PISMO BEACH COMMUNITY WILDFIRE PROTECTION PLAN (CWPP) November, 2022

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Contents

Executive Summary

Community Wildfire Protection Plans (CWPP) seek to reduce losses to human life, property, and critical infrastructure for communities present within the Wildland Urban Interface (WUI). CWPPs originated from the Healthy Forests Restoration Act of 2003 and utilize wildfire risk assessment, provide community overviews and descriptions, identify assets at risk from wildfire, and offer recommendations towards improving community wildfire prevention, mitigation, preparedness, and recovery. CWPPs aid in wildfire planning and increase community access to resources for achieving the goals outlined in the document.

This CWPP studies (5,250)-acre region located in Pismo Beach, California in San Luis Obispo County. The Plan Area encompasses a wide range of land uses including tourism resorts, communities and other private property, and open space frequently used by the public. The potential for wildland fire in the region is substantial as highlighted by the 2020 Avila Fire which burned over 400 acres within the Plan Area. Wildfire poses significant threats to human assets within the plan area, highlighting the necessity of this CWPP. This document provides an overview of the study area including notable stakeholders, critical assets at risk, a description of weather and fuel conditions, and an analysis of wildfire behavior for both average and extreme weather conditions. Based on this information, we provide both biophysical and sociopolitical recommendations for improving community wildfire prevention, mitigation, preparedness, and recovery within the study area. Achievable measures are presented which significantly reduce the likelihood of disastrous wildfire in the plan area. We present a detailed description of each recommendation and highlight their priority for implementation. This document is intended to act as a living document capable of being amended through consistent stakeholder and community interaction.

1.0 Introduction

The desired goals of this community wildfire protection plan are provided in addition the objectives which outline measurable steps necessary to achieve these goals. These goals were developed in coordination between the County of San Luis Obispo Fire Safe Council and CAL Fire/Pismo Beach Fire Department. These goals and objectives also align with those identified in the County of San Luis Obispo CWPP.

Table 1. Goals and objectives of this CWPP.

Goals	Objectives
1) **Reduce costs and losses associated with wildland fires**	• Assess wildfire hazard within the project area and determine prioritized measures to enhance community safety • Provide recommendations for community alert protocols • Develop a GIS database for the project area with past and future fuel modification treatments • Identify and promote post-fire management practices to mitigate negative impacts of wildland fire
2) **Identify fire hazard and assets at risk**	• Determine assets likely to be impacted by wildland fire • Assess previous wildland fire occurrences within the project area • Perform fire behavior modelling to predict wildfire severity based on different weather conditions and ignition locations • Recognize the beneficial aspects of wildland fire and recommend opportunities for implementing prescribed fire

Goals	Objectives
3) **Develop prioritized mitigation practices to reduce threats and risks to identified assets**	• Recommend key areas where fuel modification should be conducted • Recommend citizen-based changes that improve home and structure hardening and the implementation of defensible spaces
4) **Promote fire-safe community education through the San Luis Obispo Fire Safe Council and FIREWISE community designation process**	• Develop public educational strategy to communicate the findings of this plan to relevant members of the community • Provide the community with resources for becoming a designated FIREWISE community

1.1 Policy and Regulatory Framework

An understanding of relevant policies and regulations is essential for creating a CWPP that aligns with federal, state, and community guidelines. The goals and recommendations provided in this plan are consistent with these policies and regulations. Relevant federal, state, and local policies and regulations are provided in Appendix A.

1.2 CWPP Development

The Healthy Forests Restoration act of 2003 developed the necessary requirements for developing a CWPP. These include:

1) **Collaboration-** The plan must involve relevant local and state representatives, while consulting with interested agencies and parties.
2) **Prioritized Fuel Reduction-**The type and location of fuel reduction measures must be identified in a CWPP to protect at risk communities and other assets at risk
3) **Treatment of Structural Ignitability-** The plan must provide measures that community members and homeowners can undertake to reduce the ignitability of structures within the plan area.

2.0 Community Overview and Demographics

The Plan Area is comprised of a roughly 5,250-acre area in Pismo Beach, California, an incorporated city located in San Luis Obispo County within the central coast region of California. The majority of the Pismo Beach City limits are included within the study area, in addition to select lands bordering the city boundary. The study area extends to the coastline and is bordered by the Pismo Beach city limits at the northwest corner, Gragg Canyon Road in the northern region, Thousand Hills Road in the eastern region, and North Oak Park boulevard and Pismo Beach city limits in the southeastern region

(Figure 1). The Plan Area is near the towns of Avila and Grover Beach and is located approximately 13 miles from the city of San Luis Obispo. A variety of land uses exist including private ranchland, agricultural areas, community open space, coastal areas, and urbanized areas including residential housing, hotels, shops and restaurants, and schools. Highway 101 bisects the study area, making Pismo Beach a familiar destination for many. Desirable weather, beautiful scenery, and ample access to recreation make Pismo Beach a popular tourist destination. While the Plan Area's coastal proximity leads to a deceptive interpretation of wildfire risk, many of the urbanized areas can be classified to be within the Wildland Urban Interface (WUI) which includes areas where the built environment borders the natural environment. Risks from wildfire are highest in these areas within the Plan Area.

Figure 1. CWPP plan area boundary showing infrastructure, community names, and other notable features.

2.1 Population

The population of Pismo Beach is estimated at 8,054 as of 2022 (US Census Bureau 2021). The city has seen a 5.05% growth rate in population since 2010 which is moderate when compared to other cities in California. Most people within Plan Area reside within the community of Shell Beach, the Pismo Heights, Pacific Estates, or Pacific Oaks. Growth in residential housing within the City limits is suppressed given limited available land and the city's coastal proximity. The number of people present within Pismo Beach varies greatly due to considerable levels of tourism, with over 2.5 million people visiting the area annually (Klemz, 2013). Tourism peaks during summer months and is a valuable component of the city's economy.

2.2 Demographics

Residents within the Plan Area are predominantly white at 88.34%. The median age is 57.5 years. Average family size is 2.56 with an average household size of 1.94. 30.5% of people in Pismo beach over 25 years of age possess a bachelor's degree, while 2.7% of individua's lack a high school diploma. The rate of home ownership is 72.5%, while 27.5% of people are renters. Median home value is estimated at $759,800 and monthly rent costs average $1,805. Of the homes sold in 2022, median price averaged at $1.4 million. Home sales in Pismo Beach increased 6.0% compared to those observed in 2021. Household income is roughly $117,000, with an overall poverty rate 8.14%. Extreme wealth is also represented within the study as represented by select homes valued at $6.5 million. 53.4% of people participate in the labor force, with the rate of those unemployed currently at 2.6% (U.S Census Bureau, 2021).

2.3 Land Uses

The Plan Area features a variety of land uses. Regions bordering the coastline commonly include residential housing and developments for tourism. The popular Pismo Pier and neighboring downtown are the most used coastal areas. Multiple community parks also exist along the coastal areas of the study area. A large proportion of the land area north of Highway 101 includes ranchland, small agricultural areas, and open space. While most of these lands are limited to private access, the Pismo Preserve owned and maintained by the San Luis Obispo Land Conservancy allows public access. The Pismo Preserve features recreational trails for horseback, hiking, and biking and is a popular destination for recreationalists. The preserve recorded roughly 180,000 visitors in 2021 and continues to grow in popularity. This high level of human activity is stark compared to neighboring private lands, therefore making the Pismo Preserve an area associated with high risk of human-caused ignitions. Additional natural areas within and bordering the Plan Area include the areas of Avila Ridge and the Cave Landing area owned by County Parks. These locations also attract

substantial human use for their outdoor recreational opportunities, increasing the risk of human caused ignitions. The ignition risk from these areas and others will be described further in subsequent sections. The study area includes ecologically sensitive areas, important utilities and communication infrastructure, and schools. A detailed description of these areas and the risks posed to them from wildfire is provided in the assets at risk section.

2.4 Local Jurisdictions

The Plan Area includes both state (SRA) and local responsibility areas (LRA) (Figure 2). These different designations are important in that they result in different regulations regarding community wildfire management. SRA lands are those in which the state of California is financially responsible for wildfire suppression and prevention. LRAs include incorporated cities and other areas where local governments are responsible for wildfire protection. CAL Fire is the state agency responsible for fire management on SRA lands. LRA lands in San Luis Obispo County are unique in that CAL Fire (San Luis Obispo County Fire) serves as the contracted responsible fire agency and has done so since 1930. Therefore, CAL Fire handles fire prevention and suppression efforts in the SRA and LRA in the study area. However, SRA and LRA lands in the Plan Area do involve key regulatory differences. Homeowners residing in the SRA must comply with Chapter 7A of the California building code, regulatory requirements set by the Office of the State Fire Marshall which have a goal of reducing damage to human life and property. The regulations described in Chapter 7A apply only to structures built after 2008 and are enforceable for homeowners with living within SRA lands designated as expressing Very High, High, or Moderate fire severity zones. Yet local governments can choose to either adopt or reject these regulations in the LRA. This is relevant in the context of this study area, as the city of Pismo beach has chosen to reject the state fire hazard severity zone designation. Building construction within the LRA instead must comply with regulations outlined in the City of Pismo Beach Building Code. The specifics of these local regulations will be described in further detail in subsequent sections.

Figure 2. SRA and LRA lands within the plan area.

3.0 Collaboration

Collaboration across multiple groups and stakeholders is essential for mitigating risks associated with wildfire. Understanding and cooperation between relevant groups facilitates and increases pace and scale of actions aimed to reduce wildfire losses. While recommending productive management practices is quite feasible, actualizing these recommendations often requires interoperation across multiple groups. We outline key stakeholders and describe their interest in the wildfire issues present in this study area.

3.1 CAL Fire/Pismo Beach Fire Department

The City of Pismo Beach is in a cooperative fire protection agreement with CAL Fire and is the agency responsible for fire suppression and prevention in the plan area. The department employs a full-time staff comprised of a battalion chief, six fire captains, six fire apparatus engineers, and firefighting personnel. They prioritize mitigating losses to human life and property. The department develops pre-attack plans which are utilized during the event of a wildland fire and is responsible for tactical firefighting decisions. They also enforce state designated building codes in addition to the City of Pismo Beach Weed Abatement Program. Fuels treatments are either sub-contracted or conducted by CAL Fire crews. The department is interested in this CWPP for its potential to mitigate wildfire risks in the Plan Area.

3.2 Land Conservancy of San Luis Obispo

This non-profit works cooperatively with private landowners and government agencies to conserve lands in San Luis Obispo County. The land conservancy has conserved over 24,000 acres within the county, including the Pismo Preserve which exists within the study area. This group is interested in decreasing ignitions and fire risk at the Pismo Preserve. The land conservancy also greatly promotes the protection of biological, archaeological, and scenic resources.

3.3 City of Pismo Beach

The City government is comprised of multiple divisions which work collaboratively to make community level decisions, provide services, and recreational opportunities. The City of Pismo Beach seeks to reduce risks to human life and critical infrastructure within city limits.

Planning Division

This department works with both the City Council and Planning Commission to develop and carry out long term plans including the City's Local Coastal Plan. The Planning Division also references the City General Plan to guide long-term planning. Most notably for the purposes of this CWPP, the Planning Division is responsible for approving or disproving new development within the city limits.

These decisions influence community fire risk, which is greatly considered during the approval process.

Pismo Beach Public Works Department

This department is responsible for constructing, designing, and maintaining public infrastructure within city limits. The department oversees the maintenance of streets, water and wastewater infrastructure, and city parks. Wildland fire poses a threat to this infrastructure and the services it provides, some which area essential for the community.

Pismo Beach Police Department

The City Police Department seeks to provide a public safety service within the Pismo Beach City limits. City police departments play an important role during a wildland fire through assisting with evacuation and preventing public access in mandatory evacuation areas. The department also can also assist in reducing ignitions through enforcement of local fire restriction guidelines.

3.4 Northern Chumash Tribal Council

The plan area exists within Northern Chumash tribal lands. The Northern Chumash Tribal Council is a nonprofit corporation seeking to preserve Chumash culture in San Luis Obispo County. The council is concerned with protecting cultural resources present in areas of the study area. Cultural resources may be impacted directly from wildfire, wildfire suppression activities, or fuels treatments.

3.5 California Coastal Commission

This government agency seeks to preserve and enhance coastal areas of California through environmentally sound development and land use decisions. The Plan Area exists within the San Luis Obispo Coastal Zone which exists between the Monterey and Santa Barbara Coastal Zones. The Coastal commission possesses authority over permitting decisions within the Coastal Zone as outlined in the California Coastal Act (CCA). Implementation of policies described in the CCA is accomplished through Local Coastal Programs (LCPs) that are mandated by counties and cities within the Coastal Zone. The City of Pismo Beach possesses a valid LCP which describes requirements related to development including the treatment and protection of coastal biological resources. These requirements are considered when planning and conducting fuels reduction projects in the jurisdictional area of the Pismo Beach LCP. Coastal development permits may be required for pre-fire activities defined to be “development”. The necessary permitting process is determined by the local coastal planner.

3.6 San Luis Obispo County Parks

County parks owns and operates the Cave Landing area just south of Avila Beach and adjacent to the plan area. The area was designated as part of the County Parks system in 2021 after approval

from the San Luis Obispo County Board of Supervisors. County parks is interested in considering fire risk when managing the park for the future given high ignition risk at the site from high public use and an unhoused population.

3.7 Homeowners and Homeowners Associations (HOAs)

Homeowners within the Plan Area have expressed concerns regarding risks from wildland fire. The Avila Fire of June 2020 greatly increased community awareness about wildfire threats. Many homeowners are interested in improving fire safety of their property through the creation of defensible space, home hardening measures, and other pre-fire preparedness measures. Many homes and HOAs exists within the WUI, increasing the risks from wildland fire. Minimizing homeowner losses within the study area is a key reason for this CWPP, making homeowner participation and buy in an essential component. HOAs can also be useful sources of funding for neighborhood projects including fuels reduction and the maintenance of defensible space. HOAs are often responsible for annual maintenance of community Fuel Modification Zones.

3.8 Private Landowners

Most areas classified as wildlands in the Plan Area are privately owned land holdings. Owners of these lands have been previously impacted by the Avila fire and are aware of the potential for wildfire on their lands. An estimated 75% of landowners outside the city participate in vegetation management. The involvement of these landowners is essential for improving fire management within the plan area and achieving long term goals described in this CWPP.

3.9 California Department of Fish and Wildlife (CDFW)

The project area falls within the Department of Fish and Game Central Region #4. CDFW has regulatory responsibility for protecting state wildlife. The agency is mainly concerned with conserving species protected under the California Endangered Species Act (CESA). CDFW may need to be consulted during fuel modification treatments if threats to protected wildfire are present, or where streambeds may be altered.

3.10 California Highway Patrol (CHP)

California Highway Patrol is a valuable asset during an active wildfire. CHP assists local police departments and helps facilitate safe evacuations and road closures. Given the presence of Highway 101 within the study area, CHP officers are essential for expediting and directing vehicles safely away from the wildfire area via the highway. CHP is likely interested in pre-fire planned evacuation routes and active fire operations.

3.11 California Department of Transportation (Caltrans)

Caltrans manages roadways designated as part of the state right-of-way highway system. This includes Highway 1 and 101 which both exist within the Plan Area. Caltrans is concerned with roadside ignitions from state rights-of-ways. Fuels reduction including mowing is common practice within the right-of-way designated areas. If fuels reduction projects promoted by external groups are likely to impact areas under Caltrans oversight, an encroachment permit from the District-5 Encroachment Permit Branch may be required.

3.12 Pacific Gas and Electric (PG&E)

PG&E owns and maintains electrical and gas infrastructure across California and within the Plan Area. PG&E equipment has been responsible for destructive wildfires in California making this stakeholder particularly interested in reducing ignitions. To mitigate ignitions from powerline infrastructure, the California Public Utilities Commission (CPUC) requires 4 feet of vegetation clearance around powerlines in High Fire-Threat Districts (HFTD) with a recommend 12 feet of clearance at the time of pruning. The project area falls under a high-fire threat designated and therefore requires PG&E maintain the requirements described in Rule 35 of CPUC General Order 95.

3.13 County of San Luis Obispo Office of Emergency Services (OES)

The County Office of Emergency Services (OES) works to ensure preparedness in response to emergencies including wildfire, flooding, or radioactive exposure from a catastrophic event at Diablo Canyon nuclear power plant. The OES creates plans for mitigating risks, planning for an emergency event, effective response during and emergency, and recovery measures. During an emergency event such as a wildfire, the county OES supports and coordinates with local cities, districts, and fire and law enforcement agencies to acquire necessary resources for emergency personnel and evacuated members of the community. The OES takes great interest regarding wildfire risk assessment and planning in the Plan Area. This group encourages effective emergency management and promotes cooperation between the public and agencies involved in wildfire emergency response.

3.14 Central Coast Region #3 Water Quality Control Board (RWQCB)

The regional water quality control board (RWQCB) seeks to protect the health of California waters and determine if proposed projects are in accordance with laws and regulations including the Porter Cologne Water Quality Control Act and the Federal Clean Water Act. The RWQCB may take interest in fuels reduction projects that may impact water quality. Water board staff should be consulted if the proposed project is believed to pose a threat to local water quality.

3.15 San Luis Obispo County Air Pollution Control District (APCD)

This agency is responsible for controlling air quality at the local level. The APCD is responsible for achieving air quality standards outlined by the California Air Resources Board (CARB) and the federal Environmental Protection Agency (EPA). Burn permits issued by the APCD are required for small burns, while larger burns including prescribed fire require the completion of a Smoke Management Plan (SMP) or an application through the Prescribed Fire Information Reporting System (PFIRS). Due to significant smoke production during a wildland fire, the APCD is also interested in reducing the likelihood of severe wildfire in San Luis Obispo County.

3.16 County of San Luis Obispo Department of Planning and Building

This department oversees planning and building within the unincorporated areas of San Luis Obispo County. All SRA lands in the project fall under this classification. The department seeks to build safe communities through policies, zoning enforcement, permitting, and environmental review. While building permits resemble the majority, the department may require permits for pre-fire activities which involve tree removal, removal of vegetation within environmentally sensitive habitat areas (ESHA), or the removal of state or federally listed species. The County Planning Department also possesses valuable databases including biological resources, land use data, geology, and archaeology.

4.0 General Description of the Fire Problem

A substantial threat from wildfire exists within the Plan Area. In California, a clear increase in the size and severity of wildfires is evident because of an increase in extreme fire weather and other combining factors (Calkin, 2019). In the Plan Area specifically, climate, fuel conditions, steep slopes, and areas at high risk for potential ignitions combine to increase the probability of catastrophic wildfire. Risks from wildfire are exacerbated due to the proximity of the built environment to natural areas which are highly receptive to fire. Wildfire threats are clearly highlighted through the Avila fire of June 2020 which burned roughly 640-acres within the Plan Area (FRAP, 2022). Driven by strong winds, this fire posed substantial threats to human life and property. If not for timely and extensive suppression efforts and an eventual decline in wind speeds, substantial losses to human property could have easily occurred. This event changed many people's perception of local wildfire risk and highlighted the present possibility for substantial losses.

5.0 Hazard Assessment

Assessing wildfire hazard is an essential component of a CWPP and provides context regarding the likelihood of a fire to occur and the scope and severity of the fire. Multiple contributing factors including fuel conditions, weather, and topography combine to influence the degree of wildfire hazard. We provide an assessment of the factors influencing the severity of wildfire in the study area and use these attributes to model potential fire behavior.

5.1 Fire Ecology

Fire is a natural component of many ecosystems throughout California, including coastal areas of San Luis Obispo County. In addition to ignitions from natural sources such as lighting, indigenous people actively participated in prescribed burning to clear land for agriculture, create favorable hunting grounds, and promote healthy ecological conditions. Historic natural fires were large and infrequent, while intentionally set fires were often smaller and more strategic (Cuthrell et al., 2012). The historical role of fire in the Plan Area is clearly observed through the presence of plant species which express fire-adapted traits. This is seen through resprouting following a wildfire, fire resilient bark, or species which only germinate following physical or chemical exposure to fire. Further, many species produce prolific seedbanks within the soil to enhance post-fire re-establishment (Sugihara et al., 2006). The study area also exists where the Northern Chumash historically inhabited prior to European colonialization, a tribe that frequently used fire as a beneficial tool.

The fire regime of the Plan Area has been greatly altered in recent centuries due to urbanization and greater occurrences of extreme fire behavior. Ignitions are most-often accidently caused by humans or other infrastructure. Increased development near wildland areas has led to an overall increase in fire suppression efforts, nearly eliminating the natural role of fire in the local environment. Upward trends in temperature and extreme weather events have also exacerbated the potential for wildfire severity. On rare occasions, thunderstorms and lighting strikes can occur in the study area. Although uncommon, dry-lighting storms can produce significant ignition risk. This possibility was highlighted in August of 2020 when a dry lighting event ignited hundreds of wildfires including the CZU Lighting complex in Santa Cruz County. Fires in proximity to the Plan Area were also started during this event including the Crux Fire (190 acres) and the Ranch Fire (75 acres).

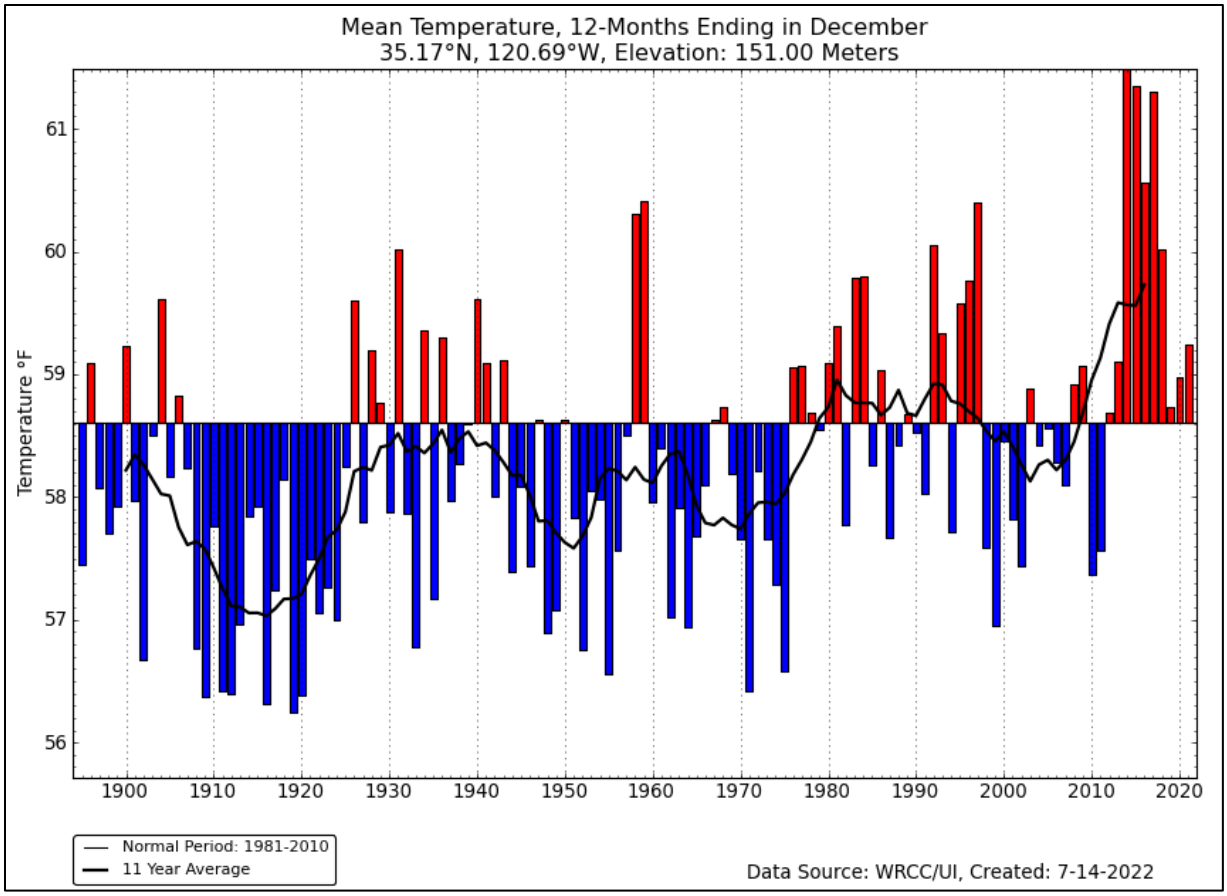

Figure 3. Mean temperatures in Pismo Beach from 1890-2022 (Abatzoglou et al., n.d. (WestWide Drought Tracker).

Pismo Beach has warmed 2.7 degrees Fahrenheit since 1915 (Figure 3). In addition, statewide reductions in nighttime humidity during non-winter months has resulted in drier and more fire receptive fuel conditions. Paired with the potential for dry and warm Diablo winds, present conditions promote a greater likelihood for severe fire behavior. In Pismo Beach, negative trends in minimum relative humidity have occurred since 2000 (Figure 4).

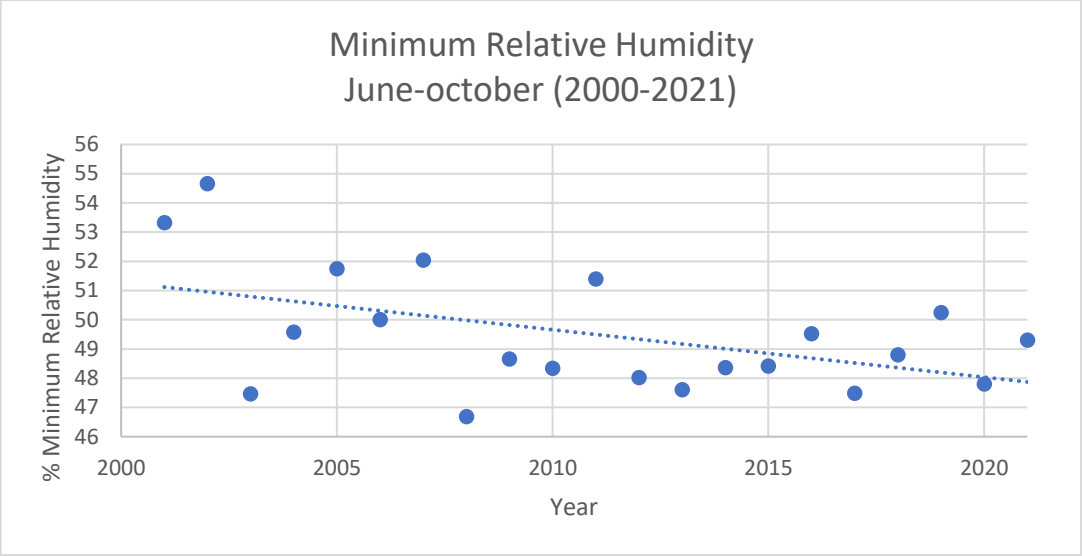

Figure 4. Changes in mean relative humidity in Pismo Beach from 2000-2022 (Visual Crossing Weather, n.d.).

Understanding historical and current wildfire dynamics in the Plan Area is needed to effectively understand risks and to develop management practices to mitigate negative impacts from wildfire.

5.2 Vegetative Communities

The study area possesses vegetative communities common to the central coast region of California (Figure 5). Oak woodlands are extensive throughout and commonly found on north facing slopes or within drainages and riparian areas. Mixed chapparal communities are common in the Plan Area and are comprised of species including chamise, manzanita, and scrub oak. The largest continuous patches of chapparal exist within the Squire canyon area and on the west facing slopes adjacent to Highway 101 in the northern region of the study area. Coastal scrub communities are mainly comprised of species such as California black sage, California sagebrush, and coyote brush. Coastal scrub possesses similar fire dynamics to chaparral, yet often burns at a lower severity. Coastal scrub commonly exists on south facing slopes in the with large patches found south of Avila Ridge and on the steep slopes north of Highway 101. Grassland communities are common in flatter areas. These communities are predominantly comprised of annual species with high proportions of non-natives.

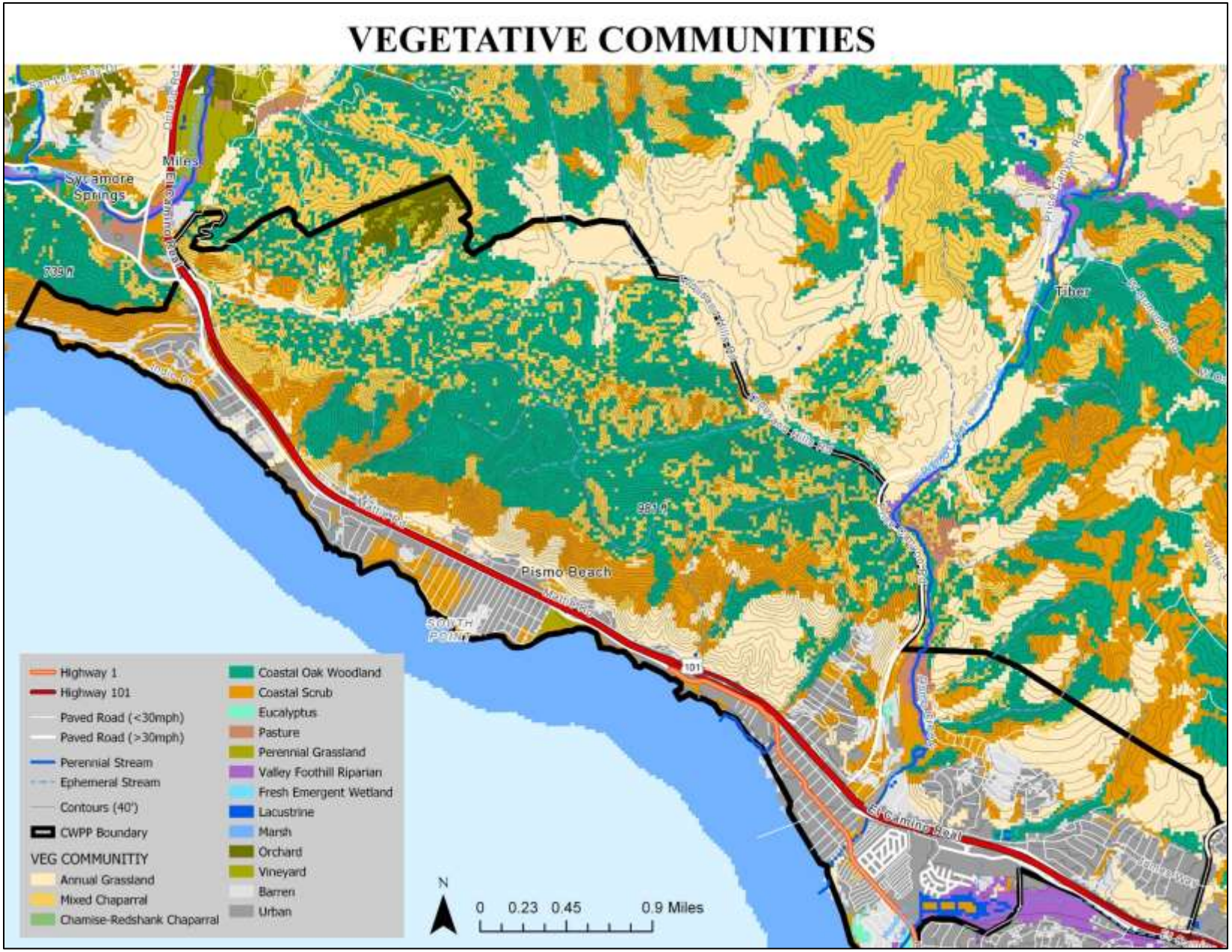

Figure 5. Vegetative communities within the plan area. Data obtained from CAL Fire FRAP GIS Database.

5.3 Fuel Conditions

Characteristics of both live and dead vegetation, commonly referred to as fuels, greatly influence potential wildfire behavior and severity. Fuel conditions include the type of vegetation (e.g Coastal scrub, oak woodland, annual grassland, chaparral, etc.), the fuel moisture, chemical makeup, and density. These factors combine to influence the fuel's flammability. The type of vegetation and its fuel moisture is often the greatest influencer of flammability. Tree species such as Coast Live oak generally possess greater moisture contents and are more resistant to ignition. Yet, trees create the opportunity for crown fire which occurs when fire is transferred from one tree to another via canopy spread. Crown fire is often observed during extreme fire behavior and can magnify a fire's rate of spread and flame lengths. Urban tree species such as Eucalyptus pose high risk of crown fire due to flammable oils present within canopy leaves. Trees are often classified as heavy fuels which burn slower and over longer periods. While heavy fuels require greater energy for ignition, their long burn periods and high fuel content can promote extreme fire behavior. Shrub species comprising coastal scrub and chapparal vegetative communities can also facilitate severe fire behavior given their low moisture content and often high proportion of dead woody material. Chaparral is often highly conducive to wildfire spread due to a high surface area to volume ratio, volatile organic compounds present in leaves, and high proportion of dead woody material. Wildfire hazard is exacerbated in mature chapparal from increased fuel continuity and the buildup of dead flammable material which accumulates over time. A common shrub species within the study area, Chamise, possess oils within its leaves that substantially increases flammability. Grasses are generally classified as fine or flashy fuels. This fuel type expresses a high surface area to volume ratio which causes grassed to ignite readily. The flammability of grasses is highly dependent on the greenness of the plant. While grasses in the winter and spring months are often green and express substantial fuel moisture, grasses can become cured following the growing season leading to increased ignitability and greater potential for wildfire spread.

Fuel models exist to map fuel types for use in fire behavior predictive modelling. The fuel model developed by Scott and Burgan (2022) was utilized to quantify fuel conditions within the Plan Area (Figure 6).

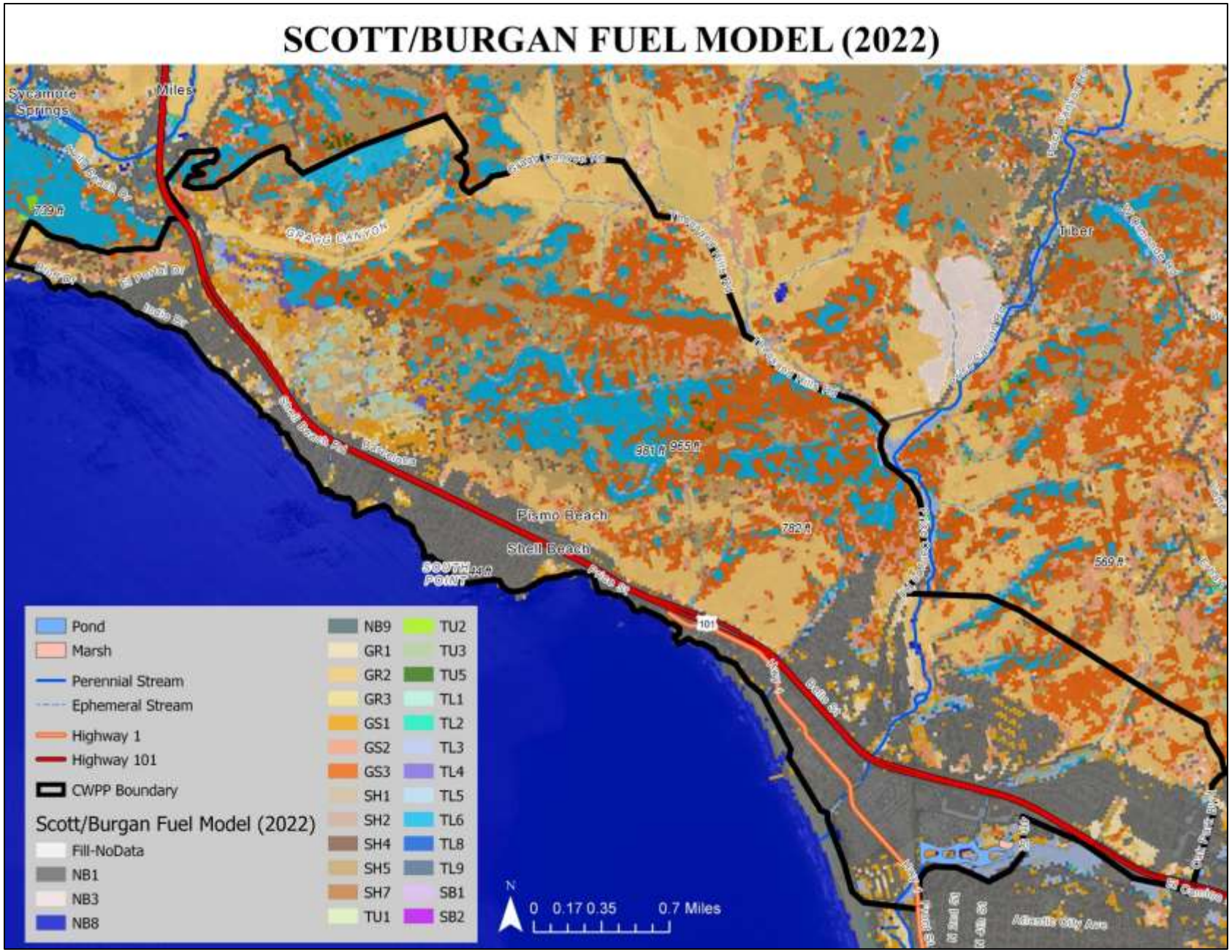

Figure 6. Fuel model types within the Plan Area using the Scott and Burgan Fuel Model (2012). Data obtained from LANDFIRE.

Table 2. Fuel model designations present within the Plan Area.

FUEL MODEL NAME	DESCRIPTION
NB1	Urban/developed
NB3	Agricultural
NB8	Open Water
NB9	Bare Ground
GR1	Short, sparse, dry climate grass
GR2	Low load, dry climate grass
GR3	Low load, very course, humid climate grass
GS1	Low load, dry climate grass-shrub
GS2	Moderate load, dry climate grass-shrub
GS3	Moderate load, humid climate grass-shrub
SH1	Low load, dry climate scrub
SH2	Moderate load, dry climate scrub
SH4	Low load, humid climate timber-shrub
SH5	High load, dry climate shrub
SH7	Very high load, dry climate shrub
TU1	Low load, dry climate timber-grass-shrub
TU2	Moderate load, humid climate timber-shrub
TU3	Moderate load, humid climate timber-grass-shrub
TU5	Very high load, dry climate timber-shrub
TL1	Low load, compact conifer litter
TL2	Low load, broadleaf litter
TL3	Moderate load, conifer litter
TL4	Small-downed logs
TL5	High load, conifer litter
TL6	Moderate load, broadleaf litter
TL8	Long-needle, litter
TL9	Very High load, broadleaf litter
SB1	Low load, activity fuel
SB2	Moderate load, activity fuel or low load blowdown

5.4 Climate

The Pismo Beach region resembles a Mediterranean climate with the majority of annual rainfall occurring during the winter months. Annual rainfall averages 12.8 inches and occurs mostly from November-April. February is often the wettest month with an average of 2.7 inches of rainfall. Winter months are mild with average temperatures hovering around 65 degrees with a high number of sunny days. The dry season ranges from May-September with the least precipitation often occurring in July. Summer daytime temperatures average at 72 degrees (U.S Climate Data, 2022). The region receives strong coastal influence from the Pacific Ocean which commonly creates cooler temperatures in comparison to inland regions of the county. Fog is common from June-August and has great influence over daily temperatures and humidity. Springtime climate closely resembles that seen during winter months, while fall climate commonly resembles summer conditions, yet with less foggy days. Weather conditions are also influenced by regional topography including the Santa Lucia range and Point San Luis, features that influence wind and temperatures changes. Weather in Pismo Beach often expresses high day to day variability in response to quick changes in wind direction in addition to the degree of marine layer present.

5.5 Average Weather Conditions

5.5.1 Temperature

Long-term average temperatures in August range from nighttime lows of 55 degrees to daytime highs of 75 degrees. Peak temperatures often occur at 2:00 PM (Weatherspark, 2022). Day time temperatures are highly dependent on the existence or absence of marine layer which can substantially decrease temperature (Figure 7). Wind direction also impacts temperature, with onshore winds lowering temperature and offshore winds typically bringing warmer inland air to the region.

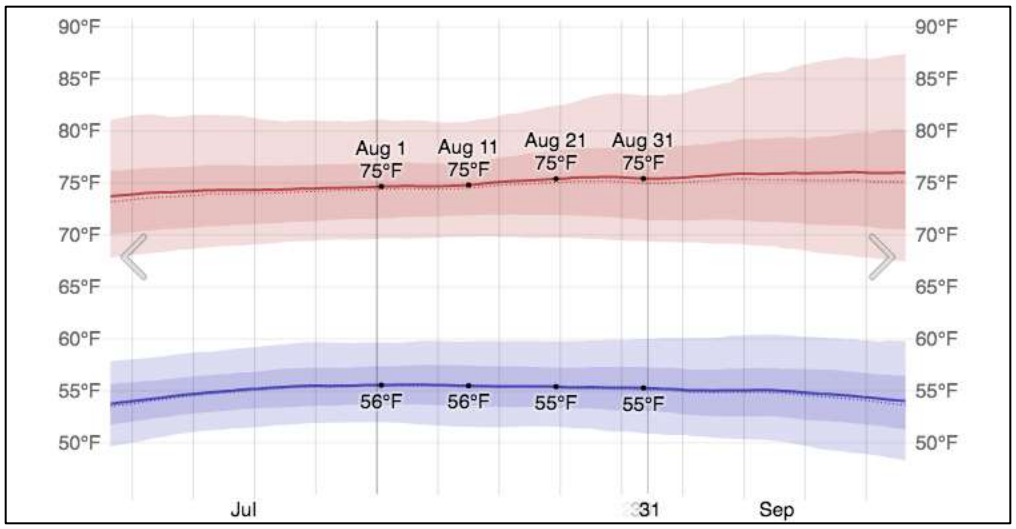

*Figure 7. Average daily and nightly and temperatures in Pismo Beach for the month of August (*Weatherspark, 2022*).*

5.1.2 Wind

Typical August wind patterns in the Plan Area tend to repeat daily. These repetitive wind patterns, also referred to as diurnal patterns, create predictable directional wind shifts. In addition, peak wind speeds often occur at similar times during the day. Average wind speeds in Pismo Beach are 7.2 mph (Figure 9). Daytime prevailing winds often flow from the northwest (Figure 8).

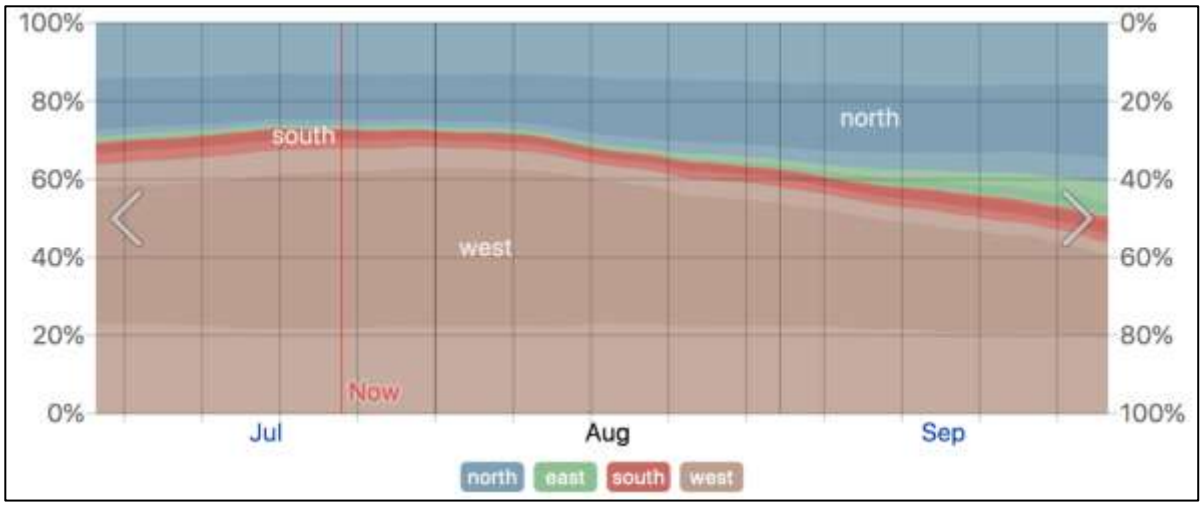

Figure 8. Wind directions by percentile in Pismo Beach for the month of August (Weatherspark, 2022).

Wind direction often shifts to an easterly direction at night and is maintained though the early morning. Wind speeds are highest from 2-5pm, also known as the critical fire period.

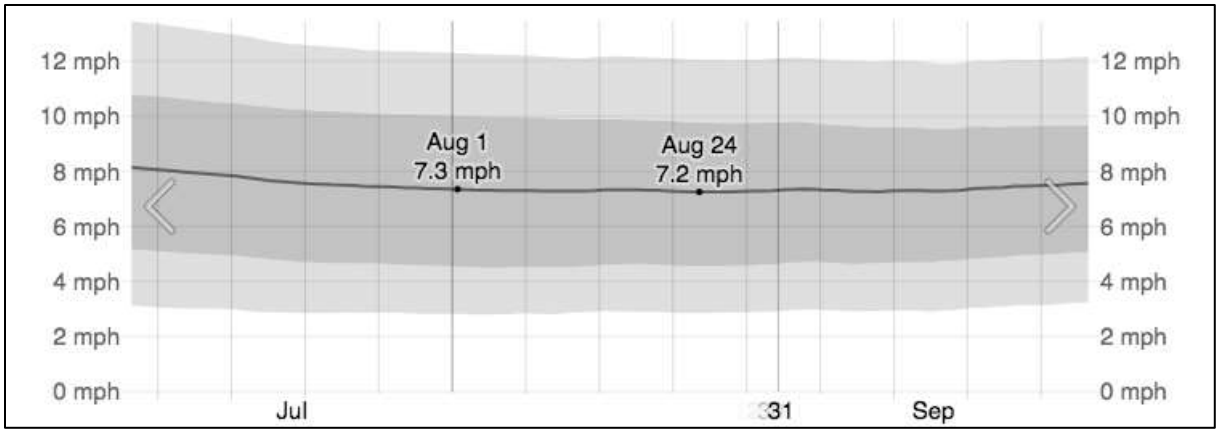

Figure 9. Average wind speeds in Pismo Beach for the month of August (Weatherspark, 2022).

Average august winds typically decrease significantly in speed after sunset and remain low throughout the night.

5.1.3 Humidity

Minimum humidity levels in Pismo Beach for the month of August are 64% on average (WeatherSpark, 2022). Humidity in the study area is steady throughout the year, with lowest humidity occurring in the months of September and October. Humidity over the course of an average day fluctuates roughly 20%. Humidity levels are generally lowest from 2-5 PM when daytime temperatures peak. Humidity levels then rise in the evening and throughout the night as temperatures cool and the marine layer resides closer to land. Wind direction also influences humidity levels. Westerly winds bring moisture into the air from the cool Pacific Ocean, whereas easterly winds lower humidity by introducing warm and dry air from inland areas. Changes in hourly humidity cam impact fuel moisture by drying fuels and creating more receptive fuel beds.

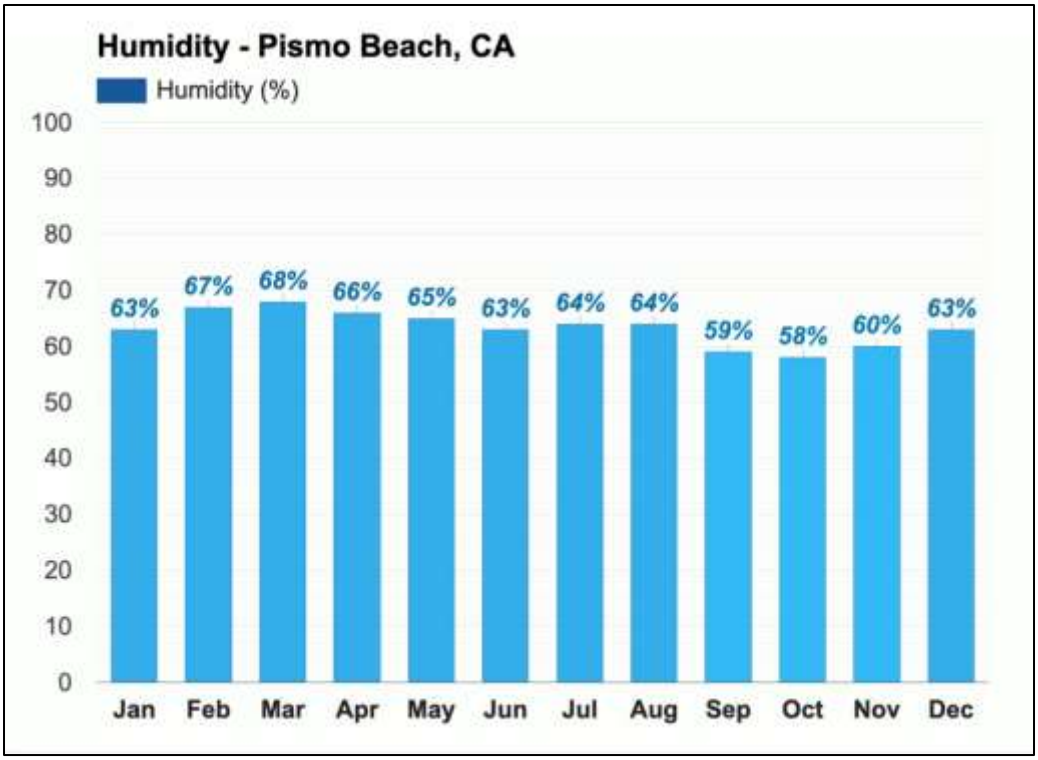

Figure 10. Average monthly relative humidity in Pismo Beach (WeatherSpark, 2022).

5.6 90th Percentile Conditions

Significantly above average weather conditions lead to conditions that present greater potential for severe wildfire to occur. 90th percentile weather is often utilized as a reference for assessing less common and more severe fire weather conditions. 90th percentile weather was calculated though the Fire Family Plus 6.0 software.

5.6.1 Temperature

90th percentile temperatures in the month of August reach average highs of 82 degrees Fahrenheit, 6 degrees higher than during average weather conditions. Days experiencing 90th percentile weather often reach day-time high temperatures earlier than average conditions. In addition, nighttime temperatures often remain higher than during average weather conditions. Increase temperature and prolonged hot periods extends the critical fire weather period during 90th percentile weather conditions.

5.6.2 Wind

Wind speeds during 90th percentile weather conditions in the month of August peak on average at 12 mph, roughly 5 mph greater than during average weather conditions. These high winds are typically caused when greater atmospheric pressure differences occur between the ocean and land

mass. These conditions often produce onshore winds which brings cool air with higher moisture to the Plan Area. However, high easterly winds can also occur in August leading to warmer air temperatures and more severe fire weather.

5.6.3 Humidity

90th percentile humidity is often a result of winds blowing from the east which greatly reduce moisture levels in the air. Humidity levels under these conditions resemble that of inland regions as the influence of Pacific Ocean becomes negligible. Minimum humidity under 90th percentile weather averages at roughly 40%. Under these conditions, humidity levels often stay low overnight and prolong the critical fire weather period.

5.7 Extreme Weather Conditions (Santa Lucia Wind Events)

The potential for extreme fire weather exists within the Pismo Neach region. Extreme weather conditions are caused on rare occasions by Santa Lucia Winds. These winds are caused by clockwise wind patterns in the Great basin which push warm winds across the desert and Sierra Nevada ranges. As these winds reach the central coast, they continue to warm and dry as the descend the coastal range. These downslope winds, also referred to as katabatic winds, have the potential to warm by 5.5 degrees Fahrenheit for every 1,000 feet of descending altitude. With the capacity to reach speeds of 60 mph, Santa Lucia winds can lead to catastrophic wildfire conditions (Chambers, 2022).

Extreme wildfire conditions occurred on September 6, 2020, when record temperatures were recorded at 113 degrees Fahrenheit in Pismo beach. Minimum humidity levels were astonishingly low for the region at 11%, with easterly wind gusts reaching 30mph. While no fires occurred in the Plan Area on this day, the potential for extreme fire weather was clearly demonstrated.

5.8 Topography and Slopes

The shape and form of the landscape plays an integral role in influencing wildfire behavior. Slope steepness, elevation, and aspect all combine due influence the severity of wildfire. In addition, the general shape of the landscape can greatly influence wind direction and speed. Changes in landscape topography leads to heterogeneous fire behavior, meaning that wildfire behavior change significantly based upon the specific region. Steep slopes are known to accelerate the speed at which fire travels as flames can pre-heat upslope vegetation. Wildfires burning up steep slopes also create upward drafts which can increase the likelihood of spot fires (Dupuy, 1995). Slopes which face south receive more family sunlight and heat and dry quicker than south facing slopes. While south facing slopes generally experience cooler temperate and greater fuel moisture, these

conditions can promote higher rates of vegetation growth which can increase fuel loads. Higher elevation hillslopes may have lower fuel moistures when compared to coastal areas.

A large proportion of the Plan Area has steep slopes, with the steepest areas reaching 43 degrees. Steepest slopes are observed on hillslopes east of Highway 101, north of Price Canyon Road, and west of Thousand Hills Road. Avila Ridge and the Highway 101 corridor in the northwest region of the study area can alter the prevailing wind direction and resulting in swirling winds. This can be problematic for fire-fighting personnel as the directional movement of wildfire in this area may be unpredictable. Similar phenomena can occur within the steep canyons observed throughout the study area leading to local changes in wind directions and speed. While most of the urban development exists on level areas, many structures reside in proximity to steep hillslopes.

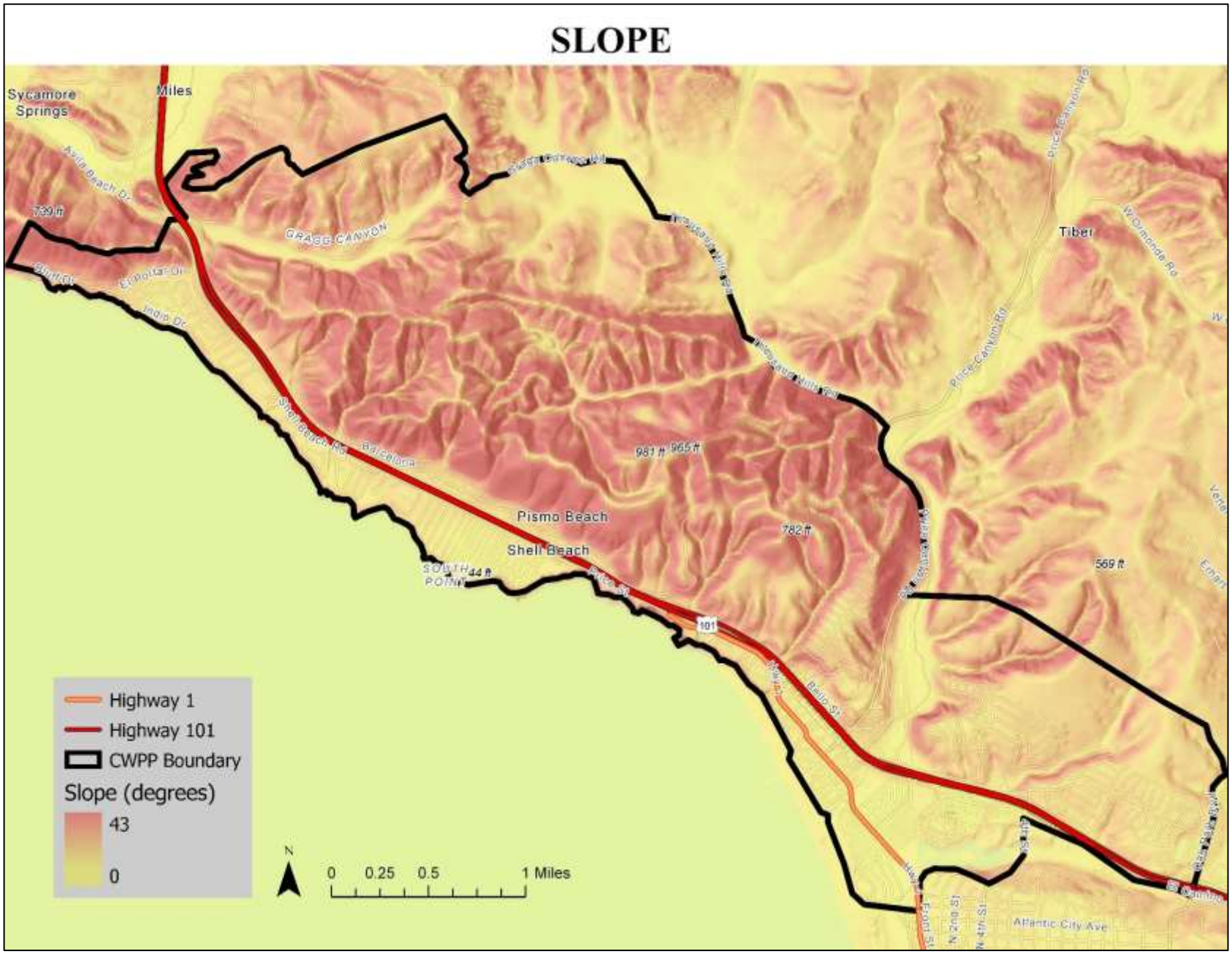

Figure 11.. Slope steepness in the Plan Area. Data obtained from LANDFIRE 2020.

5.8 Fire History

San Luis Obispo County has experienced multiple large and destructive wildfires in recent decades including the Highway 58 fire which burned over 100,000 acres and resulted in the destruction of 13 structures, the Chimney Fire which destroyed 70 structures, and the Spanish Ranch Fire which led to the death of four firefighters (Table 3) (CAL Fire FRAP, 2022). These large fires highlight the potential for significant wildfire to occur within the county.

Table 3. Historical large and destructive fires in San Luis Obispo County,

Fire Name	Size	Structures Lost	Human Casualties
Highway 58 Fire	106,000	13	0
Las Palitas fire	75,000	10	0
Logan Fire	50,000	0	0
Highway 41 Fire	49,000	103	0
Chimney Fire	46,235	70	0
Alamo Fire	28,700	14	0
Chispa Fire	10,000	12	0
Spanish Ranch Fire	940	0	4

Source: CAL Fire FRAP, 2022

Notable fires have also occurred near and within the Plan Area (Figure 12-15). Recent fires in proximity include the Estates fire, Price Fire, Hills Fire, Mattie Fire, and most notably, the Avila Fire.

Figure 12. Previous fires near the Plan Area. Data obtained from CAL Fire FRAP Fire History Database (1 of 2)

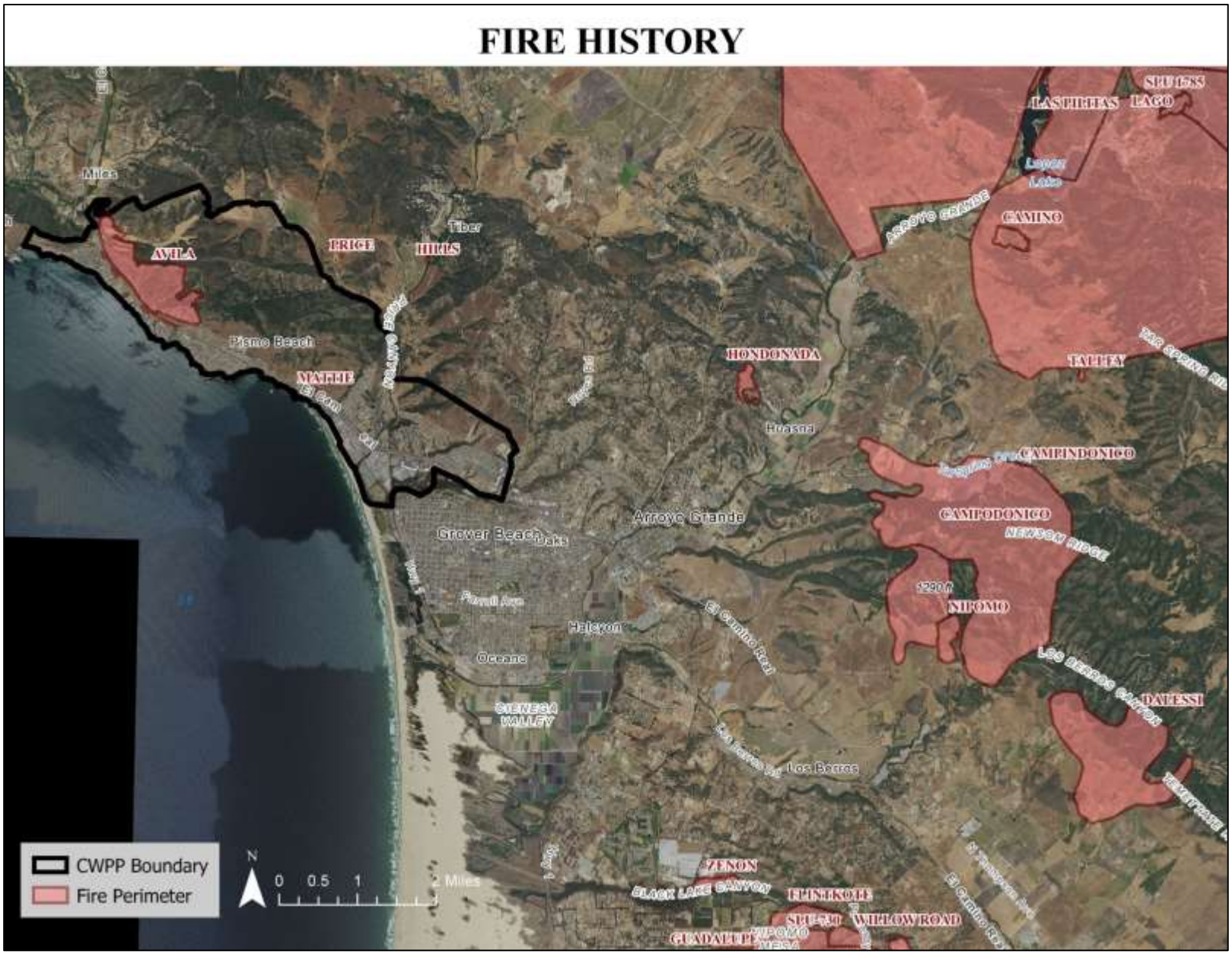

Figure 13. Previous fires near the Plan Area. Data obtained from CAL Fire FRAP Fire History Database (2 of 2).

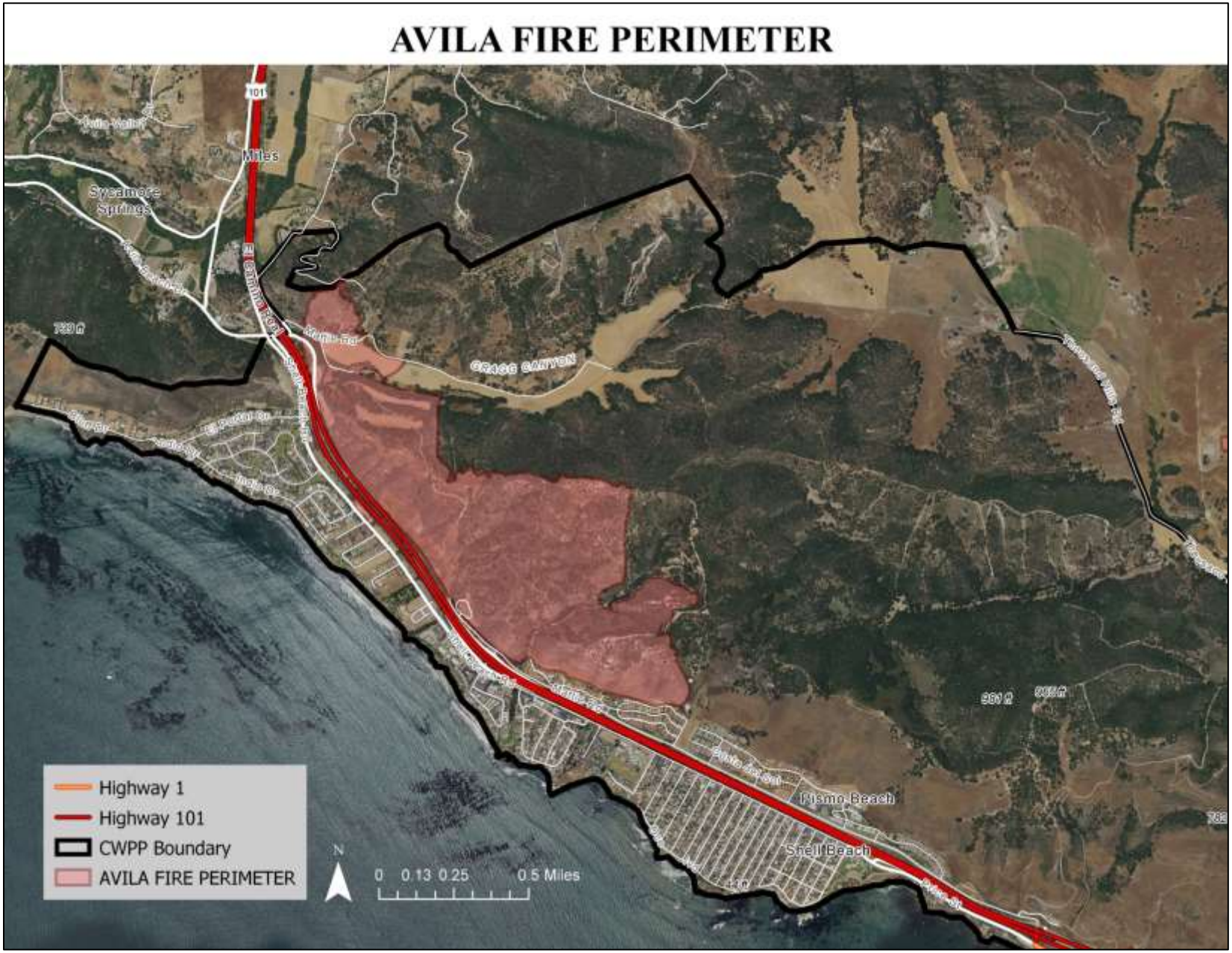

Figure 14. Fire perimeter from the Avila Fire of which burned in the Plan Area in June 2021 (CAL Fire FRAP, 2022).

The Avila Fire occurred on June 15th, 2020, around 3 PM. The fire ignited in a creek drainage just south of Gragg Canyon Road near Monte Road and Highway 101. The cause of the fire is believed to be arson. The fire quickly began burning up the south facing slope adjacent to Gragg Canyon Road. While fire-fighting personnel prevented the fire from extending north of the ridgeline, swirling winds due to the local topography caused fire to move southward. Flames engulfed a patch of eucalyptus trees before moving south along the steep slopes just east of Highway 101. Winds were sustained from 20-30 mph from the northwest and humidity levels were roughly 40%. Air temperature was roughly 77 degrees Fahrenheit at the time of ignition. The fire continued to burn south on steep slopes with heavy fuels despite substantial aerial and ground suppression efforts. The fire also spotted across Highway 101 near beachcomber drive and burned for a brief period. Ember cast also led to the ignition of palm trees throughout neighborhoods in the Shell Beach area. High spotting distances caused the fire to continually jump containment lines. Firefighting personnel were finally able to tame the fire after wind speeds dropped substantially after sunset. Without this shift to more favorable weather conditions, CAL Fire officials estimate that the fire would have continued its heavy push south before eventually burning into the Pismo Heights neighborhood. Surprisingly, no structures were lost throughout the duration of the Avila despite the fire's proximity to human structures. The Avila Fire exposed residents to the potential for severe wildfire in the study area. While many individuals considered the region to express low fire risk given its close proximity to the coast, the perception of community members changed significantly in the aftermath of this fire.

While less substantial than the Avila Fire, the Mattie Fire occurred on July 17th, 2018, and was ignited along Highway 101 just southeast of the parking lot for the Pismo Preserve (Figure 15). The fire began burning uphill into the Pismo Preserve, but low winds and proximity to the road allowed fire-fighting personnel to quickly stop forward progress and contain the fire. If winds were more severe, CAL Fire personnel suspect that the fire could have moved uphill at rapid rates before eventually threatening the Pismo Heights neighborhood.

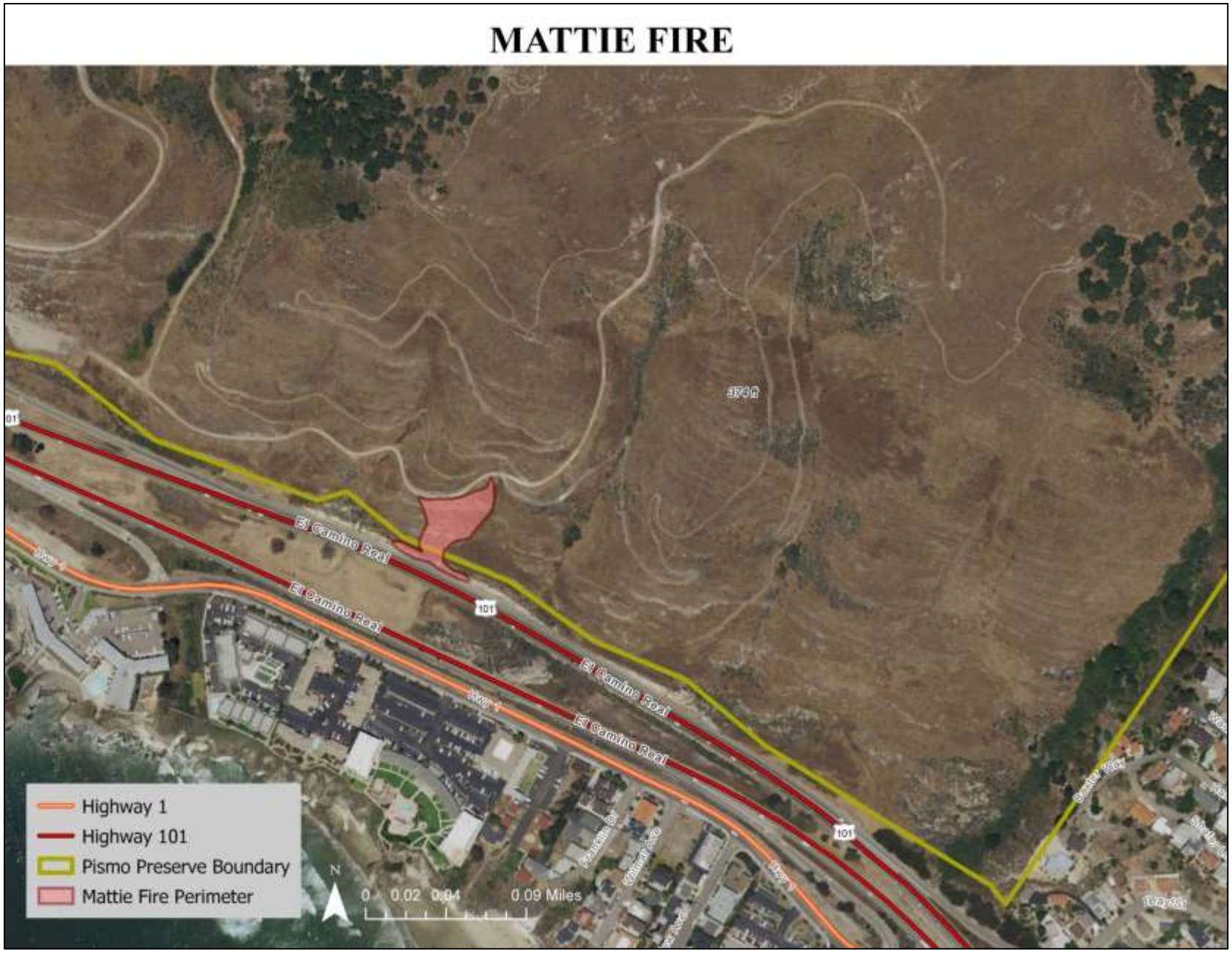

Figure 15. Mattie Fire perimeter which burned into the Pismo Preserve property (CAL Fire FRAP, 2022).

5.9 Wildfire Risk Assessment

A wildfire risk assessment was conducted to predict wildfire behavior and identify wildfire hazard in the Plan Area. The Interagency Fuel Treatment Decision Support System (IFTDSS) and FlamMap were utilized to conduct the wildfire risk assessment. Results from this assessment can be used to identify assets at risk from wildfire as well as priority areas to conduct fuels treatments.

5.9.1 Integrated Wildfire Hazard

Integrated wildfire hazard assessments combine the likelihood of a fire burning in a particular area with the predicted flame lengths into a single characteristic that can be mapped. Integrated wildfire hazard assessments allow likely areas of severe wildfire to be identified. This assessment was IFTDSS under 97th percentile weather conditions. IFTDSS provided model inputs to represent 97th percentile weather conditions in the plan area. Notable areas of high hazard include adjacent lands northwest of the Pismo Heights, the hillslope east of the Pismo Heights Community along Price Canyon Road, and long Thousand Hills Road, north of the Pismo Estates Community, and north of the Spyglass Ridge Community (Figure 16). These areas are predicted to express higher burn probabilities and more severe fire behavior.

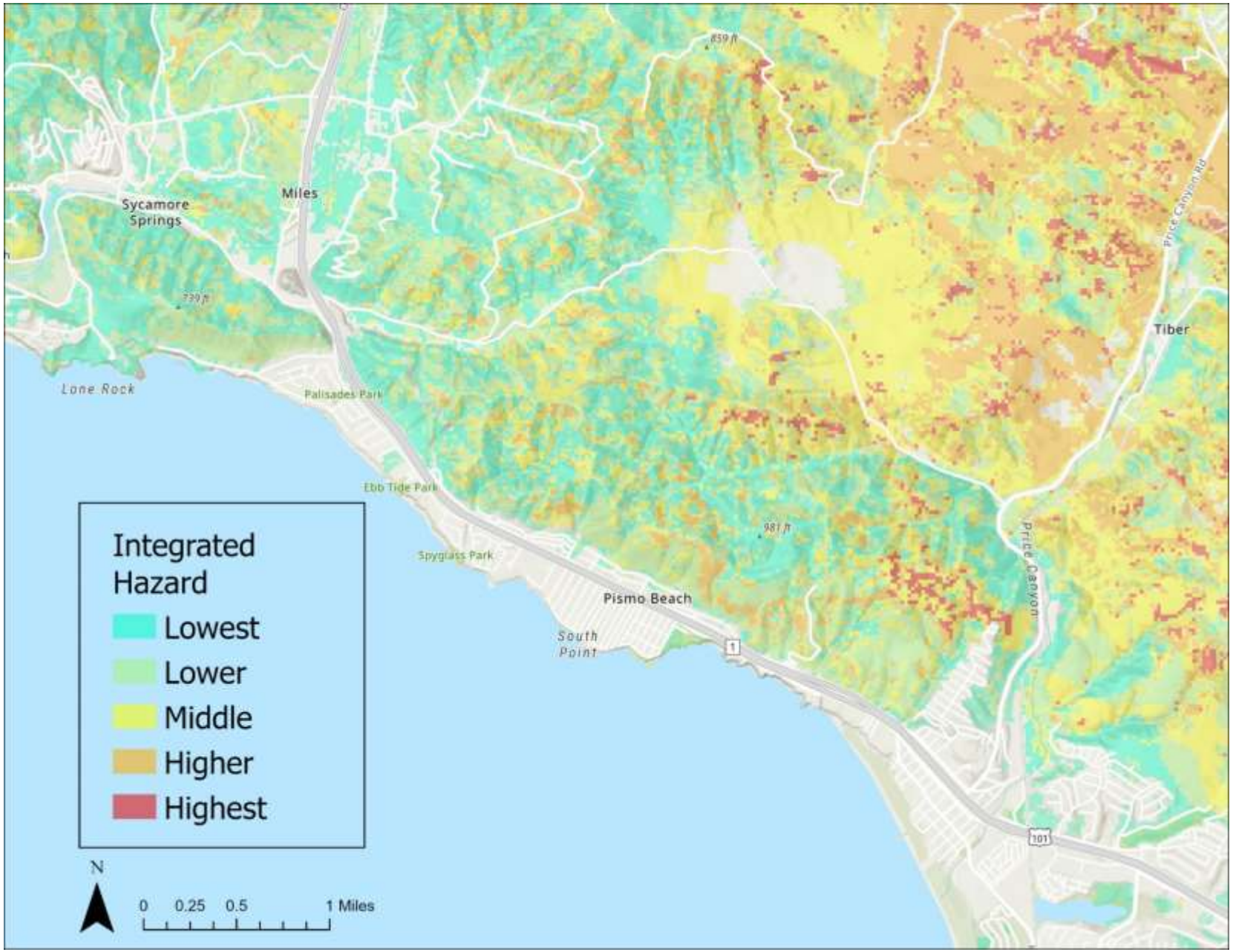

Figure 16. Integrated Wildfire Hazard under 97th percentile weather conditions in the Plan Area.

5.9.2 Predicted Wildfire Behavior

Assessing potential fire behavior assists in determining areas within the Plan Area that express high potential for severe wildfire. Fire behavior modelling utilizes fuels, topography, and weather data to simulate wildfire under different including weather conditions or varying points of ignition. We utilized wildfire Flam Map 6.0 to simulate wildfire behavior during average, 90th percentile, and extreme conditions. Weather data was obtained from Remote Automated Weather Stations (RAWS) and compiled using Fire Family Plus. We also simulated wildfire from likely ignition points in the study area. The results fire behavior modelling informs the location of assets experiencing high wildfire risk. Predicted flame lengths and rates of fire spread can inform the feasibility of fire suppression and highlight areas of emphasis. Further, model outputs assist in identifying areas of prioritized fuel medication aimed at mitigating risks to assets.

Table 4. Inputs used for fire behavior modelling.

	Wind Speed (mph)	Wind Direction (Degrees)	1 Hour Fuel Moisture (%)	10 Hour Fuel Moisture (%)	100 Hour Fuel Moisture (%)	Herbaceous Fuel Moisture (%)	Live Woody Fuel Moisture (%)
Average	7	315	7	8	14	10	101
90th Percentile	18	300	3	5	11	3	98
Extreme	35	60	3	4	7	3	71

Flame lengths are commonly used to depict fire severity and the capacity of fire suppression efforts. Understanding the firefighting implications of different flame lengths is important when strategizing fire suppression.

Table 5. Flame length impacts of fire suppression efforts.

Flame Length (ft)	Implications for Fire Suppression
0-4	Hand crews can effectively engage in ground suppression efforts using hand tools to contain the fire.

Flame Length (ft)	Implications for Fire Suppression
4-8	Flame lengths are too large to safely suppress fire from hand tools. Heavy equipment including bulldozers, fire engines, and aircraft is required to contain the fire.
8-11	Ground efforts are likely to be ineffective and too dangerous for suppressing the fire. Aircraft suppression is needed but may also be ineffective due to torching and spotting.
>11	Suppression efforts are unlikely to suppress the fire. Crowing, torching, and spotting will occur.

5.9.3 Fire Behavior Modelling Results

Fire behavior model accuracy was tested by comparing model outputs with actual fire perimeter data from the Avila Fire. The model run used weather conditions and fuel moistures present at the time of the Avila Fire which occurred at 2 P.M. on June 15th, 2020. Fuel and weather inputs used in the model are provided in Table 4. Model outputs show similar fire behavior and rate of spread to the Avila Fire (Figure 17). While models are never perfect, this suggests that the fire behavior models used to simulate fires within the study area provide a fair representation of potential fire behavior.

Results for fire behavior under average, 90th percentile, and extreme weather conditions are presented in the following sections. Predictions of flame lengths and rate of spread are described in detail.

Figure 17. Comparison between the Avila Fire perimeter and the predicted fire perimeter derived from Flam map fire behavior modelling.

5.9.3.1 Average Conditions for August

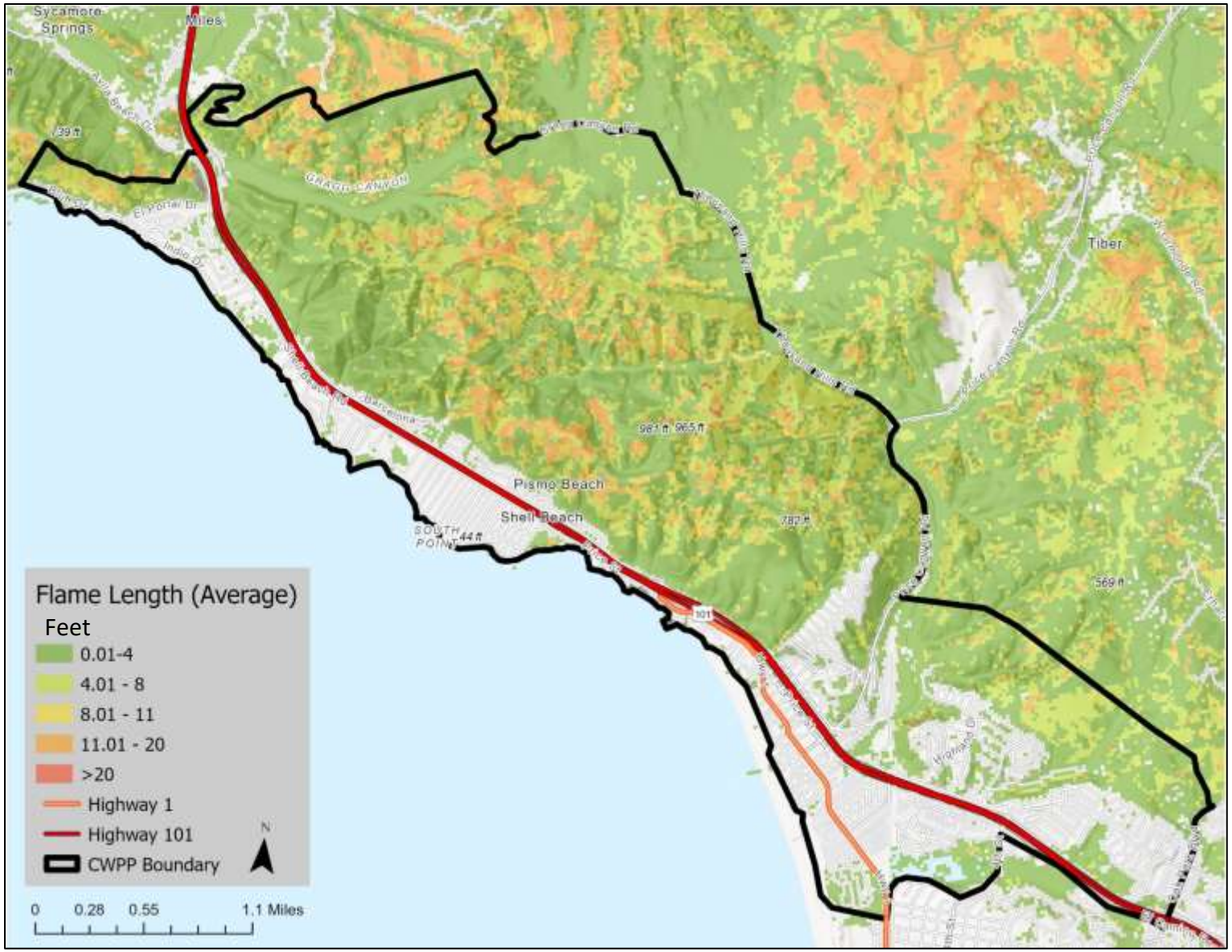

Figure 18. Flame Lengths during average August fire weather conditions (Table 6).

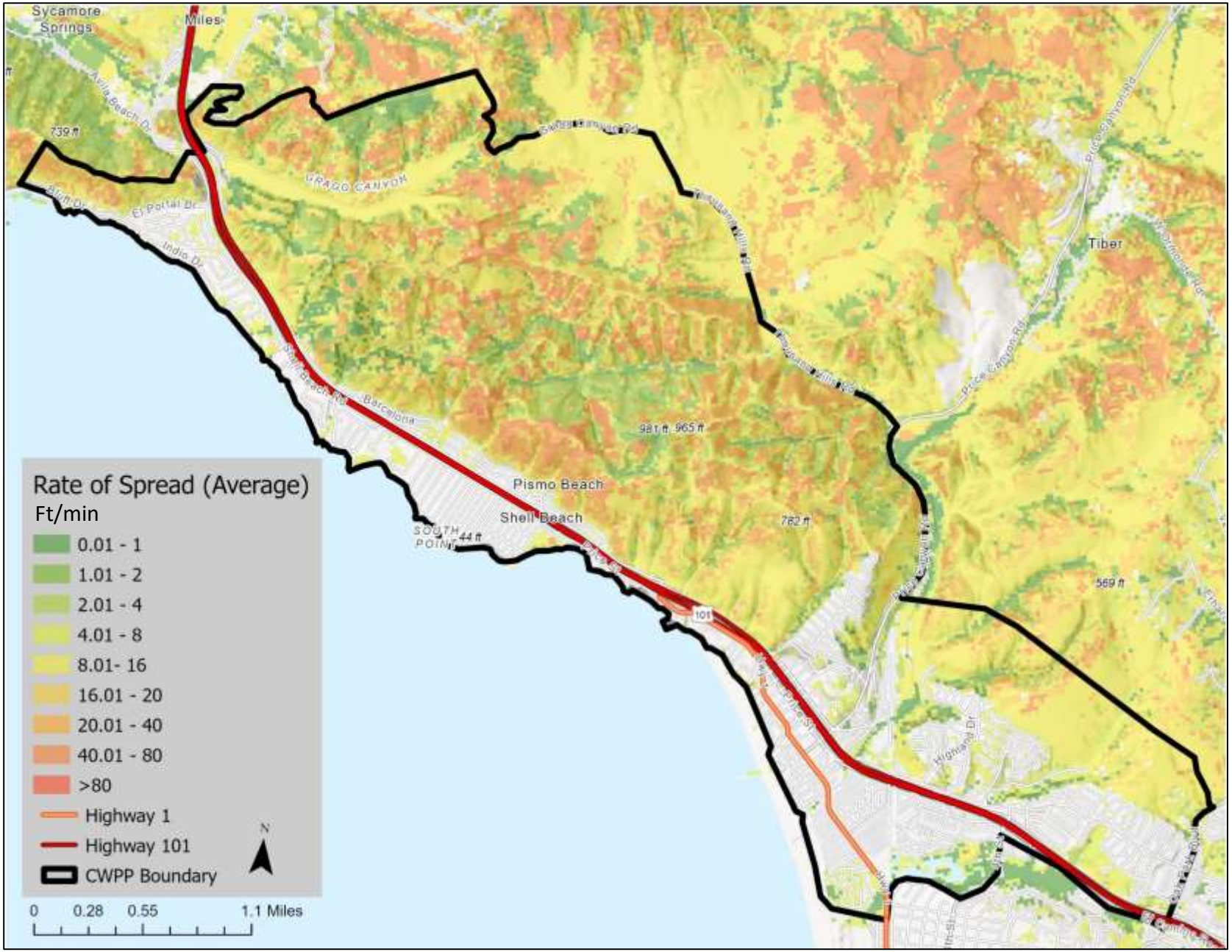

Figure 19. Rate of spread during average August conditions (Table 7).

Under average conditions, most of the study area (66%) was modeled to express flame lengths of 4-8 feet. Ten percent of the Plan Area is predicted to burn with flame lengths of 20 feet or greater (Table 6).

Table 6. Flame lengths by percent area in the Plan Area for average weather conditions.

FLAME LENGTH	PERCENT OF STUDY AREA
4-8	66
8.1-11	19
11.1-20	5
≥20	10

Wildfire spread in the majority of the Plan Area (59%) was modelled to be 9-22 ft/min. Seven percent of the Plan Area is predicted to experience wildfire spread of 80 ft/min or greater during average weather conditions (Table 7).

Table 7. Wildfire rate of spread by percent for 90th percentile weather conditions.

RATE OF SPREAD (FT/MIN)	PERCENT OF PROJECT AREA
1-2	5
2.1-4	6
4.1-8	8
8.1-16	23
16.1-20	36
20.1–40	4
40.1-80	11
≥80	7

5.9.3.2 90th Percentile Weather Conditions

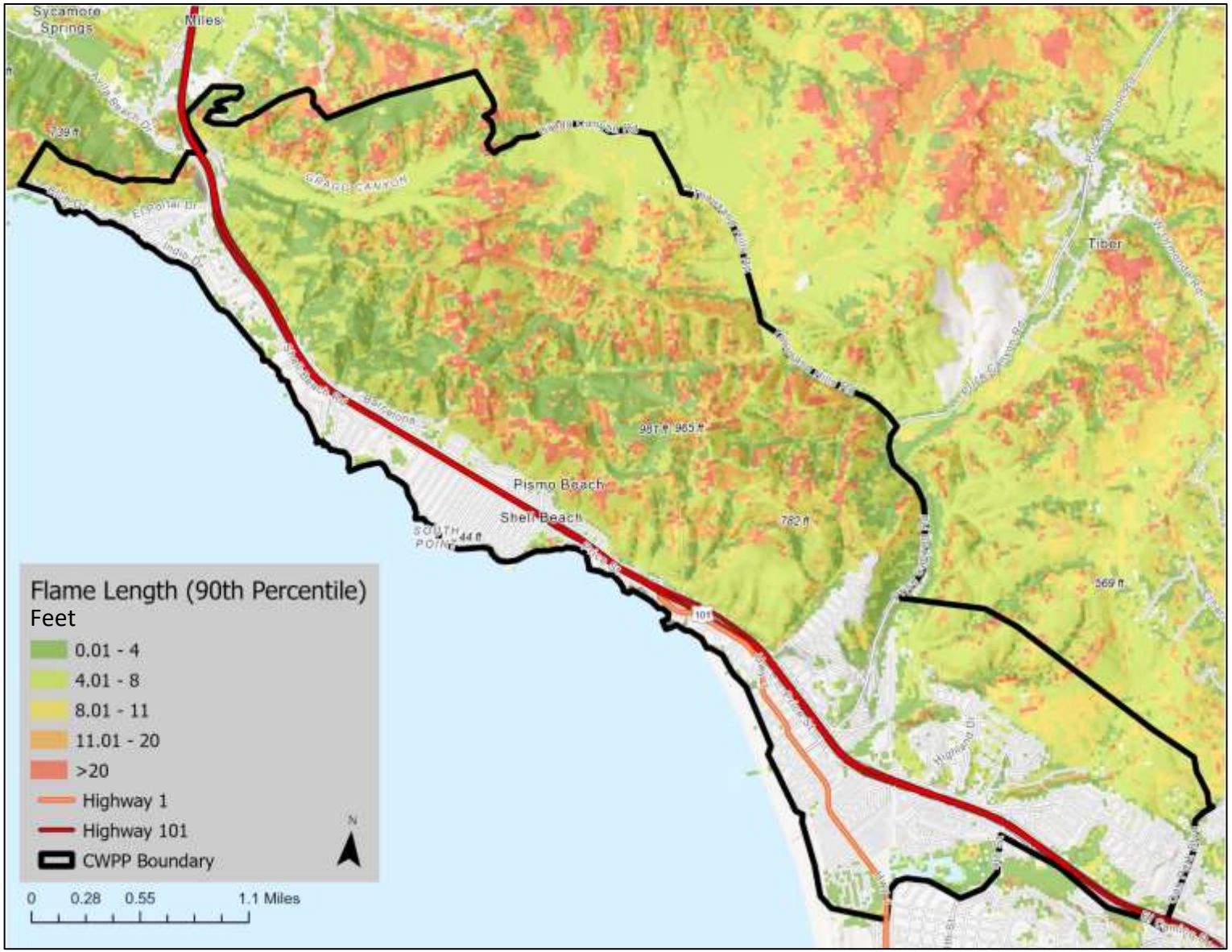

Figure 20. Flame Lengths during 90th percentile fire weather conditions in August (Table 8).

Figure 21. Rate of spread during 90th percentile fire weather conditions in August (Table 9).

Under 90th percentile conditions, the occurrence of flame lengths of greater or equal to 20 feet doubled from average conditions to 20% of the Plan Area.

Table 8. Flame lengths by percent area for 90th percentile weather conditions.

FLAME LENGTH (FT)	PERCENT OF STUDY AREA
4-8	24
8.1-11	46
11.1-20	10
≥20	20

Areas predicted to experience wildfire spread at a rate greater than 80 ft/min increased during 90th percentile weather conditions by roughly six times when compared to average conditions.

Table 9. Wildfire rate of spread by percent for 90th percentile weather conditions.

RATE OF SPREAD (FT/MIN)	PERCENT OF PROJECT AREA
1-2	3
2.1-4	4
4.1-8	6
8.1-16	3
16.1-20	12
20.1–40	6
40.1-80	24
≥80	40

5.9.3.3 Extreme Weather Conditions (Santa Lucia Wind Event)

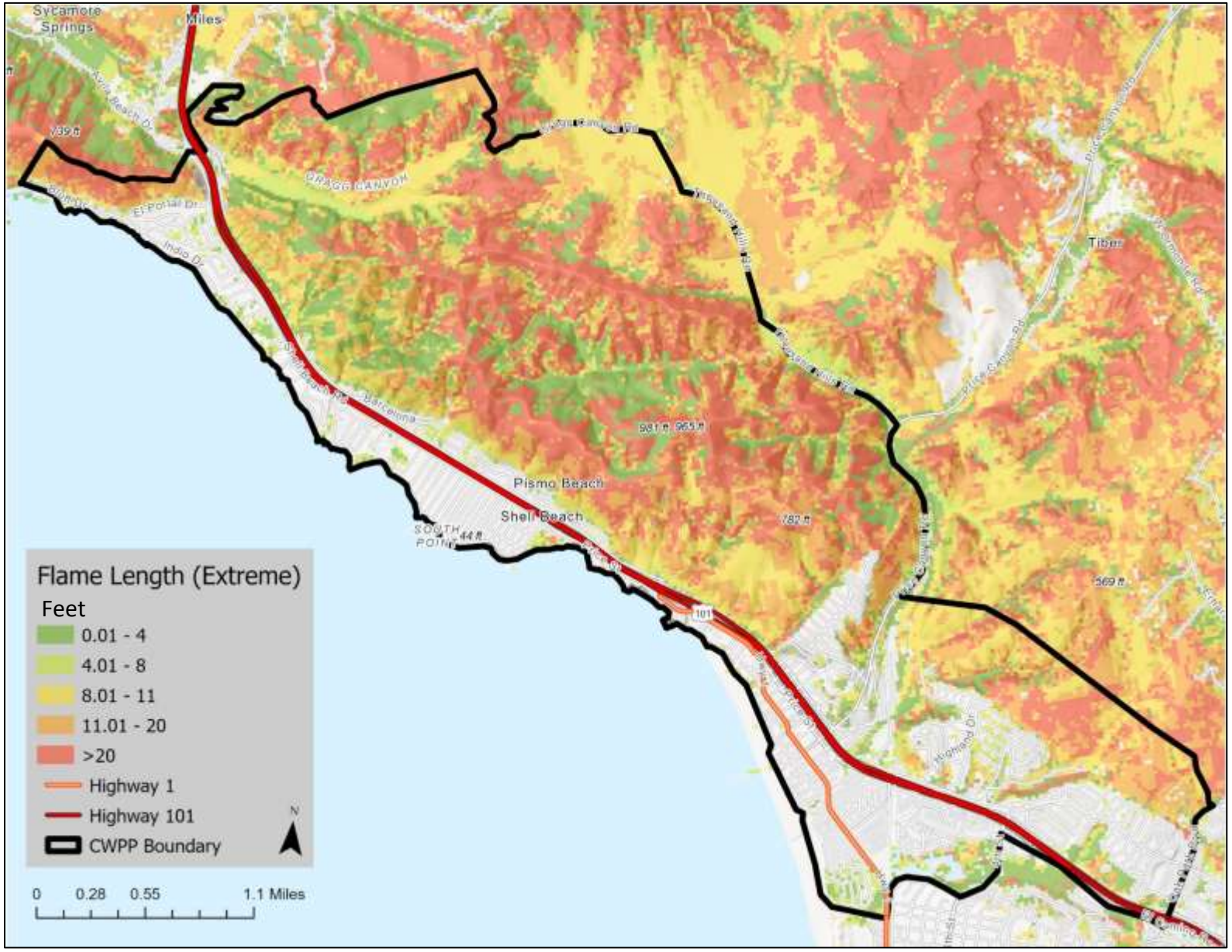

Figure 22. Flame lengths during extreme fire weather in August (Table 10).

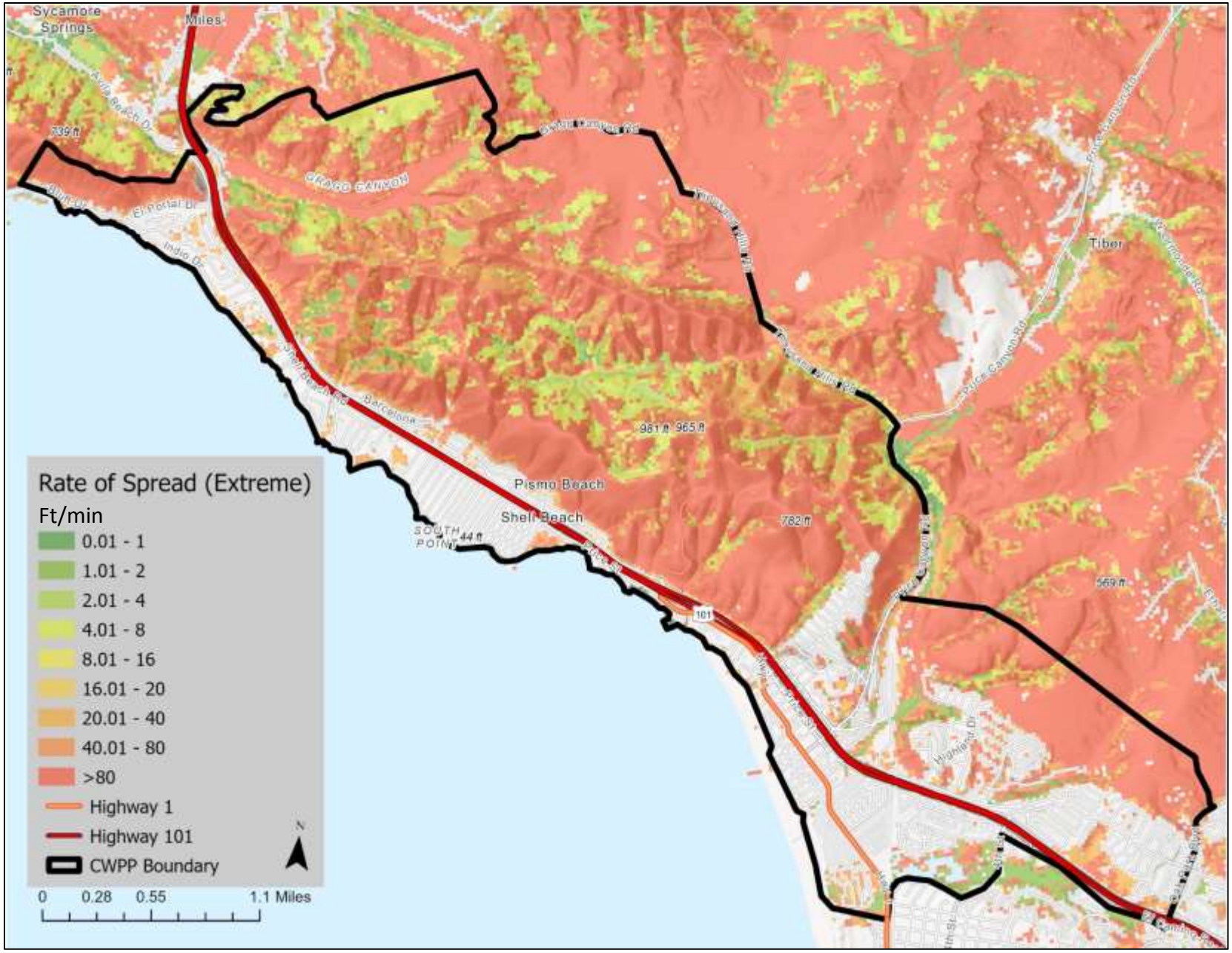

Figure 23. Rate of spread during extreme fire weather conditions in August (Table 11).

Under 90th percentile conditions, the occurrence of flame lengths of greater or equal to 20 feet increased by roughly five times (54%) compared to average conditions.

Table 10. Flame lengths by percent area for extreme weather conditions.

FLAME LENGTH (FT)	PERCENT OF STUDY AREA
4-8	16
8.1-11	7
11.1-20	23
≥20	54

The majority of the Plan Area (77%) is predicted to experience wildfire spread rates greater than or equal to 8o ft/min under extreme weather conditions.

Table 11. Wildfire rate of spread by percent for extreme weather conditions.

RATE OF SPREAD (FT/MIN)	PERCENT OF PROJECT AREA
1-2	0
2.1-4	3
4.1-8	3
8.1-16	6
16.1-20	1
20.1–40	0
40.1-80	9
≥80	77

5.10 Ignition Risk

Human-caused ignitions are the most likely form of ignition within the Plan Area (Figure 24). Human proximity to fire receptive vegetation is observed throughout the study area. We highlight historic ignition points and high-risk ignition areas to depict areas where wildfire is likely to start in the Plan Area.

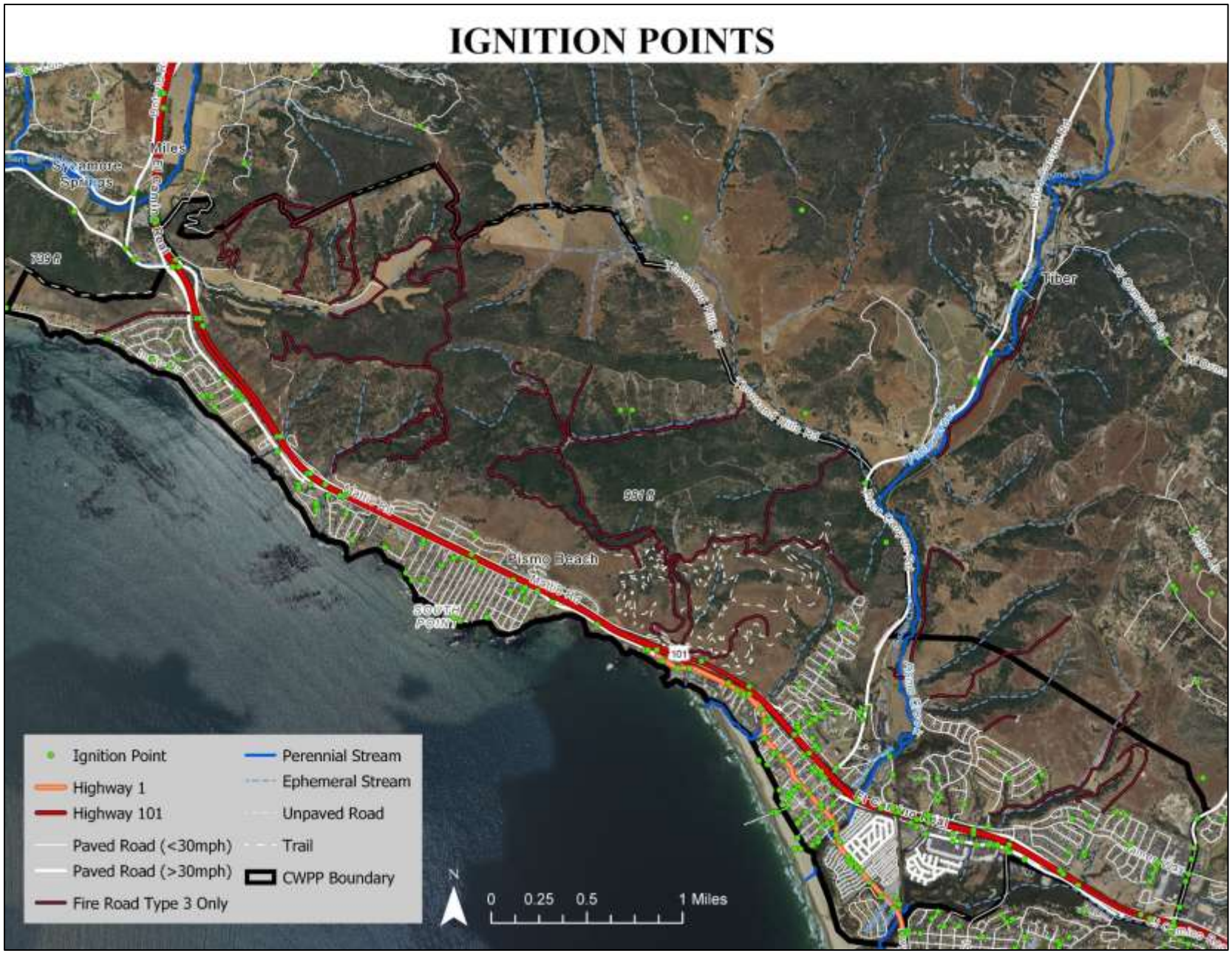

Figure 24. Previous ignition points documented by CAL Fire in the Plan Area. Data obtained from CAL Fire SLU GIS.

5.10.1 Ignition Point Simulations

Wildfire simulations at specific ignition points were performed using the Minimum Travel Time feature in FlamMap to assess wildfire spread in areas where the likelihood of human caused ignition is high. Simulations were conducted in the areas of Cave landing, the Pismo Preserve, and Price Canyon. Arrival time was analyzed to identify the length of burn period needed to threaten human structures in these areas. Each simulation used fuel moistures and wind speeds for 90th percentile conditions in August (Table 4). Wind directions were chosen to reflect conditions which posed the greatest threat to structures in these areas.

Cave landing: 22 minutes

The Cave landing area has been identified as an area of high human caused ignition risk due to its high recreational use and the frequent occurrence of illegal campfires. The steep slopes of Ontario ridge and continuous fuels increase the severity of potential wildfire behavior. Wind direction was from the northeast for this simulation. This wind direction drives wildfire upslope to Ontario ridge with a path towards the homes of The Bluffs and El Portal neighborhoods. A wildfire originating at the cave landing parking lot is predicted to directly threaten homes after 22 minutes (Figure 25). This highlights the need for an urgent emergency response in this area.

Pismo Preserve parking lot: 24 minutes

The Pismo Preserve experiences thousands of visitors annually resulting in a greater likelihood of human caused ignitions. Proximity to the at-risk community of the Pismo Heights has drawn considerable concern regarding ignitions at the Pismo Preserve. Wind directions from the northwest were used for this simulation. Wildfire is expected to reach the Pismo Heights community after 24 minutes after originating from the Pismo Preserve parking lot (Figure 26). An urgent suppression and evacuation response is required to protect human life and property. The rapid rate of spread predicted in this simulation limits the capacity for a timely and complete evacuation of the Pismo Heights.

Price Canyon: 10 min

Roadside ignitions have occurred along Price Canyon Road. The slope on the north side of the road is very steep with continuous fuel beds. Homes on top of this slope are at risk from an ignition originating downslope. Winds from the northeast were used for this simulation to represent conditions where threats to structures are the highest. Wildfire is expected to reach ridgetop homes of the Pismo Heights in 10 minutes under these weather conditions (Figure 27). Immediate evacuation in these circumstances is required to reduce risks to human life and safety. This requires an urgent broadcasting of evacuation orders to members of the Pismo Heights Community. Of all

ignition points, an ignition on the west side of Price Canyon Road during a northeast wind event poses the greatest threats to human life and property. An ignition from this location occurred in August 2020 and was almost uncontained due to rapid spotting.

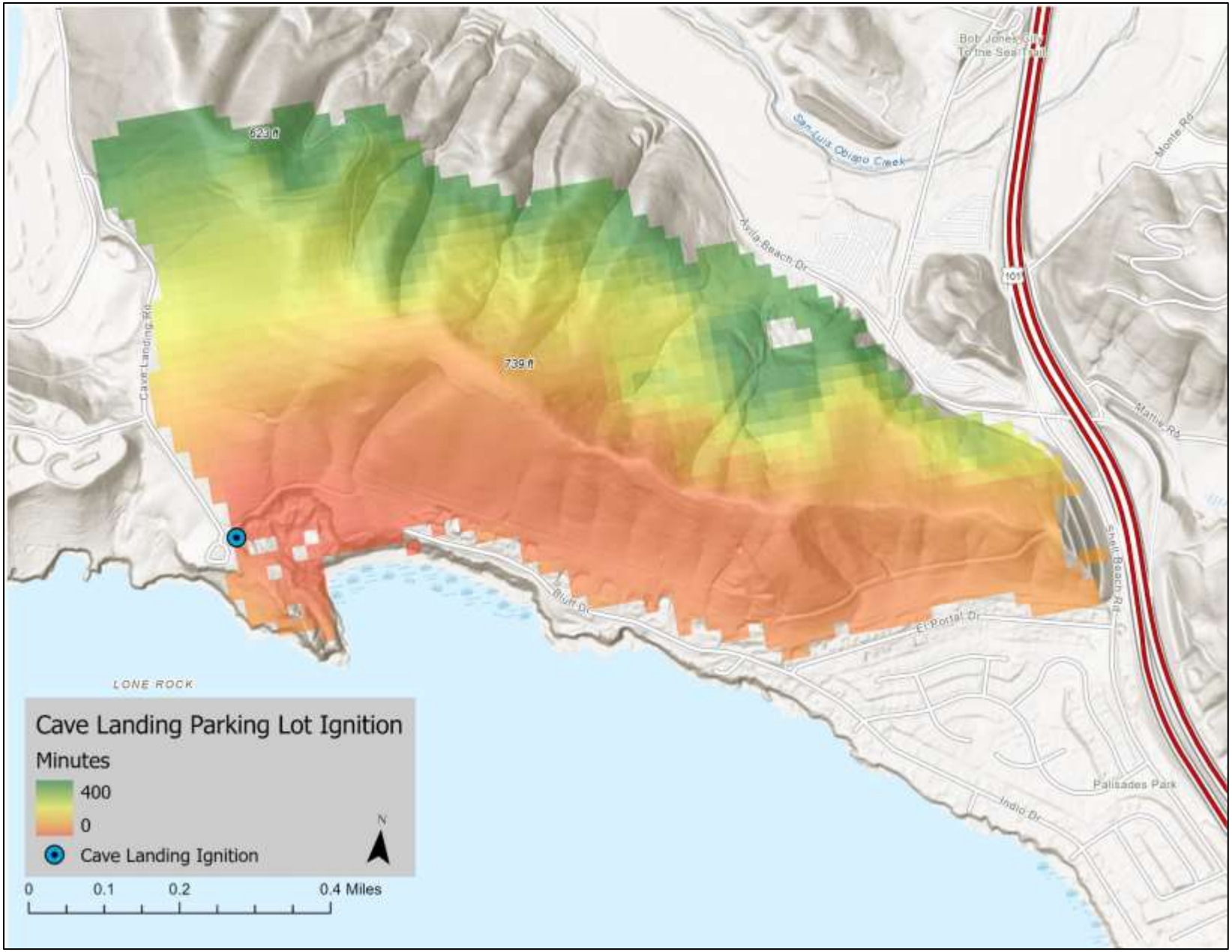

Figure 25. Wildfire arrival time after an ignition from the Cave Landing parking lot over a 400-minute burn period.

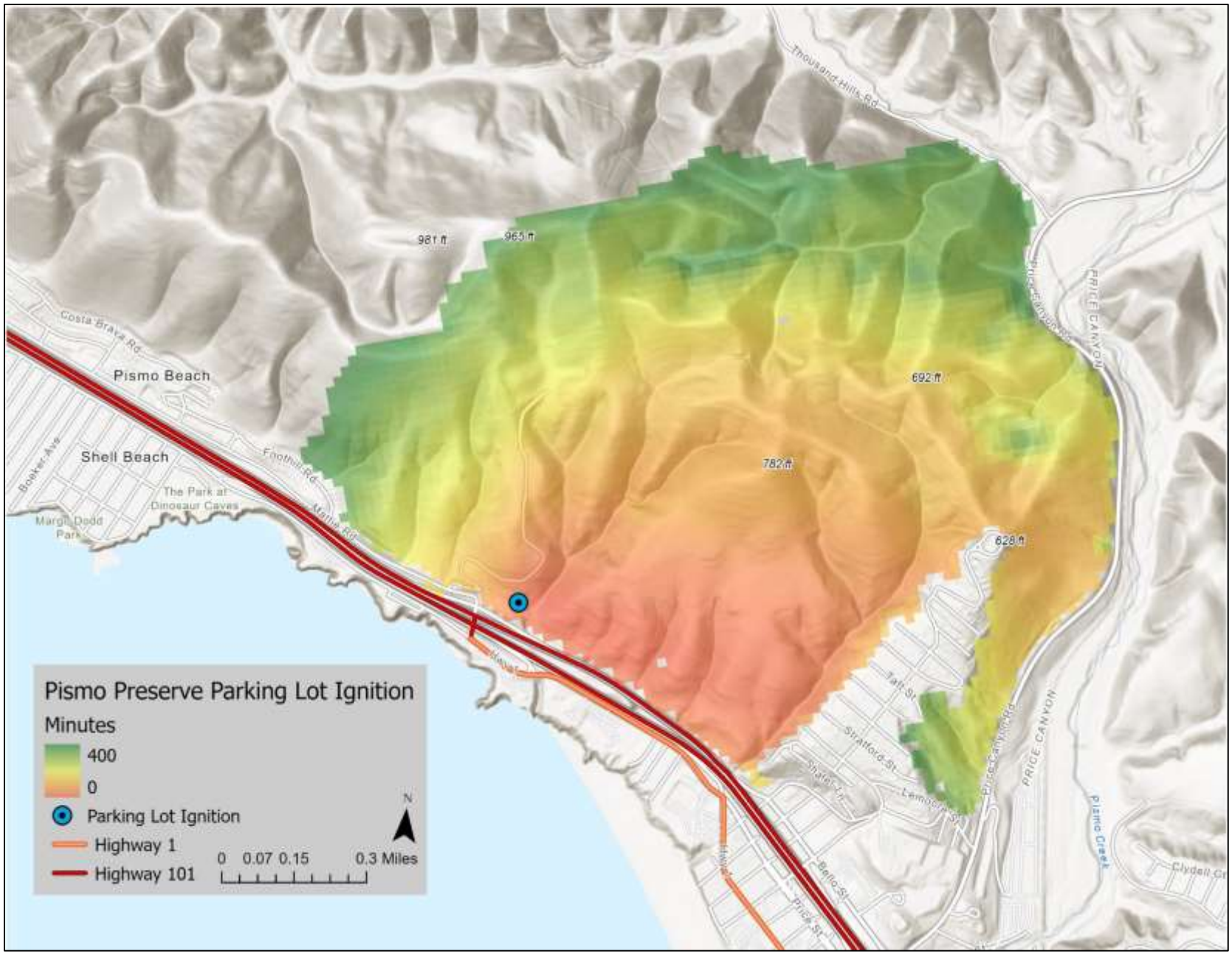

Figure 26. Wildfire arrival time after an ignition from the Pismo Preserve parking lot over a 400-minute burn period.

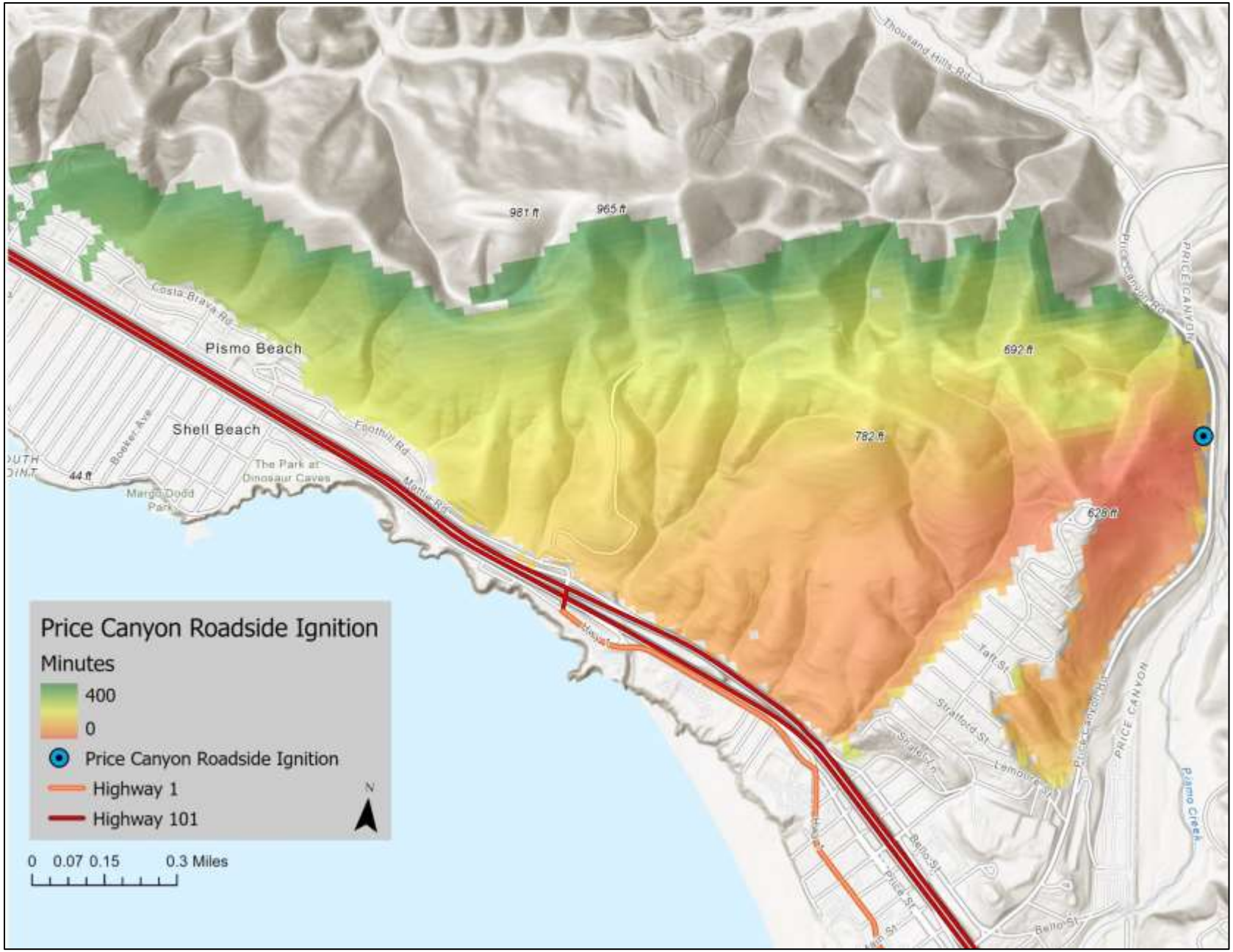

Figure 27. Wildfire arrival time after an ignition along Price Canyon Road over a 400-minute burn period.

5.11 Fire Hazard Severity Zones

Fire Hazard Severity Zones (FHSZ) are produced by CAL Fire for lands in the SRA. CAL Fire also maps FHSZs in the LRA for use by local governments for wildfire planning decision making. Hazard scores are determined by considering potential vegetation over a 30-50-year period, topography, local climate, crown fire potential, ember production and movement, and fire history. We provide FHSZ maps for both the SRA and LRA lands within the Plan Area (Figure 28).

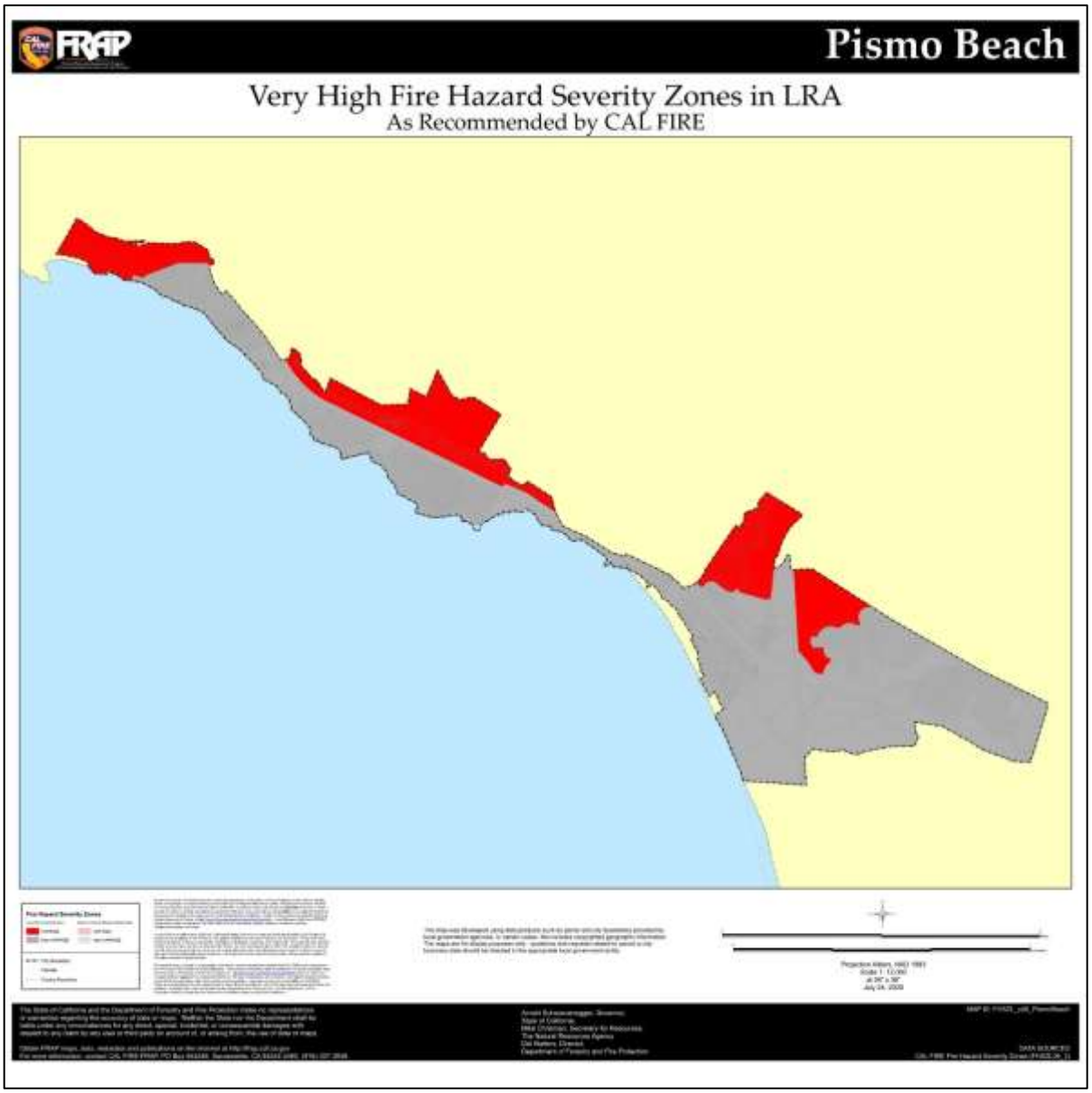

Figure 28. Very High Fire Hazard Severity Zones in the City of Pismo Beach as recommended by CAL Fire.

Figure 29. Fire Hazard Severity Zones within SRA of study area. Data obtained from CAL Fire FRAP GIS Data.

6.0 Assets at Risk

Assets are defined as things that are assigned value by a community. Assets include both human and environmental entities and are generally important to the function and structure of the community. We provide a list of assets at risk from wildfire in the Plan Area, identifying their susceptibility to experience negative impacts from wildfire.

6.1 Human life

Protecting human life is the greatest priority of this CWPP. Wildfire threatens human life and safety for obvious reasons. The potential for human causalities from wildfire in California is highlighted through in recent years from catastrophic fires including the Camp fire, Carr Fire, Tubbs Fire, and North Complex Fire, which have claimed 130 lives in the past five years. The loss of human life is often in result to extreme wildfire behavior when community members are unable to evacuate safely. Individuals identified as "at risk" community members are more susceptible from the dangers of wildfire. At risk community members are defined as individuals who are disabled either physically or mentally, those with little English-speaking ability, senior citizens, children, and unhoused individuals.

Table 12. At risk population demographics in Pismo Beach.

At Risk Population Description	Percent of Population
Above the age of 65	31.9 %
Below the age of 18	9.8 %

Source: US Census Bureau, 2022

In the event of a wildfire, firefighters and other emergency responders may experience risks to life and safety depending on the severity of the fire. The potential for severe wildfire exists in the Plan Area, causing concern regarding the safety of first responders.

6.2 Built Environment

The built environmental includes developed regions which possess communities, infrastructure, and other man-made features or land uses.

6.2.1 Homes and neighborhoods

Homes and neighborhoods throughout the Plan Area are exposed to risks from wildfire. As shown by the Avila Fire in 2020, firefighters actively engaged in structure defense to protect homes from

igniting. Fire burned adjacent to and within neighborhoods in the Shell Beach area on the northside of Highway 101, however, no structures were destroyed despite close exposure to flames.

The majority of housing in the Plan Area includes single-family residential homes on fairly small properties. Multi-unit apartment buildings are also common in specific areas of the Plan Area. Neighborhoods within the Plan Area can be separated into eight main regions: Shell Beach, Pismo Heights, downtown Pismo Beach, Pacific Estates and Pismo Oaks, Spyglass Ridge, and Mattie Road Annex, and Baycliff Village. We provide a description of these neighborhoods and describe the level of risk they face from wildfire.

6.2.1.1 Shell Beach

The area of Shell Beach includes the community on southside of Highway 101 spanning from Ontario ridge southward until Dinosaur Caves Park. Initial development beginning in 1926 mostly included resorts until residential housing construction began following World War 2. Shell Beach was incorporated into the City of Pismo Beach in 1946 and is known by locals as a quiet and charming beach community. Housing is quite dense with small lot sizes. Dwellings are generally single-family homes; however multi-unit condominiums and apartment buildings exist in this community. Home construction type varies within this community. Newer homes often possess Spanish style stucco construction, while older homes are generally built of wood.

Figure 30. Older style home in Shell Beach neighborhood on Boeker Avenue.

Figure 31. Home in shell beach neighborhood on Ocean Boulevard. Home construction features mostly wood materials increasing flammability.

Figure 32. Home within the El Portal neighborhood adjacent to Ontario Ridge. The wooden patio as represented in this house is a common feature present on other homes in Shell Beach.

Figure 33. Home in Shell Beach neighborhood on Seacliff home. The home features a modern construction style which is seen commonly in newer homes built in this area.

Figure 34. Apartment complex on Solana Road. Note wood siding, wood fencing, and wooden staircase.

While most areas of the community do not exist adjacent to natural vegetation, homes in Shell Beach remain at risk from wildfire due to ember cast. The communities' western proximity to the extensive wildland areas east of Highway 101 increase the chances of home ignitions from ember cast during severe fire weather conditions. Strong Santa Lucia winds from the east may push embers directly into the Shell Beach community. During the Avila Fire, swirling winds cast embers into this community, igniting multiple palm trees within residential areas. While extinguished quickly, these events highlight the real possibility for home ignitions in this community. If home ignitions were to occur, minimal distances between homes increases the likely of house-house spread in Shell Beach.

6.2.1.2 Pismo Heights

The neighborhood of Pismo Heights has been identified as a high-risk neighborhood. The neighborhood exists on an elevated hillside just east of downtown Pismo beach and is bordered by Highway 101, Price Canyon Road, and the Pismo Preserve. The neighborhood is a classic example of the Wildland Urban Interface, as natural vegetation directly borders the community on three sides. CAL Fire designated this community under as a very high fire hazard severity zone in the LRA. On the north edge of the community exists Rattlesnake Canyon, a steep drainage within the Pismo Preserve. Steep slopes, heavy fuels, and prevailing northwest winds can potentially increase fire severity in this area and increase the chance of home ignitions.

Figure 35. Example of wildland urban interface in the Pismo Heights. Photo taken on Fresno Street on the north facing slope of Rattlesnake Canyon.

Figure 36. Home in the Pismo Heights overlooking Rattlesnake Canyon. Note the dense fuels and steep slopes adjacent to this home. Wooden features including the raised staircase and deck increase the ignitability concerns for this home.

A fire moving spreading to similar to the Avila Fire under prevailing wind patterns poses significant threats to the Pismo Heights. Even without direct flame contact, the Pismo Heights is likely to receive ember cast from a fire a considerable distance away due to its alignment with the prevailing northwest winds. On the southeast edge of the Pismo Heights, a steep slope comprised of flashy fuels also increases risks to community safety, as an ignition downslope along Price Canyon Road could move rapidly uphill, threatening homes and human safety due to rapid spread. Fire in this area could be further exacerbated by west pushing Santa Lucia winds.

Figure 37. Home at the top of Pismo Heights facing southeast towards Price Canyon Road. The steep slopes and raised wooden deck combine to increase home ignition risks.

Figure 38. Steep slopes adjacent to Price Canyon Road leading the homes in the Pismo Heights above.

Access to the Pismo Heights is also limited. Residents living in the most upslope homes are limited to Longview Road as the main ingress and egress. This decreases the capacity for rapid evacuation from the area in the event of a wildfire, and limits entry for fire-fighting personnel. To exacerbate evacuation concerns, Judkins middle school located adjacent to the Pismo Heights poses additional congestion concerns if mandatory evacuations were to take place when school was in session.

Figure 39. Heavy fuels adjacent to home on Wadsworth Avenue adjacent to the north facing slope of Rattlesnake canyon.

Figure 40. A home on Tulare Street that represents typical home construction in the Pismo Heights. Note the raised wooden patio, large, exposed vents, and wood siding.

Many homes in the Pismo Heights were constructed in the 1920's and feature construction styles that increase the chances of home ignitions including wood siding, wood roofs, extended wood patios and porches, single pane windows, and large and exposed vents. Homeowners in this neighborhood are largely senior citizens, a demographic identified as an at-risk group. Similarly, to other neighbored in the study area, homes exist near one another. This dramatically increases the chance of house-house spread during a wildfire and increases risks for homes located in the interior of the neighborhood.

6.2.1.3 Spyglass Ridge, Mattie Road Annex, Baycliff Village

The communities of Spyglass Ridge, Mattie Road Annex, and Baycliff Village exist on the north side of Mattie Road adjacent of the community of Shell Beach. These neighborhoods border the steep southwest facing slope that runs parallel to Highway 101. Spyglass Ridge is the newest of the three neighborhoods, followed by Mattie Road Annex and Baycliff Village respectively. Spyglass Ridge predominantly features upscale two-unit condominiums with Spanish influenced construction design.

Figure 41. A two-unit condominium on Costa Brava Road in the Spyglass Ridge community. The stucco design and roof form is typical of structures in this community.

This community is managed by an HOA which requires specific covenants, conditions, and restrictions (CC&Rs) which residents are required to comply with. CC&Rs manage allowable home decorations and property maintenance requirements such as landscaping. Single family homes within Spyglass Ridge exist along Bayview Drive, a community subset referred to as Spyglass Pointe, and feature a similar Spanish design style. The Spyglass Ridge community was directly impacted by the Avila Fire as the fire burned adjacent to and within this community. While landscaping plants and bark mulch were ignited in the yards of many homes, no structures were lost. Intense structure protection efforts in addition to the fire-resistant qualities of Spanish style construction including a stucco exterior and composite roof tiles were likely responsible for preventing home ignitions in this community during the Avila Fire.

Figure 42. Flames during the Avila Fire burning adjacent to structures in Spyglass Ridge near the water tower on Costa Rica Road.

Figure 43. A Type three CAL Fire engine engaging in structure defense for homes in Spyglass Pointe during the Avila Fire.

Figure 44. Fire retardant covering homes in Spyglass Ridge during suppression efforts of the Avila Fire.

Homes within the Mattie Road Annex community are mainly comprised of single-family residential homes. Home construction is like that of Spyglass Ridge yet with less Spanish influence. Traditional stucco siding is prevalent in addition to concrete roof tiles. These features are not highly conducive to ignition in comparison alternative wooden materials. Forward progress of the Avila Fire was halted at Costa Rica Road, just west of the Mattie Road Annex community.

Baycliff Village features multi-unit condominiums of similar construction. These condominiums feature wood siding, wooden raised patios, and asphalt composite roof shingles. While asphalt composite roofing is considered a Class A roofing material and is highly fire resistant, the substantial use of wooden materials threatens the overall fire resistance of these condos. The remaining structures in Baycliff Village are single family homes along Foothill Road. These homes have similar construction to homes in the Mattie Road Annex community, with stucco siding and concrete roof tiles.

Figure 45. Condominium in Baycliff Village. Note the wood siding, wood fencing, raised wood patio, and asphalt composite roof shingles.

6.2.1.4 Downtown Pismo Beach

Home types in the downtown area of Pismo Beach are diverse, ranging from single family homes, multi-unit condominiums, apartment buildings, and mobile home parks. Home construction is also diverse, resulting in differences in home ignition resistance throughout this community. While newer homes often feature stucco siding and concrete roofing, older homes are generally constructed with wood siding and large vent openings. While the potential for direct ignition from flames is minimal is most areas, homes along Ocean Avenue which runs adjacent to Pismo Creek, and homes bordering the Pismo Marsh are at risk of direct ignition. While both areas are riparian, fuel moisture often drops considerably in late summer which increases the potential for ignitions and wildfire spread. The unhoused population which frequently resides in both areas leads to increase concern regarding ignitions, as individuals often use open fires for cooking and warmth. In addition to direct ignitions, home ignitions from ember cast are possible in this community. Embers are most likely to ignite homes with wooden roofs or large vents as embers can enter the inside of the home and easily ignite flammable materials. This includes homes that are a considerable distance away from natural vegetation. Embers can travel several miles from the fire perimeter, further exacerbated by dry and strong winds. Recent estimates conclude that up to 90% of home ignitions in the WUI are caused by embers (IBHS, 2019).

Figure 46. Older style single family home located of San Luis Drive in Pismo Beach. Note extensive wood siding, a raised wooden porch, and large vent opening, all factors which increase ignition risk from ember cast.

Figure 47. Newly constructed condominiums in downtown Pismo Beach featuring a mixed siding design of wood and stucco.

6.2.1.5 Pacific Estates and Pismo Oaks

The communities of Pacific Estates and Pacific Oaks exists southeast of Price Canyon Road and north of Highway 101. Homes in both communities show variations in age and construction style. Pacific Estates exclusively features single family residential homes. Many homes resemble a Spanish style construction style as commonly seen in the Plan Area featuring stucco siding and clay roof tiles. Newer home construction in the northwest region of the features a more modern design. Most homes within Pacific Estates are constructed in a fire safe manner with little use of wood materials, ceramic or concrete roofing, and small vents. However, some homes in this community are built with a more traditional construction style, increasing the risk of home ignitability. This community remains designated under Very High Fire Hazard severity per CAL Fire recommendation. Heavy fuels exist adjacent to homes on Valley View Drive, Rancho Pismo Drive, and Clydell Court. Combined with steep slopes, the western and southeastern areas of this community face the highest risks from wildfire. In addition, a fire moving west driven by Santa Lucia winds is likely to experience more severe fire behavior as it enters Price Canyon, a significant topographical feature adjacent to this community. Lighter fuels and annual grazing on lands adjacent to the northern border of this community decrease fire risk in this area.

Figure 48. Photo taken from Rancho Pismo Drive looking south towards homes within the Pacific Estates neighborhood. Dense oak woodland and understory brush and steep slopes increase risks from wildfire in this neighborhood.

Figure 49. Photo taken from the end of Rancho Pismo drive facing south towards Clydell Court. Dense fuels with high proportions of dead material are present.

Figure 50. Older home on Valleyview Drive. The wooden fence, raised outdoor patio, and large exposed vents increase ignitability risks for this home. Wooden fences attached to homes have been shown to greatly increase chances of home ignitions.

Figure 51. Newly constructed home on Clydell Court featuring stucco and stone siding and concrete roofing.

Older and more diverse home types exist in the community of Pacific Oaks. Multi-unit condominiums and single-family homes are common in this community. In general, home construction in this community is less ignition resistant compared to homes in Pacific Estates. Homes along Shamrock Lane, Panorama Drive, and Skyline Drive possess the greatest risk for direct impacts of wildlife as they exist adjacent to a densely stocked oak woodland. To exacerbate this risk, many of these homes are constructed with materials expressing poor fire-resistance.

Figure 52. Home on Panorama Drive with a highly flammable construction design. Wooden shingle siding and multiple exposed roof vents increase the chances of home ignition.

6.2.2 Commercial Buildings and Economy

The study encompasses a range of businesses that employ residents and attract visitors to the area (Table 13). Wildfire pose threats to commercial buildings and local economies. Loss of businesses, hotels, and other commercial infrastructure can create long term community impacts. In 2018 alone, economic damage caused by California wildfires was estimated at $148.5 billion (Wang et al., 2021)

Table 13. Primary industry in Pismo Beach.

Industry	Percent of Population
Retail trade	15%
Health care and social assistance	13%
Manufacturing	11%
Public administration	11%
Educational services	9%
Professional, scientific, and management, and administrative and waste management services:	9%
Arts, entertainment, and recreation, and accommodation and food services:	9%
Professional, scientific, and technical services	9%
Transportation and warehousing, and utilities:	9%
Accommodation and food services	7%
Utilities	6%
Construction	5%
Finance and insurance, and real estate and rental and leasing:	3%
Other services, except public administration	3%
Arts, entertainment, and recreation	2%
Finance and insurance	2%
Transportation and warehousing	2%
Real estate and rental and leasing	1%
Wholesale trade	1%
Administrative and support and waste management services	1%

Source: US Census Bureau, 2021

6.2.3 Critical Infrastructure

Critical infrastructure, including transportation systems, public utility lines and facilities, communications facilities, water treatment and supply facilities, recreational facilities, police and fire stations, schools, medical centers, and hospitals can be impacted during a wildfire. Impacts to critical infrastructure threatens public safety, emergency response, and community recovery.

Table 14. Infrastructure at risk from wildfire as identified in the Pismo Beach General/ Local Coastal Plan assuming the greatest impacts from wildfire.

Administrative Buildings	Police and Fire Stations	Wastewater Treatment Facilities	Potable Water facilities	Commercial Recreational Facilities	Schools	Total
2	3	6	10	2	2	26

Source: Pismo Beach General/Local Coastal Plan

We have identified key critical infrastructure in the study area designated as high priority assets at risk from wildfire.

Judkins Middle School

Judkins middle school exists within the Pacific Heights community, a region and community designated under very high fire hazard severity by CAL Fire. The school is located along Wadsworth Avenue, the main ingress and egress road in and out of the Pismo Heights. In the event of mandatory evacuations, this road is likely to become extremely congested, especially near its outlet which lays near the school. Students and school employees attempting to evacuate the area during a wildfire are likely to experience slow egress from the area which increases exposure to wildfire impacts and increases risks to human life and safety.

Ontario Ridge and Pismo Beach Communications Equipment

Damages to communications equipment can threaten communication between emergency personnel and prevent evacuation instructions to community members. In addition, this equipment carries significant financial value and can cost upwards of a million dollars to replace. Key communication infrastructure exists within the study and is at risk from damages due to wildfire. Communications equipment atop Ontario Ridge maintains effective regional communication between emergency response members when functional. It's position atop steep ridge and proximity to heavy fuels increase the risk of damages from wildfire (Figure 53). The Pismo Beach communications equipment is at lower risk from wildfire due to the surrounding urban environment. Yet, natural, and planted vegetation including dense Eucalyptus trees growing around the equipment increase the risk of dames from wildfire (Figure 54).

Figure 53. Communications equipment and surrounding vegetation on top of Ontario Ridge. Trees planted to decrease visibility of the equipment pose ignition threats.

Figure 54. Communications equipment near downtown Pismo Beach located off Price Canyon Road. Proximity to Eucalyptus trees increases the risks of damages to communications equipment during wildfire.

Pismo Beach City Hall

Pismo beach City Hall houses important city and administrative offices. The protection of these offices is important in preserving city functions. City Hall is located off Mattie Road and is at risk from wildfire impacts due to its proximity to areas likely to exhibit high severity fire as shown during the Avila Fire which burned just half a mile away from this building. In addition, the building is constructed with flammable building materials and features including wood siding, wooden staircases, raised wooden walkways, and large windows (Figure 55).

Figure 55. Pismo Beach City Hall showing its proximity to natural areas and wooden construction.

Spyglass Ridge and Pismo Heights Water Tank

An easily accessible water supply is important when conducting wildfire suppression efforts, specifically during structure protection. Water tanks upslope of communities pressurize water supply and allow for community access. Damages to these tanks can limit water supplies during a fire and decrease the potential for protecting structures and other assets. Two large above ground water storage tanks exist above the Spyglass Ridge community and supply water to the Shell Beach community area. While metal tanks are often undamaged by flames, pumping mechanisms or important electrical hardware maybe destroyed during wildfire preventing or limiting the drafting of water.

A concrete water storage tank at the junction of Longview Avenue and Merced Street supplies water for the Pismo Heights community. While the tank itself is unlikely to experience damages from wildfire, the pump house and external pumping equipment has the potential to be damaged or destroyed during wildfire due to adjacent proximity to the steep and densely vegetated slope of Rattlesnake canyon. Damage to this infrastructure during a wildfire could greatly limit the capacity for structure defense in the Pismo Heights.

Agriculture and Ranching

Agricultural operations occur within the Plan Area within Gragg Canyon Ranch. The ranch owner owns and maintains roughly 60 acres of Avocado orchard which possesses significant economic value. The orchard is surrounded by dense shrublands and exists on steep slopes, both factors that increase wildfire severity. Agricultural lands damaged by wildfire often take years to restore through considerable expense and labor.

Cattle grazing occurs on ranchlands throughout the study area. Damage to these lands from wildfire limits the capacity for cattle to graze and may exclude grazing for multiple years post-fire as the vegetation recovers. Direct threats to livestock during wildfire and subsequent post-fire conditions can lead to economic hardships for ranchers.

Figure 56. Land ownership in the study area (1 of 2).

Figure 57. Land ownership in the study area (2 of 2).

6.4 Natural Environment

Wildfires can lead to substantial impacts of natural resources. Natural resources include biological resources, visual resources, streams, soil stability, and air quality. We provide a description of these natural assets within the study area and highlight their potential degradation from wildfire.

6.4.1 Biological Resources

The diversity of vegetation communities within the Plan Area results in high species diversity. Oak woodlands, riparian corridors, annual grasslands, chaparral lands, and coastal scrub communities enhance habitat variety within the study area. The Pismo Beach region provides important habitat for species inhabiting the coastal region, an ecosystem which has been greatly degraded and transformed in California. The central coast of California functions as an important biological transition zone for multiple threatened and endangered species plant and animal species (Table 15;16). The City of Pismo Beach has also identified conservation areas within city limits which contain a large and diverse number of plant and animal species (Figure 58).

Figure 58. Conservation areas in Pismo Beach identified in the City of Pismo Beach General/Local Coastal Plan.

Six federally listed animal species have been recorded in the Plan Area (Table 15). This includes the Tidewater Goby which is listed as Federally Endangered Species. This species has been found to occur in the Pismo Marsh. While unlikely to experience direct impacts from wildfire, Tidewater Goby may be impacted by habitat changes associated with wildfires burning in upstream areas of the watershed. One State Listed Endangered species, the Western yellow-billed cuckoo, has been recorded historically in the Plan Area. However, this species has been since extirpated.

Table 15. Special Status Animal Species in the Study Area

SPECIES NAME	FEDERAL LISTING	STATE LISTING
CALIFORNIA RED-LEGGED FROG	Threatened	None
STEELHEAD – CENTRAL COAST DPS	Threatened	None
WESTERN SNOWY PLOVER	Threatened	None
TIDEWATER GOBY	Endangered	None
MONARCH (CALIFORNIA OVERWINTERING POPULATION)	Candidate	None
WESTERN YELLOW-BILLED CUCKOO*	Threatened	Endangered

Note: * indicates extirpated species
Source: CDFW. 2022

Four state and federally listed plant species have been recorded in the Plan Area including Pismo Clarkia, Beach Spectaclepod, Marsh Sandwort, and Surf Thistle (Table 16). The ladder three species inhabit coastal and marsh areas resulting in unlikely direct impacts from wildfire or fuels treatments. Pismo Clarkia, a federally listed endangered species, possesses a very limited range in San Luis Obispo County. This species is most often observed inhabiting weathered white sandstone outcroppings. Wildfires and fuels treatments have the potential to directly impact this species in the Plan Area.

Table 16. Special status plant species in the study area.

SPECIES NAME	FEDERAL LISTING	STATE LISTING
PISMO CLARKIA	Endangered	Rare
BEACH SPECTACLEPOD*	None	Threatened
MARSH SANDWORT	Endangered	Endangered
SURF THISTLE*	None	Threatened

Note: * indicates extirpated species
Source: CDFW. 2022

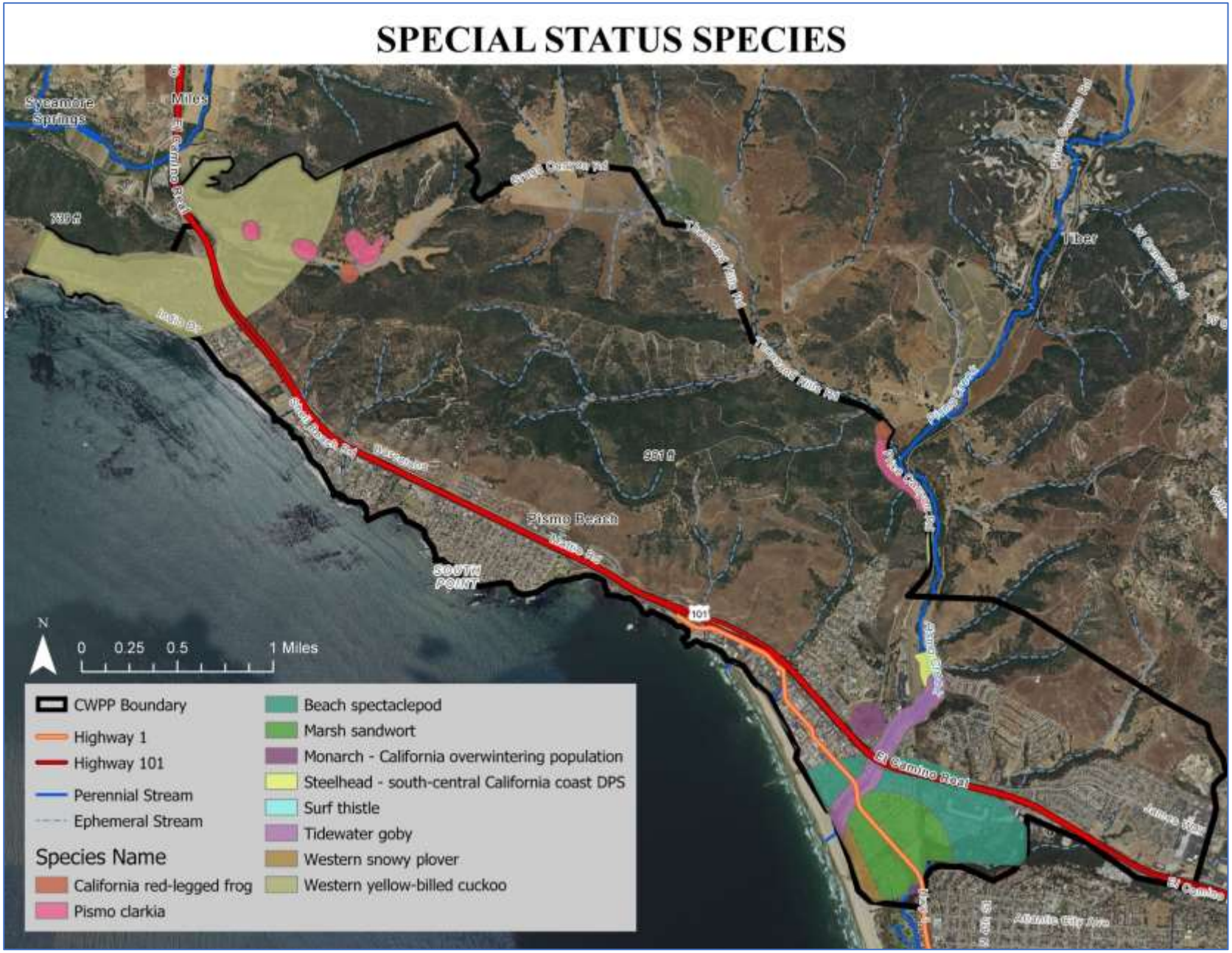

Figure 59. Special status plant and animal species in the study area. Data obtained from CNNDB Database.

Special status species are generally highly susceptible to negative impacts of wildfire. Small populations often struggle to rebound after wildfire. Further, these species often occupy unique ecological roles and are more sensitive to environmental changes. Wildfire poses direct risks to these species and their habitats.

6.4.1.1 Critical Habitat

Critical habitat is defined as areas that are essential for the conservation of a species. These areas often imply special restrictions where the use of federal funding, permits, or authorizations are required. Critical habitat for Tidewater goby exists within and directly adjacent to the study area, located at the outlet of San Luis Obispo Creek and the Pismo Marsh.

6.4.1.2 Environmentally Sensitive Habitat

Environmentally sensitive habitats (ESH) been identified in the study area by the San Luis Obispo County Local Coastal Plan (LCP). Actions in these areas are required to protect from disruption of habitat values and be dependent on the protection of the habitat resources. Pismo Marsh is designated as an ESH in the study area. This area includes the California State Parks managed Pismo Ecological Reserve which conserves important wetland habitat. Marshland vegetation, while often saturated, can become dry during severe drought. Wildfire poses considerable threats to wetland vegetation and species which are not well adapted to wildfire. Further, upstream impacts to water quality from wildfire can degrade downstream marshland habitats

6.4.1.3 Streams and Water Resources

Intact riparian corridors provide important habitats while also promoting enhanced water quality through shading streams which reduces water temperatures, stabilizing streambanks, and minimizing erosion. These functions may be significantly degraded if not completely lost from severe fire, resulting in potential catastrophic impacts for riparian species. Southern steelhead, a federally threatened species, has been identified in Pismo Creek. Steelhead are highly sensitive to water quality and require a specific range of water temperatures, stream bed characteristics, and dissolved oxygen to survive and spawn in freshwater streams. Wildfire in the Pismo Creek corridor poses substantial risks to this species as the potential for increases water temperatures, reductions in dissolved oxygen, and increased turbidity due to elevated levels of sediment is likely. The presence of unhoused individuals residing in the Pismo Creek riparian corridor exacerbates wildfire risks due to a greater chance of human-caused ignitions.

6.4.1.4 Slope and Soil Stability

Wildfires result in accelerated rates of erosion due to the loss of soil cover, increase speeds of overland flow, and lowered soil water absorption capacity. Vegetation functions to protect the soil surface, increase soil stability through roots, decrease the speed of water movement across the soil, and facilitate increased rates of soil water absorption. Accelerated erosion can often result in increased sediment deposits in streams which negatively impacts water quality and aquatic habitats. Steep hillslopes are likely to see the greatest rates of hillslope erosion due to soil instability and high speeds of overland flow which can create deep channels in the soil. In addition, a loss of the top organic layer of the soil can degrade soil health and limit the re-establishment of vegetation following a wildfire. Steep slopes frequently experience soil mass movements, which occur when a large amount of soil detaches from the hillslopes and moves downslopes. Mass movements following wildfire can pose significant threats to human property and safety. A Large soil movement was observed following the Avila Fire above the Spyglass Ridge neighborhood. This event deposited large loads of eroded sediment into the neighborhood impacting streets and homes. The presence of steep slopes throughout the study area and highly erosive soils increases the likelihood of soil mass movements following wildfire.

Figure 60. Erosion deposit on road surface due to a soil movement following the Avila fire in 2020. https://www.youtube.com/watch?v=-ObgBf0byi8

6.4.1.5 Air Quality

Clean air and favorable climate are important aspects of Pismo Beach attracting both residents and visitors to the area. Pismo Beach resides within the Coastal Plateau air quality basin, a 5-10-mile-wide basin ranging from sea level to 500 feet of elevation. Wildfires negatively impact air quality through smoke production that is likely to exceed the acceptable levels of carbon monoxide, carbon-

dioxide, methane, and non-methane hydrocarbons, $PM_{10,}$ and $PM_{2.5}$ mandated by the San Luis County Regional Air Pollution Control District (RAPCD). The severity of air quality concerns in dependent on fire behavior and the amount of fuel consumption. Wildfire smoke poses risks to community members, especially senior citizens, those with raspatory problems, and other at-risk individuals. Prescribed fire is a common fuels management strategy to reduce fire risk. However, implementing smoke management plans through the RAPCD can result in achieving air quality standards.

Figure 61. Smoke plume from the Avila Fire in 2020 causing impaired air quality for the city of Pismo Beach (805 webcams.com)

6.4.1.6 Cultural Resources

The Plan Area harbors significant cultural resources. Cultural resources include archaeological, tribal, and historic resources. Many of these resources are derived from human settlements existing along the central coast for thousands of years. The conservation of cultural resources is mandated through the California Environmental Quality Act (CEQA), California Public Resources Code, and California Health and Safety Code. Cultural resources can be significant impacted or destroyed from wildfire. The Pismo Beach area was home to the Chumash people at the time of European settlement. Chumash establishment in the study area is evident thorough the occurrence of multiple

archaeological sites throughout the study area. A significant archaeological site has been identified on Judkins middle school property located in the Pismo Heights city plan area. One historic building exists within the study area, the John Price house located on Rancho Pismo Drive (Figure 62). This building is listed on the National Register of Historic Places and is a part of Price historic park which was dedicated to the city of Pismo Beach by a non-profit organization.

Figure 62. John Price historic house within Price Historical Park.

7.0 Wildfire Prevention Measures

We identify ways to prevent wildfires within the study area through biophysical and sociopolitical practices.

7.1 Biophysical

Biophysical prevention measures seek to reduce ignitions by through physical changes of the landscape and built environment.

7.1.1 Roadside Clearance

Roadside ignitions represent a substantial proportion of all human-caused wildfire ignitions in the Unites States with 60% of ignitions occurring within 200 meters of roads (Morrison, 2007). Roadside ignitions can be caused by vehicles themselves, sparks from passing vehicles, or other causes including lit cigarettes. Treating vegetation directly adjacent to roads can limit the likelihood of

ignition and fire spread from roadside activities. Roadways are often unsafe for use during wildfire, especially narrow roadways bordered closely by dense vegetation. Roadside vegetation treatments improve ingress and egress for emergency personnel by reducing fire activity along roadways. Roads can also be utilized as fire lines during fire suppression. The safety and feasibility of conducting fire suppression efforts for roadways is improved when fuel loads are minimal. We provide a list of roadways where roadside vegetation management should be conducted.

- Gragg Canyon Road
- Thousand Hills Road
- Mattie Road
- Price Canyon Road
- Rancho Pismo Drive
- Highland Drive
- James Way
- Ventana Drive
- Mankins Ranch Road
- Cave Landing/Bluff Fuel Break
- Bluff Drive
- Pismo Heights Escape Route to Price Canyon Road
- Pismo Preserve Access Roads
- Thousand Hills Ranch Access Roads
- Shell Beach Bluff Trail

Roadside treatments should occur annually and at minimum promote conditions resembled in the Zone 1 Defensible Space Requirements. Standard treatments should occur within 10 feet from the roadside; however, greater vegetation clearance is recommended in areas with steep slopes, dense vegetation, or critical infrastructure. 30 feet of vegetation clearance is recommended around fire road gates and hydrants and other water supply infrastructure. Responsibility for maintaining roadside clearance along these roadways falls under landowners of HOAs when the property boundary extends to the right of way. Roadside treatments of county-maintained roads often include the county of Department of Public requires as responsible entities.

7.1.1.1 Priority Areas for Roadside Clearance

We identify priority areas where roadside treatments should be conducted. Reducing fuels along these roadways is important for reducing threats to human life and property during wildfire.

1) *Pismo Heights Escape Route to Price Canyon Road*

The San Luis Obispo Land Conservancy has granted emergency access through the Pismo Preserve for individuals evacuating the Pismo Heights community via an unpaved road that connects to Price Canyon Road via Thousand Hills Road. This emergency escape route begins at the top of Longview Avenue and provides an additional evacuation option for residents during a wildfire (Figure 63).

Figure 63. Emergency escape road at the top of Longview Avenue. The unpaved road traverses through the Pismo Preserve and intersects with Thousand Hills Road.

Removal of roadside vegetation decreases risks for those evacuating via this route, especially considering the route passes through areas of high and highest wildfire hazard (Figure 16). We recommend annual roadside mastication before June to maintain safe evacuation conditions during the summer months. Conducting these roadside fuel treatments will require cooperation with the San Luis Obispo Land Conservancy given the road exists on their ownership.

2) *Cave Landing/Bluff Fuel Break*

The Shell Beach Bluff Trail has been maintained between Cave Landing Road and Buff Drive to allow emergency vehicular access (Figure 64). This unpaved route can be used as an alternative evacuation route for Avila Beach and the Shell Beach area, particularly for residents of the Bluffs and El Portal HOAs. While the community of Avila Beach exists outside the Plan Area, a wildfire in proximity may require evacuation through the Plan Area via this emergency evacuation route. Roadside treatments have occurred prior and should be maintained annually before June to remove flammable vegetation. Conducting these treatments will require continued approval and coordination with San Luis Obispo County Parks as this road exists partly in their ownership.

Figure 64. Prior roadside fuels reduction treatment along Shell Beach Bluff Trail emergency route.

3) *Price Canyon Road*

An ignition along Price Canyon Road presents considerable threats to human life and safety given the proximity to structures, steep slopes, and continuous fuel beds. The west side of Price Canyon Road between Selma Street and Thousand Hills Road is of particular concern as a roadside ignition could spread rapidly uphill and threaten homes in the Pismo Heights. Previous analysis shows that an ignition in this area could spread to the Pismo Heights in just 11 minutes. Current roadside fuels

reduction is inadequate and involves the removal of fuels 5 feet from the roadside (Figure 65). We recommend these treatments be more substantial and remove fuels at least 15 feet from the roadside to significantly reduce the likelihood of a roadside ignition.

Figure 65. Current roadside fuels reduction on the west side of Price Canyon Road between Selma Street and the Cortana homes community.

7.1.2 Powerline Fast Trip Sensors

Powerlines are a common ignition source for many wildfires in California. Powerline contact with vegetation can fault powerlines and cause sparking. To mitigate this risk, PG&E has developed "Fast-trip" sensors, which detect faults in transmission lines and quickly de-energize to reduce the likelihood of an ignition in the affected area. These temporary power-outages are distinct from PG&E's public safety power shutoffs, which de-energize transmission equipment during severe fire weather in high fire severity areas.

The City of Pismo Beach and greater San Luis Obispo County should communicate with PG&E about the installment of Fast-trip sensors on applicable electrical infrastructure to reduce ignition risks. PG&E should be notified of the high fire risk to communities in the study area and be influenced to pursue the installation this equipment.

7.1.3 Mechanical Equipment Safety

The use of mechanical equipment can lead to ignitions through improper use, equipment failures, or other circumstances. Equipment such as lawnmowers, electric saws, and other electrical or gasoline power tools have the potential to start fires through spark production or direct combustion after battery failure. In addition, vehicle use in vegetated areas can result in ignitions through sparking or direct ignition from the heated undercarriage. The potential for mechanical equipment to cause ignitions was highlighted in the study area in February 2022 when a home under construction on Costa Brava Road near Pismo Beach City Hall caught fire after the battery of an electrical power tool combusted (Figure 66). While the fire was contained by firefighters and did not spread to adjacent vegetation due to low winds and high fuel moisture, the same may not have been true if the fire occurred when fuels were more fire receptive.

Figure 66. House fire on Costa Brava Road which was ignited by the combustion of a battery of a power tool in February 2022.

We provide recommendations to prevent ignitions from the use of mechanical equipment.

1) Develop fire-safe equipment use requirements into contractor-homeowner construction and maintenance contracts, especially when the property exists within a fire hazard severity zone.
2) Homeowners within fire hazard severity zones should be required to mow before 10am.
3) Require the use of spark arrestors on gasoline powered construction and maintenance equipment.
4) Homeowners and contractors should maintain 10 feet of clearance from vegetation during welding or griding activities and obtain Hot Work Permits for relevant activities.
5) Mowing, welding, grinding, or any activity that may result in spark production should not be allowed during red flag warnings for properties located within a fire hazard severity zone.
6) Vehicles operating on unpaved roads or directly within vegetation should be required to carry a fire extinguished and shovel.

7.2 Sociopolitical

In addition to biophysical measures, potential ignition sources can be mitigated through sociopolitical measures and activities. Sociopolitical prevention seeks to reduce wildfire risks in the study area through public education, law enforcement, and other fire safe practices.

7.2.1 Public education

Educating community members about local wildfire risk and prevention measures is a critical component for fostering a fire-safe community. Human caused ignitions are the most likely cause of wildfire in the study area, emphasizing the need for community wildfire risk awareness. We provide recommendations to improve public education for communities within the study area.

1) The San Luis Obispo County Fire Safe Council and the Pismo Beach Fire Department/CAL Fire should conduct annual community education days for concerned community members. Community members should be educated about ways to reduce the chance of ignitions on their property.
2) Fire safe signage should be implemented in high use recreational areas including areas of the Pismo Preserve and Cave Landing. Signs should portray the local wildfire risks and describe applicable fire prevention laws. Fines for violating these laws should be emphasized to deter illegal activities that may cause a wildfire.

3) The City of Pismo Beach should develop brochures describing local wildfire risk and prevention laws to hand out in high use areas to educate visitors who may be unfamiliar with the wildfire risk in the study area.
4) Partner with local utility services to attach fire prevention educational materials to mail and electronic billing notifiers for community members.

7.2.2 Law enforcement

Maintaining an active law enforcement presence is important for preventing illegal activities which may cause a wildfire. Campfires or other recreational fires are always prohibited on publicly accessible lands in the Plan Area, and seasonally prohibited for private landowners. Areas of concern for campfire use include Cave Landing, Ontario Ridge, and the Pismo Preserve. The Cave Landing area expresses the greatest illegal campfire activity with recreational bonfires common in the Pirates Cove area. In addition, unhoused individuals living within the region frequently use campfires for cooking, safety, and heating. Of all emergency calls originating from the Cave Landing area, 25% relate to fire activity.

We provide law enforcement recommendations to reduce ignitions in the study area.

1) Increase law enforcement presence in areas where illegal campfire activity commonly occurs. The Pismo Beach Police Department should patrol the Cave Landing area to deter illegal campfire use.
2) A gate should be installed on Cave Landing Road to prevent vehicle nighttime use. This county park is currently closed after sundown; however, access is not currently prevented. Installing a gate would greatly reduce nighttime recreational fire use.
3) Fines for illegal fire use should be doubled during days designated with red flag weather to further deter illegal fires during the highest risk days.

8.0 Wildfire Mitigation

Wildfire mitigation seeks to reduce damage to assets at risk during a wildfire. Mitigation practices intend to reduce wildfire impacts while also improving the capacity for fire suppression efforts. We highlight recent fuels reduction activities and recommend additional areas for fuel reduction to mitigate wildfire risk in the study area.

8.1 Recently Conducted Fuels Reduction

CAL Fire and other groups have performed fuels reduction actives in strategic areas to reduce threats to human life and property and to create areas to engage in direct fire suppression from the

ground. Common practices include annual mowing of grasses in homes within the Wildland Urban Interface, removal of roadside vegetation by mastication and hand crews, mastication of brush around neighborhoods, ridgeline fuel breaks, grazing, and prescribed fire (Figure 67;68). Fuels reduction in the study area is also permitted through the Pismo Vegetation Management Plan (VMP) which permits prescribed fire as a fuel reduction method on the Thousand Hills Ranch property.

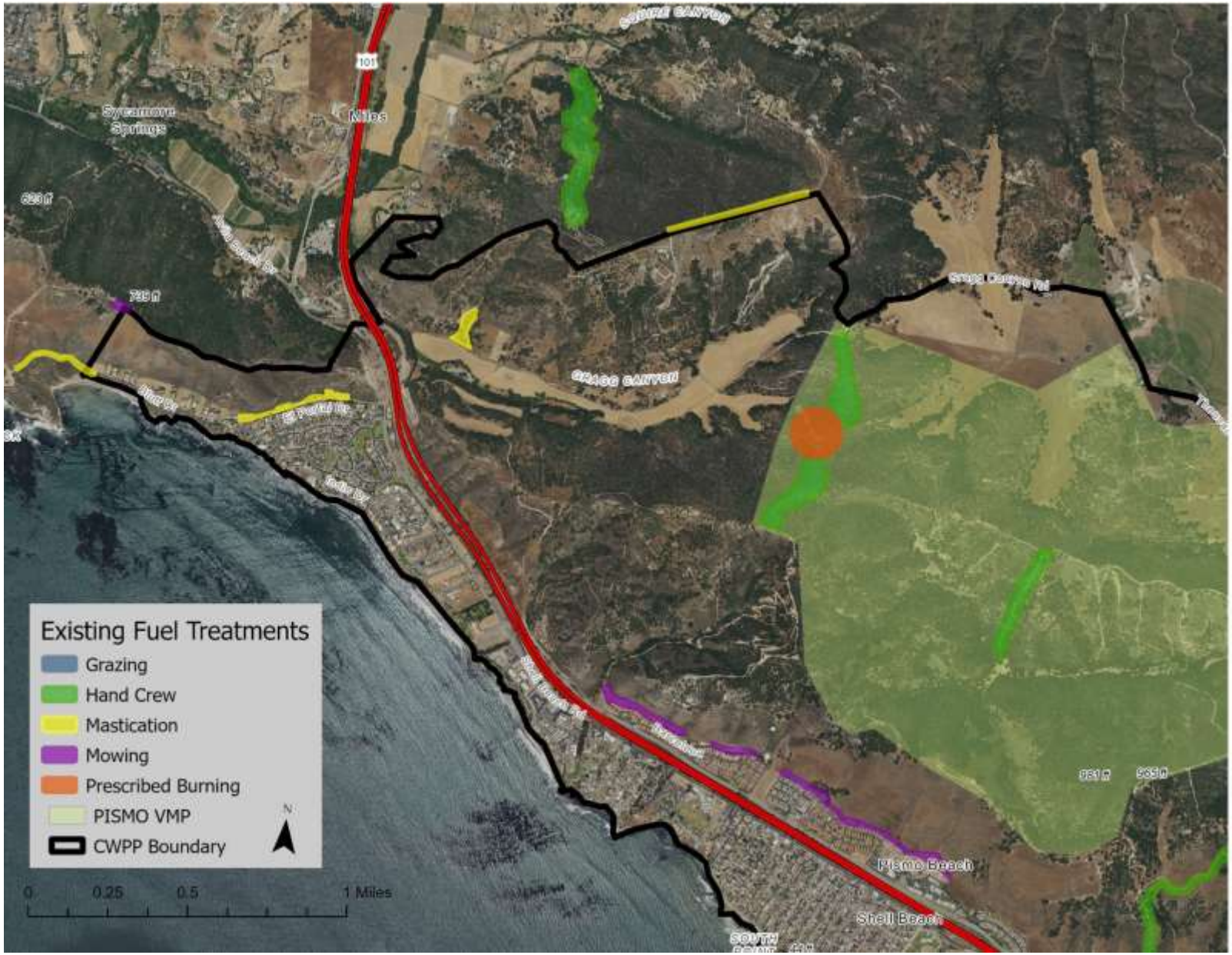

Figure 67. Current fuel treatments in the study area (1 of 2). Note: Map does not include recent fuel breaks which connect the top of Squire ridge to Gragg Canyon Road.

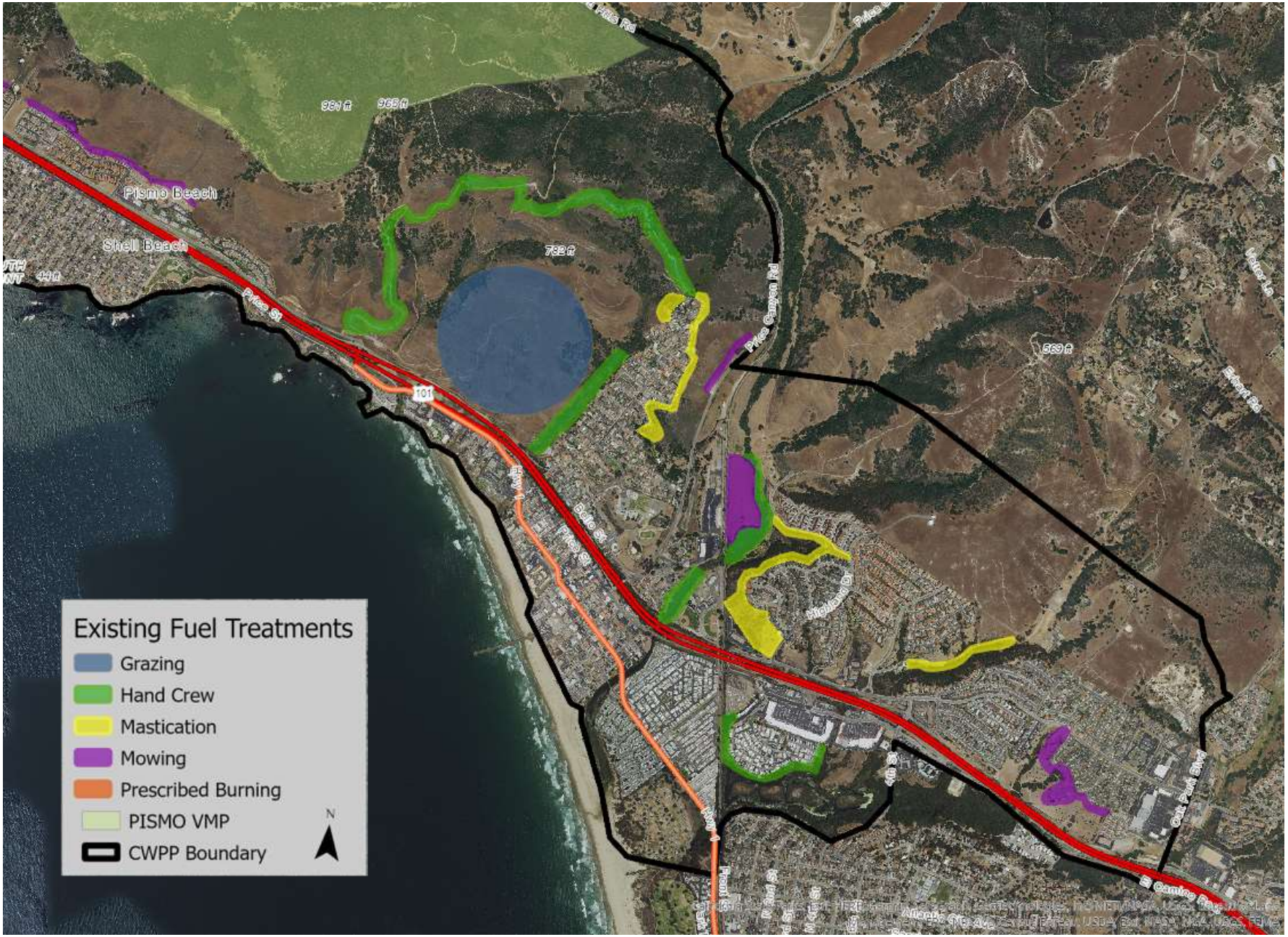

Figure 68. Current fuel treatments in the study area (2 of 2).

8.2 Non-Residential Vegetation Management Recommendations

We identify non-residential areas where fuels reduction should be performed to mitigate risks to valuable assets.

8.2.1 Rattlesnake Canyon Fuels Reduction

Rattlesnake Canyon has been identified as a priority area to conduct fuels reduction treatments. This area exists within the Pismo Preserve directly adjacent to the Pismo Heights community. Steep slopes, dense vegetation, and proximity to structures highlight the need for fuels reduction in this area to mitigate fire severity and increase the capacity for structure protection. Current fuel conditions pose immediate threats to the Pismo Heights (Figure 69;70)

Figure 69. Upslope view of Rattlesnake Canyon. Imagery obtained from Google Earth Pro.

Figure 70. Downslope view of Rattlesnake Canyon. Imagery obtained from Google Earth Pro.

Two previous fuels reduction treatments have occurred in Rattlesnake Canyon in 2015 and 2019. Both treatments utilized hand crews to lop and scatter small diameter material to reduce continuity between ground and ladder fuels. Further and more intensive fuels reduction is required to adequately mitigate fire risks. Steep slopes and limited road access have prevented the utilization of heavy machinery in the area such as tracked masticators and chippers. Yet, the use of this equipment is likely necessary to significantly mitigate risks.

Common tracked masticators are limited to operating on slopes less than 70%. Yet, the Menzi Muck 4x4 excavator or other walking style excavators can operate on slopes greater than 100% (Figure 65) (Menzi Muck, n.d.). The machine utilizes four independent arms to maneuver and stabilize itself on steep and uneven terrain. Large rubber tires enhance traction while also giving the machine a light footprint on the soil. This excavator can be attached with a FAE-60" Drum Mulcher to chip brush and trees up to 12 inches in diameter (FAE, n.d.).

Figure 71. Menzi Muck 4X4 walking style excavator.

We recommend this machine be used in Rattlesnake Canyon, especially on the north facing slope, to masticate understory brush and small diameter vegetation. Access points can occur at the outlets of dead-end crossroads within the Pismo Heights. Treatments should be repeated to maintain desired fuel conditions. Successful completion of these fuel treatments will require coordination and between the San Luis Obispo Land Conservancy, CAL Fire, property owners in the Pismo Heights, and the California Department of Fish and Wildlife (CDFW).

The Interagency Fuels Treatment Decision Support System (IFTDSS) was used to analyze how this fuel treatment would influence fire behavior. Two simulations were performed to compare differences between untreated and treated landscapes. The treatment area included the entirety of the north facing slope of Rattlesnake Canyon and involved mastication with slash remaining after the treatment. Both simulations utilized identical 97th percentile fire weather inputs generated by IFTDSS. A significant decrease in flame lengths was observed in the treatment area. This highlights the potential to significantly reduce fire behavior severity through this fuels reduction approach (Figure 72).

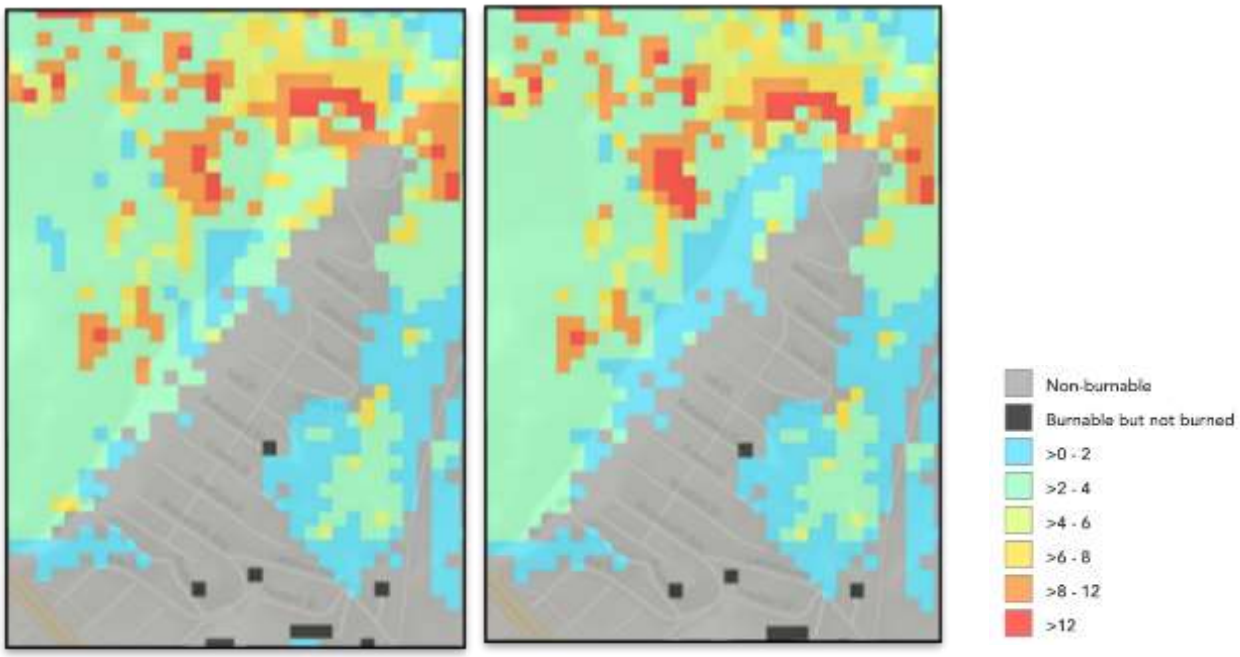

Figure 72. Conditional flame lengths in Rattlesnake Canyon for untreated (left) and treated (right) scenarios.

8.2.2 Pismo Estates and Pismo Oaks Shaded Fuel Breaks

Results from the wildfire behavior modelling predicted areas expressing flame lengths greater than 30 feet in the drainages adjacent to homes along Clydell Court and Shamrock Lane in the Pismo Estates and Pismo Oaks neighborhoods respectively (Figure 73;74). These areas of potential extreme fire behavior exist near homes, increasing the risk of homes ignitions and limiting the capacity for safe and effective structure protection efforts during a wildfire.

Figure 73. Densely vegetated drainage adjacent to homes along Clydell Court increasing home ignition risk. Note that empty lots now possess constructed homes. Imagery obtained from Google Earth Pro.

Figure 74. Densely vegetated drainage adjacent to homes along Shamrock Lane increasing home ignition risk. Note that empty lots now possess constructed homes. Imagery obtained from Google Earth Pro.

Maintaining aesthetics was described as a high priority for homeowners adjacent to these drainages. In response, we recommend shaded fuel breaks be constructed to decrease fire risk while also meeting the desired aesthetic appeals. Unlike conventional fuel breaks which remove all vegetation, shaded fuel breaks remove small diameter understory material while retaining larger trees. On occasion, larger diameter trees are removed to maintain adequate spacing between trees to limit the opportunity for wildfire spread within the tree canopy. Shaded fuel breaks in forest stands have also been found to improve forest health by reducing competition. This results in healthier trees which store more carbon in a less competitive environment. Guidelines for constructing shaded fuel breaks can be obtained from the California Vegetation Treatment Programmatic Environmental Impact Report (CalVTP).

8.2.4 Fuel Break Maintenance

Fuel breaks involve the removal of vegetation in strategic areas to slow fire spread and create an area where firefighters can directly engage and contain the fire. Roads, both paved and unpaved, and multi-use trails can also function as fuel breaks. Fuel breaks can also be created adjacent to roadways to increase the capacity for fire suppression. While multiple fuel breaks currently exist in the study area, we recommend enhancements and additions to these areas.

1) Widening of Ontario Ridge Trail

Ontario Ridge trail traverses Ontario Ridge and functions as the northwest boundary of the Plan Area (Figure 75). The trail is frequented by hikers and bikers who enjoy the panoramic views the trail has to offer. We propose that this trail be widened to enhance the capacity to function as a ridgetop fuel break. Fire behavior is expected to be severe in this area given the steep slopes present and the hillslopes orientation to the prevailing wind direction. Further, chances of human caused ignitions are high from the nearby Cave Landing and Pirate's Cove recreational area which sees substantial use from recreationalists and unhoused individuals. Widening of the Ontario Ridge trail to a minimum of 15 feet wide would improve the likelihood of containing a fire from crossing the ridgeline.

Figure 75. View from Ontario Ridge trail looking towards Highway 101.

Following the removal of vegetation, effective fuel breaks require maintenance every few years to maintain desired vegetation conditions. In areas currently functioning as fuel breaks, we recommend the development of a maintenance plan to ensure long-term benefits.

2) Grazing of El Portal Shaded Fuel Break

A shaded fuel break exists behind the homes of the El Portal neighborhood to create a buffer between at risk homes and increase the capacity for structure defense during a wildfire (Figure 76). While the fuel break is masticated annually, considerable revegetation limits its benefit. We recommend that grazing by goats be implemented to reduce understory flashy fuels during summer months. Goats have been proven to significate reduce understory revegetation and are commonly well-received by community members (Lovreglio et al., 2014). Establishing a grazing plan for this shaded fuel break should occur to maintain desirable vegetation conditions during fire season.

Figure 76. Current vegetation conditions of the El Portal shaded fuel break highlighting the significant presence of flashy understory fuels.

3) Repeated maintenance of fuel breaks in Gragg Canyon and Thousand Hills Ranch

Multiple ridgeline fuel breaks have been created within the Gragg Canyon and Thousand Hills Ranch properties. These fuel breaks allow access points for firefighters to suppress wildfire moving through these areas. Holding wildfire at these fuel breaks prevents continued fire spread and potential impacts to communities in the study area.

Following treatment, which may be either manual, mechanical, or prescribed burning, the vegetation present at the reestablishes over subsequent years. This is especially true for shaded fuel breaks which retain a greater amount of vegetation resulting in quicker revegetation rates. Fuel breaks should be annually inspected to assess if additional vegetation treatments are required to maintain conditions adequate for suppressing wildfire.

8.2.5 Removal of Vegetation Around Electrical Transmission Lines

Powerline infrastructure has the potential to start wildfires as proven through countless catastrophic wildfire including the Camp Fire in Paradise, CA which was started by electrical transmission lines

owned and operated by Pacific Gas and Electric (PG&E) and resulted in the death of 86 people. Electrical transmission lines can ignite vegetation through downed lines, vegetation contact, conductor slap, repetitive faults, and apparatus failures. PG&E is mandated to maintain adequate clearance around transmission lines to mitigate ignition risk.

- **General order 95, Rule 35** Required continual maintenance of 18-inch radial clearance between vegetation, live or dead, and electrical transmission lines transmitting voltages of 69,000 volts or greater. This requirement is increased to 4-feet in areas designated as expressing high fire hazard. Select laws supersede this rule within SRA lands.

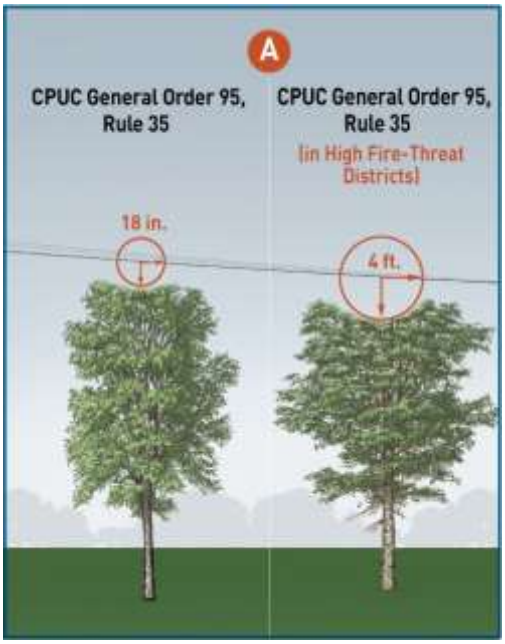

Figure 77. Illustration of vegetation clearance requirements mandated in CPUC General Order 95, Rule 35

- **Public Resource Code 4292** Requires the removal of all flammable vegetation 10 feet from the power pole down to bare soil. Limbs that exist within the 10-foot clearance zone are required to be removed from eight feet and below, in addition to the removal of all dead limbs in the 10-foot zone regardless of their height above ground.
- **Public Resource Code 4293** Mandates that 4-feet of vegetation clearance be continually maintained for conductors between 2,400 and 72,000 volts. Clearance requirements are enhanced for greater voltages.

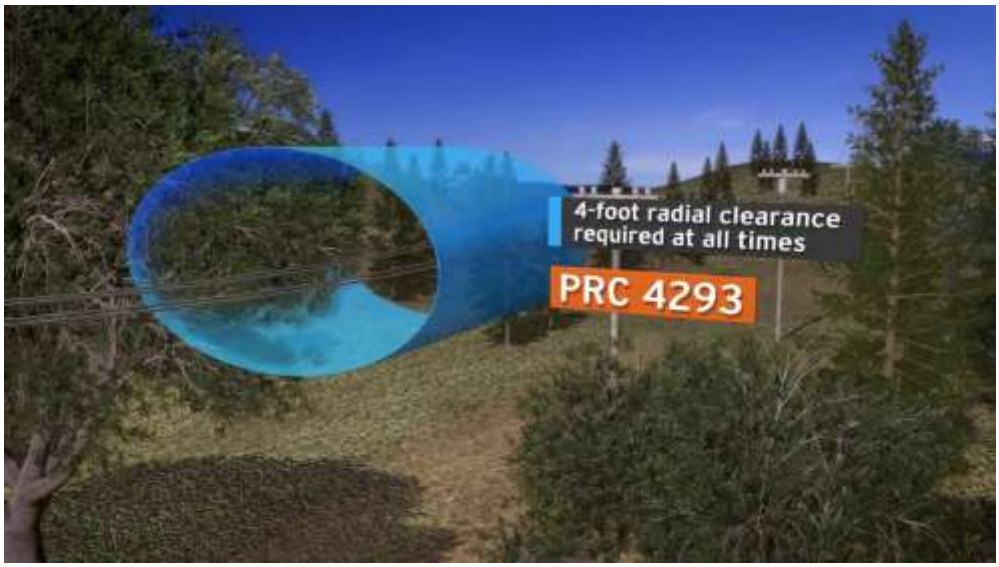

Figure 78. Illustration of 4-foot vegetation clearance requirements mandated in PRC 4293.

- **CPUC Resolution ESRB-4** Mandates that PG&E removes all dead, dying, or diseased trees which could fall and encounter distribution lines.

The minimum requirements for electrical transmission requirements are not currently met within the Plan Area. The sub-transmission lines along Price Canyon Road and Ontario Ridge are of particular concern given their capacity to ignite fires in areas where wildfire poses substantial threats to human life and safety. We recommend that measures be taken to remove vegetation near and around these transmission lines to reduce the chance of ignitions from electrical infrastructure. The City of Pismo Beach should contact PG&E to schedule maintenance of electrical transmission lines.

8.2.6 Prescribed Fire

Prescribed fire is a useful tool for reducing fuel loads and promoting natural ecological processes. Fire can be controlled in a controlled setting to achieve desired management objectives. Low severity understory fire reduces flashy understory fuels, can mitigate disease and pests, recycle soil nutrients, and improve habitat for wildlife.

The Pismo VMP currently exists within the study area on the Thousand Hills Ranch property. The plan identifies prescribed fire as the main vegetation management technique. This VMP is a reissuance of the expired Long Canyon and Pismo VMPs which expired before burning was completed. The current Pismo VMP seeks to utilize previously constructed control lines and burn units outlined in the Long Canyon VMP (Figure 79;80). These previously constructed control lines need to be re-opened

given substantial vegetation growth since their construction in 2015. We recommend that the prescribed burning plan approved in the Pismo VMP be carried out to its full extent prior to the plan's expiration on November 1st, 2029.

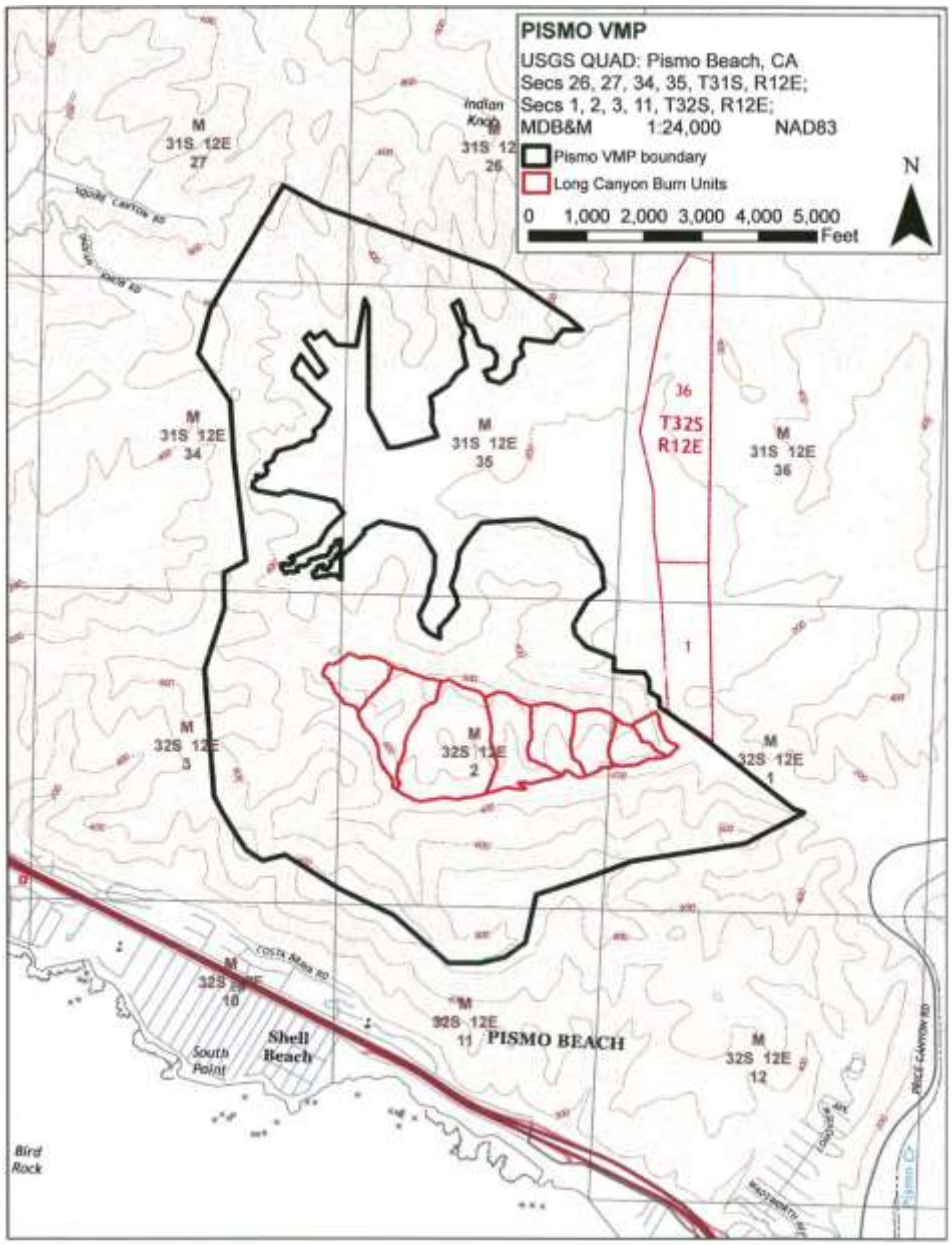

Figure 79. Map of Pismo VMP boundary and identified burn units.

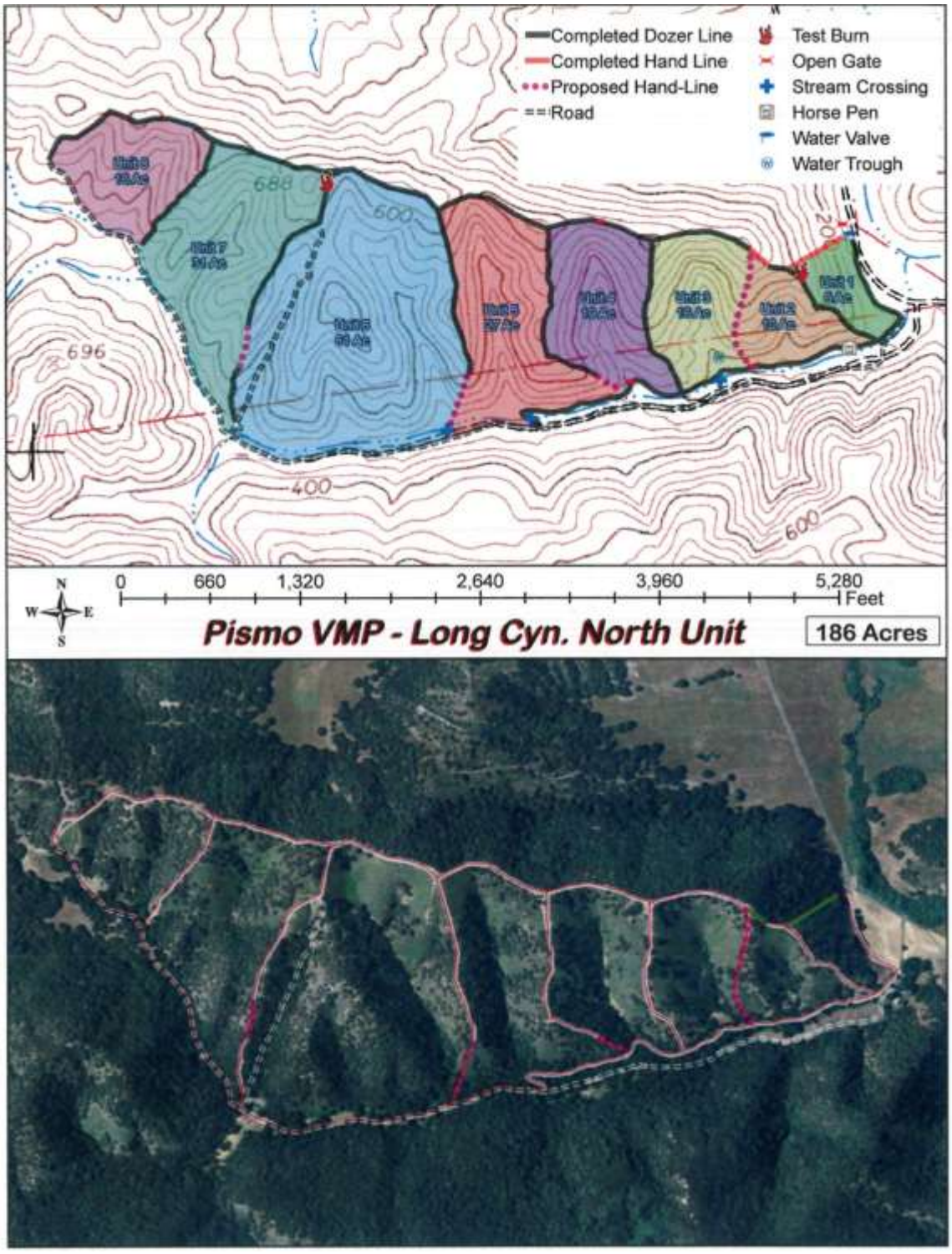

Figure 80. Map of approved burn units within Pismo VMP showing control lines previously constructed through the Long Canyon VMP.

In addition to the prescribed fire approved in the Pismo VMP, we recommend that further opportunities to introduce prescribed fire be pursued within the study area. The Gragg Canyon

regions presents opportunities for future prescribed burning given current vegetation conditions and the previous engagement of the landowner.

8.3 Residential Vegetation Management

Managing vegetation in residential areas is a key factor influencing home ignitions in the WUI. Residential vegetation can greatly influence fire behavior in and around neighborhoods (Alexandre et al., 2016). In addition, residential vegetation can influence the capacity for firefighters to protect structures safely and successfully during a wildfire. If constructed properly and well maintained, homes may also survive wildfire without structure protection efforts. We outline current requirements for residential vegetation management in the study area and provide recommendations for further actions.

8.3.1 Current Residential Vegetation Management

City of Pismo Beach Weed and Hazard Abatement Program

The CAL Fire/Pismo Beah Fire Department currently mandates residential vegetation requirements through a local Weed and Hazard Abatement Ordinance. This program applies to all parcels within Pismo Beach city limits. By June first each year, yards and vacant lots must ensure that their property meets the minimum requirements outlined in the program including:

- Grass must be cut to 3 inches or less in height
- Dead limbs, leaves, and other excess combustibles must be removed

The Pismo Beach Fire Department performs annual inspections to ensure compliance with these requirements.

8.3.2 Recommended Residential Vegetation Management

We provide a list of recommended residential vegetation management practices to lessen the impacts of wildfire in the Plan Area.

8.3.2.1 Creation of Defensible Space

Defensible space involves the removal of vegetation around structures to decrease the risk of home ignitions while also providing space for firefighters to engage in structure protection during a wildfire. Adequate defensible space may also allow homes to stand alone and allow firefighters to contain the wildfire instead of defending homes. Defensible space requirements are mandated for homeowners within high and very high fire hazard severity areas within the SRA. Local governments in the LRA can also choose to adopt these requirements. CAL Fire produces fire hazard severity maps for both the SRA and LRA. In 2009, the City of Pismo Beach chose not to adopt the Very High Fire Hazard Severity

Zone (VHFHSZ) recommendations as pictured in Figure 28. Instead, the city created their own fire hazard map identifying areas subject to strict building codes to reduce structural ignitability. Neighborhoods classified under this designation include The Bluffs, El Portal, Spyglass Ridge, Mattie Road Annex, Baycliff Village, and the Pismo Estates.

These requirements are mandated through the current laws.

- California Fire Code 4907.2
- Public Resource Code 4291
- Title 14 of the California Code of Regulations
- Assembly Bill 3074

We describe the current requirements for creating defensible space around structures and recommend that the City of Pismo Beah and Pismo Beach Fire Department mandate these requirements for homes designated to be within a Very High Fire Hazard Severity Zone.

Recommended Defensible Space Requirements

Defensible space requirements are mandated within 100 feet of a homes. Requirements are specific for multiple zones which involve different distances from the home.

- *Zone 0 - Ember Resistant Zone (0-5 Feet)*
- *Zone 1 – Lean, Clean, and Green Zone (5-30 Feet)*
- *Zone 2 – Reduce Fuel Zone (30-100 Feet)*

Specific requirements for each zone are described below in Figure 78.

Figure 81. Defensible space regulations for each designated zone. Figure obtained from Marin County CWPP.

In addition to the requirements designated for each zone, homeowners must also comply with vertical and horizontal spacing requirements for vegetation within the 100-foot zone. Ensuring adequate spacing between vegetation reduces the potential for wildfire spread around homes.

Tree branches should be removed within 6 feet of the ground. This spacing should be increased when shrubs exist beneath trees. To prevent the spread of flames to the tree canopy, the distance between shrubs and the lowest branches should be 3x the height of the shrub. For example, 15 feet of vertical clearance should be created between a 3-foot tall shrub and the lowest tree branches.

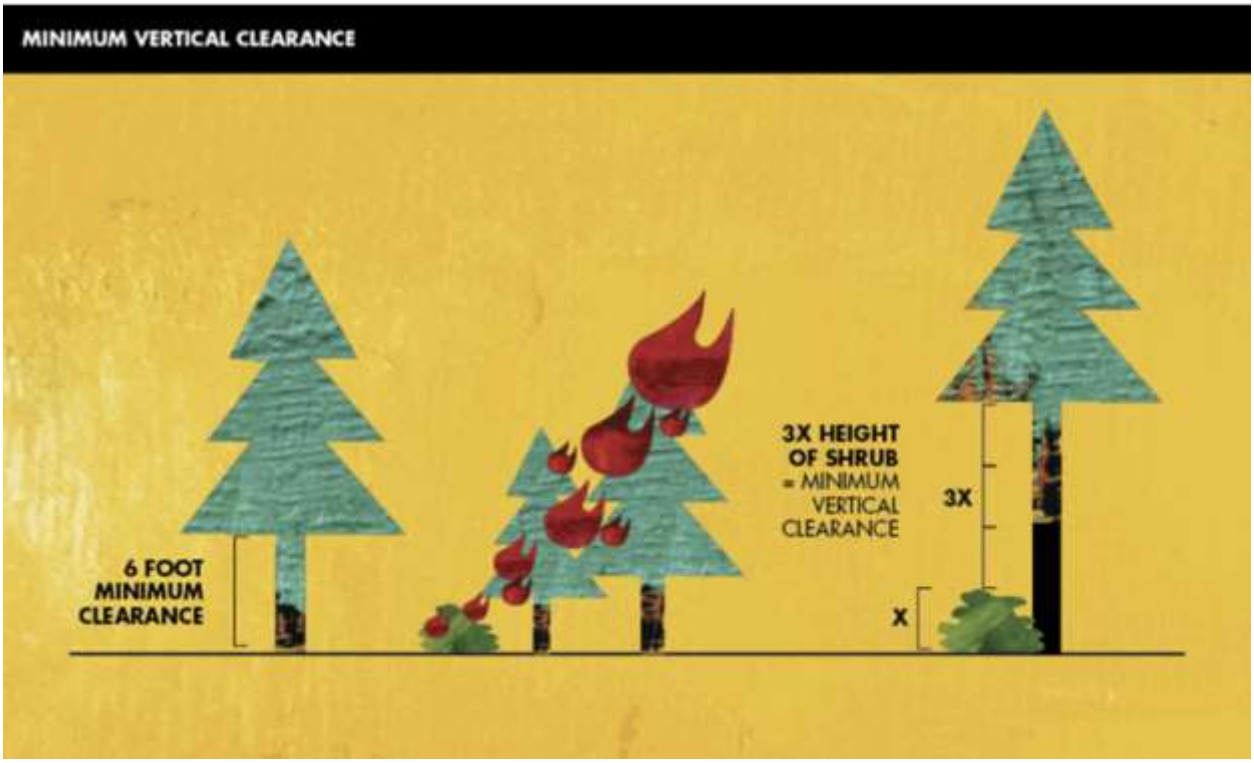

Figure 82. Depiction of minimum vertical clearance between vegetation in 100-foot defensible space zone. Figure obtained from CAL Fire Defensible Space Program website.

Horizontal spacing requirements depend on the slope steepness, with greater spacing required with on steeper slopes. Requirements also differ between shrubs and trees. Figure 80 depicts horizontal spacing requirements across a range of slopes.

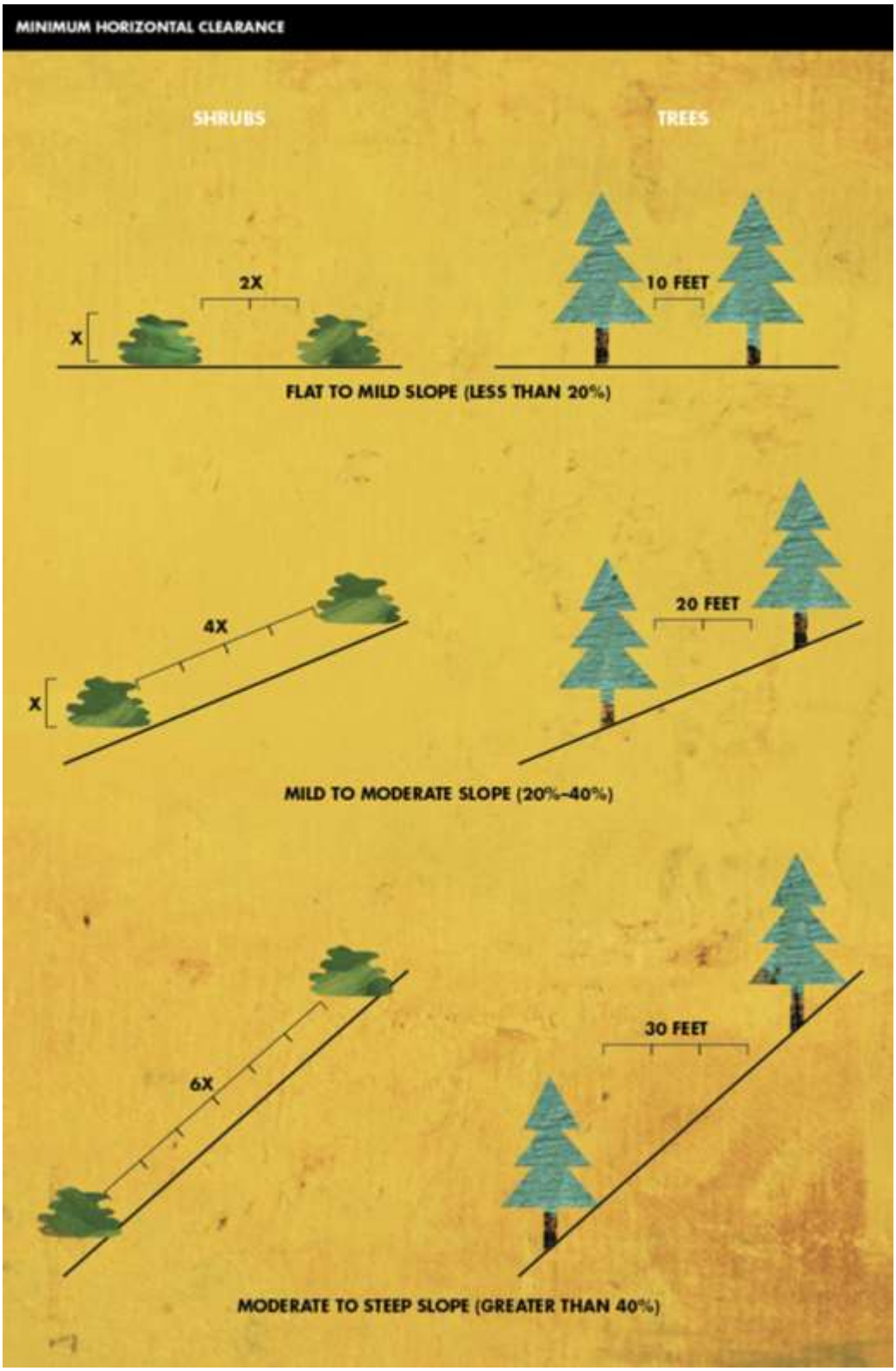

Figure 83. Horizontal space requirements for 100-foot zone around homes across a range of slopes for trees and shrubs. Figure obtained from CAL Fire Defensible Space Program website.

Parcel size may limit the ability to create 100 feet of defensible space on individual properties. To mitigate this, property owners should engage with adjacent landowners to create the recommended100-foot fuel modification zone. Property owners can also apply for utilities easements to manipulate fuels on adjacent properties to create desired conditions.

8.3.2.2 Community Chipper Days

The creation of adequate defensible space often requires significant removal of residential vegetation. The disposal of this material can be burdensome to homeowners and can be a large barrier preventing the creation of defensible space. To address this issue, community chipper days should be allocated in the Plan Area. The San Luis Obispo County Fire Safe Council possess grant funding allocated for community chipping. The City of Pismo Beach and community members should coordinate with the Fire Safe Council to schedule Chipper days in accordance with community needs. Contracted crews chip and spread pre-piled vegetation with no costs placed on the landowner. This form of residential management promotes community engagement in the wildfire mitigation process.

8.3.2.3 Fire Wise Landscaping

In addition to yard and property vegetation maintenance, the design of landscaping can greatly reduce the likelihood of home ignitions during wildfire. Fire wise landscaping involves plant selection and design to create a fire-resistant landscape.

Plant Selection

- Choose drought resistant plants with high moisture content such as succulents to reduce changes of ignition.
- Slow-growing plants require less pruning are likely to possess fire-safe conditions for longer periods
- Select trees with fewer branches and leaves with open canopies to reduce fuels and fire behavior
- Do not plant resinous or oily species including Junipers, Pines, Eucalyptus, or spruces.
- Avoid planting palm trees due to their high combustibility and susceptibility to ignitions from embers

Avoid Certain Mulches

- Shredded bark mulches including the common “Gorilla hair” style mulch should be avoided due to their high combustibility. Gorilla hair mulch was found to ignite in neighborhoods impacted by the Avila Fire.

- Use a non-woody mulch alternative such as colored rock or decomposed granite. These materials eliminate the potential for combustion while also maintaining a desired aesthetic. *Fire Safe Landscape Design*
- Avoid planting vegetation directly next to structures
- Retaining walls and other rock features around homes have been found to keep embers away from homes
- Disrupt the continuity between fuels by clumping vegetation and utilizing non-combustible features between clumps such as stone pathways, masonry, or rocks to reduce the chances of fire spread.

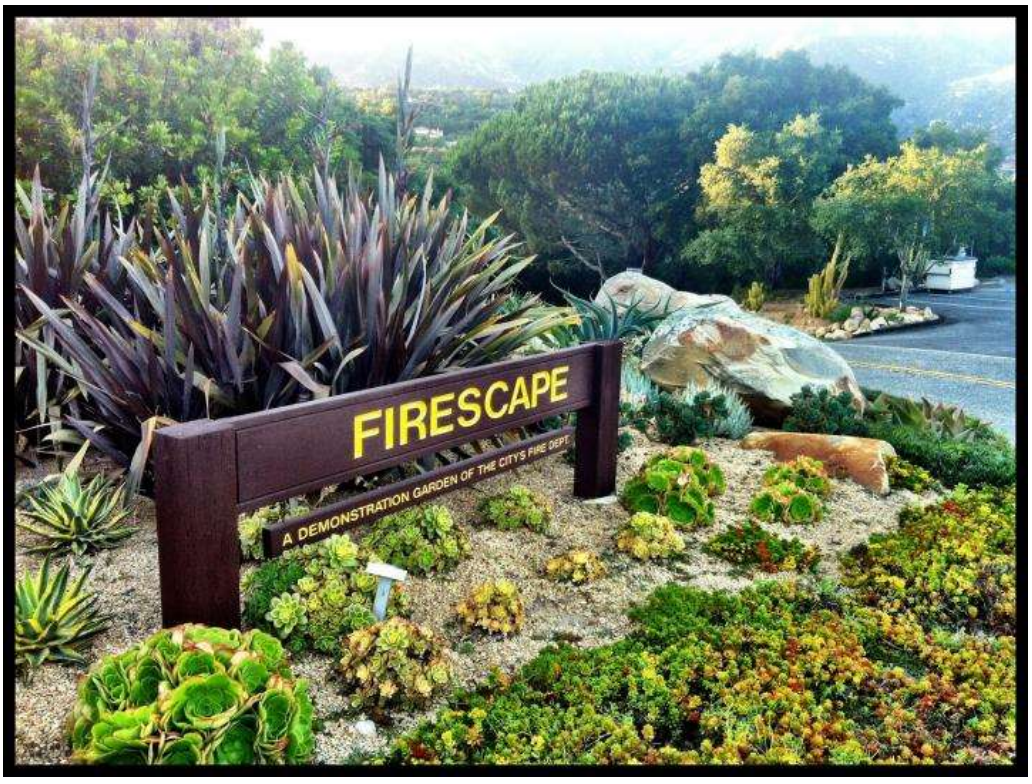

Figure 84. Example of fire safe landscaping highlighting non-combustible plant selection, the use of gravel instead of woody mulch, and separation between vegetation by rock features.

9.0 Home Design and Construction to Reduce Structural Ignitability

Home design and construction materials can have the greatest impact towards influencing home ignitability. Chapter 7A of the California Building Code titled *Materials and Construction Methods for Exterior Wildfire Exposure,* mandates new homes after 2009 within the Wildland Urban Interface

Zone or areas designated as expressing either high or very high fire hazard severity comply with minimum requirements to reduce structural ignitibility from embers or flame intrusion. Chapter 7A applies to roofing, exterior doors and windows, exterior siding, vents, outdoor stairs and decking, and porch ceilings and eaves. In the study area, these requirements apply to homes built after 2009 in fire hazard severity zones within the SRA and for homes located within the CAL Fire recommended Very High Fire Hazard Zone within the LRA. We present a summary of home construction requirements outlined in Chapter 7A. The full description can be found at hcd.ca.gov.

9.1 Ignition Resistant Homes

We provide a description of home construction methods and materials that can reduce structural ignitability of homes in the plan area.

9.1.1 Roofing

- Utilize non-combustible roofing materials identified as Class-A roofing materials. Examples of Class-A roofing includes asphalt shingles, metal, concrete, clay, synthetic, and slate.
- Prevent space between roof covering and roof decking to limit flame intrusion.
- Roof cutters should be constructed to allow for leaves and other debris to be easily removed.
- Open roof eave decking material should consist of either non-combustible material, ignition resistant material, be covered by a 5/8th in Type X gypsum sheathing, or covered by 1-hour fire resistive exterior wall assembly.

9.1.2 Vents

- Ventilation openings should be covered with a metal-wire mesh with minimum spacing of 1/16th inch with a maximum of 1/8th inch.
- Exterior siding materials should qualify as either non-combustible, ignition resistant, heavy timber wall assembly, or log wall assembly.
- Exterior siding should extend from the top of the foundation to the roof.

9.1.3 Exterior Porches and Porch Ceilings

- Exterior porches and porch ceilings should be constructed with fire-resistant or non-combustible materials or covered by a fire-resistant material

9.1.4 Windows

- Windows should be constructed with multi-pane glazing with a minimum of one tempered glass pane.

9.2 Home Retrofitting Towards Reducing Structural Ignitability

While firesafe construction can be implemented for newly constructed homes, existing homes can also be retrofitted to reduce the chances of structural ignitability. Many of these practices are cost-effective and greatly reduce the likelihood of home dagames from wildfire. We provide a list of practices that homeowners can carry out to help mitigate risks to homes during wildfire.

- When the time comes to replace roofing, choose Class-A roof tile materials.
- Consider replacing windows with multi-pane tempered glass.
- Install screens on windows to provide ember resistance if windows break during wildfire.
- Enclose open eaves with non-combustible materials.
- Add spark arrestors with chimneys with 3/8th in openings.
- Replace plastic skylights with tempered glass.
- Install a gutter cover to reduce the accumulation of combustible debris.
- Upgrade home vents to comply with standards outlined in Chapter 7A of the California Building Code. Explore vent options branded to reduce as flame and ember resistant.
- Close gaps in exposed with plugs and caulk to prevent ember intrusion.
- Install weather stripping under garage and home doors to prevent ember intrusions.
- Remove combustible materials from underneath or on top of outdoor deck when not in use.
- Store firewood at least 30 feet away from the home.
- Store combustible outdoor furniture away from home when not in use.
- Close windows and skylights when away for long periods or when wildfire is imminent.
- Stow away retractable awnings and umbrellas to prevent debris accumulation.

9.2.1 City Programs to Incentivize Home Retrofits for Reducing Structural Ignitability

Homeowners are likely to incur costs when making changes to their homes to meet home building requirements described in Chapter 7A of the California Building Code. Highest costs are most associated with retrofits to roofs and walls. However, this should not negate the benefits of restoring a home as individual home ignitability is largely driven by the building materials and construction methods.

To incentivize home retrofits in the study area, we recommend the implementation of City Programs to assist with mitigating the costs of home retrofits. These may include but are not limited to;

- Local tax breaks to incentivize homeowners to retrofit their homes.
- Develop Community-level sourcing programs to reduce the cost of materials and labor.
- Reduce utility rates for participating homeowners.

10.0 Wildfire Preparedness Measures

Wildfire preparedness measures seek to mitigate risks during an active wildfire in the plan area. Wildfire preparedness is centered around both biophysical and sociopolitical practices to ensure an effective emergency response capacity and safe evacuations.

10.1 Pismo Beach Pre-Attack Plan

A pre-attack plan has been created by CAL Fire for the Pismo Beach Unit (Figure 85). Pre-attack plans identify fire-fighting infrastructure, roadways, water sources, and temporary refuge areas. Temporary refuge areas are locations where firefighters can take refuge and short-term relief from wildfire without needing to deploy a fire shelter. Temporary refuge areas should be annually maintained to ensure that they meet the requirements necessary to provide safe refuge during a wildfire.

The Pismo Beach Pre-Attack Plan is useful when conducting tactical firefighting decisions. The pre-attack plan is also of benefit to fire-fighting personnel who may be unfamiliar with the area, as it provides essential information to stay safe when engaging in fire suppression.

Figure 85. Pismo Beach Pre-attack map created by CAL Fire to inform fire suppression during a wildfire in the Plan Area.

10.2 Firefighting infrastructure

Sufficient firefighting infrastructure increases the potential for effective wildfire suppression. We provide a summary of relevant firefighting infrastructure within and near the Plan Area.

10.2.1 Fire Stations

Access to sufficient firefighting infrastructure is a priority for successfully suppressing wildland fire. Six Fire stations exist within twenty minutes of the Plan Area. It is possible that resources from all these stations would be utilized in the event of a wildland fire in the Plan Area. The closest CAL Fire stations include the Shell Beach station (Station 63), Pismo Beach station (Station 64), and the Avila Valley station (Station 62). Additionally, Five Cities Fire Department Station 2 exists adjacent to the study area in Grover Beach. These stations are within seven minutes of the plan area and would be the first to respond to an incident. Three other stations exist further away from the Plan Area and include the South Bay station in Los Osos, San Luis Obispo station, and the San Luis Obispo Airport station. Estimated response times were produced for stations near the study area. Travel distances are derived from Google Road data while travel times are calculated applying the nationally recognized Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard formula (T=0.65 + 1.7 D, where T= time and D = distance). The ISO response travel time formula discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout time.

Table 17. Estimated response times for fire stations located near the study area. The Pismo Heights community was used to model arrival times.

Station	Distance from Study Area	Estimated Arrival Time
Shell Beach station (63)	3.2 miles	6 min: 6 sec
Pismo Beach Station (64)	0.1 miles	0 min: 50 sec
Avila Valley Station (62)	7.1 miles	12 min: 43 sec
Five Cities Fire Department Station 2	3.7 miles	6 min: 56 sec

10.2.2 Ground and Aerial Resources

In total, San Luis Obispo CAL Fire resources include sixteen Type 1 and Type 2 engines, twelve Type 3 engines. In addition, the City of Pismo Beach staffs three Type 1 city engines, one Type 3 state engine, two city rescue vehicles, and one city rescue watercraft. Paso Robles Air-Attack base is also a valuable fire suppression resource and includes two Grumman S-2T 1,200-gallon tankers and one OV-10A air tactical aircraft (CAL Fire SLO). These air resources can reach the Plan Area in under twenty minutes and are important for increasing containment of a wildland fire. Additional air resources are available from the Santa Maria Air Attack base which regularly staffs two large U.S Forest Service air tankers, and the Arroyo Grande Helitack Base on High Mountain Road which possesses one helicopter.

10.2.3 Water Supply

Other firefighting infrastructure, water supply, is essential for effective fire suppression. For aerial resources, water can be drafted from multiple locations including Laguna Lake, Lopez Lake, or sources nearer the Plan Area such as the Pacific Ocean, Pismo Marsh, or San Luis Obispo Creek. A larger concern is sufficient water resources for ground attack, especially when considering structure defense. Large above ground water supply tanks are a common form of community water supply within the study area. It is essential that this infrastructure be protected from wildfire damages to ensure an adequate supply of residential water supply for structure defense. We recommend that sufficient clearance between water supply infrastructure and flammable vegetation be created to prevent damages during wildfire. This management practice also applies for community fire hydrants.

10.3 Information Dissemination

An efficient dissemination of information to the public is crucial for mitigating risks to human life and safety during a wildfire. Rapid broadcasting of evacuation orders and recommendations is needed to ensure that residents can evacuate in a timely manner to avoid direct exposure to wildfire. The need for quick transfer of emergency information is highlighted through multiple communities in the study area which exist adjacent to areas expressing a potential rapid rate of spread and proximity to likely ignition points. We provide recommendations to ensure efficient information dissemination in the event of a wildfire in the study area.

1) Community members should enroll in the San Luis Obispo County Sherriff's Office Reverse 911 Program. This program allows the county sheriff's dispatch office to provide emergency notifications during emergencies. While this program is currently set up for every land line

phone, residents are encouraged to enroll for this program on their cellular devices. Those wanting this service can sign up at the San Luis Obispo County Website.

2) Permanent electronic emergency notification signage should be installed in communities located within a fire hazard severity zone. This technology can inform at risk community members about updated evacuation routes, the location of the fire, and other emergency instructions. Emergency dispatch can provide rapid dissemination of information which can be easily updated in response to changes in wildfire behavior, transportation traffic, and other factors influencing evacuation. Implementation of this infrastructure may prove particularly useful within the Pismo Heights where an alternative emergency evacuations route exists. In addition to other forms of communication such as reverse 911, residents can be notified through electronic signs when this evacuation route is open or recommended. This method for information dissemination also emergency notifications concerns regarding those without cell phones or landlines.

10.4 Mutual Aid Agreements/ Agency Coordination

Statewide mutual aid agreements for wildfire response are currently outlined through the California Fire Service and Rescue Emergency Mutual Aid Plan. This plan is connected to the California Emergency Plan and coordinates mutual aid agreements for emergency response at the state, county, and regional levels. The California Office of emergency Services (COES) plans coordination between County OES to administer county level emergency response. The San Luis Obispo County OES may be triggered during a wildfire in the study area to coordinate emergency response between groups and provide essential public safety infrastructure.

The San Luis Obispo County Mutual Aid Plan created by the County OES identifies fire departments, agencies, and districts engaged in mutual/automatic aid for San Luis Obispo County.

- Atascadero Fire Department
- Morro Bay Fire Department
- Atascadero State Hospital Fire Department
- Paso Robles Fire Department
- Avila Beach Fire Department (CAL Fire)
- Pismo Beach Fire Department CAL FIRE
- San Benito-Monterey Unit Santa Barbara County Fire Department
- Camp Roberts Fire Department
- South Bay Fire Protection District
- San Luis Obispo County Fire CAL FIRE

- San Luis Obispo City Fire Department
- Cambria Fire Protection District
- San Miguel Fire Protection District
- California Men's Colony
- Santa Maria Fire Protection District
- CAL FIRE Fresno-Kings Ranger Unit
- Santa Margarita Fire Protection District
- Five Cities Fire Authority
- Templeton Fire Protection District
- Guadalupe Fire Protection District
- U.S. Forest Service (Los Padres National Forest)

The San Luis Obispo County Sheriff's office is responsible for administering evacuation orders, ensuring safe traffic routes, and controlling public access to damaged or dangerous areas. Community members within the study area should be aware of the different evacuation levels that may administered including:

Evacuation Order

- Evacuation is mandatory and should be pursued immediately due to an immediate threat to human life or property.

Evacuation Warning

- The potential for immediate threats to human life and property exists. Residents should evacuate or be prepared to evacuate at a moment's notice.

Shelter in Place

- Community members should remain secured inside of their current location. This order occurs when an evacuation is predicted to cause a greater threat to human life and safety.

Safe Refuge Area

- Identified areas where residents are held until safe evacuation is possible.

10.5 Evacuation Planning

Rapid evacuation is a critical component of protecting human life safety during a wildfire event. Community members living within an area where threats from wildfire exist should be well prepared prior to the occurrence of a wildfire. Given the proximity of high fire hazard areas to communities within the study area, little to no prior notice may be given to community members due to the potential for high rates of fire spread near communities. We outline steps community members can take to prepare for evacuation and reduce risks to human life and safety during a wildfire.

Households should be aware of the available evacuation routes specific to their community. If multiple routes exist, consider which route is safest in accordance with potential wildfire areas. Communities should consult with the Pismo Beach Police Department if they are uncertain about how to evacuate. It is important that community members identify multiple possible evacuation routes if the priority route is unusable. In addition, evacuating individuals should remain hyper aware of changing conditions which may influence the direction of fire spread. Rapid changes in fire behavior can result in altering how and in which direction individuals choose to evacuate, or whether temporarily sheltering in place is the safest option. It is critically important that affected community members rely on sound judgement based on personal awareness, a sound understanding of likely fire behavior, and the openness to deviate from pre-planned evacuation methods dependent on changing conditions.

10.5.1 Evacuation Concerns for Special Problems

Special populations face unique challenges during wildfire evacuations. Senior citizens are considered a special population sue to mobility problems and chronic health conditions which are more likely to impact older individuals. Further, care providers and support services may be temporarily unavailable during a wildfire emergency. Evacuation concerns are exacerbated through the presence of vision and hearing problems and cognitive impairment, all of which are more likely to impact senior citizens and limit the ability to understand and respond to emergency evacuations. A list of special concerns impacting senior citizens during wildfire and evacuation is provided below. These concerns are exacerbated for the Pismo Heights community which possesses a high level of senior citizens.

- Many older individuals do not own a vehicle or are unable to drive themselves and require transportation assistance during evacuations.
- The average senior citizen takes 5-7 prescription medications. These can be forgotten during evacuation or may run out during an extended period of shelter in place.
- Some individuals require the use of electrical medical devices such as oxygen tanks. Electricity may be lost during a wildfire. Electrical power access may also be limited during an evacuation.
- For senior citizens receiving full time care, they may rarely leave the community. Therefore, they may be unfamiliar with local roadways, evacuation routes, and safe refuge areas.
- Individuals with disabilities may require special means of transportation which accommodates wheelchair needs or other physical impairments.

- Individuals with cognitive disabilities may become confused during wildfire evacuations and require special accommodations and guidance.

10.5.2 Emergency Go Bags

Community members should prepare emergency go bags to expedite the evacuation process and prevent added stress during household evacuation. Go bags are easily accessible and include essential items. These items may include:

1) Water
2) Non-perishable food
3) Essential medications
4) Flashlight
5) Cash
6) Important documents (Passport, Driver's License, Birth Certificate, Social Security Card, etc.)
7) Emergency fire shelter
8) Important hard drives
9) Personal items of prioritized value
10) Toiletries
11) First Aid Kit

Emergency go bags should be stored in an easily accessible location. The location should be disclosed to all household members. More information about emergency go bags can be found through the educational video at this link: https://www.youtube.com/watch?v=RwsgYhYEqNY.

10.5.3 Preparing Your Home to Survive Wildfire

Simple measures can be taken to increase the chances of home survival prior to evacuation. We provide a list of recommendations for increasing the resiliency and defensibility of your home when wildfire is imminent.

1) Close all Windows and doors and leave them unlocked
2) Cover large vents. This can be planned for in advanced by installing sliding vent covers.
3) Close chimney vent
4) Turn off propane or other gas tanks
5) Bring outdoor furniture inside
6) Place ladder leaning against roof to allow firefighter roof access
7) Remove flammable items from underneath outdoor patios
8) Connect hoses to outdoor valved for firefighter use

9) Open all gates to allow for efficient access for firefighters
10) Locate pets and keep them nearby
11) Do not leave sprinklers or other outdoor water supplies running to prevent loss of water pressure for firefighters
12) Leave indoor and outdoor lights on
13) Remove flammable window shades and curtains

10.5.4 Household Evacuation Education

Household evacuation education should be conducted to ensure that all household members are on the same page about how to plan for and undergo safe and rapid evacuation. Family education is especially prudent when a household members include young children, babies, persons with disabilities, or senior citizens. Households should work together to complete a family education plan to respond quickly and safely in case of fire. More information about family evacuation education can be found at Prepare Your Family - Ready for Wildfire.

10.5.5 Insurance Planning

Community members are encouraged to obtain and maintain fire insurance plans, particularly in communities identified within fire hazard severity zones. Homes are generally an individual's largest asset. Homeowners and renters should ensure that they are well protected from a wildfire disaster. CAL fire identifies five tips to ensure the financial coverage of your home following damages from wildfire.

1) Conduct Annual Insurance Check-ups
2) Know the coverage of your policy
3) Ensure that your policy is updated to include home additions
4) Maintain an insurance plan
5) Get renters insurance if leasing a home

Many homeowners residing in communities identified as fire hazard severity zones experience difficulties when trying to obtain conventual fire insurance form private providers. Many conventional insurance companies have seized providing fire insurance for communities within high-risk areas. In response, homeowners can pursue fire insurance through the California FAIR Plan, a state sponsored program that provides insurance for high-risk properties. Further information about the California FAIR Plan can be found at Home page - The California FAIR Plan (cfpnet.com).

10.5.6 Community Preparedness Educational Days

Engaging with community members is important for fostering community wildfire awareness and buy in. Community education can also spark community involvement which can promote a greater

capacity for wildfire mitigation and prevention measures. Active community members play a large role in creating a firesafe community for the present and future.

The San Luis Obispo Fire Safe Council and the Pismo Beach Fire Department/CAL Fire should develop annual community educational seminars for residents of the study area. Educational materials would include:

- Evacuation Recommendations
- Wildfire Risks Specific to Each Community
- Ways to reduce structural ignitability
- Vegetation Management Goals

Community members would also be able to ask questions and obtain answers from qualified individuals. Educational seminars also open a dialogue between wildfire groups and community members to facilitate cooperation between these groups. This open dialogue is an important part of strengthening the relationship between concerned individuals and creating cooperative wildfire management.

11.0 FIREWISE Community Designation

The Firewise USA recognition program, administered by the National Fire Protection Association (NFPA), promotes collaboration within communities organize and improve the ignition resistance of homes and communities. Communities can receive a Firewise community designation through the California Office of the State Fire Marshal's Community Wildfire and Preparedness and Mitigation Division. In addition to financial support for conduction risk reduction projects, homeowners living within Firewise designated communities are qualified to receive insurance discounts with the California Fair Plan. Communities can complete the designation process through four steps.

1) **Organize** - Communities need to form a board or community including residents and other stakeholders vested in the wildfire problem. Stakeholders may include local fire departments, elected officials, emergency operations managers, and property managers. The committee should identify the Firewise community boundary and scale. To qualify, Firewise communities must have at least 8 single family dwellings and less than 2,500.
2) **Plan** - Communities should obtain a wildfire risk assessment from the local fire department to quantify wildfire risk and identify areas of previous risk reduction and areas in need of further work. From these findings, the board should develop an action plan involving a

prioritized list of risk reduction projects and community investments. Action plans should be updated every three years or sooner.

3) **Do** - Committees should host outreach events addressing the goals identified in the action plan. Each community is required to invest one voluntary hour per dwelling unit to qualify for a Firewise designation
4) **Apply** – portal.firewise.org

12.0 Wildfire Recovery Measures

Wildfire recovery measures address the impacts following wildfire in the plan area. Recovery measures seek to preserve community safety and provide opportunities and resources for community members negatively impacted by wildfire.

12.1 Mitigation of Secondary Disasters

In addition to immediate damages, wildfires also can lead to secondary disasters that impact the environment and human life and safety. We summarize these impacts and provide recommendations to address them.

12.1.1 Post-fire Erosion

Combustion of ground and canopy vegetation during a wildfire in addition to changes to physical soil characteristics increases the rate of hillslope erosion. Hillslope erosion is often greatest on steep slopes in areas of high soil burn severity. In extreme cases, landslides and debris flows can occur during high intensity rain events. CAL Fire conducts post-fire assessments to identify high-risk areas for landslides and debris-flow risk. CAL Fire may issue evacuation orders for at risk areas when conditions may result in soil mass movements which threaten human life and safety. CAL Fire may also recommend areas where erosion control should be implemented yet lacks direct enforcement on SRA lands.

A post-fire erosion model was conducted for the study area using the Universal Soil Loss Equation (USLE). This methodology allows for understanding post-fire erosion dynamics at the watershed scale. This model multiplies five variables to predict annual soil loss in tons/acre as shown below. Regional climate and soils data were implemented into model inputs. The model assumed vegetation cover following high severity wildfire in the study area to model the highest post-fire erosion potential.

$$A = R * K * LS * C * P$$

Where:

A= *Soil loss (tons/acre/year)*

R= *Rainfall erosion index, in 100 feet – tons/acre*in/hr*

K= *Soil erodibility factor, tons/acre per unit of R*

LS= *Slope length and steepness factor, dimensionless*

C= *Vegetative cover factor, percentage of bare soil*

P= *Erosion control practice factor*

The model output highlight areas likely to experience significant levels of post-fire erosion (Figure 86). Steep slopes which experience considerable runoff velocities are predicted to produce the greatest amount of erosion following wildfire. Areas of concern include the south facing slope of Ontario Ridge, the south facing slopes north of Highway 101, and the south facing slope adjacent to Price Canyon Road. Communities adjacent to these areas are predicted to experience negative impacts resulting from accelerated rates of post-fire erosion.

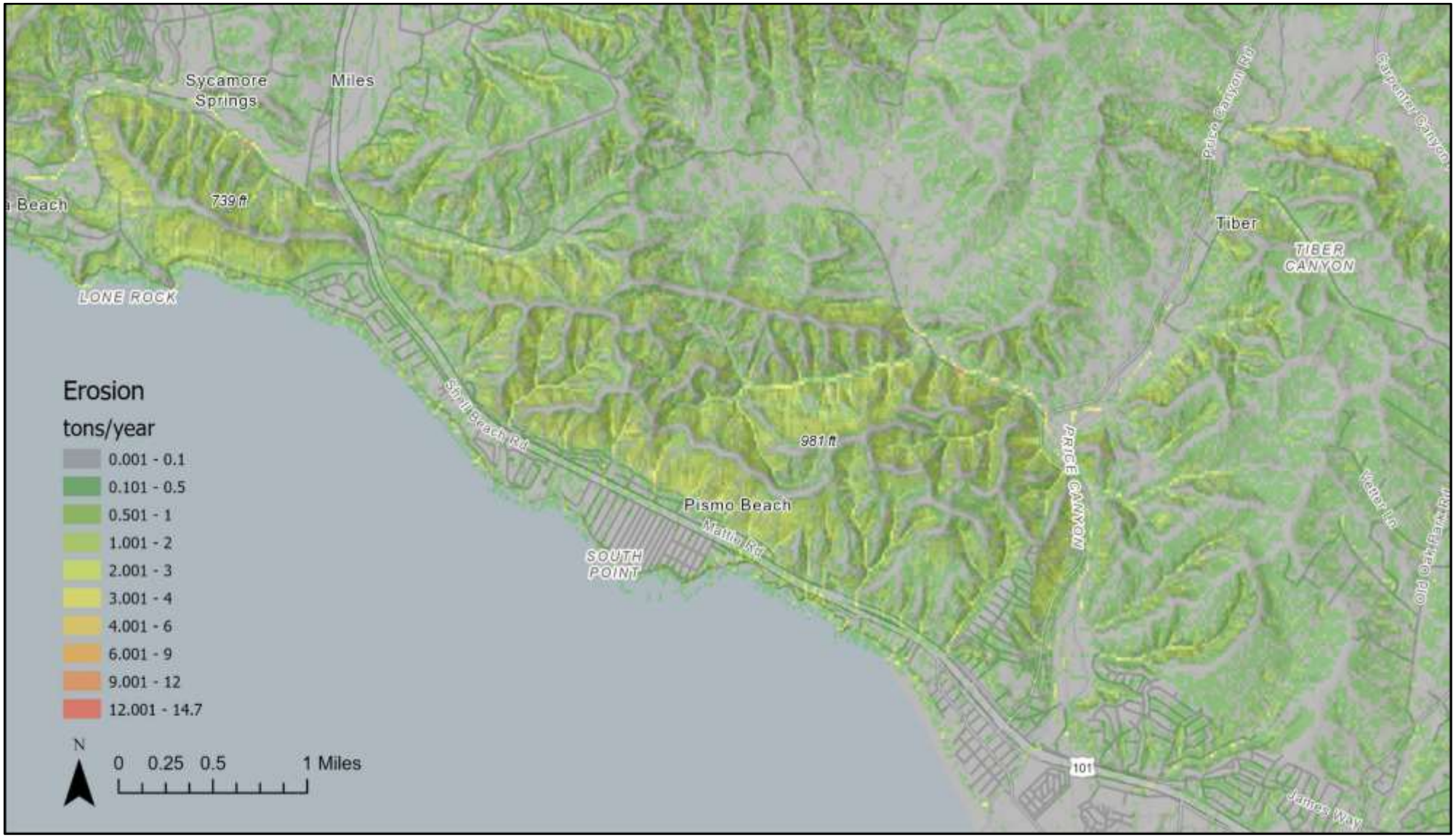

Figure 86. Estimate of post-fire hillslope erosion for the Plan Area using the Universal Soil Loss Equation (USLE).

Following the Avila fire, a small landslide occurred above the Spyglass Ridge Community depositing roughly 75 tons of debris into the community. While no damages to homes occurred, clean-up crews filled three dump trucks with soil, rocks, and debris from roads and yards. This event highlights the potential for erosion hazards following wildfire in the study area.

Figure 87. Small landslide on the hillslope adjacent to the Spyglass Ridge community following substantial rains after the Avila Fire (Healy, 2021).

Figure 88. Eroded soil cleaned from the road and yards after a small landslide following the Avila Fire (Healy, 2021).

Landowners and HOA's can mitigate erosion concerns through applying hillslope treatments following wildfire. The HOA adjacent to the affected community chose to employ hillslope mitigation treatments following the Avila fire. This hillslope, with nearly identical characteristics to the hillslope which gave way, incurred no large erosion events. The HOA financed the implantation of geotextile soil coverings and straw waddles to mitigate hillslope erosion. This should be used as a case study to highlight the effectiveness of post-fire erosion control on steep slopes within the study area.

Wildfires also lead to increased floor risk due to a reduced capacity in soil water absorption and higher volumes of runoff. Post-fire runoff can overwhelm municipal water infrastructure. The City of Pismo Beach Public Works Department should develop protocols for post-fire response and the maintenance and monitoring of public water infrastructure in addition to coordination with relevant agencies including CAL Trans.

While often expensive to implement, the City of Pismo Beach can apply for post-fire hazard grant funds through the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program if a previous Fire Management Assistance Grant (FMAG) has been declared. Qualifying applicants can receive $5,250 per acre for post-fire erosion and flood control. The City of Pismo Beach can also apply for grant funding through the Natural Resource Conservation Service (NRCS) Emergency

Watershed Protection Program (EWP). This program can finance up to 75% of costs related to stream debris removal, maintaining culverts and bridge abutments, eroding bank restoration, or reseeding a damaged area.

12.1.2 Hazard Tree Removal

Burned trees may remain standing following wildfires. These dead trees are likely to fall over time and can threaten human safety and property. Additionally, falling trees can impair roadways and prevent safe ingress and egress, something of particular concern during community evacuations. Burned trees can also fall onto powerline infrastructure resulting in fire hazards and threatening municipal power supplies. Trees deemed as hazardous should be removed immediately following wildfire. CAL Trans is responsible for removing hazard trees along state right of ways, and PG&E is responsible for protecting powerline infrastructure. Private landowners may be responsible financing hazard tree removal on their property. Landowners should consult professional arborists to assess hazard and remove trees if necessary.

12.1.3 Critical infrastructure restoration

Critical infrastructure is often damaged during wildfires. Critical infrastructure includes assets that are essential to societal functioning. These assets included public utility infrastructure, water resources, roads and bridges, and communications equipment. Downed powerlines weakened or damaged bridges, and impaired roadways can pose risks for human safety in the aftermath of a wildfire. The direct communication to the public of post-fire threats resulting from damaged critical infrastructure is needed to maintain human safety. Public access in areas where damaged critical infrastructure threatens human safety should be restricted.

Timely restoration of damaged and impaired critical infrastructure is needed to reinstate community functioning. Partnerships with the City of Pismo Beach and critical infrastructure cooperators including PG&E and Cal Trans increase the efficiency of post-fire infrastructure remediation.

12.1.4 Disaster relief funding

Wildfire damages to property and infrastructure can incur significant costs to local governments, businesses, and community members. Wildfires can also reduce tourism during and in the aftermath of a substantial incident. We provide applicable grants that can reduce financial burdens following wildfire.

FEMA's Individuals and Households Program (IHP)

This program provides federal funds for qualified individuals who have uninsured or underinsured post-disaster needs.

Supplying Aid to Victims of Emergency (SAVE) Program

This program is funded through the California Fire Foundation and provides financial support for basic needs for those impacted by wildfire.

California Wildfire Relief Fund

This fund provides basic needs support for individuals and communities impacted by fire including but not limited to food, water, emergency supplies, and temporary shelters for those who have lost their homes. This program also provides grants to impacted communities for developing long-term recovery measures.

California Department of Transportation Emergency Relief Program

This program allocates federal funds to state and public transportation agencies that have incurred substantial damages to transportation infrastructure. This fund can also provide funds to reimburse costs associated with evacuations.

California Department of Resources Recycling and Recovery (Cal Recycle)

This program provides local jurisdictions with assistance towards removing debris following a disaster such as wildfire.

California Department of Social Services Disaster (D-Cal Fresh)

This stat program provides funding to meet the nutritional needs of individuals impacted by a disaster for a 30-day period.

U.S Small Business Administration (SBA) Disaster Loan Programs

This program provided federal funding for businesses who have experienced property damage. The SBA provides physical damage loans, mitigation assistance, and economic injury disaster loans.

13.0 Conclusions

The potential for catastrophic wildfire exists in the Plan Area as highlighted through the presence of the Wildland Urban Interface and high burn probabilities associated with the local wildfire regime. Results from fire behavior modelling identify the potential for extreme fire behavior during Santa Ana wind events. Fuel conditions in select areas also present the opportunity for high severity fuel driven wildfires during average weather conditions. Multiple communities exist adjacent to areas expressing the potential for high severity fire. Home construction within these communities also influences wildfire risk throughout the study area as many homes involve older construction methods increasing the potential for structural ignitability during wildfire. While all communities within the study area are at risk from wildfire, the Pismo Heights community is of greatest concern given its proximity to likely ignition points, the potential for fast moving wildfire adjacent to the community, and concerns regarding a rapid evacuation of the community.

This CWPP provides feasible mitigation measures than can reduce wildfire risks for the Pismo Heights community and other communities throughout the study area. A summary of these recommendations and their coinciding priority for implementation is provided below.

Priority Ranking		
Very High	High	Moderate
Rattlesnake Canyon/Pismo Heights Fuels Reduction	Pismo Estates and Pismo Oaks Shaded Fuel Breaks	Avila Ridge Fuel Break Widening
Price Canyon Road Roadside Fuels Reduction	Shell Beach/Bluffs Fuel Break Fuels Reduction	Grazing of El Portal Shaded Fuel Break
Pismo Heights Escape Route Roadside Fuels Reduction	Electrical Powerline Vegetation Clearance	Prescribed Fire in Pismo VMP
Defensible Space Implementation and Routine Inspection	Vegetation Clearance and Firewise Landscaping around Ontario Ridge and Pismo Beach Communications Equipment	Home Retrofits to Reduce Structural Ignitability
Pismo Heights Evacuation Education Days	Community Chipper Days	City Programs to Incentivize Home Retrofits
Increased Patrols at Cave Landing/ prohibited nighttime vehicle access	Mechanical Equipment Safety and Regulations	FIREWISE Community Designations
Emergency Information Dissemination Improvements	Fuel Break Maintenance	PG&E Fast Trip Sensors

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Appendix A
Policy and Regulatory Framework

Federal

Healthy Forests Restoration Act (HFRA)

The HFRA is part of the Healthy Forest Initiative and places a high priority om fuel treatments identified in CWPPs. This act creates the framework for CWPP to and allows for community input and involvement in the identification of areas of high wildfire risk.

National Incident Management System (NIMS)

NIMS guides governmental and private sectors to collaborate to prevent, response to, mitigate, protect against, and recover from incidence. Guidance is provided regardless of the cause, size, or location of the incident.

National Historic Preservation Act

This act protects cultural and historic sites during development, fuels treatments, or other landscape alterations.

Endangered Species Act (ESA)

The Endangered Species Act of 1973 protects species that are listed as endangered or threatened throughout all or a significant portion of their range. Critical habitats for which the species depends upon are also protected through the ESA.

International Wildland-Urban Interface Code

The International Wildland-Urban Interface Code was created by the International Code Council and addresses wildfire issues in the WUI. This is intended to be adopted and amended by local jurisdictions. The California Building Code is references from the International Wildland-Urban Interface Code.

State

California Strategic Fire Plan

The 2018 Strategic Fire Plan for California reflects CAL FIRE's focus on fire prevention and suppression and natural resource management.

1) Identify and evaluate wildland fire hazards and recognize life, property, and natural resource assets at risk, including watershed, habitat, social and other values of functioning ecosystems. Facilitate the collaborative development and sharing of all analyses and data collection across all ownerships for consistency in type and kind.

2) Promote and support local land use planning processes as they relate to: (a) protection of life, property, and natural resources from risks associated with wildland fire, and (b) individual landowner objectives and responsibilities.
3) Support and participate in the collaborative development and implementation of local, county, and regional plans that address fire protection and landowner objectives.
4) Increase fire prevention awareness, knowledge, and actions implemented by individuals and communities to reduce human loss, property damage, and impacts to natural resources from wildland fires.
5) Integrate fire and fuels management practices with landowner/land manager priorities across jurisdictions.
6) Determine the level of resources necessary to effectively identify, plan and implement fire prevention using adaptive management strategies.
7) Determine the level of fire suppression resources necessary to protect the values and assets at risk identified during planning processes.
8) Implement post-fire assessments and programs for the protection of life, property, and natural resource recovery.

CAL Fire Strategic Plan

The CAL Fire Strategic Plan was published in 2019. The plan outlines four goals including:

1) Improve the core capabilities,
2) Enhance internal operations,
3) Ensure health and safety,
4) Build an engaged, motivated, and innovative workforce (CAL FIRE 2019a).

California Fire Service and Rescue Emergency Mutual Aid Plan

This state mutual aid plan extends from the California Emergency Plan and supports the Incident Command System, Integrated Emergency Management System, and multi-hazard response planning. The plan details fire and rescue plan operation at state, regional, and local levels.

California Government Code: Sections 5117 through 51189

Sections 51175 through 51189 of the California Government Code guide the classification of fire hazard areas and require specific management of property within those lands. CAL FIRE classifies FHSZs based on statewide criteria and allows for public review and comments. Local agencies also designate Very High FHSZs within their jurisdiction based on the recommendations of CAL FIRE.

California Public Resources Code

PRC Section 4290 outlines minimum requirements for defensible space, road, and water supply standards for residential, commercial, and industrial buildings within SRA lands designated as Very High Fire Hazard Severity Zones.

PRC Section 4291 mandates fuels reduction adjacent to buildings next to areas of flammable material and requires 100 feet of defensible space around structures. This code also requires the removal of dead or dying material from roofs.

PRC Sections 4292-4296 and 14 CCR 1246 mandate vegetation clearance standards for electrical utilities.

California Code of Regulations

Title 14, Natural Resources

California Code of Regulations (CCR) Title 14, Division 1.5, Chapter 7, Subchapter 3, Fire Hazard, outlines specific requirements for defensible space.

Title 19, Public Safety

CCR Title 19 addresses fire and safety requirements for emergency ingress and egress, emergency planning, and evacuation protocols.

Title 24, Part 2, California Building Code

The California Building Code includes requirements for home and building construction and methods in high fire hazard areas. Chapter 7A outlines these requirements in detail.

Assembly Bill 3074

Assembly Bill 3074 requires an additional third zone of defensible space, the ember resistant zone. The law requires the Board of Forestry and Fire Protection to develop regulations for the ember-resistant zone (Zone 0) within 0 to 5 feet of a structure by January 1, 2023

Assembly Bill 38

Assembly Bill 38 requires that property sellers in a High or Very High FHSZ are required to provide evidence of adequate defensible space to the buyer.

1968 California FAIR Plan Act

The California FAIR Plan Act was created to provide ire insurance throughout the state, especially for properties within high fire hazard areas.

County

San Luis Obispo General Plan

The San Luis Obispo County General Plan outlines a framework for development within the unincorporated areas of the county. Goals and policies are described to protect from wildfire hazards.

San Luis Obispo County Emergency Operations Plan

The county emergency operations plan outlines potential hazards and provides goals and procedures for preparing and responding to emergency events such as wildfire. Mutual aid support agreements are further outlines in this plan.

City

City of Pismo Beach Local Coastal Plan/General Plan

The Pismo Beach Local Coastal Plan/General Plan outlines procedures and requirements for future changes within the city. This legal mandate outlines city-wide zoning, emergency response, and evacuation.

Environmental Review

California Environmental Quality Act (CEQA)

Proposed projects on state or private lands may require environmental review through CEQA. Certain fuel treatment projects on applicable lands may be subject to CEQA review and documentation. CEQA analysis may include a categorical exemption, Initial Study/Mitigated Negative Declaration, Environmental Impact Report, or a document tiered from the CalVTP Program EIR.

California Vegetation Treatment Program (CalVTP)

The CalVTP Program EIR provides a programmatic analysis of potential impacts stemming from vegetation treatment the Treatable Landscape defined by the CalVTP. This allows for a streamlined CEQA review for applicable vegetation management projects.

California Coastal Act (CCA)

The California Coastal Act defines the Coastal Zone requires the preparation of Local Coastal Plans to guide development within the Coastal Zone. Coastal development permits are required for projects proposed within the Coastal Zone.