow Creek Road, and Wrights Beach Access Road in Pacific View/Willow Creek; and Bay Flat Road, Bean Avenue, Brooke Road, Churchill Street, Doran Beach Road, Driftwood Road, Extension Between Westshore and Whaleship Roads, Maryana Drive, Ocean View Avenue, Shaw Court, Smith Brothers Road, and Westshore Road in State Beach/Bodega Bay (**Table C-PS-1a**).

All or portions of the Proposed California Coastal trail could be inundated as a result of future sea level rise. In addition to these public facilities, numerous private residences, vacant properties, and businesses along State Highway 1 in Jenner and Bodega Bay, in Duncans Mills, and on Mill Street in Valley Ford could be inundated.

**Table C-PS-1a** may be used as a resource for identification of potential hazard areas and vulnerable properties; however, inclusion or exclusion from this list cannot be considered to definitively determine hazard or vulnerability, and local site conditions must be examined using the best available science.

## **Adaptation to Sea Level Rise**

Much is at stake from sea level rise, and in order to minimize damage and losses, California's coastal communities must make adaptation to sea level rise a priority by conducting community sea level rise vulnerability and risk assessments and developing a Sea Level Rise Adaptation Plan. It is important to obtain support for the vulnerability and risk assessments and Adaptation Plan by holding meetings with the general public, coastal property owners and residents, and elected officials to present the impacts and hazards of sea level rise, the history of past storm and flooding damage, future vulnerabilities, and options for sea level rise adaptation strategies and measures.

**Vulnerability and Risk Assessments.** The vulnerability assessment involves the following tasks: collecting all information on the community's historical vulnerability to coastal hazards; obtaining sea level information; obtaining projections for future sea level rise; collecting information on short-term increases in sea level, exposure to El Nino events, and changes in wave climate; mapping exposure to inundation and flooding associated with long-term sea level rise; and documenting historical coastal retreat and assessing future risks from increased coastal bluff and dune erosion.

The risk assessment includes assessing adaptive capacity (the capacity of the community to adapt to sea level rise) and developing a risk assessment. Assessing adaptive capacity involves evaluating the regulatory, planning, administrative, technical, fiscal, and infrastructure capabilities of the community. Developing a risk assessment involves considering the actual or future threats or hazards of concern, the economic importance or value of public facilities and infrastructure to the community, the value and community importance of private commercial or residential development sectors, the magnitude of impacts of future hazardous events and how often these events occur, and the certainty of projected impacts to the degree that these are known or can be expected.

The sea level rise adaptation planning effort funded by the Ocean Protection Council (OPC) will result in updated maps showing the areas inundated as a result of sea level rise and the 100-year flood by 2030, 2050, and 2100 along the entire Sonoma County Coast, and will assess the vulnerability to sea level rise by 2100 for the entire Coast relative to farmland, people, public infrastructure, and public access and recreation. The County will also identify and conduct focused vulnerability assessments for the areas and critical public facilities that are highly vulnerable to sea level rise impacts. These focused vulnerability assessments will consider exposure, sensitivity, adaptive capacity, and consequences as outlined in the Coastal Commission's *Draft Sea Level Rise Guidance*.

The Center for Ocean Solutions (COS) and the Natural Capital Project (NCP) have conducted analyses of the relative exposure of areas along the Sonoma County coastline to erosion and sedimentation caused by storms, and the role of natural habitat in reducing this exposure under the Sonoma County Coast sea level rise adaptation planning effort funded by the OPC.

**Table C-PS-1a. Roads, State Facilities, and County Facilities on the Sonoma County Coast Potentially Flooded as a Result of Sea Level Rise and the 100-Year Flood by Year 2100**

SUBAREA	ROADS	STATE FACILITIES	COUNTY FACILITIES
<p><b>The Sea Ranch North (1)</b></p>	<p>State Highway 1</p>		<p><i>Gualala Point County Park &amp; Expansion Area</i></p> <p>Blufftop Sea Ranch Access Trail</p> <p>Walk-on Beach Sea Ranch Access Trail</p>
<p><b>The Sea Ranch South (2)</b></p>			<p><i>The Sea Ranch Access Trails:</i></p> <ul style="list-style-type: none"> <li>• Shell Beach</li> <li>• Stengel Beach</li> <li>• Pebble Beach</li> <li>• Black Point Beach</li> </ul>
<p><b>Salt Point (4)</b></p>		<p><i>Salt Point State Park</i></p> <ul style="list-style-type: none"> <li>• Fisk Mill Cove</li> <li>• Gerstle Cove</li> <li>• Horseshoe Cove</li> <li>• Horseshoe Point</li> <li>• Salt Point</li> <li>• Stump Beach</li> </ul>	
<p><b>Timber Cove/Fort Ross (5)</b></p>	<p>State Highway 1</p>	<p><i>Fort Ross State Historic Park</i></p> <ul style="list-style-type: none"> <li>• Kohlmer Gulch</li> <li>• Sandy Cove</li> <li>• Windermere Point</li> </ul>	<p><i>Stillwater Cove Regional Park</i></p> <ul style="list-style-type: none"> <li>• Stillwater Cove &amp; Boat Launch</li> <li>• Stillwater Cove Expansion: Pocket Cove</li> </ul> <p>Bluff Trail – Ocean Cove to Stillwater Cove</p>

SUBAREA	ROADS	STATE FACILITIES	COUNTY FACILITIES
<p><b>High Cliffs /Muniz-Jenner (6)</b></p>	<p>State Highway 1 State Hwy 116 Burke Ave Pacific Ave Willig Drive</p>	<p><i>Sonoma Coast State Park</i></p> <ul style="list-style-type: none"> <li>• North Jenner Beach</li> <li>• Jenner Beach</li> <li>• Russian Gulch</li> </ul> <p>Jenner River Access</p> <p>Russian River Access: State Highway 1 Bridge to Sawmill Gulch</p>	
<p><b>Duncans Mills (7)</b></p>	<p>State Highway 1 State Hwy 116 B Street Freezeout Road Main Street Moscow Road Steelhead Blvd</p>	<p><i>Sonoma Coast State Park</i></p> <ul style="list-style-type: none"> <li>• Duncans Mills River Access</li> <li>• Rancho del Paradiso - Freezeout River Access</li> <li>• Steelhead Boulevard River Access</li> <li>Willow Creek - Freezeout Access</li> </ul>	
<p><b>Pacific View /Willow Creek (8)</b></p>	<p>State Highway 1 Emery Road Willow Creek Road Wrights Beach Access Road</p>	<p><i>Sonoma Coast State Park</i></p> <ul style="list-style-type: none"> <li>• Arched Rock</li> <li>• Blind Beach</li> <li>• Duncans Cove, Point, &amp; Landing</li> <li>• Goat Rock Beach</li> <li>• Mann Beach</li> <li>• Monte Rio to Willow Creek Trail</li> <li>• No Name Beach</li> <li>• North Portuguese Beach</li> <li>• Penny Island</li> <li>• Portuguese Beach</li> <li>• Willow Creek Environmental Campground Russian River Access</li> <li>• Wrights Beach</li> </ul>	
<p><b>State Beach /Bodega Bay (9)</b></p>	<p>State Highway 1 Bay Flat Road Bean Avenue Brooke Road Churchill Street Doran Beach Road</p>	<p><i>Bodega Dunes Campground</i></p> <p><i>Sonoma Coast State Park</i></p> <ul style="list-style-type: none"> <li>• Salmon Creek Beach</li> </ul>	<p><i>Doran Regional Park</i></p> <p><i>Mason's Marina:</i> onshore facilities</p> <p><i>Spud Point Marina:</i> onshore facilities</p>

SUBAREA	ROADS	STATE FACILITIES	COUNTY FACILITIES
	Driftwood Road Extension -Westshore to Whaleship Roads  Maryana Drive Ocean View Ave Shaw Court Smith Brothers Road Westshore Road		<i>Westside Regional Park:</i> boat launch
<b>Valley Ford (10)</b>	State Highway 1 John's Street Middle Road School Street (Main Street) Valley Ford – Estero Road Valley Ford – Freestone Road Valley Ford Road		Gold Ridge Soil Conservation District Office

**NOTES:**

- (1) Pacific Institute Report (Heberger 2009)
- (2) The County's hazards maps and tables can be used as a resource for identification of potential hazard areas and vulnerable properties; however, absence of maps alone cannot be considered absence of hazard, and local site conditions must be examined using the best available science.

The Center for Ocean Solutions (COS) and the Natural Capital Project (NCP) have conducted spatial analyses of the relative exposure of areas along the Sonoma County coastline to erosion and inundation caused by storms. In addition, the analyses evaluated the role of natural habitat in reducing coastal exposure in Sonoma County. The information below summarizes the findings for the spatial analyses under a 2030 sea level rise scenario (National Academies of Science 2012).

**Figures C-PS-4a-c** depict the findings of the analyses on relative coastal exposure for Sonoma County to erosion and inundation caused by storms under a 2030 sea level rise scenario. The coastal exposure values reflect the relative exposure of different coastline segments to erosion and inundation caused by coastal storms. The map is based on spatial data that includes the 2030 projection for sea level rise, coastal geomorphology, coastal topography and bathymetry, surge potential, wind and wave exposure, natural habitats, and human population. The mapped values represent relatively: 1) "Lower Exposure," 2) "Medium Exposure," and 3) "Higher Exposure." This mapping approach is qualitative and provides a broad overview of the spatial patterns of coastal exposure along the Sonoma County coastline to help prioritize future nature-based adaptation planning strategies for specific locations.

The habitats fringing a coastline attenuate waves and thus reduce storm-related damage to shorelines from erosion and inundation. North of the Russian River mouth to the northern extent of Sonoma County, kelp forest habitat backed by rocky cliffs dominate the landscape and are generally “low exposure.” In contrast, south of the Russian River mouth, a greater diversity of habitats (e.g., wetlands, beaches, dune systems) are present and are habitats that are highly exposed to erosion and inundation during storms compared to north of the River mouth. As coastal development and rising sea levels alter or damage these habitats, coastlines and nearby infrastructure become increasingly vulnerable to storms.

Coastal habitats provide an ecosystem service by reducing the impacts of storms and by increasing resilience in coastal areas. However, with ever increasing stresses on ecosystems, it is important to identify where natural habitats provide the greatest benefits to prioritize adaptation planning efforts that protect or restore those critical natural habitats. The habitat types which provide the highest level of natural protection have been identified and mapped.

**Figures C-PS-5a-c** depict the areas along the Sonoma County coastline in which natural habitat plays a role in reducing exposure to erosion and inundation during storms. This map highlights the relative role of habitat in reducing the exposure to erosion and inundation during storms. For example, the dark brown areas in Doran Beach and south of Salmon Creek indicate locations where habitats play the largest role in reducing exposure. The lighter tones in the map also indicate where habitat areas provide a protective coastal ecosystem service.

**Adaptation Plan.** Development of a Sea Level Rise Adaptation Plan involves setting goals, identifying objectives and adaptation measures, developing adaptation strategies for undeveloped versus developed lands, developing adaptation strategies for public versus private property, and ensuring the Adaptation Plan has support among stakeholders. Russell and Griggs (2012) provide the following examples of objectives for areas vulnerable to sea level rise and high coastal erosion hazard: 1) develop a plan or timeline for phased relocation of existing infrastructure or public facilities; 2) site and design all future public works projects to take these factors into account; 3) eliminate public subsidies for future development; 4) prioritize critical public infrastructure for retrofit/protection; 5) remove barriers to landward migration of heavily used public beaches and estuaries/wetlands; 6) develop strategic property acquisition programs to discourage development, encourage relocation, and allow inland migration of coastal habitats; and 7) reduce and eliminate the use of shoreline protection structures.

A successful long-term Sea Level Rise Adaptation Plan sets unambiguous, quantifiable, time-bounded objectives. Specific geographic areas at the highest risk of flooding from sea level rise and coastal erosion should be mapped and delineated, and timelines should be established for actions based on specific conditions or thresholds. For example, as future high tides reach a certain elevation, a relocation plan will have been established and action initiated to address flooding. Objectives and action measures should be focused primarily on planned or proactive adaptation as opposed to reactive adaptation.

A range of criteria may be used to select the best adaptation options for a particular coastal community, including actual effectiveness, cost and benefit, ease of design and implementation, and public and political acceptability. Each potential adaptation measure should be reviewed individually using these criteria. Adaptation measures recommended to decision-makers should

be those most likely to be successfully implemented. These choices may be the most cost-effective or easiest to implement or most politically acceptable adaptation measures. In some cases a particular adaptation measure will yield the best results when it is combined with other measures.

In any coastal community there are three types of areas to be considered for adaptation planning: 1) undeveloped land that is considered or zoned to be developable; 2) existing unprotected development, including residential and commercial areas as well as infrastructure; and 3) existing development that has already been armored. The only armored area along the Sonoma County Coast is a portion of the residential development above Gleason Beach.

An additional consideration is the difference between public and private property. Adaptation planning for private property can be more difficult than that for public property. In the long run, the cost of restricting or limiting new development in areas vulnerable to the hazards or impacts from sea level rise is far lower than the cost of dealing with damaged or threatened development. For existing private development in vulnerable areas, potential strategies for addressing the impacts from sea level rise include:

- (1) Develop incentives for planned retreat or relocation from vulnerable areas; establish mandatory rolling setbacks for future development or significant redevelopment in areas that are likely to be affected by the impacts from sea level rise within the anticipated lifetime of the structures.
- (2) Develop a plan and identification of funding or other incentives for purchase or relocation of existing structures out of vulnerable areas.
- (3) Restrict rebuilding of structures in vulnerable areas that have been damaged by storms or the impacts from sea level rise.
- (4) Evaluate existing armored areas to determine whether additional armor or retreat is the most practical long-term approach.
- (5) Reduce and eliminate dependence on shoreline protection structures; there may be some critical structures where armoring may provide short-term protection until other long-term solutions can be implemented.

For existing public infrastructure or community resources, strategies for addressing the impacts from sea level rise include:

- (1) Development of retreat or retrofit plans for existing infrastructure subject to future flooding, and remove and relocate or replace the infrastructure according to the plans.
- (2) Siting and design of all future projects and infrastructure to account for sea level rise predictions based on the most up-to-date science and the projected life spans of the structures and facilities.
- (3) Reduce and eliminate dependence on shoreline protection structures; there may be some critical structures where armoring may provide short-term protection until other

Based on all of the costs and benefits as well as the risks, the next step is evaluate for each structure or facility at what point should the community take action to prevent or reduce impacts from sea level rise. For example, a coastal park or parking lot can be used intermittently for a long time with periodic winter flooding, but a water or wastewater treatment plant at or near beach elevation must be retrofitted, relocated, or replaced well in advance of facility flooding or failure.

Sonoma County will develop community sea level rise adaption plans and consider additional policies and other actions to address the impacts of sea level rise. As applicable, recommendations may include the following:

- (1) Relocation of existing or planned development to safer locations, including working with entities such as Caltrans that plan or operate infrastructure.
- (2) Changes to Local Coastal Plan land uses and siting and design standards for new development, to avoid and minimize risks.
- (3) Changes to standards for wetland, ESHA, and stream buffers.
- (4) Changes to standards for erosion rates and setbacks.
- (5) Modifications to the Local Coastal Plan Public Access Element and Public Access Plan to ensure long term protection of the function and connectivity of existing public access and recreation resources.

**Goal C-PS-4:** Prevent unnecessary exposure of people and property to risks of injury or damage from sea level rise.

**Objective C-PS-4.1:** Regulate new development to reduce the risks of human injury or property damage in areas subject to projected future sea level rise and other coastal hazards to an acceptable level.

**Objective C-PS-4.2:** Minimize the risks for existing development of human injury and property damage from projected future sea level rise and other coastal hazards to an acceptable level.

**Objective C-PS-4.3:** Assess what existing development and public facilities and infrastructure are vulnerable to projected future sea level rise and other coastal hazards.

**Objective C-PS-4.4:** Assess the risks to and potential impacts on existing development and public facilities and infrastructure from projected future sea level rise and other coastal hazards.

**Objective C-PS-4.5:** Develop a plan for community adaptation to projected future sea level rise and other coastal hazards to reduce the risks and impacts to an acceptable level.

**Objective C-PS-4.6:** Disclose in real estate transactions whether properties are subject to inundation, flooding, and/or coastal erosion hazards as a result of projected future sea level rise. **(New)**

**The following policies, in addition to others in this Public Safety Element and those in the Open Space and Resource Conservation, Water Resources, and Land Use Elements, shall be used to achieve these objectives:**

### *Research and Study*

**Policy C-PS-4a:** Monitor mean sea level elevation trends along the Sonoma County Coast. **(New)**

**Policy C-PS-4b:** Prepare and periodically update a comprehensive study of the potential impacts of sea level rise and other coastal hazards on public facilities and infrastructure, private development, communities, and natural ecosystems based on the most up-to-date science. **(New)**

**Policy C-PS-4c:**

For the purposes of vulnerability and risk assessments, mapping, land use planning, and adaptation planning, consider the areas projected to be inundated by sea level rise (including under projected high tides, high water conditions in combination with high tides, and with wave and wind impacts during storm events) by 2100 to be the areas at risk from sea level rise; and assume the amount of sea level rise by that point in time to be 6 feet unless the most up-to-date science indicates a higher elevation. **(New)**

**Policy C-PS-4d:** Study, monitor, and develop and implement a plan to mitigate the impacts to groundwater from saltwater intrusion resulting from sea level rise based on the most up-to-date science. **(New)**

### *Adaptation Planning*

**Policy C-PS-4e:** Prepare Sea Level Rise and Coastal Hazards Vulnerability and Risk Assessments for the Sonoma County Coast according to the California Energy Commission's publication *Adapting to Sea Level Rise: A Guide for California's Coastal Communities* (Russell and Griggs 2012) and other applicable publications. Focus on those SubAreas of the Sonoma County Coast at the highest risk of inundation, flooding, or coastal erosion resulting from sea level rise, which include The Highcliffs/Muniz/Jenner (SubArea 6), Pacific View/Willow Creek (SubArea 8), Duncans Mills (SubArea 7), and State Beach/Bodega Bay (SubArea 9).

**Policy C-PS-4f:** Prepare and implement a Sea Level Rise and Coastal Hazards Adaptation Plan for the Sonoma County Coast based on the California Energy Commission's publication *Adapting to Sea Level Rise: A Guide for California's Coastal Communities* (Russell and Griggs 2012) and other applicable publications. Focus on those SubAreas of the Sonoma County Coast at the

highest risk of inundation, flooding, and/or coastal erosion as a result of sea level rise, which include The Highcliffs/Muniz/Jenner (SubArea 6), Pacific View/Willow Creek (SubArea 8), Duncans Mills (SubArea 7), and State Beach/Bodega Bay (SubArea 9).

Preparation of the Sea Level Rise and Coastal Hazards Adaptation Plan shall involve collaboration with pertinent County of Sonoma departments and agencies, independent utility districts, and responsible federal and state agencies; and participation of the public.

The Sea Level Rise and Coastal Hazards Adaptation Plan shall focus on public and quasi-public facilities and infrastructure and include the following components in addition to those included in Russell and Griggs (2012) and other applicable publications:

- (1) Discussion of the following planning tools to help communities adapt to sea level rise and other coastal hazards: public purchase of private property for public uses, sale or transfer of public land to accommodate relocated roads and infrastructure, transfer of development rights, parcel reconfiguration, and zoning and land use designation amendments.
- (2) Requirements and standards for siting, design, and construction of new public facilities and infrastructure and private structures in areas subject to sea level rise and other coastal hazards as mapped in the Vulnerability Assessment.
- (3) Requirements and standards for maintenance and removal of abandoned structures;
- (4) Cost/benefit analyses of: a) adaptation measures versus no adaptation measures and b) carrying-out adaptation measures pre-inundation versus post-inundation (i.e., emergency conditions)
- (5) Plan for full disclosure of potential hazards to owners of property in areas subject to sea level rise and other coastal hazards as mapped in the Vulnerability Assessment.
- (6) Discussion of no County obligation to compensate owners for loss of or damage to private property resulting from sea level rise and other coastal hazards.

The County will continue to work with the Ocean Protection Council and other agencies and organizations to develop possible adaptation strategies for particular areas of the Sonoma County Coast. **(New)**

### ***Project and Development Review***

**Policy C-PS-4g:** Recognize scientific uncertainty by using a reasonably foreseeable projection of sea level rise within the acceptable range established by the best available science. These values shall be revised during periodic updates of Local Coastal Plan policies; County Codes; and departmental procedures based on best available science, as determined by the PRMD Planning Director. **(New)**

**Policy C-PS-4h:** Use the most up-to-date science and technical analyses available in combination with site-specific information when evaluating land use or development proposals in areas subject to sea level rise and other coastal hazards. **(New)**

**Policy C-PS-4i:** Applications for Coastal Permits for new development and improvements to existing or new public facilities and infrastructure potentially subject to hazards from future sea level rise shall include a geologic/flood hazards report prepared by a licensed Geotechnical Engineer or a certified Engineering Geologist that evaluates the vulnerability of and potential risk to the development or facilities/infrastructure from inundation, flooding, and/or coastal erosion resulting from projected future sea level rise and other coastal hazards over the economic life of the development (100 years) or facilities/infrastructure based on the most up-to-date science. The report shall evaluate a range of low to high projected future sea level rise and determine the minimum acceptable amount of sea level rise to be used to locate, design, and construct the development or facilities/infrastructure; and include mitigation measures to reduce the vulnerability of and risk to the development or facilities/infrastructure from sea level rise and other coastal hazards to an acceptable level. **(New)**

**Policy C-PS-4j:** New development shall be set back a sufficient distance landward, otherwise sited, and designed to eliminate or minimize, to the maximum extent feasible, inundation, flooding, and/or coastal erosion resulting from projected future sea level rise and other coastal hazards based on the most up-to-date science over the expected economic life of the development (100 years). **(New)**

**Policy C-PS-4k:** For development projects proposed where potential inundation, flooding, and/or coastal erosion resulting from projected future sea level rise cannot be completely avoided, potential sea level rise adaptation measures shall be evaluated and incorporated into the development siting, design, and construction. **(New)**

**Policy C-PS-4l:** New development shall be avoided on natural lands immediately adjacent to wetlands or other sensitive natural habitats at risk of inundation or flooding resulting from projected sea level rise based on the most up-to-date science so that these lands are available for future wetland or other habitat restoration projects. **(New)**

**Policy C-PS-4m:** A buffer at least 100 feet wide from the upland edge of wetlands and riparian habitat shall be provided for new development. Buffers shall be measured to allow and adapt for projected future sea level rise based on the most up-to-date science. In some cases, especially for saltmarsh wetlands, the required buffer could be greater than 100 feet. The California Department of Fish & Game, U.S. Fish & Wildlife Service, and U.S. Army Corps of Engineers shall be consulted to determine the buffer width. **(New)**

**Policy C-PS-4n:** Consider adopting an ordinance or an amendment of the Sonoma County Building Code which allows reconstruction of a structure damaged or lost from inundation or flooding resulting from or exacerbated by sea level rise, to be rebuilt where certain standards or criteria can be met; and which requires raising a reconstructed structure a minimum number of feet above the anticipated base flood elevation considering projected future sea level rise during the economic life of the structure based on the most up-to-date science; and where such an adaptation approach is considered feasible and practical and is expected to minimize the risk of inundation and flooding of the structure to an acceptable level. **(New)**

**Policy C-PS-4o:** As a condition of coastal permit approval for development in hazardous areas, require the applicant to record a document exempting the County from liability for any personal or property damage caused by natural geologic or other hazards on such properties and acknowledging that future shoreline protective devices to protect structures authorized by such coastal permit during the structure's economic life are prohibited. **(New)**

### *Wetlands & Other Sensitive Habitats*

**Policy C-PS-4p:** Encourage the California Department of Parks and Recreation, Sonoma County Regional Parks Department, Sonoma County Agricultural Preservation and Open Space District, Sonoma Land Trust, and similar organizations to purchase natural lands adjacent to wetlands or other sensitive natural habitat which are at risk of inundation or flooding from sea level rise (based on the most up-to-date science) for use as wildlife habitat. **(New)**

### *Real Estate Disclosure*

**Policy C-PS-4q:** Consider development of a Local Option Real Estate Disclosure Statement form to substitute for the State Natural Hazards Disclosure Statement form as provided in Section 1102.6a of the California Civil Code. A Local Option Real Estate Disclosure Statement form may be substituted for the State Natural Hazards Disclosure Statement form only if it contains substantially the same information and substantially the same warning about potential natural hazards. Include in the Local Option Real Estate Disclosure Statement form a section regarding whether a property is located in an area subject to inundation, flooding, and/or coastal erosion hazards as a result of projected future sea level rise. **(New)**

**Policy C-PS-4r:** Prior to the lease, sale, or other conveyance of any portion of public property subject to future sea level rise, the owner shall be required to provide to the prospective lessee, buyer, or other recipient of such conveyance a Real Estate Disclosure Statement which states that the property is subject to inundation, flooding, and/or coastal erosion hazards as a result of projected future sea level rise. **(New)**

**Policy C-PS-4s:** Encourage the owners of private property subject to future sea level rise to provide a Real Estate Disclosure Statement to prospective lessees, buyers, or other recipients of a lease, sale, or other property conveyance, which states that the property is subject to inundation, flooding, and/or coastal erosion hazards as a result of projected future sea level rise. **(New)**

**Policy C-PS-4t:** The conditions of approval for any discretionary project on public or private property that is subject to hazards from future sea level rise shall include the requirement that the owner shall record a deed with the following information included: "The subject property is located in an area subject to inundation, flooding, and/or coastal erosion hazards as a result of projected future sea level rise." **(New)**

## **6. WILDLAND FIRE HAZARDS POLICY**

## Background

The combination of highly flammable fuel, long dry summers and steep slopes creates a significant natural hazard of large wildland fires in many areas of Sonoma County. Wildland fire results in death, injury, economic losses, and a large public investment in firefighting efforts. Woodlands and other natural vegetation are destroyed resulting in the loss of timber, wildlife habitat, scenic quality and recreation. Soil erosion, sedimentation of fisheries and reservoirs, and downstream flooding can also result.

Most damage results from a few large fires in the dry weather months. There were 21 wildland fires of 100 acres or more in the County between 1989 and 2000.

Fire hazard severity has been mapped by the California Department of Forestry and Fire Protection (CAL FIRE). Areas on the County Coast with a high or very high fire risk are shown on **Figures C-PS-4a-c** and include Timber Cove and Sea Ranch. The highest fire hazard in Sonoma County is found in mountainous areas with dry summers, plenty of fuel, and steep slopes.

Residences have increased the number of fires in rural areas. Ninety-seven percent of the wildland fires over 50 acres in Sonoma County since 1989 were caused by human activities or facilities. Residences in rural areas cause fire suppression agencies to devote limited resources to structural protection while the wildfire spreads.

The probability of large damaging fires in developed areas is affected by weather conditions and the spread of fires in surrounding wildland areas. The type of construction, preventive measures, and the extent of fire suppression services are the chief factors which determine how far these fires spread.

## Hazards and Risk Assessment

Fire hazards shown on **Figures C-PS-4a-c** are only a general picture of the actual hazard because of the size of the areas and differences in vegetation and slope. The maps show the fire hazards only in unincorporated areas which are classified as "wildlands" and are therefore within the "State Responsibility Area" served by CAL FIRE.

## Land Use Planning

In order to reduce the risks of property damage and human injury from wildland fires in rural areas, the types and intensities of land uses should be limited. Rural development should be most restricted where natural fire hazards are high, fire protection is limited, and road access prevents timely response by firefighting personnel and rapid evacuation by residents. Wildland fire hazards may be reduced by mitigation measures including removing vegetation and installing dependable water systems, but cannot be eliminated entirely.

## The Sea Ranch Fuels Management

A landscape and fire management plan for The Sea Ranch was implemented in the 1990s to balance fire safety with the basic concept of preserving the natural landscape. In 2002 The Sea Ranch implemented a Public Safety Element

Ranch Association (TSRA) introduced a more aggressive “Fuels Management Program” to reduce fuel loads throughout The Sea Ranch. It incorporates the Sonoma County “Fire Safe Standards” (see Regulatory Environment below) and includes the following objectives and actions: create roadside fuel breaks to allow for safe evacuation and emergency access; reduce fuels on hillsides below homes to reduce fire intensity; enlarge the Highway 1 fuel break and reduce fuels on both sides of the highway; introduce sheep and goat grazing in the meadows on both sides of Highway 1; enhance riparian vegetation and remove conifers in drainages; and control new vegetation growth. TSRA also addresses fire safety around individual structures through its “Defensible Space Fuel Management” Resolution which requires the owners of developed property to maintain the fuel breaks around structures mandated by the California Department of Forestry and Fire Protection (CAL FIRE); and its Design Manual Rules, which outline the permit process, procedure, and standards for fuels management on private lots and neighboring property.

## **Fire Safety Standards**

Fire hazard regulations are intended to minimize on-site property damage and personal injury, avoid damage to adjacent properties, and reduce the cost of fire suppression services. Increasing “built-in” fire protection in those areas where new construction is allowed is the most cost effective way of achieving these objectives. All development must have adequate water available for fire suppression, whether from a hydrant and community system or from an on-site storage tank.

Where development is permitted near wildlands and natural vegetation, the fire hazard must be further mitigated by other measures. The locations of subdivision lots and building envelopes can maximize access by emergency vehicles and minimize construction in steep or wooded areas. Fire retardant roof materials are now required in high fire hazard areas. Preventing the spread of wildland fires to and from structures also requires use of fire retardant materials and/or removal of surrounding vegetation and clearing of fuel breaks.

Differences in local, state, and federal fire safety standards and requirements and in staffing and training among local fire districts prompted the formation of the Sonoma County Department of Fire Services in 1985, now the Sonoma County Fire and Emergency Services Department. Improvements in standards for road design, water supply, and sprinkler systems have increased the effectiveness of local fire protection services. In February 2003 the County Board of Supervisors approved Ordinance Nos. 5402 and 5373 that amended the County Fire Code to require fire sprinklers for both residential and commercial development with some exceptions. In recent years, fire services have reorganized and consolidated in order to minimize administrative costs and to promote more efficient and consistent service response.

CAL FIRE enforces requirements for fire fighting and prevention, works with property owners on controlled burns, and advises rural residents on fire prevention methods. Cal FIRE is currently preparing minimum fire safety standards for wildland areas. See “Regulatory Setting” below for more information about CAL FIRE responsibilities and activities.

Another important component of fire safety is an improved system of street addresses throughout the county. Fire response time, particularly in rural areas, is occasionally affected

by the ability of the responder to locate the affected address. Improved visibility and standardizing street addresses can result in reduced emergency response time.

## Public Education

Increased public awareness of fire hazards and fire safe practices is an effective way to avoid or reduce future fire damages and loss of life. Emergency service providers typically provide educational programs that focus on fire prevention. In addition to continuing to promote these ongoing programs, fire prevention information can be provided directly to the general public and to prospective permit applicants for incorporation into the building design. Such a program can be further expanded to include fire hazard information by providing fire hazard warning signs along roadways in particularly vulnerable fire hazard areas.

## Regulatory Environment

The California Department of Forestry and Fire Protection (CAL FIRE) has lead responsibility for fighting wildland fires in designated "State Responsibility Areas". The Sonoma County Fire and Emergency Services Department (County Fire) provides fire prevention, fire protection, rescue, emergency medical, code enforcement, and arson investigation services for the unincorporated areas of Sonoma County that are not included in an independent fire protection district. County Fire is responsible for enforcing the California Fire Code and other fire-related codes and ordinances. It enforces vegetation management, reviews building construction plans, and performs inspections of new construction for fire code compliance. In addition, three volunteer fire districts providing fire protection services to different portions of the Sonoma County Coastal Zone. See the Public Facilities and Services Element for a more detailed description of the fire protection services in the Coastal Zone.

The Sonoma County Fire Code is based on the National Fire Code, California Fire Code, Uniform Building Code, and California Subdivision and Development Code; constitutes the local adoption of the California Building Code; and is in Chapter 13 of the Sonoma County Code. It sets forth the requirements of the Sonoma County Fire Safety Ordinance, referred to as the "Fire Safe Standards". The County Fire Code was adopted to establish minimum fire safe standards for development within the unincorporated area of the county. The County Fire Code requirements ensure that all new development within the unincorporated area of the county will provide a basic level of fire protection around itself making it easier and safer for fire fighters to fight wildland and structure fires.

The Fire Safety Standards include but are not limited to requirements for emergency access, road naming and addressing, minimum emergency water supply and sprinklers to ensure a supply of water to fight or defend property from a fire, fuel modification and defensible space to reduce the possibility and intensity of a wildfire, and other fire protection measures. Due to the severe fire risk in many areas of the County, the County's Fire Safe Standards which outline development standards for emergency access, water supply, and vegetation management are more stringent than those required by the California Fire Code.

**Goal C-PS-5: Prevent unnecessary exposure of people and property to risks of injury or damage from wildland and structural fires.**

**Objective C-PS-5.1:** Work with other fire agencies to improve fire safety standards, carry-out fire prevention and protection programs, and educate the public about fire hazards and fire prevention.

**Objective C-PS-5.2:** Regulate new development to reduce the risks of human injury and property damage from known fire hazards to an acceptable level.

**The following policies, in addition to those in the Land Use and Public Facilities and Services Elements, shall be used to achieve these objectives:**

### *Agency Cooperation*

**Policy C-PS-5a:** The Sonoma County Department of Emergency Services shall offer assistance to local agencies in adopting and enforcing fire safety regulations and shall work with local agencies to develop proposed improvements to related County Codes and standards. **(GP2020)**

**Policy C-PS-5b:** Work with the California Department of Forestry and Fire Protection to identify areas of high fire fuel loads and take advantage of opportunities to reduce those fuel loads, particularly in Areas With Very High or High Potential for Large Wildland Fires and in High Fire Hazard Severity Zones. **(GP2020)**

**Policy C-PS-5c:** ~~Support the~~ Encourage continued operation of Division California Department of Forestry and Fire Protection and local fire districts in creation and maintenance of a complete pre-suppression fire plan programs for (fuel breaks, fire breaks, brush management, controlled burnsing, water development); revegetation, and fire roads for fire prevention; however, brush clearing and controlled burns shall not take place in designated Environmentally Sensitive Habitat Areas (ESHAs) or other sensitive habitats. **(Existing LCP Revised)**

~~18. Insure the safety of grazing lands and forest areas from wildland fire by the continued use of agricultural and forestry burning procedures and regulations.~~ **(Existing LCP)**

### *Fire Safety Regulations*

**Policy C-PS-5d:** Continue to adopt revisions to the California Fire and Building Codes and other standards which address fire safety as they are approved by inspection organizations and the State of California. Review, revise, and/or adopt existing or new local Codes, ordinances, and Fire Safe Standards to reflect contemporary fire safe practices. **(GP2020)**

~~17. Require any construction to comply with the standards prescribed by comprehensive Building Codes and Fire Prevention Codes which give special consideration to different degrees of hazard.~~ **(Existing LCP)**

**Policy C-PS-5e:** Encourage strong enforcement of state requirements for fire safety by the California Department of Forestry and Fire Protection. **(GP2020)**

**Policy C-PS-5f:** Controlled burns shall be allowed on agricultural land with a permit from the local fire agency and in consultation with the local Air Quality Management District and California Department of Forestry and Fire Protection. **(Existing LCP)**

**Policy C-PS-6g:** Automatic fire sprinkler systems or other on-site fire detection and suppression systems shall be required in all new residential and commercial structures, with exceptions for detached utility buildings, garages, and agricultural-exempt buildings. **(GP2020)**

~~19. Regulate the use of spark retarding devices on all equipment. (Existing LCP)~~

### *Development Review*

**Policy C-PS-5h:** The severity of natural fire hazards, potential damage from wildland and structural fires, adequacy of fire protection services, and mitigation measures consistent with the Public Safety Element shall be considered in the review of proposed development projects. **(GP2020)**

**Policy C-PS-5i:** Proposed development projects and proposed revisions to the Sonoma County Fire and Building Codes shall be referred to the Sonoma County Fire and Emergency Services Department and responsible fire protection agencies for their review and comment. **(GP2020)**

**Policy C-PS-5j:** Consider additional impact or mitigation fees or a benefit assessment to offset the impact of new development on fire services. **(GP2020)**

**Policy C-PS-5k:** ~~Require~~ Fire management plans ~~shall be required with applications~~ for subdivisions and for new or expansion of existing recreational facilities in non-urban areas, including the development of State California Department of Parks and Recreation and Sonoma County Regional Parks Department holdings. Such plans ~~should~~ shall include, but not be limited to, adequate water storage, adequate ingress and egress for emergency vehicles and occupant evacuation, and building siting to minimize fire hazards. **(Existing LCP Revised)**

### *Emergency Response*

**Policy C-PS-5l:** Improve and standardize the County's street addressing system in order to reduce emergency service response times. **(GP2020)**

### *Public Education*

**Policy C-PS-5m:** Encourage and promote fire safe practices and the distribution of fire safe educational materials to the general public, permit applicants, and local planning agencies. **(GP2020)**

**Policy C-PS-5n:** ~~Urge~~ Encourage the State California Department of Parks and Recreation, and the Sonoma County Regional Parks Department to continue efforts to educate the public ~~to~~ about fire hazards and fire prevention. **(Existing LCP Revised)**

**Policy C-PS-5o:** Provide fire hazard information signs in Areas of Very High or High Potential for Large Wildland Fires in a manner that is consistent with the Local Coastal Plan and does not degrade Scenic Highway Corridors or scenic views. **(GP2020)**

**Policy C-PS-5p:** Encourage private individuals and communities on the Sonoma County Coast to construct small-scale water ~~impoundments~~ storage facilities for back-up use in the case of fire and for back-up non-potable water demand ~~in coastal communities~~. ~~Agricultural Extension Service advice and credit assistance now available to farmers and ranchers should be made available to those interested in such construction.~~ **(Existing LCP Revised)**

## 7. HAZARDOUS MATERIALS

### Background

Many man-made substances can be hazardous to human health and the environment, which includes air, soil, water, plants, and animals. The California Health & Safety Code defines a hazardous material as "any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and the environment if released into the workplace or the environment." Common hazardous materials include oils, fuels, paints and varnishes, antifreeze, cleaning products, solvents, pesticides (includes herbicides, insecticides, fungicides, and rodenticides), and the associated hazardous waste. The increased use of hazardous materials has increased the potential hazards from hazardous materials and actual human injury and environmental damage, especially when they are used and disposed of near surface water. Public concerns have led to tighter controls on the production, transport, storage, sale, and use of hazardous materials, particularly on the handling and disposal of concentrated residues and wastes produced by power plants and other industrial operations.

Hazardous materials are found at many locations in Sonoma County. The electrical generating plants in The Geysers geothermal area use and produce hazardous materials hauled on winding mountain roads. Spills and releases of such materials have occurred. Petroleum fuels get into groundwater and surface water, particularly from underground storage tanks at gasoline stations and marinas. Preventing hazardous materials in the County's solid waste landfills and transfer stations and industrial operations is important because these materials could affect water quality. Boat use, repair, and maintenance activities at Bodega Bay, Spud Point Marina, and Porto Bodega in the Coastal Zone involve the storage, handling, use, and disposal of hazardous materials such as oils and fuels, paints and varnishes, solvents, and cleaning agents that may drain to surface water.

Pesticides are another hazardous material commonly used in Sonoma County by agricultural operations as well as residential, commercial, and recreational land uses. While state law preempts local regulation of pesticides, the County does have the authority to establish use restrictions applicable to its own operations. By doing so, the County can set an example that will encourage others to reduce reliance on pesticides.

Concerns about Outer Continental Shelf (OCS) oil and gas development led to the approval of Ordinance 3592R in the late 1980s, a Countywide ballot initiative that requires voter approval of any proposed Local Coastal Plan Amendment to allow onshore facilities that would support OCS oil and gas development (see Outer Continental Shelf Development Policy in the Land Use

Element). The issue of potential oil or other hazardous material spills from onshore support facilities would be addressed in the required environmental documents on the proposed projects.

The management of hazardous materials is included in this Public Safety Element because it has become a major public safety issue requiring attention significant personnel and financial resources and attention by local agencies. Different local, state, and federal agencies have different responsibilities in regulating hazardous materials, discussed under “Regulatory Setting” below.

## Regulatory Setting

Public concerns over the possible adverse effects of hazardous materials on human health and the environment have led to tighter regulatory controls on the production, transport, storage, sale, handling, and use of hazardous materials.

**California Coastal Act.** Section 30232 of the California Coastal Act requires that measures to protect against hazardous materials spills, and facilities and procedures for containment and cleanup of hazardous substances spills, be incorporated into proposed projects meeting the definition of “development” and which involve handling or transporting hazardous substances.

***Section 30232. Oil and hazardous substance spills.***

*Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.*

**Hazardous Materials and Waste Handling, Storage, Use & Disposal.** The primary federal laws regulating hazardous materials, administered by the U.S. Environmental Protection Agency (U.S. EPA), are the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). CERCLA, often referred to as the Superfund, was enacted to provide broad federal authority to clean up releases or threatened releases of hazardous substances at abandoned hazardous waste sites in the U.S.

RCRA amended the Solid Waste Disposal Act of 1965 and set national goals for protecting human health and the natural environment from the potential hazards of waste disposal; energy conservation and natural resources; reducing the amount of waste generated through source reduction and recycling; and ensuring the management of waste in an environmentally sound manner. It is now most widely known for the regulations that set standards for the treatment, storage, and disposal of hazardous waste in the United States. The hazardous materials waste program under RCRA establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal — in effect, from “cradle to grave.” In any given State, EPA or the State hazardous waste regulatory agency enforces hazardous waste laws. EPA encourages States to assume primary responsibility for implementing a hazardous materials and waste program through State adoption, authorization, and implementation of the regulations.

The State of California has assumed the primary responsibility for implementing the federal hazardous materials and waste program. California legislation adopted in 1993 (Senate Bill 1082) established the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program). The Unified Program consolidates, coordinates, and makes consistent the California EPA (Cal EPA) programs for hazardous materials inventories and business plans; permitting for generators of hazardous waste and operators of on-site hazardous waste treatment; aboveground storage tanks; underground storage tanks; spill or accidental release prevention, control, and response; and fire code management plans. Under the Unified Program Cal EPA certifies local agencies to implement the six state environmental programs listed above within their jurisdictions. These local agencies are referred to as Certified Unified Program Agencies (CUPAs).

The California Department of Toxic Substances Control (DTSC) is vested with the primary authority through the U.S. EPA to enforce federal and state laws pertaining to the regulation of hazardous materials and waste in California. DTSC regulates hazardous waste, cleans-up existing contamination, and looks for ways to reduce the hazardous waste produced in California. DTSC programs include but are not limited to preventing releases of hazardous waste by ensuring that those who generate, handle, transport, store and dispose of hazardous waste do so properly and by overseeing site cleanups when improper hazardous materials releases occur. The DTSC has authorized the Sonoma County Fire and Emergency Services Department as the Certified Unified Program Agency (CUPA) to enforce federal, state, and local laws pertaining to hazardous materials and hazardous waste management. The Fire and Emergency Services Department enforces Chapter 29 of the Sonoma County Code regarding hazardous materials management, and for preparing a comprehensive hazardous materials and hazardous waste management plan. Chapter 29 regulates the storage, handling, and management of hazardous materials, whether in waste or non-waste form, unless specifically preempted by state or federal law. The Fire and Emergency Services Department is also responsible for emergency response to hazardous materials incidents throughout most of the County in coordination with local fire and police personnel, and enforces portions of the California Fire Code which address hazardous materials, including routine inspections.

**Underground Storage Tanks.** The State Water Resources Control Board (SWRCB) is vested with the primary authority through the U.S. EPA to enforce federal and state laws pertaining to Leaking Underground Storage Tanks (USTs) containing hazardous substances. The SWRCB has authorized the Sonoma County Department of Health Services as the lead agency and Certified Unified Program Agency (CUPA) to enforce federal, state, and local laws pertaining to leaking USTs in the County.

**Pesticides.** The U.S. EPA and the various States register or license pesticides (herbicides, insecticides, herbicides, fungicides, rodenticides, and antimicrobials) for use in the United States under the Federal Insecticide, Fungicide, and Rodenticide Act of 1972 (FIFRA) and the Federal Food, Drug, and Cosmetic Act of 1938 (FDCA). States are authorized to regulate pesticides under FIFRA and the state's pesticide laws. States may place more restrictive requirements on pesticides than the U.S. EPA. Pesticides must be registered both by the U.S. EPA and the state before they can be distributed.

The California Department of Pesticide Regulation (DPR) is vested with the primary authority through the U.S. EPA to enforce federal and state laws pertaining to the proper and safe use of

pesticides in California. DPR's enforcement of pesticide use in the field is largely carried out in California's 58 counties by County Agricultural Commissioner Offices and their staffs. The DPR has authorized the Sonoma County Office of the Agricultural Commissioner as the lead agency and Certified Unified Program Agency (CUPA) to enforce federal, state, and local laws pertaining to the use, storage, and sales of pesticides in the County.

**Oil Spills.** The Oil Pollution Act of 1990 (OPA) was enacted largely in response to rising public concern following the oil spill from the ship *Exxon Valdez*. The OPA improved the nation's ability to prevent and respond to oil spills by establishing provisions that expand the federal government's ability, and provide the money and resources necessary, to respond to oil spills. Under the OPA, the U.S. Coast Guard and U.S. EPA are the lead responsible agencies for preventing, preparing for, and responding to oil spills that occur in and around coastal waters and inland waters of the United States, respectively. In addition, the OPA provided new requirements for contingency planning for oil spills by government and industry

**Transport of Hazardous Waste.** The California Department of Toxic Substances Control (DTSC) is vested with the primary authority through the U.S. EPA to enforce federal and state laws pertaining to the transport of hazardous waste in California. The DTSC has authorized the California Highway Patrol and Office of the State Fire Marshal to enforce some of the federal, state, and local laws pertaining to the transport of hazardous waste.

To operate in California, hazardous waste transporters must be registered with the DTSC. Unless specifically exempted, hazardous waste transporters must comply with the regulations of the U.S. Department of Transportation, DTSC, California Highway Patrol, and Office of the State Fire Marshal. Unless specifically exempted, it is unlawful for any person to transport hazardous waste unless the person holds a valid registration issued by the DTSC; or to transfer custody of a hazardous waste to a transporter who does not hold a valid registration issued by DTSC. A hazardous waste registration issued by DTSC to a transporter is not transferable to any other person. Any person who transports hazardous waste in a vehicle must have a valid registration certificate issued by DTSC in his or her possession while transporting the hazardous waste.

**Goal C-PS-6:** **Prevent unnecessary exposure of people and property to risks of human injury or property damage from hazardous materials.**

**Objective C-PS-6.1:** Regulate the handling, storage, use, and disposal of hazardous materials in order to reduce the risks of human injury or property damage from hazardous materials.

**The following policies, in addition to others in this Public Safety Element and those in the Land Use and Public Facilities and Services and Water Resources Elements, shall be used to achieve these objectives:**

### *Agency Cooperation*

**Policy C-PS-6a:** Work with applicable regulatory agencies to regulate the transport of hazardous materials consistent with adopted County policies. **(GP2020)**

## *Regulations*

**Policy C-PS-6b:** While maintaining the autonomy granted to the County pursuant to State zoning laws, implement Federal, State, and County requirements for the storage, handling, disposal, and use of hazardous materials, including requirements for business, management, and spill or accidental release prevention, control, and response plans. **(GP2020)**

## **Facility Siting**

**Policy C-PS-6c:** Siting of hazardous waste repositories, incinerators, facilities that use a substantial quantity of hazardous materials, or other similar facilities intended primarily for hazardous waste disposal shall be avoided in any area subject to Modified Mercalli Index (MMI) Groundshaking Intensity Level of Very Violent (X), Violent (IX), Very Strong (VIII), or Strong (VII) identified on **Figures C-PS-1a-c** or within one quarter mile of schools. **(GP2020)**

**Policy C-PS-6d:** Siting of hazardous waste repositories, incinerators, or similar facilities intended primarily for hazardous waste disposal shall be avoided in any area designated for urban residential or rural residential use; on agricultural lands; or near waterways, bays, or the ocean. **(GP2020)**

**Policy C-PS-6e:** Hazardous waste facilities which have the primary purpose of reuse, recycling, or source reduction of hazardous wastes shall be sited in areas designated for industrial use in close proximity to users of hazardous materials and/or generators of hazardous wastes. **(GP2020)**

## *County Facilities and Operations*

**Policy C-PS-6f:** Continue to design and operate County owned solid waste disposal facilities to prevent disposal of and contamination by hazardous materials. **(GP2020)**

**Policy C-PS-6g:** Continue as needed the hazardous materials business advisory group, and consider adding an agricultural representative. **(GP2020)**

**Policy C-PS-6h:** Maintain the Sonoma County Operational Area Hazardous Materials Incident Response Plan that provides for effective responses to releases of hazardous materials, the safe disposal of hazardous wastes, and a public information program. **(GP2020)**

## *Public Education & Private Sector*

**Policy C-PS-6i:** Continue to educate the public about, encourage, and promote the reduction in use of hazardous materials and the use of safe alternatives to hazardous materials in County operations and private businesses. **(GP2020)**

**Policy C-PS-6j:** Continue to educate the public about and promote the Sonoma County Waste Management Authority's Household Hazardous Waste Program. Encourage free drop-off and reuse of computers and similar equipment containing hazardous materials. **(GP2020)**

**Policy C-PS-6k:** Continue to educate the private sector about green business opportunities and expand and promote the Sonoma Green Business Program of the County Department of Fire and Emergency Services. **(GP2020)**

**Policy C-PS-6l:** Encourage the private sector to reduce the use of potentially hazardous pesticides and to use alternatives such as best management practices. **(GP2020)**

**Policy C-PS-6m:** A use permit shall be required for any commercial or industrial use involving hazardous materials in threshold planning quantities as determined by Federal and State laws. A hazardous materials management plan shall be required as a condition of approval for such permits. **(GP2020)**

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