San Marcos Pass - Eastern Goleta Valley Mountainous Communities

Community Wildfire Protection Plan



Submitted February 20, 2019

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SAN MARCOS PASS – EASTERN GOLETA VALLEY MOUNTAINOUS COMMUNITIES COMMUNITY WILDFIRE PROTECTION PLAN

MUTUAL AGREEMENT PAGE

This Community Wildfire Protection Plan was developed for the San Marcos Pass – Eastern Goleta Valley communities within Santa Barbara County:

- ✓ Was collaboratively developed. Interested parties, key stakeholders, local fire departments, and federal land management agencies managing land in the vicinity of the Planning Area have been consulted.
- ✓ This plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will enhance protection of communities within the Planning Area.
- ✓ This plan recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.

The following entities mutually agree with the contents of this Community Wildfire Protection Plan:

Approved by: _____

Steve Lavagnino, Chair

Santa Barbara County Board of Supervisors

Approved by: _____

Mark A. Hartwig

Fire Chief, Santa Barbara County Fire Department

Approved by: _____

Scott Jalbert

Fire Chief, San Luis Obispo Unit – CAL FIRE

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Acknowledgments

The following communities, agencies, and stakeholders were involved in the collaborative process in preparation of the San Marcos Pass and Eastern Goleta Valley Mountainous Communities Community Wildfire Protection Plan (CWPP):

CWPP Working Group

- Dennis Bozanich – Santa Barbara County Executive Director
- Glenn Russell – Santa Barbara County Planning & Development
- Mindy Fogg – Santa Barbara County Planning & Development
- Steve Oakes – Santa Barbara County Fire Department

CWPP Development Team

- Rob Hazard – Santa Barbara County Fire Department
- Rocky Siegel – Wildland Residents Association and Westside of San Marcos Pass Communities / San Marcos Pass Volunteer Fire Department Representative
- Mark Linane – Paradise Road Representative
- Kendra O'Connor – San Marcos Foothills Representative
- Susan Epstein – San Marcos Foothills Representative
- Kevin Buckley – Painted Cave Volunteer Fire Department / Painted Cave and East Camino Cielo Representative
- Phil Seymour – Santa Barbara Fire Safe Council Representative
- Nic Elmquist – United States Forest Service, Los Padres National Forest

Table of Contents

Executive Summary

San Marcos Pass - Eastern Goleta Valley Mountainous Communities Community Wildfire Protection Plan

The San Marcos Pass and Eastern Goleta Valley (SMP/EGV) Mountainous Communities Community Wildfire Protection Plan (CWPP) was developed in response to local stakeholders desire to protect communities within the San Marcos Pass and Eastern Goleta Valley area. In late October 2016, Santa Barbara County Fire Department (SBC Fire) hired a consultant to assist in the development of a CWPP.

This CWPP serves to guide future actions of agencies and individuals but does not legally commit any public agency to a specific course of action. Actions identified in this CWPP that exceed environmental thresholds defined in Santa Barbara County's 2008 *Environmental Thresholds and Guidelines Manual* may require an initial study (state) or categorical exclusion (federal) following state or federal environmental laws for evaluating potential environmental impacts. Actions that trigger permit requirements of the County Land Use and Development Code (LUDC) Environmentally Sensitive Habitat/ Riparian Corridor (ESH/RC) Overlays within the Eastern Goleta Valley Community Plan (EGVCP) area would comply with state and federal environmental laws, as applicable. This CWPP meets all requirements for the Healthy Forest Restoration Act (HFRA) and adheres to the CWPP development process established by the County. The following summarizes the sections within this CWPP:

Section 1 – INTRODUCTION

The purpose of this CWPP is to identify wildfire hazard mitigation strategies for communities in the SMP/EGV mountainous areas that are in balance with sustainable ecological management and fiscal resources. Additionally, this CWPP provides educational resources for residents to enhance wildfire preparedness.

As defined by the HFRA, a CWPP must be collaboratively developed, must identify and prioritize areas for hazardous fuel reduction treatments, and must recommend measures to reduce the ignitability of structures. The Santa Barbara County Board of Supervisors has an approved CWPP Development Process that identifies the need to engage interested parties and to collaborate with applicable federal and state agencies. The *Community Wildfire Protection Plan Development Process for Santa Barbara County* consists of eight steps that describe a standardized approach for the CWPP planning process in Santa Barbara County. This process enhanced engagement and participation with stakeholders and ensured this CWPP not only meets the intent of the HFRA, but exceeds it. It also provided the basis for development of the CWPPs goals and objectives.

Goals of this CWPP:

- Reduce the threat of wildfire within the wildland urban interface (WUI)/intermix to promote life safety; provide agencies and the environmental community guidance and direction for future actions; and, ensure that the SMP/EGV CWPP adheres to all local, state, and federal policy and regulatory framework related to community wildfire protection in the Planning Area.
- Enhance protection of values at risk from wildfire (e.g., homes, businesses, critical infrastructure, natural resources, cultural resources, agricultural resources, watershed resources).
- Balance wildfire protection strategies with natural and cultural resource sustainability.
- Identify funding opportunities including grants for wildland fire protection.

Section 2 – COMMUNITY OVERVIEW

The Planning Area is located in an unincorporated area of Santa Barbara County north of the cities of Goleta and Santa Barbara (See Figure 2, Planning Area Map in the CWPP). The Planning Area includes over 29 square miles and 19,588 acres, including approximately 8,534 acres of private land, 10 acres of California Department of Parks and Recreation lands, 238 acres of local government managed lands, and 9,930 acres of federally managed lands. There are 12 communities identified within the San Marcos Pass and Eastern Goleta Valley Mountainous Planning Area, including:

- Lower Paradise Road/Stagecoach.
- Paradise Canyon.
- Stagecoach/Cold Springs.
- Rosario Park.
- San Marcos Pass/Kinevan.
- West Camino Cielo.
- East Camino Cielo.
- Painted Cave.
- San Marcos Trout Club.
- Old San Marcos Road.
- Twinridge.
- San Marcos Foothills.

Values at risk

The primary focus of a CWPP is to protect life safety, structures, and critical infrastructure. Actions taken to protect those values, when applied carefully, can also enhance the protection of natural and cultural resources within the communities.

Stakeholders identified the following values for the Planning Area:

- Life safety.
- Homes and neighborhoods.
- Critical infrastructure.
- Natural and cultural resources.
- Recreational amenities and facilities.

Land Use and Zoning

The Planning Area includes unincorporated portions of Santa Barbara County, federal lands administered by the Los Padres National Forest, and a small portion of California Department of Parks and Recreation land (State Parks) directly adjacent to Painted Cave Road. Each of these jurisdictional authorities have specific land use requirements addressed in agency specific planning documents.

Fire Protection

Wildland fire protection in the State of California is the combined responsibility of local, state, and federal governments. Fire protection responsibility areas represent areas of jurisdictional authority for fire protection, including local, state, and federal governments (See Figure 9, Direct Protection Area Map in the CWPP). Santa Barbara County Fire Department (SBC Fire) and the United States Forest Service (Forest Service), Los Padres National Forest (LPF) have primary wildland fire suppression responsibility within the Planning Area.

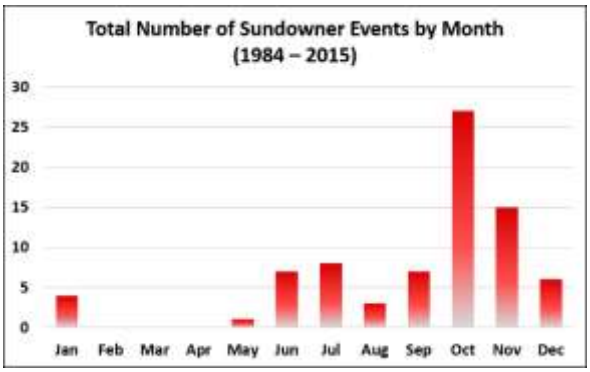
Agreements

Automatic aid agreements exist with SBC Fire, Forest Service, City of Santa Barbara, Carpinteria/Summerland Fire Protection District, and Montecito Fire Protection District. These agreements assure that the closest available resources are dispatched to emergencies.

Section 3 - DEFINING THE WILDFIRE PROBLEM

The wildfire problem in the Planning Area was evaluated using large fire history, wildfire ignition data, weather data, slope, and fuel data up to the end of 2016.

Fire history shows that the predominance of large fires that have burned within or immediately adjacent to the Planning Area have occurred during a weather event featuring offshore winds, high temperatures, and low relative humidity. These conditions are known locally as Sundowners and can occur in almost any month of the year (see graphic below).



Continuous heavy fuels, steep slopes, strong winds, low fuel moistures, and a rich history of wildfire ignitions along major transportation routes and recreation areas all contribute to the development of large wildfires.

While the wildfire problem is well known among longtime residents of the local area, many have not proactively addressed needs of their own residences to reduce the potential of structure ignition during a wildfire. Basic structure hardening techniques and the effective development of personal and community defensible space can enhance protection of these structures during a wildfire.

While many local residents understand the wildfire hazard associated with native vegetation, the impacts of ornamental vegetation on fire spread in an urban environment and on structure loss are often under appreciated. The Urban Creeks Council has provided a list of native vegetation that residents should consider removing or maintaining in a less flammable state through active management of the landscape elements (see Section 3 in CWPP, Table 9).

Section 4 - COMMUNITIES AT RISK

Due to potential fire behavior within and adjacent to communities in the Planning Area, a refined WUI boundary beyond the description provided in the HFRA was developed for the Planning Area (See Section 4 in CWPP, Figure 19, CWPP WUI Map).

As part of the requirements of the HFRA, State Forester's across the nation were tasked with the identification of communities at risk of damage from wildfire that were in the ***vicinity*** of federal lands. Within and adjacent to the Planning Area, the following communities are designated by the State Forester as communities at risk:

- Santa Barbara.

- Goleta.

The *Santa Barbara County 2018 Unit Fire Plan* and *2017 Multi-Jurisdictional Hazard Mitigation Plan* designates the following communities within the Planning Area as *"other communities at risk"*:

- Rosario Park.
- Paradise.
- San Marcos Trout Club.
- Painted Cave.

As part of this CWPP, 12 communities in specific geographic areas having similar physical and structural components were included for evaluation. These communities are not officially designated *"communities at risk"* or *"other communities at risk"* as defined in the *2018 Unit Fire Plan* and *2017 Multi-Jurisdictional Hazard Mitigation Plan*, but are designated to facilitate a better understanding of the potential impacts of wildfire on specific geographic locations within the Planning Area (See Figure 2, Planning Area Map in Section 2 of the CWPP).

Section 5 - WILDFIRE ANALYSES

The contractor performed analyses to assist in better understanding the wildfire environment associated with the Planning Area. The primary analyses were:

- Hazard Assessment - Two fire-modeling scenarios were analyzed. Figure 21 in Section 5 of the CWPP spatially displays where problem fire behavior occurs. The factor considered was flame lengths greater than eight feet under 90th percentile weather conditions with no Sundowner wind event. Locations near Twin Ridge, Trout Club, Painted Cave and Lower Paradise Road have elevated wildfire hazard.

  As stronger winds, such as Sundowner winds, enter the fire environment, the modeled flame lengths significantly increase. Figure 22 in Section 5 of the CWPP depict fire behavior under 90th percentile conditions with an offshore wind event. Larger portions of the Planning Area display flame lengths in excess of eight feet, the threshold where fire suppression actions at the flaming front of a wildfire are less likely to be successful.

  Under these moderately strong offshore winds, the probable success of firefighting operations decreases, and the importance of structure hardening and adequate defensible space will be required. Strong wind events, such as Sundowner winds, create significant problem fire behavior.

- Risk Assessment – The risk assessment is based on wildland fire burn frequency over a 75-year period. Areas that burn more frequently received a higher relative risk rating. Three categories relative risk include:
  - Zero to one wildfire occurrence – Low Risk.
  - Two wildfire occurrences – Moderate Risk.
  - Three or more wildfire occurrences – High Risk.

  Based on our analysis, western Paradise Canyon and areas west of San Marcos Trout Club, and north of San Marcos Foothill communities are at high risk.

- Safe Operational Space – This analysis evaluated whether Santa Barbara County's required defensible space standards are sufficient to allow firefighters and the public an opportunity to safely engage in structure protection activities. Primary data for this analysis was not available for the Planning Area but a dataset from nearby Mission Canyon served as a proxy for the Planning Area since the vegetation and

topography are similar. Results based on Mission Canyon indicate that most parcels require vegetation management greater than 100 feet in order to achieve a Safe Separation Distance for firefighters and the public. These results support the concept of "*community level defensible space*", whereby homeowners work together to leverage the effectiveness of the hazard mitigation work currently required by Santa Barbara County Fire Department.

- Structure Defensibility and Vulnerability - The results from this analysis show a number of challenges to firefighters when protecting structures and that much of the Planning Area has low potential for defensibility (See Section 5 in the CWPP, Figure 25, Defensibility Potential Map).
- Ember Exposure and Spot Fire Distance – Spot fires are known to accelerate fire spread by moving fire ahead of the main flaming front of the fire. Embers are a common cause of structure loss, as they can ignite flammable vegetation near a structure or interact with a receptive fuel on a structure not fully hardened against ember exposure.

  Results show that Paradise Road, Stagecoach/Cold Springs, East Camino Cielo, San Marcos Pass/Kinevan, West Camino Cielo, and San Marcos Trout Club have the highest ember exposure in the Planning Area (Section 5 in the CWPP, Figure 27, Ember Exposure Map).
- Fuel Treatment Effectiveness – When evaluating if a fuel treatment can reduce fire hazard, the type, location, and intensity of the fuel treatment needs to be determined. This is typically associated with site-specific project planning. This CWPP does not provide spatially explicit treatment information, rather it focuses on locations where treatments may be appropriate to reduce fire hazard. Table 17 in Section 5 in the CWPP provides a guide for determining how fuels change when treated and subsequently, how fire behavior changes with a fuel treatment. Planners can use this table to evaluate the effectiveness of the proposed fuel treatments.

Section 6 - RECOMMENDED FUTURE ACTIONS

Utilizing the results from the wildfire analyses, recommendations for follow up actions were developed. These include recommendations concerning community preparedness, structure survivability, fuel treatment strategy, recommended treatment standards, best management practices, environmental protection measures, and evacuations.

- Community preparedness summarizes services and programs available to the public in order to enhance their individual readiness for a wildfire.
- Structure survivability looks at structure hardening practices that individual homeowners should undertake to improve the likelihood of their home surviving a wildfire (Section 6 in the CWPP, Table 18, Structure Hardening Mitigation Actions). Survivability of structures during a wildfire can be enhanced by making structural improvements to harden points of entry against embers and by managing ornamental and native vegetation immediately adjacent to structures to provide space from radiant and convective heat.
- Fuels Modification Strategy looks at existing and potential fuel reduction projects that can be implemented or maintained to enhance community protection without creating significant environmental impacts. Projects were identified across jurisdictional boundaries and include work that has or may occur on private, County, state or federal lands. The greatest degree of wildfire protection may be obtained through leveraging the work of all involved agencies and private landowners. The *"Potential Projects"* will require further environmental analysis under California Environmental Quality Act (CEQA)

or National Environmental Policy Act (NEPA), and possibly permitting from the County prior to implementation. Existing projects are assumed to have current environmental documentation or permits for ongoing maintenance actions.

To prioritize potential projects, burn frequency (a measure of risk) and flame lengths (a measure of hazard) were used to determine a "Relative Hazard Rating". This rating was applied to all 30 x 30 meter pixels within a treatment area. The areas with the highest percentage of "Very High Relative Hazard" were ranked the highest priority. Using the percentage of "Very High Relative Hazard", treatments were ranked from highest to lowest priority (see Section 6 in CWPP, Table 20 and Appendix E).

- Evacuations from an evolving wildfire require coordination between fire, law enforcement, and the public to efficiently move people and their animals from harm's way. Sheltering in place or staying and attempting to protect a home can lead to entrapment of individuals placing law enforcement and firefighter personnel at risk should they be required to execute a rescue. The County's Ready! Set! Go! Program informs the public of proper actions to take before and during an evacuation. The CWPP provides recommended evacuation routes established by SBC Fire and special consideration for vulnerable population, people with special needs, and small and large animals.

Section 7 - FISCAL RESOURCES

The actions proposed in this CWPP are discretionary and should be addressed as agency funds and staffing become available for this work or as residents are financially able to improve the survivability of their individual structure.

Special funding obtained through grants provides the least fiscal impact on local government and, in many cases, empowers citizen groups such as Fire Safe Councils to address specific local priorities. Current sources of grant funding include:

- California Fire Safe Clearinghouse – *www.cafiresafecouncil.org/grants-clearinghouse.*
- CAL FIRE - *www.fire.ca.gov/grants/grants*.
- Federal Emergency Management Agency (FEMA) - *www.fema.gov/hazard-mitigation-grant-program*.
    - Hazard Mitigation Grant Program.
    - Pre-Disaster Mitigation grants.

Section 8 - MONITORING

CWPP Monitoring

This CWPP serves as a foundation for wildfire protection of the Planning Area. Review and revision of these elements are necessary to maintain a viable plan. SBC's Fire Marshal is responsible for conducting a thorough review of this plan at 5-year intervals and should seek input from the Working Group. Significant changes in policy, budget, and/or environmental conditions may warrant a more frequent review.

Fuel Treatment Monitoring

Currently, there is no fuel treatment monitoring program within the Planning Area. Fuel treatment effectiveness monitoring should be established on implemented projects in order to validate that treatment standards, as presented in this CWPP, are effective and do not lead to environmental degradation. Information on the methodology associated with photo monitoring can be found at *www.fs.fed.us/pnw/pubs/gtr526*.

Section 9 - RECOMMENDATIONS

The following identifies recommendations for further consideration by SBC Fire, residents, and SBC County government:

- Based on results of the wildfire analyses and potential life safety issues, consider increasing the defensible space requirements for property owners within high hazard communities in the EGVCP Planning Area in an effort to enhance protection of life safety for firefighters and the public.
- Develop an ongoing educational program for area residents on structure hardening, maintenance of defensible space, and evacuation planning. Elements may include:
    - Update websites to include comprehensive current information on home vulnerability analysis, structure hardening options, defensible space requirements, evacuation planning and preparedness, local emergency plans, and contact information for further inquiries.
    - Outreach program for new area residents. Should include distribution of written information and face-to-face contact by experienced residents or firefighters regarding fire danger, evacuation planning, defensible space maintenance and structure hardening options. All new residents should sign up for emergency alerts.
    - Maintain supplies of up-to-date information sheets and pamphlets for distribution at community events or by request.
    - Conduct annual preparedness meetings for threatened communities. Subjects may include long-term fire weather forecasts, updates on fuel management plans, evacuation planning, local firefighting plans, and available assistance for structure hardening, chipping programs, and reminders concerning basic defensible space requirements.
    - Establish a speaker list of local representatives from fire agencies, scientific community and citizen's organizations to speak at events regarding wildfire safety issues, structure hardening and fuel management planning
- Consider applying for a FEMA Pre-Disaster Hazard Mitigation Grant for structure hardening measures.
- Revise the existing CWPP Development Process to address the interaction of a contractor with the Development Team. Consider using the contractor for technical support, if the Development Team is to be tasked as the principal author.
- Develop a Vulnerable/Special Needs Population Disaster Preparedness Guide for emergency wildfire evacuation.
- Support state or local legislation to provide tax structures with incentives for structure hardening and hazardous fuel treatment mitigation.
- Create a short informational video about fuel management and the process. Footage could be taken by firefighters in the field and a link placed on the CWPP webpage as well as the SBC Fire, WRA and Fire Safe Council websites. Informational brochures could be available at the County Administrative building similar to "Water Wise" or "Creating Defensible Space".
- Consider the implementation of parking restrictions during time of elevated fire danger on narrow roadways that serve as primary access and egress routes into the communities. These restrictions would require a new County Ordinance and should be included in an update to the existing Red Flag Warning program managed by SBC Fire.
- Consider establishing a SBC Fire, Forest Service, and private landowner fuel treatment monitoring program for the Planning Area.

- Encourage private landowners, recreational-based businesses, and organizations within the Planning Area to develop individual evacuation preparedness plans.
- Consider assessing the fire suppression water system and water supply for the Santa Barbara Front communities to determine (1) if existing water sources and distribution lines are adequate to support exterior fire sprinkler systems; (2) if existing water supplies and distribution systems are adequate to support major firefighting efforts (e.g., resupplying engines, supplying helicopters); (3) what improvements, if any, are necessary to provide adequate supplies to firefighters in the event of an emergency.
- Augment budget of SBC Planning & Development to provide for staff time to support development of CWPPs and other fire safety plans.
- Maintain the SMPEGV CWPP Development Team as an advisory committee to meet on an annual basis to ensure CWPP currency. The SMPEGV CWPP Advisory Committee would also engage with SBC Fire and LPF for project planning and implementation ensuring community involvement and participation in the process.

Community Wildfire Protection Plan

San Marcos Pass - Eastern Goleta Valley Mountainous Communities

Section 1.0 Introduction

Wildfire has been a natural part of the ecosystem in the Santa Barbara area for thousands of years; however, over the past 100 years there has been a significant change in the ecosystem as a whole. Human development and urban growth has expanded from the lower elevation of the coastal plains into the Santa Ynez Mountains. This expansion created a WUI problem that has added to the complexity of wildfire management. Altering the natural environment has contributed to habitat loss for native species and the introduction of invasive exotic species.

The Santa Barbara Front (which includes the CWPP Planning Area south of the Camino Cielo ridgeline), at one time experienced infrequent natural fire ignition and low fire frequency, now experiences more frequent wildfires that pose a substantial threat to human life, improvements, and to the area's natural and cultural resources.

Property owners, environmental groups, and agencies can have differing ideas on how to protect property and natural habitats. Natural and ornamental vegetation that provide privacy and scenic beauty to a property owner can also serve as habitat for sensitive species. However, this same vegetation can allow wildfires to burn more intensely, spread more rapidly, and threaten lives, homes, and habitat. Wildfires are inevitable; however, the loss of human life is preventable and the loss and damage to human development and natural and cultural resources can significantly be reduced through thoughtful planning and careful implementation of hazard mitigation actions.

In October, 2016 the Santa Barbara County Board of Supervisors adopted the East Goleta Valley Community Plan (EGVCP), which constitutes the County's general plan for unincorporated County lands between the City of Santa Barbara and City of Goleta including the San Marcos foothills and portions of the Santa Ynez Mountains located within the CWPP area. Action FIRE-EGV-1B in the EGVCP directs the County to "shall encourage and support" development of a Community Wildfire Protection Plan (CWPP) for at-risk communities in the EGVCP planning area. In March of 2016 representatives of the Wildland Residents Association and Painted Cave Volunteer Fire Department formed an initial steering committee to pursue development of a CWPP, in consultation with representatives of SBC Fire, LPF, Urban Creeks Council, and citizen representatives of the mountain areas. Upon recommendation of SBC Fire, the proposed scope of the CWPP was subsequently expanded to include the San Marcos foothills and Paradise Canyon communities. Formal meetings with representatives of County Planning, the County Executive Office and Second District Supervisor's office were commenced in late April, 2016.

In October, 2016, SBC Fire hired a consultant to assist in the development of a Community Wildfire Protection Plan (CWPP). In early 2017, the Santa Barbara County Fire Safe Council received a State Responsibility Area Fire Prevention Fund (SRAFPF) Grant to fund approximately 50 percent of the consultant's cost. The San Marcos Pass and Eastern Goleta Valley Mountainous Communities (SMP/EGV) CWPP is the result of efforts by members of the CWPP Development Team. The intent of the stakeholder led Development Team is to enhance the protection of life safety and other values from wildfire within the Planning Area. This CWPP is written to

ensure that recommended actions developed during the CWPP planning process are in balance with sustainable ecological and cultural resource management practices and fiscal resources.

The SMP/EGV Development Team created the SMP/EGV CWPP as a guidance document pursuant to the Healthy Forests Restoration Act of 2003 (HFRA). The contents of this CWPP follow the guidelines established in the *Community Wildfire Protection Plan Development Process for Santa Barbara County,* adopted by the SBC Board of Supervisors in 2011 and in *The Wildland Fire Leadership Council's handbook*, *Preparing a Community Wildfire Protection Plan, A Handbook for Wildland Urban Interface Communities*.

This CWPP serves to guide future actions of agencies and individuals but does not legally commit any public agency to a specific course of action. Actions identified in this CWPP that exceed environmental thresholds defined in the County's 2008 *Environmental Thresholds and Guidelines Manual*, may require an initial study (state) or categorical exclusion (federal) following state or federal environmental laws for evaluating potential environmental impacts. Actions that trigger permit requirements of the County Land Use and Development Code (LUDC) ESH/RC Overlays within the Eastern Goleta Valley Community Plan area would comply with state and federal environmental laws, as applicable. Proposed projects on federal lands would be subject to National Environmental Policy Act (NEPA) compliance.

1.1 Purpose of Plan

The purpose of this CWPP is to identify wildfire hazard reduction strategies for communities in the SMP/EGV mountainous areas that are in balance with sustainable ecological management and fiscal resources. Additionally, the CWPP provides educational resources for residents to enhance wildfire preparedness.

1.2 Goals and Objectives

Table 1 identifies the goals that guided the development of this CWPP and objectives that provide a mechanism to meet these goals:

Table 1 CWPP Goals and Objectives

GOALS	OBJECTIVES
Reduce the wildfire threats within the wildland urban interface/intermix to promote life safety	• Identify areas within the project boundary with the greatest wildfire threat to life safety using all available data and fire modeling • Evaluate wildfire protection and evacuation capabilities • Develop guidelines and strategies that reduce the wildfire threat to life safety • Develop evacuation guidelines and identify activities and travel routes that enhance evacuation processes during wildfires • Review potential environmental and other constraints on fuel management strategies and recommended appropriate mitigation measures
Enhance protection of values at risk from wildfire (e.g., homes, businesses, critical infrastructure, natural resources, cultural	• Identify and locate values within the Planning Area

GOALS	OBJECTIVES
resources, agricultural resources, and watershed resources)	• Review potential impacts on wildfire protection capabilities based on existing environmental policies found in the *EGV Community Plan* (EGVCP) • Assess potential damage and loss of structures from burning embers and a flaming fire front • Evaluate and develop activities that enhance the County's wildfire preparedness, firefighting capabilities, and community education and existing wildfire hazard reduction programs • Develop specific guidelines and strategies that minimize the wildfire threat to values within the Planning Area • Identify strategies that reduce structure vulnerability • Identify and prioritize hazardous fuel treatments that reduce the wildfire threat to life, property and resource values, incorporating environmental protection measures
Balance wildfire protection strategies with natural and cultural resource sustainability	• Implement fuel modification strategies that consider visual quality. Follow guidelines established in the EGVCP and the Eastern Goleta Valley Residential Design Guidelines, Santa Barbara County Comprehensive plan • Ensure fuel modification activities follow best management practices regarding natural and cultural resources • Develop fuel treatment options that provide for reduction of the wildfire threat to values consistent with sustainability of natural and cultural resources and environmental protection laws
Identify funding opportunities and grants for wildland fire protection	• Ensure the CWPP meets or exceeds the requirements of the Healthy Forests Restoration Act of 2003 • Identify grant funding sources within the CWPP

1.3 Policy and Regulatory Framework

Development of this CWPP and potential wildfire hazard reduction projects within it are consistent with applicable federal, state and local laws regulating land use, development and environmental resource protection. Environmental protection measures, including Best Management Practices (BMPs) must be implemented before, during and after all proposed fuel hazard reduction projects that have not already been approved. These measures help ensure appropriate erosion and sediment control of surface waters and are intended to reduce adverse effects to natural and cultural resources. With project specific environmental protection measures including BMPs implemented in the field, many substantial impacts to the environment may be avoided.

1.3.1 Federal Level Policy

Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act (2000–present)

Section 104 of the Disaster Mitigation Act of 2000 (Public Law 106-390) enacted Section 322, Mitigation Planning of the Robert T. Stafford Disaster Relief and Emergency Assistance Act that created incentives for state and local entities to coordinate hazard mitigation planning and implementation efforts, and is an important source of funding for fuels mitigation efforts through federal hazard mitigation grants.

National Incident Management System (NIMS)

National Incident Management System (NIMS) provides a systematic, proactive approach to guide government agencies, nongovernmental organizations, and the private sector to work together to prevent, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment. NIMS improves a community's ability to prepare for and respond to potential incidents and hazard scenarios.

National Fire Plan (NFP) 2000

The summer of 2000 marked a historic milestone in wildland fire records for the United States. This resulted in the Western Governor's Association's "*A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment - A 10-Year Comprehensive Strategy - Implementation Plan*", which collectively became known as the National Fire Plan. This plan places a priority on collaborative work within communities to reduce their risk from large-scale wildfires.

Healthy Forest Initiative (HFI) 2002 ⇨ Healthy Forest Restoration Act (HFRA) 2003

The intent of the Healthy Forests Initiative (HFI) is to reduce the severe wildfires risks that threaten people, communities, and the environment. Congress then passed the Healthy Forests Restoration Act (HFRA) on December 3, 2003 to provide the additional administrative tools needed to implement the HFI. This Act emphasized the need for federal agencies to work collaboratively with communities in developing hazardous fuel reduction projects and places priority on fuel treatments identified by communities themselves in their CWPPs.

National Environmental Policy Act

Enacted in January 1970, the National Environmental Policy Act (NEPA) is a United States environmental law that promotes the enhancement of the environment and established the President's Council on Environmental Quality (CEQ). This covers federal lands within the Planning Area.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) (Public Law 89-665; 54 U.S.C. 300101 et seq.) is legislation intended to preserve historical and archaeological (cultural) sites in the United States of America. The act created the National Register of Historic Places, the list of National Historic Landmarks, and the State Historic Preservation Offices.

Endangered Species Act of 1973

The Endangered Species Act of 1973 provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend.

Migratory Bird Treaty Act of 1918

Migratory Bird Treaty Act of 1918 makes it unlawful without a waiver to pursue, hunt, take, capture, kill or sell birds listed therein ("migratory birds"). The statute does not discriminate between live or dead birds and grants full protection to any bird parts including feathers, eggs and nests.

National Forest Management Act (NFMA)

The National Forest Management Act (NFMA) of 1976 (P.L. 94-588) is a United States federal law that is the primary statute governing the administration of national forests and was an amendment to the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on national forest lands.

Los Padres National Forest Land Management Plan

Each national forest and national grassland is governed by a land and resource management plan in accordance with the National Forest Management Act (NFMA). These plans outline management direction, including desired future conditions, suitable uses, monitoring requirements, goals and objectives, and standards and guidelines. Monitoring of conditions on a national forest or national grassland ensures projects are done in accordance with plan direction and determines effects that might require a change in management direction.

Quadrennial Fire Review Report (2014)

The *Quadrennial Fire Review* is a strategic assessment process conducted every four years to evaluate current mission strategies and capabilities against best estimates of future environment for wildland fire management. This integrated review is a joint effort of the five federal natural resource management agencies and their state, local, and tribal partners that constitute the wildland fire community. The objective is to create an integrated strategic vision document for fire management.

Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy (2014)

The *National Cohesive Wildland Fire Management Strategy* mandates that federal agencies work collaboratively among all stakeholders and across all landscapes, using best science, to make meaningful progress towards three primary goals: resilient landscapes, fire adapted communities, and safe and effective wildfire response. Its vision is to safely and effectively extinguish wildfire when needed, use wildfire where allowable, manage our natural resources, and to live with wildland fire.

National Fire Protection Association (NFPA)

The National Fire Protection Association (NFPA) maintains numerous codes and standards that provide direction on development in the WUI including:

- NFPA 1, Fire Code, Chapter 17.
- NFPA 1051, Wildland Fire Fighter Professional Qualifications.
- NFPA 1141, Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas.
- NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting.
- NFPA 1143, Standard for Wildland Fire Management.
- NFPA 1144, Standard for Reducing Structure Ignition Hazards from Wildland Fire.

- NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.
- NFPA 1720, Standard for the Organization and Deployment of Fire Suppression, Emergency Medical Operations and Special Operations to the Public by Volunteer.

1.3.2 State Level Policy

California Environmental Quality Act (CEQA)

The 1970 California Environmental Quality Act (CEQA) has evolved into one of the most prominent components of community planning in California. It requires state and local agencies to follow a protocol of analysis and public disclosure of environmental impacts in proposed projects and to include feasible measures to mitigate those impacts. The implementation of any potential hazardous fuel treatment projects on non-federal lands recommended in this CWPP must comply with CEQA regulations.

Water Quality, Supply, and Infrastructure Improvement Act of 2014: Protecting Rivers, Lakes, Streams, Coastal Waters, and Watersheds

In protecting and restoring California rivers, lakes, streams, and watersheds, the purposes of Chapter 6 in the Water Quality, Supply, and Infrastructure Improvement Act of 2014 are to implement fuel treatment projects to reduce wildfire risks, protect watersheds tributary to water storage facilities, and promote watershed health. It also determines priorities for water security, climate, and drought preparation.

California Strategic Fire Plan (revised 2018)

The *California Strategic Fire Plan* (Fire Plan) is the state's road map for reducing the risk of wildfire. The Fire Plan is a cooperative effort between the State Board of Forestry and Fire Protection and the California Department of Forestry and Fire Protection. By placing the emphasis on what needs to be done long before a fire starts, the Fire Plan looks to reduce firefighting costs and property losses, increase firefighter safety, and to contribute to ecosystem health. The 2018 Plan reflects Cal Fire's focus on (1) fire prevention and suppression activities to protect lives, property, and ecosystem services, and (2) natural resource management to maintain the state's forests as a resilient carbon sink to meet California's climate change goals and to serve as important habitat for adaption and mitigation.

California Office of Emergency Services – California Fire Service and Rescue Emergency Mutual Aid Plan (2014)

The *California Fire Service and Rescue Emergency Mutual Aid Plan* is an extension of the *California Emergency Plan*. The *California Emergency Plan* is published in four parts as follows:

- Part One: Basic Emergency Plan.
- Part Two: Peacetime Emergency Plan.
- Part Three: Compendium of Legislation and References.
- Part Four: War Emergency Plan.

California State Multi-Hazard Mitigation Plan (updated 2013)

The purpose of the *State Multi-Hazard Mitigation Plan* (SHMP) is to significantly reduce deaths, injuries, and other losses attributed to natural- and human-caused hazards in California. The SHMP provides guidance for hazard mitigation activities emphasizing partnerships among local, state, and federal agencies as well as the private sector. This plan will be updated in 2018.

California Public Resource Code (*Public Resources Code) Section 4290*

California Public Resource Code (Public Resources Code) Section 4290 grants authority to State Board of Forestry and Fire Protection to develop and implement fire safety standards for defensible space on State Responsibility Area (SRA) lands.

Public Resources Code Section 4291

Public Resources Code Section 4291 extends the required defensible space clearance around homes and structures from 30 feet to 100 feet for wildfire protection. The Code applies to all lands that have flammable vegetation. The regulations include several requirements for how the vegetation surrounding buildings and structures should be managed to create defensible space.

Public Resources Code 4292-4296 and 14 CCR 1256, Fire Prevention for Electrical Utilities

Statutes and regulations Public Resources Code 4292-4296 and 14 CCR 1256, Fire Prevention for Electrical Utilities address the vegetation clearance standards for electrical utilities. They include the standards for clearing around energy lines and conductors such as power-line hardware and power poles.

Public Resources Code 4741

In accordance with policies established by the State Board of Forestry and Fire Protection, CAL FIRE shall assist local governments in preventing future wildland fire and vegetation management problems by making its wildland fire prevention and vegetation management expertise available to local governments to the extent possible within the department's budgetary limitations (Public Resources Code 4741). CAL FIRE recommendations shall be advisory in nature and local governments shall not be required to follow such recommendations.

California Code of Regulations, Title 14, 1270.04

California Code of Regulations, Title 14, 1270.04 applies to the following: (a) local jurisdictions shall provide the CAL FIRE Director with notice of applications for building permits, tentative parcel maps, tentative maps, and use permits for construction or development within SRA; (b) Director shall review and make fire protection recommendations on applicable construction or development permits or maps provided by the local jurisdiction; and, (c) the local jurisdiction shall ensure that the applicable sections of this subchapter become a condition of approval of any applicable construction or development permit or map.

2016 California Fire Code

2016 California Fire Code establishes regulations affecting or relating to structures, processes, premises and safeguards regarding residences and historic buildings. The Code includes: 1) hazards of fire and explosion arising from the storage, handling or use of structures, materials or devices; 2) conditions hazardous to life, property or public welfare in the occupancy of structures or premises; 3) fire hazards in the structure or on the premises from occupancy or operation; 4) matters related to the construction, extension, repair, alteration or removal of fire suppression or alarm systems; and 5) conditions affecting the safety of fire fighters and emergency responders during emergency operations.

Senate Bill 1241 Compliance

In order to address fire protection and prevention, Senate Bill 1241 (SB 1241) requires jurisdictions to update the Safety Element with new information regarding fire hazards. California's increasing population and expansion of

development into previously undeveloped areas is creating more WUI issues with a corresponding risk of economic loss caused by wildland fire.

Government Code 51175-51189: Very High Fire Hazard Severity Zones

Government Code 51175-51189: Very High Fire Hazard Severity Zones defines Very High Fire Hazard Severity Zones and designates lands considered by the State to be a very high fire hazard. It also defines defensible space, fuel, fuel management, and wildfire.

Government Code 51189: WUI Building Standards

Government Code 51189: WUI Building Standards directs the Office of the State Fire Marshal to create building standards for wildland fire resistance. The code includes measures that increase the likelihood of a structure withstanding intrusion by fire (such as building design and construction requirements that use fire-resistant building materials) and provides protection of structure projections (such as porches, decks, balconies and eaves), and structure openings (such as attics, eave vents, and windows).

California Building Code 2013 Edition, Section 705A

California Building Code 2013 Edition, Section 705A establishes minimum building standards for the protection of life and property by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flames or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.

Government Code 65302.5: General Plan Fire Safety Element Review

Statute, Government Code 65302.5 requires the State Board of Forestry and Fire Protection to provide recommendations to a local jurisdiction's General Plan fire safety element at the time that the General Plan is amended. While not a direct and binding fire prevention requirement for individuals, General Plans that adopt the Board's recommendations will include goals and policies that provide for contemporary fire prevention standards for the jurisdiction.

1968 California Fair Plan Act

The *California Fair Access to Insurance Requirements* ("FAIR") *Plan* was created by state legislation in July 1968 following the 1960's brush fires and riots. It is an insurance pool established to assure the availability of basic property insurance to people who own insurable property in the State of California and who, beyond their control, have been unable to obtain insurance in the voluntary insurance market.

The FAIR Plan is a private association comprised of all insurers licensed to write property insurance in California. All insurers conducting property business in California must be a member of the Association. FAIR Plan profits and losses are shared by its members in direct proportion to their market share of property insurance written in California. There is no public funding, or taxpayers' monies involved. The FAIR Plan is not a state agency.

1.3.3 Santa Barbara County Level Policy and Regulations

Office of Emergency Services, Multi-Jurisdictional Hazard Mitigation Plan (2017)

The Multi-Jurisdictional Hazard Mitigation Plan is a tool for stakeholders to increase public awareness of local natural and human-made hazards and risks, while providing information about options and resources available to reduce risks by hazard mitigation measures.

Santa Barbara County Unit Strategic Fire Plan (2018)

The *Santa Barbara Unit Fire Plan* is intended to convey management direction from the County Fire Chief, involve and educate stakeholders on the wildfire environment, establish strategic priorities for wildfire prevention and suppression projects and programs into a single unified plan, and be a living document that will adapt to changing conditions and be updated on a regular basis.

Santa Barbara Operational Area Mutual "All Risk" Mutual Aid Plan (2018)

The goal of the *Santa Barbara Operational Area Mutual "All Risk" Mutual Aid Plan* is to provide, in an expedient manner, fire, rescue, emergency medical services, hazardous materials, urban search and rescue or other expertise in the form of resources and qualified personnel as would be necessary to manage a major incident or disaster that would exceed the capabilities of a single agency. Santa Barbara County is located in California Mutual Aid Region I, which includes San Luis Obispo, Ventura, Los Angeles, Orange, and Santa Barbara counties. Each county is required to have a Mutual Aid Plan that outlines procedures, policies, resources, and personnel information. This Plan assists local, state, and federal fire agencies in preparing for a major emergency.

Santa Barbara Comprehensive Plan (Adopted 1991, Republished 2009)

The *Santa Barbara Comprehensive Plan* is a long-term plan mandated by California state planning law for the physical development of a city or county. Various elements of the plan are mandated, including land use, circulation, open space, conservation, housing, safety, and noise. The objective of this plan was to analyze regional resources and environmental constraints in order to be able to identify and rank opportunities for urban development, agricultural expansion, and recreational activities. Areas to be preserved because of environmental hazards, ecological communities, or scenic value also were evaluated. Additional elements in Santa Barbara County include groundwater resources, oak tree protection, air quality, and coastal land use. Goleta Valley is an unincorporated area of the South Coast of Santa Barbara County and one of ten community planning areas under County jurisdiction.

The eastern portion of the Goleta Valley Planning Area (the Eastern Goleta Valley Community Plan Area) lies primarily on the coastal shelf between the Pacific Ocean and the Santa Ynez Mountain Range, east of the City of Goleta and west of the City of Santa Barbara, and includes the southern slopes of the mountains up to the crest. The 2015 *Eastern Goleta Valley Community Plan* was adopted by the Board of Supervisors on October 20, 2015. Within the Coastal Zone, the California Coastal Commission certified the *Eastern Goleta Valley Community Plan* and it took effect in the Coastal Zone on December 14, 2017.

Santa Barbara Operational Area Emergency Management Plan (2013)

The *Santa Barbara Operational Area Emergency Management Plan* (EMP) addresses the Santa Barbara Operational Areas planned response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies. The EMP does not address normal day-to-day emergencies, or the well-established and routine procedures used in coping with such emergencies. Instead, the operational concepts reflected in this plan focus on potential large-scale disasters, which can generate unique situations requiring unusual emergency responses.

Eastern Goleta Valley Community Plan (2015)

The *Eastern Goleta Valley Community Plan* (EGVCP) provides land use policy for Santa Barbara County (SBC) decision makers, the community, and landowners in the unincorporated Eastern Goleta Valley and adjoining foothill and mountainous area. Most portions of the CWPP Planning Area south of the crest of the Santa Ynez Mountains lie within the EGCVP boundaries. The EGVCP requires the SBC public safety services departments, such as Fire, Sheriff's and Office of Emergency Services Departments. The EGVCP adopts land use designations, development standards, policies, and actions to organize development within Eastern Goleta Valley around the adopted vision for the community. It amends the SBC's Land Use and Zoning maps, the Local Coastal Program, the Comprehensive Plan, zoning districts and overlays, and design guidelines. The EGVCP determines Eastern Goleta Valley's community design and capital improvement programming. The EGVCP also identifies the groups and/or agencies responsible for implementing portions of the plan, as well as potential funding sources for various improvement programs. The EGVCP is general to accommodate unforeseen conditions, changes, or requirements.

Permits from Santa Barbara County Fire Department, Section 01331

Provides policy for installation and acceptance permits for sprinkler Systems including NFPA 13, 13R and 13D, NFPA 24 Underground Fire Service, NFPA Standpipe System, Fire Hydrants (NFPA 24), Water tanks (NFPA 22), Monitoring Equipment, Fire alarm/detection systems, and Fire Protection Systems including Hood and Duct systems, CO_2 systems, and CFC-free systems. Section 116 of the 2013 California Building Code is replaced in its entirety to read as follows:

Santa Barbara County Code, Chapter 10 – Building Regulations

Chapter 1, Division I and II, of the 2013 California Building Code was adopted in its entirety except as amended as administrative provision of Chapter 10 of Santa Barbara County Code and is applicable to all primary codes enlisted in Chapter 10 unless specifically modified and amended elsewhere in this chapter. Only amendments to the California Building Standard Codes are addressed in this chapter. These include:

- Buildings that are damaged by fire or by natural disasters where the extent of damage to the building exceeds 75 percent of the valuation of the building prior to the disaster.
- Applications for new buildings, additions, alterations, and repairs located in any Fire Hazard Severity Zone or any Wildland-Urban Interface Areas designated by the enforcing agency constructed after the application date shall comply with the provisions of this chapter; designated High Fire Hazard Area as an area considered to be a Wildland-Urban Interface Area.
- Use of Wood roofing materials is prohibited except approved Class A or B fire-retardant-treated wood roofing materials are permitted to effect repairs for roofs of similar existing wood roofing material where such repairs do not exceed 25 percent of the existing roof area within any given 12-month period.
- New buildings, additions, alterations, and repairs for which an application for a building permit is submitted on or after July 1, 2008, located in any Fire Hazard Severity Zone or Wildland Urban Interface Area, shall comply with all sections of this chapter, including all of the following areas:

Santa Barbara County Code, Chapter 15 – Fire Prevention

Includes adoption of the California Fire Code with amendments, fire Development Standards, standards for weed abatement, and fire protection mitigation fees.

Chapter 35 Codes and Ordinance, Section 35-1 Santa Barbara County Land Use and Development Code

Chapter 35 Codes and Ordinance, Section 35-1 Santa Barbara County Land Use and Development Code (LUDC) is the zoning ordinance for most of Santa Barbara County. It currently is applicable to the unincorporated areas of the County outside of Montecito and the Coastal Zone. The LUDC implements the Comprehensive Plan (and eventually the Coastal Land Use Plan) by classifying and regulating the uses of land, buildings and structures in unincorporated areas of the County. The LUDC also contains road naming and street addressing standards as well as sign regulations. The LUDC contains specific regulations governing vegetation removal in areas subject to the Environmentally Sensitive Habitat (ESH) and Riparian Corridor (RC) overlay zones in the EGVCP area.

Santa Barbara County Code, Chapter 35, Article IX - Deciduous Oak Tree Protection and Regeneration Ordinance

Santa Barbara County Code, Chapter 35, Article IX addresses deciduous oak tree removal in the inland rural areas if such removal is not associated with development that requires a permit under Section 35-1 and Section 35-2 of Chapter 35 of the County Code or Ordinance 661.

Eastern Goleta Valley Residential Design Guidelines (2006)

The unincorporated Eastern Goleta Valley region of Santa Barbara County is well known for the scenic beauty of its mountains and seascapes and the livability of its neighborhoods. Given the importance of the area's visual character, the *Eastern Goleta Valley Residential Design Guidelines (2006)* were developed to help maintain the high quality of Eastern Goleta Valley's neighborhoods and promote neighborhood compatibility and good architectural design.

County of Santa Barbara Planning and Development Environmental Thresholds and Guidelines Manual (2008)

The *County of Santa Barbara Planning and Development Environmental Thresholds and Guidelines Manual* was prepared to assist the public, the applicant, environmental consulting firms, and County decision makers in understanding the use and application of various environmental impact thresholds as they relate to project proposals.

1.4 CWPP Planning Process

Development of this CWPP involved a process whereby stakeholders identified the CWPP goals and objectives, defined community values, utilized a science-based assessment to identify the wildfire threat, identified and prioritized proposed hazardous fuel treatments, and collaborated on a course of action to address the wildfire threat. This process provides a community-based product that influences where and how local, county, state, and federal agencies and organizations implement wildfire mitigation activities within the Planning Area.

This plan complies with the requirements for a CWPP, as required by the 2003 HFRA, including:

- Collaboration - A CWPP must be collaboratively developed. Local and state officials must meaningfully involve federal agencies that manage land in the vicinity of the community and other interested parties, particularly non-governmental stakeholders.
- Prioritized Fuel Reduction - A CWPP must identify and prioritize areas for hazardous fuel reduction treatments on both federal and non-federal lands and recommend the types and methods of treatment that, if completed, would reduce the wildfire risk to the community.

- Treatment of Structural Ignitability - A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

1.4.1 County of Santa Barbara CWPP Process

The Santa Barbara County Board of Supervisors has an approved *Community Wildfire Protection Plan Development Process for Santa Barbara County* ("CWPP Development Process") that identifies the need to engage interested parties and to collaborate with applicable federal and state agencies. The development process consists of eight steps that describe a standardized approach for the CWPP process in Santa Barbara County.

Working Group

The Working Group consisted of representatives from SBC Fire, County Planning and Development, the County Executive Officer (or designee), and State Forester (represented by San Luis Unit Forester). A project kickoff meeting was held on November 9, 2016, with the contractor, to discuss an overview of the CWPP, the CWPP process, development team formation, public outreach planning, and future development team and public meeting scheduling. The County Board of Supervisors Second District Staff were present at this initial meeting but the representative from the San Luis Unit was unable to attend.

Agency Meeting

On December 8, 2016, an agency meeting was held to introduce the CWPP planning process and solicit input from various agencies. Invitations were sent to twelve federal, state, and local stakeholders with the meeting attended by representatives from the following:

- San Marcos Pass Volunteer Fire Department
- Painted Cave Volunteer Fire Department
- United States Forest Service, Los Padres National Forest
- California Department of Fish and Wildlife
- City of Santa Barbara
- Santa Barbara County Public Works Water Resources Flood Control
- Santa Barbara County Fire Safe Council
- California Department of Parks and Recreation United States Bureau of Reclamation
- Santa Barbara County Office of Emergency Management

SBC Fire Marshal Rob Hazard led a discussion of the CWPP planning process and explained how stakeholder input would lead to a more robust plan. The contractor presented maps of the CWPP Planning Area, wildfire hazard assessment and known environmentally sensitive habitats to the representatives. A round table discussion of general issues and specific agency policy constraints followed the presentations.

At the conclusion of the meeting, the representatives were invited to sit in on future, yet unscheduled, Development Team meetings. Rob Hazard was designated as a point of contact for the agency representatives.

Public Workshops

Figure 1. January 26, 2017 Public Meeting

The initial public workshop took place on January 26, 2017 at the Santa Barbara County Emergency Operations Center (Figure 1). Approximately 86 property owners and representatives from local government agencies, homeowner associations, and environmental groups as well as other interested members of the public attended the workshop. The presentation included introductions, goals and objectives for the workshop (by SBC Fire staff) and a PowerPoint presentation (by the contractor).

This PowerPoint presentation provided a description of the CWPP planning process, draft CWPP goals and objectives, the major plan components, an overview of wildfire history, and an initial wildfire hazard and risks assessment. SBC Fire staff presented the next steps in the process and an invitation was extended seeking interested individuals to serve on the CWPP Development Team.

A final public workshop occurred on February 7, 2019 at the Santa Barbara County Planning Commission Hearing Room. The meeting was hosted by the Development Team and included a presentation of the Plan followed by question and answers. Approximately 100 community members and various stakeholders attended the meeting. Feedback was given to the Development Team for final changes to the Draft Plan.

Development Team

A Development Team to lead the CWPP process was formally convened in January 2017. Members of the Development Team were chosen by agreement of citizen representatives of the CWPP area and County government. Development Team meetings were held each month between January 2017 and February 2018. The Development Team (Team) was tasked with providing community-based input on local issues and concerns to the consultants preparing the CWPP. Deputy Fire Marshal Rob Hazard and Santa Barbara County Fire Safe Council representative Phil Seymour provided leadership for the team that included residents and representatives from local homeowner associations, environmental groups, and volunteer fire departments.

The Team spent over three months developing a comprehensive list and maps of existing, planned, and potential fuel treatments. Mapping of existing and potential future fuel treatment areas was completed based on on-the-ground inspections by County Fire and LPF fire personnel, local Development Team members, affected property owners and area residents. Team members facilitated local meetings to share and gather information from local residents and convened panels of concerned stakeholders to vet issues and concerns regarding these potential treatments. A priority process, which was approved by the Development Team, assisted in prioritizing hazardous fuel treatments.

The Team also served as liaisons to their local communities to compile information concerning specific characteristics regarding wildfire susceptibility of communities located within the Planning Area. This information allowed the Team to delineate 12 specific community areas, each with unique issues and concerns.

Environmental concerns centered on potential hazardous fuel treatments and structure-hardening guidelines for the CWPP occupied much of the remaining Team's discussions. A final set of structure hardening mitigation, hazardous fuel treatment areas and guidelines, and proposed environmental protection measures including best management practices was developed as part of the Team's work. The guidelines, for both structure-hardening and for hazardous fuel treatments, provide stakeholders interested in decreasing their wildfire exposure a starting point for taking appropriate mitigation actions within the limits of existing policy and regulation.

Stakeholder Meetings

San Marcos Trout Club, West Camino Cielo, and Rosario Park Communities

Members of the Wildland Residents Association coordinated information gathering and developed tentative fuel treatment areas for all areas on and west of Highway 154. Individuals from the San Marcos Trout Club, West Camino Cielo, and Rosario Park conducted community outreach for the development of potential fuel treatments.

Painted Cave, East Camino Cielo

For areas east of Highway 154, Development Team representatives contacted affected property owners directly and conducted community meetings on proposed potential fuel treatment areas. Initial meetings with Painted Cave residents and property owners were held on March 2 and March 14, 2017. A major community meeting attended by Painted Cave and East Camino Cielo area residents was held at the Forest Service San Marcos Pass fire station on April 13, 2017. Additional information was available for residents on the Wildland Residents Association website, community bulletin boards, and mailboxes. Multiple community field trips were conducted with Forest Service and SBC Fire representatives in attendance.

San Marcos Pass Foothills

The San Marcos Foothills community representatives wrote and disseminated letters to 250 community members. Most of the letters were sent by email via Homeowner Associations (HOA) presidents or neighborhood leaders. Others were hand-delivered by a neighborhood leader.

The letter described the CWPP goals and process, and requested feedback from residents. It was disseminated to residents of the following neighborhoods: San Antonio Creek Neighborhood Association, Rancho San Antonio, Park Highlands, La Romana, Twinridge, Shadow Hills, Via Regina, San Antonio Estates, Paseo Cameo, and Via Chaparral.

In addition, the letter was posted to the website *NextDoor.com* and all the foothill residents in the CWPP who subscribe to *NextDoor.com* had access to that posting. About 40 people responded to the two foothills community representatives by email, phone, or in person with questions or feedback. Most of the questions pertained to concerns about defensible space on neighboring properties, either private property or County property. Responses were provided by the community or SBC Fire representatives.

The two foothills community representatives were invited to give presentations to two HOAs on March 6 and March 27, 2017. SBC Fire Vegetation Management Captain Fred Tan attended both of these meetings. They presented for about 15 minutes at each HOA meeting. Captain Tan brought maps of the foothills and shared detailed information about existing and proposed fuelbreaks and other information. On March 6, they attended the annual meeting of the Park Highlands Association. About 25 people were in attendance and Q&A lasted about 10 minutes. Most questions pertained to evacuation and roads (egress). On March 27, they attended the San Antonio Estates homeowners meeting. About 18 people attended. Again, most of the questions were about the limited roads for evacuation.

San Marcos Pass

On May 11, 2017, a community CWPP meeting was held at Forest Service San Marcos Fire Station for approximately 35 residents of San Marcos Pass/Kinevan, West Camino Cielo, Paradise Canyon, and Stagecoach Road/Cold Springs. A representative from the Santa Barbara County Fire Safe Council gave an overview of the CWPP process with presentations from LPF and SBC Fire representatives regarding agency hazardous fuel

treatments near the San Marcos Pass. Suggestions for additional fuel treatments within the San Marcos Pass Area were taken, and in some cases, added to the maps.

California Department of Fish and Wildlife / Forest Service Meeting

On April 14, 2017, a meeting with representatives from the California Department of Fish and Wildlife (CDFW) and the Forest Service occurred to discuss draft best management practices and their potential beneficial effects to environmentally sensitive habitat and species. Both CDFW and Forest Service submitted recommendations for modification to these draft best management practices for use in the CWPP.

Meeting with Academia

A meeting occurred on May 22, 2017 with the Chaparral Institute and professors from the University of California, Santa Barbara to discuss various issues raised by members of the Development Team. The group also discussed a range of topics, including stream course protection, limited operating periods for nesting and migratory birds, invasive species management, and the potential impacts of climate change. Recommended measures derived from the discussion were incorporated in Section 6.4.4.

Section 2.0 Community Overview

The Santa Barbara area is considered one of the most scenic regions in California with the Santa Ynez Mountain Range providing a beautiful backdrop to Santa Barbara and Goleta with striking views of the cities, ocean, Channel Islands, and the Santa Ynez Valley. In 2016, *Livability.com*, a website that ranks quality of life and travel amenities of America's small and mid-sized cities, voted Santa Barbara the fourth best place to live.

The Planning Area is located in an unincorporated area of Santa Barbara County north of the cities of Goleta and Santa Barbara (See Figure 2, Planning Area Map). The boundary consists of over 29 square miles and 19,588 acres, including approximately 8,534 acres of private land, 10 acres of California Department of Parks and Recreation lands, 238 acres of local government managed lands, and 9,930 acres of federally managed lands. There are 12 communities identified within the San Marcos Pass and Eastern Goleta Valley Mountainous Planning Area including:

- Lower Paradise Road/Stagecoach.
- Paradise Canyon.
- Stagecoach/Cold Springs.
- Rosario Park.
- San Marcos Pass/Kinevan.
- West Camino Cielo.
- East Camino Cielo.
- Painted Cave.
- San Marcos Trout Club.
- Old San Marcos Road.
- Twinridge.
- San Marcos Foothills.

2.1 Communities within the Planning Area

Generally, several communities within the Planning Area include enclaves of tightly packed structures and individual structures scattered on larger lots or acreage. The following describes the communities within the Planning Area (See Figure 2 for a map of the locations for the communities):

Paradise Canyon and Lower Paradise Road/Stagecoach

Paradise Canyon community is located in the most northern portion of the Planning Area. The community is approximately 1,795 acres in size and is a highly utilized recreational area administered by the Forest Service. It includes Rancho San Fernando Rey (a large private working ranch), Forest Service administered recreational residences, Los Prietos Ranger Station and work center, public campgrounds, Los Prietos Boys Camp (a Santa Barbara County youth probation camp), and Rancho Oso (a private recreational guest ranch and stable).

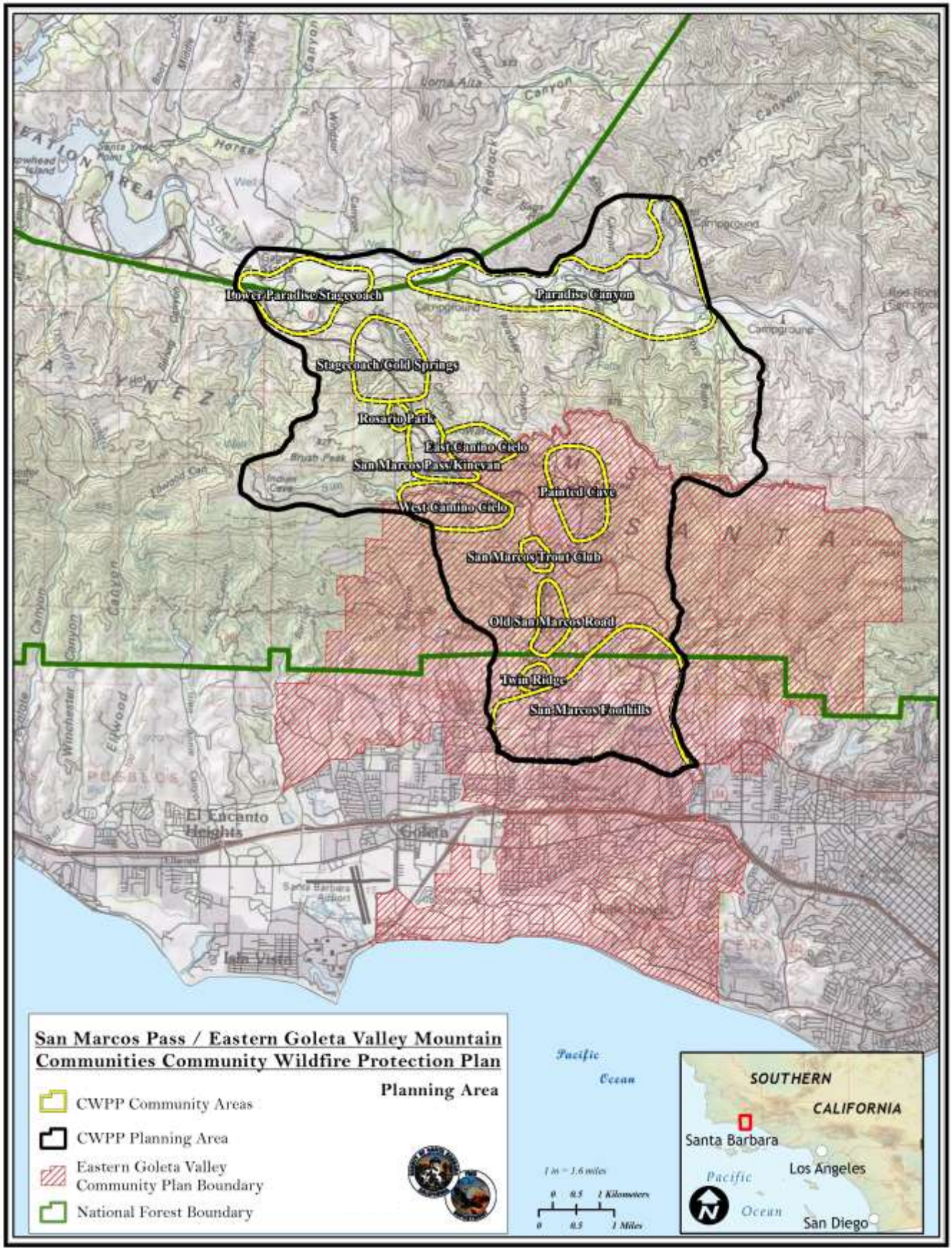


Figure 2. Planning Area Map

There are approximately 196 structures, mostly consisting of single-story residences with combustible siding, fire resistant roofs, unenclosed eaves, wood decks, and a mix of screened and unscreened vents. Approximately 20 structures are mobile homes. The private guest ranch includes recreational vehicle campsites, recreation cabins, and miscellaneous temporary structures. Spacing of structures within this area is a mix of scattered structures and enclaves of tightly compacted recreational residences.

Infrastructure within the community includes above ground telephone and powerlines, propane gas tanks, and two large water tanks with gravity-fed standpipes.

The road system includes Paradise and Stagecoach Roads, which are the primary evacuation routes for this community. A potential secondary evacuation route to the Camino Cielo Road is the Arroyo Burro Road; however, this unpaved road will need annual maintenance to support a large evacuation by cars.

A range of fuel conditions exist, including agriculture, grasses, oak woodlands, and moderate to heavy chaparral. Ornamental vegetation is not commonly associated with this community.

Special considerations: Single-lane dirt roads can hamper evacuation of individuals from the recreation residences and may limit access for fire equipment. The large numbers of temporary and recreational visitors within this area may require evacuation. These individuals may be unfamiliar with the travel routes required for safe evacuation during a wildfire. A substantial number of domestic large animals may require evacuation from Rancho San Fernando Rey and Rancho Oso.

The Lower Paradise/Stagecoach community is approximately 698 acres in size and is located near the intersection of Paradise Road and Stagecoach Road in the State Responsibility Area. There are approximately 15 homes, numerous outbuildings, and 1 general store.

Infrastructure within the community includes above ground telephone and powerlines, propane gas tanks, and individual private stored water systems with gravity-fed standpipes.

The road system includes Paradise Road, Stagecoach Road, and Highway 154, which are the primary evacuation routes for this community.

A range of fuel conditions exist including agriculture, grasses, oak woodlands, and moderate to heavy chaparral. Ornamental vegetation is not commonly associated with this community.

Stagecoach/Cold Springs

This community includes the Cold Springs Tavern and the San Marcos Christian Camp and encompasses 584 acres of both public and private lands within the Los Padres Forest boundary. The Cold Spring Tavern (Figure 3) is a historic stagecoach stop built in 1886 as a way station to serve the travelers on the new "*turnpike*" over the San Marcos pass. The Tavern is located about a mile off Highway 154 along Stagecoach Road (in the San Marcos Pass area). The Cold Springs Tavern structure cluster consists of approximately eight structures located in Cold Springs Canyon. One structure has rock siding while the remaining

Figure 3. Cold Spring Tavern
Source: Google Earth

structures have wood siding. Seven structures have wood shingle roofs and one structure has asphalt shingles but has wood siding. Wood fencing is found throughout the compound and wood decks attached to structures are poorly maintained.

Stagecoach Road is a narrow two lane paved road that meets Highway 154 to the south and Paradise Road to the north.

Infrastructure within the Tavern compound includes above ground telephone and powerlines, and propane gas tanks. Water is supplied by the spring.

Vegetation consists of Sycamore trees, oak woodland, and riparian vegetation.

Special Considerations: Vegetation clearance between Stagecoach Road and the structures has occurred, but little clearance exists behind and beside the buildings. Ivy is growing up the side of one building, which provides an ignition source for burning embers. There is one 1-½ inch wharf hydrant located in the lane to the south of the restaurant, approximately 50 feet from Stagecoach Road. There is 15,000-gallon tank with gravity feed.

The San Marcos Christian Camp (Camp) is located north of the Santa Ynez Mountains ridgeline on Stagecoach Road down canyon from Cold Springs Tavern. It is approximately 155 acres of private property inside the Los Padres Forest boundary. The facility has been hosting church camps for almost 50 years and is recognized as an "*organized camp*" by Santa Barbara County. A range of activities occur at the Camp, including conferences, camping, weddings, hiking, swimming, and other outdoor activities.

There are approximately 30 structures, consisting of 18 cabins, two houses, commercial kitchen and dining hall, pool building, shower building, and miscellaneous outbuildings. These structures mostly consist of combustible wood siding (except the pool building which is stucco) and fire-resistant asphalt shingle roofs.

The Camp can accommodate up to 130 individuals at full capacity. Two families live at the facility fulltime but mostly the Camp accommodates up to 100 guests that stay between one and five nights.

Infrastructure within the camp includes above ground telephone and powerlines, propane gas tanks, and two 15,000-gallon water tanks. One water tank is gravity-fed and one is reliant on an electric water pump. There are three fire hydrants accessible by a dirt road that runs through the Camp. The swimming pool holds an estimated 85,000 gallons of water when full.

The road system includes Stagecoach Road and a paved driveway, which is the only access/egress route for this facility. There is a dirt road loop through the property that can assist with access/egress from the property to the driveway.

A range of fuel conditions exist, including grasses, oak woodlands, and moderate to heavy chaparral. Ornamental vegetation not commonly associated with this community. There is a large open dirt/grass field, approximately four acres in size.

Special considerations: The single-lane driveway can hamper evacuation of individuals and limit access for fire equipment. There is potential for large numbers of temporary and recreational visitors. SBC Fire has determined that several large open fields can be utilized for "*shelter in place*" in some wildfire

situations. The Camp practices fire drills for groups staying longer than five consecutive days. The camp drills consist of demonstrating the siren and gathering at the main meeting hall.

Rosario Park

There are approximately 23 single-family homes on various sized private property lots within the Los Padres National Forest boundary totaling approximately 50 acres. The community is located on the west side of Highway 154 north of San Marcos Pass and the Santa Ynez Mountains ridgeline. Structures within the community are of varying ages and style of construction. Most are constructed of wood framing with only a few built to current building standards having hard surfaces like stucco or concrete siding.

Infrastructure within the community includes above ground telephone and powerlines, and propane gas tanks. One 6,000-gallon water tank with gravity flow serves homes and five 1.5-inch standpipes and two 2.5-inch standpipes are located within the community.

Rosario Park Road is a single-lane paved road that serves as the only point of access/egress from Stagecoach Road. There are several paved and dirt tributary roads that dead-end providing access to structures in the community. Two fire/utility roads extend from the west side of Rosario Park to the Brush Peak Fuelbreak and a third dirt road returns to lower Stagecoach Road following utility lines. Individual driveways are narrow with limited turnarounds for large fire equipment.

Coastal Live Oak dominates vegetation with some chaparral understory. Ornamental vegetation may contribute to potential structure loss in this community.

Special considerations: Rosario Park Road is the only paved maintained access/egress route to Stagecoach Road and Highway 154 for the community. Access by fire equipment is limited due narrow road widths. Conflicts between incoming fire equipment and exiting residents should be expected during an evacuation of the community. The Forest Service maintains the Brush Peak Fuelbreak, which is accessible through Rosario Park Road or from Stagecoach Road just above Highway 154 and Stagecoach Road. This fuelbreak was significantly improved during the Whittier fire (2017) from the Winchester Gun Club to Stagecoach Road traversing behind Kinevan Ranch and Rosario Park.

West Camino Cielo and San Marcos Pass/Kinevan

The West Camino Cielo area covers over 476 acres of private property within the Los Padres National Forest boundary consisting of single-family homes on lots of varying sizes. It includes the Haney Tract, Tanbark Oaks, Windermere Ranch, and Winchester Gun Club. This community is located west of Highway 154 and is accessible by West Camino Cielo road near the San Marcos Pass summit. There are about 66 primarily residential structures and roughly the same number of outbuildings.

The San Marcos Pass/Kinevan community lies just to the north of West Camino Cielo and encompasses 290 acres of private property within the Los Padres National Forest boundary along the summit of San Marcos Pass. There are about 46 primarily residential structures and roughly the same number of outbuildings.

Construction standards within both communities vary. They range from wood siding, open vents, and unenclosed eaves to modern structures with stucco siding and clay tile roofs built under recent fire codes. Many residences have wooden decks and other wooden exposures.

Infrastructure within the communities include above ground telephone and powerlines, and propane gas tanks. Water tanks, hydrants, and swimming pools exist within both communities but the extent and amount of these water sources is unknown.

The road system includes West Camino Cielo/Forest Service Route 5N12, Kinevan Road, and Hidden Valley Road. These are County maintained roads that intersect with Highway 154 west of the San Marcos Pass summit. Many branches of the road system and driveways are unpaved. Much of this road system consists of extremely narrow winding roads that limit access for fire equipment and wooden bridges that do not support the weight of large fire equipment. Additionally, overhead vegetation limits the height of vehicles able to access the road system.

A range of fuel conditions exist, including grasses, oak woodlands, and moderate to heavy chaparral. Some areas within this community have adequate clearance; however, much of the area does not. Ornamental vegetation may be a contributing factor to potential structure losses in the communities.

Special considerations: The road system can hamper evacuation of residents. Road construction standards can limit access for fire equipment, especially off Highway 154. The West Camino Cielo Road/Forest Service Route 5N12 extends to the west along the Santa Ynez Mountains ridgeline; however, it may not be passable due to lack of maintenance. The potential evacuation of large domestic animals would be a concern during evacuations.

East Camino Cielo

The community of East Camino Cielo runs along the Santa Ynez ridgeline and Camino Cielo Road east of Highway 154 at the summit of San Marcos Pass. The community encompasses approximately 250 acres of mostly private property.

The community consists of approximately twenty homes and a Forest Service fire station on private and public lands within the Los Padres National Forest boundary. The majority of primary residences within the community are built to fire resistant standards with mostly stucco, concrete, or fire-resistant siding. All roofs are either slate, terra cotta tile, or other fire-resistant materials. Two homes have wooden decks with exposed wooden supports. One modular structure is located within the community. Fourteen structures are located on the north aspect of the ridgeline and five homes are on the southern aspect of the ridge.

East Camino Cielo Road is a single-lane paved road that extends east across the Santa Ynez Mountains ridgeline to Gibraltar Road and Romero Saddle where it then turns into unpaved roads. Individual driveways are narrow pavement and dirt with limited turnarounds for fire equipment.

Infrastructure within the community includes above ground telephone and powerlines, and propane gas tanks. Water sources include private water wells.

Fuel conditions are oak woodland, chaparral with some eucalyptus trees, and grassy open spaces. Ornamental vegetation may be an issue in some locations.

Special considerations: East Camino Cielo Road is the only paved maintained access/egress route for the community providing access to Gibraltar Road or Highway 154. Access by fire equipment to structures is limited due to narrow road width. Defensible space is adequate for most residences with some vegetation treatments extending out 300 feet.

Painted Cave

This community includes 71 tightly compacted single-family homes on small lots and 34 single-family homes scattered on larger lots or acreage. This community totals approximately 500 acres in size on private property within the Los Padres National Forest boundary. The community is located on the east side of Highway 154 south of the Santa Ynez Mountains ridgeline and has two points of access. The primary access is Painted Cave Road off Highway 154 south of the community with secondary access from East Camino Cielo Road to the north.

The age and fire resistance of structures varies widely in the community. Most structures within the community were built prior to 1990 under outdated building codes that includes wood siding, unenclosed eaves, and open vents. All homes except two have been hardened with fire resistant roofing material (metal, tile, or 'Class A') and some homes have fire resistant siding (e.g., stucco, cement board, or metal siding), and fire resistant porches and decks.

A survey of 57 homes in the Painted Cave community identified only one was built to current fire codes. Of the remaining 56 homes, 38 had wood siding, 11 had stucco or cement siding, and 7 had been hardened with hard board or similar flame-resistant siding materials. Roofs are typically Class A asphalt shingles, although age and state of repair vary. Nine homes had tile, metal or composite material roofs. Over half of the homes (31) had attached wooden decks, balconies, porch covers or other features with exposed wooden undersides that would be vulnerable to flames or convective heat. Forty-three of 56 older structures also had exposed wooden eaves. Approximately half of the homes had detached wooden garages, sheds or other accessory buildings in various states of repair. Vegetation clearance by homeowners was generally adequate.

Infrastructure within the community includes above ground telephone and powerlines, and propane gas tanks. One 160,000-gallon water tank with gravity flow serves homes, eleven 2.5-inch hydrants, and three 4-inch hydrants within the community. Laurel Springs Ranch has 22,000 gallons stored in tanks with several hydrants. Many property owners have small tanks (less than 5,000 gallon) connected to 1.5-inch and 2.5-inch hydrants.

The primary access to Painted Cave Road is a marginal two-lane road that passes through the community. On the south end of the community, the road is extremely narrow and winding, which is a potential barrier to incoming large fire equipment. Access is better from the north, but road standards can still act as a barrier for large fire equipment. The internal road system is extremely poor, consisting of single-lane paved or gravel roadways. Residences outside of the community boundary have steep grades that are gravel or paved, but have constructed turnarounds for larger fire apparatus.

A range of fuel conditions exist, including grasses, oak woodlands, riparian vegetation, and moderate to heavy chaparral. Ornamental vegetation, including non-native eucalyptus trees, can be a contributing factor to potential structure loss in this community. The community has implemented localized fuel treatments providing some buffer from the surrounding wildlands.

Special considerations: Painted Cave Road provides the only access/egress route for the community to Highway 154 or East Camino Cielo. Access by fire equipment is limited as this primary access due to the winding narrow road width and low hanging vegetation that impacts vertical clearance for some fire equipment.

San Marcos Trout Club

This community includes approximately 120 acres of private property within the Los Padres National Forest boundary and consists of approximately 38 single-family homes on lots of varying sizes. The entrance to this community intersects with Old San Marcos Pass Road, which can be accessed off Highway 154 at the upper end and Cathedral Oaks Road at the lower end. This community is high density with homes tightly packed together.

Structures within this community range from homes with wood siding, wood shingle roofs (1), open vents, and unenclosed eaves to modern structures with stucco siding and clay tile roofs built under recent fire codes. Many residences have wooden decks and other wooden exposures.

Infrastructure within the community includes above ground telephone and powerlines, and propane gas tanks. Two 50,000-gallon water tanks with gravity flow serve the homes, two fire hydrants, and sixteen 1½-inch wharf hydrants.

The road system is limited to the single-lane San Marcos Trout Club Road from Old San Marcos Pass Road. The road is narrow and loops through the community back on to itself.

A range of fuel conditions exist, including grasses, oak woodlands, and moderate to heavy chaparral. Ornamental vegetation is not commonly associated with this community. Fuel treatment work has been ongoing in this community and the residents maintain a 200-foot buffer around all homes in a 'park-like' setting.

Special considerations: The San Marcos Trout Club Road provides the only access/egress route for the community from Old San Marcos Road. The San Marcos Volunteer Fire Department has a fire engine located in the community.

Old San Marcos Road/Twinridge

The Old San Marcos Road community includes approximately 206 acres of private property within the Los Padres National Forest boundary and consists of 12 single-family homes on lots of varying sizes, averaging 10 to 40 acres. The community is built along the prominent ridgeline traversed by Old San Marcos Road, which can be accessed off Highway 154 at the upper end and Cathedral Oaks Road at the lower end. Most of the homes were built/rebuilt after the 1990 Painted Cave fire and conform to relatively modern high fire area building code.

Infrastructure within the community includes above ground telephone and powerlines, and propane gas tanks. Water systems are individual privately stored water of various capacities. Old San Marcos Road is narrow and winding, and receives a high amount of outside community use.

Fuels consist predominately of moderate to heavy chaparral. Fuel treatment work has been ongoing in this community primarily focused on individual defensible space and along Old San Marcos Road.

The small community of Twinridge located near the lower end of Old San Marcos Road includes approximately 74 acres located in the State Responsibility Area (outside the Los Padres National Forest boundary) and consists of 23 single-family homes on lots averaging one acre in size. The majority of homes are located along Twinridge Road accessed off Old San Marcos Road. About half of the homes in the community were built/rebuilt after the 1990 Painted Cave fire and conform to relatively current high fire area building code.

Infrastructure within the community includes above ground telephone and powerlines. The Goleta Water District provides the water system with several municipal pressurized hydrants located along Twinridge Road.

Fuels consist mainly of ornamental vegetation, annual grasses, and some pockets of medium to heavy chaparral.

San Marcos Pass Foothill Community

The San Marcos Pass Foothill Community covers approximately 2,024 acres of mostly private property that borders wildland open space. The community is located in the southern portion of the Planning Area west of Highway 154, north of Cathedral Oaks Road, and west of Patterson Avenue. There are approximately 761 single-family homes and 8 Homeowners Associations. The community includes two private preschools, a park (Tucker's Grove Park), a reservoir, substation, the Shadow Hills Retirement Community, four churches, and one synagogue. There are several large equestrian boarding/training centers located in the community. The northern end of the community is characterized by a prominent interface between suburban residential development and the wildland.

The residences range from tightly compacted subdivisions to scattered homes that are zoned 40-acre units. The majority of parcels are within the urban subdivisions of one unit or less per acre. The foothills are an area of high property values, with per square foot values among the highest in California. Homes vary in size from 1,500 to 2,500 square feet in older, established neighborhoods to newer 2,500 to 6,000 square feet homes. Newer homes, over 5,000 square feet, have automatic fire sprinklers installed, as this is a high fire hazard area within the County. This area suffered significant structure loss during the 1990 Painted Cave fire so residences within that area were rebuilt compliant to relatively current fire codes. Structures along San Marcos Road, Via Regina, and the west did not burn during the 1990 fire so may not meet current fire codes. Construction of approximately 45 new homes is underway in new subdivisions.

Infrastructure within the community includes above ground telephone and powerlines. The San Antonio Creek and Rancho San Antonio neighborhoods have underground utilities with the exception of San Antonio Creek Road itself. The water system is provided by Goleta Water District with municipal

pressurized fire hydrants throughout the subdivisions. The South Coast Conduit water pipeline, operated by the Cachuma Operations and Maintenance Board, runs directly across the San Marcos Foothill community and supplies water to Southern Santa Barbara County including, the Eastern Goleta Valley, and cities of Goleta and Santa Barbara.

The road system includes Highway 154 and Cathedral Oaks Road with paved ancillary road systems off of these major transportation routes. San Antonio Creek Road/ Via Los Santos are the only passable access to the largest foothill neighborhood connecting Old San Marcos Road to the south and Highway 154 to the north. A semi-rural residential road, San Antonio Creek Road, is characterized by narrow shoulders and lacks curbs or sidewalks. In 2018 the San Antonio Creek HOA completed developer-funded road improvements to upgrade a lower portion of San Antonio Creek Road. This section of roadway connects San Antonio Creek neighborhoods with Tucker's Grove Park and serves as a vital emergency evacuation route. The neighborhoods of Rancho San Antonio (Camino Del Rio) and the Shadow Hills areas (Via Chaparral) each only have one route of ingress and egress to Cathedral Oaks Road.

A range of fuel conditions exist, including grassland, agriculture, oak woodlands, and moderate to heavy chaparral. Ornamental vegetation is a significant factor in this community. Several large agricultural properties with permanent orchards provide portions of the community some significant separation from wildland fuels. The San Antonio Creek Open Space area bisects the community along both sides of San Antonio Creek and contains a mix of riparian, oak woodland, and chaparral. The public San Antonio Creek Trail runs the length of the open space area and is heavily utilized for outdoor recreation.

The San Marcos Foothills are especially vulnerable during Sundowner wind events given the community's location at the bottom of San Marcos Pass. The winds are naturally funneled by topography directly into the foothills, with gale force winds, high temperatures, and low relative humidity often reaching Red Flag Warning criteria.

Special considerations: Single-lane roads and driveways in some areas may hamper access for fire equipment and can set up potential conflict between responding fire equipment and residents evacuating during a wildfire. The ability to evacuate quickly and safely is a notable concern with limited primary and secondary access routes. Home Owner Associations within the community maintain a list of vulnerable populations, although this list may not be up to date. Large domestic animal evacuation will be a consideration in this community.

2.2 Values at Risk

The primary focus of a CWPP is to protect life safety, structures, and infrastructure; however, actions taken to protect those values, when applied carefully, can also enhance the protection of natural and cultural values that are also part of the communities.

Stakeholders identified the following values for the Planning Area:

- Life safety.
- Homes and neighborhoods.
- Critical infrastructure.

- Natural and cultural resources.
- Recreational amenities and facilities.

2.2.1 Life Safety

Life Safety Considers Both the Life and Physical Well-Being of Emergency Personnel and the Public

Historically, catastrophic wildfires in the Santa Barbara Front have destroyed numerous homes, triggered wildfire entrapments and burn-overs, and caused serious injuries and death. Stakeholders identified life safety as the highest priority for all wildfire hazard mitigation strategies and activities identified in this CWPP. Based on 2010 United States Census Bureau data, there are approximately 7,322 individuals living within the Planning Area.

For the public and first responders, there are numerous life safety issues to consider during a wildfire, including:

- Should the public be evacuated?
- How quickly, and when?
- What are the safest routes for evacuation in an extremely fluid situation?
- Who are the vulnerable populations and where are they located?
- How should vulnerable populations be evacuated and where should they be taken?
- Is there adequate access and egress for both emergency personnel/equipment and the public?
- Are there adequate safety zones or structures that can serve as safe refuge?
- Is the "urban" fuel source creating more intense fire behavior?
- Can firefighters safely engage in wildfire protection activities?

The Planning Area has experienced multiple wildfire evacuation orders including the 2017 Whittier fire, 2016 Rey fire, 2009 Jesusita fire, 2008 Tea and Gap fires, 2007 Zaca fire, and the 1990 Painted Cave fire. During these extremely fast-moving wildfires, first responders must often make decisions to evacuate residents very quickly with little to no notice.

Unfortunately, oftentimes during wildfires, individuals choose not to evacuate immediately and choose to stay to defend their homes. Injuries and fatalities often occur in Wildland Urban Interface fires when residents stay to protect their homes and/or evacuate their homes too late. Their decision not to evacuate or to delay evacuation puts their lives and the lives of first responders at risk, and can hamper overall emergency operations. Most individuals that died during the 2003 Cedar and Paradise fires in San Diego County did so while in the process of evacuating at the last minute. In every instance but one, those who died while evacuating were leaving homes that eventually were destroyed by the fires (Mutch 2007).

The Santa Barbara Front has experienced a number of high intensity, rapidly spreading wildfires in the past where fire conditions made it unsafe and/or impossible for property owners to stay and defend their property. Sheltering in place or staying to defend one's home requires careful planning and preparation. Australia pioneered the "*Stay and Defend or Leave Early*" (SDLE), which asks Australians to decide well before a fire occurs to leave or stay and actively defend their property with the understanding that they may not have the support of professional firefighters. This policy was considered a success until February

7, 2009, a day that now is referred to as "Black Saturday" when massive wildfires destroyed more than 2,000 homes and killed 173 people. Of those killed, 113 were found in or near homes that were destroyed by fire. This suggested to researchers that staying and defending could be more dangerous than previously thought. Since that time, Australia has implemented a new program called "Prepare, Act, Survive", which acknowledges that under some fire conditions it may not be possible to protect homes and everyone should leave.

Whether individuals should stay or go depends on many factors*, including:

- Are structures hardened and have adequate defensible space (for the structure or as a safety zone for themselves), including other structures within 100 feet of the other?
- Do individuals have adequate training and equipment to safely and effectively fight fire?
- Are individuals physically fit enough to fight fire in and around a home for long periods of time?
- Are individuals and/or their family able to cope with intense smoke or heat and the stress of firefighting?
- Can individuals balance protecting a home while also caring for family members and pets?

**Adapted from "Sheltering in Place – Rancho Santa Fe Fire Protection District", www.rsf-fire.org*

In June 2017, a wildfire in Portugal resulted in the deaths of 64 individuals and over 150 injuries. Out of the 64 individuals that were killed by the fire, 47 died on a road. Thirty of these individuals burned to death in their cars, trapped by the flames, while others died after abandoning their vehicles. Fuel types in areas where fatalities occurred may have had a large component of eucalyptus trees. Paulo Fernandes, a professor in the forest science department of a Portuguese university, addressed concerns regarding eucalyptus as the sole fuel problem. "It's a popular perception," he said, "But it's quite exaggerated because when we analyze fire data versus land cover data, we really don't find fire has a preference for eucalyptus forests. It's true it's quite flammable, but pine forests are quite flammable and shrubland is highly flammable." (Jones 2017). Members of the Development Team expressed concern about the presence of eucalyptus within the Planning Area.

Throughout the year, but most often during the summer months and weekends, substantial numbers of visitors seek recreational opportunities (e.g., Cold Springs Tavern, San Marcos Christian Camp, Rancho Oso, Santa Ynez Recreation Area, Winchester Gun Club, Windermere Ranch, Laurel Springs Ranch) within the Planning Area. Evacuation can especially be difficult when emergency responders don't know how many people are in an area and where they may be located. Additionally, these individuals are likely unaware of evacuation procedures and may be out of communication due to lack of cellular phone service.

Individuals of special concern during an evacuation are those that the Federal Emergency Management Administration (FEMA) and the Centers for Disease Control (CDC) define as people with special needs. These include individuals with permanent or temporary disabilities, mobility-impaired, children, the elderly, people with serious mental illness, people without vehicles or transportation, people with specific dietary needs, those with limited or no English proficiency, and pregnant women (Kailes 2008).

There is much to consider for individuals with special needs, such as transportation, communication, medical treatment and medications, and temporary or long-term shelters. An example is the evacuation of someone suffering from dementia who is homebound and bedridden. (S)he may require several resources, including a paramedic, caretaker, ambulance, oxygen support, and a facility ready to receive the patient. Other examples of challenges during wildfire evacuation include: those individuals who don't speak English; elderly individuals who may respond more slowly to a crisis and not fully understand the extent of the emergency; and, individuals with hearing loss who may appear disoriented and confused when all that is wrong is that they are unable to understand verbal instructions provided by emergency services personnel. Special needs populations are often less likely to respond to, cope with, and recover from a wildfire, and are less likely to get involved in wildfire mitigation activities (Ojerio 2008). Currently, it is unknown how many special needs or vulnerable individuals live within the Planning Area.

An approaching wildfire is a dynamic event and subject to sudden changes that can be very difficult for firefighters to anticipate. The public, both socially and politically, expect protection by firefighters from human-caused and natural disasters. While no reasonable person expects a firefighter to die or suffer serious injury protecting their property, there is an expectation that firefighters will put themselves in harm's way in an attempt to protect them and their property. Fire in the WUI, such as the Santa Barbara Front, adds challenges to routine fire operations, as firefighters often perceive neighbors, friends, and their local communities to be in peril. An agency mission and the value of homes can place undue psychological pressures on firefighters, which can potentially lead to unfounded risk taking.

The scenario where firefighters are protecting life safety and structures while a wildfire rapidly spreads downslope from the Santa Ynez Mountains is all too common for local residents. As Sundowner winds push wildfires down slope, they also push large amounts of radiant and convective heat ahead of them. This affects the ability of fire firefighters to establish viable safe operational space from which to safely engage in structure protection activities. Fast moving wildfires, such as the Painted Cave, Romero, and Coyote fires, demonstrate the speed of a wildfire and the potential threat to life safety in the Santa Barbara Front County. The Painted Cave fire killed one resident while four firefighter fatalities occurred on the Romero fire and one firefighter fatality occurred on the Coyote fire.

Pets and large domestic animals are another vulnerable population to consider during a wildfire evacuation. The life safety of these animals is often compromised due to poor pre-evacuation planning by their human caretakers. Animals can become frightened during wildfire and are often more difficult to handle, thereby increasing the time it takes to evacuate them. People will often risk their lives and the lives of others to save their pets and animals.

2.2.2 Structures

According to the National Interagency Fire Center (NIFC), nationally, 2,598 structures are lost annually to wildfire with more than half of these losses being primary residences (NICC 2017). The National Fire Protection Agency (NFPA) reports that 4,312 structures nationally were destroyed by wildfires in 2016, including more than 3,000 homes and 70 commercial buildings. In 2016, California lost 754 residences

and 12 commercial structures to wildfires (NFPA 2017). The record breaking 2017 fire season resulted in 10,823 structures destroyed and 1,238 damaged in California alone (Cal Fire 2018).

WUI fire disasters typically do not occur under 90th percentile weather conditions when local fire protection resources have a greater probability of containing a wildfire. WUI fire disasters are most commonly associated with extreme fire behavior conditions that account for the one to three percent of the wildfires that escape control by initial attack resources (JP Menakis et al. 2003). There's a misconception by many that large high intensity fires are the cause of structure damage or loss. That is not always the case. Low intensity fires can destroy structures that are highly ignitable while structures with low ignitibility can survive high intensity fires.

Research has shown repeatedly that the main reason for structure loss during a wildfire is the ignitability of a structure itself with burning embers acting as the primary source of structure ignitions in the WUI (Cohen 2000). Burning embers can directly ignite components of vulnerable structures and/or ignite nearby vegetation and other combustibles that ignite adjacent structures, whether the physical structure has been hardened or not (Quarles 2012). Additionally, flammable attachments in close proximity to a structure, such as wood decks and wood fences, can act as a wick drawing fire directly to a structure. Structure losses from wildfires can also occur in neighborhoods built under existing fire-resistant building codes (Rahn 2009); however, building codes have reduced the loss and damage to residential structures.

A study of the 2007 fires in San Diego County indicated that 13 percent of the homes within the fire perimeters were destroyed. Those homes built under building codes enacted in 2001 had a loss rate of four percent, while homes built under codes modified in 2004 had a loss rate of only two percent (Rahn 2009). High-density housing developments can create conditions where wildfires move from structure to structure as a primary form of fire spread once a wildland fire enters a community (Maranghides et al. 2013). Structure-to-structure spread has been a driver of home loss in a number of fires (Mell et al. 2010).

The risk of structure ignition is a direct result of construction material and maintenance practices, and the exposure of the structure from radiant and convective heat or ember cast. Structures ignite through three methods of heat transfer:

- Convection: This consists of the transfer of heat by the movement of rising hot air or gasses. Convective heat tends to rise, visually observed as flames and smoke columns. Convection lifts firebrands into the sky. However, convective heat can also be influenced by wind, topography and extreme fire behavior. Steep slopes, chutes, gullies, and saddles can channel and concentrate convective heat. Flames can overwhelm a structure by direct flame impingement, which could be a result of inadequate spacing of structures, lack of defensible space, and/or extreme fire behavior.
- Radiation: Heat energy is released in all directions from a burning object. Flammable structural elements exposed to radiant heat can reach their ignition temperature causing these elements to ignite. Nearby burning structures can ignite adjacent structures with the potential for structure-to-structure fire spread. This potential is greatly reduced as space between structures and fuel is increased.

- Burning Embers (also known as firebrands): Burning embers include flammable materials (i.e., wood shingles, tree bark, leaves) that detach from the main fire front. These burning embers can be carried by strong convection and winds to receptive fuels below or downwind causing spot fires. Wildfires can produce hundreds to thousands of burning embers that can be carried long distances by winds. Burning embers may also enter vulnerable structures through vents, open windows or doors, or other means, and ignite the structure from within.

Figure 4 depicts heat transfer in the WUI.

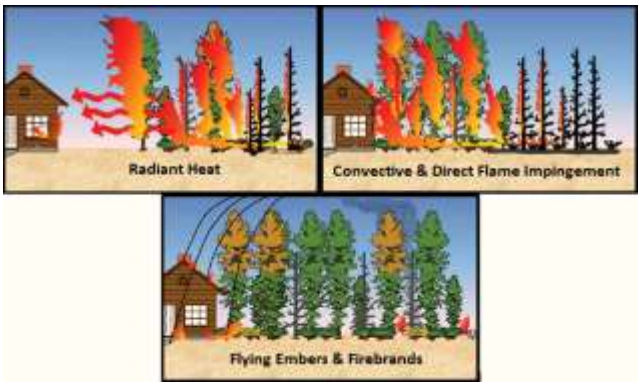


Figure 4. Heat Transfer in the WUI

A WUI fire creates a scenario where wildland and structural firefighters must utilize very different skillsets with specialized fire suppression strategies and tactics. Wildland firefighters may be faced with protecting a structure or entire neighborhoods in the path of a large fire and structural firefighters may be faced with flammable vegetation and other factors before the fire arrives in the neighborhood. Both situations may be unfamiliar roles for these firefighters.

As firefighters arrive at the scene of a WUI fire, they perform "*structure triage*" to determine whether they can safely engage in structure protection activities. Structure triage is a dynamic process and any change in the fire environment can quickly alter the defensibility of a given structure. As an example, a change in fire behavior or weather conditions may jeopardize a firefighter's life safety so they must disengage from structure protection activities.

Structure Triage
The process of inspecting and classifying structures according to whether their defendable or not, whether risks to firefighters' life safety can be mitigated, and continual assessment of changes in the fire environment that may dictate a need to disengage.

WUI fires have the potential to spread firefighting resources thin quickly and not every structure will have the benefit of fire equipment pre-positioned in their driveway. In a rapidly developing fire, firefighting capacity is often out paced by fire spread. The ability of a structure to withstand the passage of the fire may be related to the quality of the defensible space and structure hardening work completed by the homeowners long before the fire started.

The Santa Barbara Front has experienced significant structures losses during wildfires, many within the Planning Area. The 1990 Painted Cave fire was the first WUI fire studied by researchers to determine the cause of structure loss. Jack Cohen, a Forest Service researcher who studied the Painted Cave fire, determined that whether a structure is damaged or destroyed depends primarily on exterior construction material, a structure's design, housing density, placement relative to nearby homes, geographic location, and whether the home has adequate defensible space (Cohen 2000).

The potential for wildfires to threaten communities within the Planning Area can occur any time of the year with the greatest likelihood for catastrophic wildfires occurring in the summer and late fall. Those who live in the WUI must recognize the reality of the wildfire threat into which they have put themselves, and the fact that action taken as individual property owners can greatly influence the survivability of their home and the community as a whole. With 1,121 structures within the Planning Area, there are simply not enough firefighters, fire equipment, or firefighting aircraft to protect every structure in a community; structures should be able to stand on their own. Figure 5 depicts structures within the Planning Area.

2.2.3 Critical Infrastructure and Economic Impacts

Wildfires can damage or destroy critical infrastructure, such as utility lines, transportation systems, communication facilities, and water supply facilities. The repair, restoration, or replacement of infrastructure can sometimes take days, weeks, or months following a wildfire and cost thousands or millions of dollars. While significant economic losses may occur, typically the cost and impacts associated with a wildfire are only reported by the number of acres burned and the number of structures damaged or lost. A 2010 report by the Western Forestry Coalition Leadership Organization found that wildfire suppression costs are only a fraction of the true costs associated with a wildfire event. The report reveals that total wildfire costs can range from two to 30 times greater than the reported suppression costs (Dale 2010).

The total economic impact of the 2003 wildfires in San Diego County was estimated at $2,450,016,476 that equates to a cost of over $6,500 per acre burned. The total suppression costs of those wildfires amounted to less than two percent of the entire economic impact. Additionally, during these wildfires, significant losses occurred to the area's infrastructure. The total impact on infrastructure was estimated at $147.3 million and included a loss of 3,200 utility power poles, 400 miles of wire, 400 transformers, and damage to 100 other related utility equipment (Rahn 2009).

In 2016, the NFPA still identifies the 1990 Painted Cave fire as the tenth most costly wildfire in United States history, in terms of losses due to wildfire. The estimated losses in 1990 were $237 million with the adjusted cost in 2015 dollars of $430 million (NFPA 2016).

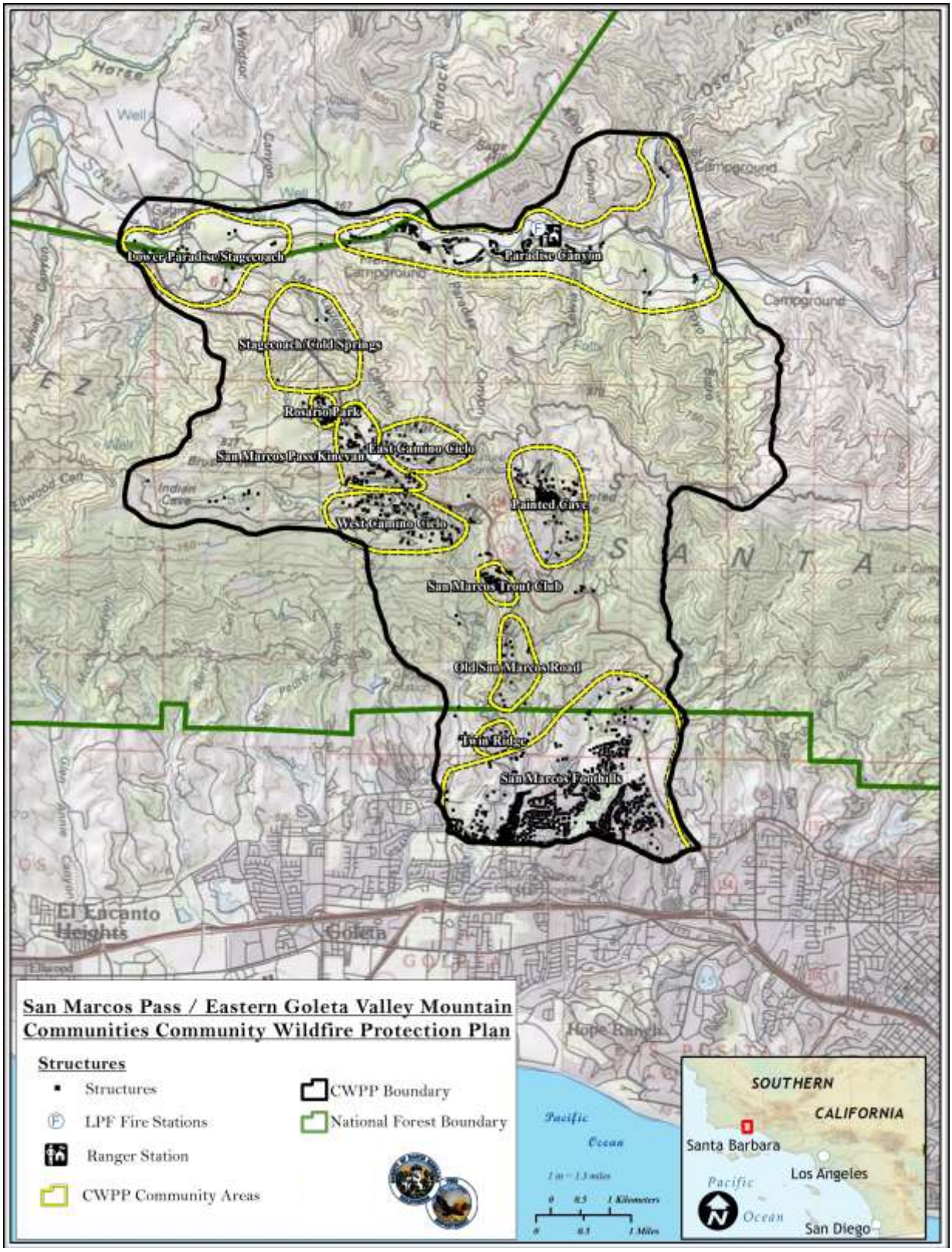


Figure 5. Map of Structures within the Planning Area

The 2004 Gaviota fire disrupted freight and passenger railroad traffic for several days because of fire damage to a wooden railroad trestle that resulted in economic losses cascading well beyond the cost to replace the trestle. During the 2008 Gap fire, a critical electrical transmission facility was compromised resulting in loss of electrical power to thousands of customers in the Santa Barbara area (Wildland Urban Interface Fire Colloquium). The effects of a wildfire on infrastructure can be both short and long-term to the communities in the Planning Area (Figure 6 depicts the location of main infrastructure and Table 2 lists infrastructure within the Planning Area).

Impacts to infrastructure can include:

- Compromised access to and from communities due to road damage or loss of bridges.
- Limited communication by hard line, cellular phones, radio, and internet.
- Disruption of utility services, such as water, electricity, sewer/septic, and gas.
- Contamination of water supplies by ash and/or debris from a wildfire.

Infrastructure within the Planning Area includes waterlines, transmission lines, bridges, churches/synagogues, communication structures, schools and day care centers, fire stations, Forest Service facilities, pump stations, utility substations, and water supplies.

Table 2 Infrastructure within the Planning Area

Infrastructure Type	Number
Water Line	1.56 miles
Transmission Line	17.45 miles
Abutment - Bridge	2
Churches/Synagogues	5
Communication Structures	22
Day Care Centers - HSIP	3
Fire Station	3
Forest Service Facility	1
Pump Station	4
Schools/Preschools	3
Substation	1
Tanks/Tower - Large	1
Water Supply	1

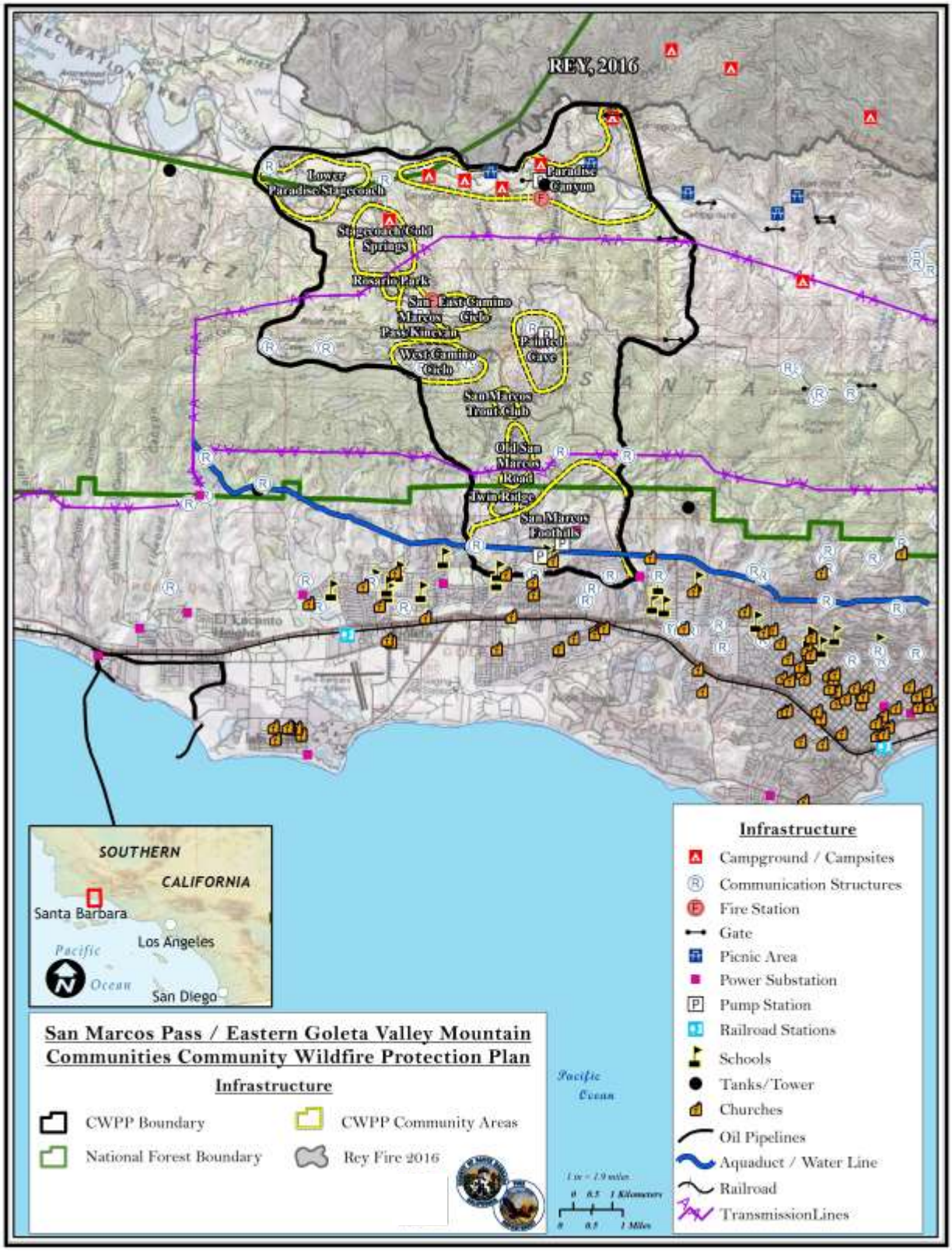


Figure 6. Map of Primary Infrastructures within the Planning Area

2.2.4 Recreation Amenities

The impacts of wildfires to recreational amenities include the loss of recreation facilities (e.g., picnic tables, toilet structures), degradation of scenic values, loss of trail systems, and loss of wildlife viewing experiences. The cost to restore or replace these amenities can run into thousands of dollars and take years to recover back to their original state.

A study on wildfire's impacts to recreation suggests that there are substantial direct impacts from fire on outdoor recreation and substantial risks to recreation opportunities in the future (Chavez et al. 2004). Closures to recreational amenities occur because of wildfire activity, while post fire resource damage can limit and/or eliminate recreational opportunities. Table 3 is a list of recreation facilities within the Planning Area.

Table 3 Recreation Facilities in the Planning Area

Recreation Amenities	Ownership
Painted Cave State Park	State of California
Tuckers Grove County Park	Santa Barbara County
San Antonio Creek Open Space	Santa Barbara County
Fremont Campground	Forest Service
Los Prietos Campground	Forest Service
Middle Santa Ynez Campground	Forest Service
Paradise Campground	Forest Service
Upper Oso Campground	Forest Service
Fremont Campground	Forest Service
Los Prietos Campground	Forest Service
Sage Hill Campground	Forest Service
First Crossing Day Use Area	Forest Service
White Rock Day Use Picnic Area	Forest Service
Winchester Gun Club	Privately Owned
Rancho Oso	Privately Owned
San Marcos Christian Camp	Privately Owned

Trail systems associated with the Planning Area provide a popular form of recreation for hikers, backpackers, horseback riders, and mountain bikers. These trails range in length from 0.8 miles (Knapp's Castle Trail) to trails extending beyond the project area, the longest more than 18 miles into the San Rafael Wilderness. Additionally, prior to extensive damage caused by the Rey Fire, off-road vehicle enthusiasts enjoyed the Camuesa Off-Highway Vehicle route that loops through 10 miles of the

surrounding forest that is partially located within the Planning Area. Table 4 lists trail systems in the Planning Area.

Table 4 List of Trails and Trailheads within the Planning Area

Trails and Trailheads
San Antonio Creek Trail
Lizard's Mouth Trail
Knapp's Castle Trail
Aliso Trailhead Trail
Arroyo Burro Trail
Snyder Trail
Upper Oso Trail - Santa Cruz Trailhead
Camuesa OHV Route
Fremont Trail

Historically, these trail systems have had long-term closures following wildfires. As of May 2017, the Santa Cruz trail from Upper Oso to Little Pine is still closed due to damage caused by the 2016 Rey fire.

2.2.5 Cultural and Natural Resources

Cultural Resources

Cultural resources can include collective evidence of past human activities and accomplishments, including buildings, objects, features, locations, and structures with scientific, historic, and cultural value.

The Planning Area includes several cultural resources including Painted Cave, Cold Spring Tavern, San Jose Winery, Cathedral Oaks Schoolhouse, Rancho San Marcos (now the golf course), Maria Ygnacia Ranch, San Marcos Barn and Spring House, and Deere Lodge. Archaeological sites across the Planning Area also include a variety of prehistoric stone tools and occupation sites. Specific cultural resource information and locations are not fully available to the public in order to help protect sites from looting and degradation. Figure 7 displays the publicly available known historic site locations within the Planning Area.

Fire protection planning should include awareness and understanding of the inherent risks that wildfire poses to these values. While these sites have likely experienced wildfires in the past, protection of these sites during fire suppression and hazard mitigation activities is mandated under the National Historic Preservation Act.

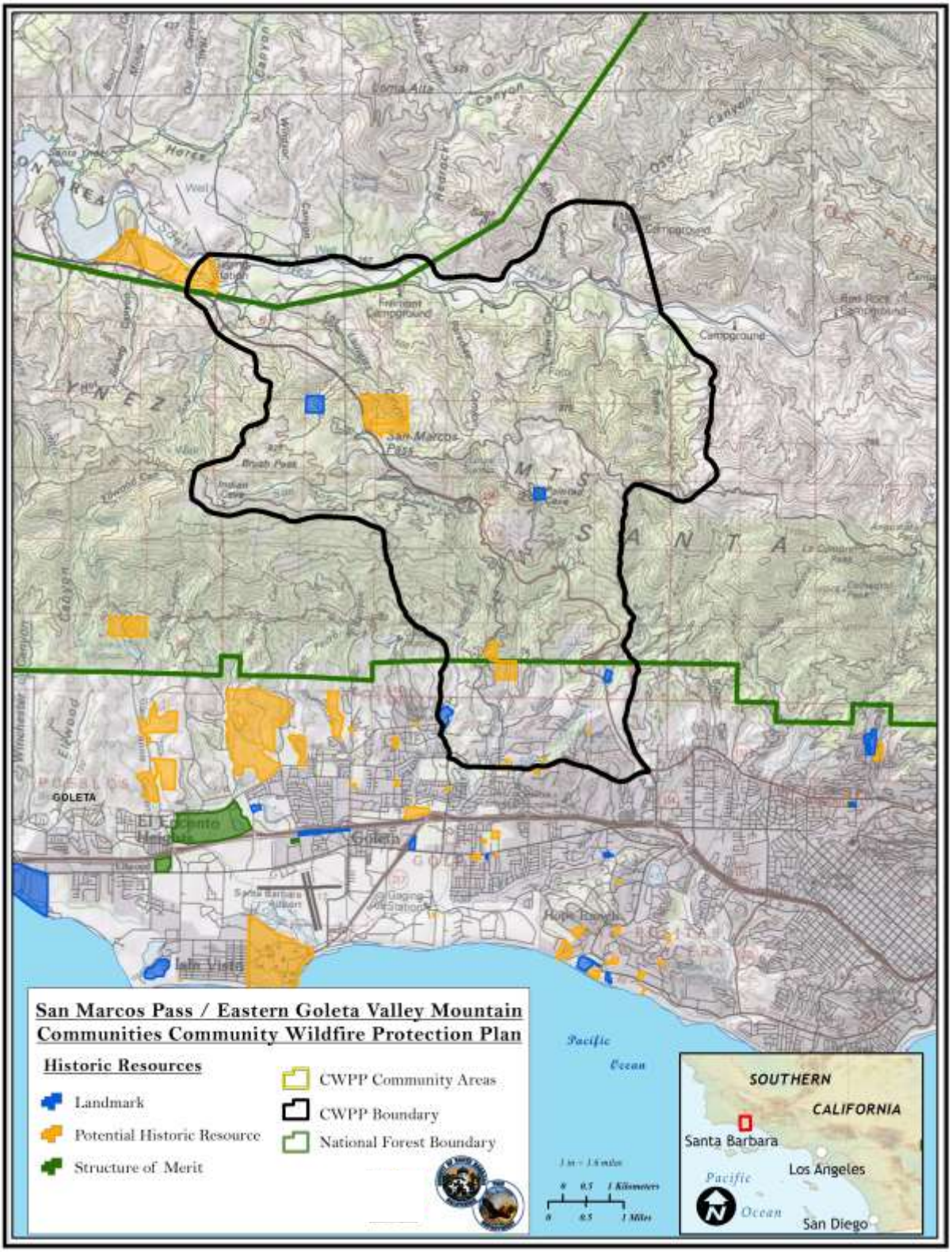


Figure 7. Historic Resources Map (only publicly available data displayed)

Natural Resources

The Planning Area contains many unique natural resources, including animal and plant species, and unique habitat that are subject to protection by county, state, and federal agencies. All species require a particular set of environmental conditions to flourish in the wildlands. Species within the Planning Area have had their habitat negatively affected by urban growth and an increase in fire frequency over the past several decades. Federal, state, and local policies are in place to assure the protection of specific species and habitats; and must be considered when taking action that may have an effect on these natural resources.

Protected Species Habitat

Figure 8 displays the areas currently identified as having threatened species, endangered species, critical habitat, and other specially designated natural resource areas. Areas that qualify as Environmentally Sensitive Habitat (ESH) or Riparian Corridors (RC) for purposes of the EGVCP have been mapped by the County and are subject to special protection policies established in the EGVCP and LUDC. (Figure 2 displays the Eastern Goleta Planning Area in relationship to the CWPP Planning Area.) These areas include:

- Riparian woodlands and riparian corridors (including but not limited to willow, riparian mixed hardwood, California sycamore, and riparian mixed shrub alliances).
- Monarch butterfly roosts.
- Sensitive native flora.
- Coastal sage scrub (including but not limited to California sagebrush and soft scrub – mixed chaparral alliances).
- Chaparral (e.g., chamise chaparral, lower montane mixed chaparral, ceanothus chaparral, soft scrub – mixed chaparral alliances) where it supports rare or vulnerable native vegetation alliances and/or sensitive native plant and/or animal species.
- Oak woodlands (including but not limited to coast live oak and coastal mixed hardwood alliances).
- Vernal pools.
- Native grasslands (including but not limited to perennial grasses and forbs alliance).
- Raptor/turkey vulture roosts.
- Critical wildlife habitat.
- Wildlife corridors.

Table 5 identifies the total acres of ESH within the Planning Area.

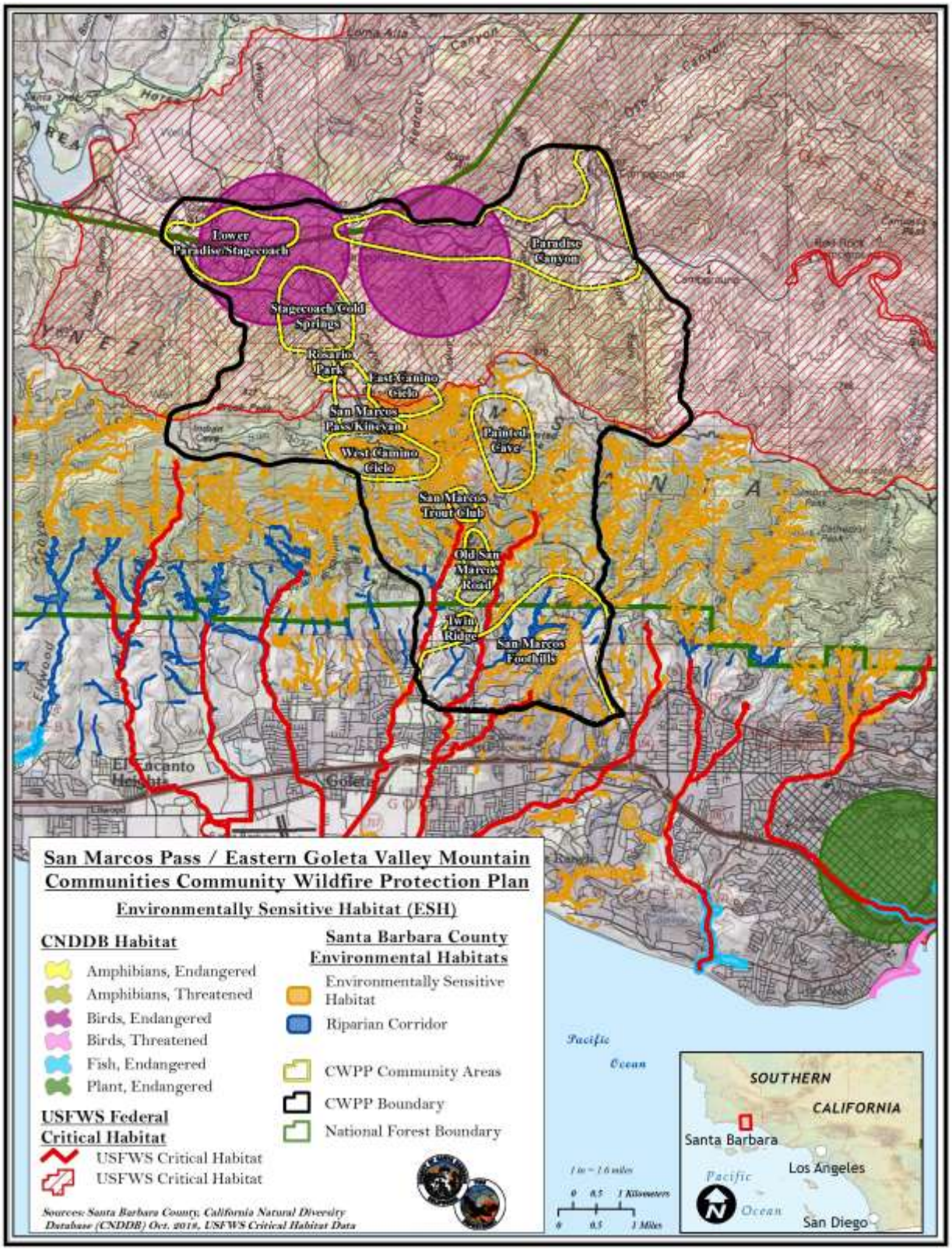


Figure 8. Environmentally Sensitive Habitat within the Planning Area

Table 5 Total Acres of ESHs and Riparian Corridors within the Planning Area

Santa Barbara County	Acres
ESH	1,400
Riparian Corridors	135
TOTAL	**1,535**

California Department of Fish and Wildlife (CDFW) Database

CDFW's California Natural Diversity Database (CNDDB) inventories the status and locations of rare plants and animals in California. The CNDDB provides location and natural history information on special status plants, animals, and natural communities to the public, other agencies, and conservation organizations. The data helps agencies make conservation decisions, aids in the environmental review, and provides baseline data helpful in endangered species recovery efforts. The goal of the CNDDB is to provide the most current information available on the State's most imperiled elements of natural diversity and to provide tools to analyze these data. Table 6 identifies CDFW's listed species and number of acres of their habitat in the Planning Area.

Table 6 CDFW Listed Species and Habitat within the Planning Area based on CNDDB

CNDDB				
***CDFW Listed* Species**	**Endangered**	**None***	**Threatened**	**Acres**
California red-legged frog			5	5
least Bell's vireo	3,404			3,404
Santa Ynez false lupine		280		280
tricolored blackbird		450		450
TOTAL	**3,404**	**730**	**5**	**4,139**

** Not federally listed*

Federal Critical Habitat

A federally identified critical habitat contains features essential to the conservation of an endangered or threatened species. Critical habitats may require special management and protection, but designation as a critical habitat does not necessarily restrict further development. Designated critical habitat serves as a reminder to federal agencies that they must make special efforts to protect the important characteristics of these areas. Within the CWPP Planning Area, Steelhead habitat is designated critical and encompasses approximately 6.74 miles of streams.

Watershed

Two primary watersheds, the Santa Ynez River and the Santa Barbara Coastal, fall within the Planning Area. A healthy watershed includes vegetation and healthy soils that typically prevent erosion by slowing surface water flow, increasing infiltration, and reducing precipitation impact on the surface of the soil. A healthy watershed is important to flora and fauna and clean water for our local communities. Burned slopes have little to no vegetation that leaves soils unprotected, thereby increasing the risk of flooding, sedimentation, and debris flows during winter rains. Sediment accumulation may intensify flooding by decreasing waterway capacity (Abramson et al. 2009). Sedimentation can significantly reduce critical water storage capacity in Cachuma, Gibraltar, and Jameson reservoirs that the communities in the Santa Barbara South Coast depend on for drinking water.

In January 2017, an evacuation warning was issued by the Santa Barbara County Sheriff's Office for areas burned in the 2016 Sherpa fire. It included areas in and around El Capitan Canyon, El Capitan Ranch, El Capitan State Beach, Refugio State Beach, Refugio Canyon, Canada Venadito Canyon, Canada Del Coral, and Las Flores Canyon. A debris flow from the fire burn scar dammed up water and caused flooding at a downstream campground. Seven cabins were lifted off their foundations, fifteen vehicles were swept away, and over two dozen people had to be rescued (*http://santamariatimes.com/news/local/major-flooding-in-el-capitan-canyon-causes-evacuations-closures/article_5375a4a8-751e-54aa-92e9-d02bd39d94f3.html*, accessed September 2017). As recently as September 2017, a flood advisory was issued for the 2016 Sherpa and 2017 Whittier burn areas due to widespread rain potentially causing debris flows. On January 9, 2018 a short duration but extremely high intensity rainfall event occurred in the Thomas Fire burn scar behind the communities of Montecito and Carpinteria (*https://en.wikipedia.org/wiki/2018_Southern_California_mudflows*). This triggered a catastrophic debris flow which destroyed 65 residences, damaged another 462 structures, and caused 23 fatalities and 163 injuries. Damages were estimated in excess of $177 million and cost $7 million in emergency responses and another $43 million to clean up.

Burned vegetation and scorched soil pose a significant threat to communities within and downslope of the Planning Area through erosion. These areas, especially after multiple fire events, can be extremely vulnerable to erosion and slides. A 2009 study of a severely burned area in the Sycamore Canyon Basin within the Tea fire burned area, found that all the areas that previously experienced moderate erosion were more vulnerable to sediment loss. These areas of moderate past erosion have nearly doubled their sediment load, while areas with past low sediment loss remained somewhat stable in terms of their total soil lost. This level of soil stability is likely due to these regions having little to no slope or underlying bedrock outcroppings that protect the areas from major increases in erosion rates. It is estimate that post-fire soil loss in Sycamore Canyon watershed is over five times that of the pre-fire watershed. The increased erosion rates have the potential to washout roads, remove valuable topsoil, undercut roads and remaining structures, and deliver excess sediment loads to the stream channels and ocean (Carlson 2009).

2.3 Land Use and Zoning

The Planning Area includes unincorporated portions of Santa Barbara County, federal lands administered by the Los Padres National Forest, and a small portion of California Department of Parks and Recreation land (State Parks) directly adjacent to Painted Cave Road. Each of these jurisdictional authorities have specific land use requirements addressed in agency specific planning documents. Documents that address land use requirements for the unincorporated portions of Santa Barbara County within the Planning Area include the *Santa Barbara County Comprehensive Plan* and the EGVCP. Land use requirements for federal lands are addressed in the *Forest Plan for the Four Southern California National Forest*s (Forest Plan) with Part 2 of the Forest Plan providing specific direction for the Los Padres National Forest. Management of the eight-acre Chumash Painted Cave State Historic Park falls under the auspices of the State Parks. The EGVCP is applicable to County and private lands within the CWPP Planning Area north of Cathedral Oaks Road and south of Camino Cielo Road (See Figure 2). The Planning Area boundary on the east and west follow of the east and west boundary the EGVCP.

2.4 Fire Protection

SBC Fire and the Forest Service are the two agencies with primary wildland fire suppression responsibilities within the Planning Area.

Santa Barbara County is one of six "contract counties" (i.e., Santa Barbara, Ventura, Los Angeles, Orange, Kern, Marin) that has executed a contract with the State of California to provide wildland fire protection on state responsibility areas.

Wildland fire protection in California is the combined responsibility of local, state, and federal governments. Fire protection responsibility areas represent areas of jurisdictional authority for fire protection, including local, state, and federal governments (See Figure 9, Direct Protection Area Map). The Planning Area includes the following fire protection responsibility areas:

- Local Responsibility Areas (LRA) - These areas are private lands outside of State designated watershed areas or lands within incorporated city boundaries. City fire departments, fire protection districts, counties, and CAL FIRE under contract to local governments typically provide fire protection for these areas.
- State Responsibility Areas (SRA) - SRA are areas of the state where the State of California is financially responsible for the prevention and suppression of wildfires. SRA does not include lands within incorporated city boundaries, fire protection districts, or federal lands.
- Federal Responsibility Areas (FRA) - The primary responsibility for wildfires suppression and prevention on federal lands is carried out by the Forest Service, Bureau of Land Management, National Park Service, Fish and Wildlife Service, Bureau of Indian Affairs, and Defense Department for military lands.

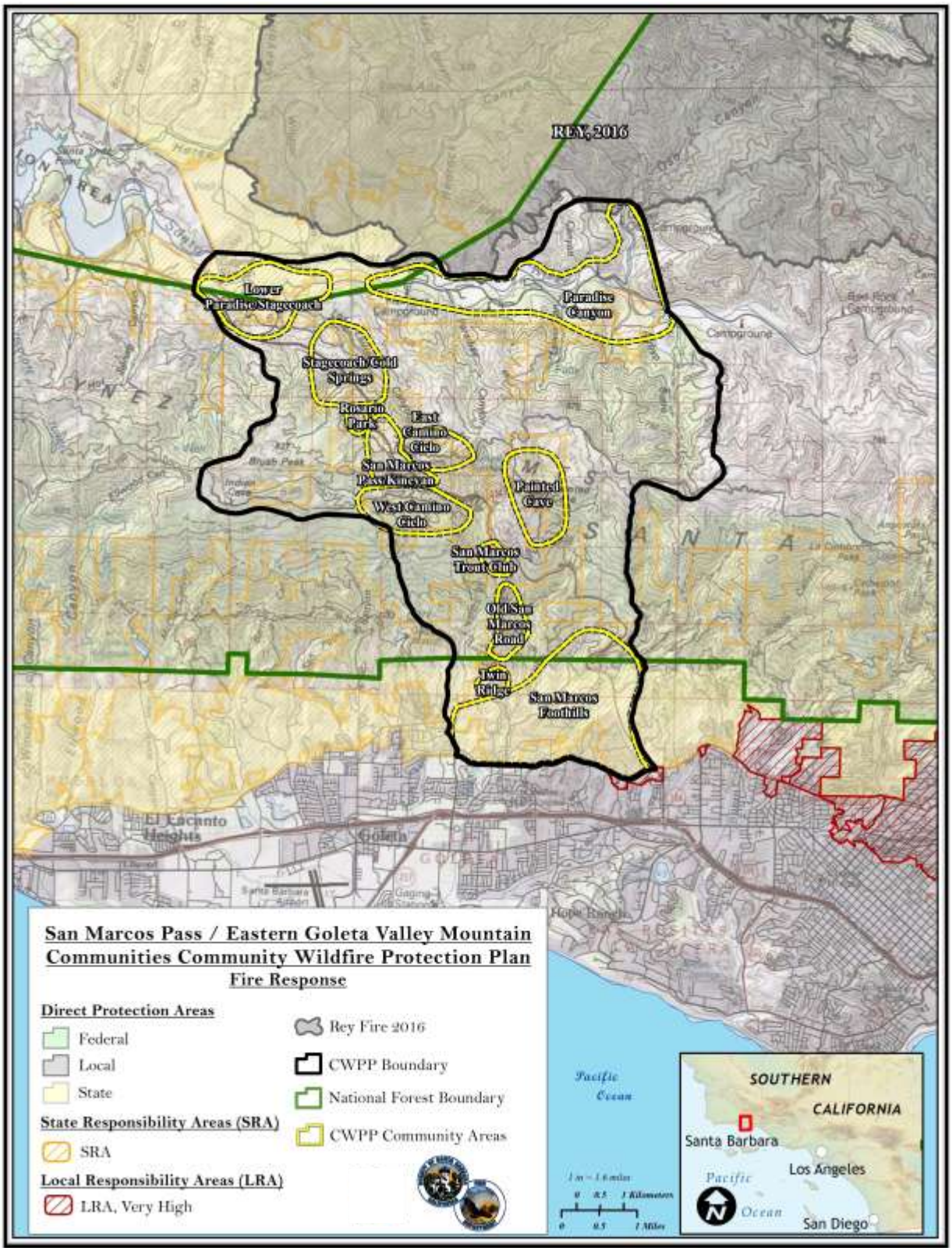


Figure 9. Direct Protection Area Map

2.4.1 Direct Protection Area

Direct Protection Areas (DPA) are those locations where a particular fire protection organization has the primary responsibility for attacking an uncontrolled fire and for directing the suppression actions. Such responsibility may develop through law, contract, or personal interest of the firefighting agent (e.g., a lumber operator).

SBC Fire has responsibility for the prevention, protection, and mitigation of all emergency incidents including wildlands within its Fire District with the exception of fire suppression of wildland incidents within the Los Padres National Forest administrative boundary. On SRA lands inside the Los Padres National Forest boundary, SBC Fire still has wildfire prevention responsibility, including fuels management, as those lands are private or state and fall under state policies (e.g., CEQA). The California Cooperative Wildland Fire Management and Stafford Act Response Agreement states that the Forest Service has DPA for wildfire suppression on those state and private SRA lands inside the forest boundary. Structures and lands protected under responsibility by SBC Fire are intermingled or adjacent to lands protected by the Forest Service (See Figure 9, Direct Protection Area Map).

2.5 SBC Fire Organization

SBC Fire is under contract with CAL FIRE to provide wildland fire protection on all SRA lands in the county. As such, SBC Fire is considered a CAL FIRE Ranger Unit in regards to wildfire prevention, protection, and suppression in the county. SBC Fire has a fire organization typical of a structural fire department, but differs in that it includes a Vegetation Management Section and an Air and Wildland Battalion. SBC Fire's Vegetation Management Section manages hazardous fuel treatment projects on minor roads identified as wildland hazards due to location and fuel type.

The SBC Fire's hand crew and construction section (e.g., dozers, heavy equipment) are the primary resources used to complete these recurring projects and are integral to the success in suppressing wildfires in the County.

The Air and Wildland Battalion of the Operations Division includes the hand crew. While the crew's primary mission is fire suppression, their duties also include:

- Implements vegetation management projects in LRA and SRA lands.
- Collaboratively works with other County departments to reduce hazardous fuels on County-owned properties.
- Works on parks, trails, communication facilities, and open space parcels.
- Creates defensible space around County buildings.
- Removes hazard trees.
- Works with the Construction Section to maintain accessibility of unimproved roads throughout the County for firefighting resources.
- Assists with preparing and implementing prescribed fire projects.

2.5.1 SBC Fire Stations and Fire Equipment

SBC Fire is organized into two battalions with over 260 employees. Available fire protection resources include 16 fire stations that house 16-structure engines, 14 wildland engines, and 6 reserve engines. To support wildland fire and other special operations, SBC Fire also maintains two water-dropping helicopters, four dozers, two tactical and two support water tenders, and a hand crew (SBC 2016).

2.5.2 Water Sources

Water sources are a critical element in a firefighter's ability to suppress a wildfire. There are approximately 261 fire hydrants and 14 "waterbody" features, such as pools, lakes, and large river pools in the Santa Ynez River within the CWPP Planning Area (See Figure 10, Water Sources Map). Water supply is variable and many fire-planning documents developed by various entities in the County commonly cite water availability as a concern. It is unknown whether water sources in the Planning Area meet the needs of fire suppression activities in the Planning Area.

2.6 Agreements

Automatic aid agreements exist with SBC Fire, the Forest Service, the city of Santa Barbara, Carpinteria/Summerland Fire Protection District, and Montecito Fire Protection District. These agreements assure that the closest available resources are dispatched to emergencies. Within pre-identified mutual threat zones, the Forest Service will dispatch equipment, including crews and overhead to support firefighting operations within the SBC Fire jurisdiction. In reciprocation to the support from the Forest Service, SBC Fire provides firefighting support to the federal agency when fires are located within mutual threat zones on FRA.

Existing fire protection agreements help to facilitate an expedient response of firefighting resources when needed. These agreements include:

- California Master Mutual Aid
    - Statewide mutual aid is voluntary aid provided between and among local jurisdictions and the State under the terms of the California Disaster and Civil Defense Master Mutual Aid Agreement (MMAA) as provided for in the California Emergency Services Act. The MMAA creates the formal structure where each jurisdiction retains control of its own facilities, personnel and resources, but may also receive or render assistance without the expectation of reimbursement, to other jurisdictions within the State.
    - Resources mobilized under the auspices of MMAA for Santa Barbara County would be sent from California OES Region 1, the Santa Barbara County Operational Area.
- California Fire Assistance Agreement
    - This agreement provides for local government resources to aid State and Federal agencies for fires burning on lands under their jurisdictional control.
- California Master Cooperative Wildland Fire Management Agreement (CFMA).

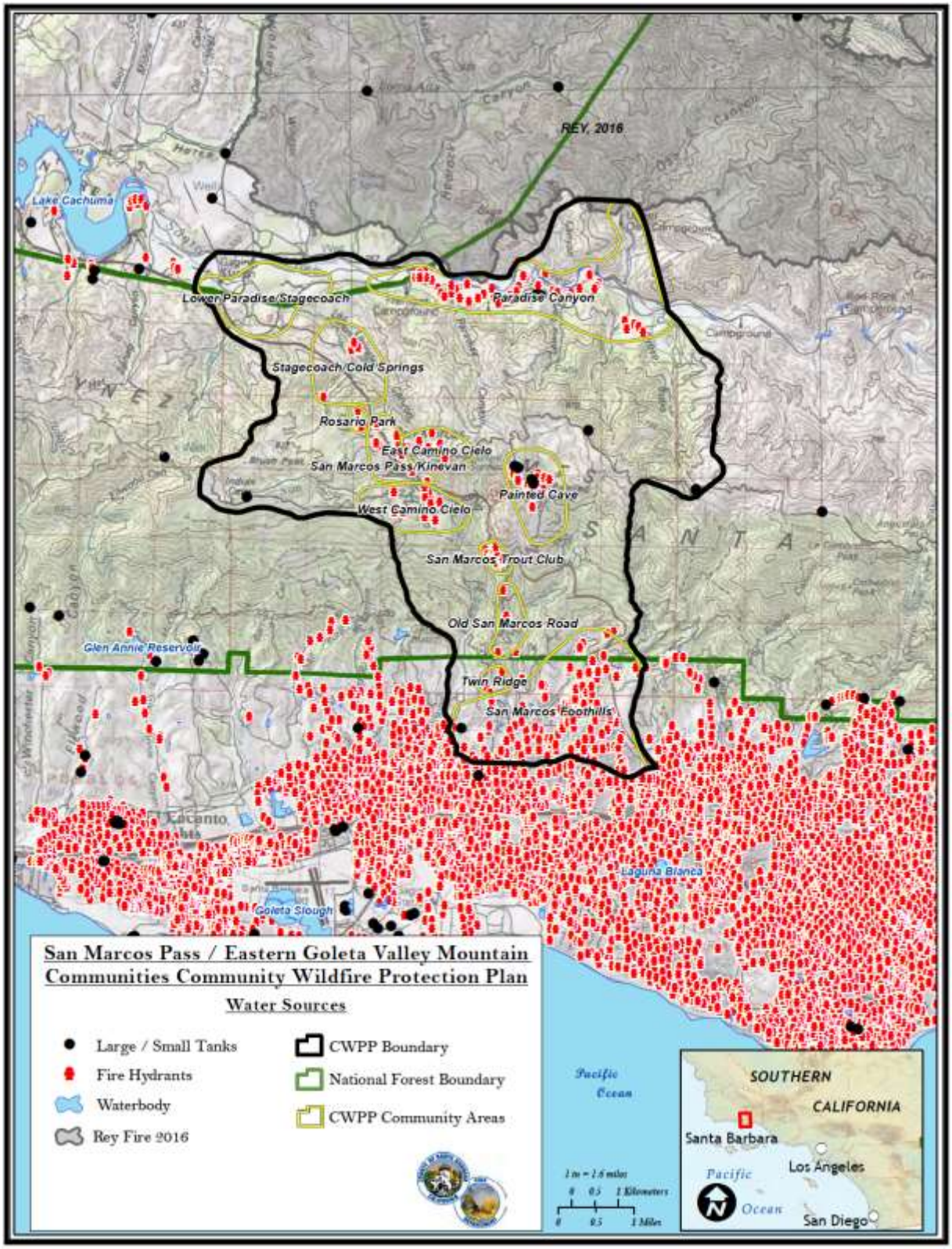


Figure 10. Water Sources Map

- This agreement is between the Forest Service and CAL FIRE. SBC is a contract county within the CAL FIRE organization and provides wildland fire protection on State Responsibility Areas within the unincorporated areas of Santa Barbara County. As the representative of CAL FIRE in the County, SBC Fire has the authority to receive and provide firefighting resources under this agreement.

The Painted Cave and San Marcos Pass Volunteer Fire Departments have a Memorandum of Understanding (MOU) with SBC Fire and can respond to wildland fires within pre-determined response areas. According to the MOU, the fire companies operate as limited risk fire departments, which adhere to standards and practices of National Wildfire Coordinating Group (NWCG) 310-1 and are organized pursuant to Section 14825 of the California Health and Safety Code. They are registered with the California State Fire Marshal's Office. Personnel from these departments must be qualified to standards described in the existing MOU.

All agencies with wildfire responsibility operate under the concept of closet available resource. This assures that the closest available firefighting resources are dispatched to an evolving incident regardless of their agency. The use of aircraft is the exception to this rule, as aircraft are not part of the local fire protection agreement between the Forest Service and SBC. Aircraft will only respond to fires within the jurisdictional lands of the agency hosting the aircraft unless specifically ordered by Incident Commanders. Table 7 indicates the closest available firefighting resources to the center point of the CWPP Planning Area.

Table 7 Fire Stations with a 20-minute or less Travel Time to Highway 154 and East Camino Cielo Road

Station Identifier	Distance to San Marcos Pass &Hwy 154	Travel Time*	Apparatus Assigned
Forest Service San Marcos Station	0 miles	1 minute	Type III engine
Forest Service Los Prietos Station	7.4 miles	11 minutes	Type III engine, Type I crew water tender
SBC Fire HQ	7.8 miles	10 minutes	Overhead
SBC Fire 11	14.9 miles	20 minutes	Type I Engine, Ladder Truck
SBC Fire 12	11.7 miles	18 minutes	Type I and Type III engines
SBC Fire 13	9.1 miles	13 minutes	Type I and Type III engines
SBC Fire 14	13.7 miles	18 minutes	Type I and Type III engines
SBC Fire 15	10.4 miles	15 minutes	Type I and Type III engines, patrol
SBC Fire 17	14.3 miles	19 minutes	Type 1 engine
Santa Barbara City 7	11.8 miles	19 minutes	Type III engine, patrol

** Travel time estimated using Google Maps.*

Based on the 2012 *Standards of Coverage Study*, a 12-minute response time for first arriving units is desirable for rural areas of the County (Citygate Associates 2012). Figure 11 estimates the response time of "first-in" firefighting resources to a wildfire within the Planning Area. Other fire suppression personnel and equipment responding to wildfires within the Planning Area will rapidly support these "first-in" resources.

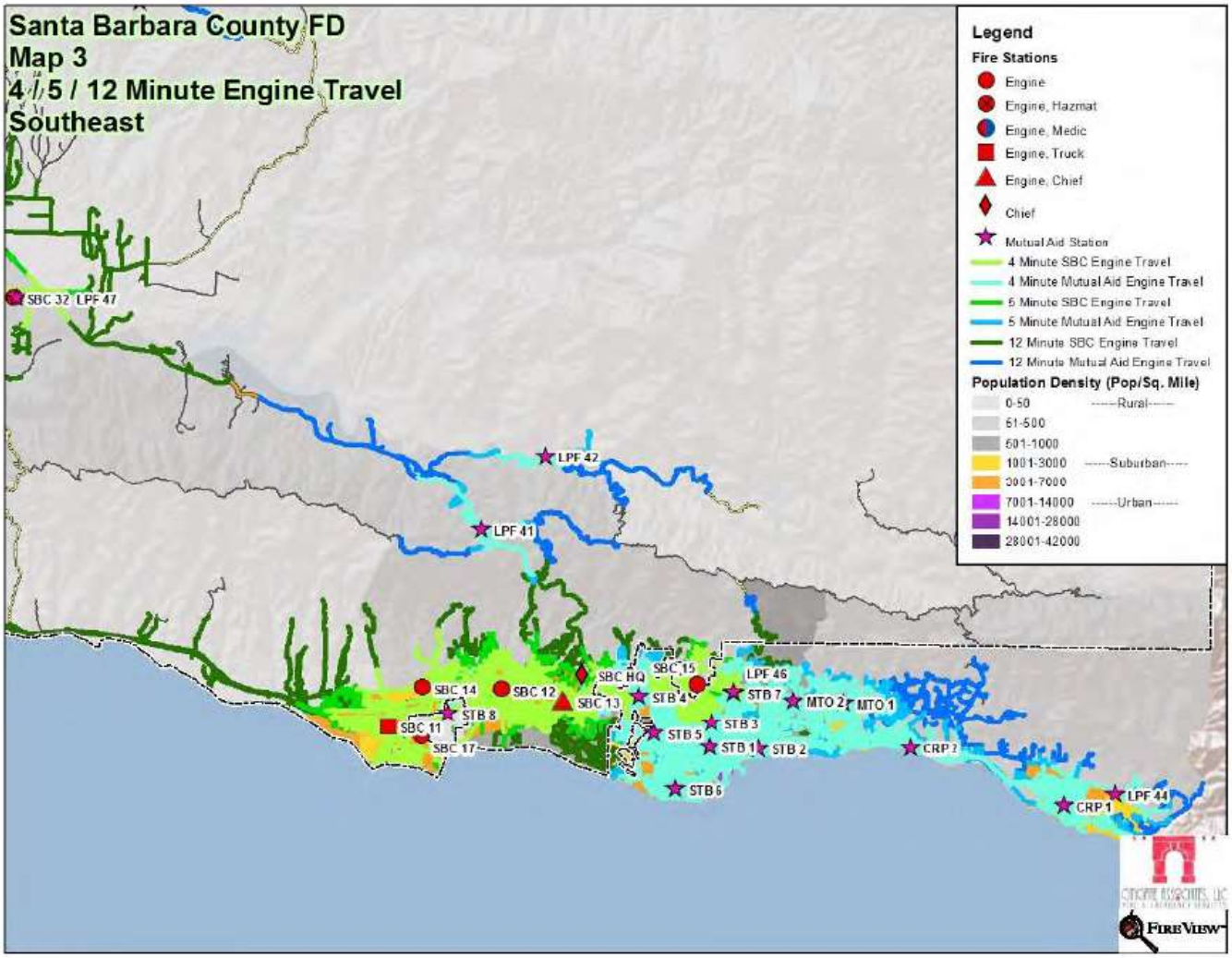


Figure 11. Citygate's Standards of Coverage Study Response Time Map

**Taken from Citygate Associates' 2012 Fire Service Deployment and Departmental Performance Audit Report, Volume 2 of 2–Map Appendix.*

Section 3.0 Defining the Wildfire Problem

Each year nationally, firefighters combine efforts to successfully contain approximately 97 percent of wildfires at less than ten acres. This success is a direct result of favorable weather and fuels conditions, early fire reporting, and a rapid and aggressive fire suppression response. However, when an ignition occurs during unfavorable weather and fuel conditions, or when firefighting assets are committed to fighting simultaneous wildfires, a new fire has the potential to escape the efforts of initial attack firefighters.

The probability of a catastrophic wildfire occurring at any particular location within or adjacent to the Planning Area is dependent on a chain of events that includes fire ignition, fire weather, fuel, heat transfer, topography, fire behavior, suppression actions taken, and the interaction of these factors.

To understand the wildfire problem in the Planning Area requires an understanding of fire ecology, the expansion of the human development, and the influences of a changing climate.

3.1 Fire Ecology

The science of fire ecology describes the intersection between evolutionary adaptation to fire and physiological response to fire from the individual species at the landscape scale.

3.1.1 Ecoregion Conditions: Climate, Vegetation, and Wildlife

The Santa Barbara Front, like much of southern California, is described as a Mediterranean climate. This description also applies to the vegetation communities found in the area, which are primarily determined by the climatic regime. Mediterranean landscapes are generally temperate, being dominated by maritime influences that limit the annual temperature range to approximately 10 to 20 degrees Fahrenheit (ºF) difference between the mean January and July temperatures. Winter temperatures generally remain above freezing, while summer temperatures generally remain moderated by the effects of a daily onshore breeze and a moisture-laden marine layer (i.e., coastal fog) that forms at the interface of land and sea.

The Planning Area receives approximately 18 inches of precipitation annually, with annual rainfall nearing 30 inches at higher elevations in the Santa Ynez Mountains, although the realized precipitation each year is highly variable around this mean. Most precipitation falls in winter and early spring months, with a long (greater than 6 months) annual dry period producing an annual climatological drought in the area. On the southern, coastal side of the Santa Ynez Mountains, the effects of this dry period are somewhat moderated at lower elevations by the marine layer, which produces a daily increase in humidity during the summer months when the marine layer moves onshore in the evenings. This ambient moisture also helps support the abundant vegetation that evolved to dominate the area: chaparral.

The chaparral ecosystem is a heathland type consistent with Mediterranean biomes globally. It is dominated by three primary species: manzanita (*Arctostaphylos* spp.), chamise (*Adenostoma fasciculatum*), and California lilac (*Ceanothus* spp.) shrubs. Additional species, such as oaks and some herbaceous plants, will also be found in this system; these species are confined primarily to riparian areas on the south slopes of the Santa Ynez Mountain Range. Chaparral species are fire-adapted in that they

are not destroyed by fire, but rather resprout very rapidly following fire (sometimes within weeks) from roots and burls in the woody skeleton of the plant or regenerate from seedbanks that germinate after fire. Due to the high content of volatile oils found in the schlerophyllus (hard and waxy) evergreen leaves of these shrub types and the amount of fine fuels from prior years of growth that collect in and below the shrub canopy, they function as contributors to rapid fire spread.

At lower elevations and closer to the coastline, chaparral transitions to a coastal sage scrub community that is dominated by California sagebrush (*Artemisia californica*). In contrast to the more fire-adapted chaparral community, the coastal sage scrub community does not resprout rapidly after fire, and instead relies upon seedling recruitment. It is likely that proximity to the marine layer is partially a determinant in where this transition occurs. The coastal sage scrub community has largely been eliminated in the Santa Barbara County region due to the expansion of urban and suburban development, increases in invasive species displacing native species, and an increase in fire frequency facilitating a land cover conversion to more herbaceous species and grasses.

Riparian systems are found wherever streams drain from the Santa Ynez Mountains, with vegetation in these drainages consisting of species such as oaks, sycamore, and willows. These riparian corridors typically resist fire due to higher moisture levels and shading, but can burn under extreme conditions. Wildlife use these corridors to meet a variety of basic needs, with greater biodiversity supported at the interfaces of the upland chaparral systems and the riparian corridors (leading to most of the riparian systems being classified as environmentally sensitive areas). Dominant fauna communities in this ecosystem are smaller avian species (e.g., songbirds), small mammals, reptiles, and insects. These species primarily survive fire either in ground burrows or in fire refugia, with most species able to recolonize rapidly after wildfires from surrounding intact habitat (van Mantgem et al. 2015).

3.1.2 Natural Fire Regime and the Evolution of Human Influence

There is considerable evidence to support an infrequent (very low) fire return interval in the absence of human intervention in this region (Keeley and Fotheringham 2001). The chaparral shrub species and oaks that characterize the Planning Area have evolutionary characteristics consistent with fire-adapted ecosystems. Some shrub species (e.g., scrub oaks) are obligate resprouters that utilize stored reserves to regenerate from existing stems shortly following the fire event. Thus, they must build up sufficient carbon reserves before the next fire in order for the regenerative machinery to function. Other shrub species are obligate seeders (e.g., some species of ceanothus and manzanita), regenerating only from stored seed bank in the soil or adjacent unburned areas. In the coastal sage scrub community, similar to many sagebrush ecosystems, the seedling recruitment period is generally multiple decades, with an early period of grasses and herbaceous species that later dwindle and die off as shrub canopy crown cover increases and reaches closure. This transition requires many decades between fires to reach late succession and is particularly vulnerable to increased fire frequency. Finally, facultative seeders (e.g., chamise) that colonize resource-poor sites both re-sprout and regenerate from the seed bank, and can take several decades to establish enough seed reserves to survive subsequent fire. As such, they are also sensitive to increased fire frequency.

Prior to expansive human impacts in the region, ignitions were infrequent due to very limited occurrence of lightning coupled with winds able to carry fires in shrub-dominated systems. In much of the Planning Area, it is likely that there were relatively few small fires, with most area burned attributed to infrequent very large fires that occurred when a summer lightning ignition held over into autumn and was still combusting at the time of Santa Ana and Sundowner wind events. This type of coupled occurrence was infrequent enough that it is thought that the natural fire return interval ranges from several decades to more than a century in much of the area.

Widespread native settlement patterns by the 15th century increased the number of ignitions drastically. Native burning is well documented, and the patterns of human ignitions did not considerably change for the next 500 years, even as Spanish settlement occurred and then gave way to westward American expansion (Mensing et al. 1999). The dramatic increase in population in the 20th century in the region and the subsequent development of forest management practices have further altered the natural fire regime of the region (Syphard et al. 2007). Today, the majority of area burned across the Planning Area is still associated with infrequent large fires, the growth of which is supported by Sundowner wind events. However, the frequency of these events has increased due to increasing human ignitions, changing land cover, and changing climatic conditions. Further, the diversion of water from streams for both commercial and residential needs has facilitated increased flammability in the riparian zones as vegetation becomes water-stressed. Where soil moistures have been depleted by drought, by over drafting of groundwater, or by diverting of water from streams for any purpose, conditions within creeks and drainages often present serious dangers to nearby residents and to firefighters. Live fuel moisture drop and dry fuels can accelerate the rate of fire spread.

It is important to highlight a key concept for fire management in this area related to fire frequency, evolutionary adaptation, and management of fire in this region. There has been considerable scientific support in much of California and the western United States for the concept of "re-introducing fire" in forested ecosystems where overly aggressive fire suppression tactics in frequent fire ecosystems have produced significant alterations in fire regimes, including higher severity fires and increased fire size. However, in the Planning Area, there is no evidence to support the concept of too much fire suppression leading to "fuels build-up" such that fire should be re-introduced (Keeley et al. 1999; Keeley et al. 2004). Large fires have always occurred in the Planning Area when extreme wind events align with existing ignitions, and the fundamental shift in recent decades has been towards increased human ignitions, not a change in fuels associated with fire suppression (Moritz 1997). As such, it is likely that large, extreme wildfires will continue to occur, and fire management and protection of human development must be based on this place-based science, rather than trying to apply science from other regions in California and the western United States where ecosystems and fire regimes are considerably different.

3.1.3 Invasive Species Concerns and Type Conversion

One of the key concerns related to changing fire regimes and management approaches to fire prevention and suppression in the Planning Area is the introduction and spread of invasive species. Type conversion of shrub communities readily occurs with too frequent fire. In the Planning Area, annual invasive grasses easily replace both chaparral and coastal sage scrub communities. This conversion occurrence is

associated with two types of increased fire frequency: both increased wildfire frequency and the application of prescribed fire regularly or out-of-season. Out-of-season prescribed fire will inhibit regeneration of native shrub species and support the establishment of invasive annual grasses (Keeley 2006). The establishment of invasive annual grasses then permanently alters the fire regime by creating a positive feedback loop where fire frequency continues to increase (facilitated by fine, readily burnable grasses and plenty of human ignitions), inhibiting any potential for shrub recovery (Keeley and Brennan 2012).

3.2 Impacts of Climate Change

While global climate change is often reported as an average rise in temperature (i.e., warming) for the entire planet, the observed changes are highly variable across the globe and even within small countries and states, such as California. Changes in temperature, precipitation, and other meteorological phenomena are also variable both across the seasons of the year, and in terms of the intensity of extreme events. As wildfire tends to occur under extreme conditions in the Planning Area, namely hot, dry Sundowner wind events, it is critical to understand how climate change specifically impacts both the frequency and intensity of these extreme weather events, as well as how it affects the vegetation fueling the fire.

Fire-climate relationships in the Planning Area have been difficult to tease out in the scientific literature, for two primary reasons. The first reason is that the broader southern California area is typically treated holistically as one region, but there are two very distinct fire seasons: one season occurs during the summer and is primarily driven by dry fuels inland with steep topography and the other season occurs during the autumn that is primarily wind-driven (Brown et al. 2012). The pattern in the CWPP Planning Area is somewhat different. Santa Ana winds, which account for the worst major wildfires in southern California, do not occur in the Planning Area. While Sundowner winds may occur in the fall, major Sundowner wind-driven fires in and around the Planning Area have occurred in the spring and summer months. The second reason it can be difficult to understand fire-climate relationships is that different climate factors tend to control fire activity in forested and non-forested (shrubland and grassland) sites. In the shrublands that comprise the Planning Area, an area burned during a wildfire is generally associated with high temperatures and drought conditions in spring, summer and fall, often following a year of slightly above normal precipitation that facilitates fine fuel growth (Abatzoglou and Kolden 2013).

The south coast of California (as defined in Abatzoglou et al. 2009) has warmed 2.7° F in the last 100 years (See Figure 12) with mean temperatures in 2014, 2015, and 2016 as the top three hottest years for the region since 1895. The warming has occurred across all four seasons and for both daytime highs and nighttime lows, but the greatest warming are the nighttime lows, particularly in spring, summer, and fall. By contrast, both annual and seasonal precipitation has not changed significantly over the past century. These trends support anecdotal observation from fire suppression personnel that fires are more active at night now than they have been in the past, which is consistent with reduced nighttime relative humidity recovery.

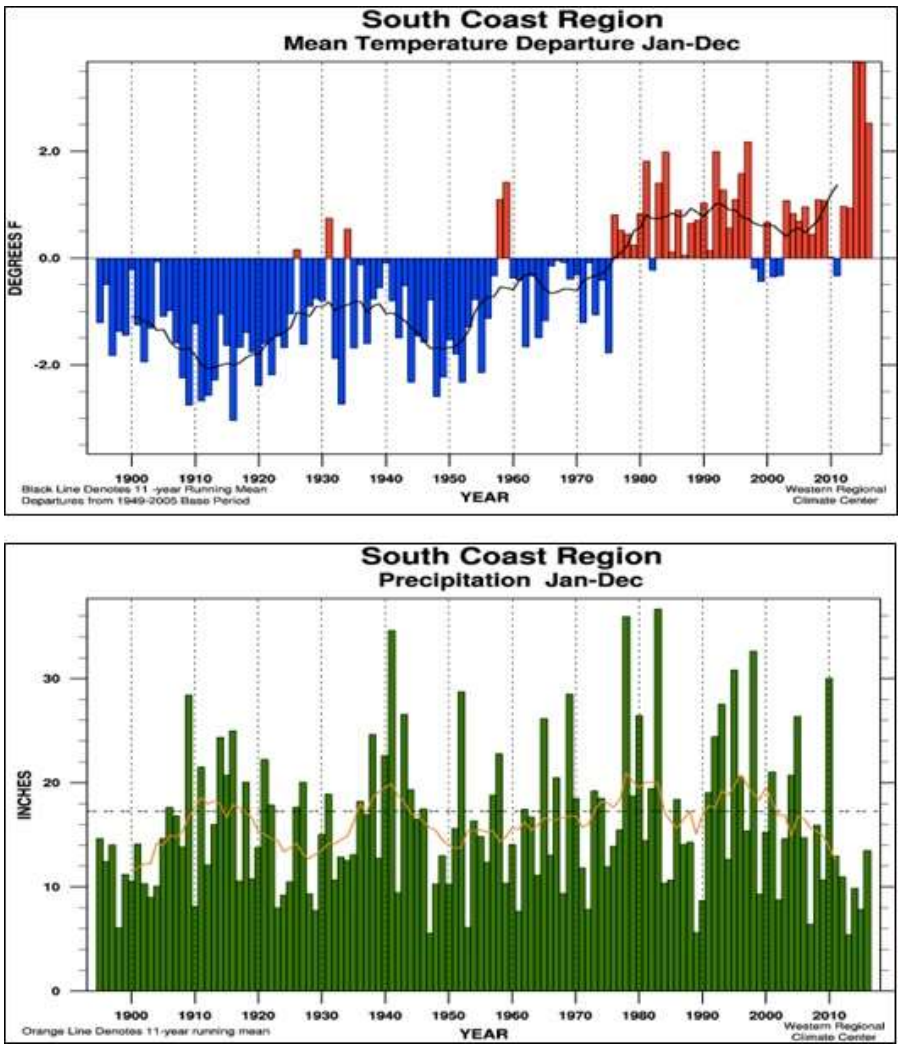


Figure 12. Mean Annual Temperature (top and annual water year (Oct.-Sept.) precipitation for the South Coast Region from 1895 - present (California Climate Tracker, http://wrcc.dri.edu/monitor/cal-mon/frames_version.html)

This reduced nighttime humidity recovery across spring, summer, and fall seasons is a contributing factor to an observed trend towards increased fire danger, specifically because fuel aridity is higher and fuels are less resistant to fire spread (Abatzoglou and Williams 2016). When a Sundowner wind event develops in conjunction with low fuel moisture (i.e., high fuel aridity) there is a greater probability of rapid fire spread and the development of large, longer duration wildfires (Rolinski et al. 2016).

Projections of future climate change are modeled based on anthropogenic (i.e., human) emissions of greenhouse gases, but also account for natural climate variability. Increases in fire activity across the western United States have been definitively partially attributed to anthropogenic climate change (Abatzoglou and Williams 2016), so there is high confidence that projections of future climate will have implications for fire (i.e., these trends aren't just part of Earth's natural climate variability).

In the Planning Area, there is a projected temperature increase of an additional 3 to 4° F by 2070, with increases seen across all seasons, and for both maximum and minimum daily temperatures (Abatzoglou

2013). In contrast to high relative certainty that temperatures will continue to increase, there is less certainty about how climate change will influence precipitation. Winter, summer, and autumn precipitation amounts are projected to remain relatively consistent with the present, but spring precipitation is projected to decline slightly.

This combination of even warmer temperatures year-round and drier springs would facilitate increased large fire probably at all times of the year, but especially during the spring period when Sundowners are currently frequent but vegetation is often too wet to burn. Periods of drier vegetation in the early spring, coinciding with Sundowner wind events, would facilitate more area burned, faster rates of spread, and even more intense fire behavior than has historically been seen during spring fires.

The frequency and timing of Sundowner wind events themselves has not been addressed in the context of climate change impacts, as changes in extreme meteorological wind events is one of the most difficult areas of climate change impacts to predict. However, studies projecting changes in Santa Ana wind events have suggested that Santa Ana winds may shift to later in autumn, and potentially become more frequent (Miller and Schlegel 2006). Given that the same atmospheric pressure conditions produce both Sundowners and Santa Ana winds, it's likely that this may also apply to Sundowner potential, thus extending the fire season to later in autumn.

3.3 Vegetation Management Strategies in this Context

There are two primary classes of fuel treatments that have been widely used in southern California and throughout the western United States to reduce fire risk and the potential for disastrous consequences (e.g., homes consumed, life safety): landscape fuel reduction treatments and localized fuel removal treatments. Landscape fuel reduction treatments are generally larger in area and often occur on federal lands (e.g., Forest Service). The premise of these treatments is to slow a wildfire advancing from the wildlands by reducing fire intensity and flame lengths. This would provide time for fire suppression resources to access the treated area, often with aerial retardant drops, or in an extended attack fire, through building fireline through light fuels. By contrast, targeted or localized fuel treatments primarily occur on private lands immediately adjacent to homes, subdivisions, roads, and other infrastructure. These treatments focus on removing most or all fuels in order to provide safer operational space for firefighters to defend homes and try to hold an advancing fire front along the treatment areas.

Since the 2000 *National Fire Plan* revision and the 2003 HFRA, there has been considerable focus on thinning and otherwise reducing vegetative fuels across federal lands, particularly in national forests like the Los Padres National Forest, in order to reduce wildfire hazard. For the Forest Service, hazardous fuels reduction became directly tied to management budgets, thus driving landscape fuels treatments. However, landscape fuels reduction treatments are predicated on a body of ecological scientific literature that was developed primarily in the Sierra Nevada and across the southwestern United States in dry Ponderosa pine forests, where fire suppression across the 20th century produced a significant increase in forest fuels (Stephens and Ruth 2005; Reinhardt et al. 2008).

As previously discussed, such an increase has not been observed for the Planning Area. Thus, landscape fuel treatments over large areas in the wildlands away from communities are not ecologically supported

for the Planning Area. Further, there is considerable concern that use of landscape fuel treatments will facilitate invasive plant species expansion and permanent conversion of chaparral shrublands. Landscape fuel treatments have been widely implemented across the southern California national forests over the last two decades, which has provided agencies with an opportunity to assess their effectiveness in reducing fire risk. When fires have reached fuel treatments, particularly in chaparral, they were generally only effective when maintained and when they were easily accessible to firefighters who could use them strategically to support suppression (Syphard et al. 2011a,b). Further, the primary factors that determine whether homes burn or not during wildfires in the region are the design of the community, home construction and landscaping materials, and defensible space immediately adjacent to the home (Syphard et al. 2012, 2013, 2014).

The considerable body of recent science on fuel treatments and home loss in chaparral shrubland systems points to a need for localized approaches to vegetation management for reducing fire risk. These include:

- Modifying home construction materials to be fire resistant.
- Removing vegetation within 100-feet or more of a structure.
- Planning localized fuel reduction projects adjacent to homes, critical infrastructure, and roads.
- Developing localized fuel treatment prescriptions to support safe firefighting operations (i.e., creating safe working zones) and facilitate resident evacuation.
- Incorporating vegetation management into policy and zoning codes consistent with the best available science, with flexibility for updates as new science emerges.

Intensive vegetation treatment in localized critical areas that are regularly maintained and highly accessible (especially during a wildfire event) coupled with focused efforts to mitigate home construction materials with fire-resistant materials, will likely be the most effective strategy for reducing both impacts to life safety and structure loss.

3.4 Fire History

Wildfire has been a natural part of the ecosystem in the Santa Barbara area for thousands of years. A study of microscopic charcoal from the Santa Barbara Channel indicates that over the past 560 years large wildfires (greater than 49,421 acres) have occurred in the Santa Barbara area on an average of every 20 to 30 years (Mensing et al. 1999). Many areas on the southern California coast, mountains, and valleys have seen fire frequencies increase dramatically over the last century with most of the increase associated with population growth occurring at the end of World War II (Keeley and Fotheringham 2001; Syphard et al. 2007). Native vegetation surrounding San Diego, Los Angeles, and Santa Barbara metropolitan areas have been the most negatively impacted by the increase in fire frequency (Stafford and Van de Water 2014).

Since the 1950s, the greater Santa Barbara area averaged one large fire per decade; however, since 2008, five large fires (fires greater than 1,500 acres) have burned within or adjacent to the Planning Area (See Figure 13, Fire History Map). In 2016, two large fires (greater than 5,000 acres) occurred threatening the communities of the Santa Barbara Front.

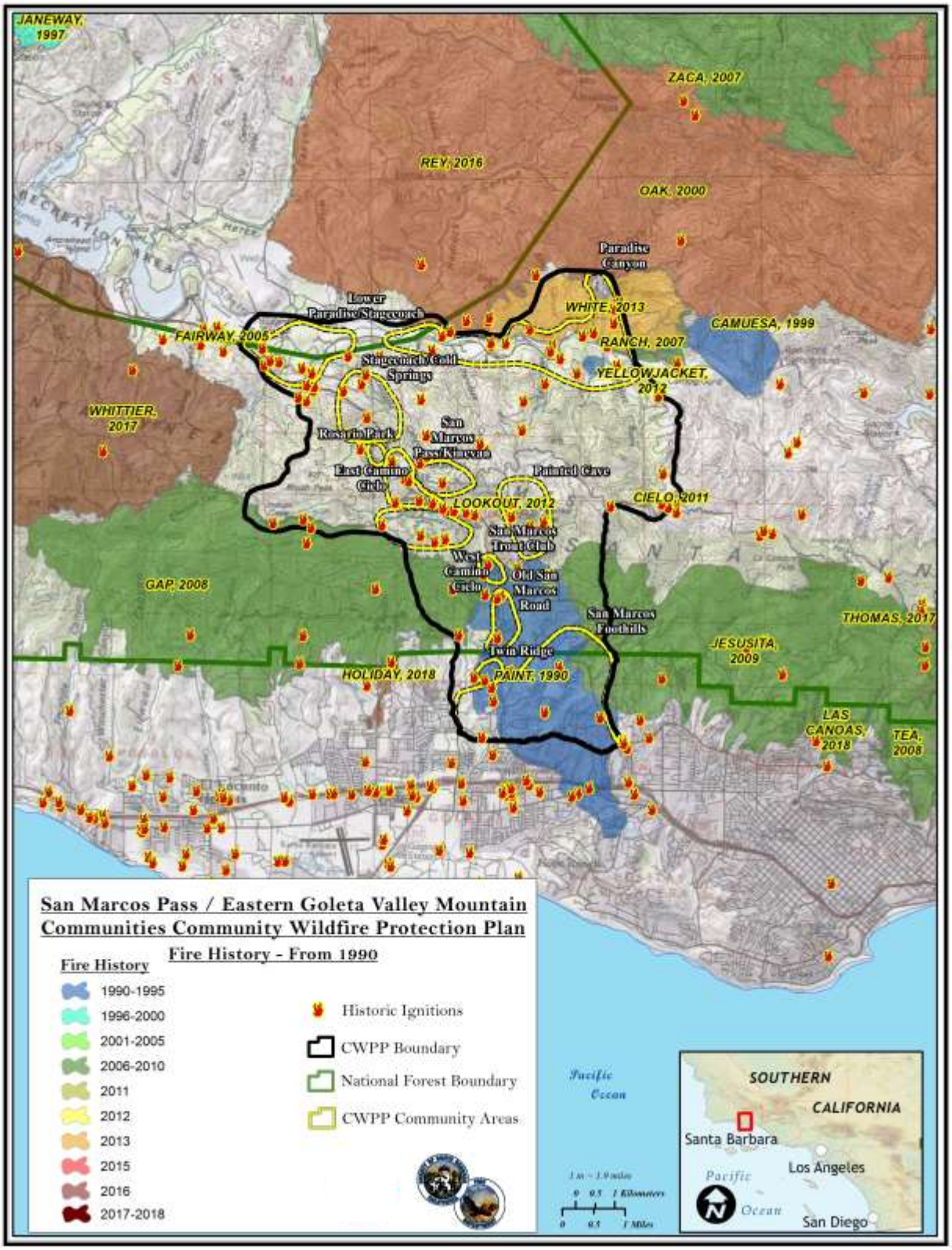


Figure 13. Fire History Map

The 1955 Refugio fire burned 79,428 acres including the western portion of the CWPP plan area. The eastern portion of the CWPP plan area was burned a decade later in the 1964 Coyote fire which consumed 65,339 acres. The fire destroyed 106 structures, nineteen of them in the CWPP plan area.

One of the first WUI fires in the United States that was studied for structure survivability was the 1990 Painted Cave fire (also known as the Paint fire). It burned almost 4,900 acres and destroyed over 440 homes, 28 apartments, and killed one civilian. CAL FIRE has it listed as number 1310 out of the 20 most destructive wildfires in California. The Paint Fire occurred in the heart of the SMP/EGV CWPP plan area.

While recent large fires have spared structures within the Planning Area, one only has to look back to the 2009 Jesusita fire to foresee potential impacts to the various communities at risk. Driven by strong Sundowner winds in May 2009, the Jesusita fire burned 8,733 acres, destroyed 160 structures, damaged an additional 17 structures, and injured three firefighters.

The 2016 Sherpa fire also threatened communities in the Planning Area. It burned 7,400 acres and destroyed one structure with more than 4,000 residents under evacuation notice from the Santa Barbara County Sheriff's Department (Inciweb 2016). The fire caused the closure of Highway101, interrupted Amtrak services and forced the closure of State beaches near Gaviota. Although the fire was located west of the Planning Area, Incident Commanders were initially concerned that the fire may burn into populated areas as the fire was pushed by strong Sundowner winds the first two nights of the incident (Santa Maria Times 2016). In August 2016, the Rey fire burned 32,600 acres, destroyed five structures, and did significant damage to Forest Service recreation facilities in the Santa Ynez Recreation Area. During that fire, Incident Commanders re-opened fuelbreaks along the East Camino Cielo Road anticipating that the fire would potentially spread south of the primary fire control line of Paradise Road. While these indirect firelines were not utilized, substantial time and money were used to establish these indirect fire control features.

The 2017 Whittier fire started near Camp Whittier and Lake Cachuma on the north side of the Santa Ynez Mountain Range and burned rapidly south up and over the Mountain Range towards the western edge of the City of Goleta. Thousands of people were evacuated including residents in the western portions of the Planning Area. The fire burned approximately 18,430 acres and destroyed 16 residences and 30 outbuildings, and damaged 1 residence and 6 outbuildings. In an effort to protect structures, firefighters constructed approximately 105 miles of dozer line and re-opened roads and fuelbreaks, including the West Camino Cielo and Brush Peak fuelbreaks. Approximately 34 utility poles and almost a mile of conductor line needed replacement and two 12-foot tall line towers that distribute 12,000 volts of electricity suffered smoke contamination.

The Thomas fire was a massive wildfire that affected Ventura and Santa Barbara Counties, and one of multiple wildfires that ignited in southern California in December 2017. It burned approximately 281,893 acres (440 square miles), becoming the largest wildfire in modern California history (since surpassed by the Mendocino Complex Fire's Ranch fire in August 2018), before it was fully contained on January 12, 2018. The Thomas fire destroyed at least 1,063 structures, while damaging 280 others; and the fire caused over $2.2 billion in damages, including $230 million in suppression costs.

Table 8 lists wildfires that have threatened or destroyed homes within or adjacent to the CWPP Planning Area from 1955 through 2017.

Table 8 Wildfires within or adjacent to CWPP Planning Area

Fire Name	Date	Fire Size (acres)	Structures Lost	Fatalities
Thomas	December 2017	281,893	1063	2
Whittier	July 2017	18,430	16 homes, 30 misc.; 1 home damaged, 6 misc. damaged	0
Rey	August 2016	32,606	5	0
Sherpa	June 2016	7,474	1	0
White	May 2013	1,984	1	0
Jesusita	May 2009	8,733	160 destroyed, 17 damaged	0
Tea	November 2008	1,940	210	0
Gap	July 2008	9,445	4	0
Zaca	July 2007	240,207	1	0
Painted Cave	June 1990	4,900	440 homes, 28 apartments, 30 misc.	1
Sycamore	July 1977	805	195	0
Romero	October 1971	15,650	4	4
Coyote	September 1964	65,339	106	1
Refugio	September 1955	79,428	20	0

3.5 The Wildland Fire Environment

The wildland fire environment is comprised of weather, topography, and fuels, all of which play a role in the potential ignition of a wildfire and its rate of spread, intensity, and resistance to control (National Park Service Learning Center 2016). This section describes the wildland fire environment within the Planning Area.

3.5.1 Fuels

Vegetation is the primary fuel source for wildfires and is the most important factor in determining fire hazard. In addition to the native vegetation, anthropogenic fuels, such as structures and ornamental vegetation can also significantly influence fire behavior and fire suppression tactics. Figure 14 displays the existing vegetation types that occur within the Planning Area. This vegetation is the fuel that can support wildfire activity.

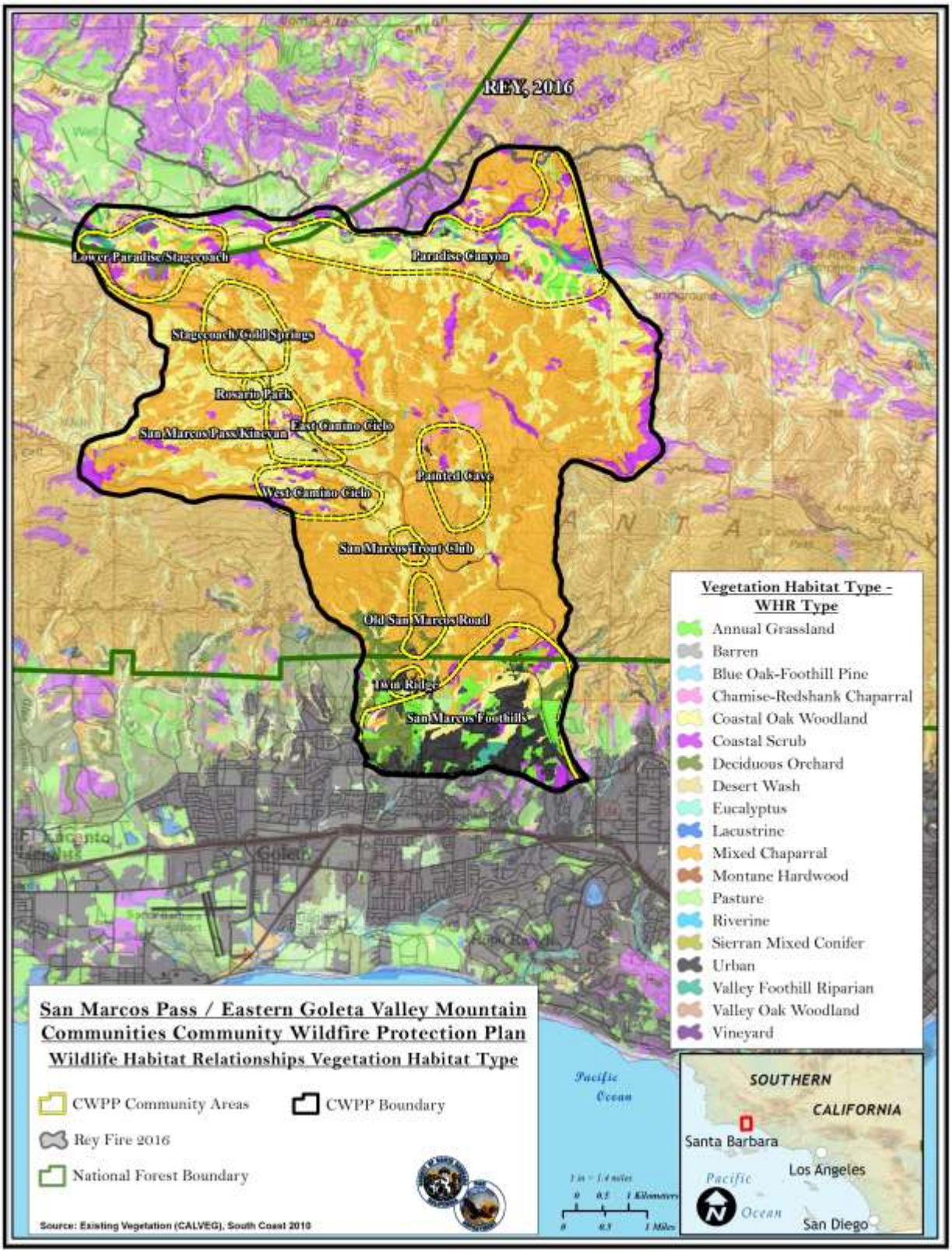


Figure 14. Vegetation Type within the Planning Area Map

The EGVCP divides the southern portion of the CWPP Planning Area into several land use zones, including the Urban Area north of Cathedral Oaks Road, Agricultural/Commercial land use designation across the lower foothills, and the Mountain Areas that includes the Existing Developed Rural Neighborhoods, such as Painted Cave and Trout Club (EGVCP 2015). Native vegetation, as a fuel source, dominates in all land use zones with the exception of the Urban Area, where a mix of native and ornamental vegetation combine to form a wildland-urban fuel mix.

Within the Urban Area, the EGVCP identifies residential land uses with the stated residential component of the Plan being, "Preserve and enhance the character of existing neighborhoods through preserving open spaces and key aesthetic resources…" (EGVCP 2015). One of the large open spaces within this urban area is St. Vincent's, which consists of a 33-acre two-parcel proposed development that has a development standard that would retain native vegetation and coastal sage scrub habitat (EGVCP 2015).

Open spaces with native vegetation in an urban setting have the potential to receive embers (firebrands) during wind driven wildfires. These embers provide a path for wildfires in the mountains above the urban area to spread into the more developed settings of the Planning Area. Research indicates that firebrands are thought to be one of the primary sources of ignition in the wildland-urban interface (Gollner et al., 2015) and that the fuelbed characteristics and the moisture content of a receptive fuel are key to the ignition of spot fires (Viegas 2013; Weir 2004).

Definition of a receptive fuel is a fuel that will ignite and support the spread of a wildland fire when a firebrand lands on it

Environmentally Sensitive Habitats (ESH) exist within the Planning Area and include vegetation that under certain environmental conditions will support wildfire spread. These ESHs have specific protection policies designed to preserve the intrinsic value of the habitat. These protection policies are found in the three primary planning documents that cover the Planning Area. The protection standards must be followed when designing any fuel treatment projects within ESH areas.

In addition to native vegetation, ornamental and non-native invasive species can contribute to wildland fire behavior and potential structure damage or loss. This is particularly true as these species are often associated with landscaping near structures. While not all non-natives are significant contributors to fire behavior, many can accelerate fire spread and serve as sources of firebrands when involved in the flaming front of a wildfire. Table 9 shows common non-native species that can contribute to localized fire behavior problems. Residents and stakeholders should consider removing these species in order to better protect values at risk from wildfire damage.

The Diablo Fire Safe Council maintains a robust online listing of plant species with both favorable and unfavorable fire characteristics (*www.diablofiresafe.org/tolerance.html*).

*Table 9 Non-native Vegetation Commonly Associated with the CWPP Planning Area**

Common Name	Scientific Name
Mexican Fan palm	*Washingtonian robusta*
wattle	*Acacia redolens*
Canary Island palm	*Phoenix canariensis*
Tasmanian Blue Gum	*Eucalyptus globules var. globules*
Red Gum	*Eucalyptus camaldulensis*
Arundo	*Arundo donax*
Pampas Grass	*Cortaderia jubata, Cortaderia selloana*
Fountain Grass	*Pennisetum setaceum*
Myoporum	*Myopoum laetum*
Tamarisk	*Tamarix ramosssissima*
Spanish Broom	*Hirschffeldia incana*
Poison Hemlock	*Conium maculatum*
Caster Bean	*Ricinus communis*
Sweet Fennel	*Foenicum vulgare*
Tree Tobacco	*Nicotiana glauca*
Italian Thistle	*Carduus pycnocephalus*
Brome (multiple species)	*Bromus* spp.

*Table compiled by Dan McCarter, Santa Barbara Urban Creeks Council

3.5.1.1 Fuel Characteristics

Characteristics of fuels that affect fire behavior include fuel type, fuel moisture content, fuel loading, chemical content, horizontal continuity, and vertical arrangement. Each of these characteristics contributes to one or more fire behavior processes (National Park Service Learning Center 2016). Understanding the association of fuel characteristics and fire behavior can facilitate the design of effective fuel treatment strategies.

Fuel Types/Fuel Models

Fuel types within and adjacent to the communities includes grasses, shrubs/brush, and the ground litter associated with forested areas (e.g., oak, eucalyptus, scattered conifer). Fuel types are broken into specific fuel models that describe the physical properties of vegetation that support wildfire with each specific fuel model having associated burning characteristics. Observed burning characteristics can change significantly as fire spreads through different fuel models across a landscape. Through the

removal or rearrangement of vegetation, it is possible to modify the fuel model; therefore, modify the resulting fire behavior at specific locations on the landscape.

Fuel Moisture

Fuel moisture is a dynamic variable controlled by seasonal and daily variations in the weather. The moisture of living and dead fuel is an important component that influences wildfire behavior, as vegetation is most flammable when fuel moisture levels are low. Understanding the influence of both live and dead fuel moisture on fire behavior are important when evaluating wildfire spread.

Dead Fuel Moisture

The fire environment influences both live and dead fuel moistures. Dead fuels act like a sponge absorbing or giving up moisture to the air and ground that surrounds the fuel. This exchange of moisture with the environment leads to the changes in dead fuel moistures. In general, moister air/ground conditions increase dead fuel moisture and conversely drier air/ground conditions decrease dead fuel moisture.

Fire managers use the concept of "timelag" to define how rapidly the exchange of moisture occurs between dead fuel and the surrounding environment. Smaller diameter fuels, such as dry grasses exchange moisture relatively rapidly. This is why a dry grass field covered in dew early on a summer morning can burn in a wildfire later that same afternoon. Table 10 displays the rate of moisture exchange between dead fuel and the environment. Times shown reflect the hours required for the dead fuel to come into equilibrium with its surrounding environment. The time required to reach equilibrium is referred to as "timelag".

Table 10 Timelag Rate of Moisture Exchange

Diameter Class	Timelag	Fuel Description
0 – 0.25"	1-hour	Grasses, forbes
0.25 – 1.0"	10-hour	Small sticks and branches
1.0 – 3.0"	100-hour	Larger branches, small logs
3.0" and greater	1000-hour	Larger logs

Live Fuel Moisture

Live fuel moisture is the water content in living fuel expressed as a percentage of the oven-dry weight. Internal physiological mechanisms of the vegetation in response to external influences, such as rainfall patterns, diurnal changes, drought, aspect, and elevation all help to influence live fuel moisture content.

Typically, live fuel moistures in the Planning Area are highest in the spring through early summer and at their lowest in late summer through winter. Locally, live fuel moisture sampling of chamise occurs throughout the year near the Forest Service San Marcos Pass Fire Station. Live fuel moistures can range as low as 55 percent to over 124 percent (National Fuel Moisture Database, accessed

December 2016). Research indicates that a chaparral fuel moisture of 79 percent or less is strongly correlated to large wildfire activity (Dennison and Moritz 2009). Critical live fuel moistures vary with plant type. For example: manzanita has a critical live fuel moisture of 80 percent, while chamise has a critical live fuel moisture of 60 percent (NWCG 2014). Figure 15 displays live fuel moisture data for chamise from the Forest Service San Marcos Pass Fire Station.

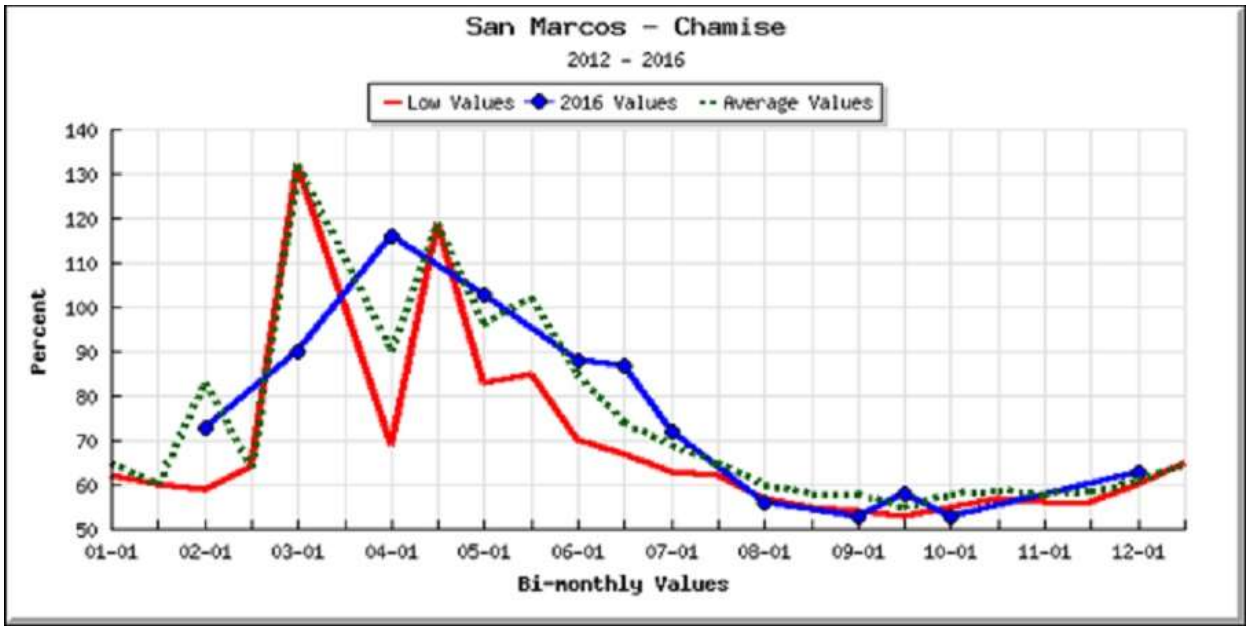


Figure 15. Live Fuel Moistures in Chamise from the San Marcos Pass Sample Site from 2012 to 2016

Fuel Loading

Fuel loading represents the oven dry weight of fuel by area, generally expressed as tons per acre. Fuel loading varies greatly by fuel type. Generally, grasslands produce fuel loadings between one to five tons per acre, while brush species may produce fuel loads of 20 to 50 tons per acre, and timber up to 100 tons per acre. Fuel loading directly relates to fire intensity with areas of heavier fuel loads releasing more heat energy than areas with lighter fuel loads.

Chemical Properties

Chemical properties of fuels relate to the presence or absence of volatile substances such as oils, resins, wax, and pitch. Locally, chaparral species, sages and non-native eucalyptus have higher concentrations of volatile chemical compounds when compared to oaks, oak litter, and grasses.

During summer months, an increase in ether extractives occurs in some vegetation with a high chemical content resulting in increased combustibility in these plant species (Philpot and Mutch 1971). Ether extractives in some species can rise from 8.3 to 15 percent during the summer, increasing the ease of ignition for these fuels (Philpot 1969). Research has shown that an extractive content over 10 percent indicates high crown fire potential (Philpot and Mutch 1971).

Horizontal Continuity

The horizontal continuity of fuels describes the uniformity or patchiness of fuels across the landscape and the effect of fire spread. Fuels within the Planning Area have recovered from past wildfires and are now generally continuous across the landscape. Within the lower foothills immediately adjacent to Cathedral Oaks Road, the fuels are broken up by road systems and neighborhoods. However, while development has broken up the horizontal continuity of fuels in this area, sufficient native and ornamental vegetation is found adjacent to some structures and in open space enclaves to support fire spread, especially when strong winds influence the fire environment. Riparian corridors, such as San Antonio and San Jose Creeks, also provide continuous fuel pathways into the community.

Vertical Arrangement

Vertically arranged fuels are those fuels that can carry fire burning in surface fuels into the canopy or crowns of overstory vegetation. Continuous vertical continuity is known as a "fuel ladder". Continuous areas of ladder fuels do not exist widely within the Planning Area; however, within the lower foothills where ornamental tree species can be found, the vertical arrangement of fuels will allow for individual or group torching of these trees.

3.5.2 Fire Weather

Weather is the most variable element of the wildland fire environment and the least predictable. The important components of fire weather are temperature, relative humidity, precipitation, wind, and atmospheric stability. All of these elements have the potential to enhance or retard wildfire spread and intensity.

Two distinct weather zones exist within the Planning Area: the coastal slopes, including the south facing aspect below the Camino Cielo ridge (Santa Barbara Front), and the Santa Ynez River corridor. The Santa Ynez River corridor is significantly warmer and drier than the lower portions of the coastal slopes. Conditions on the upper south facing coastal slopes also tend to be warmer and drier than on lower slopes due to the presence of a marine inversion layer, which traps moisture and cooler air at lower elevations, through much of the year. The Remote Automated Weather Station (RAWS) at the Santa Barbara Botanic Gardens established in 2011 provides the most representative weather for the coastal slopes; however, this station has limited historic data. The Los Prietos RAWS best represents weather for the Santa Ynez River corridor and has archived weather data back to 1961. The San Marcos Pass RAWS was installed in 2015 near Old San Marcos Road and Hwy 154. It provides the most representative weather for the upper mountain communities; this station also has limited historic data.

August is the warmest month of the year in the Planning Area with an average maximum temperature of 77.1°Farenheit (F). However, extremely hot temperatures can occur in Santa Barbara, with the record high temperature for August being 109°F. Data from the Los Prietos RAWS (representing the Santa Ynez River corridor) shows an average high temperature for July of 96°F with a record high temperature for the month of 116°F.

The annual average precipitation in Santa Barbara is 17.73 inches with the vast majority of the precipitation occurring between November and April. January is historically the wettest month of the year with rainfall averaging 3.98 inches (*www.wrcc.dri.edu/*, accessed December 2016).

Using data from the Santa Barbara Airport (representing the Santa Barbara Front), the average wind speeds for all months of the year is 5.5 mph, with a dominant wind direction of west to south (See Figure 16). While at the Los Prietos RAWS (representing the Santa Ynez River corridor), average annual wind speed is 3.8 mph that is dominated by a westerly flow (Fire Family Plus 2016).

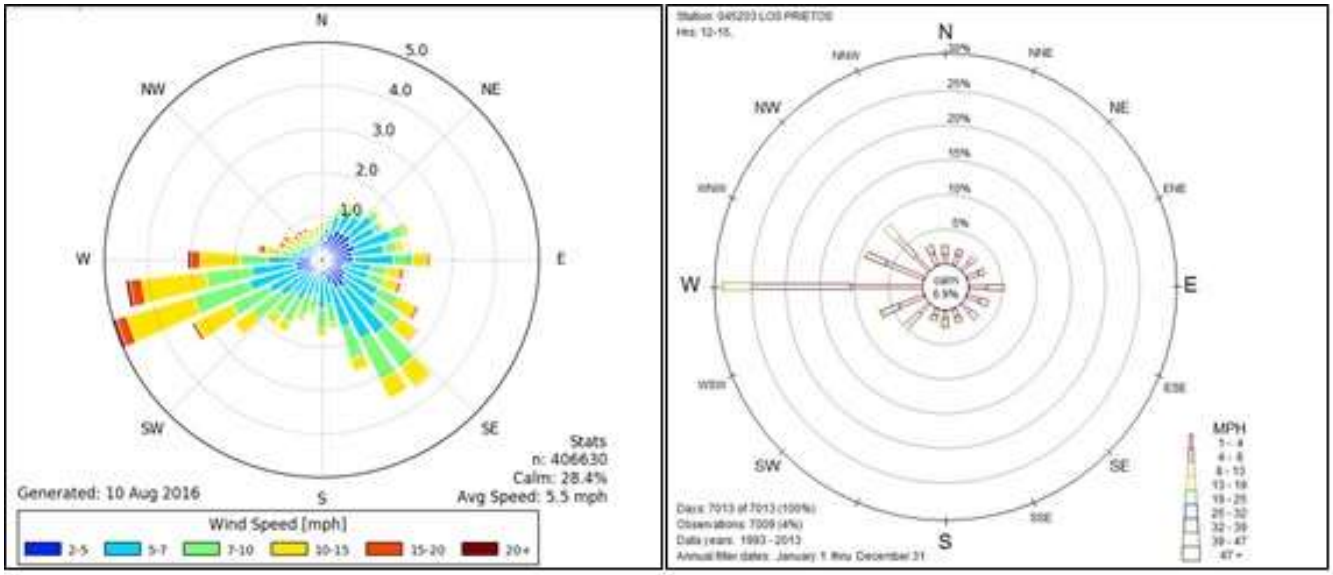


Figure 16. Wind Roses Showing Dominant Wind Speeds and Directions at Santa Barbara Airport and Los Prietos RAWS (Source: https://mesonet.agron.iastate.edu/, accessed December 2016)

Sundowner winds are a significant weather pattern unique to the Santa Barbara Front. These winds often begin in the late afternoon or early evening and are associated with a rapid rise in temperature and decrease in relative humidity (Blier 1998). They may occur throughout the year (See Figure 17). Sundowner winds channel through the primary drainages that bisect the Planning Area as they blow downslope over the Camino Cielo ridge. On May 6, 2009, at 3:00 pm, the weather data from the Santa Barbara Airport during the Jesusita fire indicated an air temperature of 96°F with an average winds speed of 24 mph, gusting to 39 mph. Figure 17 displays the number of Sundowner wind events for the time period 1984 to 2015.

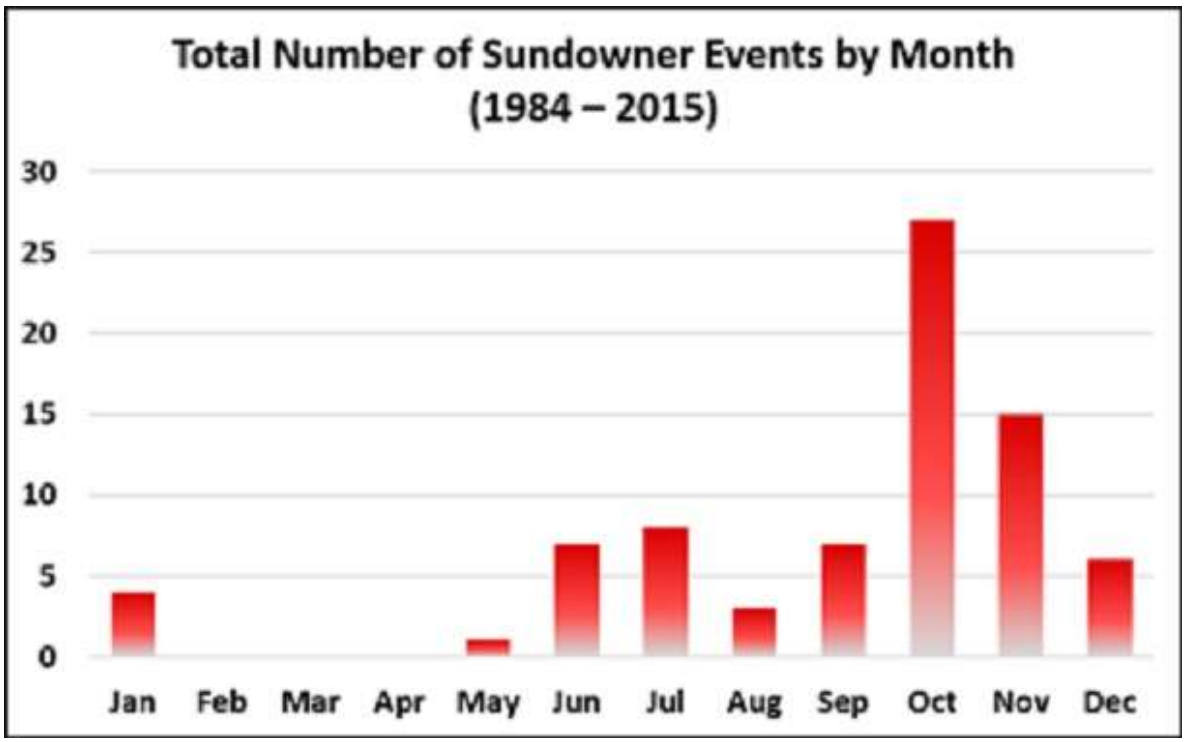


Figure 17. Sundowner Wind Events, 1984 – 2015

3.5.3 Topography

Topography is the configuration of the earth's surface. Topography is the most stable of the elements in the fire environment. It plays an important role in how a fire will burn as it modifies general weather patterns by channeling winds, inducing slope and valley winds, creating thermal belts, producing orographic thunderstorms, and contributing to Foehn or Sundowner winds. Factors of topography that affect fire behavior include slope, aspect, land features, and elevation. Wildfires typically burn upslope at much greater speeds than when burning downslope in similar terrain and fuel conditions. Of all of the topographic features, the steepness of slope is the most influential on fire behavior.

Covering approximately 28 square miles, the Planning Area sits along the east-west trending segment of the California coastline. The low elevation coastal plain rapidly gains elevation as the slope raises toward the Santa Ynez Mountain and the east-west dividing ridge between the Santa Ynez River and the coastal slopes. Slope steepness north of Cathedral Oaks Road within the Los Padres National Forest routinely exceed 50 percent with an elevation range of 100 to over 3,600 feet.

Four major north-south trending drainages (e.g., San Jose, San Antonio, Maria Ygnacio, San Pedro) originate from the Santa Ynez Mountain and bisect the Planning Area on the south facing slopes. These drainages descend sharply from the ridgetop before flattening as they pass through the more developed portions of the communities. The drainages help define the natural environment of the area, supporting a diverse oak woodland/riparian vegetation mix; however, these drainages also serve as major flow paths for Sundowner and Santa Ana winds, channeling and accelerating the off-shore winds.

The north side of the Santa Ynez Mountain Range defines part of the Santa Ynez River corridor. Slopes are similar in steepness as the south side of this primary ridge with Laureles, Paradise, Lewis and Arroyo Burro Canyons all draining north into the River. Figure 18 depicts slopes within the Planning Area.

3.5.4 Fire Behavior Characteristics

Fire behavior characteristics describe how a fire will burn, its rate of spread and intensity. The diversity of fuels, topography, and weather associated with the Planning Area leads to a fire environment that can support the full spectrum of fire behavior. The range of wildland fire behavior is defined by the following terms:

- Ground fires burn in the organic material beneath the surface litter, such as layers of duff, roots, and buried or partially buried dead and decaying woody material.
- Surface fires burn in material above the ground including low vegetation such as grasses, low shrubs, small trees, and woody debris on the soil surface.
- Crown fires burn in the tops of trees and tall shrubs or brush. Crown fires are classified as passive, active, and independent.
- Spotting occurs when firebrands (embers) are transported by wind, convection, or gravity outside the main perimeter of the fire. Whether or not a "spot fire" develops is dependent on if a firebrand lands on a receptive fuel.

During the summer fire season, the lower coastal slopes (Santa Barbara Front) experience generally moderate weather conditions, with light winds, cool temperature and high humidity on many days due to the influence of the marine inversion layer. Higher elevations generally experience more varied conditions, with temperatures often equaling or exceeding those found in the Santa Ynez River Corridor. Under these conditions, wildfires spread upslope influenced by topography and local winds. During this same time, within the Santa Ynez River corridor, temperatures can be 30°F warmer than on the lower coastal slopes with much stronger up canyon winds. Wildfires in this river corridor typically spread much faster and burn at higher intensity under these weather conditions.

Strong local winds known as Sundowners occur on a regular basis along the front range of the Santa Ynez Mountains. The criteria for defining a Sundowner wind are based on dew point depression and wind speed, and are presented in the research, which supports the current Santa Ana Wind Threat Index (*http://sawti.fs.fed.us/#8/33.995/-119.192*). The combination of high temperatures, low relative humidity, and strong winds creates wildfire behavior that exceeds the ability of firefighting personnel to suppress the fire. Observed fire behavior under Sundowner winds includes flame heights of over 70 feet, rate of spread over two miles an hour and spotting distances of ¾ of a mile. Wildfires burning under these severe weather conditions have resulted in loss of life, structures, and important natural and cultural resources.

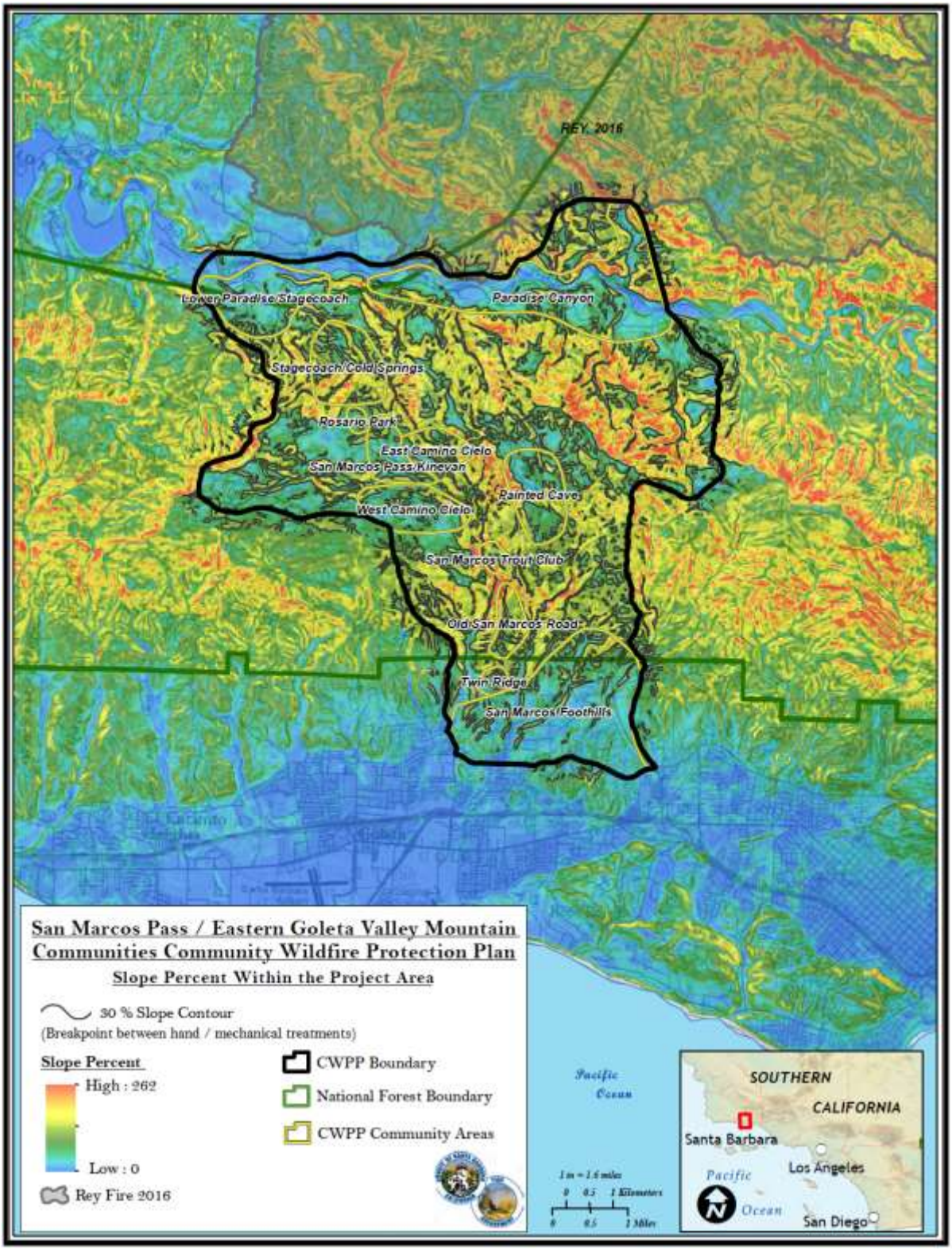


Figure 18. Slope Map

Section 4.0 Communities at Risk

The WUI is defined as "the urban wildland interface community exists where humans and their development meet or intermix with wildland fuel" (Federal Register 2000). The 2003 HFRA limited the WUI to an area within 0.5 mile of a community's boundary or within 1.5 miles when mitigating circumstances exist, such as sustained steep slopes or geographic features that aid in creating a natural firebreak. However, the HFRA also states that a WUI can be refined in development of a CWPP.

The *Los Padres National Forest Land Management Plan* uses a broader interpretation of WUI with the addition of the WUI Threat Zone, which includes an additional strip of vegetation that may be modified to reduce flame heights and radiant heat. The Threat Zone generally extends approximately 1.25 miles out from the WUI Defense Zone boundary. The extent of the Threat Zones is based on fire history, local fuel conditions, weather, topography, existing and proposed fuel treatments, natural barriers to fire, and community protection plans (CWPP). These zones combined can extend well beyond the 1.5 miles addressed in the HFRA. The expectation is that the design of these zones together makes structures more defendable (LPF LMP 2005).

Due to the potential fire behavior within and adjacent to the communities in the Planning Area, the Development Team refined the WUI boundary beyond the description provided in the HFRA (see Figure 19, CWPP WUI Map).

4.1 Designation as a Community at Risk

In 2003, the California Department of Forestry and Fire Protection (CAL FIRE) undertook the task to enhance the list of communities at risk (CAR) for California as well as identify the level of fire threat to these communities. CAL FIRE used three main factors to determine which communities were at risk and their level of fire threat: 1) high fuel hazard, 2) probability of a fire, and 3) proximity of intermingled wildland fuels with urban environments. The California State Forester (CAL FIRE Director) has the responsibility for managing this list.

There are 1,329 communities identified at risk in California that include Santa Barbara, Goleta, and the communities within the Planning Area.

Communities that are at risk and were not captured in any state or federally recognized list, but were identified by the *2017 Santa Barbara County Unit Strategic Fire Plan* and *2011 Multi-Jurisdictional Hazard Mitigation Plan* include Painted Cave, Trout Club, Rosario Park, and Paradise Road.

Section 5 of this CWPP analyses more site-specific risks and hazards within the Planning Area.

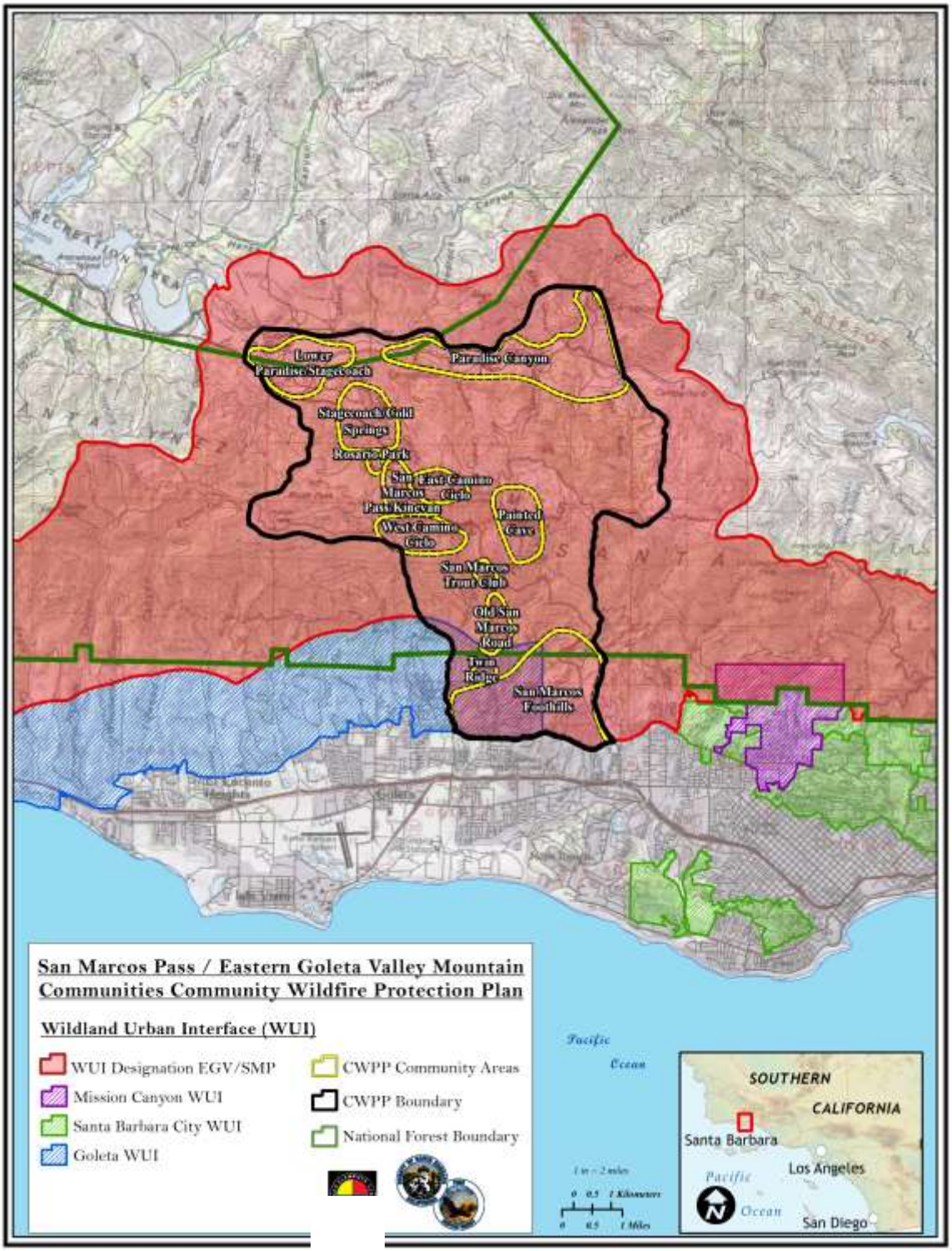


Figure 19. CWPP WUI Map

Section 5.0 Wildfire Analyses

There have been a number of wildfire analyses completed to determine wildfire hazard across the United States and the State of California. These analyses, thus far, are broad and general in nature but do provide fire managers and the public with a landscape level view of the overall wildfire problem. Two of the most recent analyses are the Forest Service's *Wildfire Hazard Potential* mapping project and the *Westwide Risk Assessment* sanctioned by the Western Governors Associations. Both projects attempted to categorize hazard for large landscapes (USFS 2016); however, these wider landscape level approaches do not adequately address the more site-specific concerns of this CWPP.

In order to quantify site-specific wildfire hazard, risk, defensibility potential, and ember (firebrand) exposure, the contractor's fire behavior analysts completed wildfire analyses using local weather and fuels data with full awareness of each models' capabilities, assumptions, appropriate uses, and limitations.

5.1 Hazard Severity Zones

California law mandates that CAL FIRE identify "fire hazard severity zones" on lands where the State of California has wildfire protection responsibilities. These fire hazard severity zones are defined as areas that have similar burn probabilities and fire behavior characteristics (See Figure 20). Local governments, such as the City of Santa Barbara and the Montecito Fire Protection District have also established local fire hazard severity zones within their jurisdictional areas, while the Forest Service does not assign such fire hazard severity zones for their managed federal lands.

5.2 Hazard Assessment

Historically, the greatest wildfire threat to local communities comes from fire originating on the Los Padres National Forest and SRA lands in the Santa Ynez Mountains. Continuous chaparral vegetation, steep terrain and the potential for hot and dry weather associated with Sundowner winds can combine to create a hazardous wildfire environment. Federal lands managed by the Los Padres National Forest model as the highest wildfire hazard, but there are State and private lands along the Highway 154 corridor and the lower foothills zone of the Planning Area that also have an elevated wildfire hazard.

Several wildfire fire models were used to evaluate the specific wildfire hazard for the Planning Area. These models include Wildfire Analyst™, FlamMap, Behave Plus 5.0.4 (Build 305), and Fire Family Plus (Version 4). These fire models are considered the best available science for analyzing wildfire potential. Data used in the models came from state and federal sources, including LANDFIRE, Weather Information Management System (WIMS), and the Fire Resource and Assessment Project (FRAP).

Based on the ability of firefighters to successfully suppress a wildfire of varying intensities, modeled flame lengths from Wildfire Analyst™ are used to assign wildfire hazard at a 30-meter resolution across the Planning Area. The models used and their applications in the assessment for this CWPP are briefly described below.

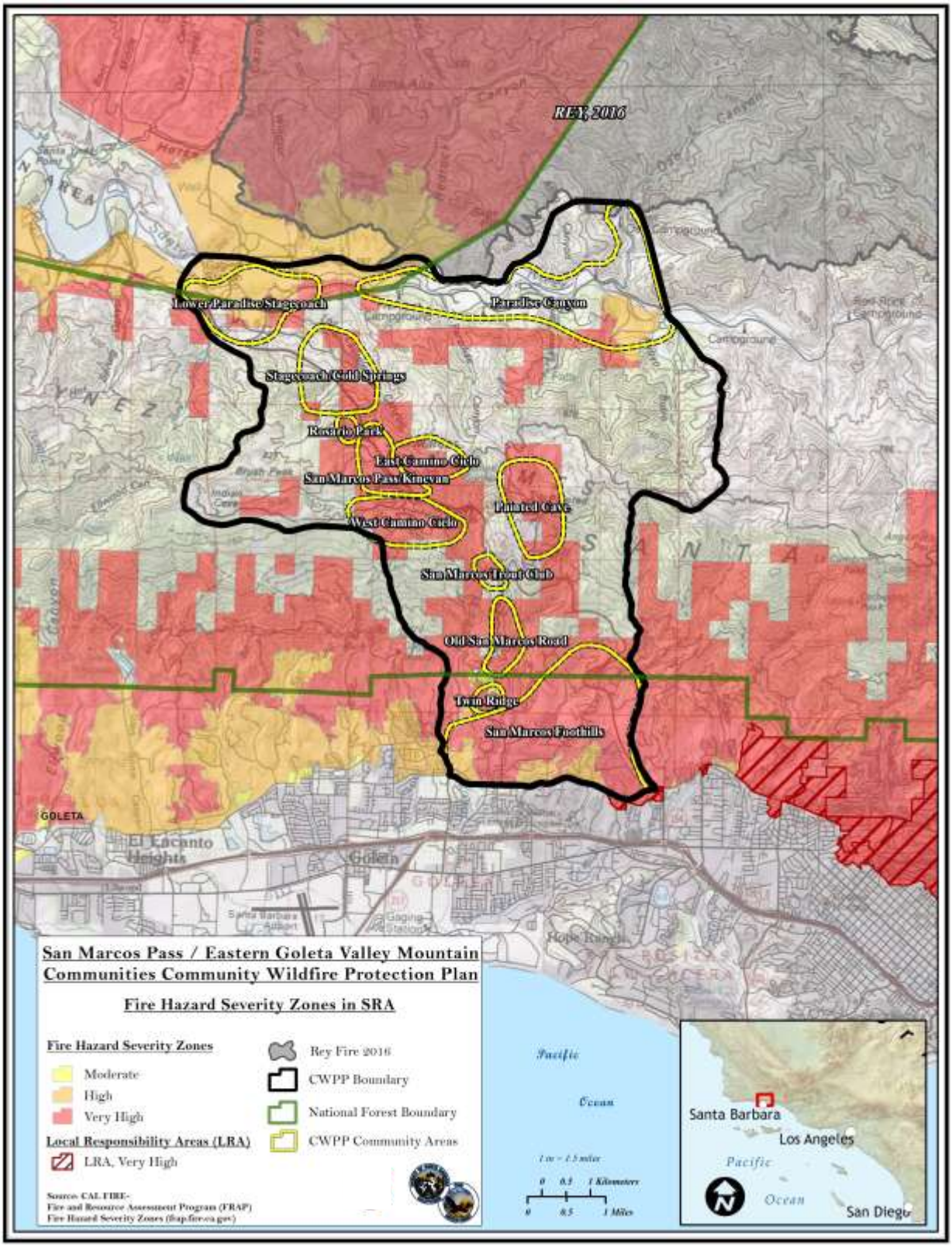


Figure 20. SRA and LRA Fire Hazard Severity Zones Map

Wildfire Analyst™

Wildfire Analyst™ is a fire simulation model that provides real time analysis of wildfire progression, wildfire characteristics and suppression capabilities. The program integrates all the functionality of FlamMap and Farsite into a geographic information system (GIS) based analysis platform that allows for the rapid interpretation of modeling results. The program introduces new modeling concepts, such as evacuation mode that time tags fire spread to values at risk, and backward simulations, which can prove useful in determining the point of origin of a wildfire. Wildfire Analyst™ was the principle model used when evaluating fire spread and intensities for this analysis.

FlamMap

FlamMap is a spatial fire behavior mapping and analysis program that uses elevation, slope, aspect, surface fuel model, canopy cover, fuel moisture, and weather data to evaluate fire behavior. The outputs from FlamMap provide a reasonable representation of surface fire behavior, crown fire potential, and spotting distances across the landscape. FlamMap evaluates an entire analysis area under a defined set of environmental conditions, thus providing insight into how fire behavior changes across the landscape.

Behave Plus

Behave Plus is the most commonly used program for predicting fire behavior. Behave Plus predicts surface fire characteristics at a single point on the landscape under defined environment conditions. This program does not analyze fire spatially and is not compatible with GIS analysis. Behave Plus is useful to evaluate specific points of interest or to assess how fire behavior might change as environmental inputs such as wind, slope or fuel moistures change. Behave Plus evaluated potential spotting distances.

Fire Family Plus

Fire Family Plus (Version 4) is a fire climatology and occurrence program that combines the functionality of various weather and climate programs into a single package. The model allows the user to summarize and analyze weather observations for use in other fire models.

5.2.1 Data Sources for Models

Much of the data used for modeling came from the LANDFIRE program, a federal government sponsored website that supports wildfire planning at the landscape level. More than 50 data products are available from LANDFIRE; however, for the purposes of this assessment only elevation, slope, aspect, surface fuel model, canopy cover, and existing vegetation were used.

Wildland Fuel Models

A wildland fuel model is a mathematical representation of a vegetative fuel complex that specifies all fuel descriptors required for use in the fire models. The fire behavior modeling associated with the CWPP utilized the Scott and Burgan's Standard Fire Behavior Fuel Model (FBFM) classification system,

which describes the composition and characteristics of both surface and canopy fuels (Scott and Burgan 2005).

A major challenge in wildfire assessments is accurate mapping of fuels in order to determine spatial fire hazard and plan hazard reduction efforts. The LANDFIRE fuels layer represents the best available data for the Planning Area with the data spot-checked to verify that the fuel models, as reported in the LANDFIRE data, were representative of on-the-ground conditions. All fuels within the perimeter of the 2016 Rey fire were adjusted to "unburnable" to account for the effects of the recent burn. As vegetation recovers, fuels within the Rey fire area will again be capable of supporting wildfire spread.

The 30-meter resolution of the fuels data available from LANDFIRE does not capture the level of detail needed to assess small open spaces and urban lots; however, for planning purposes the 30-meter resolution of the data is sufficient to assess overall wildfire hazard and to make recommendations for minimizing identified hazards. A list and explanation of the fuel models used in fire modeling are available at *www.fs.fed.us/rm/pubs/rmrs_gtr153.pdf*.

Weather Data

Historic weather data obtained from the Montecito and Los Prietos Remote Automated Weather Stations (RAWS) were analyzed in Fire Family Plus using 90th and 97th percentile weather conditions for the Planning Area. Data for these two stations is limited to 1997 through present day. The RAWS located at the Santa Barbara Botanic Garden (established 2011) and San Marcos Pass (established 2015) did not have sufficient data to be included in this weather analysis.

The annual data was trimmed for the analysis to represent the summer and fall fire seasons from June 1 through October 31. This time period was selected as the "core fire season" as Fire Danger records indicate that this is the time of year when the minimum Energy Release Component (ERC) derived from the National Fire Danger Rating System is consistently greater than zero. An ERC greater than zero represents environmental conditions that will support the propagation of wildfire. While large wildfires have occurred outside of this core time period, these fires are generally wind driven, with unique conditions that could occur anytime of the year.

Both 90th percentile and 97th percentile weather conditions and weather parameters specified by SBC Fire were used in different fire modeling scenarios.

5.3 Wildfire Analyses Results

5.3.1 Hazard Assessment

The four categories for Fire Hazard (very high, high, moderate, and low) developed for this assessment are based on modeled flame lengths derived from Wildfire Analyst™ and the ability of firefighters to successfully suppress a wildfire of varying intensities. Table 11 details the expected fire behavior characteristics, hazard rating, and firefighter suppression capabilities. As wildfire intensity (as measured by flame length) increases, the ability to successfully suppress a wildfire decreases.

Table 11 Fire Behavior Characteristics, Relative Hazard Rating, and Suppression Capabilities

Flame Lengths (feet)	Relative Wildfire Hazard Rating	Interpretation
0 - 4	Low	Fires can be generally attacked at the head or flanks by persons using hand tools. Handlines should hold the fire
4 - 8	Moderate	Fires are too intense for direct attack at the head of the fire by persons with hand tools. Handlines cannot be relied upon to hold the fire. Equipment such as dozers, engines and retardant aircraft can be effective.
8 - 11	High	Fires may present serious control problems – torching out, crowning and spotting. Control efforts at the head of the fire will probably be ineffective.
11 +	Very High	Crowning, spotting and major fire runs are common. Control efforts at the head of the fire are ineffective.
Caution: These are not guides to personnel safety; fires can be dangerous at any level of intensity; Wilson (1977) has shown that most fatalities occur on small fires or isolated sections of large fires. Source: NWCG Fireline Handbook, Appendix B, Fire Behavior, April 2006		

Based on the analysis, very little difference in fire behavior characteristics appear between 90th and 97th percentile weather conditions. When stronger winds are added to the fire environment, wide scale problem fire behavior is observed.

Figure 21 spatially displays where problem fire behavior are probable under 90th percentile weather conditions. Problem fire behavior is defined as flame lengths greater than eight feet, which is the threshold where fire suppression actions at the flaming front of a wildfire are less likely to be successful. Locations near Twin Ridge, Trout Club, Painted Cave and Lower Paradise Road have elevated wildfire hazard.

As stronger winds, such as Sundowner winds, enter the fire environment, the modeled flame lengths significantly increase. Figure 22 depicts fire behavior under 90th percentile conditions but with an offshore wind event. Larger portions of the Planning Area display flame lengths in excess of eight feet.

Under these moderately strong offshore winds, the probable success of firefighting operations decreases and the importance of defensible space and appropriate site-specific hazard reduction mitigation actions to protect values at risk increases. Table 12 compares the expected flame lengths using a 90th percentile weather and offshore wind modeling scenarios.

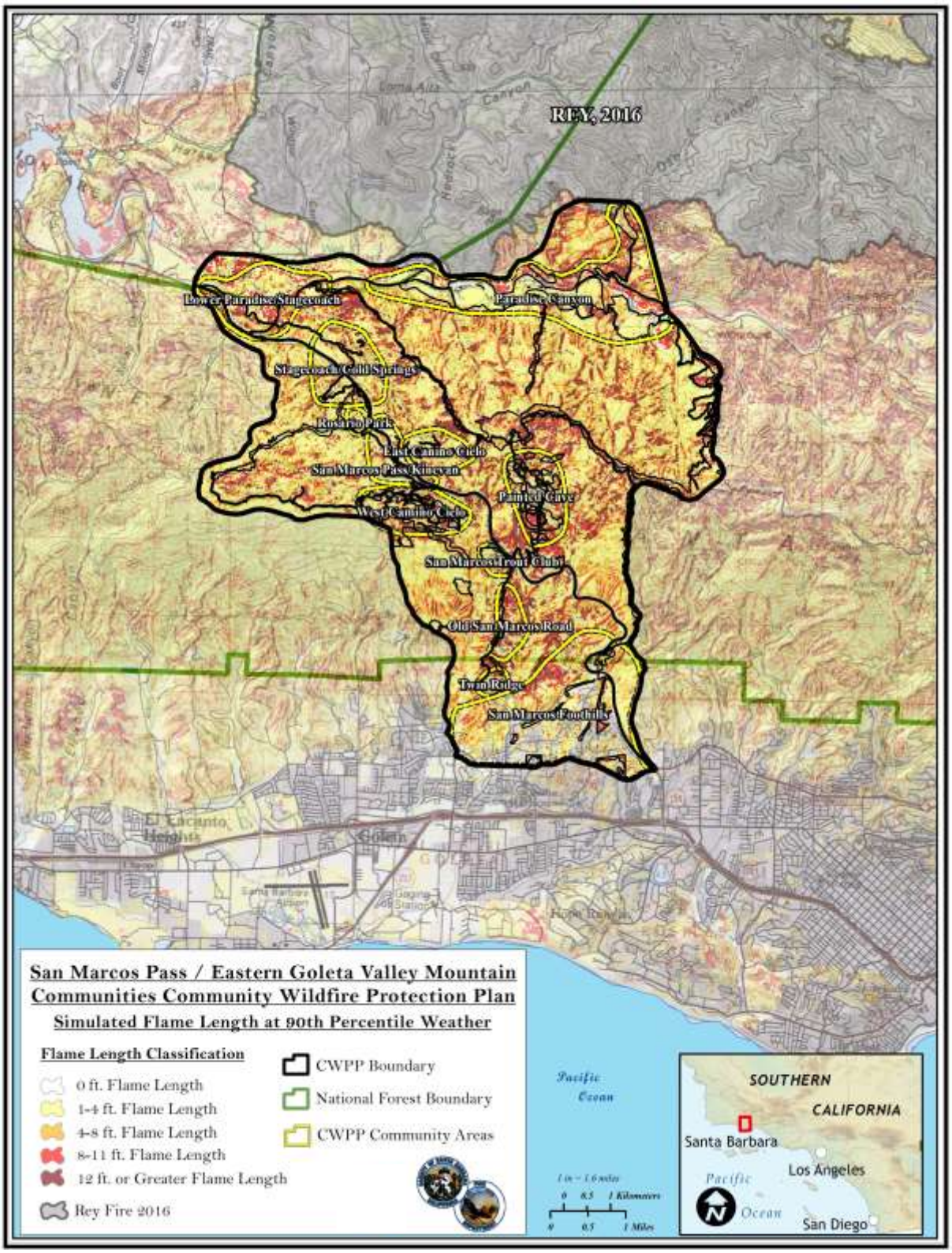


Figure 21. Results of Modeled Fire Behavior Using 90th Percentile Weather and Fuel Conditions Map

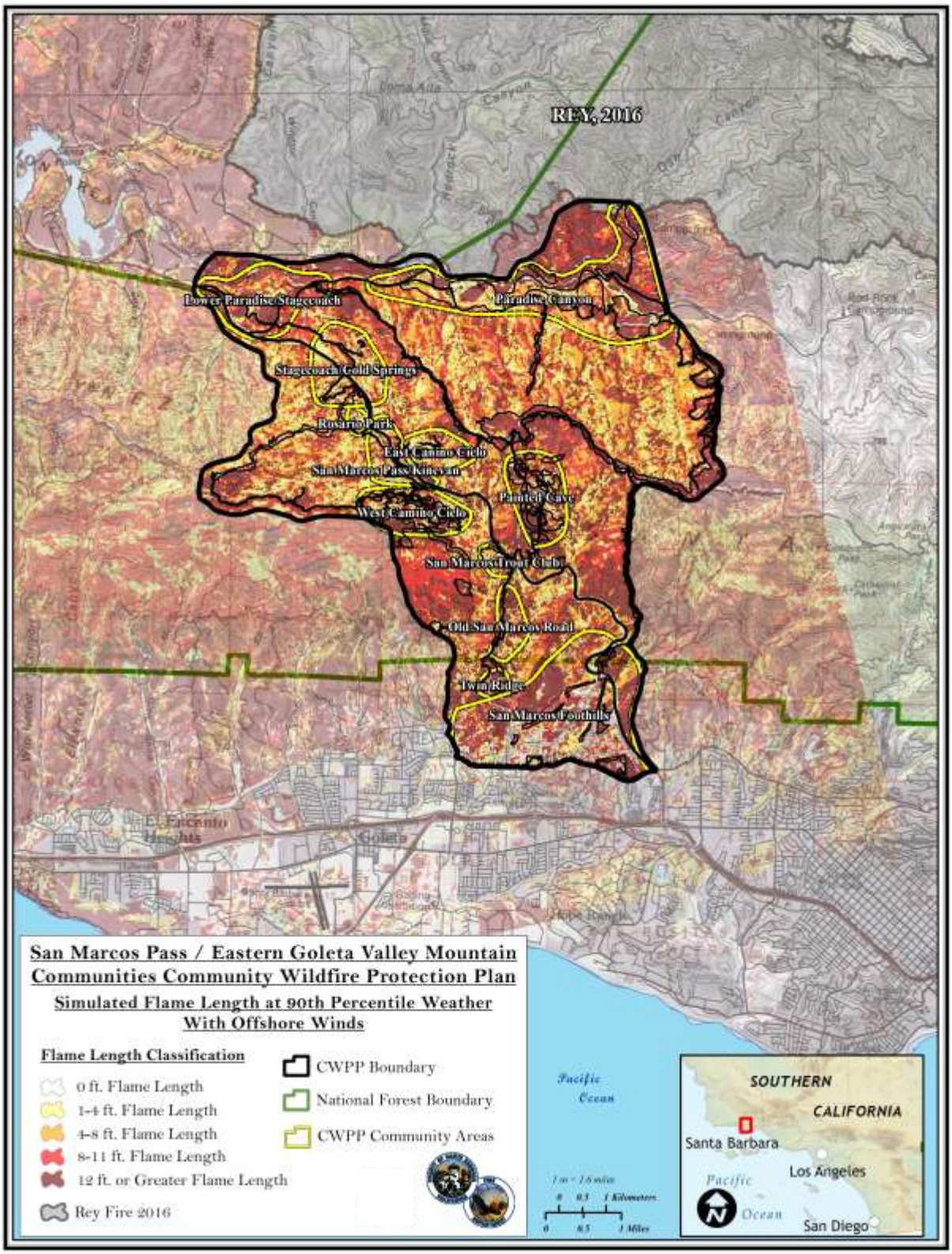


Figure 22. Results of Modeled Fire Behavior Using 90th Percentile Weather and Fuel Conditions with an Offshore Wind Event Map

Table 12 Flame Length Comparison - 90th Percentile vs. Sundowner Wind Conditions

Flame Lengths	90th Percentile Modeling Scenario	Offshore Wind Modeling Scenario	Relative Wildfire Hazard Rating
None	8.75%	5.62%	Low
0.1 - 4.0 feet	47.56%	19.83%	Low
4.1 - 8.0 feet	21.24%	21.27%	Moderate
8.1 - 11.0 feet	12.05%	23.47%	High
11.1+ feet	10.39%	30.81%	Very High

Portions of these maps (Figures 21 and 22) show no flame activity based on outputs from Wildfire Analyst™. This is a result of the 30-meter resolution of the fuel model data used for the fire model and the fact that urban development, lawns, roads, paved areas, and some agricultural lands are classified as "unburnable".

In the fire models, "unburnable" fuels do not generate flame lengths outputs; however, locations that do not generate modeled flame lengths may still experience fire activity as was evident during the 2009 Jesusita fire when wildfire spread readily through some "unburnable" areas. While there appears to be locations on the hazard map that are not at risk from a wildfire, this is not an entirely correct interpretation. The influence of ornamental vegetation and generalization of fuel models at a 30-meter resolution cannot fully account for all probable wildfire activity.

5.3.2 Risk Assessment

For the purpose of this assessment, the definition of risk is the likelihood that a landscape will burn in a wildfire. One can look at past wildfire ignitions and fire spread patterns to evaluate where wildfires have historically burned on the landscape, and from those patterns, make an assumption that environmental and anthropogenic factors will continue to support similar burn patterns in the future.

Utilizing 75 years of fire history data, the following methodology established wildfire risk for the Planning Area:

Burn Frequency

- Zero to one wildfire occurrence – Low Risk.
- Two wildfire occurrences – Moderate Risk.
- Three or more wildfire occurrences – High Risk.

Based on the analysis, western Paradise Canyon and areas west of San Marcos Trout Club, and north of San Marcos Foothill communities are at high risk.

Ignition Density

SBC Fire reported that countywide, 77 percent of all wildfires started within 50 feet of a road (SBC 2015). When expanded to include all available ignition data for a 20-year time period from SBC Fire, Los Padres National Forest, and CAL FIRE, a pattern of roadside fire starts become apparent. The transportation corridors of Highway 154, Paradise Road, Painted Cave Road, and Camino Cielo Road show the greatest ignition density.

Significant numbers of fires are also started by the electrical distribution system. County-wide, seventeen percent of wildland fire ignitions are caused by power lines. The Lookout Fire which briefly threatened the Painted Cave community in 2012 was started by a downed power line in the canyon below Painted Cave.

The CWPP Planning Area contains some 17.45 miles of electric power lines. In the wake of recent spate of power line related fires, Southern California Edison, the company that provides electricity service in most of southern California, has announced plans to substantially upgrade the safety of its utility facilities and distribution system. Potential elements of this program include increased vegetation management and removal of hazardous trees around power lines; overall improved maintenance and replacement of older power lines and equipment; replacement of uninsulated lines with insulated lines in critical locations; creation of a comprehensive dedicated weather monitoring system to anticipate and allow preparation for hazardous weather conditions; and shutting off power to critical line segments during hazardous conditions. No detailed plans or schedules for implementation have been announced at this time. Extensive tree trimming, tree removal and replacement of older power poles have, however, already occurred in some areas within the CWPP boundaries. Undergrounding of power lines has apparently not been considered due to potentially prohibitive cost considerations and, in wildland areas, potential high environmental costs.

Information on ignition patterns can assist fire managers in understanding where additional fire prevention efforts may be appropriate in an attempt to reduce the overall number of ignitions. Since nearly all wildfires associated within the Planning Area are human caused, a proactive fire prevention program may lead to a reduction in the number of wildfire ignitions.

Figure 23 depicts areas of risk and ignition density in the Planning Area.

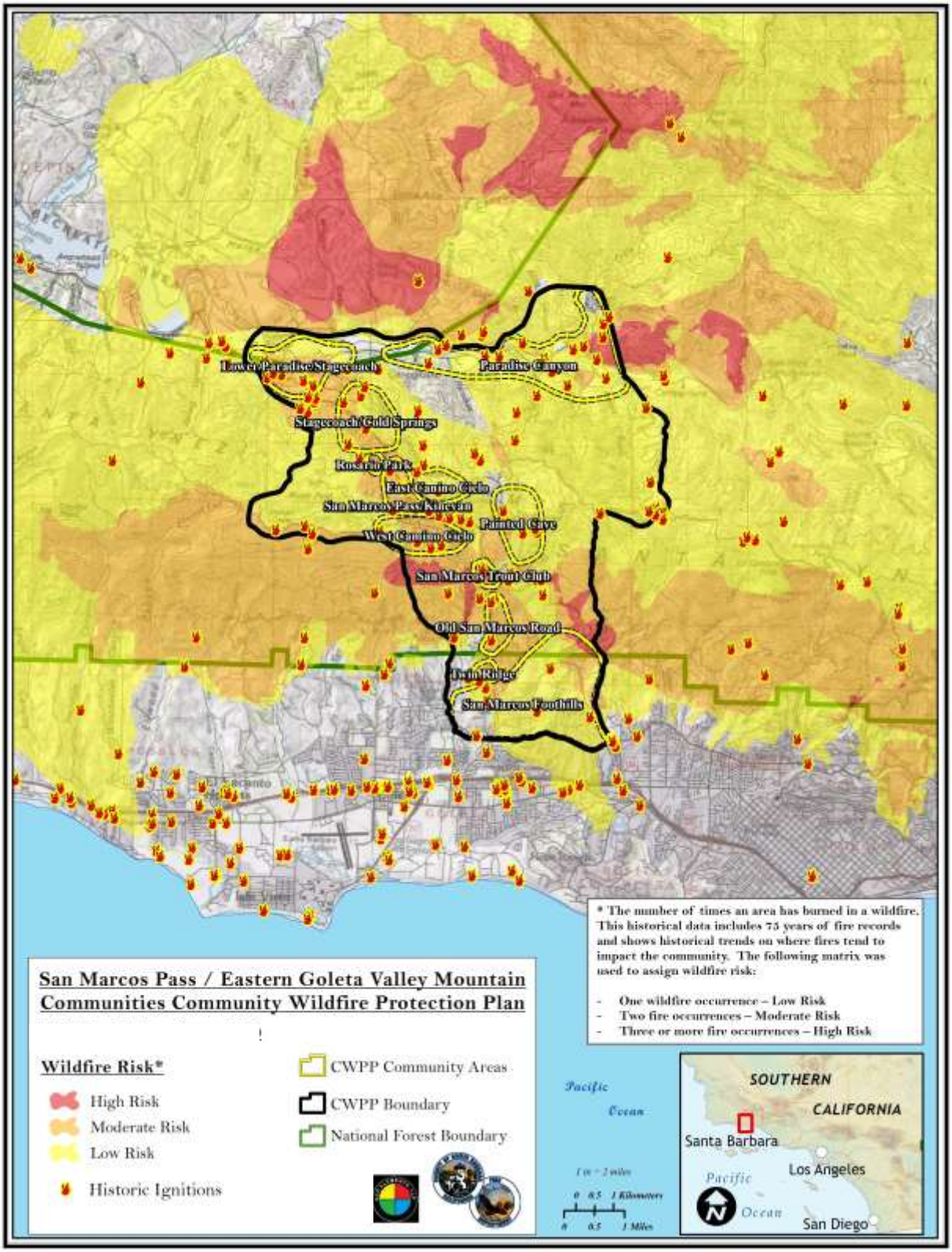


Figure 23. Wildfire Risk Map

5.3.3 Firefighter Safe Operational Space Analysis

The fire hazard and risk analyses does not account for life safety associated with structure defense. Defensible space helps to protect structures from igniting due to either direct flame contact or radiant and convective heat, but it is also important for the safety of firefighters assigned to defending structures.

An essential question related to firefighter safety is the required distance between a wildfire and firefighters in order to prevent thermal injury. The wildfire terminology used to describe this distance is Safe Separation Distance (SSD) and an area that meets the SSD requirements is called a safety zone. The SSD is based on thermal exposure of skin to heat. Heat exposure creates pain at about 111° F, first degree burns occur at 118° F, second degree burns occur at 131° F, and at 162° F human skin is instantly destroyed (NIST 2016). Typical forest fuels ignite at 500 to 750° F and burning temperatures can exceed 1,800° F.

For many years, the estimated SSD was four times the height of the flame length, which in effect is the distance required to prevent thermal injury from radiant heat. However, re-analysis of wildland firefighter fatalities and injuries, as well as combustion experiments at Missoula Technology and Development Center, have yielded updated safety zone guidelines (Butler 2014, 2015). These new guidelines include slope, burning conditions (to account for factors such as drought or presence of beetle kill), and wind as factors to calculate the SSD; thereby, accounting for convective heating (Additional information is available at https://www.firelab.org/project/firefighter-safety).

The new equation for SSD is:

$$SSD = 8 * \Delta * Vegetation\ Height$$

Where Δ is the slope/wind factor, as determined by Table 13.

Table 13 Safe Separation Distance Equation (Butler 2015)

Δ	Slope (%)				
Wind (mph)		0	15	30	>40	Burning Conditions
	0	0.8	1	1	2	Low
		1	1	1.5	2	Moderate
		1	1.5	1.5	3	Extreme
	10	1.5	2	3	4	Low
		2	2	4	6	Moderate
		2	2.5	5	6	Extreme
	>20	2.5	3	4	6	Low
		3	3	5	7	Moderate
		3	4	5	10	Extreme

Using the formula, a 15 mph wind, 24 percent slope, and 6-foot tall vegetation would require an SSD of 144 feet (8 x 3 x 6 = 144 feet). These distances are estimated for only one firefighter and do not include firefighting equipment. These distances translate into minimum safety zone sizes based on the number and types of fire suppression personnel and equipment. These guidelines for SSD were developed for wildlands but apply equally to the WUI.

Vegetation height must be either estimated on site through observations or acquired through remote sensing. LANDFIRE has an Existing Vegetation Height data layer, but this layer does not provide modeled or observed vegetation heights, rather, it provides height ranges based on vegetation type classes. This data does not provide the specificity required for an SSD analysis.

Light Detection and Ranging (Lidar) data are optimal for obtaining precise, high-resolution vegetation heights. No known Lidar data has been acquired, as of June 2017, for the Planning Area; however, the University of California, Santa Barbara (UCSB) acquired Lidar data in 2009, 2010, and 2011 for the Mission Canyon area just to the east of the Planning Area. Using this data, UCSB developed a Vegetation Height Model at 1-meter spatial resolution (i.e., the pixels are 1 meter by 1 meter square). Data from Mission Canyon serves as a good proxy for the Planning Area since the vegetation is similar.

Vegetation height model data was used in conjunction with the County's parcel data to quantify SSD across the Mission/Rattlesnake Canyon area and to summarize SSD for firefighters and civilians for the worst-case scenario, which is a wildfire burning under extreme conditions (greater than 20 mph winds and slopes greater than 40 percent). The mean SSD for 4,237 parcels was used in the analysis, which removed more extreme anomalies, such as tall trees that would skew the results. All parcels in the dataset had a mean SSD of greater than 100 feet, with the majority of parcels falling in the range of 300 to 700 feet mean SSD. The application of the SSD model indicates that the 100-foot defensible space clearance provides inadequate SSD for firefighter and property owners. This is critical to highlight, as a study from 2011 (Syphard et al. 2011) states that any clearance greater than 60 feet does not increase the probability of home survival in a wildfire; however, there are some key differences between the objectives of the 2011 paper and the analysis conducted here. The 2011 paper does not consider whether humans (homeowners or firefighters) were present in defending a home; it simply looks at the proximity of vegetative cover surrounding a home prior to a wildfire, and whether that home survived or not. Further, it does not account for burning conditions at the time of the fire and should not be used as guidelines for whether a home can be considered defensible during a fire event.

Approximately 38 parcels would need an SSD of 100 to 200 feet, 487 parcels would need 200 to 300 feet, and 3,712 parcels would need 300 feet or greater SSD within the area covered by Lidar. Figure 24 depicts the number of parcels in each mean SSD class as calculated from Lidar-derived vegetation height for Mission and Rattlesnake Canyons.

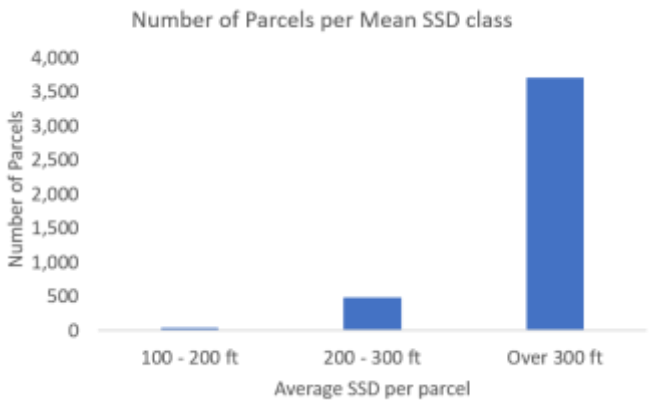


Figure 24. Mean Safe Separation Distances per Parcel within the Lidar coverage area

Given that the vegetation, topography, community characteristic, and environmental conditions within the Planning Area are similar to Mission and Rattlesnake Canyons, it is likely that most of the structures in the Planning Area do not have adequate SSD for life safety. This analysis presents what should be considered the most extreme estimation of SSD requirements, but extreme conditions are also when greatest loss of life occurs.

The high SSD values make it clear that under extreme conditions, such as a Sundowner wind event, it is neither reasonable nor prudent for homeowners or firefighters to try to defend homes from wildfires. The term 'defensible space' is a misnomer under these conditions. Vegetation modification along driveways and roads and structural hardening should be considered critical to facilitating life safety.

5.3.4 Structure Vulnerability and Defensibility Potential

Defining the degree to which a structure might be defensible during a wildfire is a highly complex issue. Many variables can affect the determination whether a structure has a high or low probability of firefighter's success in protecting or defending structures during a wildfire. One of the keys to defending a structure during a wildfire is the ability to secure a safe operational space from which firefighters can conduct structure defense operations. Once safe operational space has been attained, firefighters have the ability to address several tactical challenges that may be less than optimal for successful structure defense. The Incident Response Pocket Guide developed by the National Wildfire Coordinating Group identifies the following as potential tactical challenges (NWCG 2014):

- Narrow roads, unknown bridge limits, and septic tank locations.
- Ornamental plants and combustible debris next to structure.
- Poor driveway access and low clearances.
- Limited opportunity to observe the main fire.
- Wooden siding and/or wooden roof materials.
- Open vents, eaves, decks, and other ember traps.
- Fuel tanks, propane tanks and hazardous materials.
- Powerlines.
- Limited water sources.

- Residents/property owners remaining on-site.

For this CWPP, a combination of wildfire hazard and the rate in which firefighting equipment can produce fireline in various fuel types are used to determine structure defensibility. This evaluation does not include the site-specific tactical challenges listed above, but rather provides a more generalized approached to defensibility, allowing the public and firefighting personnel to understand where structure defensibility issues exist on a landscape scale. The analysis also does not take into account structural characteristics and defensibility of residences and other structures in the CWPP area. The defensibility of individual structures may vary greatly based on site specific topographical and fuel conditions.

Figure 25 spatially displays the "defensibility potential" for the Planning Area as a whole. The map is derived from the Modeled Flame Length Map overlaid with fuel model data used for fire behavior modeling. Each fuel model was assigned a "fireline production rate" of low, medium, or high based on the density of the fuels. The production rates used in this evaluation are from the West Wide Wildfire Risk Assessment developed for the Council of Western State Foresters and the Western Forestry Leadership Coalition (Sanborn Map Company 2013). Generally, grasses and low brush have higher fireline production rates than do heavy brush or timber dominated fuel models.

Table 14 displays how fireline production rates and wildfire hazard determined the defensibility potential for the Planning Area.

Table 14 Defensibility Potential Analysis for the Planning Area

Defensibility Potential			
Wildfire Hazard	**Fireline Production Rate**		
	Low	Medium	High
Low	Medium	High	High
Moderate	Low	Medium	Medium
High	Low	Low	Low
Very High	Low	Low	Low

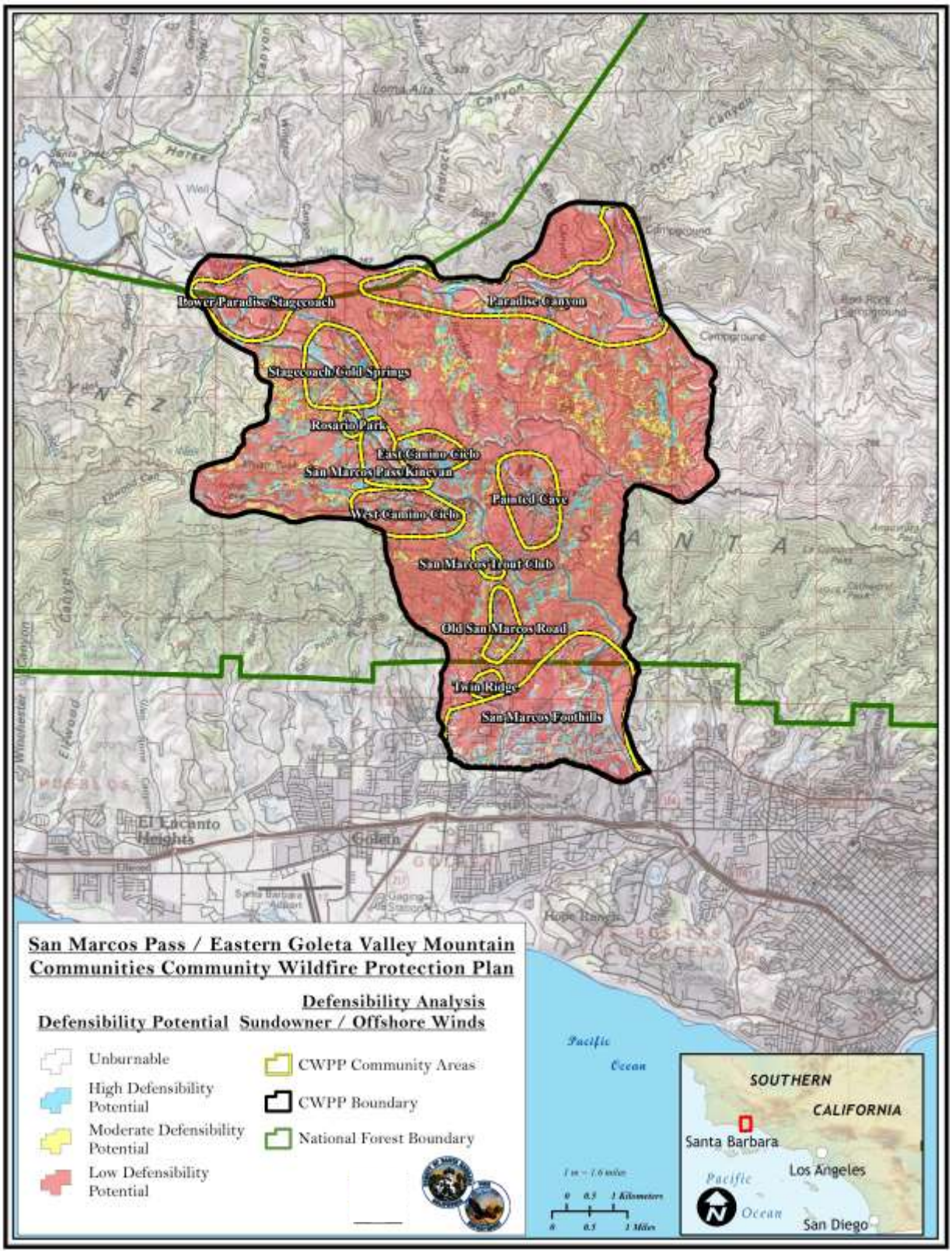


Figure 25. Defensibility Potential Map

Property owners and stakeholders should recognize that locations classified as having a high probability of defensibility in a wildfire still have a risk of suffering damage or being destroyed; however, this analysis helps to identify where hazard reduction work can improve the defensibility of structures in the Planning Area.

Structure Vulnerability

Based on results of the defensibility analysis, most of the communities have a low probability of defensibility absent adequate protective measures, especially under extreme conditions, such as a Sundowner wind event. It's important to note that, although Rosario Park shows a higher probability of defensibility, it still has a risk of suffering damage and loss. Additionally, defensibility also depends on the availability of and access for fire suppression resources. Table 15 provides results from the defensibility analysis for each community.

Figure 26 Home within the Planning Area. Source: Google Earth

No matter the environmental setting, many property owners within the Planning Area have not been proactive in hardening their homes making them vulnerable to damage and loss from a wildfire. A contributing factor for the lack of structure hardening could be the costs associated with hardening structures, which can be prohibitive especially for lower income property owners.

A cursory survey of structures in the Planning Area identified structures with the following vulnerabilities:

- A small number of wood shake shingles on roofs and siding.
- Inadequate defensible space.
- Native and ornamental vegetation poorly maintained.
- Wood exposures that appear to be hazardous, such as unmaintained patios or gazebos, eaves, fascia boards, and wood siding.
- Homes without boxed in eaves.
- Ineffective attic screens. Substandard screens will not prevent burning embers from entering vents, potentially causing ignitions in attics during wind-driven fires.
- Leaf and litter buildup in rain gutters and roof valleys providing an ignition source for burning embers.
- High-density neighborhoods.

Table 15 Defensibility Potential by Community Table

Community	Low	Moderate	High	Total
East Camino Cielo	66.69%	12.82%	20.49%	100.00%
Lower Paradise/Stagecoach	86.42%	2.72%	10.85%	100.00%
Old San Marcos Road	75.95%	9.96%	14.10%	100.00%
Painted Cave	81.63%	4.63%	13.73%	100.00%
Paradise Canyon	83.10%	4.89%	12.01%	100.00%
Rosario Park	42.32%	6.64%	51.04%	100.00%
San Marcos Foothills	77.47%	6.53%	16.00%	100.00%
San Marcos Pass/Kinevan	61.42%	9.69%	28.89%	100.00%
San Marcos Trout Club	56.33%	14.11%	29.57%	100.00%
Stagecoach/Cold Springs	65.59%	12.66%	21.76%	100.00%
Twin Ridge	76.79%	5.74%	17.47%	100.00%
West Camino Cielo	78.84%	7.57%	13.59%	100.00%
Grand Total	77.58%	6.74%	15.68%	100.00%

There are significant opportunities for wildfires to ignite, establish, and destroy structures. Pathways to structure loss depend on a variety of characteristics found in the WUI, including:

- Proximity to receptive wildland vegetation or ornamental vegetation.
- Community characteristics such as housing density, zoning, separation distance, and physical barriers.
- Structure composition including exterior structure construction material, structure design, site location (e.g., midslope, hilltop), flammable structure extensions (e.g., wood decks, wood patios), structure maintenance, and heat sources (e.g., landscaping, flammable exposures) within 100 to 200 feet of structures.

A receptive fuelbed may be native or ornamental vegetation, but can also be debris found in rain gutters or flammable roofing or deck materials. Roads, parking lots, green lawns, some agricultural lands, and bare ground limit the probability that an ember from a wildfire will cause a spot fire, but these areas represent only a small fraction of the total Planning Area.

Structure enclaves, interior open spaces, riparian corridors, ornamental vegetation, and/or eucalyptus tree woodlands are interspersed with structures throughout the communities. These characteristics

create opportunities for wildfires to impact communities. Vulnerable parts of a structure that contribute to ignition during a wildfire include:

- Roofing – Roof construction and maintenance has been a key factor in structure loss on many fires. It is not just the type of roofing material, but also the design, construction details, condition of the material, and whether the roof is clear of burnable material (e.g., pine needles other debris).
- Garages - Garages with gaps at the top, bottom and edges of doors allow firebrands (embers) to enter the structure. Oftentimes garages contain flammable materials that can enhance ignition potential. Garages usually have vents at various locations, especially if they contain gas furnaces or hot water heaters. These vents can be easy entry points for embers.
- Siding - Flammable siding can provide a pathway for flames to reach vulnerable portions of a structure, such as the eaves or windows. Siding needs a source of ignition, which in many cases includes vegetation, wooden decks, fences, stacked firewood, or other flammable material in close proximity to a structure. This can provide a heat source that can ignite siding.
- Vents - Soffit vents in the eaves are an easy entry point for wind-driven burning embers during a wildfire. Attic fires are not easily detected from the outside and structures have been lost when fire personnel have left the scene unaware that a fire has ignited within the attic.
- Windows - Unprotected and inadequate windows can be another major entry point for fire. Windows broken by airborne materials or cracked by thermal expansion during a wildfire ignite materials in the structure through radiation, convection, and/or firebrands (embers).
- Nooks and crannies - Little grooves, inside corners, and roof valleys all become areas where flammable debris (e.g., pine needles, bird's nests) have collected over time. Burning embers can land on this debris, igniting it.
- Crawlspace Vents – If not adequately screened, crawlspace vents, not just under a structure but also under decks and other attachments, are difficult to protect. Much like vents in the attic, firebrands enter these areas and flammable material underneath a structure can ignite.
- Wood Fences – Firefighters have observed that wood fences act as a fuel source that can carry fire to a structure. Fences when attached to homes present a threat to the structure.
- Wood Decks – Decks that are attached or directly adjacent to structures can act as a source of fuel. When ignited by wildfire the radiant and convective heat output can ignite structures. In addition, most decks are adjacent to large windows or glass sliders and the heat from a deck fire can cause the glass to fail allowing the wildfire to enter a structure.
- Flammable landscape vegetation and/or flammable items such as firewood or flammable debris piled in close proximity to the house - Structures are more susceptible to ignition when exposed to significant radiant and convective heat from burning material such as landscape vegetation and flammable piles, such as firewood.

5.3.5 Ember Exposure Zones

This CWPP uses fire modeling to evaluate the potential ember exposure of specific locations expected under offshore winds associated with a Sundowner weather event. While spotting can occur from fires

burning under onshore winds, fire intensity is typically lower on wildfires burning under these conditions; therefore, they are not as much of a concern to managers. Lower fire intensity leads to fewer firebrands produced and shorter transport distances for firebrands when compared to normally stronger off shore winds, such as Sundowners wind events.

The MAXSPOT output of FlamMap modeled the maximum distances that a firebrand should travel given a 60 mph wind blowing from the northeast. While FlamMap is the best available science for fire modeling, it does have limitations when it comes to evaluating chaparral-dominated systems. A limitation of this model is that it uses spotting distances from chaparral fuels based on a surface fire and not a crown fire. This limitation underrepresents ember exposure as presented in Figure 27 and should be used for comparative purposes rather than a specific quantified measurement of the maximum spotting distance of a wildfire. For this reason, a relative scale to quantify ember exposure is used in the CWPP.

To develop the Ember Exposure map (See Figure 27), the maximum spotting distance of each pixel on the digital landscape was determined from FlamMap using a 60-mph northeast wind and the "dry" fuel moisture scenario (i.e., 3, 4, 5, 30, 60 percent). Using the outputs from FlamMap, each pixel on the landscape was buffered using ArcGIS to represent the maximum spotting distance. For example, a pixel with a 300-foot MAXSPOT distance was buffered 300 feet in all directions from the center of the pixel. This creates a circle on the digital landscape with a 300-foot radius. When ArcGIS applies this concept to all pixels on the landscape, a series of overlapping circles is developed.

The number of overlapping circles for any pixel is then determined and evaluated against other pixels on the landscape to establish the relative intensity of the number of possible ember sources that can provide an ember to a pixel. Pixels with a high number of potential ember sources are rated a "High Ember Exposure Zone" while areas where few external sources of embers affect a pixel are considered a "Low Ember Exposure Zone". The gradation between these two ember exposure extremes created the color-coded frequency map used to evaluate the potential of an ember landing on any specific location of the landscape.

NOTE: It is important to recognize that it only takes a single ember to create a spot fire; therefore, areas classified as a "Low Ember Exposure Zone" are still at risk during a wildfire.

To account for the fact that FlamMap does not fully consider ember production from chaparral fuels, a second method evaluated spot fire potential within the Planning Area. For this evaluation, BEHAVE Plus determined how far an ember could be transported from the flaming front of a wildfire under a variety of wind speeds.

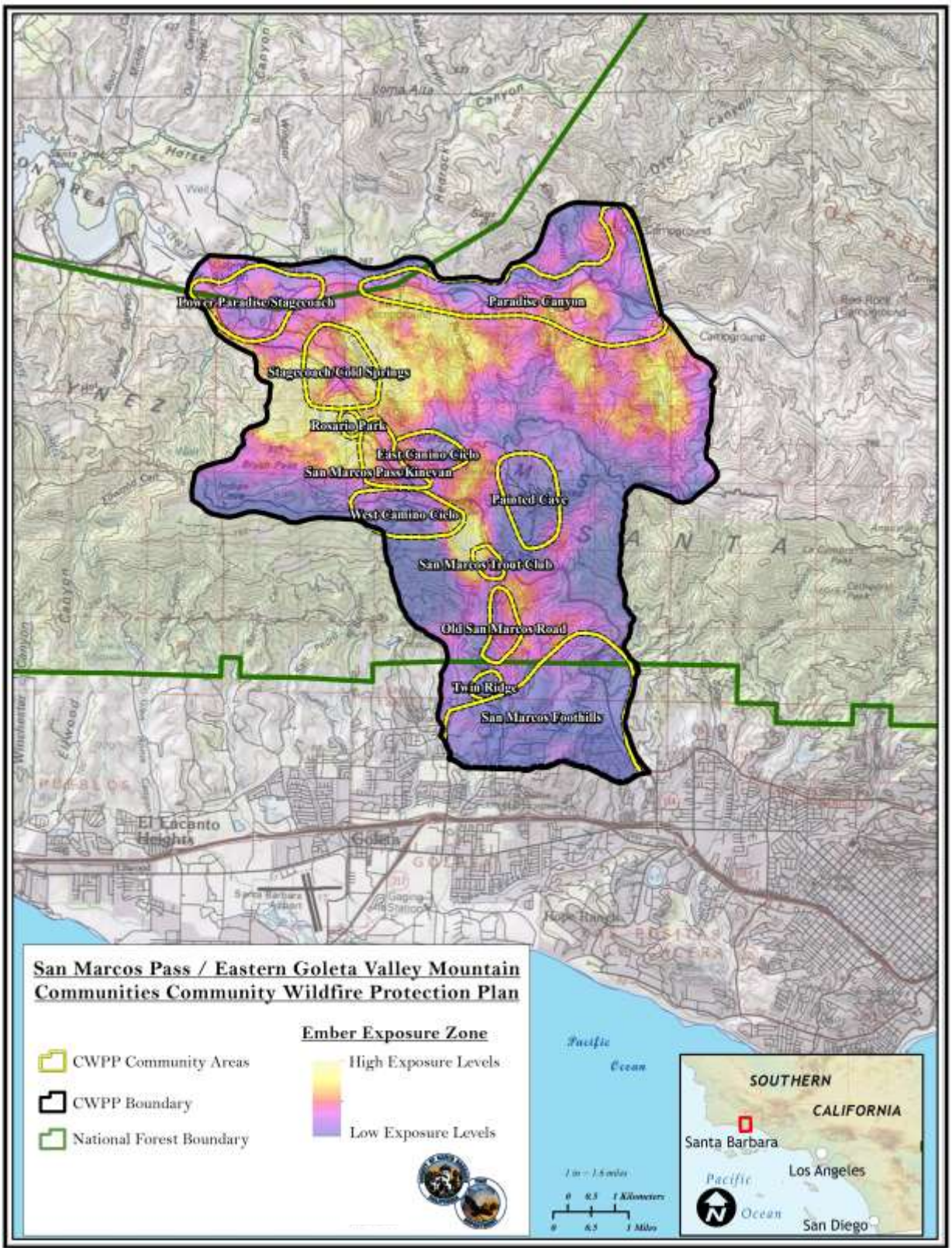


Figure 27. Ember Exposure Map

The point of the flaming front considered in this analysis was near the intersection of East Camino Cielo and Painted Cave Roads. Using a variety of 20-foot wind speeds spotting distances were determined (See Table 16). This table shows that under the strongest winds evaluated, improvements more than a mile downwind may be exposed to the ember cast of a wildfire.

Table 16 Spotting Distances

20-foot Wind Speed (mph)	Maximum Spotting Distance (miles)
30	0.8
40	1.0
50	1.2
60	1.4
70	1.7
Based on 13-foot surface flame lengths, three torching trees, and a downwind canopy height of 30 feet.	

5.3.6 Fire Run Damage Potential

Fire damage estimates can be difficult to accurately determine. Variables, such as the number and type of available firefighting resources, time of day, weather conditions, quality of defensible space, and residential construction standards, can all influence the degree to which structures, businesses, and infrastructure are impacted by a wildfire. For this CWPP, the following simplified methodology is used to quantify the potential monetary damages from a wildfire.

For the damage potential simulation, a wildfire with a point of origin on Highway 154 near San Marcos Pass was modeled for Sundowner wind conditions defined by SBC Fire. A strong offshore wind from late afternoon through early morning was used in the model with the maximum wind speed of 50 mph occurring at 1:00 a.m. Winds transitioned to onshore during the morning and early afternoon hours (minimum wind speed, 6 mph at 2:00 p.m.). Temperatures for the 24-hour modeling period ranged between 71°F and 90°F with live woody fuel moisture set at 70 percent. Also, for the simulation, fine fuels were considered fully cured with 1-hour fine dead fuel moistures at three percent. The fire model assumes that no suppression actions were taking place on the incident or that suppression actions did not significantly impact the free burning characteristics of the fire.

It's important to note that the modeling assumption will, in all likelihood, lead to a modeled fire larger than what would actually occur on a wildfire since fire suppressions actions on a real-world fire are generally occurring somewhere on the edge of the fire. Figure 28 displays the spatial extent of the modeled wildfire and the intersection with structures. SBC Fire provided structure location data. Additional fire runs under other conditions are available in Appendix A.

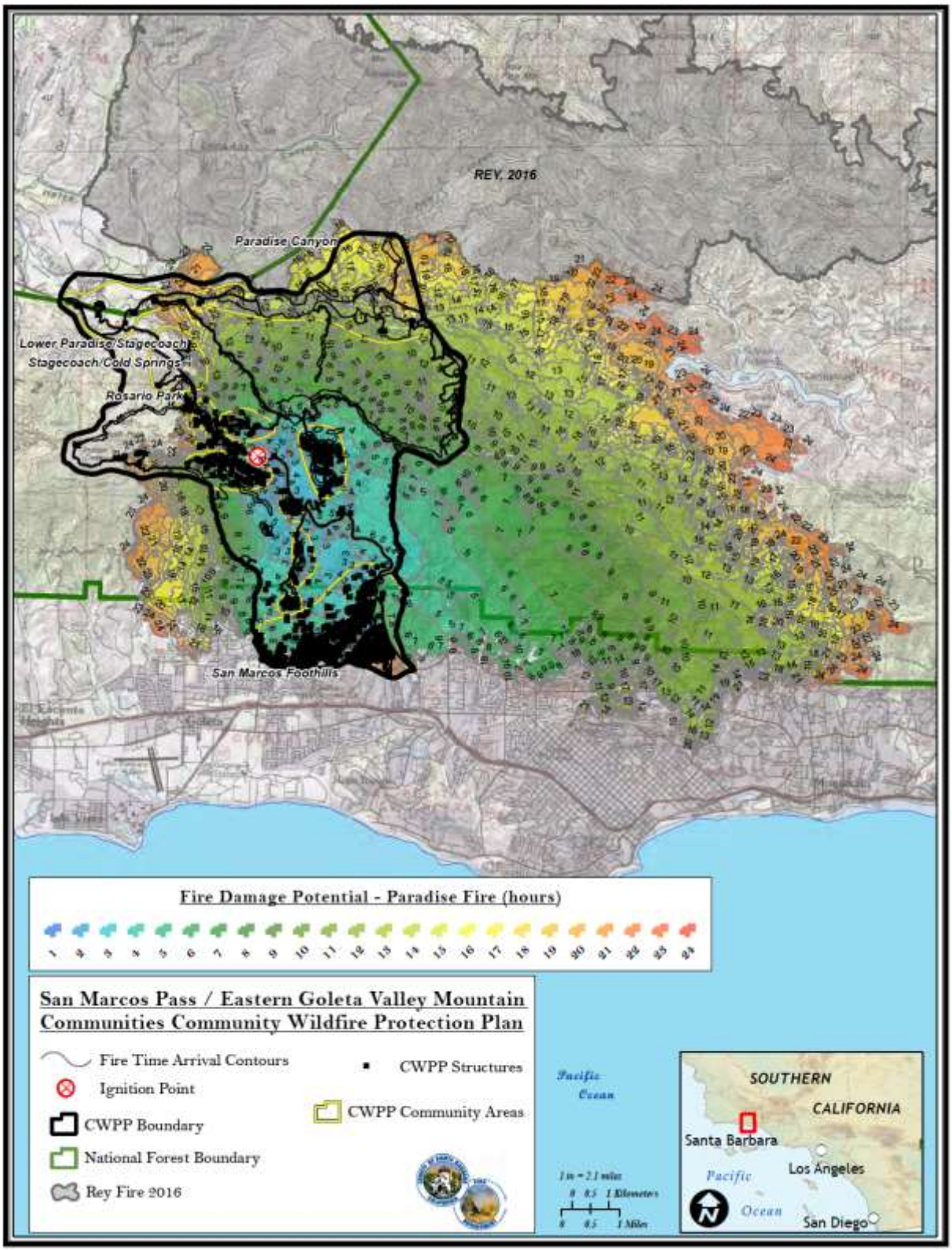


Figure 28. San Marcos Fire Run Damage Potential Map

In order to determine potential monetary losses based on damage to structures from the simulated fire, several assumptions were made. These assumptions included:

- Structure data provided by SBC Fire is complete and represents only occupied structures. The data does not include point locations of outbuildings.
- Structures within the simulated fire perimeter are damaged using the following criteria:
    - 25 percent of the structures are completely destroyed with a total loss of value.
    - 50 percent of the structures are partially damaged, losing 50 percent of the structure's value.
    - 25 percent of the structures are undamaged with no loss in value.
- The median home price obtained from Zillow for zip code 93105 is $1,059,400 and is applied to all structures impacted by the modeled fire (*www.zillow.com*, accessed 5/22/2017).
- No attempt was made to capture the value of businesses or other non-residential values within the modeled fire perimeter.
- Loss of natural or cultural resource values or post-fire flood damage assessments are not included.

Approximately 1,107 structures fall within or intersect with the final simulated fire perimeter. Using the standards previously defined, 277 structures are assumed to be totally destroyed, 553 structures are partially damaged, and 277 structures are undamaged. The total potential fire damage using these assumptions is $586,377,900.

5.3.7 Evaluate Wildfire Protection Capabilities against Modeled Fire Behavior

As described in Section 2, the Planning Area has strong fire protection coverage by multiple fire agencies under multiple agreements. In 2012, the SBC Fire retained Citygate Associates, LLC to conduct a deployment analysis and departmental performance audit. Citygate's report found that the County:

- Has a significant wildfire threat but has an excellent working relationship with the LPF and CAL FIRE.
- Works closely with mutual aid partners in training and equipping their firefighters to combat wildfires.
- Has adopted a prevention strategy to inspect and require best management practices fuel reduction measure for parcels with or next to significant wildfire hazards.

Evaluating the effectiveness of firefighting resources against wildfire is complex. On the same wildfire, there are locations where firefighters can be successful in defending structures or securing portions of the fire's perimeter, while at the same moment firefighters elsewhere on the wildfire are unable to engage due to the intensity and rate of spread of the fire.

A common standard used to evaluate the potential of firefighting resources to succeed on the fireline are the fire suppression interpretations based on flame length found in the Wildland Fire Incident Management Field Guide (NWCG 2014). Generally, these interpretations evaluate what type of firefighting resources would be required to successfully suppress the head of a wildland fire based on the observed flame length (see Table 11, Fire Behavior Characteristics, Relative Hazard Rating, and

Suppression Capabilities in Section 5.3.1). Since flame lengths can be directly related to potential firefighting success, these breakpoints are also used for classifying modeled fire behavior throughout the CWPP.

The classifications in Table 11 provide insights into resource capabilities but can be misinterpreted if applied out of context. For example, eight-foot flame lengths can be successfully suppressed by engine crews using hose lays, if they are able to approach the fire from a direction where convective and radiant heat are focused away from the firefighter. The same eight-foot flame length will likely overwhelm firefighters positioned in a manner where they are receiving large portions of the heat flux from the fire, such as when a fire is below firefighters or where firefighters are attempting a frontal assault on an advancing fire front. Butler and Cohen (1998) found convective energy transferred by wind gusts, fire whirls, or air turbulence can significantly increase the total heat transfer to the firefighter and increase the required safety zone size necessary to engage the fire.

5.3.8 Fuel Treatment Effectiveness

Fuels treatments have the potential to modify fire behavior by changing the structure, loading or continuity of an existing fuel complex. How much a treatment influences the fire behavior is primarily a function of the intensity of the treatment. More intense treatments, where large volumes of vegetation are treated and where the vertical structure of the fuel complex is disturbed to a significant extent, will have greater effects on the potential fire behavior than less intense treatments. However, even relatively minor changes to a fuel complex can have impacts on fire behavior by interrupting the continuity, changing the compactness of the fuelbed, or reducing fuel loading.

To judge the effectiveness of a potential fuel treatment, assumptions need to be made concerning how the action will change the fuel structure and fuel model within the treatment area. Evaluating the change in fuel model associated with a fuel treatment is not an exact science and requires professional judgment. In this CWPP, GIS was used to determine the existing fuel models within the Planning Area and professional judgment of the Fire Behavior Analysts was used to identify the post-treatment fuel models. Table 17 summarizes the changes in fuel models based on implementation of fuel treatments and resultant changes in fire intensity as measured by flame lengths.

The pre-treatment and post-treatment expected flame lengths for each fuel model displayed in Table 17 were obtained using a consistent set of environmental parameters in the fire behavior model BEHAVE 5.0. The change in flame length between existing and post-treatment conditions can be used as one method for evaluating the effectiveness of the fuel treatment.

Table 17 Estimated Changes to Fuel Models because of Fuel Treatments

Existing Fuel Model	Existing Model Number	Post-treatment Fuel Model	Post-treatment Model Number	Existing Condition Flame Length*	Post Treatment Flame Length*
Short, Sparse Dry Climate Grass	101	Short, Sparse Dry Climate Grass	101	2.2	2.2
Low Load, Dry Climate Grass	102	Short, Sparse Dry Climate Grass	101	6.6	2.2
Low Load, Dry Climate Grass-Shrub	121	Low Load, Dry Climate Grass	141	4.8	1.0
Moderate Load, Dry Climate Grass-Shrub	122	Low Load, Dry Climate Grass-Shrub	121	7.0	4.8
Moderate Load Dry Climate Shrub	142	Low Load Dry Climate Shrub	141	6.1	1.0
Very High Load, Dry Climate Shrub	147	Moderate Load Dry Climate Shrub	142	16.5	6.1
Very High Load, Dry Climate Timber-Shrub	165	Low Load Dry Climate Timber-Grass-Shrub	161	9.4	2.4
Low Load Broadleaf Litter	182	Low Load Broadleaf Litter	182	1.1	1.1
Moderate Load Conifer Litter	183	Low Load Compact Conifer Litter	181	1.3	0.7
Small downed logs	184	Moderate Load Conifer Litter	183	1.8	1.3
High Load Conifer Litter	185	High Load Conifer Litter	183	2.8	1.3
Moderate Load Broadleaf Litter	186	Low Load Broadleaf Litter	182	3.5	1.1
Large Downed Logs	187	Small downed logs	184	4.4	1.8
Long-Needle Litter	188	Moderate Load Conifer Litter	183	9.7	1.3
Very High Load Broadleaf Litter	189	Low Load Broadleaf Litter	186	15.5	3.5

* The consistent environmental parameters used in BEHAVE 5.0 to obtain the flame length output from the model are: Slope = 20%, Mid-flame Wind = 7 mph, Dead Fuel moistures = 4%, 5%, 6%, Live herbaceous fuel moisture = 30%, Live woody fuel moisture = 77%

Section 6.0 Action Plan

A fast-moving wildfire within and adjacent to the Planning Area is inevitable; however, we don't have to accept the loss of life, homes, infrastructure, businesses, and cultural and natural resources. Whether wildfires are catastrophic or not depends on the efforts and commitment of all stakeholders. However, the greatest responsibility for the protection of structures in a community rests not on the fire department but with property owners.

Current land use planning, zoning regulations, and municipal codes adopted by State of California and Santa Barbara County provide the regulatory basis for fire preparedness but these alone will not protect values within the Planning Area. Actions taken by property owners can significantly enhance the protection of life safety and greatly influence the survival of homes, schools, churches, infrastructure, and natural and cultural resources within communities during a wildfire event. Preparedness requires participation by all stakeholders, at all levels.

Since the question is not "if" but "when" wildfires will occur, a strategy to reduce the wildfire threat to values at risk can be developed. Utilizing the wildfire analyses from Section 5, appropriate risk reduction measures have been identified to address the hazards and risks while balancing the impacts to natural and cultural resources within the Planning Area. This Section describes existing community preparedness programs, potential actions to protect values and implement a fuels management strategy, and evacuation guidelines.

6.1 Community Preparedness and Education

Community preparedness is the ability of a community to prepare for, withstand, and recover from wildfire.

6.1.1 Santa Barbara County Fire Department

SBC Fire provides educational information, including information about special programs available to anyone who is interested in personal and public safety. The programs and educational information are designed to help individuals and their families become more safety conscious and prepared.

SBC Fire is responsible for the following activities related to wildfire hazard reduction:

- Fire Suppression.
- Managing the Defensible Space Program.
- Enforcing PRC 4291 (defensible space).
- Enforcing Development Standards.
- Writing and implementing the *SBC Unit Fire Plan* (meeting the *California Strategic Fire Plan* and *National Fire Plan* Standards).
- Assisting SBC Planning Department with Development Standards for High Fire Hazard Areas.
- Conducting Community Outreach and Public Education Programs.
- Conducting prescribed burns and vegetation management projects.

- Monitoring "fire weather" and maintaining and utilizing "Red Flag Alert" signs as part of the "Red Flag Warning Plan." The intent is to alert citizens of dangerous fire weather conditions.
- Administering the Burn Permit Program (agriculture and hazard reduction pile burning) to reduce hazardous accumulations of fuels.

SBC Fire's Programs include: Community Emergency Response Team, Ready! Set! Go!, PRC 4291 implementation, Fire Safety Trailer Program, Red Flag Warning Plan, Mobile Computer/Automatic Vehicle Locator Program, public service announcements, RAWS, and structure survey.

Community Emergency Response Team (CERT)

Started in 1985 Community Emergency Response Team (CERT) is designed to train civilians to meet their own and community's immediate needs following a disaster. The Federal Emergency Management Agency (FEMA) recognizes the importance of preparing citizens and the Emergency Management Institute (EMI). The National Fire Academy adopted and expanded the CERT materials believing them applicable to all disasters/hazards. Since 1993 when this training was made available nationally, communities in 28 States and Puerto Rico have conducted CERT training. A community can supplement its response capability after a disaster with civilians who can be auxiliary responders.

SBC Fire holds CERT classes several times a year throughout the County. Individuals wanting more information or are interested in having a CERT class in their area, should contact SBC Fire's Public Education Officer, Mike Eliason at (805) 681-5556 or email at Mike.Eliason@SBCFire.com.

Ready! Set! Go! (RSG)

Ready! Set! Go! (RSG) is a wildfire education campaign launched in May 2009 as a new approach to educating southern California residents about the year-round threat of wildfire. This public education program seeks to gain active public involvement in reducing life and property loss caused by wildfires. This program is presented in three steps:

- Ready! Prepare yourself, your family and your property.
- Set! Monitor fire weather/activity and prepare to evacuate.
- Go! Leave early when directed to by public safety officials.

This program provides a strategic approach and a specific action plan. It's intended to aid SBC Fire and other agencies in southern California in creating communications to reach each of its target audiences with one unified message. The program can be accessed online at *http://www.readyforwildfire.org/*.

California developed an app to aid in implementing the program. This app aids people in preparing for wildfire before it strikes by following Ready, Set, Go! Principles. The app includes easy-to-follow checklists for maintaining defensible space, hardening your home, creating a wildfire action plan, assembling an emergency supply kit, and evacuation information. This app is available free of charge through iTunes and Google Play at *http://www.readyforwildfire.org/Ready-for-Wildfire-App/* .

Public Resources Code 4291 Implementation

SBC Fire addresses the requirements of California PRC 4291 by sending annual notices to all property owners in the high fire hazard areas outlining the measures required to maintain defensible space around their structures. Along with the hazard abatement notices, SBC Fire utilizes public education efforts through the SBC Fire website, local television stations, and newspapers to inform property owners on PRC 4291 requirements and how to assure that the work that they perform complies with the requirements of the code. Prior to the onset of high fire season, SBC Fire conducts annual inspections of all parcels that fall under the requirements outlined in PRC 4291. A Vegetation Management Captain manages the inspection program and engine companies and staff inspectors complete the initial inspections. During the inspection process, SBC Fire may recommend hazard mitigation efforts beyond the minimum requirements of PRC 4291 based on slope and fuels surrounding the structure. Property owners have approximately three weeks to meet the required fuel modification outlined in the notice for their property.

A misdemeanor citation may be issued to any property owner who does not complete the required work by the compliance date, which may require an appearance in court. If for any reason SBC Fire is forced to abate a fire hazard, the owner will pay all costs involved, which will be added to the taxes assessed against the property. Current state regulations (PRC 4291) allow an insurance company to require additional clearance to obtain a policy only if the Fire Chief or designee determines that more clearance is necessary based on the fuel and topographic conditions surrounding the structure. Should a property owner receive a notice from an insurance company requiring that they perform additional hazard mitigation work; the property owner should immediately contact SBC Fire so that the County can address the issue directly with the insurer.

Fire Safety Trailer Program

SBC Fire launched this unique educational program using a travel trailer specially designed as a child-sized home complete with a kitchen, living room and bedroom. The Fire Safety Trailer visits each elementary school in Santa Barbara County and is set up for a 50-minute fire and life safety program. An engine company teaches this program with three to four firefighters serving as teachers, working directly with third grade students.

Red Flag Warning Plan

A Red Flag Warning means that the combinations of weather and fuel moisture conditions are at hazardous levels and could lead to rapid fire spread or increases in wildfire activity. SBC Fire's *Red Flag Warning Plan* utilizes SBC Fire personnel, cooperating fire agencies, citizen groups, and the news media to inform the public of the elevated fire danger and the need to be aware of and exercise fire safe practices during these periods.

The public may track Red Flag weather conditions through the Predictive Services website of the Forest Service. This website also supports a Santa Ana Wildfire Threat Index, a tool that allows interested stakeholders to monitor the potential development of Sundowner and Santa Ana winds, *https://gacc.nifc.gov/oscc/predictive/weather/index.htm.*

Mobile Data Computer/Automatic Vehicle Locator Program

SBC Fire utilizes Mobile Data Computers (MDC) in conjunction with the Automatic Vehicle Locator (AVL) system to locate and dispatch the closest available resources available to incidents. The installation of hardware on SBC Fire vehicles aid in the management of fire resources in the field and provides emergency responders with up to date incident information.

Public Service Announcements

Public Service Announcements (PSAs) are utilized by SBC Fire to inform the public about fire danger, fire safety education, and fire threat education. SBC Fire's Public Information Section serves as the point of contact for PSAs.

Remote Automated Weather Stations (RAWS)

Remote Automated Weather Stations (RAWS) provides real-time monitoring and weather data collection across the County. In conjunction with RAWS maintained by other agencies, the data are used to support SBC Fire's Fire Danger Rating program. In order to improve current and historic fire weather data, SBC Fire has added additional RAWS. RAWS units include San Marcos Pass (within the Planning Area), Santa Barbara Botanic Garden, Refugio, Tepusquet, Sedgwick, and Gaviota.

Interested publics can access RAWS data at *https://wrcc.dri.edu/wraws/scaF.html*, and at *https://mesowest.utah.edu/cgi-bin/droman/mesomap.cgi?state=CA&rawsflag=3*.

Structure Survey

To better identify structure vulnerabilities faced by firefighters in Santa Barbara County, SBC Fire, as a contract county for CAL FIRE, has completed a survey to collect specific structure data with the newly developed CAL FIRE "Defensible Space Inspection Worksheet" and SBC Fire's "Structural Assessment Report." A summary of results for the Planning Area are found in Appendix B. This information will become part of a statewide geodatabase allowing fire agencies the ability to map, display, and analyze structure locations, characteristics, and vulnerabilities.

6.1.2 Santa Barbara County Office of Emergency Management (SBC OEM)

SBC Office of Emergency Management (OEM), a division of the SBC Chief Executive Office, is responsible for emergency planning and coordination for the Santa Barbara County Operational Area. The mission of the OEM is to enhance safety and preparedness through strong leadership, collaboration, communication, and meaningful partnerships.

The programs of the SBC OEM are designed to protect lives and property by preparing for, preventing, mitigating, responding to, and recovering from disasters, threats, and emergencies. On a day-to-day basis, SBC OEM is responsible for emergency planning and coordination among the Santa Barbara operational area entities, which include:

- **Cities:** Buellton, Carpinteria, Goleta, Guadalupe, Lompoc, Santa Barbara, Santa Maria, Solvang.

- **Special Districts:** Air Pollution Control District, Fire Districts, Sanitary Districts, School Districts, Vector Control Districts, and Water Districts.
- **Volunteer Organizations:** American Red Cross, Amateur Radio Emergency Services (ARES), Equine Evacuation, and Montecito Emergency Response & Recovery Action Group (MERRAG), Volunteer Organizations Active in Disasters (VOAD).
- **Industry Groups:** Community Awareness and Emergency Response (CAER), Petroleum industry mutual aid group, Santa Barbara Industrial Association (SBIA).
- **Tri-County Coordination:** Santa Barbara County OEM also coordinates with adjoining offices of emergency services in Ventura and San Luis Obispo Counties. The Tri-County Coordinators meet and discuss regional preparedness several times throughout the year.

Aware and Prepare Notification System

Led by SBC OEM, Aware and Prepare is an emergency notification system that allows the County to alert individuals of existing or potential emergencies. By entering contact information into the system, Aware and Prepare is able to provide notifications of emergency situations based on an individual's locations. Property owner information provided to the County is protected through this system and not used for other purposes.

When a notification about a potential safety hazard or concern is issued, residents will receive a voice or text communication from the County. Participants in the program may request to confirm the notification to minimize receiving additional contact from the County regarding a specific incident. If a message is not confirmed, the system will continue to attempt to reach residents.

To create an account, residents can visit *https://awareandprepare.org* and add contact and location information into the mass notification system. All information is strictly confidential.

Community Awareness and Emergency Response (CAER)

Community Awareness and Emergency Response (CAER) is an organization initiated by industry designed to help assure emergency preparedness and foster community right-to-know for hazardous materials. CAER is intended to serve facilities that handle acutely hazardous materials, high-risk facilities, such as those required to complete Risk Management Plans, facilities handling significant quantities of hazardous materials, government agencies, and other organizations with compatible goals. Santa Barbara County CAER has expanded its goal to encompass "all-risk" emergency planning and disaster preparedness to serve its members and the community with the full resources of its knowledge base.

Amateur Radio Emergency Service (ARES)

Amateur Radio Emergency Service (ARES) is part of the Amateur Radio Relay League's (ARRL) extensive volunteer field organization dedicated to public service. ARES is comprised of amateur radio operators who volunteer to provide a resource of trained operators for reliable primary or secondary communications links for governmental agencies and non-profit organizations.

Voluntary Organizations Active in Disaster (VOAD), Santa Barbara County

Voluntary Organizations Active in Disaster (VOAD) is a non-binding membership organization. This organization fosters "the Four Cs" (Cooperation, Communication, Coordination, and Collaboration) among organizations to enable them to work together more effectively to help individuals and families affected by disasters. Each member organization maintains its own identity and independence while collaborating with other member organizations, faith groups, and local, state, and federal authorities. VOAD does not compete with or exclude organizations, but is rather a coordinating mechanism to improve collaboration among organizations throughout Santa Barbara County.

Radio Ready

The Santa Barbara County OES, the Orfalea Fund's Aware and Prepare Initiative, and California Concern (a local citizen group) have partnered with designated local radio stations to create Radio Ready, a system that connects the release of timely information from SBC OES to the radio-listening public.

Santa Barbara Equine Assistance and Evacuation Team, Inc.

The Santa Barbara Equine Assistance and Evacuation Team, Inc. (Equine Evac) is a volunteer group whose members are registered by the Office of Emergency Services as Disaster Service Workers. Equine Evac has equipment and personnel available for large animal evacuation and billeting. Members of the team must complete the Incident Command System (ICS) course and receive the Standardized Emergency Management System certificate. They conduct periodic training sessions on large animal rescue, extrication and airlift, transporting and housing of animals during emergencies, sponsor clinics and provide in-service training for interested community groups on topics, such as barn safety, trailering, animal safety, and evacuation. The Team has established a hotline, 805-892-4484, for residents to request assistance in the evacuation of large animals. More information about their services is available at *www.sbequineevac.org*.

Santa Barbara County Animal Services

Santa Barbara County Animal Services, in cooperation with the Santa Barbara Humane Society and other local non-profits, functions as part of the SBC's emergency response system in case of wildfires. Cats and dogs being evacuated from the CWPP area should be taken to the SB Humane Society at 5399 Overpass Road in Goleta. If the Humane Society is closed or has reached capacity, dogs and cats may be brought directly to the County Animal Shelter next door at 5473 Overpass Road. Rabbits, guinea pigs and other small pets should be brought directly to Animal Services at the County Animal Shelter. Care at the County Animal Shelter is provided by the Animal Shelter Assistance Program (ASAP, for cats), Bunnies Urgently Needing Shelter (BUNS, for rabbits and guinea pigs), and Shelter staff. Evacuation locations for larger animals will generally be posted on emergency information sites as soon as possible after commencement of the emergency.

County Animal Services field staff are trained and equipped to evacuate animals from evacuations zones when owners are unable to evacuate them on their own, and when fire conditions permit safe entry of the evacuation zone. The hotline number for requesting evacuation of an animal is, as of the date of

this CWPP (805) 681-4332. More information about their services is available online at https://countyofsb.org/phd/animal/aboutus.sbc.

6.1.3 Sheriff's Department

The Santa Barbara County Sheriff's Department (SBC Sheriff) is responsible for alerting and warning the public, coordinating evacuations, enforcing laws and emergency orders, establishing safe traffic routes, ensuring that security is provided at incident facilities, ensuring access control to damaged areas, ordering and coordinating appropriate mutual aid resources, and assuming responsibility for the Coroner function. The SBC Sheriff has the sole jurisdictional authority to order and lift evacuation notices within the Planning Area.

Reverse 9-1-1® System, SBC Sheriff's Department

The Reverse 9-1-1® system is managed by the SBC Sheriff. In the event of an emergency, an operator can identify the affected neighborhood or region of the County and record a message that describes the emergency situation. The Reverse 9-1-1® system will automatically call listed and unlisted telephone numbers within the affected area and deliver the recorded message.

6.1.4 Local Volunteer Fire Departments

Painted Cave Volunteer Fire Department

The Painted Cave Volunteer Fire Department (PCVFD) was formed on July 14, 1965, following nineteen homes being lost in Painted Cave in the 1964 Coyote fire. The Painted Cave Volunteer Fire Department, in cooperation with the LPF, SBC Fire, CAL FIRE and the residents of the area has created and maintained a perimeter fuelbreak around the Painted Cave community area and along homes on East Camino Cielo. A wildfire, on October 17, 2012, on the southwest corner of the community burned to the edge of the perimeter fuelbreak and did not burn into the community. This provided evidence of the effectiveness of perimeter fuelbreaks under moderate fire conditions of a fuel/slope driven fire.

Following the 2009 Jesusita fire, the PCVFD began the development of two "gel" application fire engines (fire engines meeting Type 3 brush fire engine requirements and adding direct gel application and compressed air foam systems (CAFS) capabilities on a Type 6 fire patrol sized vehicle). These smaller sized "gel" fire engines are equipped and as capable as the large Type 3 brush fire engines. Their ideal size allows them to access homes down narrow driveways and on these windy mountain roads. Gel can be a cost-effective way to provide short-term hardening when the home is threatened by a wildfire. Forty percent of the homes in the Painted Cave area now stock "gel".

The PCVFD has: two standard Type 3 brush fire engines; two brush fire engines that meet Type 3 requirements and also have "gel" and CAFS (but are the size of typical Type 6 fire patrols); and one Type 6 fire patrol.

Wildland Residents Association/ San Marcos Pass Volunteer Fire Department

The mission of the Wildland Residents Association (WRA) is to provide a liaison between the mountain communities and public safety agencies, and to support the San Marcos Pass Volunteer Fire Department

and community safety activities. The WRA is a non-profit public benefit corporation, incorporated in 1982 under the laws of the State of California, as a 501 (c)(3) IRC corporation. All donations to the WRA are tax deductible. There are no salaried positions in the WRA as volunteers and contractors do all work.

The WRA serves as a liaison between local and state government, public-safety agencies, Santa Barbara County Fire Safe Council, Santa Barbara County Executive CERT Committee, Tri-counties Training Officers Association, the public information group Emergency Public Information Communicators (EPIC), Volunteer Organizations Active in Disasters (VOAD) and the American Red Cross.

The WRA has raised and managed over one million dollars in federal and local grants to reduce hazardous fuel loading throughout the San Marcos Pass area. The WRA also sponsors many public education and prevention programs. The WRA hazard reduction projects are coordinated through the SBC Fire Safe Council, Forest Service and SBC Fire. Past projects have included the opening of old roads, the re-establishment of former fuelbreaks, clearing tons of heavy fuel, community clean up and support of the community chipper program. The WRA's opening up of the former quarry road from Highway 154 through the Arnoldi Property on the eastern side of the Maria Ygnacio Creek was credited by fire officials with providing important access to responding fire crews during the Jesusita Fire.

The WRA—San Marcos Pass Volunteer Fire Department serves the communities of the San Marcos Trout Club, East and West Camino Cielo, Rosario Park, Painted Cave, Paradise Road, and San Marcos Pass with initial attack fire response. The San Marcos Pass Volunteer Fire Department is organized pursuant to §14825 of the California Health and Safety Code as a fire company and registered with the Governor's Office of Emergency Services as a Santa Barbara County Operational Area resource. All San Marcos Pass volunteer firefighters are trained to the National Wildfire Coordinating Group 310-1 standards, the same as all federal wildland firefighters in addition to state mandated requirements.

Fire suppression efforts are based on the concept of "self-help." A quick initial attack prior to the arrival of SBC Fire and Forest Service firefighters has proven to be very successful in preventing small fires from becoming major incidents. In addition to fire prevention activities, the department provides local structure protection during wildland fires. Two compressed air foam systems (CAFS) units mounted on wildland firefighting patrols are stationed at the Trout Club and Rosario Park to provide a rapid response to local fires and emergencies.

Public education and prevention activities are a WRA priority. The radio program "Community Alert" is in its tenth year of broadcasting. WRA members Ted Adams and Mike Williams host this program on KZSB –AM 1290. The one-hour program airs on Tuesdays at 11:00 a.m. and again at 9:00 p.m., and Saturdays at 1:00 p.m. Community Alert features guests with a specific focus on issues that relate not only to the mountain residents but also to the entire Santa Barbara community. Interviews have included officials with local fire agencies, safety officials and emergency planners as well as national public safety experts. During the Jesusita Fire, the program provided 17 1/2 hours of uninterrupted broadcasting.

In response to the 2004 Gaviota fire, the WRA established the San Marcos Pass Emergency Radio Station (SMPERS). The station provides 24-hour emergency messages, community alerts, traffic advisories, fire weather reports and specific directions in case of fire or local emergency. SMPERS— 1040 AM is owned

and operated by the WRA—San Marcos Pass Volunteer Fire Department as part of the Santa Barbara County emergency information broadcasters network in the Santa Barbara County Operational Area emergency plan.

The WRA maintains a website at *www.wildlandresidents.org* that provides a variety of public information resources and links. During emergencies, the website provides current emergency information and links to various informational sites in support of the entire Santa Barbara community. The website supports an exclusive *Nextdoor* account that reaches over 400 users during an emergency.

6.1.5 Local Organizations

Santa Barbara County Fire Safe Council

The Santa Barbara County Fire Safe Council is a non-profit community organization formed in 1997 with a mission statement that tasks the organization, "To unify public and private organizations to educate, motivate and coordinate Santa Barbara County communities to minimize the losses associated with wildfire".

The Santa Barbara County Fire Safe Council provides education, provides evacuation planning, performs community vegetation management projects, and provides neighborhood assistance. Additional information concerning this organization is available at 805-969-2983 and *http://sbfiresafecouncil.org/about*.

Red Cross

The American Red Cross is a humanitarian organization led by volunteers and guided by its Congressional Charter and the Fundamental Principles of the International Red Cross Movement. The vision of the American Red Cross, Santa Barbara County Chapter is to provide relief to victims of disasters and help people prevent, prepare for, and respond to emergencies.

The Red Cross is not a governmental agency and relies on community donations of time and money to do its work. The Santa Barbara County Chapter, founded in 1892, can respond to an emergency serving more than 407,000 Santa Barbara County residents. The local Chapter has responded to many natural and man-made disasters, including the Zaca, Gap, Tea, Jesusita and Thomas fires.

The Red Cross provides preparedness training for a range of disasters, first aid and disaster supply kits, and disaster relief with a focus of meeting people's immediate emergency disaster-caused needs.

6.2 Protecting Values

This section describes actions that enhance protection of Planning Area values from wildfire: life safety, structure survivability, and natural and cultural resources.

6.2.1 Life Safety

Life safety is a core value of all activities identified in this Plan.

Public Life Safety

Most structures and communities within the Planning Area do not meet the criteria for sheltering in place with the potential exception of SBC Fire designated areas within the San Marcos Christian Camp, Laurel Springs Ranch, and scattered structures in the San Marcos Foothills and West Camino Cielo communities. However, fire conditions can quickly change making these shelter in place locations untenable. It is always advisable that property owners evacuate as quickly as possible once an evacuation order has been issued. Individuals don't have to wait to be told by authorities to leave since fast-moving wildfires may not allow emergency responders the time required to contact everyone.

Vulnerable individuals represent a unique challenge once evacuation orders have been issued. The number of vulnerable individuals and their locations are not fully known within the Planning Area; therefore, it is crucial that vulnerable and special needs populations have a defined evacuation preparedness plan prior to the next significant emergency incident. Early evacuation of these individuals improves their chances of surviving a wildfire while also helping firefighters keep roads clear of congestion for fire suppression and structure defense operations.

Firefighter Life Safety

As presented in previous sections, there are many factors that affect the ability of firefighters to protect structures and other improvements. However, the most critical decision made by firefighters during all fire suppression activities is the identification of suitable escape routes and safety zones. The threat to life safety from a wildfire occurs through three mechanisms:

- Inhalation of toxic gases that poison biological functions.
- Inhalation of hot gases resulting in tissue swelling to the point of obstructing air exchange to the lungs.
- Thermal injury to skin either through convective or radiative heating.

The *Firefighter Safe Operational Space Analysis* indicates that distances greater than 100 feet are likely needed for property owners and firefighters to allow for safer operational space during structure protection activities.

The fire history (Section 3.4) and wildfire analyses (Section 5) completed for the Planning Area demonstrates that often, the 100-foot minimum defensible space is not sufficient for firefighters or property owners to safely engage in structure protection activities during wildfire incidents. Those structures deemed as vulnerable without adequate safe operational space should be considered a fuel source and left to stand on their own in order to preserve life safety. It's imperative that firefighters and property owners are aware of the potential threat to their life safety when deciding whether or not to engage in structure protection activities.

Once ignited, a structure may not become fully involved in burning for some time after the wildland fire event; thus, during an emergency, firefighters and property owners may consider using a structure as a last resort safety refuge. This should only occur if the structure has been evaluated for ignition susceptibility and its involvement in the fire. For example, a structure consisting of aged weathered

wood siding is less desirable than a structure with intact fire-resistant surfaces. Structures can provide protection if individuals can exit the structure before it is fully involved and after the wildfire has passed.

6.2.2 Enhancing Structure Survivability

Structures must be able to stand on their own. Whether a structure survives a wildfire, depends on its vulnerability and its susceptibility to ignition. There may not be enough fire equipment and/or fire personnel available to protect every structure, and although personnel may become available, fire behavior may not allow firefighters to safely engage in structure protection activities. The following are effective measures that can enhance structure survivability during a wildfire: start at the structure first and follow the home ignition zone recommendations. These measures are discussed in detail below.

Start at the Structure First

Wildfires can enter structures through various pathways. The most important factor in protecting a structure is with the structure itself. The primary responsibility for protecting a structure lies with each property owner. Fortifying a structure to be more resistant to burning ember intrusion and direct flame impingement can improve its potential survivability. Detailed information on structure "hardening" measures is available from many sources. Two useful on-line sources can be found at *https://anrcatalog.ucanr.edu/pdf/8393.pdf* and *http://ucanr.edu/sites/Wildfire*. Appendix C contains a comprehensive guide for homeowners assessing structure vulnerabilities and identifying potential corrective measures for their own home. (See Appendix C, also available online at *https://ucanr.edu/sites/cfro/Fire_Information_Toolkit/Homeowner/*). Cal Fire's on-line Ready, Set, Go application also provides another useful home assessment guide (See *www.readyforwildfire.org/Ready-for-Wildfire-App/*). Table 18 provides general summary of measures that can enhance survivability of structures.

*Table 18 Structure Hardening Measures **

Structure Component	Structure Hardening Measures
Addressing	Required minimum letter/number height of 3" for residential and minimum of 6" for commercial with additional posting for longer access routes
Roof	Replace wood-shake or wood-shingle roofs with a Class-A fire-resistant type (e.g., composition, metal, tile). Openings in roofing materials, such as the open ends of barrel tiles, should be plugged to prevent ember entry and debris accumulation. Regardless of the type of roof, keep it free of bird's nests, fallen leaves, needles and branches.
Chimneys	Chimney and stovepipe openings should be screened with an approved spark arrestor cap.
Eaves	Cover the underside of the eaves with a soffit or boxing in the eaves, which will reduce the ember threat. Enclose eaves with fiber cement board or 5/8-inch-thick,

Structure Component	Structure Hardening Measures
	high-grade plywood. If enclosing the eaves is not possible, fill gaps under open eaves with caulk.
Exterior Siding	Noncombustible siding materials (e.g., stucco, brick, cement board, steel) are better choices. If using noncombustible siding materials is not feasible, keep siding in good condition and replace materials in poor condition.
Windows and Skylights	Single-pane windows and large windows are particularly vulnerable. Recommend installing windows that are at least double-glazed that utilize tempered glass for the exterior pane. The type of window frame (wood, aluminum or vinyl) is not as critical; however, vinyl frames can melt in extreme heat and should have metal reinforcements. Keep skylights free of leaves and other debris and remove overhanging branches. If skylights are to be placed on steep pitched roofs that face large amounts of fuels near (e.g., a mature pine tree, another house), consider using flat skylights constructed of double-pane glass.
Vents	All vent openings should be covered with 1/8-inch or smaller wire mesh. Another option is to install ember-resistant vents. Do not permanently cover vents, as they play a critical role in preventing wood rot.
Rain Gutters	Always keep rain gutters free of bird's nests, leaves, needles and other debris. Check and clean them several times during the year.
Decks	Keep all deck materials in good condition. Consider using fire-resistant rated materials. Routinely remove combustible debris (pine needles, leaves, twigs and weeds) from the gaps between deck boards and under the deck. Enclosing the sides of the deck may reduce this type of maintenance. Do not store combustible materials under the deck.
Residential Fire Sprinkler Systems	Fire sprinkler systems are required in all new one and two family dwellings and townhouses. Existing residents that increase/replace the gross floor area to 3,500 feet or more and the aggregate structural alteration is greater than 1,000 feet in gross floor area cumulatively dating back to 1991 are required to install an automatic fire sprinkler system. Annual maintenance service or inspection of these systems is strongly recommended to ensure operability. Water pressure and supply for exterior sprinkler systems must be adequate for exterior sprinkler systems to be effective. **
Flammable Items	Keep the porch, deck and other areas of the home free of flammable materials (e.g., baskets, newspapers, pine needles, debris). Keep firewood stacked at least 30-feet away from structures.
Defensible Space	Clearance from all structures shall not be less than 100 feet using surface measurements in SRA lands. Within the 100-foot perimeter, all brush, flammable vegetation, or combustible growth shall be modified so that a wildfire burning under average weather conditions would be unlikely to ignite the structure. Follow Primary Zone guidelines in Section 6.4.3.1 for potential increase in distance. Select fire resistant plants and non-combustible hardscape for the landscaping. Plants located within this area should be kept healthy and maintained frequently.

**This table includes Santa Barbara County's fire and building codes and PRC 4291. A cost comparison of larger structural components is available in Appendix B.*

*** The mountainous communities' water systems currently are not capable of adequately supplying water in terms of both the pressure and volume required to support exterior sprinkler systems for every home. Mountain homeowners should consult their local water suppliers to determine adequacy of supply for sprinkler systems or install on-site water storage tanks and water pressure systems with adequate capacity for sprinklers. Additionally, the municipal water system in the Lower Foothill communities may not be adequate to supply large numbers of sprinkler systems while still providing water to firefighters. Additional analysis on this system would be needed.*

Fuel treatment activities alone cannot protect structures during a wildfire. One burning ember falling on a receptive fuel that is located directly on or adjacent to a structure can ignite that structure, even when defensible space is well developed. A combination of hardened structures and appropriate defensible space is required to enhance protection of homes and communities.

Fire resistant construction is required under current Santa Barbara County Fire Codes. Applying these codes when remodeling or when addressing a structure's fire safety can reduce a structure's vulnerability. Three effective locations to target when undertaking on this work are the roof, vents, and decks. Retrofitting a structure with ignition-resistant materials in these three areas and rigorously maintaining defensible space will decrease a structure's vulnerability to wildfire.

Since a roof is the most vulnerable structural component, the best investment that can be made by property owners is replacement of vulnerable roof material. There are three different fire ratings assigned to roofs: Class A, Class B and Class C. A roof with a Class A rating is considered noncombustible and can withstand higher fire exposure without igniting. The Class B rating is given to roof structures that can withstand a moderate amount of fire exposure. The Class C rating is the lowest rating applied to roofing materials and can only withstand a small amount of fire exposure, but enough to allow those inside to escape. Santa Barbara County Ordinance 4871, approved by the Board of Supervisors in 2013, requires only Class A or Class B roofs in the WUI.

A preliminary look at the typical cost to reroof, stucco, and/or add a sprinkler or foam system to a structure in the Santa Barbara area can be found in Appendix B.

Home Ignition Zone

The NFPA developed the Home Ignition Zone (HIZ) concept. It includes the structure itself and everything from the foundation out 100 to 200 feet depending on fire behavior conditions and local policy (NFPA 2015). The HIZ was developed to assist property owners in understanding what they can do to enhance survivability of their homes. Figure 29 represents what this zone could look like after treatment. Locally, SBC Fire is available to assist property owners with specific questions and concerns. The HIZ has three zones:

Zone 1 encompasses the structure and all its attachments (e.g., wooden decks, fences, patios) for at least 30 feet on all sides. In this area, actions include:

- Assess the structure and implement recommendations from Table 18 above to enhance structure survivability.
- Restore, replace, and maintain wooden decks, fences, and patios to improve their fire resistance.
- Enclose open areas under decks with screens or other material.
- Manage ornamental and wildland vegetation so that they are carefully spaced, low growing, well- watered, and free of resins, oils and waxes that burn easily.
- Mow grasses regularly and prune trees up six to ten feet from the ground.
- Create space between tree crowns and trim back any trees that overhang the house.
- Create a 'fire-free' area within five feet of the home, using non-flammable landscaping materials and/or high-moisture-content annuals and perennials.
- Remove dead vegetation from under deck and flammable piles within 10 feet of house.
- Consider fire-resistant material for patio furniture, etc.
- Remove firewood and/or stacks or piles of flammable material; they should not be in this zone.
- Water vegetation and mulch regularly.
- Consider a landscaping method developed especially for arid and semiarid climates that utilizes water-conserving techniques.

Zone 2 is 30 to 100 feet from the home. Vegetation in this zone should be low growing, well irrigated and less flammable. In this area, actions include:

- Leave 30 feet between clusters of two to three trees or 20 feet between individual trees.
- Encourage a mixture of deciduous and coniferous trees.
- Create breaks in vegetation, such as driveways, gravel walkways and lawns.
- Prune trees up six to ten feet from the ground.

Zone 3 is 100 to 200 feet from the home (a permit may be required for distances greater than 100 feet in the EGVCP Planning Area, where fuel modification could affect Environmentally Sensitive Habitat. Refer to Section 6.4.3.1 for additional information). Under some circumstances, reducing fire intensity for life safety will involve extending fuel modification beyond 100 feet depending on the location of the structure on the terrain (e.g., midslope, ridgetop), exposure to high wind events (e.g., Sundowner winds), vegetation height and density, and potential fire behavior. Thinning in this area should occur, although less than what is needed in Zone 2. In this area, actions include:

- Thin vegetation and remove heavy accumulation of dead fuels, combustible growth, ground litter, and debris.
- Reduce the density of tall trees so canopies are not touching.

Figure 29. Home Ignition Zone Diagram (source: http://www.firewise.org)

Studies have shown that fuel treatments can be effective when firefighters have access to them. Structures that are vulnerable to ember wash but have safer operational space (i.e., fuel treatment) have an improved chance of survival since firefighters can more safely engage in suppressing spot fires that threaten these homes (Syphard et al. 2011). In absence of firefighters, vulnerable homes are more likely to be damaged or destroyed during wildfires, even if minimally adequate defensible space is provided.

Reducing risks within the HIZ is important and may require a neighborhood level effort to adequately address defensible space requirements. If private property owners cannot create 100 feet of defensible space due to property lines issues, PRC 4291 does not allow individuals to trespass in order to meet this requirement. However, on LRA lands, the Fire Chief can declare a fire hazard and require that the property owner do work that is in excess of PRC 4291 based on a notice of violation issued per local Fire Code Chapter 15.

In Figure 30, the Home Ignition Zone Overlap depicts neighboring homes with an overlapping HIZ. Property owners' activities or lack of activity within their HIZ can influence the survivability of a neighbor's home. Tight subdivisions that have homes built within 100 to 200 feet of each other can cause an overlap issue. Risk reduction efforts by all neighbors in these areas are beneficial to multiple properties.

Figure 30. Home Ignition Zone Overlap (source: www.firewise.org)

The HIZ concepts, when applied to other improvements in the community, can enhance their survivability as well. No matter the environmental setting, property owners should be proactive to harden their structures from the potential damage associated with a spot fire. Most important of these steps is compliance with California PRC 4291, which defines the standards for defensible space near a structure.

Example Fuel Modification

As described in Section 5.3.8 and summarized in Table 18, appropriate modification to fuels within the Planning Area can modify fire behavior thereby reducing the wildfire threat to life safety and structures. Figure 31 is an example of acceptable defensible space.

Figure 31. Example of Acceptable Work (Source: A Road Map to Fire Safety, Santa Monica Mountains)

Landscaping Vegetation

Property owners have a choice as to what they plant and maintain in their landscape. It's important to note that no vegetation identified as "fire resistant" has been scientifically tested. Vegetation can have fire resistant properties that can reduce its ability to burn but all vegetation will burn at a given temperature (Knutson-Petersen 2005). What makes vegetation resistant to fire is plant spacing, volume, leaf and needle size, quantity, spatial extent, location, high moisture content, reduced dead material, low percentage of volatile oils and resins, and maintenance of the vegetation.

Information on acceptable Firewise plants for the Santa Barbara area is available at *www.sb.watersavingplants.com/plants.php*.

Property owners and communities have a shared risk when it comes to wildfire and they should work together in their efforts to protect life safety and property. Since 2002, the Firewise Communities/USA Recognition Program has empowered neighbors to work together in reducing their wildfire risk. Using a five-step process, communities can utilize this CWPP to guide their residential risk reduction activities, while engaging and encouraging their neighbors to become active participants in building a safer place to live. Recognition as an official Firewise Community may be possible by applying through *www.firewise.org/usa-recognition-program.aspx*.

6.2.3 Natural and Cultural Resources

As a part of the planning process, the Development Team identified enhancing the protection of life safety as the primary goal, followed by the protection of property and the protection of natural and cultural resource values. During a wildfire, decisions made to defend and protect life safety, structures, and infrastructure will likely not be the same for natural or cultural resources.

Wildfires in this area have historically burned through chaparral vegetation as stand replacement fires. A stand replacement fire is a fire that either damages or kills most of the dominant vegetation, changing the structure and composition of the vegetation substantially. One method to reduce the impacts of

wildfire to natural and cultural resources is through fuel treatment activities. Fuel treatment activities can reduce adverse impacts from wildfires on important resources while also reducing the wildfire severity should these resources burn.

6.3 Fuels Modification Strategy

Any fuels treatment strategy for the Planning Area must be based on policies and standards found in the EGVCP, California PRC 4291, NFPA's HIZ concept, and the need to enhance wildfire protection for life safety, structures, and other values at risk identified by the community, while also protecting the visual quality of the community and its biological and cultural resources. The following discussion provides broad direction as to where and how to manipulate vegetation to reduce wildfire hazard. The greatest responsibility for the protection of improvements in the Planning Area rests not with the local agencies, but with the individual property owner. The fire hazard reduction work completed on the vegetation immediately surrounding improvements and structure hardening against a wildfire can significantly influence the survival of the improvements during a wildfire.

This CWPP contains specific suggestions and guidelines for both hardening structures and modifying vegetation within the HIZ to enhance wildfire protection. As stakeholders look beyond the HIZ to high wildfire hazard locations, the strategy must also look at existing fuel treatments, those treatments that have completed the planning process and have yet to be implemented, and stakeholder proposed projects for the improvement of wildfire protection.

Fuel treatment prescriptions vary in intensity based upon the objectives of potential actions. Intensity is measured by the amount of vegetation that is modified to meet site-specific hazard reduction goals (i.e., high intensity treatments generally remove a greater volume of fuel than a low intensity treatment). The fuel mitigation activities described in this CWPP follow local, state, and federal regulations.

The guidelines and project location in the CWPP are intended to be general in nature, with site-specific analysis required prior to implementation. The fuel reduction strategy serves to guide SBC Fire, Forest Service, and property owners in the development of project descriptions and project implementation best management practices and mitigation measures. Project specific environmental analysis will occur for potential hazardous fuel treatments, presented in the strategy, when it is required by county, state or federal regulations. This environmental analysis will comply with CEQA and NEPA requirements prior to project implementation. Appendix D describes the CEQA and NEPA process required for proposed projects identified in this CWPP.

6.3.1 Fuel Modification Types and Objectives

For purposes of the SMP/EGV CWPP, fuel modification efforts can generally be divided into five categories: individual defensible space; community defensible space; evacuation route and roadside treatments; Forest Service fuel modification and fuelbreaks; and staging and temporary refuge areas. The following summarizes the basic characteristics of each fuel modification category.

Individual Defensible Space

Individual defensible space refers to the area around a structure where the flammable vegetation has been modified to reduce the potential for the structure to ignite in the event of a wildfire. Defensible space provides firefighters a safer working environment that allows them to protect buildings and structures from encroaching wildfires. Additionally, defensible space can help minimize the chance that a structure fire will escape to the surrounding wildland. This space is wide enough to prevent direct flame impingement and reduce the amount of radiant and convective heat impacting a structure. The defensible space for each structure varies and depends on the vegetation and topography. Defensible space is a critical component of the HIZ concept outlined in Section 6.2.2. California Public Resource Code (PRC) 4291 requires that all structures in the State Responsibility Area maintain a minimum 100-foot defensible space, or to the property line if less than 100 feet. California Code of Regulations Title 14 Natural Resources section 1299 provides guidance for the implementation of PRC 4291 and provides the basis for the *General Guidelines for Creating Defensible Space* document adopted by the State Board of Forestry and Fire Protection in 2006. PRC 4291 Defensible Space is a core component of the "Ready! Set! Go!" Program, which has been adopted Statewide by most fire agencies including Santa Barbara County (SBC) Fire.

SBC Fire provides guidance for private property owners working within the HIZ as required in State PRC 4291. The following is a summary of actions based on direction provided by SBC Fire:

- Defensible space hazard mitigation actions, as defined in PRC 4291, are authorized up to 100 feet or to the property line where less than 100 feet is available.
- With site-specific inspection and authorization from SBC Fire, up to 300 feet of vegetation management may be undertaken even in Environmentally Sensitive Habitat areas, using PRC4291 vegetation management guidelines. Crossing property lines to achieve defensible space is not required, but is desirable when authorized by agreements with neighboring landowners. Actions affecting Environmental Sensitive Habitat and archeological (cultural) resources must comply with applicable County or Forest Service regulations and policies, unless exempt.
- Vegetation management may occur up to 10 feet on each side of a property owner's driveway, including Environmentally Sensitive Habitat areas regardless of the length of the driveway.

Portions of the Planning Area that fall within the boundaries of the *Eastern Goleta Valley Community Plan* (EGVCP) have specific policies that apply when a vegetation treatment is proposed within designated high/very high fire hazard areas that are designated as Environmentally Sensitive Habitat (ESH) or Riparian Corridor (RC). Only the following actions are authorized in ESH and RC lands for fuel treatment projects. Additional work can occur when a specific waiver is granted by Santa Barbara County (DevStd FIRE-EGV-1C (INLAND)):

- Removal of non-native trees or immature native trees.
- Removal of surface debris.
- Removal of invasive non-native plants, as defined and listed in the California Invasive Plant Council's *California Invasive Plant Inventory.*

- Removal of vegetation in non-riparian oak woodland or forest within the minimum defensible space area, as required by SBC Fire.
- Selective limb removal of mature trees away from structures within minimum defensible space area, as required by SBC Fire.
- Thinning, pruning or mowing of vegetation (except trees) to no less than that required to meet fuel modification criteria (in no case less than 4-inch stubble) and leaving the roots intact.

Community Defensible Space

Community defensible space is intended to provide fire protection at strategic locations around or near vulnerable communities or clusters of homes. A community defensible space should allow firefighters to safely operate near or along the edges of the threatened community. The goal is to prevent a fire from entering the community or significantly reduce direct impacts from radiant and convective heat. Properly designed community defensible space may also reduce ember spread and resulting spot fires within the threatened community, but will not eliminate these risks. Consequently, community defensible space should not be viewed as a substitute for proper maintenance of individual defensible space and structure hardening within the community. Community defensible space becomes especially important in communities with clustered small parcel sizes that preclude the ability to achieve adequate individual defensible space. Where these dense communities abut larger open space parcels the guidelines for individual defensible space can be applied to a larger community-wide treatment. This can be applied to dense suburban neighborhoods adjacent to wildland areas as well.

Community defensible space may incorporate individual residential defensible space but will also generally include larger areas located on private lands with the permission of landowners, or on County or federal lands through agreements with the County or United States Forest Service (Forest Service). Responsibility for construction and maintenance of community defensible space will generally be assumed by SBC Fire, the local volunteer fire departments, local community associations, Forest Service (on federal lands), or some combination of these.

Community defensible space fuel treatment prescriptions and design guidelines follow those of individual defensible space. Project planners should design fuel treatments that complement and build off individual defensible space efforts. In most cases fuel treatment prescriptions will follow those for the fuel reduction zones outlined in Section 6.4.2, Tables 22 and 23. Roads, existing natural barriers, and agricultural green belts can complement and enhance the effectiveness of community defensible space zones.

Evacuation Routes and Roadside Treatments

Fuel modification along roadways is a major element of the community protection strategy of the CWPP. Roadside fuel modification is intended to accomplish three main purposes: (1) reduce threat of fire ignition and spread from roadways; (2) improve safety of evacuation routes for residents and ingress/egress for firefighters; and (3) improve potential for containment of fires along roadways.

Since roadways are a primary source of fire ignitions from such things as discarded cigarettes, overheated vehicles and vehicle accidents, fuel reduction on roadways is an important means of reducing the chances of fires starting and of minimizing the spread of roadside ignitions that do occur. Since roadside clearing

may also promote the growth of highly flammable lighter fuels (i.e. grasses), regular maintenance is essential for maintaining the effectiveness of roadside clearing.

Reducing the threat of direct exposure to flames and smoke along routes is important during emergency situations for safe evacuations and firefighter access. Attempting to escape through active flames has resulted in a significant number of fatalities in past wildland urban interface fires. Even the threat of getting caught in flames may be sufficient to effectively close evacuation routes. In addition, many public and private roadways in the mountainous areas of the CWPP are extremely narrow. Removal of brush and foliage along these roadways significantly reduce the risk of collisions between evacuating vehicles and incoming fire equipment or other vehicles by improving sight distances and potentially increasing passing widths.

Roadways in the Planning Area are generally not sufficient to stop an intensive slope-driven or wind-driven wildfire even with major roadside clearing. However, roads can provide a usable barrier and relatively safe space for firefighters to work under more moderate conditions and along the flanks of fires. Roadside fuel modification also serves the purpose of increasing firefighter safety in these situations and substantially increases the chances of containing fires along roadways.

Within the Planning Area, road clearances will normally be 10 to 20 feet wide on both sides of roads. In some cases terrain features, particularly steep slopes, or environmental considerations may restrict roadside clearing to shorter widths. Clearance up to 50 feet on each side could be considered along some sections of the potential evacuation routes (See Figure 37), such as Highway 154, West Camino Cielo, and Paradise Road.

Forest Service Fuel Modification and Fuelbreaks

The majority of land included within the Planning Area consists of federal lands managed by the Los Padres National Forest (LPF). Fuel management activities within these lands are governed by the Forest Service and are not subject to control by state or county governments; however, existing and planned LPF fuel modification plans have been taken into account during the development of this CWPP. Ongoing collaboration with LPF personnel will be required to implement aspects of the CWPP that involve federal land in the future. Existing and potential future LPF fuelbreaks are shown in Figure 32. LPF fuel management activities relevant to the CWPP generally fall into three categories: community defense zones, fuelbreaks, and recreation area and facility maintenance.

Santa Barbara Mountain Communities Defense Zones Project: In 2016, the LPF completed an environmental analysis and in 2017 approved the Santa Barbara Mountain Communities Defense Zones Project, which includes proposals for several community-oriented fuel treatments on federal lands within the CWPP Planning Area (See Figure 32). Some of these fuel treatments involve maintenance or expansion of previously treated areas (i.e., near Rosario Park, Haney Tract (West Camino Cielo), the Trout Club, Painted Cave) and some involve potential new fuel treatments (i.e., Lower Painted Cave area). Two fuel treatments in the project involve fuel reduction close to existing communities (i.e. Painted Cave, the Trout Club); therefore, may be considered part of the community defensible space network for these communities. Details concerning this project may be accessed at *www.fs.usda.gov/project/?project=44697*.

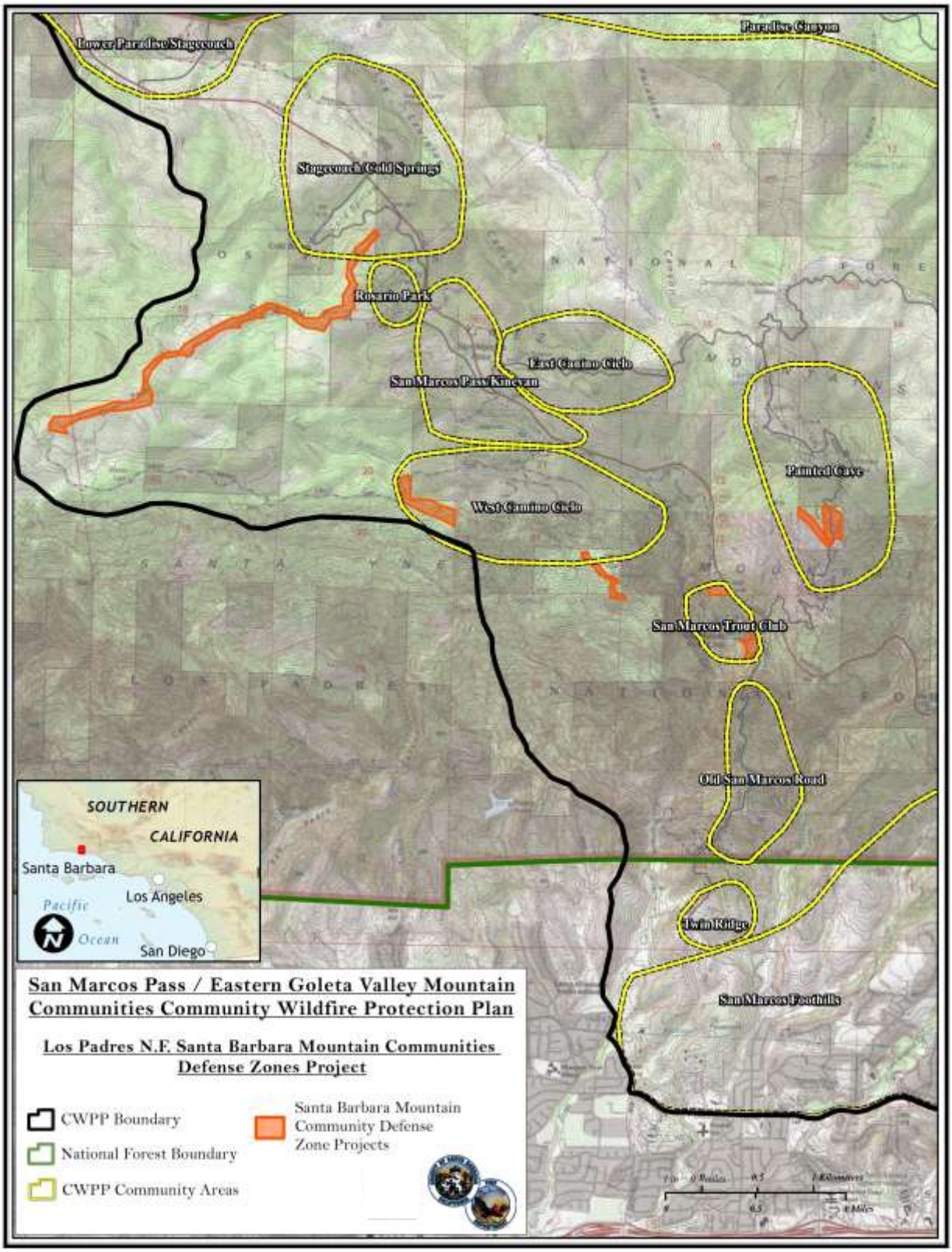


Figure 32. Los Padres National Forest Santa Barbara Mountain Communities Defense Zone Project Map

Strategic Fuelbreaks: The LPF has historically constructed and maintained a number of strategic fuelbreaks in the CWPP Planning Area, including the Windy Gap, East Camino Cielo, Arroyo Burro, Snyder, Fremont and Brush Peak (Rosario Park) fuelbreaks. While there are many instances of wildland fires stopping at maintained fuelbreaks, they are typically not expected to operate in isolation. Strategically placed fuelbreaks are designed to reduce the rate of spread, residence time, and intensity of the wildfire. They are intended to be used in conjunction with firefighting resources. Maintained fuelbreaks increase the safety, efficiency, and effectiveness of the fire response by providing firefighters better access and safe locations to establish anchor points to engage in wildfire suppression. Many of these strategic fuelbreaks were first completed in the 1950's, 1960's and 1970's. The maintenance status of these strategic fuelbreaks varies. Funding constraints have generally precluded regular maintenance activities. However, fuel reduction activities have occurred when these fuelbreaks were designated as secondary or contingent control lines during past major fires. Specifically, dozer lines and/or hand crew clearing have occurred on the Brush Peak, Fremont, East Camino Cielo, West Camino Cielo, Haney Tract, Arroyo Burro, Snyder and Windy Gap fuelbreaks in response to the Paint, Zaca, Gap, Jesusita, Sherpa, Rey, Whittier and Thomas fires.

Due to uncertainties in federal government funding priorities, the future of these fuelbreaks is uncertain. In 2015, the Forest Service conducted a Los Padres National Forest Strategic Fuelbreak Assessment. The objective of this assessment was to complete a science-based analysis of the current legacy fuelbreak system; develop a decision support tool to determine which fuelbreaks should be retained; and provide a priority ranking for maintenance activities. The Camino Cielo fuelbreak, which crosses through the middle of the Planning Area was ranked as the highest priority fuelbreak on the Los Padres National Forest. The final assessment can be found at: *https://www.fs.usda.gov/nfs/11558/www/nepa/99111_FSPLT3_3892200.pdf*.

Recreation Area and Facility Maintenance: The LPF maintains an extensive range of recreational facilities (e.g., roads, trails, campgrounds, day use areas) in Paradise Canyon, and an extensive array of administrative facilities, maintenance facilities, firefighting installations and employee housing. Several critical Los Padres National Forest Fire Access Roads are located in the Planning Area, as well as public trails. The Forest Service generally maintains fuel treatments around all such facilities both to protect the facilities in the event of a fire and (particularly in the case of recreational areas, trails, and roads) to prevent accidentally started fires from spreading to adjoining wildlands. Treatments are largely within grass and light shrub fuel types with a Coast Live Oak overstory. The treatments historically consist of yearly mowing and weed whipping annual grasses after annual fuels have fully cured. The 2013 White fire and 2016 Rey fire served as good reminders of the real wildfire threat which has historically occurred along Paradise Canyon recreational sites. There are numerous permitted recreational residences on federal lands managed by the Forest Service along Paradise Road. Residents are responsible for maintaining their annual fuel reduction in accordance with state defensible space requirements. One major goal of the CWPP is to increase support for vegetation management around facilities, particularly around campgrounds and other recreational areas.

Staging and Temporary Refuge Areas

The Development Team and advisors identified two areas where fuel modification might be utilized to create staging areas and/or temporary refuge areas where residents or firefighters might occupy in lieu of evacuating while a wildfire passes through an area. One of these potential shelter in place zones is at the San Marcos Christian Camp, where safe evacuation under certain circumstances, may be impractical due to access issues and the speed of an approaching fire. Another potential temporary refuge area is located in the lower Painted Cave area. This area has been recommended by Forest Service personnel as a potential safe area to assemble firefighting personnel and equipment when applying "fire following" tactics. "Fire following" may be employed where fire conditions are too intense to allow firefighters to take position ahead of an oncoming fire, but where it may be possible to save structures that have not yet ignited or become fully involved after the main fire front has passed through. Decisions on the size, design and advisability of these potential shelter in place zones will require extensive further evaluation in light of factors discussed elsewhere in the CWPP. It should be noted that some existing treated areas in the Planning Area have been used, formally and informally, as shelter in place locations in the past (e.g., the built-up area of Laurel Springs Ranch adjacent to the Painted Cave Community). Some recreational sites in Paradise Canyon may also be suitable for sheltering-in-place if evacuations are impractical.

6.3.2 Methods of Fuel Treatment

Fuel treatment types take on many forms but can generally be divided into five treatment categories: mechanical, manual, prescribed fire (pile burning), biological and fire retardant application. The fuel treatment strategy for this CWPP may involve all of these treatment types. The following are brief descriptions of these common fuel treatment methods:

Mechanical

Mechanical treatment is generally associated with larger fuel treatment areas where the cost associated with the use of industrial mowers or masticators can be reduced by the ability to rapidly treat larger portions of the landscape. Mechanical treatments are also effective for linear treatments such as roadsides.

Mechanical treatment also includes mowing at a smaller scale. Mowing of grasses, weeds and low shrubs is a familiar treatment activity to those that care for lawns and yards. Typically, larger commercial size mowers where the operator rides atop the equipment mow large areas. Mowing may also involve the cutting attachment pulled behind a tractor-like vehicle.

Mechanical treatments, such as mowing and mastication, do not eliminate hazardous fuels, but rearrange them into a less flammable configuration. Mechanical treatment takes vertically oriented fuels and rearranges them into horizontally oriented fuels, generally at ground level, through the process of mowing, cutting, shredding and chipping the standing vegetation. This type of treatment compacts the combustible fuel particles into a less flammable arrangement, exposes the fuel to less wind, and allows it to absorb moisture from the soil. These processes reduce the potential fire behavior associated with the post-treatment fuels.

Manual

Manual fuel treatment utilizes human labor to manually cut and remove or rearrange fuel. Thinning, pruning and clearing of fuel are the most common treatments. Manual treatments are typically done with chain saws, although other hand-held tools may be used. Manual fuel treatment includes chipping cut fuel into a less flammable state with mechanical chippers (similar to mastication), removing the material from the site, or piling for burning at a date when weather conditions preclude fire from spreading across the landscape. Downed fuel materials may sometimes also be broken up and scattered by hand in order to inhibit erosion or retain organic matter on the site.

Manual fuel treatments are more precise than mechanical treatments and can address hazardous fuel conditions without fewer impacts on visual, cultural or biological resources.

Pile Burning

Pile burning under appropriate weather conditions can rapidly eliminate fuel that has accumulated during manual fuel treatment activities. Pile burning is a very cost effective way to address the elimination of hazardous fuel, but requires permitting from air regulators due to possible negative impacts to air quality. As with any prescribed fire, an escape from a burning pile, either during the flaming or smoldering stage, always needs to be considered and mitigated. Smoke impacts to residents should be considered prior to ignitions and smoke dispersal patterns should be fully evaluated prior to ignition in order to eliminate the possibility of smoke nuisance complaints to SBC Fire or the air regulators. Piles need to be constructed away from sensitive biological or cultural resources and located such that convective heat from the burning pile does not unacceptably scorch or ignite overstory vegetation.

Biological

Biological treatments use grazing animals to forage on vegetation to eliminate hazardous fuels. This method, while effective, can be costly and comes with potential issues. The animal of choice for grazing within communities is typically goats. These animals are normally confined with fencing within a treatment unit in order to assure that they eat only the target vegetation.

Considerations for using goats include:

- Goats are indiscriminate in what they eat and will eat many plant species; however, they prefer younger, soft vegetation and will often eat non-target vegetation prior to eating the vegetation considered hazardous. Goats also typically do not eat grass, which may limit their usefulness for maintenance of some existing fuel treatments.
- Goats may introduce non-native vegetation through seeds in their droppings if they are not fed a weed-free diet prior to being introduced to the project area.
- Goats can cause soil disturbance as they walk within a confined treatment unit.
- Goats smell and can be noisy, which can be a nuisance in adjacent residential areas.
- Animal waste has a negative impact on the water quality of nearby waterways.
- In wild areas, goats are subject to predation and must be protected by dogs and/or with adequate enclosures at night.

Goats have proven very effective on many southern California jurisdictional lands. Additional information related to goats is available at *http://www.luresext.edu* and *www.webpages.uidaho.edu/rx-grazing/Handbook/Chapter_12_Targeted_Grazing.pdf*. The Forestry Division of Los Angeles County Fire Department maintains a list of approved goat wranglers in the southern California area. Within the Planning Area, goats have been successfully used for vegetation management on the Laurel Springs Ranch. The Painted Cave Volunteer Fire Department, however, recently abandoned plans to introduce a goat herd for vegetation maintenance in the Painted Cave area due to logistical concerns and unsuitability for the specific vegetation management needs of the Painted Cave fuel treatment system.

Fire Retardant Application

Several jurisdictions in southern California, including the City of Pasadena, apply ground-based fire retardant as a mechanism to reduce the number of ignitions within a high-risk area. The mixing of retardant occurs in a ground-based water tender and the mixed retardant is sprayed onto surface vegetation providing a coating of fire retardant on the fuel.

Research on the effectiveness of the application of long-term retardant is limited, however, anecdotal information from fire managers in jurisdictions which have used this treatment method claim that the retardant remains effective for several months, as long as a wetting rain event does not occur to wash the retardant from the surface of the fuel. Phos-Chek (a manufacturer of fire retardant) claims, "Functionally, Phos-Chek retardants react with, and alter the decomposition of wildland fuels, so that when used at the qualified mix ratio they do not support flaming or glowing combustion. This deprives the fire of fuel, reducing fire intensity and rate of spread."

A negative aspect of this fuel treatment method is that the fire retardant used is a fertilizer consisting of ammonium phosphate that can stimulate the growth of invasive weeds and decrease the diversity of plant communities. This effect is localized to the general area of retardant application (CAL FIRE 2017).

Additional concerns regarding the effects of fire retardants led to legal challenges to the Forest Service's use of aerial application of fire retardant for fire suppression and resulted in the development of an Environmental Impact Statement (EIS), in compliance with NEPA, to evaluate potential environmental impacts. The EIS was finalized in December 2011 and is a source of information for local agencies should they decide to explore the use of fire retardant as a fire prevention/mitigation tool. CAL FIRE has completed a negative declaration, in compliance with CEQA, to address the use of aerially applied retardant.

Experiments are currently be conducted in San Luis Obispo County utilizing an alternative to Phos-Chek-type retardants. It is unknown whether this program will result in a safe, readily usable and cost-effective alternate means of chemical treating fuels. If successfully developed, this chemical treatment might provide an effective means of enhancing the effectiveness of community defensible space and individual defensible space by spraying these areas with retardant in advance of an approaching fire. The durability of the retardant would be an important factor in that it would permit treatment to occur without waiting until the fire were close.

6.3.3 Fuel Treatment Design Options

The fuel prescription for a given site may identify a specific fuel treatment design that best fits fuel modification on the site. In any treatment design, the goal is to create a fire resilient area by implementing a three-part objective: reduce surface fuels, reduce ladder fuels, and reduce crown density (Agee and Skinner 2005). Commonly applied fuel treatment designs include fuelbreaks, shaded fuel treatment, area fuel treatments, a feathered edge effect, and gradient thinning or fuel removal. Definitions for these treatment designs are:

- Fuelbreak is, "A strategically located wide block, or strip, on which a cover of dense, heavy or flammable vegetation has been permanently changed to one of lower fuel volume or reduced flammability" (Green 1977). Fuelbreaks have a long history in the western U.S. Recent interest in fuelbreaks and similar concepts has spawned new names such as defensible fuel profile zones and community protection zones (Omi 1996; Weatherspoon and Skinner 1996). Fuelbreak prescriptions, including width, amount of fuel reduction, and maintenance standards, will vary depending on fuel type, slope and location on the land, and many other environmental factors. A fuelbreak designed in conjunction with a road can be an advantage due to ease in access for both construction and maintenance. As noted earlier, fuelbreaks are not designed to stop fires by themselves, but to reduce fire behavior characteristics and provide access for firefighters giving them a higher probability of success in suppressing a wildland fire safely.
- Area fuel treatments vary in size. Dead and live fuels are treated to reduce the fire hazard and can be arranged in a pattern that would reduce the burn intensity in the direction of where a fire is likely to spread.
- Shaded fuel treatment is a type of fuel modification in stands of trees. A shaded fuel treatment is created by modifying surface fuels, increasing the height to the base of the live crown of trees, and opening the stand canopy by removing or thinning some trees. The thinning prescriptions will vary based on many site-specific variables; including tree species and size, stand density, site location, and area objectives (further information on thinning is provided later in this section).
- Feathered edge is a treatment design used to create a less visually obtrusive treatment boundary. Allowing some variance in the distance parameters of a treatment zone's horizontal distance such that the final results are not a straight-line or linear hedge appearance does this. This feathering technique can be used in either timber or brush vegetation type.
- Gradient fuel removal describes the treatment resulting from a variation in the intensity level of fuel removal on a site. The locations or zones displayed in the columns of Tables 14 and 15 above are examples of applying a gradient to the fuels removal, such as a more intensive treatment close to homes, structures or other values graduating out to less intensive away from the value at risk.
- Thinning is generally prescribed in stands of trees with a spatial distance between crowns or stems/boles of "leave" trees and a diameter limit for trees removed. This is also described in terms of a desired percentage of canopy cover to remain after thinning. Another prescription method (more often utilized in commercial timber sale activity) is by specified basal area (the total cross-sectional area of the trees in a stand, at breast height or 4.5 feet above the ground measured in square feet per acre). A prescribed thinning treatment tactic may be part of a recommended

prescription for on-site trees in any of the spatial designs treatments described in this section. In any thinning treatment application, the thinned material must be treated; methods may include removal, chipping, mastication, or piling and burning. It is recommended that a Registered Professional Forester or arborist assist in the development of tree thinning guidelines. *NOTE: There are specified techniques required in trimming/removal of eucalyptus that will minimize stump sprouting.*

6.3.4 Community Fuel Treatment Assessments

To develop recommendations for potential fuel modification measures in the Planning Area, members of the Development Team, together with SBC Fire staff, Forest Service staff, community residents, and property owners conducted an extensive review of existing and planned fuel modification projects in the Planning Area. This process involved review of maps and aerial photographs, and on-the-ground inspections. Based on this review, it was determined that:

- In many critical locations, proactive fuel modification measures have already been implemented or planned by the Forest Service, individual homeowners, SBC Fire, and the affected communities.
- A relatively limited number of areas were identified where additions or expansions to existing fuel treatment areas would be beneficial.
- Significant improvements should be made in the extent and regularity of roadside fuel treatments, both to reduce risks of roadside ignitions and to increase the safety of evacuation routes.
- There is a strong need to improve funding and planning for long-term maintenance and sustainability of fuel treatments, including consideration of measures to limit the spread and establishment of invasive plant species.

While there are many fire protection measures generic to all communities in the CWPP, such as structure hardening, individual defensible space and roadside treatments, the community assessments also highlighted the unique and diverse threats and vulnerabilities specific to each community. Fuel treatment assessments were developed for each community.

Paradise Canyon

Paradise Canyon has a long history of Forest Service fuel treatment activities focused mainly along Paradise Road and the extensive recreation facilities in the Santa Ynez Recreation Area. Maintenance of these treatments has been inconsistent due to federal budget constraints and staffing cuts on the Los Padres National Forest. The Development Team mapped all existing fuel treatments both historic and currently maintained. Field surveys showed that significant areas of historically managed areas have not been maintained and consequently have lost viability as a fuel treatment. The prolonged drought conditions have resulted in significant oak tree mortality throughout the area further adding to the flammable fuel load. These areas should be evaluated as new potential treatments and undergo project level analysis by the Forest Service. The Development Team recommended that potential project analysis include all currently maintained fuel treatments as well. Figure 33 depicts the general locations of these existing and potential treatments combined. The identified treatments would help limit ignitions as well as lessen the growth potential of fires by reducing the amount of vegetation directly adjacent to the campgrounds, day-use areas, parking areas, turn-outs, and roadways throughout the area. In addition

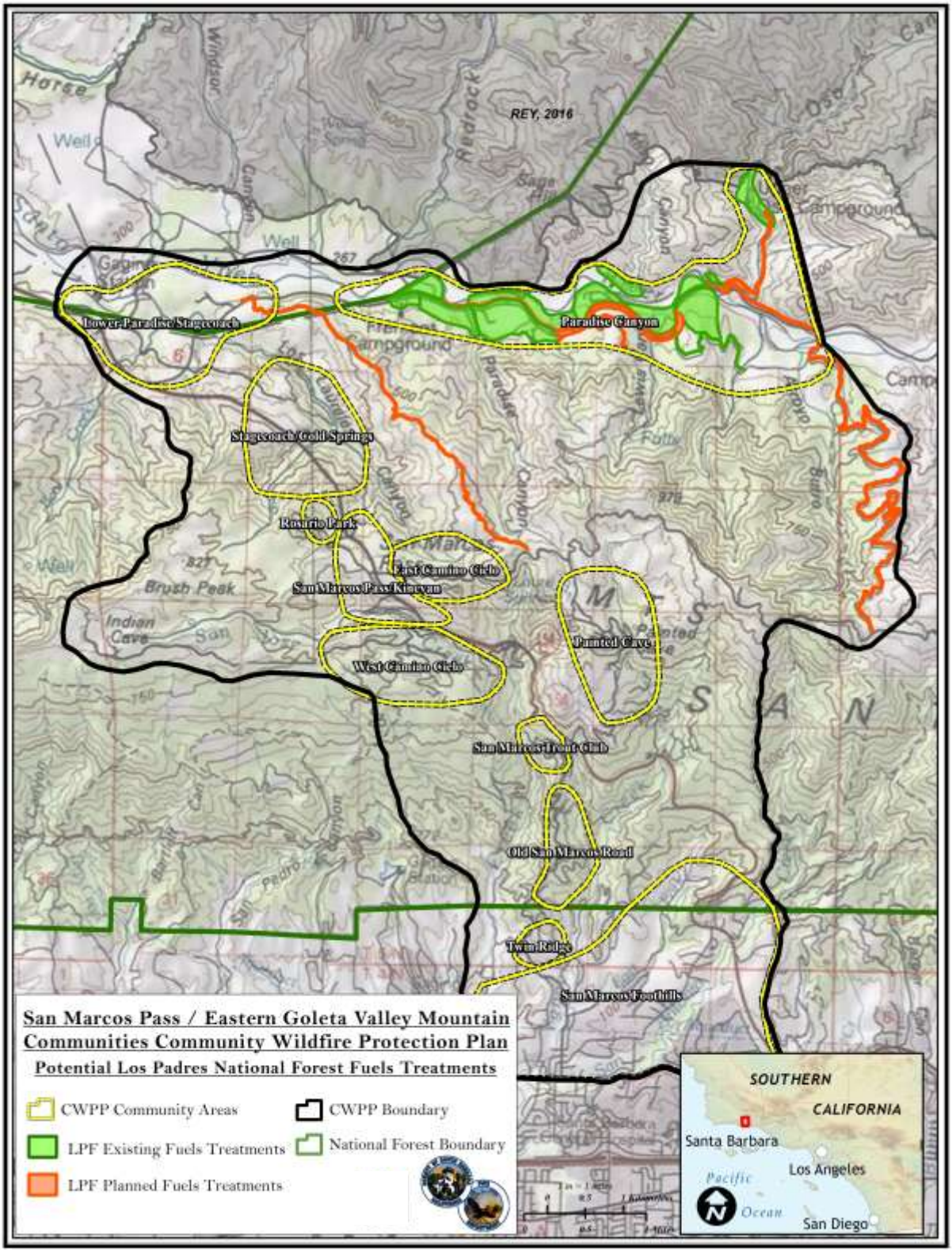


Figure 33. Potential Los Padres National Forest Fuel Treatment Projects in Paradise Canyon

to limiting ignitions, the roadside treatments would help provide a safer evacuation route for forest visitors as Paradise Road offers the only feasible way out of the canyon. The importance of a safe evacuation route was realized on Memorial Day 2013, when the SBC Sheriff's Department coordinated an evacuation of an estimated 2,000 people from Paradise Canyon ahead of the rapidly growing White fire. Strategic roadside treatments would make for a much safer egress route for the public and access routes for first responders. The identified treatments would also help protect the existing infrastructure, including several large water tanks that act as the main water supply during fire suppression operations. Reducing large wildfires that start or enter into this area not only protects the neighboring communities, but also helps protect the ecosystem services that could be affected by large wildfires that start in this area. These services include wildlife habitat, carbon storage, sedimentation reduction and watershed protection. The forested areas and watersheds north and east of Paradise Road constitute the main water supply for the reservoirs (Cachuma, Gibraltar, and Jameson Reservoirs) utilized by the front country communities. The CWPP recommends that the Forest Service move forward with the fuels treatments identified in this CWPP and complete environmental analysis in compliance with federal regulations and the National Environmental Policy Act (NEPA). This project would help meet the objectives of reducing wildfire risks to infrastructure located in the WUI, reduce risk to residents and visiting public, and help minimize property loss to wildfire as outlined in the May 18, 2016, The Wildland-Urban Interface Federal Risk Mitigation Executive Order 13728.

Lower Paradise/Stagecoach

Homes and infrastructure in the Lower Paradise/Stagecoach community exist on larger lots in a rural setting. Recommended fuel modification measures focus on individual defensible space and evacuation route/roadside treatments. The community is crossed by both Highway 154 and Paradise Road, which receive an extremely high level of use. Roadside ignitions have significant potential to develop into uncontrolled wildfires. The community does include the lower portion of the Forest Service Fremont Fuelbreak and the associated Fremont Fire Access Road. This fuelbreak has undergone sporadic maintenance over the years including fire suppression activity during the 2007 Zaca and the 2016 Rey fires. The fuelbreak follows a very prominent ridge and the associated fire access road allows fire equipment access along the entire length.

San Marcos Christian Camp

The Development Team identified several fuel treatment priorities for the San Marcos Christian Camp (Camp). The most critical priority is to increase defensible space around the community pool. This has been identified as one of the only viable shelter in place options should the Camp occupants be unable to evacuate the facility. Roadside fuel treatments are also recommended given the challenge of evacuating a large group of Camp occupants.

Stagecoach/Cold Springs

Roadside treatments and individual defensible space are recommended for Stagecoach and Cold Springs given the isolated structures and heavily traveled road.

Rosario Park

The extensive live oak forest surrounding the community of Rosario Park dictates that fuel treatments focus on individual defensible space and structure hardening. Maintaining the health of the oak forest should be encouraged given the benefits of shading and ember screening that healthy live oaks provide. The Development Team also identified maintenance of the fire access road network as a high priority given that the community has only one point of access from Stagecoach Road. The community lies adjacent to the historic Forest Service Brush Peak Fuelbreak, which has undergone recent maintenance and fire suppression activity. The close proximity of the fuelbreak to Rosario Park allows it to effectively function as a community defensible space treatment. Regular maintenance of this fuelbreak is recommended.

San Marcos Pass/Kinevan

Due to their location and the presence of heavy fuels on all sides, residences scattered along the upper portions of Highway 154, along San Marcos Pass, and in the Kinevan Ranch community could be endangered by fires coming from any direction. The worst threats are posed by Sundowner winds and upslope fires originating along Highway 154, Stagecoach Road, or within the Kinevan Ranch community itself. The recommendations of the CWPP for this area are improved roadside treatments along Highway 154 and West Camino Cielo, and improvement of defensible space around individual structures. Due to the scattered nature of residences, no practical opportunities for community defensible space were identified in this area.

East Camino Cielo

The greatest threat to residences in the East Camino Cielo area is a Sundowner-driven or slope-driven fire from the north. Residences in this area generally have good defensible space. Much of the area is dominated by dense forest made up of live oaks and madrones. Maintaining a healthy forest is important to reduce the potential for crown fires. The CWPP recommends improvement of roadside treatments on the private roads and driveways in this area, and along Highway 154 and East Camino Cielo. Continued maintenance of the Forest Service Fremont Fuelbreak will provide some strategic protection from a fire originating to the east. Due to the distance between residences, no practical opportunities for community defensible space were identified in this area.

West Camino Cielo

The West Camino Cielo community consists of dispersed homes with varying degrees of structural hardening and varying amounts of individual defensible space, ranging from extensive to minimally adequate. The West Camino Cielo area is potentially vulnerable to fire approaching from any direction. Historically, however, the greatest wildfire threat has come from wind and fuel driven fires moving east towards the community along the crest and upper slopes of the Santa Ynez Mountains ridgeline (e.g., Refugio, Gap, Whittier fires). Additional major risks include a wind driven fire (Sundowners or summer westerlies) originating along or north of West Camino Cielo Road or a slope driven fire originating below the community on the south face of the Santa Ynez Mountains.

The most important CWPP recommendation for the West Camino Cielo community is for increased roadside treatments on private roadways to facilitate evacuation and firefighting access and egress. It is also recommended that the Los Padres National Forest consider implementing a fuel modification program along the FRA portions of West Camino Cielo, where fuel modification could serve to provide a tactical fuelbreak as well as facilitate safer evacuation. Implementation of such a project would require technical and environmental review by the Los Padres National Forest, as well as review of funding options for construction and maintenance.

Additional potential fuel modification projects are identified in the CWPP. Existing protection against fires approaching the West Camino Cielo community from the south or west is provided by the major privately created fuel treatment on the Windermere Ranch property. This fuel treatment is credited with being largely responsible for protecting the community from major impacts during the Gap fire. The Los Padres National Forest, Santa Barbara Mountain Communities Defense Zone Project includes two new fuel treatments (Haney Tract East and Haney Tract West) that would essentially extend the protection of the Windermere fuel treatment to the east and to the west to West Camino Cielo Road. The CWPP identifies a possible community defensible space treatment closer to residences as a potential alternative or supplement to the Los Padres National Forest East Haney Tract fuelbreak. The CWPP map also identifies several potential fuel modification areas on private lands along the north/eastern portion of the community and along West Camino Cielo road that would augment existing individual defensible space in these areas.

Additional community-level fuel treatments have not been recommended due to the generally wide dispersal of homes in the area and the prevalence of steep slopes and/or oak woodland habitat to the east and north.

Painted Cave

The most severe wildfire threats to the Painted Cave community come from Sundowner winds, slope (and fuel) driven fires originating along Highway 154, lower Painted Cave Road, or other downslope locations, and, late afternoon and evening westerly winds that frequently reach the 15 to 25 mph range in summer and fall months. Local residents and the Painted Cave Volunteer Fire Department, with cooperation from the LPF and SBC Fire, have created a fairly extensive existing fuel treatment network around the south, west, and northern sides of the central Painted Cave community. Maintenance of this existing fuel treatment network is recommended as a high priority. A few areas for potential minor improvements or expansions of this fuel treatment network were identified in the CWPP process. Maintenance and improvement of this community fuel treatment network will be dependent upon continued cooperation of the major landowners around the central community and the securing of adequate funding and/or volunteer resources for maintenance work. Opportunities for extensions of this fuel treatment network to the eastern side of the central community are limited due to steepness of slopes, presence of State Park land (Chumash Painted Cave State Park), and extensive presence of environmentally sensitive oak woodland habitat. However, the fire threat from this side is also mitigated by the presence of the Maria Ygnacio Creek riparian zone and relative lack of understory in the oak woodland areas.

Outside the central Painted Cave community, protection from an upslope fire from the south is provided by an existing community defensible space fuel treatment network on private land in the lower Painted Cave community east of Painted Cave Road. The Los Padres National Forest Santa Barbara Mountain Communities Defense Zone Project was designed to essentially extend this fuel treatment to the west and north to tie in to the existing community defensible space along the south side of the Painted Cave community.

Outlying homes that are not protected by community fuelbreaks in the Painted Cave area are dependent upon structure hardening and individual defensible space. Development of extensive individual defensible space has been actively supported and aided by the Painted Cave Volunteer Fire Department as well as mutual cooperation among residents.

In all areas of Painted Cave, consideration of Safe Separation Distance (addressed in Section 5.3.3) is important given the orientation of the community above steep topography surrounded by heavy fuel.

San Marcos Trout Club

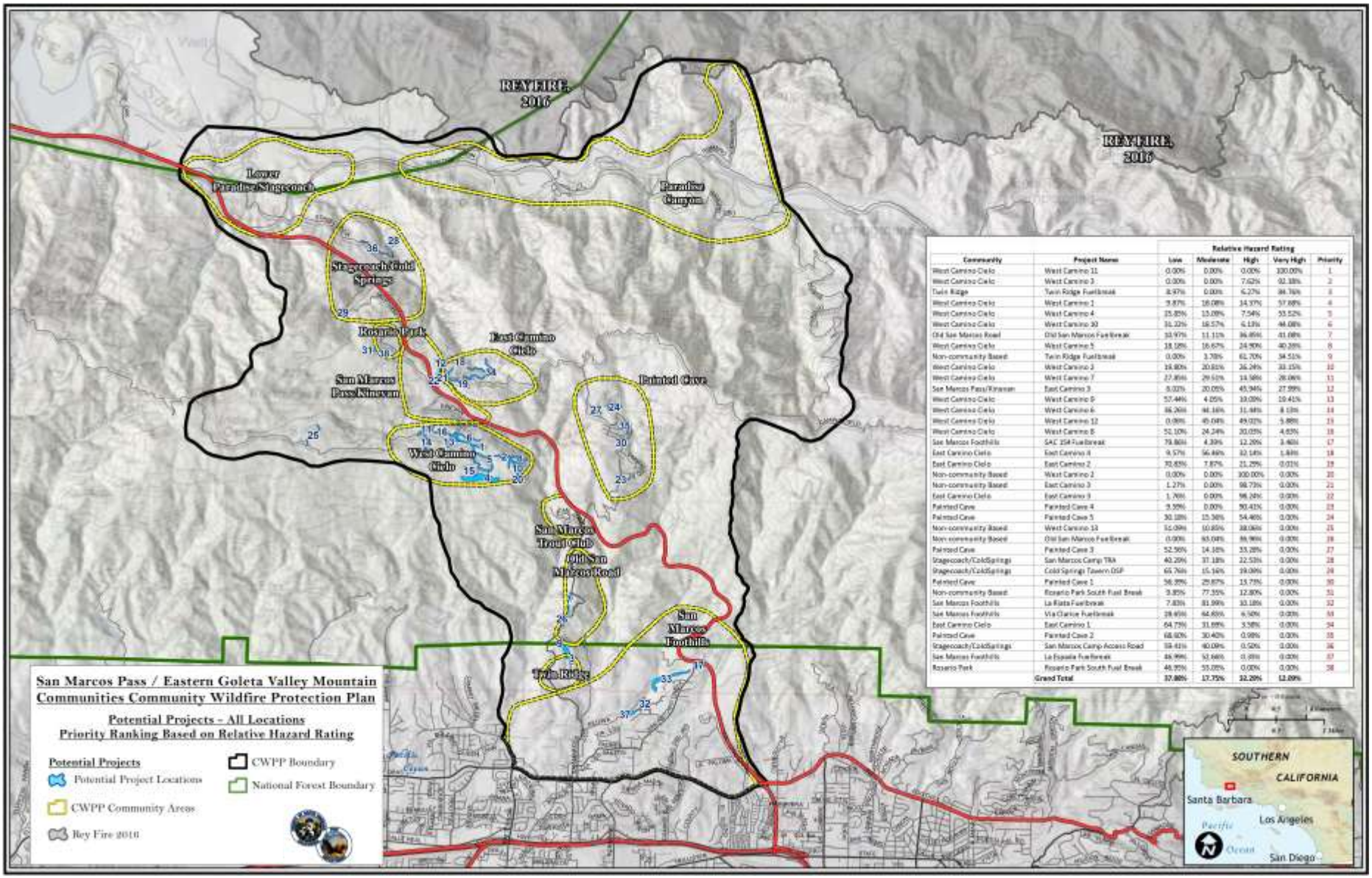
The San Marcos Trout Club (Trout Club) community was heavily impacted by the 1990 Painted Cave fire. The community now contains a mixture of rebuilt structures and older structures with varying degrees of fire vulnerability. The two greatest wildfire threats to the Trout Club community come from Sundowner winds and the potential for an upslope fire run from lower in the San Jose Creek drainage. The Trout Club started a community defensible space project in 1991. The goal was to create 200 feet of fuel treated space around the community, although this was not achievable in all areas. The Trout Club allocates a baseline of $12,000 per year for maintenance and improvement of the treated area. The Trout Club community, in collaboration with SBC Fire and Forest Service, has developed a comprehensive fuel modification plan known as the Trout Club Community Defensible Space Project that predates development of the CWPP. This plan includes a community defensible space treatment around the perimeter of the community, roadside treatment, and removal of hazardous fuels within the community. Work on the plan began in 2015 and is expected to be completed by early 2018. Future maintenance of these improvements will be the primary challenge faced by the Trout Club community under the CWPP.

Old San Marcos Road/Twinridge

Numerous residences in the Twinridge community and along Old San Marcos Road were destroyed in the Painted Cave fire in 1990. Although many of the rebuilt structures have a high degree of hardening, these communities remain at risk from another Sundowner-driven fire or fires originating in or crossing the adjacent San Jose Creek or Mario Ygnacio Creek drainages. SBC Fire conducts annual roadside treatment in this area to mitigate the risk of ignitions along Old San Marcos Road.

Residences in the Twinridge area are generally protected by adequate individual defensible space and some adjacent agricultural land. Additional protection could be achieved by construction of a fuel treatment along the ridgeline above the residential area, as indicated on the map, Potential Fuel Treatments with Priority Ranking on Non-Federal Lands (See Figure 34).

Residences along upper Old San Marcos Road are dependent upon individual defensible space and structure hardening for protection. In some cases, individual defensible space has been augmented by



Community	Project Name	Relative Hazard Rating: Low	Moderate	High	Very High	Priority
West Camino Cielo	West Camino 11	0.00%	0.00%	0.00%	100.00%	1
West Camino Cielo	West Camino 3	0.00%	0.00%	7.62%	92.38%	2
Twin Ridge	Twin Ridge Fuelbreak	8.97%	0.00%	6.27%	84.76%	3
West Camino Cielo	West Camino 1	9.87%	16.08%	34.37%	57.68%	4
West Camino Cielo	West Camino 4	25.85%	15.09%	7.54%	53.52%	5
West Camino Cielo	West Camino 10	31.22%	16.57%	6.13%	44.08%	6
Old San Marcos Road	Old San Marcos Fuelbreak	33.97%	11.11%	86.85%	41.08%	7
West Camino Cielo	West Camino 5	18.18%	16.67%	24.90%	40.26%	8
Non-community Based	Twin Ridge Fuelbreak	0.00%	3.78%	61.70%	34.51%	9
West Camino Cielo	West Camino 3	16.80%	20.81%	26.24%	33.15%	10
West Camino Cielo	West Camino 7	27.85%	29.51%	13.58%	28.06%	11
San Marcos Pass/Kinevan	East Camino 3	0.03%	20.05%	45.94%	27.99%	12
West Camino Cielo	West Camino 9	57.44%	4.05%	10.00%	10.41%	13
West Camino Cielo	West Camino 6	86.26%	44.16%	31.44%	8.13%	14
West Camino Cielo	West Camino 12	0.00%	45.04%	49.01%	5.88%	15
West Camino Cielo	West Camino 8	51.10%	24.24%	20.05%	4.63%	16
San Marcos Foothills	SAC 154 Fuelbreak	79.86%	4.39%	12.26%	3.46%	17
East Camino Cielo	East Camino 4	9.57%	56.46%	32.14%	1.84%	18
East Camino Cielo	East Camino 2	70.85%	7.87%	21.25%	0.01%	19
Non-community Based	West Camino 2	0.00%	0.00%	100.00%	0.00%	20
Non-community Based	East Camino 3	1.27%	0.00%	98.73%	0.00%	21
East Camino Cielo	East Camino 3	1.76%	0.00%	98.24%	0.00%	22
Painted Cave	Painted Cave 4	9.59%	0.00%	90.41%	0.00%	23
Painted Cave	Painted Cave 5	30.18%	15.36%	54.46%	0.00%	24
Non-community Based	West Camino 13	51.09%	10.85%	38.06%	0.00%	25
Non-community Based	Old San Marcos Fuelbreak	0.00%	65.04%	34.96%	0.00%	26
Painted Cave	Painted Cave 3	52.56%	14.16%	33.28%	0.00%	27
Stagecoach/ColdSprings	San Marcos Camp TRA	40.29%	37.18%	22.53%	0.00%	28
Stagecoach/ColdSprings	Cold Springs Tavern DSF	65.76%	15.14%	19.09%	0.00%	29
Painted Cave	Painted Cave 1	56.35%	29.87%	13.77%	0.00%	30
Non-community Based	Rosario Park South Fuel Break	3.85%	77.35%	12.80%	0.00%	31
San Marcos Foothills	La Riata Fuelbreak	7.83%	81.99%	10.18%	0.00%	32
San Marcos Foothills	Via Clarice Fuelbreak	28.45%	64.65%	6.90%	0.00%	33
East Camino Cielo	East Camino 1	64.75%	31.69%	3.58%	0.00%	34
Painted Cave	Painted Cave 2	68.62%	30.40%	0.98%	0.00%	35
Stagecoach/ColdSprings	San Marcos Camp Access Road	59.41%	40.09%	0.50%	0.00%	36
San Marcos Foothills	La Espuela Fuelbreak	46.99%	52.66%	0.35%	0.00%	37
Rosario Park	Rosario Park South Fuel Break	46.95%	53.05%	0.00%	0.00%	38
	Grand Total	37.88%	17.75%	32.29%	12.09%	

Figure 34. Potential Fuel Projects on Non-Federal lands with Priority Ranking Map

agricultural greenbelts. Due to the steep slopes in this area and low density of homes, construction of effective community defensible space would be impractical. The CWPP identifies one area for potential fuel treatment along the ridgeline parallel to Old San Marcos Road. This fuel treatment could potentially aid in containing a fire along the ridgeline between the San Jose Creek and Maria Ygnacio Creek drainages.

San Marcos Foothills

The primary wildfire threat to the San Marcos Foothills (Foothills) community is posed by Sundowner winds. The 1990 Painted Cave fire destroyed the vast majority of homes in the residential area between Old San Marcos Road and San Antonio Creek. As a result, most residences have been rebuilt under relatively recent building codes with a very high degree of hardening. Yards and open spaces have also generally been landscaped and maintained with a high degree of fire consciousness. In addition, agricultural land provides a buffer in many areas against the type of intense fire activity experienced in the Painted Cave fire. The CWPP Development Team identified a number of remaining areas which have a potential to carry fire into the Foothill community and which could potentially benefit from individual or community-supported fuel modification or maintenance efforts. Some of these areas are currently well maintained with minimal understory vegetation under an oak canopy. Other areas could benefit from additional treatment. One large parcel was considered high priority for a potential fuel treatment that would involve reducing understory and thinning of a eucalyptus grove.

6.3.5 Identification and Mapping of Fuel Treatments

Fuel treatments identified during the community assessments were plotted using GIS to facilitate both mapping and prioritization. SBC Fire staff developed a geodatabase of all existing, planned and potential fuel treatment projects (See Figure 35). Projects on federal lands are noted for informational purposes only, as the Forest Service jurisdictionally manages these lands. These projects were placed into categories that reflect the lead agency and the status of the project. The total acreage of all potential fuel treatments, after removing the road surface portion of the evacuation roadside treatments, is approximately 250 acres. This represents 1.2 percent of the 19,588-acre Planning Area (SBC Fire GIS analysis).

The following is a brief description of the SBC Fire classifications:

- Los Padres National Forest Strategic Fuelbreaks - Historic strategic ridgetop fuelbreaks created by the Forest Service are presented in the CWPP for informational purposes only, as these strategic fuelbreaks are jurisdictionally managed by the Los Padres National Forest who has full authority for actions taken on these lands.
- LPF Paradise Road Existing Fuels Treatments - This category represents existing treatments in the Forest Service Santa Ynez Recreation Area along Paradise Road that vary in states of completion and/or maintenance. These fuel treatments enhance protection of recreation residences, campgrounds, Forest Service employee housing and infrastructure, and roadside fire hazard abatement projects. The majority of these treatments are on federal lands, administrated by the Forest Service, and are subject to NEPA review.

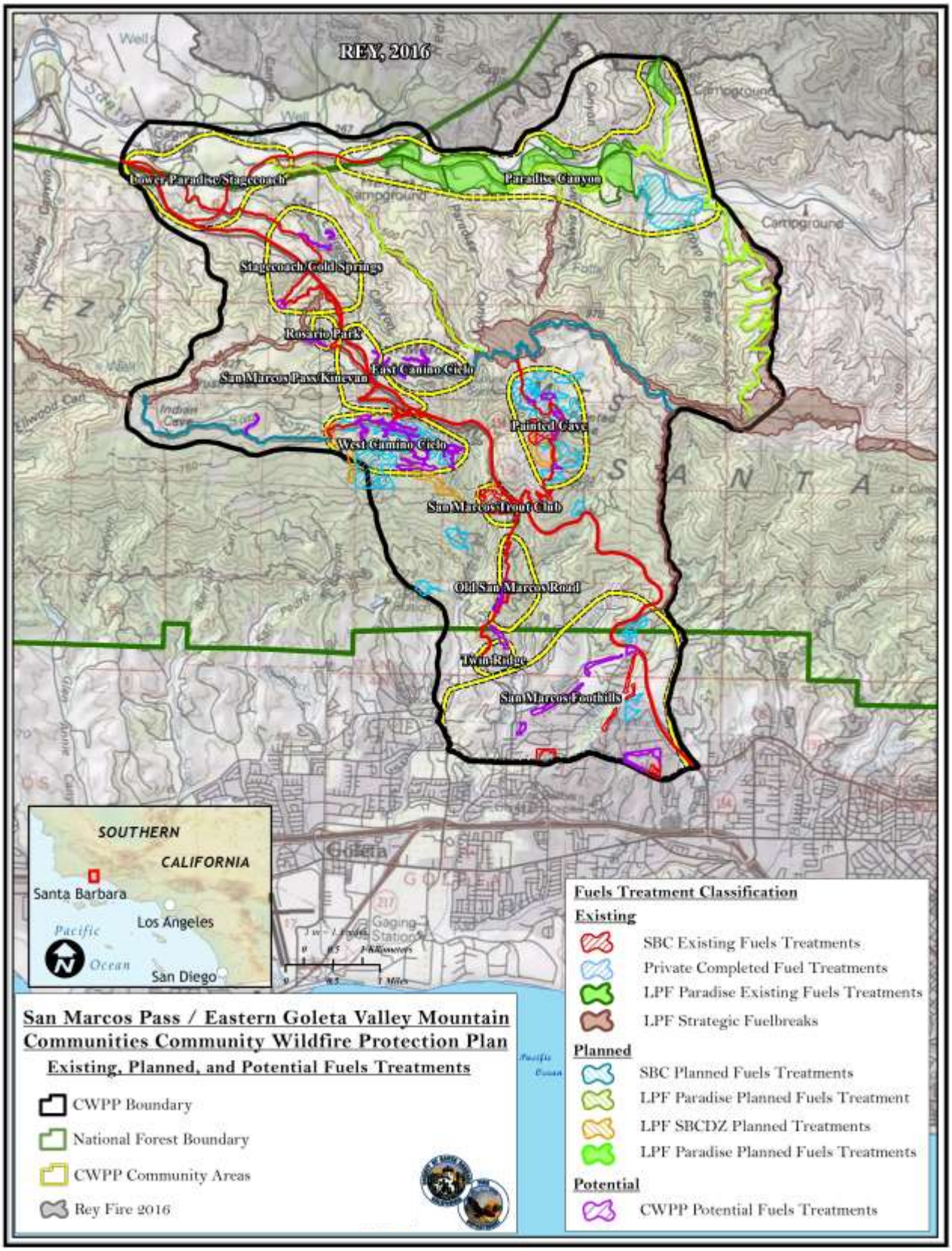


Figure 35. Existing, Planned, and Potential Fuel Treatments in the Planning Area Map

- LPF SBCDZ Planned Fuels Treatment – A Forest Service approved project that has completed environmental review including a signed decision document authorizing implementation. More information regarding this project can be found on the Forest Service website at *www.fs.usda.gov/project/?project=44697*.

- Private Completed Fuels Treatments - This category represents all existing fuel treatment work that has been completed by individual homeowners, residents or private groups, such as Home-Owner Associations, Wildland Residents Association, or Fire Safe Council. These treatments are on private property.
- SBC Existing Fuels Treatments - This category includes all existing fuel treatments in the Planning Area that have been completed by SBC Fire. These projects are on private and/or County property in the SRA. These projects have gone through project-specific CEQA review and are part of the *Santa Barbara County Fire Department Unit Strategic Fire Plan*.
- SBC Planned Fuels Treatments - This category includes all planned fuel treatments in the Planning Area that will be completed by SBC Fire. These projects are on private and/or County property in the SRA. These projects have gone through preliminary project-specific CEQA review and are part of the *Santa Barbara County Fire Department Unit Strategic Fire Plan*.
- Potential Fuels Treatments - This category represents the potential fuel treatments identified by the CWPP Development Team. The majority of these treatments are on private and/or County property in the SRA. As such, these treatments will be subject to project specific CEQA review if undertaken by SBC Fire. If undertaken by a private entity, the County may require permitting and CEQA review. One potential project overlaps onto the Los Padres National Forest in the West Camino Cielo area and would require concurrent NEPA analysis by the federal partner.

6.3.6 Prioritization of Fuel Treatments

As Section 5 of this CWPP demonstrates, reducing the vulnerability of structures and enhancing defensible space are viable methods to reduce the wildfire threat to life safety and structures. The following describes the process used by the Development Team to identify and prioritize fuel treatment activities within the Planning Area:

In order to prioritize fuel treatments, GIS was used to evaluate fire hazard and wildfire risk presented in Section 5. Those two elements were combined in a matrix (See Table 19) to determine a Relative Hazard Rating, which was applied spatially across the Planning Area. Four categories of Relative Hazard Ratings were developed (low, moderate, high and very high) from this matrix. The Relative Hazard Rating was evaluated using GIS to determine the percentage of each hazard rating category found within the fuel treatment units. Treatment units were ranked using the criteria where fuel treatments with the greatest percentage of Very High Relative Hazard were assigned the highest priority. Where treatment units had equal percentages of Very High Relative Hazard, the units were prioritized based on the percent of High Relative Hazard within the treatment unit.

Table 19 Relative Risk Hazard Rating Matrix

Risk Rating – Burn Frequency	Hazard Ratings – Flame Lengths			
	0-4′ - Low	4 -8′ - Moderate	8-11′ - High	11′+ - Very High
0 - 1 – Low	Low	Low	Moderate	High
2 - Moderate	Low	Moderate	High	Very High
3+ - High	Moderate	High	Very High	Very High

To leverage the investment of time and money that has been expended on wildfire hazard mitigation in the past, stakeholders should consider maintenance of existing fuel treatments a high priority. Without maintenance, these treatments will lose effectiveness and eventually blend back into the native vegetation. Only through reoccurring maintenance will these treatments remain viable hazard reduction features for the community. Section 6.5 provides maintenance guidelines for fuel treatments. As funding and personnel become available, new areas for hazard reduction work may be considered based on the priority fuel treatment rankings for potential projects.

The process for establishing fuel treatment priority locations was complicated by the number of communities that could be adversely affected by wildfire. Twelve community areas have been identified within the greater Planning Area and each community has prioritized fuel treatments that fall completely within the established community areas. Should specific community-based funding be obtained for fuel treatment, the community level priority-ranking can help guide where treatments are most needed. The prioritization process also included treatments that fall partially or entirely outside of a community area, where strategically located fuel treatments provide protection for isolated improvements or where treatments are considered strategic for fire suppression operations.

While all existing, planned, and potential projects were evaluated through the prioritization process, the potential new treatments provided the greatest points of contention among the stakeholder group. The CWPP does not authorize implementation of these new projects, but rather it provides guidance to stakeholders on the relative benefits of these treatments to address High and Very High wildfire risk and hazard.

Table 20 summarizes the priority rankings for all new potential fuel treatment projects and Figure 36 is a map of the Relative Hazard Ratings determined for the Planning Area (See Figure 36). These rankings should not be considered a strict implementation schedule, as site-specific environmental concerns, special funding opportunities, or the ability to leverage greater wildfire protection by working with adjacent jurisdictions or stakeholders should all be part of any implementation decision-making process. Site-specific CEQA or NEPA analysis are required prior to the implementation of any potential projects found in Table 20. Results from the full fuel treatment prioritization process are available in Appendix E.

*Table 20 Prioritized Potential Projects**

Community	Project Name	Type*	Relative Hazard Rating				
			Low	Moderate	High	Very High	Priority
West Camino Cielo	West Camino 11	ERR	0.00%	0.00%	0.00%	100.00%	1
West Camino Cielo	West Camino 3	ERR	0.00%	0.00%	7.62%	92.38%	2
Twinridge	Twinridge Fuelbreak	FB	8.97%	0.00%	6.27%	84.76%	3
West Camino Cielo	West Camino 1	CDS	9.87%	18.08%	14.37%	57.68%	4
West Camino Cielo	West Camino 4	ERR	25.85%	13.09%	7.54%	53.52%	5
West Camino Cielo	West Camino 10	ERR	31.22%	18.57%	6.13%	44.08%	6
Old San Marcos Road	Old San Marcos Fuelbreak	FB	10.97%	11.11%	36.85%	41.08%	7
West Camino Cielo	West Camino 5	ERR	18.18%	16.67%	24.90%	40.26%	8
Non-community Based	Twinridge Fuelbreak	FB	0.00%	3.78%	61.70%	34.51%	9
West Camino Cielo	West Camino 2	CDS	19.80%	20.81%	26.24%	33.15%	10
West Camino Cielo	West Camino 7	CDS	27.85%	29.51%	14.58%	28.06%	11
San Marcos Pass/Kinevan	East Camino 3	ERR	6.02%	20.05%	45.94%	27.99%	12
West Camino Cielo	West Camino 9	ERR	57.44%	4.05%	19.09%	19.41%	13
West Camino Cielo	West Camino 6	ERR	36.26%	44.16%	11.44%	8.13%	14
West Camino Cielo	West Camino 12	ERR	0.06%	45.04%	49.02%	5.88%	15
West Camino Cielo	West Camino 8	ERR	51.10%	24.24%	20.03%	4.63%	16
San Marcos Foothills	SAC 154 Fuelbreak	CDS	79.86%	4.39%	12.29%	3.46%	17
East Camino Cielo	East Camino 4	ERR	9.57%	56.46%	32.14%	1.83%	18
East Camino Cielo	East Camino 2	ERR	70.83%	7.87%	21.29%	0.01%	19
Painted Cave	Painted Cave 4	CDS	9.59%	0.00%	90.41%	0.00%	23
Painted Cave	Painted Cave 5	CDS	30.18%	15.36%	54.46%	0.00%	24
Non-community Based	West Camino 13	ERR	51.09%	10.85%	38.06%	0.00%	25
Painted Cave	Painted Cave 3	CDS	52.56%	14.16%	33.28%	0.00%	27

Community	Project Name	Type*	Relative Hazard Rating				
			Low	Moderate	High	Very High	Priority
Stagecoach/Cold Springs	San Marcos Camp TRA	TRA	40.29%	37.18%	22.53%	0.00%	28
Stagecoach/Cold Springs	Cold Springs Tavern DSP	CDS	65.76%	15.16%	19.09%	0.00%	29
Painted Cave	Painted Cave 1	CDS	56.39%	29.87%	13.73%	0.00%	30
Non-community Based	Rosario Park South Fuelbreak	CDS	9.85%	77.35%	12.80%	0.00%	31
San Marcos Foothills	La Riata Fuelbreak	CDS	7.83%	81.99%	10.18%	0.00%	32
San Marcos Foothills	Via Clarice Fuelbreak	CDS	28.65%	64.85%	6.50%	0.00%	33
East Camino Cielo	East Camino 1	ERR	64.73%	31.69%	3.58%	0.00%	34
Painted Cave	Painted Cave 2	CDS	68.60%	30.40%	0.99%	0.00%	35
Stagecoach/Cold Springs	San Marcos Camp Access Road	ERR	59.41%	40.09%	0.50%	0.00%	36
San Marcos Foothills	La Espada Fuelbreak	CDS	46.99%	52.66%	0.35%	0.00%	37
Rosario Park	Rosario Park South Fuelbreak	CDS	46.95%	53.05%	0.00%	0.00%	38
		Total	37.88%	17.75%	32.29%	12.09%	

** CDS- Community Defensible Space, ERR- Evacuation Route and Roadside, FB- Strategic Fuel Break, TRA- Staging and Temporary Refuge Area*

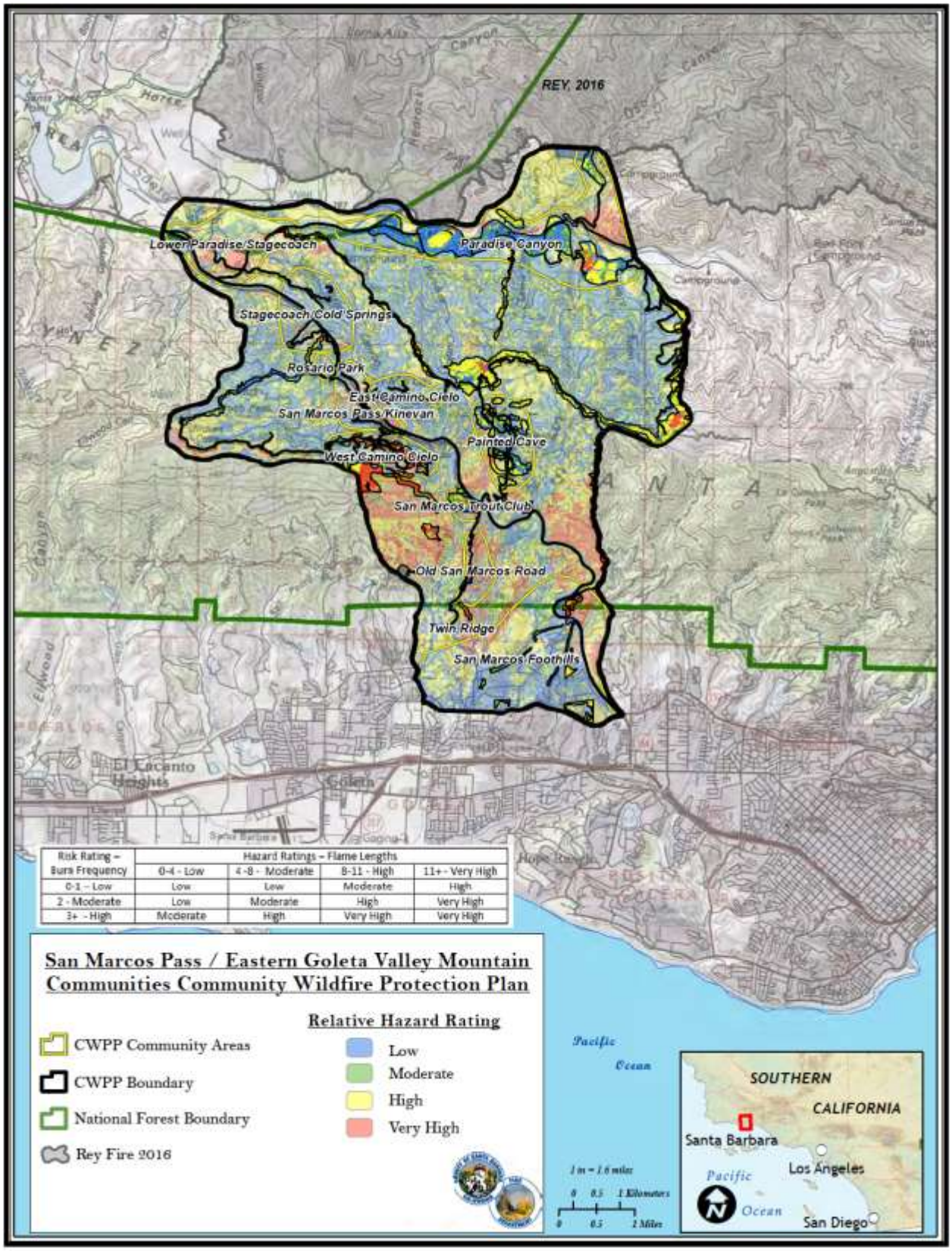


Figure 36. Relative Hazard Rating for the Planning Area Map

6.4 Fuel Treatment Prescriptive Guidelines

The fuel treatment prescription guidelines including Best Management Practices (BMPs) addressed in Section 6.4.3 and Protection of Environmentally Sensitive Resources in Section 6.4.4 were developed by the Development Team utilizing input from academia, regulatory agencies, and environmental groups. These guidelines were reviewed by California Department of Fish and Wildlife. Utilizing these practices will enhance the protection of natural resources from implementation of potential fuel treatment projects.

Tables 21 through 23 summarize treatment guidelines. These guidelines provide SBC Fire, LPF, and other stakeholders with the latitude and flexibility to design site-specific fuel treatments with consideration of life safety and structure protection while providing practices that balance environmental concerns.

6.4.1 Evacuation Routes and Roadside Treatments

As described in Section 6.3.1, fuel modification along roadways is a major element of the community protection strategy in the CWPP. Roadside fuel modification enhances life safety for evacuation of residents and visitors, provides safer access/egress for firefighters, and improves potential for containment of fires along roadways. This includes any hazard tree removal along road systems in the Planning Area.

Table 21 on the following page summarizes treatment guidelines for evacuation routes, roadways, and private driveways.

6.4.2 Primary Defense Zones, Fuel Reduction Zones, and Community Defensible Space

Primary Defense Zone 1 and Fuel Reduction Zone 2 are the areas extending from the foundation of a structure out to 100 feet as defined in PRC 4291 and HIZ concept. Community Defensible Space uses standards in Fuel Reduction Zone 3. Community Defensible Space is created by treating fuels between separate individual Primary Defensible Space treatment areas. These Community Defensible Space treatments will exceed the minimum 100-foot requirement of PRC 4291 and will spatially connect adjacent properties within a community. This zone follows the HIZ concept and creates safer operational space for property owners and firefighters that engage in structure protection activities and enhance overall community protection by leveraging work currently required by PRC 4291.

Table 22 below summarizes treatment options for primary defense zones, fuel reduction zones, and community defensible space treatments for the CWPP Planning area outside the boundary of the Eastern Goleta Valley Community Plan.

Table 23 below summarizes treatment options for primary defense zones, fuel reduction zones, and community defensible space treatments for the CWPP Planning area inside the boundary of the Eastern Goleta Valley Community Plan.

Table 21 Vegetation Fuel Treatment Prescriptive Guidelines - Evacuation Routes and Roadside Treatments

Location → **Fuel Type ↓**	**Primary Zone (A)** **(up to 20' from the road edge)*** (distance varies with terrain, accessibility, & need)	**Secondary Zone (B)** **(20' – 50 from the road edge')*** (distance varies with terrain, accessibility, & need)
Grass/ Forbs	Reduce fuel depth to 1 inch.	Treatment not needed.
Surface dead/down material	Remove all large (>3-inches diameter) dead/down material.	Remove up to 75 percent of >3" diameter dead/down material.
Chaparral/Shrub	Remove all chaparral vegetation within this zone. Retain the root crown to promote soil stability. Widely spaced specimen species of chaparral, e.g., mature manzanita may be preserved. Chipped, masticated, or hand dispersed material may be redistributed back onto cleared areas where feasible to enhance soil coverage and retard grass and weed regrowth.	Remove up to 75 percent of chaparral vegetation. Widely spaced small pockets or clumps of chaparral/shrubs are permitted. Pockets/clumps of chaparral remaining should be healthy, early seral stage plants limbed to 1/3 height of chaparral/shrub crown. Chipped or masticated material may be "blown" back onto the slope where feasible to enhance soil coverage.
Trees Overstory (without chaparral/shrub understory)	Prune all trees to 6 feet or ½ of the live crown height, whichever is less. Remove branches extending over roadways to a minimum height of 14 feet. Thin/remove smaller trees leaving larger trees (6-inch diameter at breast height (DBH) with crown spacing up to 10 feet.	Same treatment as Zone A with the exception of overstory spacing. Overstory canopy should provide shading of the surface to limit potential development of grass or shrub understory vegetation.
Trees Overstory (with chaparral/shrub understory)	Thinning specifications, same as Trees Overstory (without understory), but remove all understory chaparral/shrubs below trees in this zone.	Remove all chaparral from the understory of the tree canopy. Where crown cover allows, ensure shading of the surface to limit potential development of grass or shrub understory vegetation.

** NOTE: A Land Use Permit from SBC is required for private fuel modifications in ESH extending more than 10 feet from the driveway or roadway.*

These distances allow SBC Fire, LPF, and property owners to consider turnouts and vista points where additional distances may be needed.

Table 22 Vegetation Treatment Prescriptive Guidelines - Areas Outside of the EGVCP

Location →	Primary Defense Zone (A) (0' – 30' of a structure)	Fuel Reduction Zone (B) (30' – 100' of a structure)	Fuel Reduction Zone (C) (100' and beyond a structure')
Fuel Type ↓	*Based on California Public Resources Code 4291 and HIZ*		*Based on Life Safety*
Grass/ Forbs	Reduce fuel depth to 1" or less.	Reduce grass height to 4" or less. Longer grass in discontinuous open areas is acceptable.	Treatment may not be needed.
Surface Dead/Down Material	Remove all dead/down materials.	Reduce dead/down flammable material to < 3" depth and < 5 tons/acre. Non-contiguous isolated logs acceptable.	Reduce heavier pockets of dead/down flammable material to < 5" depth; < 5-7 tons/acre in isolated logs acceptable.
Chaparral/ Shrub	Remove all but individual specimen chaparral plants. Individual ornamental/native shrubs should be spaced at a minimum 2x shrub height.	Remove up to 75 percent of chaparral vegetation. Allow for discontinuous small pockets or clumps of chaparral/shrubs. Pockets and clumps of chaparral remaining should be healthy and the understory pruned to 1/3 height of chaparral/shrub crown.	Less intensive brush removal with up to 30 foot spacing of pockets and clumps of chaparral and shrubs. The remaining pockets and clumps of chaparral should be healthy and at the young-growth stage and limbed to 1/3 height of chaparral/shrub crown.
Trees Overstory (without chaparral/shrub understory)	Thin smaller trees leaving larger trees (>6 inches DBH) at 10 to 20-foot crown spacing (based on slope, tree size and type); limb/prune lower branches 6 feet above grade level, or lower 1/3 of tree height on smaller trees. Eliminate all branches within 10 feet of chimney or stovepipe outlets.	Thin smaller trees leaving larger trees (> than 6 inches DBH) at approximately 10-foot crown spacing (based on slope, tree size and type); limb/prune lower branches 6 feet up, or lower 1/3 of tree height on smaller trees and remove all broken limbs and dead material.	Limb and prune lower branches of larger trees up to 6 feet and remove all broken limbs and dead material.
Trees Overstory (with chaparral/shrub understory)	Thinning specifications are the same as Trees Overstory without Chaparral/shrub understory in Zone A. Understory: remove chaparral; limb/prune ornamental shrubs to 1/3 of shrub height. Eliminate all branches within 10 feet of chimney or stovepipe outlets.	Thinning specifications are the same as Trees Overstory without Chaparral/shrub understory (Zone B). Understory: allow occasional small, less dense chaparral/ shrub and small tree clumps and pockets in openings without canopy and small trees in openings (non-canopy).	Thinning specifications are the same as Trees Overstory without chaparral/shrub understory in Zone C. Understory specifications are the same as Chaparral/shrub in Zone C except the pockets and clumps are limited to tree openings (non-canopy).

Table 23 Vegetation Treatment Prescriptive Guidelines - Areas within the EGVCP

Location → / Fuel Type ↓	Primary Defense Zone (A) (0′ – 30′ of a structure)	Fuel Reduction Zone (B) (30′ – 100′ of a structure)	Fuel Reduction Zone (C) (100′ - 300′ a structure)	Fuel Reduction Zone (D) Greater than 300′ from a structure
	Based on California Public Resources Code 4291 and HIZ		*Based on HIZ. Approved on a case-by-case basis by SBC Fire. Without SBC Fire approval, Land Use Permit required in ESH or RC Overlay zones; applicable EGVCP policies and standards apply within EGV*	*Land Use Permit required in ESH or RC Overlay zones; applicable EGVCP policies and standards apply within EGV*
Grass/ Forbs	Reduce fuel depth to 1″ or less.	Reduce grass height to 4″ or less. Longer grass in discontinuous open areas is acceptable.	Treatment may not be needed.	Treatment not needed
Surface Dead/Down Material	Remove all dead/down materials.	Reduce dead/down flammable material to < 3″ depth and < 5 tons/acre. Non-contiguous isolated logs acceptable.	Reduce heavier pockets of dead/down flammable material to < 5″ depth; < 5-7 tons/acre in isolated logs acceptable.	Same a Zone C. Site specific surveys for habitat protection required
Chaparral/ Shrub	Remove all but individual specimen chaparral plants. Individual ornamental/native shrubs should be spaced at a minimum 2x shrub height.	Remove up to 75 percent of chaparral vegetation. Allow for discontinuous small pockets or clumps of chaparral/shrubs. Pockets and clumps of chaparral remaining should be healthy and the understory pruned to 1/3 height of chaparral/shrub crown.	Less intensive brush removal with up to 30-foot for spacing of pockets and clumps of chaparral and shrubs. The remaining pockets and clumps of chaparral should be healthy and at the young-growth stage and limbed to 1/3 height of chaparral/shrub crown. Site specific surveys for habitat protection may be required.	Leave larger clumps of shrubs than zone C, up to 1/8 acre in size. Remove individual dead plants. Prune/remove dead material from the shrub canopy. Site specific surveys for habitat protection required.
Trees Overstory (without chaparral/shrub understory)	Thin smaller trees leaving larger trees (>than 6-inches DBH) at 10 to 20-foot crown spacing (based on slope, tree size and type); limb/prune lower branches 6 feet above grade level, or lower 1/3 of tree height on smaller trees. Eliminate all branches within 10 feet of chimney/stovepipe.	Thin smaller trees leaving larger trees (>6 inches DBH) at approximately 10-foot crown spacing (based on slope, tree size and type); limb/prune lower branches 6 feet up, or lower 1/3 of tree height on smaller trees and remove all broken limbs and dead material.	Limb and prune lower branches of larger trees up to 6 feet and remove all broken limbs and dead material. Site specific surveys for habitat protection may be required.	Remove individual dead trees and those individual trees highly suppressed by mature specimens. Maintain surface shading to limit spread of grasses and shrubs under the tree canopy. Site specific surveys for habitat protection required.
Trees Overstory (with chaparral/shrub understory)	Thinning specifications are the same as Trees Overstory without Chaparral/shrub understory in Zone A. Understory: remove chaparral; limb/prune ornamental shrubs to 1/3 of shrub height. Eliminate all branches within 10 feet of chimney/stovepipe.	Thinning specifications are the same as Trees Overstory without Chaparral/shrub understory (Zone B). Understory: occasional small, less dense chaparral/ shrub and small tree clumps and pockets in openings without canopy and small trees in openings (non-canopy) are acceptable.	Thinning specifications are the same as Trees Overstory without chaparral/shrub understory in Zone C. Understory specifications are the same as Chaparral/shrub in Zone C except the pockets and clumps are limited to tree openings (non-canopy). Site specific surveys for habitat protection may be required.	Remove understory shrub species to create 6′ spacing between individual specimens. Remove individual dead trees and those individual trees highly suppressed by mature specimens. Maintain surface shading to limit spread of grasses and shrubs under the tree canopy. Site-specific surveys for habitat protection required.

6.4.3 Best Management Practices

The following Best Management Practices are recommended to minimize potential adverse impacts from fuel modification activities. Additional guidelines pertaining to environmentally sensitive resources are found in Section 6.4.4, below. For projects subject to CEQA, NEPA, state or County permit requirements, grant conditions or other governmental approvals, compliance with recommended practices may be mandatory to satisfy environmental requirements, project conditions of approval, or grant conditions.

6.4.3.1 Regulatory Compliance

Fuel modification work must comply with applicable federal, state and County regulations.

- Compliance with California Environmentally Quality Act (CEQA) is required for County agency projects and private projects that require discretionary state or County approvals. Compliance may be accomplished by filing a notice of exemption (if the project qualifies for a categorical or statutory exemption), preparing a negative declaration or mitigated negative declaration, or preparing an environmental impact report (EIR).
- Resource protection measures (found in this section and Section 6.4.4) are intended to reduce or eliminate adverse environmental effects and may be imposed on projects subject to CEQA and/or Santa Barbara County permitting requirements. Compliance with such mitigation requirements is mandatory.
- Outside of the EGVCP, projects less than five acres may not require County permits (i.e., Brushing Ordinance).
- Within the EGVCP, projects located within the Environmentally Sensitive Habitat (ESH) Overlay, as defined in the EGVCP and LUDC, that will: (1) remove more than 5,000 square feet of native vegetation, (2) remove native riparian vegetation along 50 linear feet or more of a stream or creek, (3) remove native vegetation that when added to previous removal will total 5,000 square feet of native vegetation or more than 50 linear feet of native riparian vegetation, or (4) grade more than 50 cubic yards, shall require a Land Use Permit. Projects that remove more than one acre of vegetation, 500 linear feet of riparian vegetation, or involve grading that exceeds 1,500 cubic yards shall require a Minor Conditional Use Permit. Exemptions exist for some limited work in ESH areas (e.g., creation of defensible space in compliance with SBC Fire fuel modification guidelines within 100 feet of existing structures, or up to 300 feet if recommended by SBC Fire for life safety) (LUDC Section 35.58.100.D).
- Within the EGVCP, projects located within the Riparian Corridor (RC) Overlay as defined in the EGVCP and LUDC, that will: (1) remove vegetation over an area greater than 20,000 square feet, (2) remove a significant amount of vegetation along 100 linear feet or more of a creek bank, (3) remove native vegetation that when added to previous removal will total one acre or more than 200 linear feet of creek bank, or (4) grade more than 150 cubic yards shall require a Land Use Permit. Projects that remove more than one acre, 500 linear feet of riparian vegetation, or

grading that exceeds 1,500 cubic yards shall require a Minor Conditional Use Permit (LUDC Section 35.28.170).

- A County permit is not required for projects undertaken by SBC Fire.
- In an unusual circumstance when fuel modification will occur on the banks or in the bed of a watercourse, a stream alteration permit may be required from the California Department of Fish & Wildlife.
- Regardless of permit requirements, work affecting ESH areas, streambeds, bird nesting sites, sites hosting protected plant or animal species or sites with historic or cultural resources may be restricted or prohibited under applicable regulations. Work during the annual bird-nesting season (January 15 to September 15 in the State Responsibility Area) may require surveys by a qualified biologist to ensure avoidance of nesting sites.
- Work on federal lands is subject to the National Environmental Policy Act (NEPA), Forest Service regulations, Los Padres National Forest Land Management Plan, and applicable other federal regulations.

See Section 6.4.4 for additional requirements and recommendations for proposed work involving environmentally sensitive resources and habitat areas.

6.4.3.2 General Design Features

- Boundaries between treatment levels should maintain free-form shapes and feathered edges that replicate natural patterns; avoid straight lines by scalloping and feathering along edges of vegetation. The feathering of edges includes undulating edges horizontally and diverse heights of the brush retained on site.
- Preservation of islands of larger chaparral vegetation is preferable over uniform thinning of vegetation in areas away from structures, safety areas and evacuation routes. However, retention of some scattered larger vegetation may be appropriate to preserve certain species (e.g., mature native trees, manzanita).
- Scattered low standing shrubs or other groundcover should be retained between islands where practical to protect soils and water retention. Chipped or hand distributed cut materials may be used where live vegetative cover cannot be maintained.
- ESH, rare plants, critical wildlife habitat, and cultural resource sites must be protected as provided in Section 6.4.4 below. Where present, ESH or other sensitive resources should be included in islands of undisturbed vegetation to minimize disruption of habitat value.
- Replacement of existing vegetation with oak trees or other less flammable vegetation should be considered where soils, environmental conditions and fire safety considerations permit.

6.4.3.3 Vegetation Removal, Preservation and Replacement Priorities

Fuel modification should focus on removal of fuels with the greatest potential to contribute to fire intensity while preserving species with significant habitat value, aesthetic value or potential to reduce fire impacts by disrupting ember travel or blocking radiant heat. Lists of native and non-native plant species rated as being relatively fire-resistant or relatively high risk are available from a number of sources (e.g., *www.diablofiresafe.org/tolerance.html* [summary of recommendations on fire resistant vegetation]; *www.laspilitas.com/classes/fire_burn_times.html* [leaf ignition times for California native plants]). Assistance in identifying native chaparral and other plant species may be found on the California Native Plant Society website at *http://calscape.org/loc-California/*. For a simplified set of priorities for fuel removal, the CWPP recommends the following priorities for treatment, priorities for preservation, and recommendations for vegetation replacement.

Priorities for treatment (in order of priority)

1. Dead Fuels. All dead fuels within 30 feet of structures should be removed. Beyond 30 feet, remove standing dead fuels less than 1-inch in diameter, except for materials incorporated in roosting and nesting sites. Dead fuels larger than 1-inch in diameter may be left if they have habitat value. In addition, woodrat nests more than 100 feet from structures should be preserved and left in islands of standing fuel where possible. Removal of partially living brush species may be necessary where dead and live material are too intertwined to permit removal of dead material only. Cut dead materials may be chipped or scattered on the site for groundcover, but accumulations of dead material in any one location should be avoided.

2. Non-native, invasive plant species. Outside of landscaped areas, priority should be given to removal of invasive non-native plant species. In particular, removal of eucalyptus, acacia, and palm trees is recommended, except where these trees constitute protected nesting or roosting habitats. Within gardens and other landscaped areas, removal should focus on more flammable non-native species. Information on common invasive plant species may be found on the website of the California Invasive Plant Council at *https://www.cal-ipc.org*.

3. Chamise. Because of chamise's relatively easy ignitability and hot burning characteristics, mature chamise is a priority for treatment. Chamise burls and root systems should be left in place to preserve soil stability. Treatment of chamise regrowth will be required every 3 to 5 years.

4. *Ceanothus megacarpus*. *Ceanothus megacarpus* is a priority for removal because, unlike its cousin *ceanothus spinosa*, *c. megacarpus* does not regenerate from its root system. Consequently, elimination of *c. megacarpus* reduces the work burden of maintaining defensible space. However, burls and root systems should be left in the ground to promote soil stability.

Priorities for preservation

Preservation of some vegetation types in fuel treatment areas is preferred for environmental, aesthetic, fire safety or ease of maintenance reasons. In areas away from structures, the following vegetation types will normally be preserved to the extent possible while achieving the necessary level of fuel reduction for effectiveness and firefighter safety. In some cases, retention may be mandatory (i.e., where preservation of designated species or habitats is required by law, government permit conditions, grant conditions or other legally imposed requirements).

1. Protected Trees or Other Vegetation, Habitat Areas: Restrictions imposed by County ESH policies, federal or state regulations governing threatened, rare and endangered species, or mitigation measures imposed under the California Environmental Quality Act (CEQA) or National Environmental Policy Act (NEPA) may require preservation of particular species, habitats or stands of vegetation within a project area. Examples include most mature native trees in ESH areas, roosting habitat for raptors, and designated rare, threatened or endangered plant species. Further guidance on protected species, habitat types and associated regulatory restrictions is found in Section 6.4.4.

2. Native Trees. Healthy native trees, whether protected by regulation or not, should generally be preserved, subject to limbing up to 6 feet in height to eliminate ladder fuels and dead branches. Where some thinning is required, priority for preservation should be given to mature native species, particularly oaks, madrone and riparian species. For further detail on trees, see section 6.4.4.3.

3. Manzanita. Manzanita species are widely valued for their aesthetic and habitat value in the Planning Area and should be preserved to the extent possible. Dead or dying limbs may be removed. Thinning in denser stands may be undertaken if necessary for safety of residents, structures or firefighters.

4. Low-lying vegetation. Low-lying shrubs and groundcover species are normally less prone to intense burning than taller vegetation and will normally be favored for preservation, particularly where potential erosion is an issue. Examples of species generally rated as being relatively fire resistant include yerba santa and monkeyflower.

5. Islands: Where scattered specimens or islands of native chaparral are to be left, less easily ignited species are preferred. Examples include healthy *Ceanothus spinosa*, mountain mahogany, and bush poppy.

Replacement Vegetation

Where feasible, replacement of existing vegetation with less flammable native species may provide a means of increasing the effectiveness of fuel modification zones while also preserving habitat values and potentially reducing maintenance requirements. Major consideration should be given to replanting with native oak trees to create shaded fuelbreaks, where environmental conditions and fire safety considerations allow. Revegetation with shrub or groundcover species that may retard growth of grasses and other easily ignitable fuels would be particularly useful in reducing maintenance requirements and

enhancing fuel treatment effectiveness. Local conditions such as soils, slope, exposure to sun and surrounding vegetation may dictate options for revegetation, as well as factors such as costs, labor availability, and availability of water.

6.4.3.4 Disposal of Cut Fuels

Chipping or Hand-Dispersal

Chipping or hand dispersal of cut fuels are the preferred methods of disposing of cut fuel materials.

- Chipping is most efficient where fuels can be piled or dragged to an area accessible to a mechanical chipper. Chips may be dispersed on site to assist with soil stabilization, weed suppression or other landscaping purposes, or may be disposed of off-site. Concentrations of chips more than 6 inches deep should be avoided.
- Hand dispersal (also known as lop and scatter) involves reducing cut materials to short lengths (6 inches or less for small diameter material, longer lengths for larger diameter trunks and branches) and spreading the material in treated areas. Accumulations of cut material more than 4 inches in depth (or the actual diameter of larger sections of trunks or branches) should be avoided. Hand dispersal is labor intensive and is best utilized on slopes and other areas inaccessible to mechanical chippers.

Pile Burning (Prescribed Fire)

Pile burning (prescribed fire) may be necessary to dispose of large volumes of cut fuel in areas inaccessible to mechanical chippers. When required, pile burning should be conducted using the following practices:

- To minimize soil sterilization, burn piles should not be larger than necessary to allow for complete combustion of fuels. Lighter brush (under 1 ½ inches in diameter) can generally be burned in piles measuring 6′ x 6′ x 4′ height or less. Larger piles may be required for larger cut fuels or where space is inadequate for multiple smaller piles. SBC Fire approval is required for piles larger than 6′ x 6′ x 4′ height.
- Excess dragging of cut materials to piles should be avoided to minimize soil disturbance and trampling of groundcover.
- Piles that cannot be burned before commencement of fire season should be compacted to the extent possible to reduce fire hazard.

6.4.3.5 Protection of Soils, Watersheds and Watercourses

- In all fuel modification areas, damage to surface soil structure should be minimized to reduce potential for erosion and sediment transport to drainages.
- In areas away from structures, existing native groundcover vegetation under 12 inches in height should be retained where there is a potential for erosion, and regrowth of native groundcover vegetation encouraged.

- Chipped or masticated cut materials should be "blown" back or hand-distributed on slopes, where feasible, to enhance soil coverage.
- Water bars and other erosion control structures will be located to prevent water and sediment from being channeled into stream courses and to dissipate concentrated flows.
- If authorized, use of off-road mechanized equipment should comply with guidelines for mechanized equipment noted in Section 6.4.3.7 below.
- Riparian zones along streams and watercourses are considered Environmentally Sensitive Habitats (ESH) in the EGVCP. Fuel modification activities should be avoided in all riparian zones whenever possible within the EGVCP area. If complete avoidance is not possible, fuel modification shall be limited to that specified in Section 6.4.4.7 below and may require a permit pursuant to LUDC Section 35.58.100.D.
- Fuel modification work within the bed or along the banks of any stream or watercourse outside of the EGVCP area should also be avoided. If work activity unavoidably must occur within the streambed or along banks, work should not result in physical changes to streambed or banks themselves. Work that may result in physical alterations, including removal of major vegetation in the streambed or streambanks, requires a Section 1601 permit from the California Department of Fish & Wildlife. Work that may result in fill to a jurisdictional water or wetland of the United States requires a permit from the Army Corps of Engineers. Plans for full restoration of the stream or wetland area will typically be required as conditions of federal, state, or Santa Barbara County approvals.
- Project-generated vegetation debris shall be removed from the stream course and banks.
- If stream crossings will be required for fuel modification work, the location and method of crossing shall be identified prior to fuel reduction activities and selected to provide the least amount of potential impacts.

6.4.3.6 Use of Goats

Goats have been utilized for defensible space maintenance and occasionally for fuel treatment construction in some areas as a cost effective natural means of fuel modification. However, careless management of goats may result in avoidable environmental impacts. The following measures are recommended to avoid or reduce adverse impacts.

- Goats should not be used in areas qualifying as ESH (See Section 6.4.4.7 below).
- Newly introduced goats may carry seeds of noxious weeds or other invasive plant species. All goats shall be purged prior to commencing work in any new fuel modification area.
- Goats are browse feeders and usually not effective at reducing grassy fuels. Where treatment is required to eliminate grass as an ignition source, treatment should be accomplished by other means.

- Overgrazing must be avoided, particularly on slopes or other areas susceptible to erosion. Goats are indiscriminate in what they eat and will eat most plant species; however, they prefer younger, soft vegetation and will often eat the non-target vegetation prior to eating the vegetation considered hazardous. Goat hooves can cause soil disturbance as they walk within a confined treatment unit. Goats should be moved to new grazing areas when the required amount of fuel reduction has been achieved.
- Manzanita and rare plants shall be protected from goats by fencing these areas to exclude grazing.
- Goats smell and can be noisy, which can be a nuisance in residential areas. Avoid using goats in areas where this could be an issue.

6.4.3.7 Mechanized Equipment

The use of off-road mechanized equipment is not anticipated for most SBC Fire and private fuel treatments other than roadside fuel maintenance in this CWPP. This is due to the general small size of these projects. Some roadside fuel maintenance will be accomplished with mechanized mowers; these mowers will normally operate with wheels or tracks staying within existing roadbeds and parking or turnout areas. Masticators or other heavy equipment may be used on some larger projects (e.g., Forest Service strategic fuelbreaks, large private projects). In such cases, the following guidelines should be applied:

- Masticators are designed to remove standing fuels without major soil disturbance and to leave masticated material on site as groundcover. Masticators are therefore heavily favored over any other type of mechanized off-road equipment for fuel modification.
- When operating equipment off roadways, the use of rubber tracked equipment with a low ground pressure coefficient is preferred.
- No mechanical equipment shall be used on slopes greater than 30 percent with following exception: the equipment is operating on slopes less than 30 percent and accessing slopes greater than 30 percent with a boom arm.
- Movement of any heavy equipment across slopes should be minimized.
- Heavy equipment shall not be used in riparian areas.
- Precautions shall be taken to prevent scarring of trees by equipment.
- Known landslide and unstable areas shall be avoided for safety reasons and because vegetation treatment activities may result in increased potential for mass wasting and sediment delivery to stream courses.
- Servicing or refueling of equipment shall occur only at sites designated by SBC Fire or in locations where spill containment protections are in place (e.g., equipment yards). Operators must remove residues, waste oil, engine coolants, and other harmful materials from all worksites. Spill containment measures shall be established prior to any on-site servicing or refueling.

- To limit the spread and establishment of invasive plant species (e.g., noxious weeds) into treatment areas, all off-road heavy equipment used during project implementation shall be washed free of noxious weeds and seeds before entering project areas. If any equipment works in an area where noxious weeds occur, it shall be washed, especially the undercarriage, to remove weed propagules prior to entering other work locations.
- All equipment staging areas shall be located away from known areas with noxious weed occurrences to the maximum extent feasible.

6.4.4 Protection of Environmentally Sensitive Resources

The following guidelines for protection of valuable or sensitive environmental resources (not addressed in earlier sections of this CWPP) are derived from applicable federal, state, and county regulations and common practices for avoiding or mitigating environmental effects. The goal of these guidelines is preservation of existing environmental qualities in the mountain and foothill areas of the CWPP while permitting adequate fire protection measures to be implemented by the Forest Service, Santa Barbara County agencies and local residents. Legally required restrictions and requirements are noted where applicable. Where not legally required, compliance with these guidelines is recommended.

6.4.4.1 Surveying, Mapping and Marking

- Surveys to identify sensitive resources shall be conducted by qualified personnel prior to fuel modification work where required by applicable regulations. Surveys by qualified personnel shall also be conducted and may be required by Santa Barbara County Planning and Development where there is a significant potential for impacts to unmapped ESH, protected species or sensitive cultural sites. Funding for necessary surveys should be requested in grant funding proposals.
- ESH areas shall be marked on project area maps and/or the boundaries flagged prior to commencement of project work.
- Areas containing any other sensitive resources (e.g., rare plants, wildlife burrows) shall also be marked on project maps and/or flagging placed around the area to be protected prior to commencement of project work in that area.

6.4.4.2 Environmental Mitigation Measures

Mitigation requirements may be imposed on projects subject to CEQA: where it is determined that the project may have significant adverse environmental impacts; as a result of Santa Barbara County permitting requirements; or as conditions of grant funding. As noted previously, compliance with such mitigation requirements is mandatory. In some cases, compliance with environmental protection measures listed in previous sections of the CWPP may provide adequate mitigation. Appropriate mitigation measures based on local conditions and the nature and severity of impacts, may include the following:

- Project redesign to avoid sensitive habitat areas by reducing clearing and/or increasing retention of existing vegetation.

- Replanting with oak trees or other preferred native vegetation.
- Additional measures to reduce and control proliferation of invasive species.
- Off-site habitat replacement or restoration, for major projects which will result in substantial habitat loss that cannot be mitigated through on-site measures.

6.4.4.3 Trees

- Mature living native trees should be preserved when practical. Within the EGVCP area, "protected trees" must be preserved to the maximum extent feasible. "Protected trees" are defined as "mature native, naturalized, or roosting/nesting trees that are healthy, structurally sound, and have grown into the natural stature particular to the species" (EGVCP Policy ECO-EGV-4.1, EGVCP Objective ECO-EGV-4). Permitted fuel modification activities for protected trees consist of removal of dead material, proper pruning, removal of lower limbs (up to 6' or 1/3 of height) and removal of understory vegetation where appropriate to eliminate ladder fuels or for life safety (EGVCP Policy ECO-EGV-4.2, DevStd ECO-EGV-4C). *EGVCP* Policy ECO-EGV-4.1 (INLAND) identifies mature, healthy specimens of the following trees as "protected trees":
    - Oaks (*Quercus agrifolia*).
    - Sycamores (*Platanus racemosa*).
    - Willow (*Salix* sp.).
    - Redwoods (*Sequoia sempervirens*).
    - Maples (*Acer macrophyllum*).
    - California Bay Laurels (*Umbellularia californica*).
    - Cottonwood (*Populus fremontii & Populus balsimifera*).
    - White Alder (*Alnus rhombifolia*).
    - California Walnut (*Juglans californica*).
    - Any trees serving as known raptor nesting or key raptor roosting sites.
    - Any trees serving as Monarch Butterfly aggregation sites.
- Trees utilized as roosting sites for raptors are classified as Environmentally Sensitive Habitat within the EGVCP, and must be preserved (EGVCP Policy ECO-EGV-5.4). This applies to native or non-native trees.
- Immature trees less than 6 inches in diameter may be thinned, as needed, or may be retained to provide ember and convective heat screening.
- Dead and non-native trees may be removed or retained for habitat value.
- Oak woodlands are considered an ESH in the EGVCP. Compliance with EGVCP policies and development standards is required for projects in the EGVCP area, except for those exempt by ESH Overlay exemptions (LUDC Section 35.28.100.D), and recommended for all other projects in oak woodlands.

6.4.4.4 Wildlife

- Sites important to wildlife should be avoided or included in islands of retained vegetation. Sites may include:
    - Water sources (i.e., springs, seeps, seasonal ponds).
    - Burrows (other than ground squirrel burrows).
    - Special food sources.
- Wood rat nests located more than 100 feet from structures should be preserved with surrounding vegetation unless determined to be a fire hazard.
- Rare and protected species may occasionally be encountered during treatment activities and shall not be harmed. Rare and protected animal species occurring or potentially occurring in the Planning Area are identified in Appendix F.

6.4.4.5 Birds

- Destroying or injuring individuals and disrupting active nests of migratory bird and raptor species are always prohibited by law. Destruction of individuals or active nests of all bird species must be avoided regardless of season and at all locations.
- SBC Fire or SBC permitted fuel treatment activities should be scheduled outside the general bird nesting season of January 15 through September 15. If removal of vegetation for purposes other than roadside maintenance or annual removal of grasses and other light fuels must be conducted during the nesting season, the project site and adjacent area must be surveyed by a qualified biologist for the presence of active nests within 100 feet of the project area for species protected by the Migratory Bird Treaty Act (MBTA) and 300 feet for federally listed, state listed, or raptor species. The survey should be conducted not more than 10 days prior to the commencement of work and should be repeated at two-week intervals if the work extends more than two weeks. If active nests are determined to exist, no vegetation removal shall occur within 100 feet of the nesting area for species protected by the MBTA or within 300 feet of the nesting area for federally listed, state listed, or raptor species, unless the consulting biologist determines that a smaller buffer area is adequate for protection of nesting activity or that nesting and rearing activities have ceased. Forest Service projects will comply with mitigation requirements established by Forest Service biologists.

6.4.4.6 Rare or Protected Plants

- Individual specimen or isolated patches of rare or protected plant species may be encountered in the Planning Area. Rare and protected plant species potentially found in the CWPP are listed in Appendix F. Specific EGVCP policies and development standards are also found in Appendix G. Rare and protected plant species and surrounding vegetation and soils generally should not be disturbed. Project conditions imposed by a permit, grant conditions, or CEQA mitigation measures may specify further specific protective actions or mitigation measures.

- Larger assemblages of rare or protected plant species will generally qualify as ESH areas (see below).

6.4.4.7 Environmentally Sensitive Habitat Areas

Certain habitat types found in the Planning Area are classified as Environmentally Sensitive Habitat (ESH) in Santa Barbara County's *EGVCP*. Fuel modification projects within EGVCP ESH areas are subject to the ESH Overlay Zone (ESH-GOL) and must comply with policies and regulations found in the EGVCP and County LUDC, unless exempt pursuant to the LUDC (LUDC Section 35.28.100.D). EGVCP policies apply to both ESH identified on County maps and ESH identified during the project planning or permit application process. For areas located outside the EGVCP area, compliance with these guidelines or similar restrictions may be mandated for grant conditions or governmental approvals subject to CEQA. Where this is not mandatory, compliance is recommended for all projects in the CWPP Planning Area.

Riparian habitats along streams and creeks on lands zoned Agriculture within the EGVCP are subject to the RC Overlay Zone, and must comply with policies and regulations found in the EGVCP and County LUDC (LUDC Section 35.28.170).

Maps depicting documented ESH areas are maintained by SBC and are included in Section 2 in this CWPP. An update to the ESH/RC Overlay for the Rural Area of the EGVCP area was completed and adopted by the Board of Supervisors on August 14, 2018.

6.4.4.7.1 EGVCP Restrictions for Fuel Modification Activities in ESH and Conditions for the Need of a Land Use Permit outside of EGVCP Areas

The EGVCP establishes the following specific restrictions for fire-related fuel modification activities in ESH:

***DevStd FIRE-EGV-1C**: Within high fire hazard areas, vegetation management practices within Environmentally Sensitive Habitat (ESH)/Riparian Corridor (RC) overlay and setback areas should be limited to the following activities to balance environmental resources preservation against wildfire protection:*

- *Removal of non-native trees or immature native trees.*
- *Removal of surface debris.*
- *Removal of invasive non-native plants as defined and listed in the California Invasive Plant Council's "California Invasive Plant Inventory".*
- *Removal of vegetation in non-riparian oak woodland or forest within the minimum defensible space area from structures as required by the County Fire Department.*
- *Selective limb removal of mature trees away from structures within minimum defensible space area as required by the County Fire Department.*
- *Thinning, pruning or mowing of vegetation (except trees) to no less than that required to meet fuel modification criteria (in no case less than 4-inch stubble) and leaving the roots intact.*

This development standard and other policies relating to ESH in the *EGVCP* area are implemented in part by the requirements of Section 35.28.100 of the County LUDC.

Section 35.28.100 of the County LUDC establishes an Environmentally Sensitive Habitat Area Overlay Zone, which applies to ESH in the EGVCP area, as well as other ESH areas.

Section 35.28.100.D.1 requires (subject to certain exceptions) that a Land Use Permit under Section 35.82.110 must be obtained for any of the following types of projects in an ESH Overlay Zone in the EGVCP area:

- Fuel modification for defensible space for any existing structure.
- Removal of more than 5,000 square feet of native vegetation.
- Removal of native riparian vegetation along 50 or more linear feet of any creek or stream.
- Removal of native vegetation that, when added to the previous removal within the affected habitat, that would total more than 5,000 square feet of native vegetation, or more than 50 linear feet of native riparian vegetation along a creek or stream.
- Grading in excess of 50 cubic yards.
- Removal of healthy native trees more than 6 inches in diameter or 6 feet in height.
- Removal of any tree used as roosting habitat by Monarch butterflies or by nesting raptors.

The following activities are exempt from the foregoing permit requirements and do not require County approval even if in areas qualifying as ESH:

- Vegetation removal up to 10 feet (on both sides) along roads and driveways.
- Fuel modification for defensible space within 100 feet of an existing structure.
- Additional fuel modification for defensible space, up to a maximum of 300 feet from an existing structure, where SBC Fire issues a letter determination that the additional clearance is required to provide an adequate safety zone.
- Vegetation removal and related activities conducted by SBC Fire, Forest Service (on federal land), state, or another department or local agency for road maintenance, fire protection, or other purposes.

6.4.4.7.2 Oak Woodlands

Oak woodlands are considered ESH in the EGVCP. Oak woodlands within the EGVCP ESH Overlay are typically comprised of Coast live oaks *(Quercus agrifolia)* with a canopy cover or 8% or more. Oak woodlands meeting this criteria are mapped on the ESH Overlay (Scrub oaks are not considered oaks for this purpose; however, one rare species of scrub oak (Nuttall's Scrub Oak) may occur in project areas and shall be protected).

- Fuel reduction in oak woodlands should be limited to removal of dead limbs, understory vegetation, fallen material and accumulations of ground fuel. The amount of surface fuels and

understory fuels removed should be sufficient to prevent flame lengths from reaching or seriously damaging the canopy.

- Any naturally occurring duff layer should be disturbed as little as possible.

6.4.4.7.3 Riparian Zones

Riparian woodlands and riparian corridors are also considered ESH in the EGVCP. In agriculturally zoned areas in the EGVCP, riparian corridors and woodlands are protected by a similar Riparian Corridor (RC) Overlay designation. A Land Use Permit is required for fuel modification in the RC Overlay Zone that involves (a) the removal of vegetation over an area greater than 20,000 square feet; (b) the removal of a significant amount of vegetation along 100 linear feet or more of creek bankl (c) the removal of vegetation that when added to the previous removal of vegetation within the affected habitat on a lot would total more than one acre or longer than 200 linear feet of creek bank, and (d) grading in excess of 150 cubic yards. A Minor Conditional Use Permit is required where a significant amount of vegetation is proposed to be removed within an area that exceeds one acre or 500 linear feet of creek bank, or where grading would exceed 1,500 cubic yards of cut and fill. Fuel modification activities in the RC Overlay Zone is subject to the following:

- Work in riparian zones shall be avoided whenever possible and shall be limited to work necessary to create adequate individual defensible space, community defensible space, or roadside clearance. As riparian corridors tend to foster growth of vegetation with higher moisture content and are typically less exposed to solar pre-heating, they may significantly improve the effectiveness of adjacent fuel modification work even when left intact.
- Where necessary, fuel reduction in riparian zones should be limited to removal of dead material, non-native vegetation, highly flammable understory vegetation and accumulations of ground level fuels as permitted by ECVCP's DevStd FIRE-EGV-1C.
- No work of any type should be conducted in stream channels or along banks unless absolutely unavoidable. Before conducting any significant work in stream channels or on stream banks, the California Department of Fish & Wildlife should be consulted to determine if a Section 1601 permit is required.
- Any cut materials that fall within stream channels or banks shall be removed to retain free flow conditions.
- To minimize erosion, groundcover shall be retained to the maximum extent possible. Bare areas created by fuel modification activities should be covered with chipped or hand-disbursed cut materials.

6.4.4.7.4 Other Environmentally Sensitive Habitat Types

While Oak Woodlands and Riparian zones are the principal type of ESH found in the Planning Area, other types recognized in the EGVCP that may occur include the following:

- Coastal sage scrub.

- Sensitive native flora.
- Vernal pools and wetlands.
- Raptor and turkey vulture roosts.
- Critical wildlife habitat.
- Wildlife corridors.
- Native grasslands.
- Bigcone Douglas Fir alliance.
- Chaparral vegetation that supports rare or vulnerable native vegetation alliances and/or sensitive native plants and/or animal species.

ESH of these types has not been documented in any areas identified as potential fuel modification areas in the CWPP. However, on-site examination of sites for ESH of these types will be required before commencement of projects within the EGVCP area. Relevant policies and standards for activity in these ESH types are found in the compendium of ECVCP policies in Appendix G.

6.4.4.7.5 Buffer Zones around ESH

The EGVCP directs that buffer zones be maintained around identified ESH. The limits of vegetation modification for fire protection found in DevStd FIRE-EGV-1C apply equally to the following buffer zones:

- Minimum buffer zones for riparian zones are 50 feet from the edge of existing riparian vegetation in the developed foothill area and around mountain residential communities, and 200 feet in other mountain areas (EGVCP Policy ECO-EGV-5.5 (INLAND)). These areas are classified, respectively, as Urban, Existing Developed Rural Neighborhoods (EDRN) and Mountainous areas in the ECVCP. SBC Zoning maps should be consulted to determine precisely where these two different buffer zone requirements apply. On-line County land use and zoning maps may be found at *http://sbcountyplanning.org/forms/maps/index.cfm?id=Community.*
- Minimum buffer zones for oak woodlands and other native woodlands are 25 feet in the developed foothill area and around mountain residential communities and 50 feet in other mountain areas (EGVCP DevStd ECO-EGV-6B).
- Minimum required buffer zones may be adjusted upward or downward by SBC staff based on relevant site-specific factors (EGVCP DevStd ECO-EGV-5D (INLAND)).

6.4.4.7.6 Cultural Resources

- Any known cultural resources within the proposed treatment area shall be protected. If any sensitive cultural resources are found, work will stop and a qualified archaeologist will be notified.
- Potential impacts to unknown cultural resources shall be considered and addressed as part of the approval process for SBC Fire and Forest Service projects and any private projects requiring SBC permits or other governmental approvals.

6.5 Maintenance

Ongoing maintenance activity is necessary to retain the effectiveness of any fuel modification and to reduce the risk of fire starts in grasses or other light fuels that usually establish themselves following fuel treatment. All proposals for community defensible space should include maintenance plans that anticipate long-term maintenance requirements, including regular removal of grasses and other easily ignitable fuels in areas exposed to the public, periodic thinning or removal of regrowth and dead fuels, and planned funding for associated costs.

Light Fuels

Intrusion or regrowth of grasses or other light flashy fuels may increase ignition potential in treated areas. To minimize risks, grasses and seasonal weedy growth should be mowed or weed-whipped to less than 4 inches in height wherever treated areas are subject to public encroachment (e.g., along roadways, formal or informal trails, near recreation areas, in private areas which have increased fire risks, such as outdoor cooking or barbeque areas, children's play areas, areas of tool use). Less intensive mowing or weed-whipping of light fuels in interior areas may be desirable to maintain overall defensibility of a fuelbreak or defensible space.

Dead Fuels

Diebacks of larger vegetation may also occur in treated areas. Significant accumulations of dead material should be eliminated as part of annual hazard reduction. Smaller accumulations of dead material may be removed as part of periodic fuel volume reduction.

Live Fuels

Natural regrowth will necessitate periodic cutting back of new fuel in the project area. Maintenance intervals will vary with the vegetation type(s) and other growing conditions (i.e., rainfall, soils, sun exposure). Generally, plans should anticipate recutting every three to five years. Priorities for removal and amounts removed should follow the initial prescriptive guidelines.

Management of Invasive and Beneficial Vegetation Types

In some cases, revegetation of treated areas with less flammable vegetation types may reduce risks of ignition in grasses or other easily ignitable regrowth and reduce overall maintenance requirements. Alternately, selective removal of highly flammable or otherwise undesirable species may facilitate natural regrowth of less ignitable local species. Existing research does not provide clear recommendations for revegetation planning in chaparral areas. However, SBC Fire and community planners are encouraged to conduct reviews of current literature and consult with local experts about potential revegetation plans for future community defensible space, fuelbreaks, and roadside clearing projects.

6.6 Community Evacuation

The Santa Barbara Front presents unique challenges for evacuation due to the speed and intensity of wildfires that occur and the narrow winding transportation systems that exist in the Planning Area. Factors associated with an evacuation such as human behavior, population density, overloaded transportation routes, visitors and recreationalists, vulnerable populations, and the evacuation of pets and large animals make the task of any evacuation more complex. Any combination of these factors may significantly increase the amount of time it takes to execute an evacuation. As a result, the decision by property owners and agencies to evacuate is often made quickly.

6.6.1 During a Wildfire Evacuation

Evacuation is a difficult process, not only for the evacuees but also for emergency responders who are committed to facilitating the evacuation while also attempting to protect citizens and values in the Planning Area.

The Santa Barbara County Sheriff, in consultation with SBC Fire, Forest Service, and/or an Incident Commander, has the responsibility and authority to issue an evacuation order. California law authorizes law enforcement officers to restrict access to any area where a menace to public health or safety exists due to a calamity, such as flood, storm, fire, earthquake, explosion, accident, or other disaster. Refusal to comply is a misdemeanor under Penal Code Section 409.5.

The Santa Barbara County Sheriff's Department (SBC Sheriff) will communicate the need for evacuation to the public using various communication methods, including:

- Reverse 9-1-1.
- Aware and Prepare Alerts.
- Emergency Alert System (EAS) supported by the National Weather Service broadcast.
- Radio and television announcements.
- Public address systems and announcements from emergency responders.
- Door-to-door notifications.
- "Backchannel" communications, such as Twitter.

6.6.2 Timing

Experience shows that evacuation planning needs to consider how long it will take to notify residents that an evacuation is necessary, how long it will take residents to get ready to leave the area, and how long it takes them to reach a safe area. The location and severity of an incident will determine the appropriate timing of an evacuation order.

6.6.3 Santa Barbara County Evacuation and Incident Re-Entry Plans

SBC Sheriff and SBC Fire have an *Incident Evacuation Plan* and *Incident Re-Entry Plan* that assists law enforcement and fire department personnel in the implementation of an evacuation plan. These plans guide agencies in the decision-making process for evacuation and re-entry of residents, and small and large animals.

Evacuation levels defined in the existing plan include:

- Evacuation Order – Movement of community members out of a defined area due to an immediate threat to life and property from an emergency incident. An Evacuation Order should be used when there is a potential or actual threat to civilian life within one to two hours.
- Evacuation Warning – Alerting residents in a defined area of a potential threat to life and property from an emergency incident. An Evacuation Warning may be issued when the potential or actual threat to civilian life is more than two hours away.
- Shelter in Place – Directs residents to stay secured inside their current location. This direction is only used if the safety of the citizens can be assured if they remain or if an evacuation will cause a higher potential for loss of life.
- Safe Refuge Area – A temporary safe location to hold evacuees until evacuation routes are open.

There are levels of closure to areas when evacuation occurs, including:

- Level 1 Closure – Closed to all traffic except local residents; this level may require escorts.
- Level 2 Closure – Closed to all traffic except fire suppression resources, law enforcement, and critical incident resources (e.g., utility companies, Caltrans, SBC Public Works, Transportation Division).
- Level 3 Closure – Closed to all traffic except fire suppression resources and law enforcement.
- Level 4 Closure – Closed to all traffic including fire suppression resources and law enforcement.

Note: Media is allowed access under all closure levels unless prohibited under Penal Code Section 409.5.

6.6.4 Evacuation Preparedness

All individuals, organizations, homeowner associations, families, and caregivers should have an evacuation preparedness plan that assures they can self-sustain up to 72 hours during a disaster. It's recommended that residents utilize the Ready! Set! Go! (RSC) program, previously described, to prepare their individual evacuation plan. SBC Fire has additional emergency preparedness information available at *http://www.sbcfire.com/safety-preparedness*.

Vulnerable Populations

Individuals and caregivers with special needs should have a heightened awareness and evacuation preparedness plans that addresses evacuation and proper care of vulnerable individuals during a wildfire evacuation. Their evacuation preparedness plans should address these additional concerns:

- Medications, equipment, or special dietary needs.
- Documentation about insurance and medical conditions.
- Coordination between emergency responders and caregivers with special vehicles who need to enter an evacuation area to facilitate evacuation.
- Transportation plans for family members with special needs.
- Caregivers or trusted family members should stay with vulnerable individuals at all times during an evacuation.
- Identification of short and potential long-term safe areas should evacuation not be possible.

Additional information on vulnerable populations and emergencies is available at *https://sis.nlm.nih.gov/outreach/specialpopulationsanddisasters.html*.

Small Pets

Evacuation preparedness planning for pets includes:

- Make plans to take animals; do not turn them loose.
- Make sure dogs and cats wear properly fitted collars with identification, vaccination, microchip and license tags. For other animals, identification and information on any current medical care requirements should be attached to the pet carrier or other containment used to transport the animal.
- Know travel routes, transportation needs and host sites. Share this plan with trusted neighbors so that they may initiate evacuation of the owner's animal, if necessary.
- Exchange veterinary information with neighbors and file a permission slip with the veterinarian authorizing emergency care for animals.
- Make sure all vehicles and pet carriers needed for evacuation are serviceable and ready to go.
- Assemble a pet to-go bag with a supply of food, non-spill food and water bowls, cat litter and box and a restraint (e.g., chain, leash, harness). Additional items to include are newspaper and paper towels, plastic bags, permanent marker, bleach/disinfectant solution and water buckets.
- Santa Barbara County Animal Services, in co-operation with local humane organizations, will establish evacuation centers during major fires. Some evacuation shelters for humans may accept pets and others may not. If you have friends or relatives in the area that will take your pets during an emergency, make plans with them ahead of time to make sure your pets will have a safe place to take refuge before a disaster strikes. If hotels have a no-pet policy, ask for a waiver in the event of an emergency. Information for local pet friendly hotels or shelters is available at *www.petswelcome.com*.
- For potential long-term stays away from home, it's recommended that animal caretakers compile a list of boarding facilities.
- When conditions permit, SBC Animal Services will evacuate animals from a mandatory evacuation area if the owners are out of the evacuation area or otherwise unable to evacuate the animal themselves. The "hotline" number to request evacuation of an animal is (805) 681-4332. Keep this number with you and check *https://countyofsb.org/phd/animal/aboutus.sbc* for updates.

Large Animals/Horse

Emergency preparedness is important for all animals, but preparedness can especially be more difficult for large animals (e.g., horses) because of their size and special transportation needs. Evacuation of horses should occur as soon as an evacuation warning is issued. If owners are unprepared or wait until the last minute, they may have to leave their animals behind.

The following provides information for pre-planning evacuation with large animals, including horses:

- Contact Santa Barbara Equine Assistance and Evacuation Team (Equine Evac) for evacuation information for large animals. They have a long history with helping in the evacuation of large

animals including horses in the local area. Equine Evac has equipment and personnel available for large animal evacuation and billeting. All requests for emergency assistance are channeled through SBC Sheriff's Dispatch (911).

- Plan now for emergency sheltering for horses. Many designated sheltering sites may become overcrowded. Make plans now to house horses with friends, at a commercial stable, or other suitable location out of the danger area. Discuss plans with everyone in the family and keep the address of emergency animal shelters and driving directions in an emergency kit.
- Make a list of emergency contacts. Keep copies in vehicles or trailer as well as in the house.
- Take photographs and prepare a written description of each horse or other large animal(s). Put one set in a safe place and another set in an emergency kit.
- Have a halter and rope for each horse/large animal. Make sure halters are marked with contact information or write the information on a piece of duct tape and stick it on the halter. If a horse has medical issues or special needs, record this information on a luggage tag and attach it to the halter.
- Microchip horses/large animals. This is an easy, inexpensive way to help identify animals.
- Have a three-day supply of feed and water (per large animal). This is particularly important if plans are to shelter in place but bring feed (and buckets) if evacuated. Make sure to include any medications the large animal(s) may need. Label any equipment.
- Teach your large animals how to trailer. Spend time loading and unloading the animals so they are safe and willing to load. Continue working with the large animals until confident, they will load.
- Keep trucks, trailers and vans well maintained and ready to move. Keep gas tanks full, particularly during Red Flag Warning days.
- Make a Disaster Preparedness Kit.
- Store non-perishable supplies in a portable container such as a clean trashcan, bucket or canvas duffle bag.

6.6.5 Potential Emergency Evacuation Routes

SBC Fire has identified potential evacuation routes (See Figure 37, Potential Wildfire Evacuation Routes Map), which offer individuals options for rapid egress from areas threatened by a wildfire.

IMPORTANT NOTE: Wildfires are extremely fluid and complex. An evacuation route may become compromised due to fire activity. This map provides suggested evacuation routes, it's recommended that property owners become familiar and practice each potential evacuation route(s) near their community.

6.6.6 Potential Issues with Evacuation

- Property owners and visitors may not have established evacuation preparedness plans.

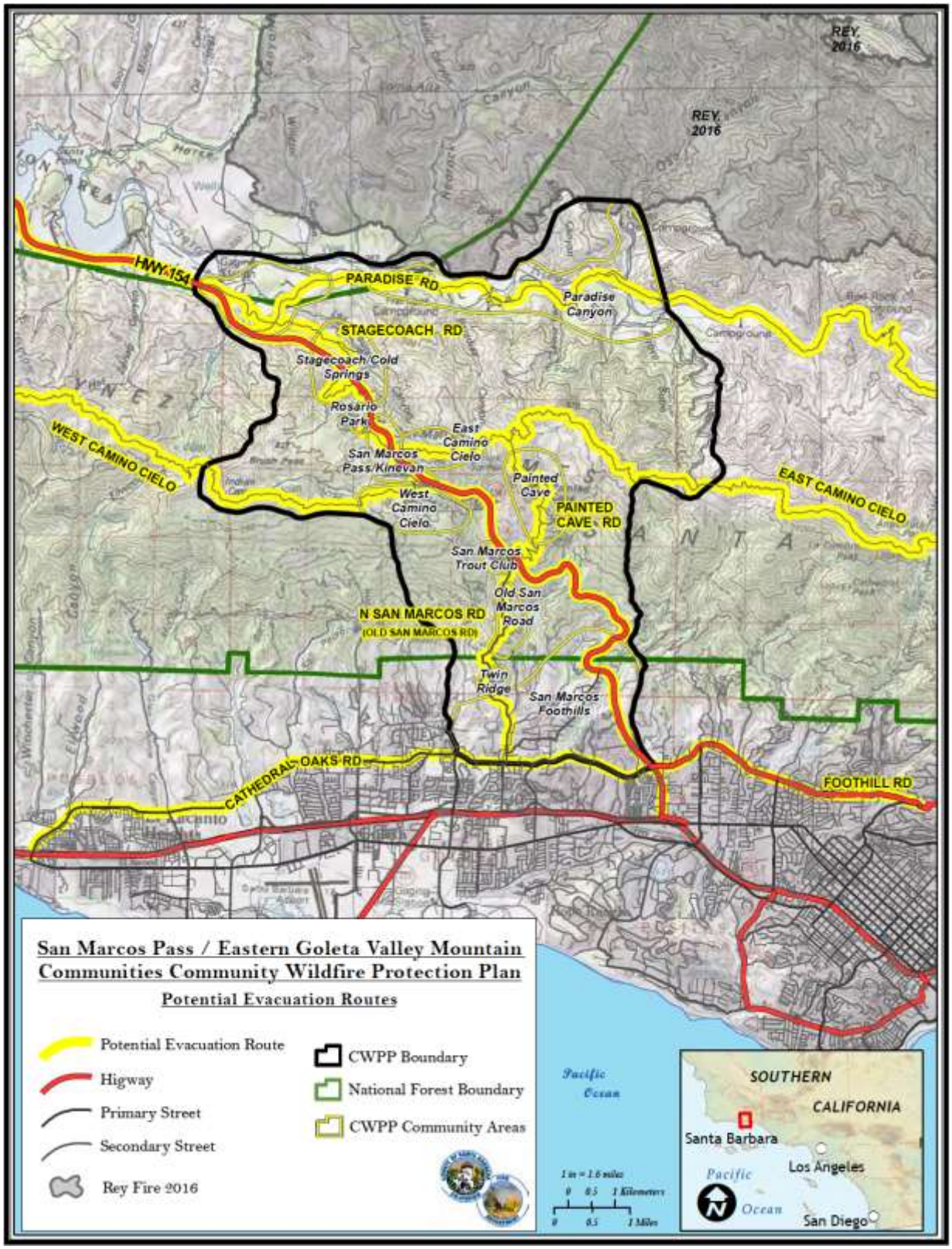


Figure 37. Potential Evacuation Routes Map

- Property owners may not choose to evacuate but to stay and defend their homes/businesses or decide to shelter in place until the fire danger passes. Without fully understanding the effects of their decisions, property owner's actions can put their life safety at risk as well as that of firefighters and law enforcement personnel.
- Individuals often delay their evacuation with the intent of defending their property or to shelter in place jeopardizing their life safety by changing their mind late in the evacuation process forcing them to flee in a panic when conditions are at their worst.
- Vulnerable populations have special needs that are critical to address during disasters such as wildfire. These populations may be less likely to respond to, cope with, recover from wildfire, and are less likely to get involved in wildfire mitigation activities. Age, physical, and mental limitations can restrict mobility making it more difficult to evacuate in a disaster. Lack of financial resources may hinder the ability for low-income populations to invest in emergency preparedness or mitigation measures as well as recover from loss. Language issues can result in communication barriers to evacuation or support services. In addition, visitors to the area are likely unfamiliar with the wildfire threat or appropriate evacuation routes making them potentially vulnerable as well.
- Evacuating pets and large animals pose problems since panicked animals behave unpredictably and may refuse to respond to normal handling approaches.

6.6.7 Re-Entry

Re-entering an evacuated area requires as much forethought and planning as an evacuation order. The safety of residents and emergency responders is of the utmost concern and must drive the decision of when to repopulate. SBC Fire and SBC Sheriff will determine when it is safe for residents, pets and large animals to move back into the area.

Section 7.0 Fiscal Resources

The success of any viable strategy for reducing losses from wildfire depends in major part upon the efforts of individual property owners to (1) create and maintain adequate defensible space on their property; and (2) increase defensibility of structures and other improvements; and (3) adequately prepare for evacuation if needed. Financial responsibility for these actions has historically rested almost entirely on individual property owners.

Resources for community defensible space, roadside clearing and major fuel break projects have historically come from a variety of sources. The existing community defensible space network around the Painted Cave community, for example, was created over many years by a combination of volunteer labor, public and private grant funding obtained by the Wildland Residents Association and Painted Cave Volunteer Fire Department, voluntary contributions by individual property owners, and SBC Fire and Forest Service fuel treatment projects. Community defensible space around the Trout Club has also been completed by a combination of community volunteer efforts and SBC Fire and Forest Service fuel treatment projects. Annual roadside weed abatement along Highway 154 has been conducted by the State of California through CalTrans. Roadside fuel modification and maintenance along other roadways in the CWPP area has been funded and carried out almost entirely by SBC Fire, although some work has been conducted by the Painted Cave Volunteer Fire Department. Fuel treatment projects on Forest Service land are funded and carried out by the federal government, although recent legislation has opened the door for more cooperative projects involving joint federal, state and local collaboration.

7.1 Fuels Management Projects

SBC Fire is the primary agency conducting roadside fuel management in the CWPP and elsewhere in the County. SBC Fire also conducts various fuel management projects around the County based on priorities determined by SBC Fire. Hands-on work for fuel management projects is performed by the SBC Wildland fire crew. Aside from state and federal grant funding (discussed below), SBC Fire is dependent upon property-based tax assessments, state SRA funds, general fund allocations approved by the SBC Board of Supervisors, and reimbursements of firefighting or other emergency response costs incurred in major incidents. SBC Fire has fire protection and prevention responsibilities at a countywide level, which can make directing funds to the specific priorities of this CWPP problematic. Due to budgetary and staffing constraints, oftentimes, a staggered approach to the implementation of fuel hazard treatment activities identified in this Plan are more attainable when SBC Fire, LPF, and private property owners can seek external sources (i.e., grants, stewardships) to fund projects associated with this CWPP.

The following grant opportunities may be available to support this CWPP through the following agencies and group: CAL FIRE, Fire Safe Council, and FEMA.

State of California, California Climate Investments (CCI) Fire Prevention Grants

CAL FIRE administers the California Climate Investments (CCI) Fire Prevention Grants Program. This program supersedes the previous SRA Fire Prevention Fund grant program. This program is the most likely source of funding for major non-federal fuel management projects in the CWPP. CCI grants may be awarded for hazardous fuel reduction projects, fire prevention education and fire prevention planning. Applications may be filed by local government agencies, special districts, Fire Safe Councils and non-profit organizations involved in fire safety. The annual grant cycle typically begins with applications in

the fall of each year culminating in final awards the following year. Grant information from CAL FIRE is available at *www.fire.ca.gov/grants/grants*.

California Fire Safe Council Clearinghouse

The California Fire Safe Council administers a Grants Clearinghouse that channels federal grant funds to local fire prevention projects. Applicants may include local government agencies, Fire Safe Councils, non-profit corporations and homeowners' associations. Grants may be awarded for fuel management projects, fire planning or fire education programs, or combinations of these activities. Proposed projects must be consistent with an approved local CWPP. Recent Clearinghouse grants have required the applicant to secure matching funds equal to one-half the cost of the project being funded.

Grant opportunities are available at *www.cafiresafecouncil.org/grants-clearinghouse*.

Federal Emergency Management Agency (FEMA) Grants

Federal Emergency Management Agency (FEMA) provides grant funding to local government agencies willing to implement structure or home wildfire mitigation assistance activities. The Santa Barbara County OEM is the conduit for potential grant funding through the *Santa Barbara County Hazard Mitigation Plan*. FEMA offers a variety of disaster assistance programs through grants with different eligibility requirements. Grant Programs include Hazard Mitigation Grant Program and Pre-Disaster Mitigation.

- ***Hazard Mitigation Grant Program (HMGP)***
  The HMGP provides funding for long-term hazard mitigation measures following major disaster declarations. Funding is available to implement projects in accordance with State, territorial, federally recognized tribes, and local priorities.

- ***Pre-Disaster Mitigation (PDM)***
  The PDM program provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects. FEMA provides funding for measures to reduce or eliminate overall risk from natural hazards.

Additional information is available at *www.fema.gov/hazard-mitigation-grant-program*.

Private Grants

Some local foundations may provide funding for fuel management projects, equipment or other fire safety projects. The Painted Cave Volunteer Fire Department has been successful in obtaining substantial foundation funding for fuel management work as well as for firefighting equipment in the past. It is unknown whether such funding will continue to be available and whether other organizations such as the WRA or Fire Safe Council could successfully obtain private grant funding in the future.

Community Self-Assessments

Some funding for fuel management and ongoing maintenance could potentially be derived from community level assessments collected by local homeowners associations, mutual water companies or volunteer fire departments. As an example, for a number of years in the 1990s, the Painted Cave Mutual Water Company collected a $ 5.00/month assessment from each household served to support the Painted Cave Volunteer Fire Department. The assessment was nominally voluntary, but was in fact paid by almost all households. Community level assessments would be particularly useful for funding ongoing

maintenance of community defensible space, since securing funding for maintenance activities has historically been a major problem. However, the ability of local associations to levy and spend such assessments, on either a voluntary or mandatory basis, may depend upon the by-laws and articles of incorporation of the organization and governing statutes, as well as the willingness of residents to support the assessment.

7.2 Structure Hardening

Generally structure hardening has been the responsibility of individual homeowners. With one known exception, state and federal funds have not been available to assist homeowners of any income category with structure hardening. The major known exception was a re-roofing program in the Big Bear area of California funded with FEMA PDM funds.

In the wake of the disastrous 2017 and 2018 fire seasons in California and elsewhere, it is likely that additional funding will become available for private home hardening, if local governments are willing to commit staffing and resources to the create the necessary programs. California Senate Bill 465, discussed below, is an example of the type of measures which may make financial assistance for structure hardening more available, as the state and federal governments reassess the need for such programs. At the present time, however, the measures discussed below remain the only established potential sources for assistance for structure hardening measures. In both cases, creation of the necessary programs would require considerable effort by the County of Santa Barbara as well as collaboration by local residents and allied non-profit organizations, homeowners' associations or other interest groups.

FEMA Pre-Disaster Mitigation Grants (PDM)

FEMA's Pre-Disaster Mitigation (PDM) Grant Program may provide grants for structure hardening as well as hazardous fuel reduction around residences. The grant must also be for projects that are consistent with the local government's federally approved Hazard Mitigation Plan. SBC's current Hazard Mitigation Plan satisfies this requirement for structure hardening projects. PDM grant applications must be made by the State, or a local government applying as a sub-applicant through the State. However, counties may submit an application to fund specific projects proposed by homeowners or non-profit associations. PDM grants are highly competitive; applications are judged based on multiple factors, including cost-effectiveness. Development of a viable grant proposal would require detailed planning for identifying homes eligible for assistance, monitoring work performed with grant funds, and administering the grant. Additional information on PDM grants may be found at *https://www.fema.gov/pre-disaster-mitigation-grant-program*.

Property Assessed Clean Energy (PACE) Program

In 2018 the State Legislature passed SB 465, which amends provisions of the pre-existing Property Assessed Clean Energy (PACE) statutory program to allow PACE funds to be used for structure hardening improvements for private homes, as well as for energy efficiency or seismic safety improvements. To establish a local PACE program covering structure hardening measures, the local government (in this case, the County of Santa Barbara) must pass a resolution designating the areas within an existing Very High Fire Hazard Severity Zone that will be included in the program; specify the types of structure

hardening improvements which may be financed, and allocate funding for the program (Cal. Streets & Highways Code section 5899.4). Qualifying homeowners may then apply to the program for funds to complete structure hardening improvements. The funds are repaid by annual additions to the homeowner's property tax bill. This program, if implemented, would provide many homeowners with what is effectively a low-cost loan to complete major one-time structure hardening improvements that they might not otherwise be able to finance.

Section 8.0 Monitoring

CWPP Monitoring

Change is inevitable and a CWPP's strength is characterized by its relevance, currency, and ability to simplify implementation. This CWPP provides a foundation for wildfire protection of the Planning Area based on input from stakeholders, current policy, wildfire analyses, and mitigation strategies. Review and revision of these elements are necessary to maintain a viable plan.

SBC's Fire Marshal is responsible for conducting a thorough review of this CWPP at five-year intervals and should seek input from the Working Group. Significant changes in policy, budget, and/or environmental conditions may warrant a more frequent review.

Fuel Treatment Monitoring

SBC Fire and LPF should establish a monitoring program to ensure that fuel treatment activities remain effective; however, a sustained monitoring program is often overlooked due to workload or budget constraints. Monitoring and evaluation of a fuel treatment establishes baseline data to draw on for decisions about maintenance schedules or if changes are needed in a fuel treatment prescription. The primary considerations of a fuel treatment monitoring program are the type of monitoring to be conducted and the monitoring interval.

A quick, inexpensive but effective method for monitoring fuel treatments is photo point monitoring. Photo point monitoring consists of repeat photography of an area of interest over a period of time with photographs taken from the same location with the same field of view as the original photo. Through the use of site marking and documentation, different people can precisely replicate photos many years apart. Details on methods for photo monitoring are available at *www.fs.fed.us/pnw/pubs/gtr526*.

Section 9.0 CWPP Recommendations

The following identifies recommendations for further consideration by SBC Fire, residents, and SBC County government:

- Based on results of the wildfire analyses and potential life safety issues, consider increasing the defensible space requirements for property owners within high hazard communities in the EGVCP Planning Area in an effort to enhance protection of life safety for firefighters and the public.
- Develop an ongoing educational program for area residents on structure hardening, maintenance of defensible space, and evacuation planning. Elements may include:
    - Update websites to include comprehensive current information on home vulnerability analysis, structure hardening options, defensible space requirements, evacuation planning and preparedness, local emergency plans, and contact information for further inquiries.
    - Outreach program for new area residents. Should include distribution of written information and face-to-face contact by experienced residents or firefighters regarding fire danger, evacuation planning, defensible space maintenance and structure hardening options. All new residents should sign up for emergency alerts.
    - Maintain supplies of up-to-date information sheets and pamphlets for distribution at community events or by request.
    - Conduct annual preparedness meetings for threatened communities. Subjects may include long-term fire weather forecasts, updates on fuel management plans, evacuation planning, local firefighting plans, and available assistance for structure hardening, chipping programs, and reminders concerning basic defensible space requirements.
    - Establish a speaker list of local representatives from fire agencies, scientific community and citizen's organizations to speak at events regarding wildfire safety issues, structure hardening and fuel management planning
- Consider applying for a FEMA Pre-Disaster Hazard Mitigation Grant for structure hardening measures.
- Revise the existing CWPP Development Process to address the interaction of a contractor with the Development Team. Consider using the contractor for technical support, if the Development Team is to be tasked as the principal author.
- Develop a Vulnerable/Special Needs Population Disaster Preparedness Guide for emergency wildfire evacuation.
- Support state or local legislation to provide tax structures with incentives for structure hardening and hazardous fuel treatment mitigation.
- Create a short informational video about fuel management and the process. Footage could be taken by firefighters in the field and a link placed on the CWPP webpage as well as the SBC Fire, WRA and Fire Safe Council websites. Informational brochures could be available at the County Administrative building similar to "Water Wise" or "Creating Defensible Space".
- Consider the implementation of parking restrictions during time of elevated fire danger on narrow roadways that serve as primary access and egress routes into the communities. These restrictions

would require a new County Ordinance and should be included in an update to the existing Red Flag Warning program managed by SBC Fire.

- Consider establishing a SBC Fire, Forest Service, and private landowner fuel treatment monitoring program for the Planning Area.
- Encourage private landowners, recreational-based businesses, and organizations within the Planning Area to develop individual evacuation preparedness plans.
- Consider assessing the fire suppression water system and water supply for the Santa Barbara Front communities to determine (1) if existing water sources and distribution lines are adequate to support exterior fire sprinkler systems; (2) if existing water supplies and distribution systems are adequate to support major firefighting efforts (e.g., resupplying engines, supplying helicopters); (3) what improvements, if any, are necessary to provide adequate supplies to firefighters in the event of an emergency.
- Augment budget of SBC Planning & Development to provide for staff time to support development of CWPPs and other fire safety plans.
- Maintain the SMPEGV CWPP Development Team as an advisory committee to meet on an annual basis to ensure CWPP currency. The SMPEGV CWPP Advisory Committee would also engage with SBC Fire and LPF for project planning and implementation ensuring community involvement and participation in the process.

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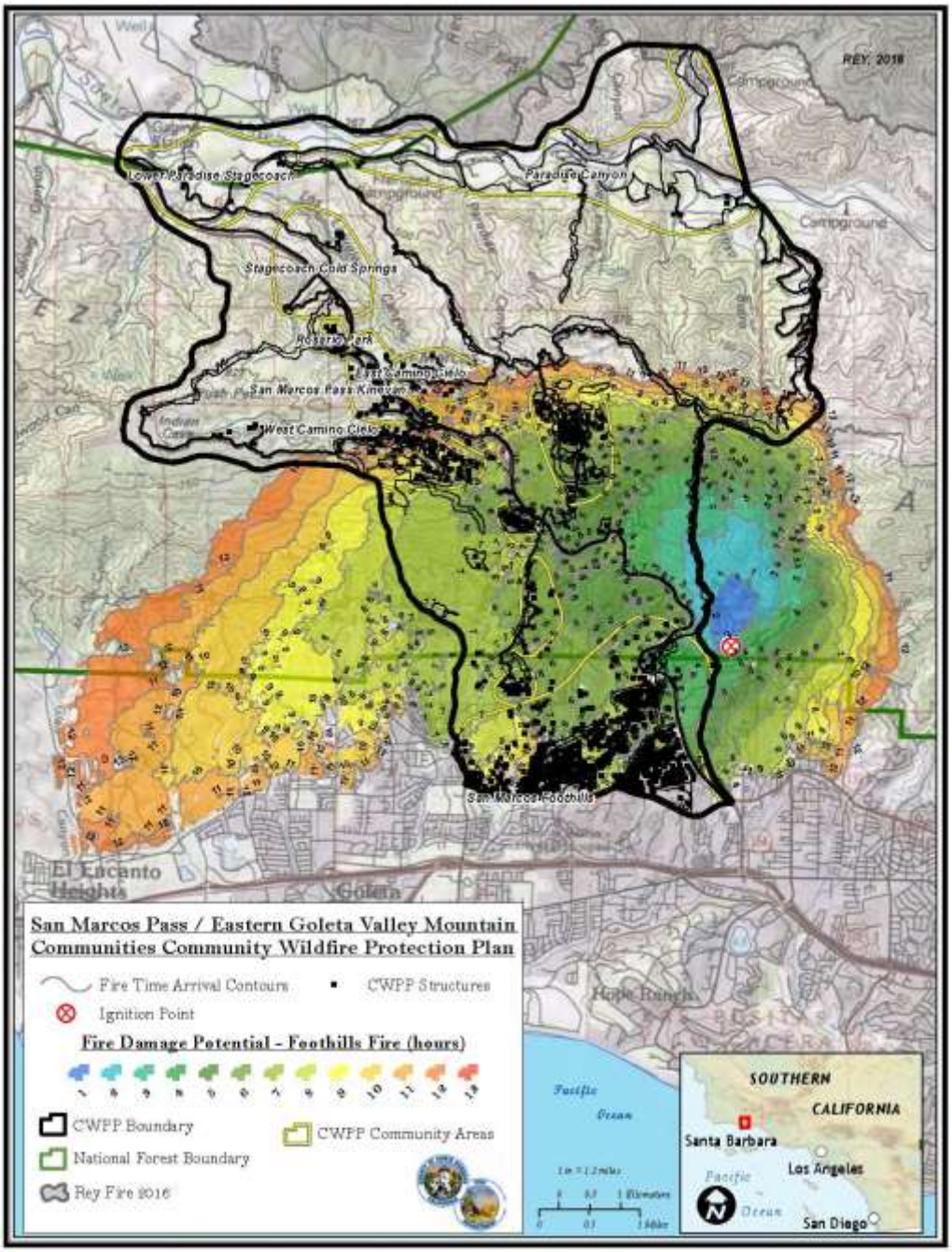
Appendices

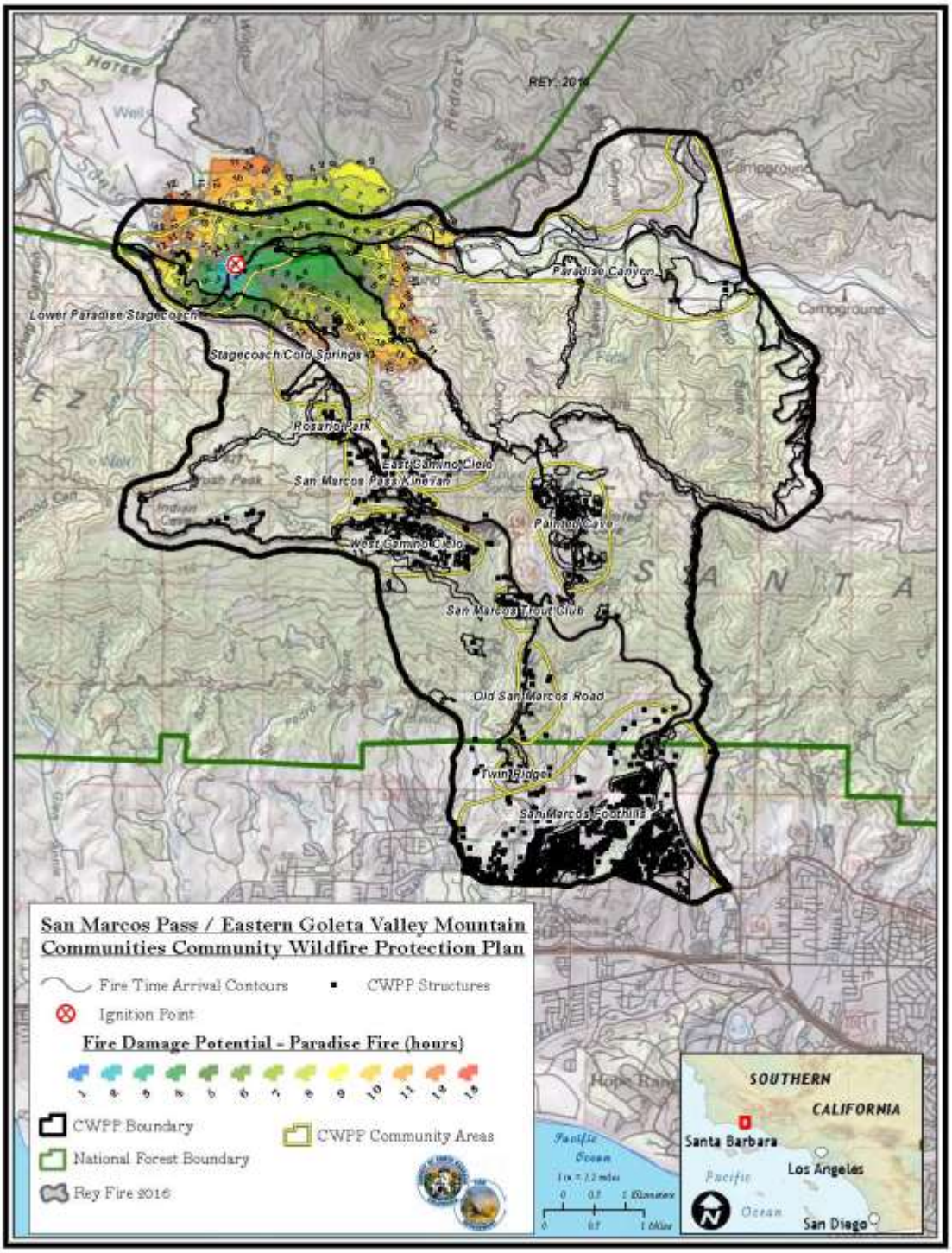
Appendix A. Modeled Fire Damage Potential with Various Scenarios



Foothill Fire simulation

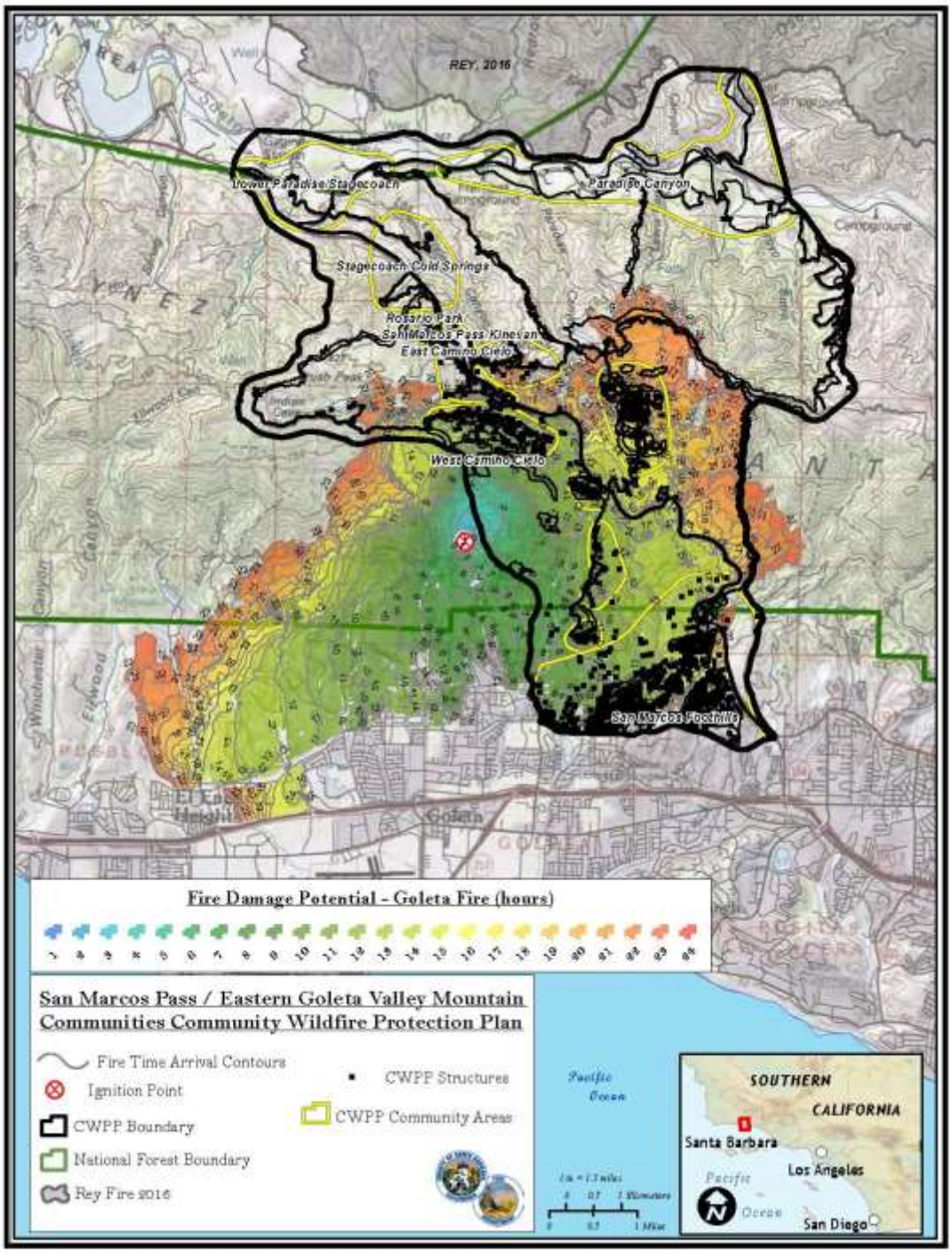
- August 1, 1430 hours, 87°, 20% RH, Wind 12G15mph S190°
- Powerline ignition
- 12 hour run

Transitions to northeast sundowner at 1830 hours. 95°, 12% RH, Wind 20G30 NE045°.



Paradise Fire simulation

- August 26, 1530 hours, 100°, 15% RH, Wind 15G18 mph WNW280°
- Roadside ignition
- 12 hour run



Goleta Fire simulation

- July 14, 1500 hours, 90°, 20% RH, Wind 15G18mph SW200°
- Powerline ignition
- 24 hour run

Transitions to northeast sundowner at 2100 hours. 95°, 12% RH, Wind 20G30 NE045°.

Appendix B. Structure Assessment Report

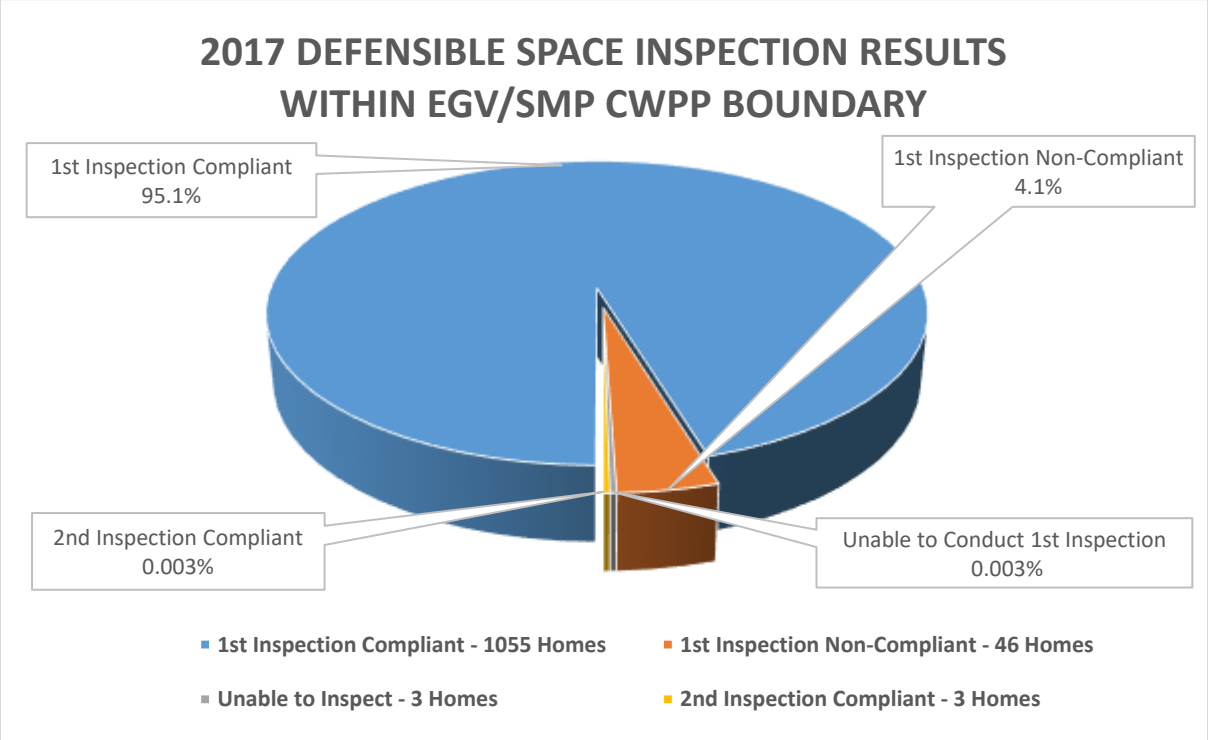
In the latter stages of the development of this document, the Development Team recognized the need to create a structural assessment of the homes within the CWPP boundary as an appendix. The Santa Barbara County Fire Department dedicated two inspectors and a GIS Technician to undertake this rigorous process to assist the EGV/SMP Development Team with completing the assessment and addition to this CWPP.

For the development of Structural Assessment Appendix, 1,109 structures were assessed for defensible space, fire resistive roofing material and fire resistive siding on structures within the CWPP boundary. Not all homes within the boundary were inspected due to lack of access, but it is unlikely the uninspected homes would significantly change the data within this Appendix.

San Marcos Pass – Eastern Goleta Valley CWPP Structural Assessment

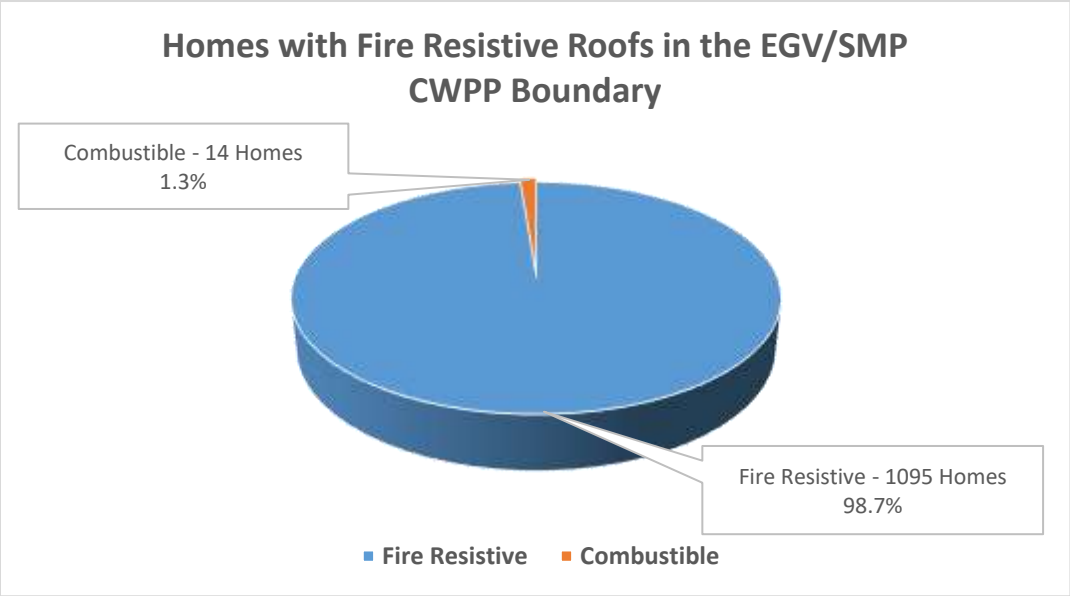
2017 Defensible Space Inspection Results

Homes inspected within the EGV/SMP CWPP Boundary lie within the State Responsibility Area (SRA) and are subject to California Public Resource Code (PRC) 4291. Based on PRC 4291 criteria, 95.1%, or 1055 homes, of the 1109 homes passed on the first inspection. An additional 4 passed on the second inspection, with second or initial inspections still pending on the remaining 49 homes in this assessment. The results of the defensible space inspections are reflected on the chart below.

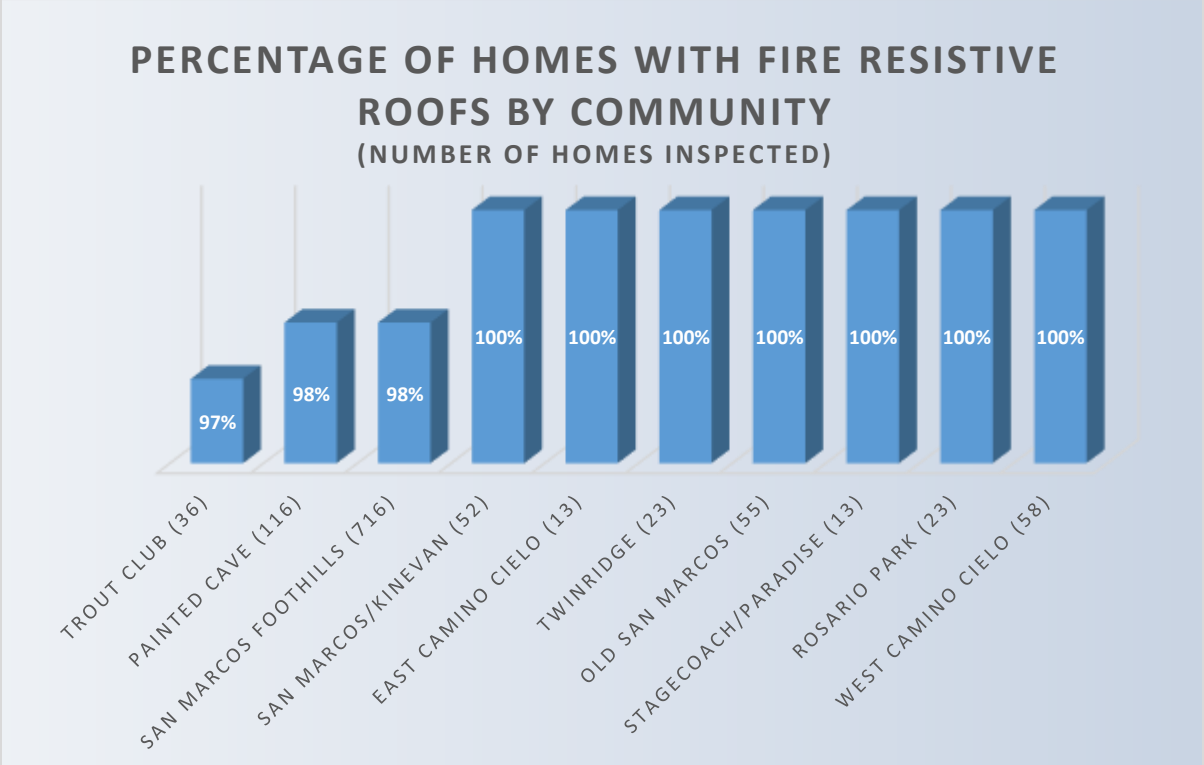


San Marcos Pass – Eastern Goleta Valley CWPP Structural Assessment

Homes with Fire Resistive Roofs within CWPP Boundary

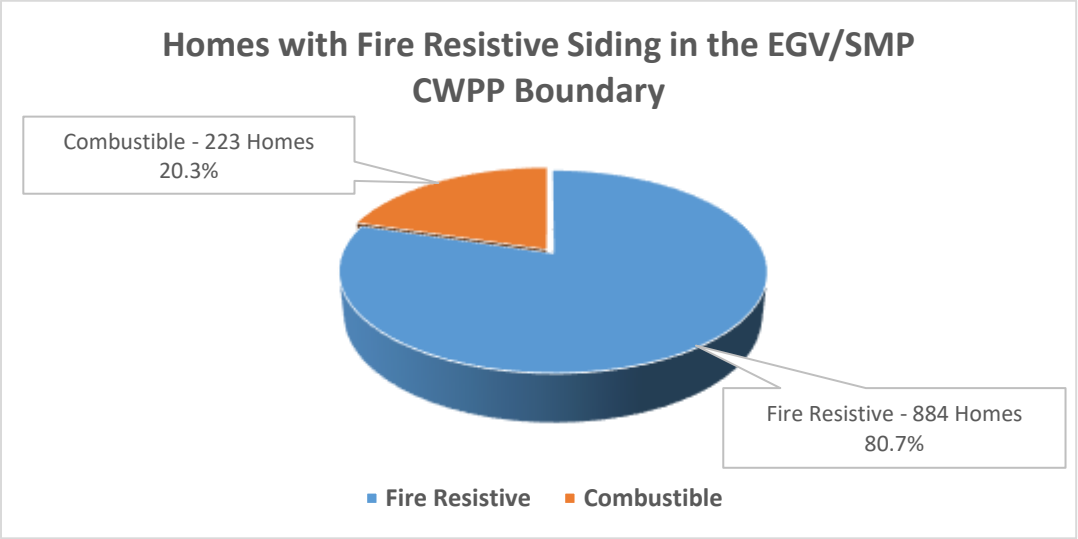


Fire Resistive Roofs by Community within CWPP Boundary

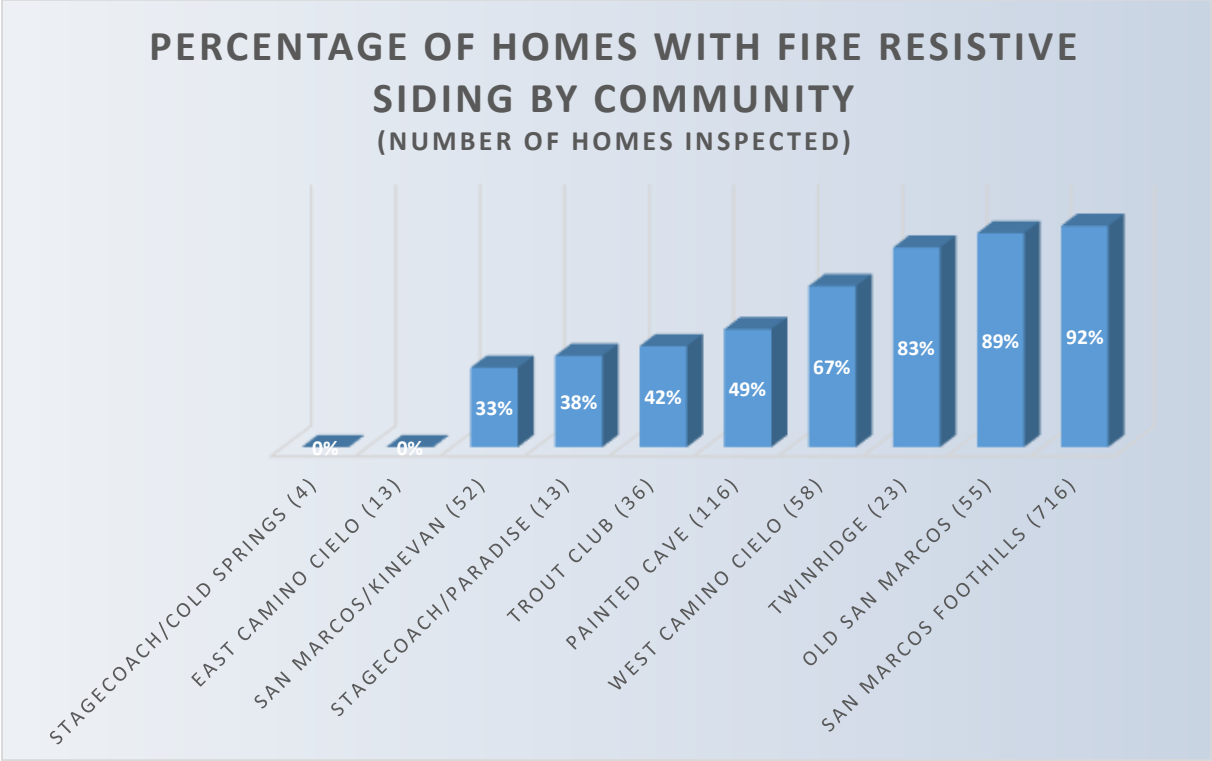


San Marcos Pass – Eastern Goleta Valley CWPP Structural Assessment

Homes with Fire Resistive Siding within CWPP Boundary

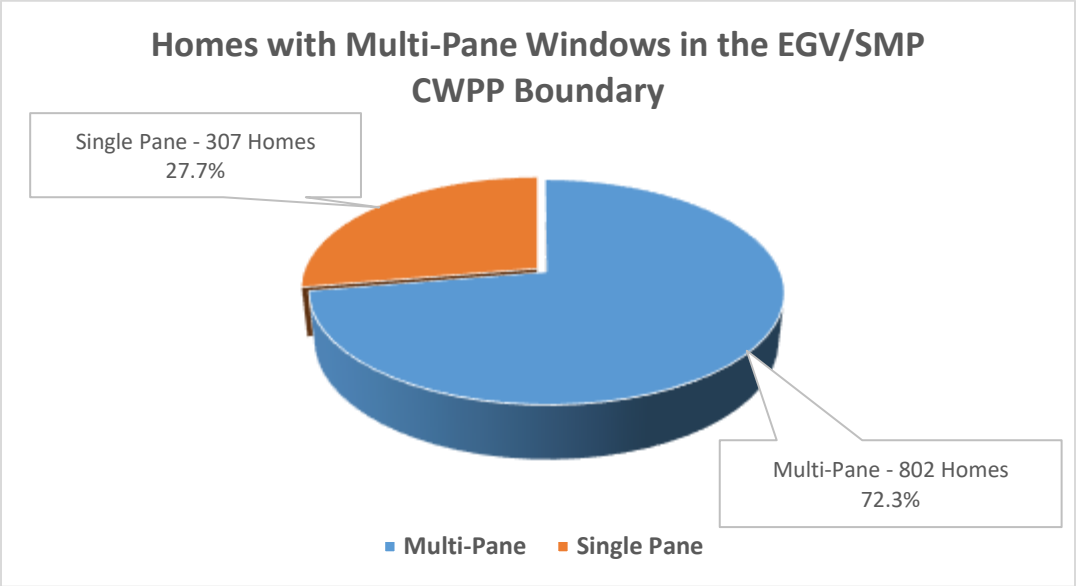


Homes with Fire Resistive Siding Materials within CWPP Boundary by Community

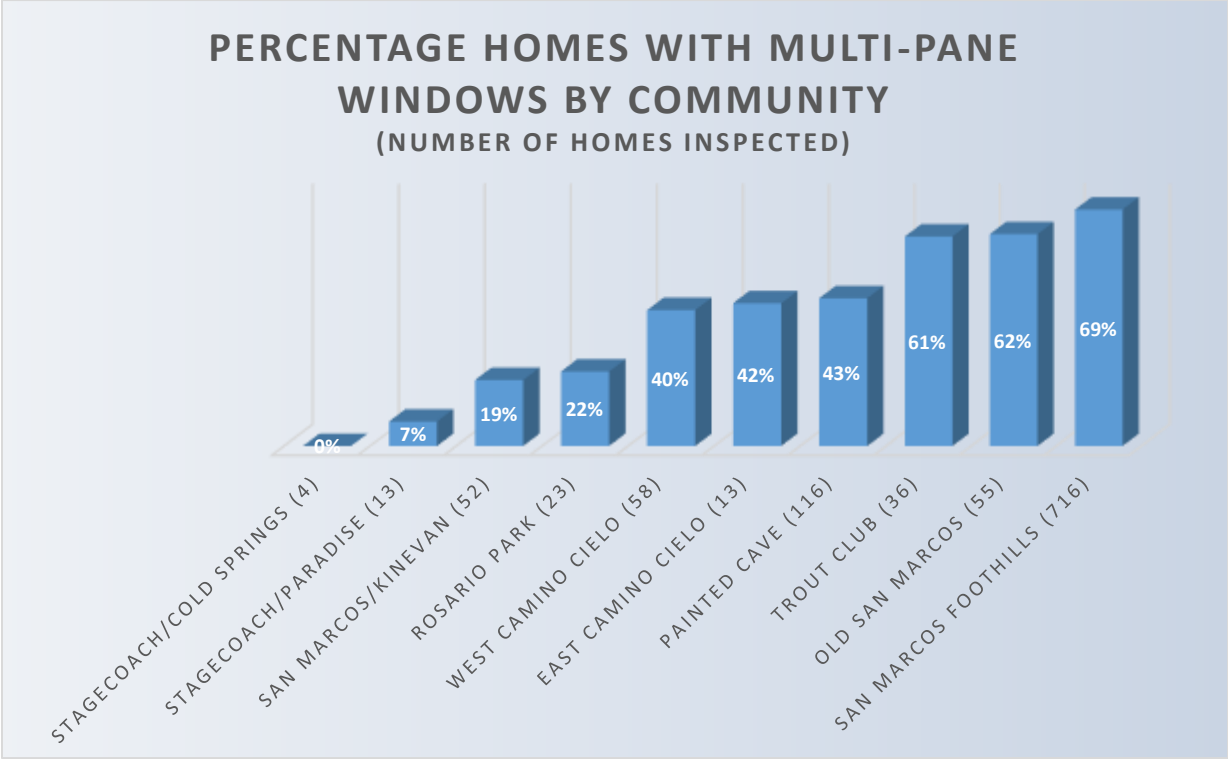


San Marcos Pass – Eastern Goleta Valley CWPP Structural Assessment

Homes with Multi-Pane Windows within CWPP Boundary



Homes with Multi-Pane Windows by Community within CWPP Boundary



Retrofitting Opportunities

Retrofitting Opportunities*	
Components	**Cost**
Roof – asphalt shingle	$10,000-14,522
Stucco	$4,185-11,070
Exterior Sprinkler System – Permanent	$18,000-25,000
Exterior Sprinkler System – Manual	$250
Fire Retardant/Foam System	$14,000-100,000+

*Using zip code 93105 and a 2,000 square foot house

The cost estimates for roofing and stucco do not include:

- general contractor costs
- permits, inspection and/or building fees
- materials and supply sales taxes
- any removal and disposal fees, removing, relocating, repairing, or modifying existing framing, surfacing, HVAC, electrical, and plumbing systems - or bringing those systems into compliance with current building codes
- general contractor fees, if used for the project
- costs for testing and remediation of hazardous materials (asbestos, lead, etc)

The cost estimates for roofing and stucco includes:

- local material / equipment delivery to job site
- service provider transportation to and from the job site
- labor
- labor setup time

Websites:

- Stucco Siding - www.towncontractors.com/stucco-installation-prices-santa-barbara-93101
- Shingle Roofing - www.towncontractors.com/shingle-roofing-installation-santa-barbara-costs-santa-barbara-county and communication with Action Roofing in Santa Barbara.
- Exterior sprinkler system - www.thedenverchannel.com/thenow/colorado-company-creates-automatic-exterior-fire-sprinkler-system and www.waveguardco.com
- Fire Retardant/Foam Systems - www.coloradofirebreak.com/wildfire-protection-facts

Appendix C. Structure Hardening Resources

User Guide for Communities

Developed by the Center for Fire Research and Outreach
May 2008

Center for Fire Research & Outreach
College of Natural Resources
University of California, Berkeley

Fire Information Engine TOOLKIT

User Guide

About the Fire Information Engine Toolkit

Wildfires affect communities around the world. The Fire Information Engine Toolkit was developed by the Center for Fire Research and Outreach in the College of Natural Resources at the University of California, Berkeley to provide Internet-available, interactive, science-based tools to help homeowners, decision-makers, and researchers better understand where wildfires occur and how to protect homes and neighborhoods, as well as get up-to-the-minute wildfire news. The Toolkit can be found online at http://firecenter.berkeley.edu/toolkit.

Some of the specific tools available through the Toolkit website include:

While many of these tools are self-explanatory, this guide was developed to provide a more detailed explanation of the Community Wildfire Hazard Assessment and Ranking (CWHAR). The following pages provide instructions for downloading and using the CWHAR form from:

http://firecenter.berkeley.edu/toolkit/communityassessment.html

Questions can be directed to firecenter@nature.berkeley.edu or 510-643-0409.

Fire Information Engine TOOLKIT

User Guide

Steps in Completing a Community Assessment

1. Download the latest version of the .pdf assessment form from (because this assessment incorporates the latest science, it is best to get the most up-to-date version):

   http://firecenter.berkeley.edu/toolkit/communityassessment.html

   A copy of this document is provided on page 4.

2. Complete hazard assessment for each parcel in a community. This can be done by an individual or in teams at a rate of approximately 30 parcels/day once trained.

   a. A field guide for completing the assessment begins on page 5.
   b. An example of a flier that can be handed out to community members in advance of an assessment is provided in Appendix A on page 14.
   c. Frequently Asked Questions from homeowners and decision-makers are answered in Appendix B, beginning on page 15.

3. Rate answers to questions based on the hazard level given for each "yes" answer on the assessment form (for example, answering yes to question R1 yields a "high" hazard rating).

4. If desired, calculate an overall per parcel score for each parcel. Some guidelines are provided on page 12.

5. Communicate results with homeowners and other stakeholders using one or a combination of the several approaches outlined beginning on page 13.

Use Agreement

COMMUNITY WILDFIRE HAZARD ASSESSMENT

Fire Information Engine Toolkit - Community Wildfire Hazard Assessment Field Form				
A1	Address:			
A2	Number of structures on property:	A3 Number of sides surveyed: 1 / 2 / 3 / 4		
A4	Distance(ft) to neighboring structure:			
Roofing and Eaves				
R1	Is the roof covering something other than Class A fire rated?	Yes (High)	No	NA/UA
R2	Does the roof have any unstopped openings at the edge or ridge (e.g., open tiles)?	Yes (High)	No	NA/UA
R3	Is the roof in poor condition (e.g., broken pieces, open areas, badly curled shingles)?	Yes (High)	No	NA/UA
R4	Is there vegetation or other combustible debris in the roof valleys?	Yes (Med.)	No	NA/UA
R5	Does the roof have a 'complex design' where debris and embers can accumulate and possibly ignite adjacent combustible siding or other vulnerable components?	Yes (Med.)	No	NA/UA
R6	Does the roof have open eaves (i.e., exposed rafter tails)? (If no, go to R7.)	Yes	No	NA/UA
R6a	If yes, do gaps greater than ~1/8" exist between the blocking and rafters?	Yes (High)	No	NA/UA
R6b	Are there vent holes in the between-rafter blocking?	Yes (High)	No	NA/UA
R7	Does the roof have boxed-in (soffited) eaves? (If no, go to R8.)	Yes	No	NA/UA
R7a	Is there a vent in the soffit?	Yes (High)	No	NA/UA
R7b	Is the soffit material combustible?	Yes (High)	No	NA/UA
R8	Is the chimney opening unscreened?	Yes (Med.)	No	NA/UA
R9	Is there debris in the roof gutters?	Yes (Med.)	No	NA/UA
R10	Is there any vegetation near the roof or roof edge (overhanging, underneath, or adjacent to)?	Yes (High)	No	NA/UA
Windows				
W1	Does the home have single pane windows?	Yes (Med.)	No	NA/UA
W2	Is the window or window frame in poor condition (e.g., window can't be closed, frame is warped)?	Yes (Med.)	No	NA/UA
W3	Are there any man-made fuels within 3' of the windows?	Yes (Med.)	No	NA/UA
W4	Is there any vegetation within 6' of the windows?	Yes (Med.)	No	NA/UA
Decking				
D1	Does the home have a deck or an exterior staircase? (If no, go to next section.)	Yes (Med.)	No	NA/UA
D1a	Is there an open-frame deck attached to the house (e.g., a deck with boards with gaps between them)?	Yes (Med.)	No	NA/UA
D1b	Is it difficult to access/maintain the area under the deck (will it be easy to keep the area clean of debris)?	Yes (Med.)	No	NA/UA
D1c	Are there any man-made fuels under or within 3' of the deck?	Yes (Med.)	No	NA/UA
D1d	Is there any vegetation under or within 3' of the deck?	Yes (Med.)	No	NA/UA
Garage				
G1	Is there an attached garage or one close (within 30') to the home? (If no, go to next section.)	Yes (Med.)	No	NA/UA
G2	Does the garage have a vehicle access door? (If no, go to next section.)	Yes (Med.)	No	NA/UA
G3	Are there any gaps under or around garage doors?	Yes (Med.)	No	NA/UA
Siding				
S1	Is the siding combustible (wood, vinyl, or wood plastic composite material)?	Yes (High)	No	NA/UA
S2	Are there any other gaps (openings) located in the building envelope?	Yes (Med.)	No	NA/UA
S3	Is the trim combustible?	Yes (High)	No	NA/UA
S4	Is there a combustible fence or gate attached to the structure?	Yes (Med.)	No	NA/UA
S5	Are there any man-made fuels within 6' of the siding?	Yes (Med.)	No	NA/UA
S6	Is there any vegetation within 6' of the siding?	Yes (Med.)	No	NA/UA
S7	Are there unscreened vents or screened vents with a mesh size >1/4" (e.g., crawl space, room containing gas water heater)?	Yes (Med.)	No	NA/UA
Suppression				
SU1	Is the address less than 3" tall or otherwise unreadable?	Yes (Med.)	No	NA/UA
SU2	Is the driveway less than 12' wide or obstructed?	Yes (Med.)	No	NA/UA

To rate this form:

- For all "Yes" answers, use the corresponding rating in parentheses. Answers are rated High or Medium and correspond to the level of hazard. (Note that questions R6 and R7 do not need to be rated.)
- All "No" answers receive a Low hazard rating. Please note that for many of the questions, however, maintenance is required to ensure a No answer.
- "NA/UA" (not-applicable or un-answerable) answers often result from not being able to survey all sides of a home -- in this case, an effort should be made to communicate the importance of the question with the homeowner.

FIELD GUIDE FOR COMMUNITY WILDFIRE HAZARD ASSESSMENT AND RANKING

Roofing and Eaves		Examples
Roof and edge components (such as gutters) are arguably the most important part of a home in terms of making it safer from wildfires. While a home may only be subjected to the flaming front of the wildfire for a few minutes, the roof (and the rest of the house) could be subjected to airborne glowing or burning embers for a few hours as the wildfire approaches and burns through an area.		
R1	Is the roof covering something other than Class A fire rated?	Class A roof covering:
	Roof coverings can obtain a Class A rating based on the covering alone (called a stand-alone Class A) or based on the covering and underlying materials that provide additional fire protection (called an assembly-rated Class A). Common stand alone Class A roof coverings include: asphalt composition ('3-tab') shingles, clay tiles, concrete tiles, and slate. Common assembly rated Class A coverings include: aluminum (metal) roofs; fire-retardant treated wood shakes (with Class B fire rating, approved by the California Office of the State Fire Marshal as a result of passing the required natural weathering test); and some recycled composite materials. It can sometimes be difficult to tell whether a roof is Class A or not. Even a homeowner may not know the classification of their own roof. In this case, the manufacturer of the roof covering can tell them. If you don't know the name of the manufacturer, you may have to consult with a professional roofer.	
R2	Does the roof have any unstopped openings at the edge or ridge (e.g., open tiles)?	Bird-stopped tile:
	Wind-borne debris can accumulate under a clay tile barrel roof covering or other openings at the edge of the roof. If accessible, birds can also build nests in the space between the roof sheathing and the bottom of the tiles, also providing combustible debris (fine fuels), that are easily ignited if embers are driven into the openings between the roof covering and sheathing.	
R3	Is the roof in poor condition (e.g., broken pieces, open areas, badly curled shingles)?	Poor condition roof:
	An older roof may lose some of its fire resistance characteristics with time. It is up to a homeowner to make sure their roof covering is inspected and maintained, and replaced when needed. When new, this asphalt composition roof covering has a Class A rating. The older, weathered roof may not provide the same protection from wildfire, and may also be more vulnerable to water leaks.	
R4	Is there vegetative fine fuel, or other combustible debris in the roof valleys?	Debris in roof valley:
	Another critical inspection and maintenance item for a roof is the removal debris (needles, leaves, and other combustible material) from areas where they naturally accumulate, and in gutters. Ignition of debris in these locations can ignite other roof components besides the roof covering - components that don't perform as well as a Class A roof. This issue is even more critical if the roof is something other than Class A.	

R5	Does the roof have a 'complex design' where debris and embers can accumulate and possibly ignite adjacent combustible siding or other more vulnerable components?	Complex roof:
	The complexity of a roof is determined by how many levels and wall/roof intersections there are. A complex roof may include features like dormers and included windows, and roof to exterior wall intersections. The more complex a roof design, the more likely it is to have debris collection points, and therefore the need to ensure that it is debris free.	
R6	Does the roof have open eaves (i.e., exposed rafter tails)? (If no, go to R7.)	Open eaves:
	The eave occurs at the edge of the roof. Eaves usually project beyond the side of the building. Open, or unboxed, eaves can make a home more vulnerable to embers.	
R6a	If yes, do gaps greater than ~1/8" exist between the blocking and rafters?	Gap in blocking:
	With an open eave construction, blocking is installed between the rafters. Gaps greater than 1/8" can provide a location for embers to accumulate, and potentially gain access to the attic.	
R6b	Are there vent holes in the between-rafter blocking?	Vent holes in blocking:
	In open eave construction, blocking is installed between the rafters. Vent holes in the blocking (provided to allow air entry for drying and cooling in the attic space) also provides an entry point for embers to enter the attic.	
R7	Does the roof have boxed-in (soffited) eaves? (If no, go to R8.)	Boxed eave:
	The eave occurs at the edge of a roof. Eaves usually project beyond the side of the building. A boxed, or soffited, eave is enclosed.	
R7a	Is there a vent in the soffit?	Soffit vents:
	Entry of burning embers has been problematic for attic vents in general, and soffit vents in particular. There are several types of soffit vents, including the strip vents seen in the photo on the right, and the one in the photo accompanying question R7b.	

R7b	Is the soffit material combustible?	Combustible soffit:
	If the soffit material is combustible, it is even more important that any vent screening is well maintained and that combustible vegetation is cleared from around the soffit area.	
R8	Is the chimney opening unscreened?	Screened chimney:
	In the case of chimney screening, it is more of a concern that embers not be able to leave the chimney (and spread fire to wildland areas), than that embers enter the home through the chimney in the event of a wildfire.	
R9	Is there debris in the roof gutters?	Gutter debris:
	Combustible debris can build up in gutters, especially from nearby or overhanging trees. Second story gutters are even more problematic, since they are seldom cleaned on a regular basis. If ignited, combustible debris in the gutter will expose the edge of the roof covering, and may be able to more easily enter the attic. Even screened gutters must be routinely maintained.	
R10	Is there any vegetation near the roof or roof edge (overhanging, underneath, or adjacent to)?	Vegetation near roof:
	Not all plants are strictly 'good' or 'bad'. The size, location, structure, and condition of vegetation determines its risk to a home. Plants or trees located closer to a home are will pose a greater risk. Some trees farther away can sometimes serve as buffers against radiant and convective energy, and fire brands (embers). However, any trees or other vegetation within 6' of the roof should be pruned, regularly watered (preferably by incorporating into a drip irrigation system), and any dead material removed, including debris at the soil level.	
Windows		**Examples**
If the glass in a window breaks during a wildfire, the fire can easily enter the home. Similarly, if a window frame ignites, it is possible that fire could burn through the frame material, and ignite other combustible materials inside the home.		
W1	Does the home have single pane windows?	Tempered window:
	An older home will likely have single pane windows. However, single pane windows can also be tempered, which affords even better protection than windows with dual pane annealed glass. Tempered glass is stronger than 'regular' annealed glass, and will provide additional protection during a wildfire (but your window will have to be closed in order to benefit from the tempered glass). Building codes already require tempered glass in some locations (for safety reasons), so some newer windows may already have tempered glass. For example, in newer construction, windows that come within 18 inches of the floor must have tempered glass. Sliding glass doors, and other doors with windows, and windows immediately adjacent to doors, will have tempered glass. A small etched label will be present in the corner of a piece of glass in a window if it is tempered. Since it is small, it may be too small to read.	

W2	Is the window or window frame in poor condition (e.g., window can't be closed, frame is warped)?	Warped frame:
	Burning embers could land on a window sill, or as is shown in this photo, the sill at an entry door. The embers could then ignite debris, or ignite the decayed trim. Decayed wood (shown in this photo) ignites as a lower temperature than that required for sound wood, so is more vulnerable to an ember exposure.	
W3	Are there any man-made fuels within 3' of the windows?	Man-made fuels:
	Man-made fuels include construction materials, newspaper or trash, coir or wood doormats, arbor or trellis, propane tanks, combustible lawn furniture, firewood pile, gas-powered vehicle, carport or detached garage, gas-powered lawn tools, flammable bins or cans, outbuildings, and other structures.	
W4	Is there any vegetation within 6' of the windows?	Vegetation near window:
	Not all plants are strictly 'good' or 'bad'. The size, location, structure, and condition of vegetation determine its risk to a home. Plants closer to a home are a greater risk to a structure. Any plants near a house should be pruned, regularly watered (preferably by being on a drip irrigation system) and any dead material removed, including at vegetative debris at the soil level. Along with these precautions, don't use bark or other combustible natural materials as plant bedding. Embers can land in this, smolder, and later go into flaming combustion. In addition, the smaller the better, especially close to combustible siding, under a window, or inside a corner. Better yet, consider using noncombustible ground cover next to combustible siding or near windows, regardless of siding type.	
Decking		**Examples**
In using the term 'decks', we are including all types of horizontal walkways, including landings, porches, and patios directly connected or close to a house. Decks are described by the surface that you walk on (called the deck covering) and the area under the deck.		
D1	Does the home have a deck or an exterior staircase? (If no, go to next section.)	Decking:
	By decks, we are including all types of horizontal walkways, including landings, porches, and patios that are directly connected or very close to a house. If ignited, a deck can provide a flame impingement exposure to the adjacent siding and windows.	
D1a	Is there an open-frame deck attached to the house (e.g., a deck with boards with gaps between them)?	Open-frame deck:
	There are two basic kinds of decks – those that use deck boards as the deck covering, and those that have a solid surface deck covering. The deck boards are almost always made from combustible materials (wood or one of the wood fibers – plastic composite or 100% plastic deck board products), although metal deck boards are now available. Solid surface deck coverings are usually made from noncombustible materials, and include light-weight concrete or stone.	

D1b	Is it difficult to access/maintain the area under the deck (will it be easy to keep the area clean of debris)?	Under deck access:
	Decks that are close to the ground or covered with trellis or otherwise difficult to access underneath can allow for the build up of debris. In addition, fascia boards are often used as decorative edges on decks, but often cause decay to develop between the fascia and deck. This deck corner ignited in a decayed area at the deck corner:	
D1c	Are there any man-made fuels under or within 3' of the deck?	Man-made fuels:
	Man-made fuels include construction materials, newspaper or trash, coir or wood doormats, arbor or trellis, propane tanks, combustible lawn furniture, firewood pile, gas-powered vehicle, carport or detached garage, gas-powered lawn tools, flammable bins or cans, outbuildings, and other structures.	
D1d	Is there any vegetation under or within 3' of the deck?	Vegetation:
	Not all plants are 'good' or 'bad'. The size, location, structure, and condition of vegetation determine its risk to a home. Plants closer to a home are a greater risk to a structure. Any plants near a house should be pruned, regularly watered (preferably dripped) and any dead material removed, including at the soil level. Along with these precautions, don't use bark or other combustible natural materials as plant bedding. Embers can land in this, smolder, and later go into flaming combustion. In addition, the smaller the better, especially close to combustible siding, under a window, or inside a corner. Better yet, consider using ground cover wherever possible next to combustible siding or near windows for any type of siding.	
Garage		**Examples**
When houses are surveyed for wildfire vulnerabilities, quite often the garage is not considered even though it could be the most hazardous aspect of the house.		
G1	Is there an attached garage or one close (within 30') to the home? (If no, go to next section.)	Garage:
		
G2	Does the garage have a vehicle access door? (If no, go to next section.)	Non-closing garage:
	If the garage has a vehicle access door, the door should be closed to ensure that embers and flames do not enter. Garage (vehicle access) doors are typically 'leaky' to embers. Combustible materials should not be stored in the garage; however, because combustible materials are often stored in the garage, it is even more important to ensure that it is resistant to embers and ignition.	

G3	Are there any gaps under or around garage doors?	Gaps around garage door:
	Gaps at the top, bottom and edges of doors can let glowing embers enter, and we all know that garages are full of combustible materials. Garages can have vents at various locations, especially if they contain gas furnaces or hot water heaters (for make up air). These vents are also easy entry points for embers. Vents that resist intrusion of embers and flame have been designed and are becoming commercially available. If the vents in garage doors can't be eliminated (for safety reasons), the newer vents could be used in these, and other, locations.	
Siding		**Examples**
Siding (cladding) is an important esthetic attribute for houses, but it also has a key role as part of a protective enclosure to help shed rain, while permitting excessive vapor to move through and out of the house.		
S1	Is the siding combustible (untreated wood, vinyl, or wood or wood-plastic composite material)?	Combustible siding and interlocking lap:
	Combustible siding provides a rapid vertical path for flames to reach vulnerable portions of a house such as the eaves or windows. If the siding is combustible, it should have interlocking lap construction and should be carefully maintained.	
S2	Are there any other gaps (openings) located in the building envelope?	Building gaps:
	Other gaps may include, for example, reentrant corners (an interior corner).	
S3	Is the trim combustible?	Combustible trim:
	Combustible trim materials can compromise noncombustible siding.	
S4	Is there a combustible fence or gate attached to the structure?	Non-combustible gate:
	There are several reasons for fences to be of concern. For one, a combustible fence or gate attached to a structure is a threat if it catches on fire, and can act as a wick, bringing fire the house. The fire can arise in a number of ways. One is that debris (leaves, trash, etc) often collect at the bottom.	

S5	Are there any man-made fuels within 6' of the siding?	Man-made fuels:
	Man-made fuels include construction materials, newspaper or trash, coir or wood doormats, arbor or trellis, propane tanks, combustible lawn furniture, firewood pile, gas-powered vehicle, carport or detached garage, gas-powered lawn tools, flammable bins or cans, outbuildings, and other structures.	
S6	Is there any vegetation within 6' of the siding?	Vegetation:
	Not all plants are 'good' or 'bad'. The size, location, structure, and condition of vegetation determine its risk to a home. Plants closer to a home are a greater risk to a structure. Any plants near a house should be pruned, regularly watered (preferably using drip irrigation system) and any dead material removed, including at the soil level. Along with these precautions, we don't recommend using bark or other combustible natural materials as plant bedding. Embers can land in this, smolder, and later go into flaming combustion. In addition, the smaller the better, especially close to combustible siding, under a window, or inside a corner. Better yet, consider using ground cover wherever possible next to combustible siding or near windows for any type of siding.	
S7	Are there unscreened vents or screened vents with a mesh size >1/4" (e.g., crawl space, room containing gas water heater)?	Vents:
	Evidence from recent wildfires has shown that vents are an easy entry point for burning embers and (not surprising) flames. Most vents incorporate a screen at the inlet. Most building codes stipulate a minimum mesh size of 1/4-inch to minimize plugging of vent holes with accompanying reduction in air movement. Smaller mesh screen is easier to plug up, whether by air borne debris, or as shown in the photograph below, being painted over during routine painting.	
Suppression		**Examples**
There are many other suppression components that could be assessed, such as road width, ingress and egress, and fire hydrant locations. However, because this assessment approach is focused on things that individuals can do to reduce fire hazards, only factors that are under homeowner control are considered here.		
SU1	Is the address less than 3" tall or otherwise unreadable?	Address visibility:
	The address of the house should be easy to see from the street -- at least 3" tall and possible to see at night (reflective, lit, etc.).	
SU2	Is the driveway less than 12' wide or obstructed?	-
	A fire truck needs at least 12' to be able to access a road or driveway. Ensure that emergency responders can reach a house by clearing obstructions.	

CREATING A COMMUNITY-WIDE RANKING SYSTEM

There are several different ways that a community-wide ranking can be calculated, and which one you use depends on your goals for completing your assessment.

Some general approaches include:

1. Give "worst case scenario" – e.g., one high makes a high rating

2. Develop appropriate cut-offs – e.g.:
   - -3 or more highs = high
   - -0-1 highs = medium
   - -everybody else gets a low

3. Create relative ranking across a community
   - -rank by the largest to smallest number of highs and break into thirds so that 1/3 of community is high, 1/3 is medium, etc.

From our perspective, the first option gives the most accurate hazard rating because of the "weakest link" principle. This means that if, for example, a home has a vulnerable wood roof, it may not matter whether the siding is non-combustible because the roof material already poses such a severe hazard. However, some newer communities may not have any wood roofs due to zoning restrictions, and may choose instead, to go with a scheme as described in number two above.

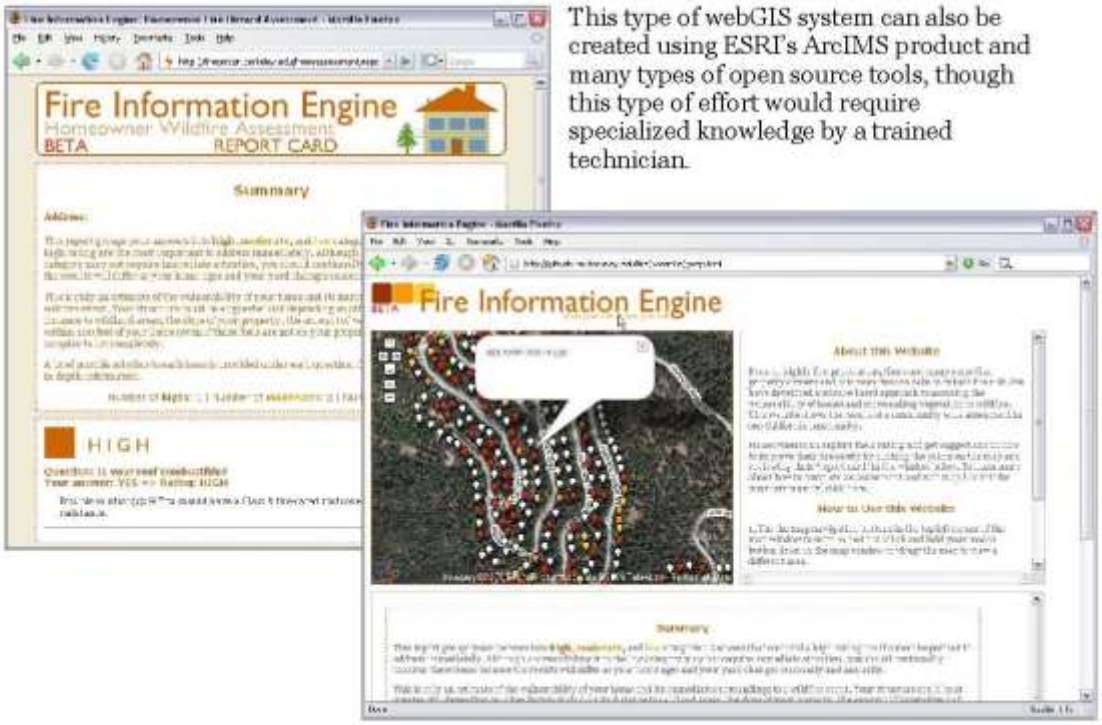
Determining the best overall rating system to use depends on the goals of your assessment. For example, if unscreened vents are a particular problem in a neighborhood or community, it could be that any house with unscreened or improperly screened vents would receive a high rating.

COMMUNICATING RESULTS

Communicating the results of the Community Wildfire Hazard Assessment and Ranking is one of the most important components of the project. Our recommended communication tools are made up of two main components:

1. A "report card" that summarizes the hazard assessment results for each parcel, and
2. A web-based mapping application (webGIS) interface that allows users to explore both their report card and the results of the assessment throughout their community. WebGIS is particularly useful in this context because it readily portrays the spatial configuration of hazards in a community.

The webGIS interface below shows the results of an assessment of the community of Yosemite West, CA, located near Yosemite National Park. Because this is a remote community, in addition to developing the webGIS that many users were able to access via a dial-up modem, we also mailed copies of the "report card" to all community members – something that could easily be done in any community.



This type of webGIS system can also be created using ESRI's ArcIMS product and many types of open source tools, though this type of effort would require specialized knowledge by a trained technician.

APPENDIX A: SAMPLE NOTICE OF COMMUNITY FIRE HAZARD ASSESSMENT

When completing a community-wide fire hazard assessment, you may wish to provide prior notice to community members, or have an informational sheet on hand. A sample of this type of informational bulletin is provided below:

> Even in highly fire-prone areas, there are steps that home-owners and communities can take to reduce fire risk. However, identifying the fire hazards for a specific property or neighborhood can be difficult because the general public often does not have access to relevant information. The **FIRE INFORMATION ENGINE TOOLKIT Community Wildfire Hazard Assessment** allows property-owners and communities to better understand fire hazards at a parcel level through the use of an intuitive, interactive Internet mapping application.
>
> To complete this assessment, we will be conducting street-level surveys of individual parcels during a two-week period in June – **we will not be going onto private property** unless a homeowner is interested in a full home assessment.
>
> Hand-held GPS units will be used to capture location information, measure distances, and record data. Each assessment should take around 20 minutes. The evaluations will consider site fuel hazards and structural hazards. Site fuel hazards are things like trees overhanging a roof, dense shrubs next to windows, and large wood piles stored under a combustible deck. Examples of structural hazards are wood roofs, unscreened vents, and large gaps under a garage door.
>
> All fire hazard information will be made available through a web-based Geographic Information System (webGIS). Home-owners will be able to identify the hazards for their parcel, understand how it was determined and get more information on how to make improvements. To learn more about this project please visit our website at _____.
>
> If you have any questions, please feel free to visit us on the web at the address listed below, send an email to _____, or call us at _____.

APPENDIX B: FREQUENTLY ASKED QUESTIONS

Questions asked by homeowners:

1. How will this assessment affect our insurance rates?

This assessment is not targeted at identifying the potential loss in value of a home. It is instead a survey based on the latest science and focused on helping homeowners to identify and mitigate parts of their homes and yards that are vulnerable to wildfire damage. Our goal is to provide homeowners with the best possible information about preventing losses in the event of a wildland fire. So, while there is no definitive answer to this question because insurance policy requirements differ from company to company, in general, anything that you can do to mitigate potential damage to your property is going to be seen as a positive by most insurance companies. In addition, most insurance companies already have their own proprietary method for assessing fire risk.

2. How will this assessment affect home values?

Again, this assessment is not targeted at identifying the value of a home, it is a tool for identifying components of a home that may put an owner at risk in the event of a wildland fire. California is leading the way in working with homeowners and communities to reduce potential losses from wildland fires, so there is little data on how this type of assessment would affect home values. However, Colorado Springs, Colorado, completed a similar survey, and over a period of several years found that homeowners that mitigated vulnerable components of their property were generally rewarded with increased property values. In addition, they truly mitigated their risk for any potential loss in value posed by a wildland fire.

3. Doesn't putting this information on a website impact privacy?

There is no easy answer to this question because when it comes to natural resource issues because they cross all boundaries, whether public or private property, state or federal lands, etc. When a fire affects a home, that home in turn can affect a neighborhood, a community, the state, and even federal services. Therefore, the condition of other properties in a community is as important a single property. By looking at a single home, and the community as a whole, it is possible to identify areas that might put your community at risk, and therefore to take steps toward reducing any potential losses. We live in a time when most homes are readily viewed on one of several popular web-based map sites, including Google Maps (http://maps.google.com) and Microsoft's TerraServer (http://terraserver.microsoft.com/) – we hope to use this technology to help homeowners and communities prevent losses from wildland fires.

4. Why is a parcel-based assessment important?

Extensive research from both post-fire surveys and field experiments indicate that wildfires do not affect communities indiscriminately -- as many other natural disasters do (earthquakes, floods, landslides). There is strong evidence that a properly prepared home can withstand the most intense wildland fires in the absence of firefighting forces. On the other hand, poorly prepared homes can ignite and burn to the ground from a single ember. What this means for the homeowner is that mitigation done on the structure and its immediate surroundings may be as or even more important than fuel reduction in surrounding wildlands.

If a home is in the wildland-urban interface, there is already an underlying risk of being exposed to a wildland fire. However, there are steps that individuals can take to improve the fire safety of a home. For example, homeowners may be able to reduce hazards by removing debris from their gutters or screening attic vents. These vulnerabilities might be overlooked if fire risk were assessed based only on, for example, proximity to a wildland area.

Questions asked by community leaders:

1. How is your assessment different from the Fire Hazard Severity Zone (FHSZ) map completed by, and currently being updated by, the California Department of Forestry and Fire Protection (CALFire)?

In general, the state-wide FHSZ map is completed at coarse spatial and temporal scales, and does not include structures. This means that an area of the FHSZ map gives a more general depiction of baseline or underlying hazard – for example, the hazard posed by living in an area that has steep topography or is highly forested. However, this does not mean that there aren't things you can do to mitigate hazard on your property – indeed, if your community is in a hazard zone, it is even more important that structures are as fire safe as possible. Completing a parcel-based assessment for your community is complementary to the statewide work being completed by CALFire – the FHSZ map is useful for understanding hazards at a larger scale, and a parcel-specific assessment can help local communities to target areas for hazard reductions.

2. How much does it cost to do a parcel-based assessment?

There are different ways to complete a parcel-based assessment. In general, using a completely field-based assessment, meaning that the assessment is completed by trained individuals going to each property and spending approximately twenty minutes to collect all the variables, will cost less than $10 per parcel based on our estimates. This price would likely increase if the surveys were completed by highly trained fire officials.

Some of the questions used for this assessment can also be answered using a combination of remote sensing and Geographic Information Systems (GIS). However, the level of resources, expertise, and willingness to share various datasets will vary from community to community. For example, currently available Urban Areas Imagery from the U.S. Geological Survey is available for the great Bay Area, but not for Marin County. NAIP imagery at 1 meter resolution aerial imagery is now available for California. However, analyzing this type of imagery takes a good deal of expertise that may be more costly than a field-based assessment. Some communities have also commissioned hyperspectral imaging flights that may be useful for gathering variables such as roof type – though this type of imaging shows great promise, it is still quite costly.

3. Why is this important?

As people increasingly move into the wildland-urban interface, at the same time that fire operations resources are being reduced, it is vital that citizens understand the risk of wildland fire and their role in reducing that risk. Pre-disaster mitigation efforts can greatly reduce during-disaster problems and post-disaster clean up. There is no doubt that large wildland fires will continue to affect communities, and helping citizens to better understand the steps that they can take in advance to reduce potential losses is a critical step in effective emergency response.

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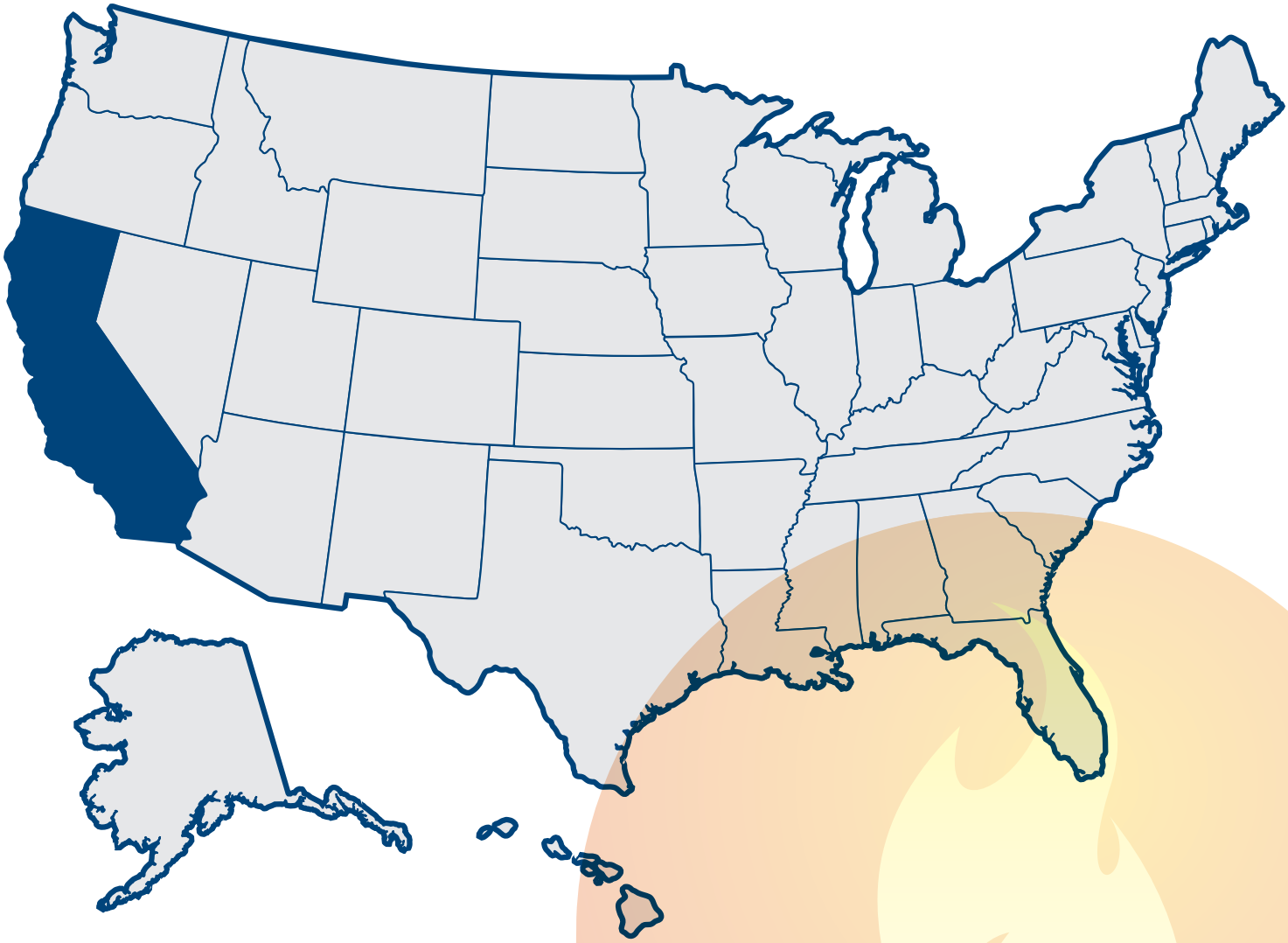
Table of Contents



YOU CAN MAKE A DIFFERENCE

Research and post-fire assessments have shown that property owners can protect their homes and businesses against wildfire by addressing three clear sources of vulnerability: materials and design features used in building the home or business, the landscaping vegetation located immediately adjacent to the home or business, and the general vegetation and other combustible materials and items on the property surrounding the home or business. Each of these sources can be dealt with through maintenance, appropriate choices in building materials, design improvements, and vegetation management.

Making your home or business and community better able to survive a wildfire is a process that will be well worth the effort. Some projects can be done in a weekend, although it is important to remember that routine maintenance must be part of any long-term plan to reduce the vulnerability of your home or business to wildfire.

This guide was created specifically for Californians and considers appropriate building styles and construction materials, common topographical features, and other factors. While reducing the vulnerability of your home or business to wildfire begins with you, a community-wide approach to fire protection will be the most effective, so please share this guide with friends and neighbors. This guide will provide information that will help your home or business and your community prepare for and survive a wildfire.

Reducing the Vulnerability of Your Home or Business: An Overview of this Guide

Wildfires can be difficult to control. What is controllable is how you prepare your home or business for wildfire before it threatens. Ultimately, the difference between survival and destruction are the steps you take to reduce the opportunity for the initial ignition of your home or business. There is an explicit link between the selected vegetation, its placement and management in the area surrounding a building, often referred to as “defensible space,” and construction materials and building design. Survivability of a building will depend on creating and maintaining an effective defensible space on the property and on careful selection of building materials and construction design features.

The ignition of a building during a wildfire can occur in one of three ways. These include exposure to wind-blown embers (also known as “firebrands”), direct contact by flames, or a radiant heat exposure (radiant heat is the heat felt standing near a burning object, such as a campfire; but during a wildfire, the heat source could include burning items such as a woodpile, tool shed and/or a large shrub). Of these, exposure to wind-blown embers is considered the most important. Wind-blown embers generated by the burning wildland vegetation, or other burning buildings or structures, can land on or near your home or business and ignite it either directly or indirectly. Examples of a direct ember ignition include ember entry through a vent or open window with subsequent ignition of combustible materials or furnishings inside the building. Direct ignition by embers also can occur through sufficient ember accumulation on combustible materials such as a wood shake roof, on combustible decking, or immediately adjacent to combustible materials such as siding. Examples of an indirect exposure include ember accumulation and ignition of vegetation or other combustible materials (e.g., a woodpile or shed) located near your home or business, with subsequent ignition of a building component by a radiant and/

or direct flame contact exposure. With inadequate defensible space, the wildfire could burn directly to your home or business and ignite an exterior component, or break the glass in a window and ultimately burn into the interior of the building. Developing and maintaining an effective defensible space will minimize the chance of this happening.

Once homes and other structures ignite and burn, they will become a source of embers and threaten other homes and buildings. Depending on building-to-building spacing and topographical features, one wildland fire-to-building ignition can result in additional ignitions by building-to-building fire spread. Building-to-building ignitions can result from embers, direct flame contact and/or radiant heat exposures. The potential damage from radiant heat will depend on the level and duration of the exposure. The radiant heat exposure from a burning building will be longer than that from a burning shrub.

This guide provides information for reducing the vulnerability of your home or business to wildfire. Vulnerable parts of a building include the roof, the area immediately adjacent to the building and under any attached deck, vents and other openings on the exterior walls, gutters, decks and siding. Specific details on reducing the vulnerability of your home or business will be provided in the "Improving the Wildfire Resistance of Buildings" section of this guide.

MANAGING VEGETATION AND OTHER COMBUSTIBLE MATERIALS AROUND YOUR HOME OR BUSINESS

Defensible Space

For the purpose of this document, defensible space is the area between your home or business and an oncoming wildfire where the vegetation has been managed, by pruning, thinning, removal, or replacement, to reduce the severity of the wildfire and improve the likelihood of a home or business surviving without assistance from firefighters (Living with Fire Program, University of Nevada Cooperative Extension, 2012). These actions reduce the chance that flames will touch any part of a building and that the associated radiant heat will be able to break window glass, ignite combustible siding, or ignite combustible items stored close to the building. Regardless of the size of the property surrounding the building, the goal is the same: to reduce and manage the amount and location of combustible vegetation and other combustible materials that would allow the wildfire to get close enough to the building to result in ignition.

Since 2005, Californians in designated wildfire-prone areas have been required by law to create 100 feet of defensible space around their home. Initially this requirement applied to those living in more rural areas (i.e., those living in State Responsibility Areas [lands where the State has the financial responsibility for prevention and suppression of wildfires]), but today it also applies to those living in urban and suburban areas in certain wildfire-prone areas determined to be "very high" hazard. Areas where native vegetation abuts a community is often referred to as the wildland urban interface, or WUI.

Similar to defensible space around a building, a fuel break can be created and maintained around a community. The goals of a community-wide fuel break or parcel-level defensible space are the same: to reduce the intensity of the fire, to drop any fire burning in the upper part of trees (the "crown") or shrubs to the ground and keep it from climbing back into the crown, and to minimize the chance of the fire burning to the home or business. If these community-wide

The defensible space on this property could be improved by removing vegetation to minimize the opportunity for fire to burn directly to the home. Source: Stephen L. Quarles

goals are achieved, the home or business would still need to be protected from burning wind-blown embers that can be transported over any property-level defensible space.

Learn more in the “Creating Defensible Space” section of this guide.

UNDERSTANDING TERMS: THE ROLE OF BUILDING CODES AND TEST STANDARDS FOR MATERIALS

When improving the ability of a home or business to survive a wildfire, it is important to understand a few keys terms. These include “noncombustible,” “ignition-resistant,” and “combustible.” The term “flammable” usually applies to fluids and so will not be generally used in this document. Based on commonly used terminology, an ignition-resistant material is still a combustible material. The following paragraphs provide more detailed descriptions.

A combustible material has been defined in an American Society for Testing and Materials standard (ASTM E176 - Standard Terminology of Fire Standards) as one that is capable of undergoing combustion under specified conditions. Whether or not a material can be considered noncombustible can also be determined using a standard test method (ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C). Examples of noncombustible materials include traditional three-coat stucco, metal (with the exception of aluminum) and some fiber-cement construction products (e.g., fiber-cement siding and soffit materials).

Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure) of the California Building Code, the International Code Council’s International Wildland-Urban Interface Code (IWUIC) and the National Fire Protection Association (NFPA) Standard 1144 (Standard for Reducing Structure Ignition Hazards from Wildland Fire) have defined an ignition-resistant material (IRM) as one meeting a minimum flame spread index. An example of an ignition-resistant material is lumber that has been pressure impregnated with a fire-retardant chemical and rated for use in an outdoor environment. Suitability for use in an exterior environment is determined by successfully passing the standard fire test after being subjected to an accelerated weathering procedure that consists of a number of wetting and drying cycles and exposure to ultraviolet light. The weathering cycle is used to remove fire-retardant chemicals that might be easily removed from the material while in service.

Many products commonly used on the outside of homes or businesses are combustible. These include solid wood and wood-based composite materials (e.g., T1-11 plywood siding and solid wood decking) and plastic and wood-plastic composite materials (e.g., decking, trim and vinyl siding). The relative performance of combustible materials can be evaluated by comparing the amount of heat that is generated when it burns (referred to as the “Heat Release Rate”); the ability of a construction assembly, such as an exterior wall, to resist fire from moving from one side of the assembly to the other (generally referred to as “fire resistance”); the time it takes a material to ignite; and other factors that can be quantified.

These terms are used to describe and compare the fire performance of construction materials. Having a basic understanding of them can help you select products for your home or business. Chapter 7A in the California Building Code uses these terms to describe the requirements of materials that can be used in new construction. Some jurisdictions, during their code

Test to determine the fire rating for a roof covering. A Class A burning brand is on this roof covering. Photo taken during experiments conducted at the University of California Fire Research Laboratory. Source: Stephen L. Quarles

adoption process, incorporated a “significant remodel” provision that requires compliance with Chapter 7A if the remodel exceeds a specified square footage or dollar value. By understanding the differences in these terms—all of which relate to the relative combustibility of a material, product or construction feature—you will be better equipped to make choices when working with a contractor on a home or building improvement project by yourself.

California has been a leader in the field of wildfire building code development. As indicated, Chapter 7A of the California Building Code applies to new construction in designated wildfire-prone areas. In addition to noncombustible and ignition-resistant materials, this chapter uses State Fire Marshal–approved standard test methods that provide a way to evaluate and compare the performance of exterior-use construction materials, most of which fall into the combustible category. For more information about Chapter 7A, visit the following link or talk with your local building or fire official:

osfm.fire.ca.gov/codedevelopment/wildfireprotectionbuildingconstruction.php

Many construction materials that have complied with the performance options of Chapter 7A are included in the Building Materials Listing Program, a program managed by the California Office of the State Fire Marshal. Product information can be found at:

osfm.fire.ca.gov/licensinglistings/licenselisting_bml_searchcotest.php

As of January 1, 2011, residential fire sprinklers are required in all new one- and two-family dwellings and townhouse construction.

Conducting an underdeck flame impingement test to evaluate the performance of decking. This test method used a gas burner to simulate an exposure from burning combustible materials stored under a deck. The procedure later became the California State Fire Marshal test procedure for evaluating the performance of decking materials. Photo taken during experiments conducted at the University of California Fire Research Laboratory. Source: Stephen L. Quarles

CALIFORNIA BUILDING CODE: CHAPTER 7A SUMMARY

VEGETATION MANAGEMENT

- Follows Public Resources Code (PRC) 4291
  - Two zones:
    - The Lean, Clean and Green Zone that includes the 30 feet immediately surrounding the home or building.
    - The Reduced Fuel Zone that includes the zone from 30 to 100 feet (or to the property line).

The provisions of Chapter 7A apply to new construction (residential and commercial) and to remodels that occur on buildings constructed after 2008, when Chapter 7A was implemented. Check with your local building code official for any local modifications to the state building code.

Some jurisdictions, during their code adoption process, incorporated a "significant remodel" provision that requires compliance with Chapter 7A if the remodel exceeds a specified square footage or dollar value.

BUILDING COMPONENTS

- **Roof:** Class A, B, or C, depending on Fire Hazard Severity Zone.
- **Gutters:** Resist accumulation of debris, usually through use of cover devices. Vinyl and metal gutters are both okay.
- **Vents:** Corrosion-resistant metal mesh, not less than 1/16 inch. Under-eave vents not allowed unless accepted by the Office of the State Fire Marshal as resisting the entry of embers and flame.
- **Siding:** Noncombustible and ignition-resistant materials okay. Combustible siding products must pass a fire-resistance test.
- **Windows:** Dual-pane with at least one pane tempered glass. Any frame material is okay.
- **Decking:** Noncombustible okay. Combustible products must pass a test that evaluates heat release rate. Restrictions on siding products will apply if the decking product has a Class C flame spread index.

IMPROVING THE WILDFIRE RESISTANCE OF YOUR HOME OR BUSINESS

You may already have a list of projects to improve your home or business. Maybe you need a new roof, want to replace old windows to improve energy efficiency, or need to rebuild a deck. Review your list to see if it includes projects in any of the following sections. If so, by modifying your plans, you may be able to reduce the vulnerability of your home or business to wildfire.

ROOF COVERING

WHAT YOU SHOULD KNOW

Replacing a roof is a major project, but it can yield major benefits. Evaluating the vulnerability of the roof should be a top priority when considering a new home or business, or remodeling an existing property. An untreated wood shake or shingle roof covering is arguably the greatest threat to a building. The fire rating for a roof covering is either Class A, B, or C, with Class A providing the best performance. A non-fire-retardant-treated wood shake or shingle roof is unrated (i.e., it has less than a Class C fire rating).

Roof shape also affects the potential vulnerability of a roof. Roof designs that result in roof-to-vertical-wall intersections (e.g., at a dormer or a chimney chase), are often referred to as having a complex roof shape. If the vertical wall uses a combustible siding product, this detail can make your home more vulnerable to wildfire, even if you have a Class A roof covering, because vegetative debris can accumulate at these intersections. During a wildfire, so can wind-blown embers. If the roof is adjacent to a vertical wall with combustible siding, the ember-ignited vegetative debris could burn into the stud cavity and spread into the occupied portion of your home or business. Make sure that your roof covering doesn't "fail" because of the ignition of materials next to the covering, thereby bypassing the protection provided by a fire-rated roof covering or assembly.

Wind-blown embers ignited debris on a roof next to dormer.

WHAT YOU SHOULD DO

Regularly inspect the areas around your home or business, paying close attention to debris accumulation on the roof and in gutters. Remove accumulated debris.

It can be difficult to tell whether you have a Class A fire-rated roof. The most common example of a Class A covering is asphalt composition shingles. If you are not sure about the fire rating of your roof covering, schedule an inspection by a professional roofer to find out. If you replace your roof, choose one that has a Class A fire rating.

Regardless of the specific Class A roofing material you choose, inspect it regularly, maintain it when necessary, and replace it when needed.

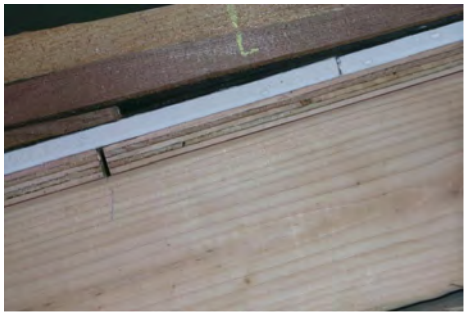
Consider replacing combustible siding located on dormer or other vertical roof-to-wall locations with a noncombustible product. If you maintain an effective defensible space, including a near-home noncombustible zone, replacing combustible siding at all locations isn't as important. Replacing siding locally at these locations will be more affordable than global replacement on your home.

THINGS TO KEEP IN MIND WHEN CHOOSING A CLASS A ROOF COVERING

Many roof coverings have a Class A fire rating that is only based on the top/external covering (i.e., the part of the roof that you can see) and the balance of a normal roof assembly that consists of the sheathing and roofing felt or other underlayment material. Some common examples include asphalt fiberglass composition ("asphalt comp") shingles and clay or concrete tiles. These materials provide a "stand-alone" fire rating.

Other roof coverings obtain their Class A fire rating by adding materials that enhance the fire resistance of the roof assembly. The assembly is composed of the roof covering that you see, and the additional underlying material(s) that you can't see. The fire rating of these coverings will be referred to as Class A "by assembly." Examples include aluminum and some of the newer composite roof coverings made from recycled plastic and rubber materials. These products require an additional layer of a fire-resistant material to achieve a Class A fire rating. Wood shakes are available with pressure-impregnated, exterior-rated fire-retardant chemicals that provide a "stand-alone" Class B fire rating, and a Class A rating "by assembly." The recycled plastic and rubber roofing products typically have a Class C "stand-alone" fire rating.

The fire rating for most, but not all, roof coverings and assemblies are evaluated using new materials. An exception is fire-retardant-treated wood shakes and shingles, which (in California) must undergo a prescribed natural weathering exposure and then pass the required fire tests before being accepted for use. Weathering is a factor that is often overlooked when using roofing products. Over time, as the product weathers, some roof coverings may become more vulnerable to fire due to wear, repeated exposure to the elements and other types of damage. Some jurisdictions in California do not allow the use of fire-retardant-treated wood shakes or shingles as a roof covering. For more information about exterior pressure-impregnated fire-retardant-treated materials, see the "Building Materials & Home Design" section at www.extension.org/surviving_wildfire.



Detailing for a "by assembly" fire rating that includes a fiberglass gypsum product. Photo taken during experiments conducted at the University of California Fire Research Laboratory. Source: Stephen L. Quarles

Wear on an asphalt composition roof. Because the surface granules are missing, it is possible that the fire rating has been compromised, particularly at this location.

TILE AND OTHER ROOF COVERINGS WITH GAPS AT THE EDGES

WHAT YOU SHOULD KNOW

Some roofing materials have a gap between the roof covering and the roof sheathing. These gaps typically occur at the ridge and edge of the roof. The most common example of a covering material where this would occur is a clay barrel tile roof, but it also occurs in some metal roofs (mainly with a standing-seam style) and other cement roof coverings. Even with flat profiles, gaps occur at the ridge and hip of the roof. The larger gaps can allow birds and rodents to get into the opening and build nests between the roof covering and the roof deck. The small pieces of vegetation used as nesting material can be easily ignited by wind-blown embers. Over time, wind-blown debris will also enter through these gaps and accumulate on top of the roof deck (and below the roof covering), adding to the amount of combustible debris. Flames from the ember-ignited debris can then spread to the structural members that support the roof, bypassing the protection offered by the Class A (or other) fire-rated roof covering.

Commercially available bird-stop material. Note missing stop (a maintenance item) and gaps between bird-stop and roof covering. Ember entry still possible—size and number could be restricted, as would be birds and rodents. Source: firecenter.berkeley.edu/bwmg/roof-1.html

Use of mortar mix as a bird-stop material. Source: firecenter.berkeley.edu/bwmg/roof-1.html

WHAT YOU SHOULD DO

Use a form of protection called a "bird stop" to cover the open edge gaps between the roof covering and roof sheathing. Bird stops can either be a manufactured product purchased from a roofing supply store or provided by the manufacturer at the time of installation, or a mortar mix that is installed as a do-it-yourself project. The bird stop is inserted into the opening at the eave edge of the roof. Don't forget to inspect the ridge and hips of your roof. A flat tile roof may or may not have a gap at the roof edge, but it will likely have openings at the ridge and hip. These openings also need to be closed. A mortar mix would be the best option to plug openings at the ridge and hips of the roof. The goal is to keep fuel sources, such as nesting materials and wind-blown debris, from getting under the fire-rated roof covering.

Some commercially available bird stops will still have small gaps between the edge of the bird stop and the roof covering, stopping birds from nesting but not embers from entering. A mortar product can completely fill the gaps. Bird-stopped areas must also be maintained, and repaired when necessary.

The tiles on this roof are damaged and should be replaced.

SKYLIGHTS

WHAT YOU SHOULD KNOW

Skylights can be vulnerable during a wildfire in two ways. First, the intersection between the skylight and the roof can collect combustible wind-blown litter (e.g., leaves, twigs and pine needles) and embers. Debris can accumulate on top of the skylight, particularly those with a flat (glass) surface when installed on a flat or low-slope roof. Second, depending upon its material, the lens can be damaged or melted by radiant heat or direct flame contact. The potential for damage from a radiant heat exposure would be more likely when the skylight is installed on a steeper sloped roof, particularly if there is vegetation or a building in a direct line of site with the skylight.

WHAT YOU SHOULD DO

Regularly inspect your roof for debris accumulation on and around skylights. Remove accumulated debris. Debris can accumulate on a roof with any slope, but it is more likely to accumulate on top of a skylight installed on a flat roof. Flat surface skylights (glass types) are more susceptible to accumulating debris than domed (plastic) types.

Skylight on a steep-slope roof. Radiant heat exposure from burning vegetation or building would be more of a problem with steeper sloped roofs.

Flat (top photo) and domed (bottom photo) skylights. Note propensity for debris to accumulate on top of flat versus domed skylights.

GUTTERS

WHAT YOU SHOULD KNOW

Wind-blown vegetative debris and debris from overhanging trees will result in the accumulation of leaves and needles on your roof and in your gutters. If dry, this debris can be readily ignited by wind-blown embers. Even if you have a Class A fire-rated roof covering, such as tile, concrete, metal or asphalt composition shingles, the edge of the roof will be exposed to flames from the ignited debris.

Many checklists suggest replacing vinyl gutters with metal gutters. Debris in any gutter will be readily ignited by embers. Once debris in a vinyl gutter has ignited, the gutter will ultimately detach at the roof edge and fall to the ground. The debris and gutter will burn on the ground, potentially igniting surrounding vegetation and combustible mulch, and adjacent combustible siding or other components in the wall assembly. A metal gutter will remain attached to the edge of the roof and the ignited debris will continue to burn there, exposing the edge of the roof, including sheathing and fascia, to flames. The best solution is to minimize the accumulation of debris in the gutter.

When dry, decayed wood and other wood-based materials that are commonly used in the under-eave and soffit can be more easily ignited.

WHAT YOU SHOULD DO

Remove tree branches that overhang your roof and remove any dead vegetation, including branches, within your defensible space. This should be part of a routine maintenance plan around your home or business. Do this at least annually at a time best suited for the health of the tree or plant.

Clean gutters and roof areas where debris collects. Inspect and remove accumulated debris in these areas at least twice a year, or more if necessary. Remove accumulated leaves, pine needles and any other combustible debris.

Inspect the roof edge to determine if a metal drip edge is installed, or included as part of your gutter. Some metal gutters have an integral flashing piece that serves the function of a stand-alone drip edge. If a drip edge is not present, install one. The drip edge will serve two purposes: (1) it will help protect the roof edge (sheathing and fascia) from a flaming exposure that could occur if debris is ignited by wind-blown embers, and (2) it will minimize the entry of embers into a soffited-eave construction by blocking the small gap that can exist between the edge of the roof sheathing and the top of the fascia.

Inspect exposed portion of the under-eave or soffit periodically to make sure construction material is in good condition.

Decayed wood at the roof edge—more readily ignited from any flaming exposure resulting from burning debris in the gutter. Source: Stephen L. Quarles

Wind-blown embers ignited debris in a gutter. Photo shows detaching vinyl gutter (left side) and attached metal gutter (right side).

Gutter with integrated drip edge. Source: firecenter.berkeley.edu/bwmg/gutters.html

Covering your gutters with screens or other devices can minimize the buildup of debris in the gutter. Regularly inspect gutters with cover devices to make sure they are still in place and performing properly. If you choose to use one of these devices, select one that is made of a noncombustible material. Also be aware that some screens and cover devices will allow debris to accumulate on the roof behind the device. If ignited, this flaming debris can increase your vulnerability if you don't have a Class A fire-rated roof covering. Even if you have a Class A roof cover, debris should still be removed on a regular basis to reduce ember generation and exposure to other parts of your home or business.

Debris accumulation on roof covering behind gutter cover device. Source: firecenter.berkeley.edu/bwmg/gutters.html

VENTS: UNDER-EAVE, ATTIC AND CRAWL SPACE (FOUNDATION)

WHAT YOU SHOULD KNOW

Attic, roof and foundation vents can be entry points for embers and flames. Embers that enter the attic or crawl space can ignite combustible debris that can accumulate in these spaces and also combustible materials stored in these spaces. Testing by IBHS and the National Institute of Standards and Technology (NIST) has demonstrated the vulnerability of vents mounted on vertical walls and surfaces to the entry of embers. These vents included gable end and foundation vents, and vents in the blocking in open-eave construction. Open-eave construction is one where you can see the rafter tails of your roof framing on the exterior underside of your roof. Vents in a soffited (boxed-in) eave were not as vulnerable to ember entry. Based on research conducted at the University of California and IBHS, there is increasing evidence that soffited eaves are less vulnerable to both ember and direct flame contact exposures.

Open-eave construction can be vulnerable even if vents are absent. If the blocking is improperly installed or if it has warped over time, gaps can develop where the blocking and rafter tails intersect. As a result, wind-blown embers could become lodged there and ignite debris and potentially the structural support wood members in these areas.

Based on testing conducted at the IBHS Research Center, dormer-type through-roof vents are vulnerable to ember entry. Ridge vents rated to resist the entry of wind-driven rain will also resist the entry of embers.

Open eave (top photo) and soffited eave (bottom photo) construction. Source: firecenter.berkeley.edu/bwmg/soffit-eave-1.html

WHAT YOU SHOULD DO

If you have vented openings to your attic or crawl space, make sure screening is present. At a minimum, these vents should be covered with ⅛-inch corrosion-resistant metal mesh screen. Chapter 7A of the California Building Code will allow 1/16-inch screening. Laboratory research has shown that embers large enough to pass through ¼-inch and even ⅛-inch screens are large enough to ignite fine fuels, so while screening will help, it won't be the perfect answer. While a finer mesh screen will offer better protection against the entry of embers, it will also require more maintenance to keep it free of debris. It is important to allow air to flow freely to help manage the moisture in your attic and crawl space (i.e., keep the moisture content low enough to minimize the chance of developing water-related damage to susceptible building materials).

Note that flames can pass through ¼- and ⅛-inch mesh screening, reinforcing the importance of actions that minimize the opportunity for flames to impinge on attic and crawl space vents, and other screened openings on the exterior wall.

Avoid the use of gable end vents—they have been shown to be vulnerable to ember entry. Consider instead a ridge vent that has an external baffle. These are effective in resisting the entry of embers. In order to be used in construction where Chapter 7A applies, a plastic ridge vent must be covered with a noncombustible wire mesh.

Ridge vents are typically plastic and therefore combustible. Removal of debris from the inlet to any ridge vent is critical since this debris could be ignited by wind-blown embers.

New vents have been designed as a result of the regulations in Chapter 7A of the California Building Code. These vents are intended to offer enhanced protection by reducing the number of embers (and the potential for flames) entering the space behind the vent. These vents typically incorporate certain design features to enhance performance over that of metal screening. They must also demonstrate enhanced ability to resist a flame contact exposure. Find a list of accepted vents at:
osfm.fire.ca.gov/licensinglistings/licenselisting_bml_searchcotest

Select “8165—Vents for Wildland Urban Interface (W.U.I.)” from the “Category” drop-down menu and then click the “Search” button.

Depending on the ease of accessing your vents, you could prepare vent covers (i.e., using ⅜- to ½-inch plywood and a thin metal plate) and include their installation as part of your wildfire pre-evacuation preparedness plan. Use of duct or metal tape could also be used as a last-minute effort. As indicated, these would be particularly useful for vents on vertical surfaces (gable end, foundation, and blocking in open-eave construction) since these types of vents and vent locations have shown to be vulnerable to embers. The covering should be removed after the wildfire threat has passed.

Closure devices for gable end and open-eave vents are also commercially available. These devices are manually activated (i.e., closed) by turning or pulling a wall- or ceiling-mounted handle. Currently, these closure devices would have to be manually reopened after the wildfire threat has passed.

This finer mesh screen was painted over when this building was repainted, minimizing airflow through the vent. The vent is damaged, allowing air and wind-blown embers to more easily pass through. Source: firecenter.berkeley.edu/bwmg/vents-1.html

A ridge vent that has an external baffle has been shown to resist the entry of wind-blown embers.

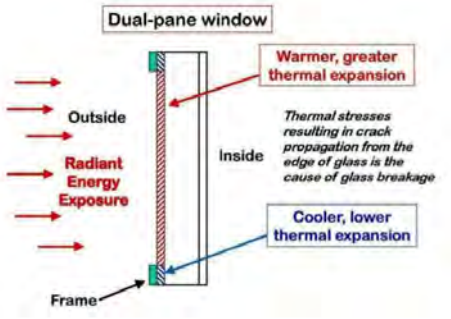
If you have open eaves (i.e., you can see the exposed rafters in the eave), you can use a sealant (such as caulking) to plug any gaps that you observe, or enclose the underside of the roof eave/overhang. Given the benefit from both an ember entry and flame contact exposure, enclosing the eave is highly recommended. To do this, use sheathing made from a noncombustible or ignition-resistant material. This enclosure can be horizontal or follow the slope of the roof and is sometimes referred to as boxing-in the eave. Enclosure would preferably be accomplished by extending the soffit material from the roof edge horizontally back to the exterior wall, thereby creating a soffited eave. The horizontal soffit member is attached to a ledger board that is itself attached to the exterior wall. If open-eave blocking includes vents, remember to add an adequate amount of soffit vents as part of your project. Make sure your vent-area ratio (vent into the enclosed soffit and enclosed soffit into the attic) follows the requirements of your local building code.

Gaps between the blocking and framing in the unvented truss bays would allow ember entry into the attic space. A sealant could be used to close gap. Source: Stephen L. Quarles

WINDOWS AND DOORS

WHAT YOU SHOULD KNOW

Windows are vulnerable to radiant heat exposures from nearby burning objects (e.g., vegetation, gazebos, decks, and other structures) and direct flame contact exposures from burning vegetation or other combustible materials stored under or near the window. Window failure can occur if the glass in the window breaks, allowing embers and flames to enter the building, or the combustible frame ignites and the fire is able to move into the occupied space. Common framing material includes wood, vinyl-clad wood, metal-clad wood (aluminum is the most common metal used in this application), metal (again, aluminum is the most common material), and vinyl. Fiberglass and wood-plastic composite materials are also used as framing materials by some manufacturers.



Glass breakage occurs as a result of temperature differences between the exposed glass and that protected by the frame material.

Studies have shown that the glass is the most vulnerable part of the window (i.e., the glass is more vulnerable than the frame). Glass breaks because of temperature differences that develop between the exposed glass and the glass protected by the window framing material. These temperature differences can occur when the window is subjected to the heat from a wildfire, including radiant heat from your neighbor's property. When this happens, cracks develop at the edge of the glass and propagate inward. This makes larger windows more vulnerable to breaking because they have a larger perimeter than smaller windows. Depending on the type of glass and level of exposure, failure (breakage) can occur after 1–3 minutes of exposure to direct flames or radiant heat.

Typical types of glass used in residential construction are either "annealed" or "tempered." Annealed glass is more common. Because of life-safety issues, tempered glass is commonly found in doors and in windows that are located close to the floor. Tempered glass resists breakage from both mechanical and thermal stresses much better than annealed glass and is therefore a good choice for use in wildfire-prone areas. In addition, when it breaks, small chunks rather than sharp shards are created.

Laminated glass, which consists of a layer of a thin plastic membrane sandwiched between two layers of glass, is also available. Based on research conducted in Australia, the resistance to heat exposure for laminated glass is similar to that of annealed glass. Although not extensively studied, the same Australian study showed that application of a metallic film to an exposed glass

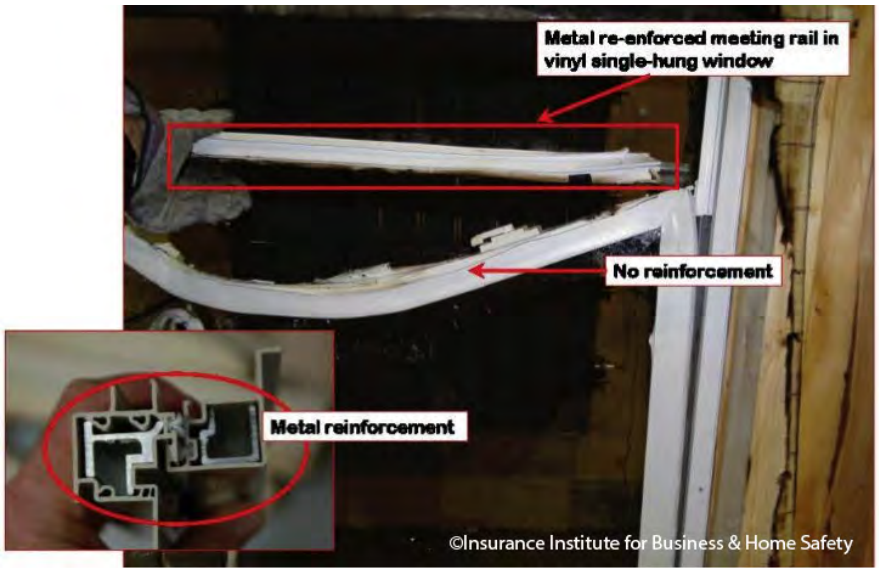
surface can improve resistance to heat exposure. It was reported that correct application of the film, according to the manufacturer's specifications, is important.[1]

Older windows may consist of a single pane of glass. Newer windows are "dual-pane" or "multi-pane." In general, dual- or multi-pane windows are better choices from both a wildfire resistance and energy efficiency perspective.

Chapter 7A of the California Building Code, the chapter that applies to new construction in wildfire-prone areas, acknowledges the importance of tempered glass and the research results regarding the relative performance of framing material in that, at a minimum, at least one pane of a dual-pane window is now required to be tempered. This requirement does not override other sections of the code that require two tempered panes in a dual-pane unit. Note that even dual-pane, tempered glass windows will not protect your home or business if left open; therefore, close all windows before leaving home when a wildfire is threatening.

If you have a wide sill area at the bottom of the outside part of the window, regularly remove accumulated debris. In order to limit the chance of a flame contact exposure to the window, combustible mulch and woody vegetation should be avoided in areas immediately under it.

If you have a wood window, inspect it to make sure it is in good condition. Replace or repair it if the members become decayed—decayed wood is more easily ignited. Vinyl windows may deform if exposed to radiant heat. The horizontal member in a single- or double-hung window, and the vertical member in a horizontal slider window, can be particularly vulnerable to radiant heat. Vinyl windows with metal reinforcement in these members have been shown to mitigate this vulnerability. Windows certified by the American Architectural Manufacturers Association (AAMA) will have this metal reinforcement.



The framing member in the middle of a single- or double-hung vinyl window should include a metal reinforcement member.

Windows that comply with Chapter 7A provisions will have a label similar to that shown here.

Decay in the sash of a wood window. Source: Stephen L. Quarles

[1] (P.A. Bowditch, A.J. Sargeant, J.E. Leonard and L. Macindoe, 2006. Window and Glazing Exposure to Laboratory-Simulated Bushfire. Bushfire CRC, Confidential CMIT Doc. 2006-205. pp. 61)

As previously stated, the most vulnerable window during a wildfire is one that is left open. If a window is inadvertently left open, screens will help protect against ember entry. Screens will also protect the glass against radiant exposures that may otherwise cause the glass to break. Screens will not protect the window from a direct flame contact exposure (e.g., flames from vegetation or combustible siding located under or adjacent to the window that has ignited). Plastic-clad fiberglass screens will quickly fail as a result of a direct flame contact exposure.

Testing at the IBHS Research Center has demonstrated that window curtains ignite after the annealed or tempered window glass breaks and falls out, as a result of extended exposure to radiant heat and/or flames. While in place, the glass (and any screening) will effectively keep out enough radiant heat to avoid ignition of interior items. Depending on the extent and duration of the radiant exposure, vinyl blinds may deform.

WHAT YOU SHOULD DO

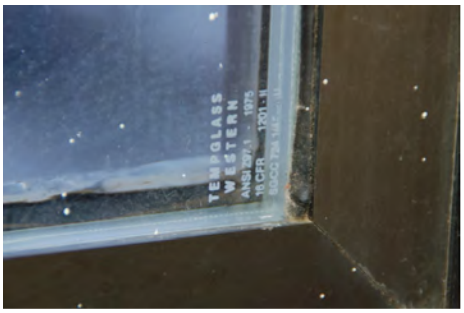
Determine what kind of windows are in your home or business. Single-pane windows are more common in older buildings. Dual-pane (or multi-pane) windows have two (or more) pieces of glass that are separated by airspace(s). The most important element is the use of tempered glass. To find out if your windows contain tempered glass, look for an etching (called a "bug") in the corner.

When you replace your windows, choose new ones with tempered glass. Considering that current energy code requirements usually call for dual-pane windows, upgrading from a single-pane to a dual-pane window will improve both fire resistance and energy efficiency.

If you cannot afford to replace your windows, it is even more important to carefully manage and maintain the fuels closest to your home or business. This includes both vegetation and combustible materials such as firewood and lumber. Avoid storing combustible materials near your home or business. A noncombustible rock-type mulch should be used in the area immediately adjacent to your home or business.

If windows are accessible, you could consider preparing covers that would be installed as part of your evacuation activities. Shutters can be made from ¼- or ½-inch plywood, and should be cut to size and labeled (for each window) in advance to allow for easier and quicker installation when a wildfire threatens. Take the time to pre-install the anchorage system. Use of shutters can be more important if a neighbor's home, or other non-movable structure, is nearby. The ¼- to ½-inch plywood will provide an extra measure of protection from radiant heat. Buildings that are used seasonally may already have shutters that are closed during the off-season to provide protection against intruders. These shutters will also protect windows and buildings during wildfires.

This cotton curtain ignited after both panes of a dual-pane window broke and fell out.



Etched "bug" in the corner of a window indicates that the window glass is tempered. Source: Stephen L. Quarles

DECKS, PATIOS AND PORCHES

WHAT YOU SHOULD KNOW

There are two general kinds of walking surfaces on decks and porches. One is made using spaced deck boards (e.g., wood, plastic or wood-plastic composite products), and the other consists of a continuous, solid surface (e.g., tiles) on top of a substrate. Spaced deck boards are usually a combustible product, although some deck boards are made from metal or other noncombustible material.
A solid surface deck can be applied over a lightweight concrete substrate or wood-based sheathing substrate, such as plywood, that has a polymer-based waterproofing membrane topping surface. The exposed walking surface can be a combustible or noncombustible material. Solid surface decks are more expensive, and therefore decks and porches made using spaced deck boards are more common. Ground-level patios often have a solid walking surface.

Decks are an important consideration because they are usually attached to a home or business and are next to a window or sliding glass (or other) access door. Consider the construction material used to build the deck, patio or porch, along with the furniture and other items that are on it and stored beneath it. This area is part of your defensible space and therefore it is also necessary to consider vegetation leading up to the deck. This is particularly important for decks attached to a home or business that is located on a sloped lot. Depending on the type and condition of the vegetation, flame lengths on a slope can reach more than 30 feet, increasing the likelihood of a flame contact exposure to the underside of an elevated deck when vegetation in this region isn't managed.

It is common knowledge that wood deck boards are combustible. There is sometimes a misunderstanding regarding the combustibility of plastic and wood-plastic composite decking products—these decking products are also combustible.

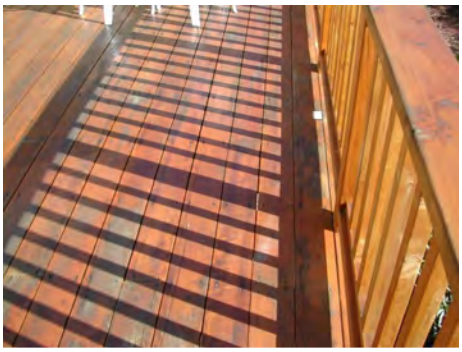
California has established performance requirements in the building code for combustible decking products. Information about these products are included in the Building Materials Listing Program managed by the California Office of the State Fire Marshal.

For information about deck boards that comply with the California requirements, see osfm.fire.ca.gov/licensinglistings/licenselisting_bml_searchcotest.php.

Select "8110—Decking for Wildland Urban Interface (W.U.I.)" from the "Category" drop-down menu and then click the "Search" button.

Wood decking products that have been treated with an exterior-rated fire-retardant chemical are commercially available, but untreated nominal 2-inch redwood and western red cedar will comply with the building code requirements, so use of a fire-retardant-treated solid wood product is not necessary to comply with the California requirements. All deck boards complying with these requirements will have a stamp or label on each board. San Diego County has adopted requirements for decking that are considered by many to be more restrictive than those adopted by the state.

A deck with a lightweight concrete (noncombustible) walking surface. Source: firecenter.berkeley.edu/bwmg/decks-1.html



A deck with wood (combustible) deck boards. Source: Stephen L. Quarles

A small deck on a house located at the top of the slope. Source: Stephen L. Quarles

Recent testing at the IBHS Research Center indicated that lower-density wood, such as redwood, was more vulnerable to ignition by wind-blown embers relative to a higher-density wood-plastic composite product. Higher-density wood, such as the tropical hardwood ipe, and exterior fire-retardant-treated deck boards were also less vulnerable than a lower-density wood decking product. All of these experiments were conducted without between-deck-board debris accumulation. Ember ignition of the debris would result in a flaming exposure to the deck boards. Previous experiments have shown that non–Chapter 7A deck boards can be vulnerable to a flaming contact exposure.

Wind-blown ember accumulation in deck board gaps at locations where deck boards intersected with the wood joists resulted in ignition of the deck boards.

Embers that accumulate on top of the deck can pass through the gaps between deck boards. Finer fuels, such as pine needles, can be ignited by these embers.

Embers passing through gaps between deck boards can ignite fine fuels that can accumulate under the deck, providing further evidence for the need to remove combustible materials from under the deck.

Wind-blown ember accumulation in deck board gaps at locations where deck boards intersected with the wood joists did not result in ignition of the higher-density wood-plastic composite deck boards.

Some checklists and guides suggest attaching a corrosion-resistant metal flashing strip between the top of the deck and extending up the exterior combustible siding. The purpose of the flashing would be to provide protection from ember accumulation next to the wall—both the embers themselves and the flaming exposure that would occur if accumulated debris at the deck-to-wall intersection were ignited by the embers. This is a good idea, as long as the flashing is tucked in behind the siding where the top of flashing terminates (called "letting in") to prevent water from entering the space between the flashing and the siding. Once inside this space, water cannot drain out and could lead to the rotting of a wood or wood-based siding product. The recommended height is a minimum 6 inches. Higher would be better, but even a 6-inch strip (or width of one piece of siding) would reduce the vulnerability of a combustible siding product. As an alternative, if you can find a close match in terms of siding pattern, the bottom two or three courses of a combustible siding product could be replaced with a noncombustible product.

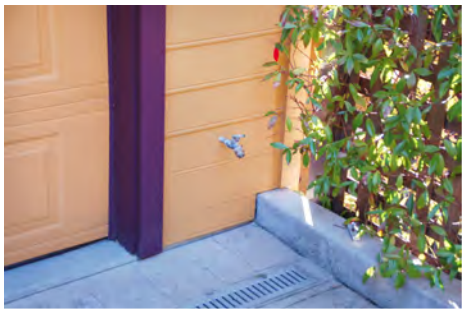
The area under your deck should be treated as part of your noncombustible zone. If you have a spaced-board deck, and absolutely must store some combustible materials under your deck, enclosing it can help reduce the risk of damage from wildfire. Decks and porches can be enclosed vertically by applying an exterior siding product around the perimeter, or enclosed horizontally by applying an exterior panelized product to the bottom of the support joists. Deck enclosure, however, brings with it the possibility of moisture-related degradation of wood structural support members and metal fasteners if proper drainage and ventilation is not provided.

WHAT YOU SHOULD DO

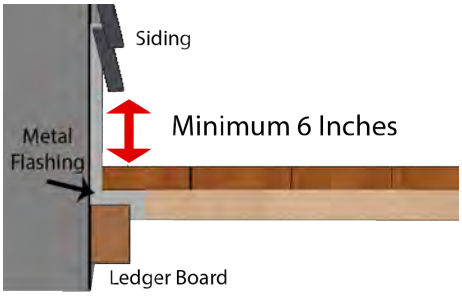
If you choose to enclose your deck or porch, with the exception of screens, make sure you provide sufficient ventilation to avoid the accumulation of excessive amounts of moisture. If you do not allow for the drying out of the structural support members and boards, fungal decay and corrosion of metal fasteners will become the biggest threat to your deck. The building code requirement for a crawl space is 1 square foot of vent area for each 150 square feet of horizontal floor area. You should have at least this much ventilation, or more if you are in a particularly wet area. Use of a fine mesh screening as "cladding" for a vertical enclosure would allow for ventilation and minimize entry of embers and wind-dispersed vegetative debris. Laboratory research has shown that embers large enough to pass through ¼-inch and even ⅛-inch screens are large enough to ignite fine fuels, so while screening will help, it won't be the perfect answer.

Enclosing your deck or porch will not reduce the risk of the top being exposed to embers. For that, the best protection is to keep the surface clear of leaves, pine needles and other vegetative debris. Higher-density deck boards (including wood-plastic composite and tropical hardwood deck boards) are more resistant to direct ember ignition.

Move combustible materials such as furniture cushions, brooms and door mats inside. Smaller furniture, such as chairs, should also be moved inside, particularly wicker furniture, which could be more easily ignited by embers.



A noncombustible lower course of siding was used in this installation with otherwise combustible siding used in the higher courses. Source: Stephen L. Quarles



Metal flashing could be used to protect combustible siding from an ember exposure. To avoid moisture-related degradation problems, the flashing should be tucked behind ("let in") the siding at a lap joint.

A horizontal enclosure, such as that shown here, can result in moisture-related degradation of wood and metal fasteners when deck boards are used.

To determine if enclosing your deck would be beneficial, consider whether your vegetation management plan is inadequate, particularly in the 0- to 30-foot zone. If you avoid storing combustible materials underneath and if you create and maintain an effective defensible space with your vegetation management plan, enclosure is not as important. If you live in a grass or brush area, and if your deck overhangs a very steep slope, building a noncombustible wall within approximately 20 feet from the deck would help deflect the flames of an uphill burning fire. As recommended in NFPA 1144 (Standard for Reducing Structure Ignition Hazards from Wildland Fire), these walls should be about 6 feet tall. If you live in a forested or wooded area, making sure the trees are thinned and limbed up, to minimize the opportunity for any fire to move into the tree crowns, would be the best solution. A crown fire in the trees will be able to burn over the top of a 6-foot wall.

The broom on this test deck was ignited by wind-blown embers. Note that the embers also ignited pine needle debris in the gutter.

SIDING

WHAT YOU SHOULD KNOW

Siding can be vulnerable for two reasons. First, if ignited, combustible siding can provide a path for flames to reach other vulnerable components of your home or business, such as a window or the under-eave area. Second, if penetrated, a horizontal or vertical lap joint will provide access for flames to enter the building. Combustible siding products are more vulnerable than noncombustible products to the penetration of flame at lap joints.

Vertical flame spread on the combustible siding product on the left-hand side of the corner section. The siding material on the right-hand side was a noncombustible product. A burning wood crib was the initial exposure for both wall sections. Source: firecenter.berkeley.edu/bwmg/siding-2.html

Flames from a gas burner on the opposite side of the wall resulted in flame penetration through a lap joint and into the stud cavity. The State Fire Marshal test method for combustible siding products consists of a flame impingement exposure, similar to that used in this test. As built, this siding product would not comply with Chapter 7A requirements. Source: firecenter.berkeley.edu/bwmg/siding-2.html

California uses a standard test procedure to evaluate the ability of a product to resist the penetration of fire, either at a horizontal or vertical lap joint, or in the field of the siding away from a lap joint. Combustible siding products that meet the requirements of this test comply with Chapter 7A. These products are included in the Building Materials Listing Program (more information is provided later in this section).

Fire-retardant coatings, usually an intumescent type, that have been developed for interior use are sometimes suggested for use in exterior applications, either applied as a primer or top coat, on products such as siding. While these products may work well in interior applications, they tend to lose effectiveness when used in exterior locations. The use of coatings as fire retardants should be avoided in exterior exposures until adequate information regarding performance after weathering has been demonstrated.

Large wood members, such as those used in log houses, are more difficult to ignite and resist penetration of fire better than the more typical smaller dimension wood siding products. The most vulnerable part of a log wall is arguably the between-log joint. Vulnerability in this area is minimized if the joint is chinked with a fire-resistant material that provides protection from flame penetration or if a more complicated (usually machined) between-log joint is used. Similarly, a wood siding product with a tongue-and-groove or shiplap joint offers better resistance to flame penetration into the stud cavity than other bevel-type joints. Incorporating an underlying sheathing panel into the wall assembly will improve the ability of any siding material to resist fire penetration at a lap joint. Sheathing is commonly used in California construction for structural reasons.

Vinyl siding will deform and fall off the wall at relatively low radiant heat or flame exposures. If this happens, protection of your home or business will depend on the performance of any underlying material.

Noncombustible siding, including fiber-cement, traditional three-coat stucco, and brick can provide the best protection. Wood siding that has been treated with an exterior-rated fire-retardant chemical will also improve the performance of siding against both radiant heat and flame contact exposures.

Materials that comply with the Chapter 7A requirements can be found at the following site maintained by the California Office of the State Fire Marshal:

osfm.fire.ca.gov/licensinglistings/licenselisting_bml_searchcotest.php

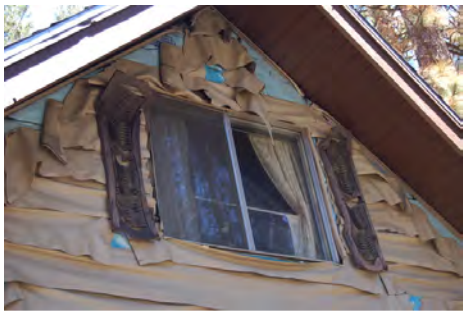
Select “8140—Exterior Wall Siding and Sheathing for Wildland Urban Interface (W.U.I.)” from the “Category” drop-down menu and then click the “Search” button.

WHAT YOU SHOULD DO

If you have combustible siding, incorporating a noncombustible or low-combustible zone next to your home or business would reduce the vulnerability of your siding. If you have a chinked-style log home or business, inspect the chinking for cracks and missing pieces. Repair and replace with fire-rated chinking.

If you have a concrete foundation, either slab-on-grade or raised-floor (crawl space), you can help protect your combustible siding from debris that accumulates by making sure you maintain the code-required ground-to-siding distance of 6 inches (required for all wood-based siding).

Replacing siding is expensive. Except where combustible siding is used on vertical walls on complex roofs, other less expensive items that are discussed in this guide, such as use of metal flashing and careful attention to the vegetation management in the area immediately adjacent to your home, will enhance protection.



Deformed vinyl siding from a radiant heat exposure from a nearby burning home. Source: Stephen L. Quarles

Clearance between the ground and the start of the siding should consistently be at least 6 inches.

Replacing siding “locally,” in areas where it meets the roof on a complex roof design, such as that shown here, would be more affordable than “global” replacement. Source: Stephen L. Quarles

FENCES

WHAT YOU SHOULD KNOW

Your fence can be a hazard if it connects directly to your home or business. The bottom of fences can collect debris, which when combined with combustible fencing material, can become a fuel source that can result in fire burning directly to the building. Similar to a burning building or burning vegetation, burning fencing will also generate embers that can cause other ignitions. Ember ignitions more easily occur where a horizontal member meets a vertical member. Subsequent spread to the building is facilitated when combustible debris is on the ground below the fence. For combustible fencing materials, designs with more between-member openings or gaps (i.e., it is more porous), such as a lattice fence, make it more difficult for lateral flame spread to occur.

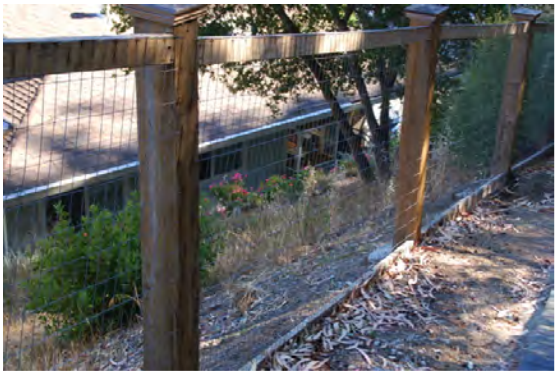
Some checklists recommend inserting a metal plate where the fence connects to the exterior wall of a building, particularly when combustible siding is used. How effective the flashing will be will depend on the size of the metal strip. Depending on how it is attached to the exterior wall, over time it could result in other moisture-related degradation problems with the siding. For example, without appropriate attachment, water will be able to get behind the flashing and will likely be absorbed by wood siding; over time, decay of the wood siding or corrosion of the fasteners could occur.

WHAT YOU SHOULD DO

New fences should be constructed of noncombustible or ignition-resistant materials. The most common product meeting the ignition-resistant material requirements is exterior-rated fire-retardant-treated wood. 4-inch by 4-inch (or larger) support posts intended for ground contact use should be treated with a preservative—wood treatments for both a fire retardant and preservative are not available. Another option would be to attach the wood column to a concrete footing using a metal connector, avoiding a ground contact exposure for the column.

A wood frame with steel mesh infill is an option that would minimize the possibility for an ember ignition; however, if vegetation is allowed to grow on the mesh infill, this advantage will be negated. Existing wood fences that are attached to the home or business should be modified so that the fence ends with a noncombustible component, such as masonry or metal, to minimize the chance of fire spreading to the home or business. A common technique is to use a metal gate with one side attached to the combustible fence and the other to the exterior siding.

It is important not to store firewood or other combustible materials against the fence and to regularly clear away debris and dead vegetation at the bottom of the fence.



Wood frame fence with metal mesh infill. Debris accumulation at base of fence, against the wood lateral member, would make that member more vulnerable to an ember ignition, and increase the opportunity for fire to spread laterally. Source: firecenter.berkeley.edu/bwmg/attachments-1.html

Ignition from ember accumulation most easily occurred at the intersection of the vertical planks and the horizontal lumber.

Flame spread to the building occurred more easily when combustible debris was present at the base of the fence, as shown here.

A gate made from noncombustible materials should be used where a connection is made to the house. Source: firecenter.berkeley.edu/bwmg/attachments-1.html

CHIMNEYS, BURN BARRELS AND OPEN DEBRIS BURNING

Many wildfires are caused by human activities. Reducing the number of wildfires and losses begins with taking precautions to reduce this cause of fire.

WHAT YOU SHOULD KNOW

Spark arrestors reduce the size of embers that can escape from your chimney.

The spark arrestor concept also applies to burning debris and garbage in an open barrel. Embers generated during burning can result in ignitions in adjacent woodlands. Fire can also escape when doing debris burning in open piles.

WHAT YOU SHOULD DO

Install a spark arrestor that has a ½-inch mesh size. These are available at lumber yards, hardware stores and fireplace specialty stores.

In the case of burning in barrels, a heavy metal screen with ½-inch mesh should be placed on top of the barrel. Debris should also be cleared from the area immediately surrounding the barrel. Care should always be taken when conducting open backyard debris burns to minimize the chance that the fire escapes. State and local ordinances may require a permit for open burning. Contact your local fire department for additional information, particularly for information regarding any restrictions on use of burn barrels.

Follow these guidelines from CAL FIRE for safe debris burning:

- Clear a safe zone that is wide enough to prevent the escape of fire
- Keep a supply of water and a rake or shovel readily accessible
- Stay with the fire until it is completely out and never leave a fire unattended
- Burn only when the wind is calm and the humidity level is high
- Extinguish fire completely if conditions become windy
- Keep brush piles small to allow quick control of the fire if necessary
- Locate brush piles an adequate distance from buildings and utilities
- Obey all outdoor burning laws including forest fire laws, air pollution and open burning regulations, and local ordinances
- Understand that you are liable for damages and cleanup if the fire escapes

A spark arrestor at the top of a chimney.

VEGETATIVE FUELS TREATMENTS AWAY FROM BUILDINGS

WHAT YOU SHOULD KNOW

Major vegetation (fuel) types in wildland areas of California include mixed conifer forests and woodlands, brush and shrubs, such as chaparral (examples of chaparral species include chamise and manzanita).

Fuels reduction treatments in forested areas, away from homes, have been shown to reduce the wildfire hazard since mechanical treatments, where selected trees and other vegetation are removed or ground-up and deposited in the ground, and prescribed fire can result in wildfires that burn largely as surface fires. When crown fires burn into a thinned and treated area, the fire will drop to the ground. Fuels treatments are more qualified in effectiveness in Southern California chaparral (shrub lands). Chaparral has only one strata and therefore fire can easily result in a crown fire. Wind-blown embers from fires in chaparral can ignite spot fires in advance of the wildfire, making fuels treatments less certain. For these reasons fuels treatments are more commonly implemented in forested areas and may not be implemented as much in chaparral. Fuels treatments in chaparral have been reported to be effective near communities, similar to that reported for forested areas.

The home and business owner should remember that vegetation and fuels treatments around the home or business is useful and effective regardless of the particular wildland vegetation in the area (i.e., it will be useful whether located in a mixed conifer or chaparral wildland area).

WHAT YOU SHOULD DO

If your community hasn't done so already, work with your community leaders to create a Community Wildfire Preparedness Plan (CWPP), one step in preparing your community for wildfire. Learn more about preparing for wildfire by participating in or initiating educational programs such as Fire Adapted Communities (www.fireadapted.org), or programs such as Firewise (www.firewise.org) and, in the Lake Tahoe Basin, the Living with Fire Program (www.livingwithfire.info).

Forested area in northern California after a wildfire. Trees with foliage in background indicates previous fuels treatments resulted in the crown fire dropping to the ground. Source: Stephen L. Quarles

Fuels treatment in chaparral, showing a planned community fuels treatment project.

CREATING DEFENSIBLE SPACE

WHAT YOU SHOULD KNOW

Identifying Fuels Management Zones

There are several kinds of fuels management (or modification) zones. These include defensible space around a home or building, community fuel breaks, fuels treatment along an access road (reducing the chance of rapid fire spread from ignition by a passing vehicle or equipment), and those used to create a community safe area. In this document, the discussion of a fuels management zone will be limited to the general objectives of preparing and maintaining defensible space around a building and those to create and maintain a similar zone around a community, such as around a community center. The term "fuel" is broadly defined

A fuel break along a rural highway in northern California. Source: Stephen L. Quarles

and includes vegetation surrounding a building or community. When discussing defensible space around a building, it would also include other combustible materials such as firewood and building materials that are often stored outside. Fuels modification and management includes actions taken in terms of selecting, locating and maintaining vegetation and decisions regarding storage of combustible items to reduce or otherwise modify the fuel loading on the property. These are critical components to making and maintaining effective defensible space. For this document, the principal objective of fuel modification and reducing fuel loading is to minimize the ability of the flame front of a wildfire to burn to the building, and reduce the opportunity for vegetation ignited by embers to create a flame contact and/or sufficient radiant exposure to ignite or damage the building.

Defensible Space

The term "defensible space" refers to the area between a building and an oncoming wildfire where vegetation has been managed to reduce the wildfire threat to the home or business.[2] Although some definitions of defensible space include a safe area for firefighters to defend the building, this document will focus on the use of defensible space to reduce the fire threat to the building so that it can have a better chance of surviving without suppression activities by firefighters. During most wildfire conflagrations, firefighters may or may not be available based on conditions and other fire activity.

Defensible space around a home or business is divided into two or three zones. In California, including Chapter 7A, two zones are used. These zones include: (1) the "lean, clean and green" zone, which starts at the perimeter of the building and extends outward 30 feet, and (2) the reduced fuel zone, which extends from 30 to 100 feet or to the property line (whichever comes first). Some defensible space recommendations include a third zone that incorporates the space from 0 to 5 feet from the building perimeter. This zone is called a noncombustible (or low combustibility) zone. Although not officially required in California, it is recommended by several outreach and education groups, including IBHS, Nevada's Living with Fire Program, and the NFPA Firewise Program. This zone will be included in the discussion in this document.

A representation of three defensible space zones, including the 0–5 feet zone ("near-building," "noncombustible," or "low-combustible" zone).

[2] (Fire Adapted Communities: The Next Step in Wildfire Preparedness, University of Nevada Cooperative Extension, Publication SP-10-10)

WHAT YOU SHOULD DO

Create and maintain an effective defensible space on your property using the information provided below.

ZONE 1: 0–5 FEET (Near-Home Noncombustible Zone)

WHAT YOU SHOULD KNOW

The objective of this zone is to reduce the chance that ignition will occur near the home and result in a direct flame contact exposure to the building. Because this zone is closest to the building, it requires the most careful selection and intensive management of vegetation and materials.

WHAT YOU SHOULD DO

Install hard surfaces in this zone (e.g., concrete walkway) or use noncombustible mulch products (e.g., rock mulch). Landscape vegetation recommended for this zone includes irrigated lawn and low-growing herbaceous (non-woody) plants. Shrubs and trees, particularly conifers, are not recommended for use in this zone. Remove dead plant material from plants. Plants adjacent to combustible siding and foundation vents, as well as plants under or next to windows and soffit vents or interior corners, present the greatest hazard.

ZONE 2: 5–30 FEET (or to the property line, referred to as the Lean, Clean and Green Zone)

WHAT YOU SHOULD KNOW

The objective of vegetation management in this zone is to prevent the fire from climbing into the crown or upper portions of trees or shrubs and to stop the fire from burning directly to the building.

CAL FIRE Office of the State Fire Marshal and Nevada's Living with Fire program recommend that a relatively small amount of vegetation be present in this area. Dead vegetation and combustible debris is eliminated. Vegetation in this area is typically irrigated, and incorporates ornamental plants that are maintained, consistent with common residential landscapes (from www.livingwithfire.info).

Paved parking areas surrounding commercial developments can serve as fire breaks, stopping the fire front from burning directly to the buildings. Embers may still be able to ignite individual islands of plants in this zone, and that is why plant selection and maintenance is so critical in the 0–5 foot zone.

WHAT YOU SHOULD DO

Trees and shrubs in this zone should be in well-spaced groupings and well maintained. Eliminating ladder fuels and creating separation between plants or plant groupings are techniques used to fulfill this objective.

Dead plant material and tree branches should be removed from vegetation on a regular maintenance schedule.

A noncombustible zone around a home in the Lake Tahoe Basin. In this case, requirements related to water runoff and protection from wildfire align.

ZONE 3: 30–100 FEET (or to the property line)

WHAT YOU SHOULD KNOW

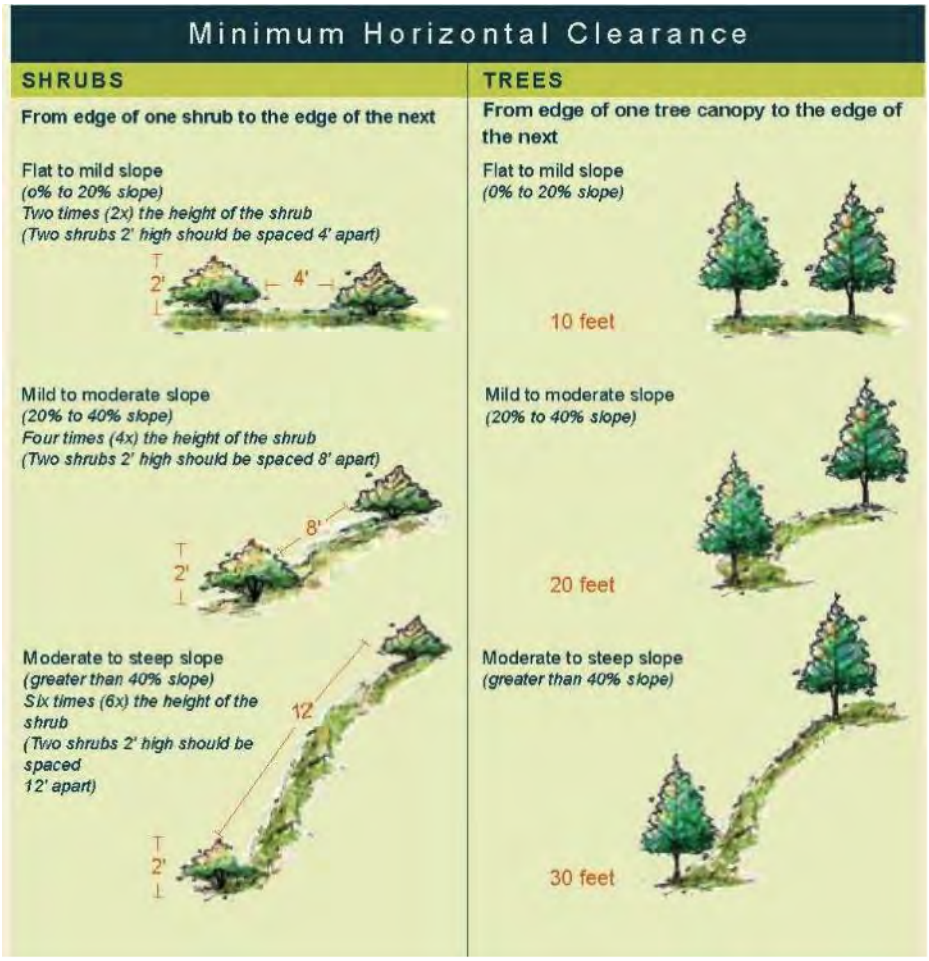
The objective of vegetation management in this zone is to slow down and reduce the energy of the wildfire and slow its advance to the building. Tree and brush spacing should force any fire in the tops of the trees, brush or shrub crowns to drop to the ground.

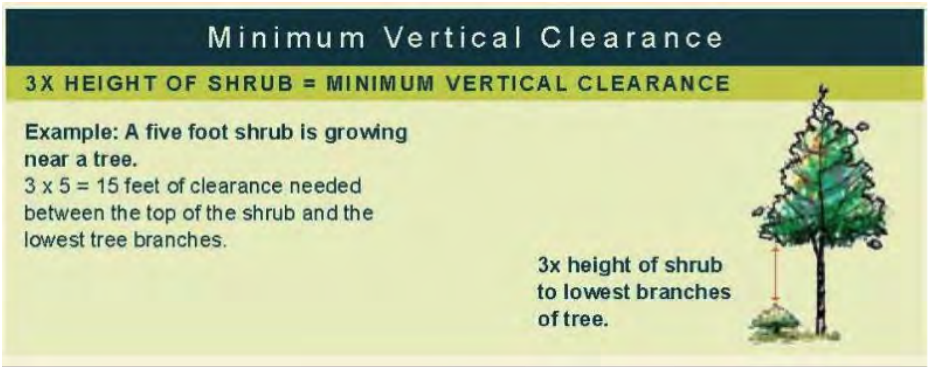
The rate of spread and flame length of a wildfire is affected by slope. A steeper slope will result in a faster-moving fire with longer flame lengths.

WHAT YOU SHOULD DO

Dead plant material and tree branches should be removed from vegetation on a regular maintenance schedule. Creating islands or groupings of vegetation creates a discontinuous path of vegetation, thereby making it difficult for the fire to burn directly to the building. Lower tree branches and nearby shrubs (the ladder fuels) should be removed so that a surface fire cannot reach the tree crown. Recommendations for vertical and horizontal separation distances have been provided by CAL FIRE (see figures on next page). Trees located within this area should be maintained with a minimum horizontal spacing of 10 feet between crown edges, with adjustments as a function of slope. From the perspective of tree health, branch removal should not exceed ⅓ of the tree height. Note that whereas CAL FIRE provides a formula to determine minimum vertical clearance between top of shrub and the lowest tree branch, some jurisdictions recommend that shrubs be removed from the area under the drip line of the tree or tree grouping.

Determine the slope of the land around the building. For new construction, the building should be set back a minimum of 15 feet from the edge of the slope for a single-story building and 30 feet for a two-story building. Buildings located mid-slope, or with inadequate setback at the top of slope, should utilize an enhanced fuel modification zone, sometimes recommended up to 150 or 200 feet for slopes greater than 40%. Locate outbuildings (e.g., for storage) at least 30 feet away from the building or create defensible space around the outbuilding.





Estimation of clearance distances. Source: CAL FIRE. (2007) Why 100 Feet? [Brochure]

FIREWOOD, LEFTOVER MATERIALS AND COMBUSTIBLE MATERIALS

WHAT YOU SHOULD KNOW

Firewood, combustible mulch or other combustible materials located near the home or business can spread the wildfire to the building. Mulch offers several beneficial attributes to the soil, including water retention and weed and erosion control, but many mulch products are combustible.

The ease with which combustible mulches ignite and the speed with which fire will spread will depend on the characteristics of the particular mulch—but they will all burn. Smaller mulches or ones that have fine fuel components (e.g., the hairy bark or needle mulches) will ignite and spread fire more quickly. Studies have shown that composted mulches perform better than other combustible mulches, but even this material exhibits smoldering combustion. Noncombustible mulch products are available and should be considered for use in the 0–5 foot zone. Since noncombustible mulches do not break down, they do not add to soil fertility and improve soil structure, but they do provide other attributes (e.g., they minimize soil compaction, moderate soil temperature, and limit germination and growth of weed seeds).

Burning rubber mulch during an experiment that evaluated various combustible mulch products. Source: Stephen L. Quarles

WHAT YOU SHOULD DO

Carefully balance the benefits of mulch with the potential hazard in terms of spreading fire to the building. Do not use wood, bark or rubber mulch products in the zone immediately adjacent to the home or business, particularly small pieces of bark or those with hairy components such as “gorilla hair” mulch. Use noncombustible rock mulches in the area immediately adjacent to your home or business. Move firewood and combustible building materials as far away as possible from your home or business. Firewood piles should be located at least 30 feet from any building on the property.

PLANTS

WHAT YOU SHOULD KNOW

There are several factors that influence the fire characteristics of plants.

1. Plant age
2. The amount of dead material in the plant (which will influence the overall moisture content of the plant), often related to plant age
3. The surface-to-volume ratio of the plant components (i.e., needles have a larger ratio than twigs, which in turn have a larger ratio than branches; needles are easier to ignite than twigs, and twigs are easier to ignite than branches)
4. The geometry (i.e., the shape of the plant and how the biomass is distributed)
5. The total volume
6. The chemical content (i.e., the amount of volatile chemicals)

7. Plant maintenance (lack of maintenance or inadequate maintenance can increase the fire hazard of a plant or landscape)

See "Additional Resources" section at the end of this document for more information.

Woody plants located close to the building can be a major fire hazard, which is why they are discouraged in this guide. Plants adjacent to combustible siding, as well as plants under or next to windows or the interior corners of a home, present the greatest hazard. Embers from a wildfire can reach the home or business from a mile or more away, and can become trapped in corners, at the base of walls and on the roof, igniting nearby plants and exposing siding and the roof overhang to flames.

WHAT YOU SHOULD DO

Carefully maintain your landscape vegetation. Remove dead vegetation closest to your home or business, paying attention to material on and underneath plants. In the areas immediately adjacent to your home or business, select non-woody low-growing herbaceous vegetation. For plants, shorten the height, remove branches that are close to the ground, prune to reduce the amount of material in the plant and remove dead material.

YARD AND GARDEN STRUCTURES

WHAT YOU SHOULD KNOW

Arbors, pergolas or trellises, combustible fencing, playground equipment, gazebos and other structures located close to your home or business will increase its vulnerability to wildfire. Wind-blown embers can accumulate in or on such structures and ignite them. Depending on how close the items are to the building, they might act as a fuel source, resulting in the ignition of your home or business, either as a result of flame contact or exposure to radiant heat. Trellises and pergolas are especially susceptible, since they are often made of wood or other combustible materials, and are typically covered with vegetation and attached to or adjacent to the building.

Play sets located near the home should be treated like gazebos, tool sheds, and other structures. If ignited, and if close enough to the home, they will create a radiant heat exposure. When determining the potential threat from your play set, consider the material used to construct it and the "surfacing material" (the type of material under and around it). Typically, wood play sets use larger and therefore harder-to-ignite members. The more easily ignited wood chips, and rubber-based surfacing materials surrounding the play set, may pose a greater threat to your home than the play set itself.

Vegetation growing over a trellis structure. If ignited, flames would impinge on the side of the house, including the nearby gable end vent. Source: Stephen L. Quarles

WHAT YOU SHOULD DO

Consider removing arbors or pergolas made from combustible materials. Structures made from metal would be acceptable choices. Wood arbors and pergolas can be more resistant to fire if they are made with exterior-rated, fire-retardant lumber or larger dimension material. If you go this route, you should also use the heartwood of a naturally durable species (such as redwood or cedar). A treatment for lumber that can function as both a fire retardant and a preservative against wood-destroying organisms isn't currently available. Remember that wood members with smaller cross-sections ignite and burn more easily. You could also consider mixing materials—using larger timbers for the supporting structural members and choosing non-combustible materials for the smaller members of the structure. Keep all yard structures free of accumulated debris.

Any structure, such as a child's play set or gazebo, using a combustible surfacing materials should be relocated at least 30 feet away from the home.

A wood play structure. Note the larger wood members in this play structure. The bark mulch used for the surfacing material pose a bigger threat in terms of ease of ignition from an ember exposure. Source: Stephen L. Quarles

OUTBUILDINGS, FUEL TANKS AND OTHER COMBUSTIBLES

WHAT YOU SHOULD KNOW

All buildings on the property face the same types of risks when it comes to wildfire. If ignited, outbuildings will burn much longer than a typical plant, resulting in a longer fire exposure for other buildings on the property. They will also generate their own embers. Boats, RVs and other personal property can also burn intensely. They should be protected inside a building or parked at least 30 feet from the home or business.

If flames come too close to exterior liquefied petroleum (LP) tanks, or if they are exposed to an extended radiant heat exposure, the pressure relief valve may activate as a result of the increasing internal pressure in the tank. This may result in ignition of the escaping gas and the resulting column of flame. Flame impinging on the upper surface of the tank, or an extended high-level radiant heat exposure can also result in an explosion, particularly when the fuel level is lower. As the temperature of the tank increases, the strength of the steel decreases; the explosion (called a Boiling Liquid Expanding Vapor Explosion or BLEVE) occurs when the internal pressure exceeds the strength of the steel.

It is important to follow your local building code requirements regarding tank placement, particularly smaller vertical cylinders located near the building that have restrictions with regard to proximity to wall vents and windows. Larger propane tanks (greater than 500 gallons water capacity [w.c.]) should be located at least 30 feet from your home or business.

WHAT YOU SHOULD DO

Locate combustible outbuildings at least 30 feet away from your home or business. Other options would be to create defensible space around the outbuilding or to incorporate noncombustible or ignition-resistant materials into the building's construction.

If necessary, relocate the propane tanks at least 30 feet from your home or business. Create a noncombustible zone within 10 feet of the tank. Another option is to enclose the tank. If an enclosure is used, it should be made of noncombustible materials (i.e., fiber-cement siding, concrete block, stucco or brick). Smaller (vertical) LP tanks that are (by code) allowed to be positioned near the home should be placed on a noncombustible platform or surface.

Poor defensible space near a propane tank. Ignition of this vegetation would provide a longer exposure to heat. Depending on level of fuel in the tank, an explosion would be possible under this scenario.

IMPORTANCE OF TOPOGRAPHY

WHAT YOU SHOULD KNOW

Wildfire-prone areas in California are also associated with canyons, hilltops and valleys. These features can present a greater fire hazard to your home or business. The topography around your home or business, which includes the slope of the land and the direction the building faces, is a major consideration in assessing the potential fire hazard. Wildfires burn up a slope faster and more intensely than along flat ground. A steeper slope will result in a faster-moving fire with longer flame lengths.

WHAT YOU SHOULD DO

Determine the slope where your home or business is located. Select a mark on the slope and walk 10 paces downhill. If your head is below the mark, you have a steep slope.

If your home or business is mid-slope or at the top of a steep slope, and set back less than 15 feet for a single-story house or 30 feet for a two-story house, take additional precautions. These include being more aggressive with your vegetation modification and maintenance plan and being more aware of the materials used to build the house, deck or any outbuildings. You will also want to push the fuel modification area beyond the 100-foot length, if at all possible. A target for the extended fuel modification area would be between 150 and 200 feet.

Consider increasing the protection of your home or business by constructing a noncombustible retaining wall to help increase the setback. This wall should be about 6 feet tall and located about 20 feet from your home or business. As indicated in the "Deck" section of this guide, if you live in a forested area, making sure the trees are thinned and lower branches are removed to minimize the opportunity for any fire to move into the tree crowns is the best solution. Any crown fire will be able to burn over the top of a 6-foot wall. When making future improvements, incorporate ember-resistant features and ignition-resistant or noncombustible materials into the home or business and surrounding landscape.

A prescribed burn in chaparral in northern California. Source: Stephen L. Quarles

IMPORTANCE OF ENVIRONMENTAL CONDITION

WHAT YOU SHOULD KNOW

Higher wind speeds, such as those associated with Santa Ana winds in the southern part of the state or the Diablo winds in the northern part of the state, are frequently associated with fast-moving wildfires. Strong winds blowing a fire toward your home or business will have the same effect as a building being located on a slope; the fire will move faster and burn more intensely, blowing embers in front of the fire. The flame lengths also will be longer.

WHAT YOU SHOULD DO

If your home or business is located on the side of a development that faces into the prevailing strong wind direction or on a side that is parallel to the prevailing strong wind direction, consider pushing the fuel modification area beyond the 100-foot length. A target for the extended fuel modification area would be between 150 and 200 feet.

DEFENSIVE ACTIONS

WHAT YOU SHOULD KNOW

Defensive actions can consist of a number of actions that can potentially help your home or business survive a wildfire. These actions are in addition to creating and maintaining defensible space on your property and selection of appropriate building materials already discussed in this document. Examples of defensive actions include one or more of the following:

1. Installing an exterior water spray system, as part of your “before the fire” activities, and then activating when a wildfire threatens, typically just prior to evacuating.

2. Application of a gel coating to the exterior of your home or business to protect it from wildfire, applied prior to evacuation. This type of coating could also be applied by fire-fighting professionals if they are present.

Post-fire studies conducted in Australia have shown that the chance of home survival increases if the resident “stays and defends.” Evidence in Australia and the U.S. have also shown that delaying evacuation will increase the chance of harm coming to the individual(s). For this reason, we urge residents to evacuate when requested by police or fire authorities. There are situations where residents could become trapped and therefore not able to safely evacuate, so preparation for that possibility would be prudent.

More recently, evidence from post-fire studies in the U.S. has demonstrated that defensive actions taken on the part of fire-fighting professionals will also improve the chance of home survival. The latter finding is not surprising, but to reiterate what has already been stated, firefighter intervention at your home during a wildfire should not be expected.

An exterior water spray system can be roof- or ground-mounted. The objective of the sprinklers is to limit the spread of the fire to the home or business and/or extinguish wind-blown embers before they reach the building being protected. Using exterior sprinklers can help to reduce the chances of a home or business being damaged by a wildfire, but like all other actions that can be taken, it requires planning and the system must be maintained. It should also be treated as one component of a fire safe plan and it should not eliminate actions taken regarding other recommendations in this guide. It is important to understand that the effectiveness of an external sprinkler system has not been completely evaluated, although studies that have been conducted in Canada have shown that ground-mounted sprinklers can help protect a building in cases where preparation and maintenance of defensible space has been lacking. These studies have stressed that the distribution lines of the sprinkler system must be protected from radiant heat and flames. Regarding the ability of the spray system to extinguish embers before reaching the home or business, it is likely that they may disrupt the flow of the water spray and therefore may not extinguish all of the wind-blown embers before they arrive.

Gels are composed of polymers that can adsorb large amounts of water. The heat from a fire will first evaporate the water contained in the gel before it can start to heat up the substrate on which the gel is applied. Several gel products are currently commercially available and can be purchased by the homeowner. When wildfire threatens, the product would be applied to vertical and horizontal surfaces on the home or business. These surfaces include siding, windows, under-eave areas and potentially under-deck areas. Gel products would start drying out (evaporating water) soon after being applied, and would become less effective with time. Gel manufacturers provide time limits whereby their product would remain effective. These times are typically reported to be hours.

WHAT YOU SHOULD DO

If you are trapped and cannot leave

We recommend following the recommendations provided by Nevada's Living with Fire Program, shown below. This list was developed in collaboration with representatives from the fire-fighting community.

If You Cannot Leave

- ☐ If you are unable to evacuate, stay in your home during the fire. It will be much hotter and more dangerous on the outside.
- ☐ Call 911 for assistance.
- ☐ Turn on all exterior lights.
- ☐ Stay away from windows and move to an interior room or hallway.
- ☐ Do not attempt to leave until after the fire has passed and you can safely leave.
- ☐ Check for small fires inside the house and extinguish them.
- ☐ Drink plenty of water.
- ☐ Make sure you can exit the house if it catches fire.
- ☐ Fill sinks and tubs with water.
- ☐ Place wet rags under doors and other openings to prevent entry of embers and smoke.
- ☐ Once the fire front has passed, check your flowerbeds, roof, rain gutters, attic and crawl space for fires or burning embers and extinguish them.

Source: Fire Adapted Communities: The Next Step in Wildfire Preparedness. SP-11-01. University of Nevada Cooperative Extension; Living with Fire Program. 20 p.

External Water Spray System

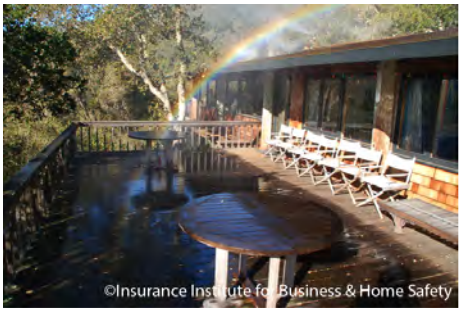
If you are considering an external sprinkler system, check with your local fire department. They may have plans, and other suggestions. In order to maximize the effectiveness of exterior sprinklers, they should be on a stand-alone, independent water system (i.e., tank, pool or lake) and should be attached to a pressurized delivery system or use a generator for needed pumps.

Gel Coatings

Proper application of the gel coating will be critical for it to provide adequate protection. Measure the water pressure at your house and compare to the pressure required by the gel manufacturer—inadequate pressure can reduce the effectiveness of the application. If you have a multi-level house, determine the limits of coverage on the upper elevations.

Because exposures could be from radiant heat and/or flame impingement, adequate coverage on the face of the wall (siding and windows) and under ledges (e.g., the underside of a drip edge on horizontal siding) is critical to performance of the product. As a resident, you may not have many opportunities to practice applying the product.

Application of gel to wood siding. Note that gel was not applied to the underlap area shown in center of photo. This area was close to the ground and allowed for fire to enter the stud cavity during a fire demonstration. A flame impingement source was used in this demonstration. Source: firecenterbeta.berkeley.edu/bwmg/siding-3.html



A home with an exterior sprinkler system. Note that the area immediately next to the house was not wetted by the watering system.

Application of gel coating to siding and under-eave assembly prior to a demonstration. Source: Stephen L. Quarles

ADDITIONAL RESOURCES (VEGETATION/PLANT SELECTIONS)

STATEWIDE

General Guidelines for Creating Defensible Space
www.bof.fire.ca.gov/regulations/proposed_rule_packages/defensible_space_2005/429145daynoticeguideline9_15_05.pdf

Office of the State Fire Marshal
osfm.fire.ca.gov/codedevelopment/wildfireprotection.php

Home Landscaping for Fire
firecenter.berkeley.edu/docs/CE_homelandscaping.pdf

LAKE TAHOE BASIN

Home Landscaping Guide for Lake Tahoe and Vicinity
www.unce.unr.edu/publications/files/nr/2006/eb0601.pdf

University of Nevada Living with Fire Program
www.livingwithfire.info/tahoe

SOUTHERN CALIFORNIA

SAFE Landscapes Guidebook
ucanr.org/sites/SAFELandscapes/

Insurance Institute for Business & Home Safety
4775 E. Fowler Avenue, Tampa, FL 33617
E-mail: info@ibhs.org | Voice: (813) 286-3400
Website: DisasterSafety.org

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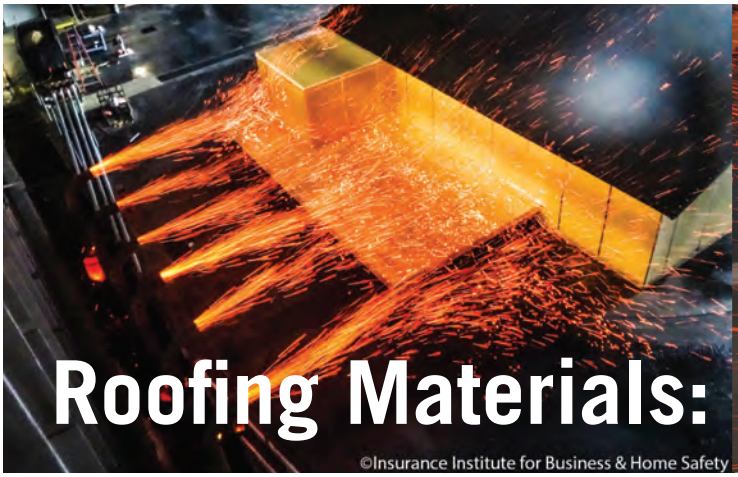

Roofing Materials:

WILDFIRE RESEARCH FACT SHEET

Roofs are a highly vulnerable part of a home during wildfires

HOMEOWNERS NEED TO IMPLEMENT RISK REDUCTION ACTIONS THAT MAKE HOMES BETTER ABLE TO SURVIVE A WILDFIRE - AND THE ROOF IS A GREAT PLACE TO BEGIN!

HOW HOMES IGNITE

Homes ignite in one of three ways: embers/firebrands, radiant heat exposure or direct flame contact. An example of an ember ignition is when wind-blown embers accumulate on combustible materials such as a wood shake roof. An untreated wood shake or shingle roof covering is the greatest threat to a home.

ROOF COVERINGS AND ASSEMBLIES

Roof covering fire ratings are Class A, B, C, or unrated; with Class A providing the best performance. Common Class A roof coverings include asphalt fiberglass composition shingles, concrete and flat/barrel-shaped tiles. Some materials have a "by assembly" Class A fire rating which means, additional materials must be used between the roof covering and sheathing to attain that rating. Examples of roof coverings with a "by assembly" fire rating include aluminum, recycled plastic and rubber and some fire-retardant wood shake products. If a wood shake roof does not have the manufacturer's documentation specifying the fire retardant, assume it's untreated.

TILE AND ROOF COVERINGS WITH GAPS BETWEEN THE COVERING AND ROOF DECK

Flat and barrel-shaped tiles, metal, and cement roof coverings can have gaps between the roof covering and sheathing, which typically occur at the ridge and edge of roofs. These openings can allow birds and rodents to build nests with materials that are easily ignited by embers. Flames from this type of ignited debris can spread to the structural support members, bypassing the protection offered by a Class A rated roof covering. Plugging these openings between the roof covering and the roof deck, is commonly called "bird stopping". Regularly inspect and maintain these areas.

DEBRIS ACCUMULATION – ROOF AND GUTTERS

Wind-blown debris (including leaves and pine needles from nearby and overhanging trees) will accumulate on roofs and in gutters. Dry debris can be ignited by wind-blown embers. These flames can extend to the edge of the roof and adjacent siding. Even with Class A fire-rated roof coverings, vertical surfaces next to the roof edge will be exposed to flames from the ignited debris. Regularly remove vegetative debris from your roof and gutters.

ATTICS, CRAWLSPACES, SOFFITS AND EAVES

Post-fire research has shown attic vents, roof and gable end vents and under-eave areas are entry points for embers and flames. Reduce the size and number of embers that pass through vents into attic and crawlspaces by covering them with a ⅛-inch metal mesh screen. When wildfires threaten, vents can be covered with ½-inch or thinner plywood, or a thin metal plate. Ensure these are removed when the threat has passed.

REDUCE YOUR ROOF'S VULNERABILITY TO WILDFIRE

1. Roofs should be Class A fire-rated, such as asphalt composition shingles. If you're unsure about your roof's rating, hire a professional roofer to make a determination.
2. Remove debris on the roof and in the gutters at least twice a year, or more often if necessary.
3. Remove tree branches that overhang the roof.
4. Periodically inspect exposed areas under eaves and soffits to ensure construction materials are in good condition.
5. Cover vents, e.g., with noncombustible, corrosion-resistant ⅛-inch metal mesh screens.
6. Inspect and maintain your roof on a regular basis. Replace when necessary.

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WILDFIRE RESEARCH FACT SHEET

Under-Eave Construction

The under-eave area of a house is often overlooked when addressing vulnerabilities that can cause damage or loss during a wildfire. Neglecting this structural component increases susceptibility to heat from flames, which can become trapped, allowing fire to spread through attic vents and into the attic. Embers lodged in gaps between blocking and joists can also result in ignition and fire entry into the attic.

TYPES OF UNDER-EAVE CONSTRUCTION

Open-Eave Construction: Roof rafters visibly extend out beyond the exterior wall. This option is typically less expensive and is commonly found in many parts of the U.S.

Soffited-Eave Construction: Material connecting and enclosing the space between the edge of the roof and the exterior wall.

SOFFITED-EAVE CONSTRUCTION IS BEST FOR HOMES WITH A WILDFIRE RISK

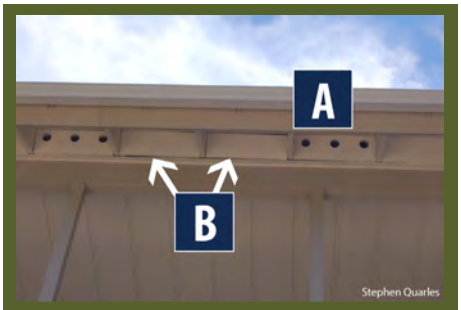
Wildfire research conducted by IBHS supports the use of soffited-eave construction. Additional research and guidance (e.g., FEMA P-737, Home Builder's Guide to Construction in Wildfire Zones - Fact Sheet No.6 https://www.fema.gov/media-library-data/20130726-1652-20490-2869/fema_p_737_fs_6.pdf) also suggests a soffited design as the best option. Vents located in the under-eave area can be entry points for embers and flames when limited effort has occurred to reduce risks in the home ignition zones (particularly in the near-home zone). Embers entering an attic can ignite stored combustible materials. Research has shown that open-eaves are more vulnerable to both ember entry and direct flame contact exposures, relative to soffited-eaves.

With open eaves, use a sealant (such as caulking) to cover gaps, or enclose the underside of the roof overhang. In open-eave construction, embers can and do accumulate between blocking and joists and can ignite these members if sufficient accumulation occurs.

The open-eave blocking likely included vents, so remember to add an adequate amount of soffit vents as part of the project. Make sure the vent area ratio (vent into the enclosed soffit and enclosed soffit into the attic) follows the requirements of local building codes.

Time-to-ignition is faster with under-eave construction and lateral flame spread is quicker, exposing other areas along the length of the home. (Using the recommended 0 to 5-foot noncombustible near-home zone minimizes the likelihood of an ignition at the base of the exterior wall.)

Using noncombustible or ignition-resistant materials to enclose the eave is recommended. The enclosure should extend from the roof edge horizontally back to the exterior wall. The horizontal soffit member is attached to a ledger board that is itself attached to the exterior wall.



Open-eave construction with vents in blocking (A), and gaps between blocking and other wood members in the under-eave area (B).

Flame impingement exposure to the underside of the eave, and time-to-ignition of the joists, blocking and fascia was quicker; and lateral flame spread faster, when an open-eave design was used in research experiments.

Lateral flame spread was reduced when a combustible soffit material ignited in this test of a soffited-eave with a combustible soffit material.

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Attic and Crawl Space Vents

Windblown embers can enter attics and crawl spaces through vents.

INSTALLING THE RECOMMENDED MESH SCREENING AND ELIMINATING STORAGE IS CRITICAL TO REDUCING BUILDING IGNITIONS DURING A WILDFIRE.

VENTS IN ATTICS AND CRAWL SPACES

Attic and crawl space vents, and other openings on the vertical wall of a home, serve important functions, including providing ventilation to remove unwanted moisture from these typically unoccupied spaces and oxygen for gas appliances such as hot water heaters and furnaces. Wind-blown embers are the principal cause of building ignition and can readily enter these spaces, which are often hot and dry. Providing air for ventilation, while also keeping out embers can present a dilemma. Dry materials are more easily ignited by embers, so limiting the entry of embers into attic spaces is critical. Adding to the problem are the combustible materials we tend to store in these spaces (e.g., cardboard boxes, old clothes and other combustible materials) because embers accumulate against them and they can be easily ignited.

HOW VENTS FUNCTION

Ventilated attic spaces have openings in two locations. Inlet air comes from vents located in the under-eave area at the edge of your roof. Exiting air leaves through vents located on the roof or at the gable ends of your home. If your home is built over a crawl space, you will typically have vents on each face of your home to provide cross-ventilation. Experiments conducted at the IBHS Research Center demonstrated that regardless of whether a vent had an inlet or outlet function, when wind blows against its face, it is an inlet vent. Therefore, any vented opening on your home should be able to resist the entry of embers. Unvented attic and crawlspace designs are available for some areas of the country. These designs are more easily implemented with new construction. Check with local building code officials to see if this is an option where you live.

USE MESH SCREENING TO REDUCE EMBER ENTRY INTO VENTS

Building codes require vent openings to be covered by corrosion resistant metal screens, which are typically 1/4-inch to keep out rodents. However, research shows that embers can pass through 1/4-inch mesh and ignite combustible materials, particularly smaller materials such as saw dust. Embers also can enter smaller screening, such as 1/16-inch, but cannot easily ignite even the finer fuels; however, this size screening is more easily plugged with wind-blown debris and is easily painted over if you are not careful when re-painting your house. Installing 1/8-inch mesh screening is suggested in wildfire prone areas, as it effectively minimizes the entry of embers. It's important to note that 1/8-inch screening only minimizes the size and number of embers and does not eliminate them entirely; making it very important to reduce what's stored in the attic and crawl space.

BEST CHOICES FOR VENTS TO RESIST EMBER ENTRY:

1. For (under-eave) inlet vents, opt for a soffited eave design. IBHS research demonstrates that gable end vents and other vent openings are vulnerable to wind-blown embers when the face of the vent is perpendicular to the wind flow, while embers are less likely to pass through vents with a face that is parallel to the wind flow. Therefore, soffited eave construction is preferred to open eave.

2. For outlet vents, opt for a ridge that is rated to resist wind driven rain. These vents have an external baffle at the vent inlet. Vents that have been approved for use by the California Office of the State Fire Marshal.

3. Turbine vents also help keep embers out, but you should attach a piece of 1/8-inch mesh to the bottom of the roof sheathing at the opening for the vent.

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SKYLIGHTS

WILDFIRE RESEARCH FACT SHEET

Skylights can compromise a home's ability to survive a wildfire when precautions are not implemented to prevent them from being an entry point for embers and/or flames.

Construction Materials/Placement

During a wildfire, a skylight can be vulnerable if subjected to an extended radiant heat exposure, or to flames when embers have ignited vegetative debris on top of the skylight. Most guidance recommends using a flat glass skylight rather than a plastic dome style because the plastic is combustible. However, there are situations, based on the slope of the roof, where a flat glass could be more vulnerable.

Vegetative debris can more easily land and stay on a low-slope roof, leading to increased risks. As seen in **Photos 1 and 2** of a low-slope roof, debris is more likely to accumulate on top of a flat glass skylight, and less likely to accumulate on a plastic dome skylight. Typical flame temperatures resulting from a wind-blown ember ignition of the debris would be high enough to break even tempered glass, the type of glass commonly used as the outer pane in a flat glass skylight.

Steep-Slope Roofs

Flat skylights are less vulnerable on a steep-slope roof because vegetative debris is less likely to accumulate. A steep-slope roof will act more like an exterior wall in terms of its response to a radiant heat exposure. Because of this increased resistance of glass over plastic to a radiant heat exposure, a glass skylight is a better choice on steep-slope roofs. The vulnerability of a domed skylight will depend on the potential for an extended radiant heat exposure, which in turn depends on the amount of vegetation and other combustibles near it **(Photo 3)**.

Dual-Pane Glass Benefits

Newer skylights feature dual-pane systems, like multi-pane windows in an exterior wall. The outer pane uses tempered glass and the inner pane uses laminated safety glass. This type of skylight is less likely to fail.

Maintenance

Both domed and flat skylights have similar framing systems (bases). Each uses a metal flashing to protect the wood framing members from both moisture- and ember-related damage **(Photo 4)**. This flashing helps the skylight survive when threatened, but should be maintained to avoid risks.

Prior to an Evacuation

Similar to windows, skylights that can open should be closed when a wildfire threatens. They also should incorporate a screen to resist the intrusion of embers in case the skylight happens to be left open **(Photo 5)**.

Photo 1. Accumulation of vegetative debris on top of a glass-type skylight on a low-slope roof.

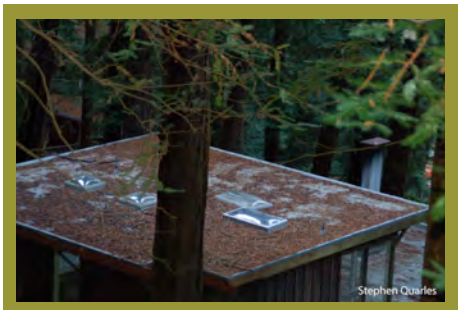

Photo 2. Minimal accumulation of vegetative debris accumulated on these dome-type skylights on this low-slope roof.

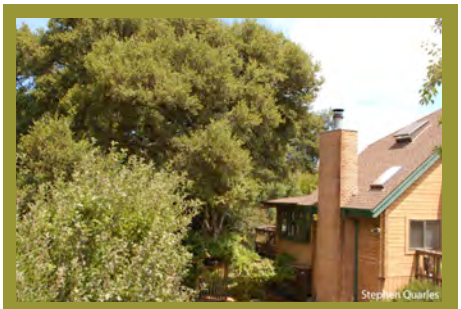

Photo 3. The vulnerability of skylights on a steep-slope roof will depend on the potential for an extended radiant heat exposure to the roof and skylight unit.

Photo 4. Metal flashing protects the framing members of a skylight from moisture, a direct ember ignition, or flames from ember-ignited vegetation debris.

Photo 5. Operable skylights should be closed when a wildfire threatens. Similar to windows, they should incorporate a screen to resist the intrusion of embers (also good for insects!).

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Residents reducing wildfire risks

WILDFIRE RESEARCH FACT SHEET

Reduce the Vulnerability of Your Deck to Wildfire

Photo Captions:

- **A** Embers that pass through deck board gaps will land on the ground, or on combustible materials stored under the deck, as shown during this IBHS test.
- **B** The near home noncombustible zone that surrounds the foundation should include a noncombustible area underneath the deck.
- **C** Vegetative debris in between deck board gaps will make this location even more vulnerable to ember accumulation.

MANY HOMES LOCATED IN WILDFIRE-PRONE AREAS HAVE ATTACHED DECKS, WHICH CAN POTENTIALLY SPREAD FIRE TO THE HOUSE WHEN IGNITED DURING A WILDFIRE.

A burning deck can ignite siding or break the glass in doors or windows, allowing fire to gain entry into the house. Consequently, making decks less vulnerable to wildfire also makes your house less vulnerable. Reducing the deck's vulnerability requires an approach that focuses on the materials and design features used to build the deck, and creating a noncombustible zone around and under the deck.

EMBER EXPOSURE AND IGNITION

Walking surfaces of decks are either solid surface or constructed using deck boards (with between board gaps). Solid surface decks are commonly light weight concrete or tile. Combustible deck board types include: solid wood and wood-plastic composites (these products are more widely used than noncombustible deck boards). Noncombustible deck board types include: metal and fiber cement.

Recent testing at the IBHS Research Center showed embers mostly lodge between deck board gaps and where deck boards rest on joists. Embers can accumulate and potentially ignite decking and combustible joists. Embers can also fall through board gaps and land on materials stored beneath the deck. It's critical to remove all combustible materials from the under-deck area to minimize the opportunity for ignitions; where resulting flames would impinge on the decking (some wood-plastic decking products are vulnerable to flaming exposures).

IBHS tests also showed that even without vegetative debris in between deck gaps, medium density softwood decking products, such as redwood or western redcedar are vulnerable to ember ignitions. Most wood-plastic composites, along with higher density tropical hardwood, and fire-retardant treated decking products are less vulnerable to embers. The vulnerability to embers in these locations is a reminder to remove debris that accumulates in these areas.

BUILDING CODE REQUIREMENTS

The International Wildland Urban Interface Building Code (IWUIC) and the California Building Code are the most commonly referenced construction codes for wildfire-prone areas; both include requirements that focus on the walking surfaces of decks. Noncombustible products are allowed by both codes.

The California Code provides provisions for accepting combustible decking products. These types of products are more commonly used by homeowners living in wildfire-prone areas across the country. Their requirement governs the amount of heat released when combustible decking is ignited by a gas burner. This mimics burning debris that could be located under the deck, or burning vegetation impinging on the underside of the deck, but does not mimic ember exposure. Combustible decking products that comply with the California Code can be found at: http://osfm.fire.ca.gov/licensinglistings/licenselisting_bml_searchcotest.

The IWUIC prohibits common combustible deck boards with the exception of fire-retardant treated decking (rated for outdoor exposure) and other materials that meet the requirements of an Ignition Resistant Material. However, as of this date, no other materials meet these requirements. The IWUIC allows an enclosed deck option that uses a horizontal construction attached to the bottom of the deck joists. This option should only be used with a solid surface deck. Using this option with deck boards (and the associated gaps), will cause moisture-related degradation problems (corrosion of fasteners and wood rot). Water from rain or melting snow will easily get into the enclosed space and will have a much harder time getting out.

RECOMMENDATIONS FOR YOUR DECK:

1. Combustible materials should not be stored beneath decks. This will effectively create a noncombustible zone under the entire footprint of the deck.
2. Routinely remove debris that accumulates in between deck board gaps and debris that can accumulate at the intersection between the deck and house.
3. If the deck is a non-fire-retardant treated softwood deck, consider removing and replacing deck boards within a few feet of the house. Be careful to match the deck board thickness.
4. When building new decks, select deck boards that comply with the California Building Code requirements. If using wood joists, cover the top and part of the sides with a foil-faced bitumen tape product.

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WILDFIRE RESEARCH FACT SHEET

Fire Spread on Ember-Ignited Decks

Wind-blown embers generated during wildfires are the single biggest hazard wildfires pose to homes, and homeowners should never overlook the potential risk that an attached deck can create. Recent testing by the Insurance Institute for Business & Home Safety (IBHS) offers important findings that can help minimize risk from wind-blown embers to decks.

Nothing that can ignite should be stored under a deck. This action, along with development of effective and well-maintained home ignition zones, will minimize the chance of all but a wind-blown ember exposure to your deck. An ignited deck can result, for example, in the ignition of combustible siding, or glass breakage in a sliding glass door.

ABOUT THE RESEARCH TESTS

IBHS's tests evaluated how an ember-ignited fire on an attached deck can spread to the home, and yielded important guidance to minimize the chance of fire spread to the house. Tests showed that the fire was typically small (Figure 1), sometimes just smoldering (not flaming). It spread slowly, taking more than an hour to travel the 4 to 6 feet from the ignition point to the home. Research from IBHS showed all ember-ignited deck fires occurred in the gaps between deck boards and initially started as a small smoldering fire that transitioned to a flaming fire. Although these small fires self-extinguished during IBHS tests that did not include any wind, wildfires almost always involve elevated wind speeds. During lab tests, even mild wind speeds of 12 mph, enabled fires to spread. Under certain conditions, the small fire did grow, always in the under-deck area (see Figure 2). Our results demonstrated that fire growth occurred in the under-deck area when joist spacing was 8" to 12", less than the typical 16".

Wind blowing against a building has a return flow component, so if fire were able to burn to the home, it would have to travel there as a backing fire, or against the wind. Research shows the "fuel" has to be close together for this to occur. That "fuel" could be the deck boards, or a combination of deck boards and support joists.

HOW DOES THE FIRE SPREAD?

IBHS tests demonstrated that fire spreads both toward, and away from, the house regardless of the deck board's orientation (parallel or perpendicular). When deck boards were perpendicular to the building, the fire would spread in the gap between boards. The 1/8" gap between deck boards was narrow enough for the fire to continue burning into the unburned wood (the fuel), in both directions from the ignition point. The fire spread pattern was more complicated when deck boards were parallel to the test building. In this case, fire could spread parallel to the test building, or directly to it. Fire spread directly to the building included a smoldering mode that occurred in the space between the top of the joist and the bottom of the deck board. Flaming combustion occurred when smoldering reached a gap between deck boards. Lateral flame spread can result in the ignition of joist members, resulting in fire growth.

IMPORTANCE of the HOME IGNITION ZONES

To minimize the possibility of deck ignitions, reduce fuels in the home ignition zones by carefully selecting and positioning vegetation and implementing regular maintenance. Pay particular attention to the area under the footprint of the deck, where storage of combustible materials should be avoided.

Although there are noncombustible deck board and decking options, many of the commercially available deck board products are combustible. IBHS research on deck materials is available at: disastersafety.org/ibhs/wildfire-ignition-potential-decks-subjected-ember-exposure.

CONSTRUCTION RECOMMENDATIONS

IBHS research shows that, for medium density softwood decking products (such as redwood and cedar), which can be vulnerable to ignition from embers, the associated fire spread on the deck can be minimized by the following:

1. Increase the gap between deck boards from 1/8 inch to 1/4 inch.

Fire spread in the gap between deck boards. Note the small flame burned all the way to the test building.

2. Increase joist spacing from 16 inches to 24 inches.

Narrow joist spacing was a condition that could result in fire growth in the under-deck area.

3. Apply a foil-faced self-adhering adhesive flashing tape (foil-faced bitumen tape) on the top of each joist.

Using a foil-faced self-adhering bitumen flashing tape reduces flame spread by removing the joist as a fuel source for both parallel and perpendicular deck board installations.

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Fencing

A ©Insurance Institute for Business & Home Safety

B ©University of California, Agriculture and Natural Resources

WILDFIRE RESEARCH FACT SHEET

C ©Insurance Institute for Business & Home Safety

Material, Installation and Maintenance Choices

NONCOMBUSTIBLE FENCING PRODUCTS REDUCE POTENTIAL HOME IGNITIONS

Many wildfire educational programs, along with the Insurance Institute for Business & Home Safety (IBHS) recommend noncombustible fencing products when placed within five feet of a building. As a necessary component, fencing located within the zero to five-foot noncombustible zone should be constructed of noncombustible materials.

A noncombustible zone minimizes the likelihood of wind-blown embers igniting fine fuels (such as bark mulch) located close to the building. Ember-ignited mulch can result in a radiant heat and/or flaming exposure to the building's exterior. Using noncombustible fencing where it attaches to the building reduces the opportunity of a burning fence igniting the exterior of the structure. Fencing products are often available in eight-foot pieces and use of that full section of noncombustible material is recommended. Observations made during the 2012 Waldo Canyon fire in Colorado Springs, CO provided evidence that burning fencing generates embers that can result in additional ignitions down-wind.

PERIMETER FENCING

When neighboring buildings are located within 20 feet of each other, use of steel fencing for the perimeter area can serve as a radiant barrier, providing added protection should a neighboring building ignite and burn. Research in Australia demonstrated the ability of panelized steel fencing to resist a radiant heat exposure.

RESEARCH FINDINGS TO HELP AVOID FENCE IGNITIONS

Recent research conducted by IBHS and the National Institute of Standards and Technology (NIST), both independently and in a collaborative project, provided additional information about the vulnerability of combustible fencing.

Photo Captions:

A Flame spread to the building when combustible debris was at the base of the fence.

B Gates made from noncombustible materials should be used where a fence is attached to the home. Source: University of California, Agriculture and Natural Resources

C Ignition from ember accumulation at the intersection of the vertical planks and horizontal support member.

RESEARCH FINDINGS:

1 Use a noncombustible fence section when it's attached to a building.

2 The area at the base of the fence should be kept clear of debris. Flame spread to the building will be more likely if fine vegetative fuels (e.g., pine needles, leaf litter and small twigs) have accumulated. Avoid placement of combustible mulch near the fence.

3 A fence design that allows for greater air flow, such as a single panel lattice fence, makes it more difficult for wind-blown embers to accumulate at plank, or lattice panel to horizontal support locations. If an ignition occurs, it's also more difficult for lateral flame spread to occur in the fencing material. Fence ignitions from wind-blown embers are more likely to occur at locations where vertical fencing planks attach to horizontal support members. The most vulnerable fencing from this perspective is a "privacy" fence, where the fence planks are on the same side as the horizontal support members.

4 A fence built from lattice that's applied to both sides of the support posts may be desired for privacy or other landscaping purposes, but should be avoided in wildfire-prone areas. Recent research at NIST has demonstrated that fire growth and lateral flame spread are much greater in this design style.

5 Vinyl fencing is not vulnerable to ember exposures alone, but did burn when subjected to flaming exposures from burning debris. Vinyl fencing will deform if subjected to radiant heat.

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WILDFIRE RESEARCH FACT SHEET

Coatings

Product types, application requirements and performance limitations

Buildings threatened by wildfire can be mitigated through the development of a strategy that addresses the built environment, vegetation, and other combustible materials on the property. Use of noncombustible materials and ember-resistant design features are examples of strategies that reduce the vulnerability of homes to wildfire. The use of coatings has been suggested as a strategy to provide enhanced protection against extended radiant heat and flame contact exposures for homes located in wildfire-prone areas, particularly when a combustible siding product is installed and other homes are nearby. In these cases, it can be argued that applying a coating is a less expensive option than replacing a combustible product with one that is noncombustible.

COMMON USE OF COATINGS

The term "coatings" is a generic term referring to products that are applied to various building components. These building components can be combustible or noncombustible materials and are used to provide added protection from various environmental factors. The most common use for coatings applied on wood, and wood-based products, is to provide protection from water or water vapor where the coating reduces the rate that moisture enters and leaves. Depending on additives and the chemical makeup, coatings can also improve the fire retardancy or fire resistance of the wood or other combustible material.

GELS

Another example of a coating is what's commonly referred to as a "gel." Gels are water absorbent polymers that can be applied to a building component to provide temporary protection from radiant heat or flames. You may have heard of these products being applied to homes when a wildfire is threatening. Once applied, the absorbed water starts to evaporate, whether or not the wildfire actually arrives, and therefore the time that a gel coating is effective is limited. The effective time is on the order of hours.

RECOMMENDATIONS

Given the current performance limitations of coatings, we recommend other proven mitigation strategies to reduce the vulnerabilities of homes to wildfire, such as using ember-resistant design features and creating and maintaining the home ignition zones. For more information visit: disastersafety.org/wildfire

Photo Captions:

A Gel product applied to wood siding.

B Using a wet-film gauge to ensure the film thickness is adequate.

INTUMESCENT PAINTS

A common example of a coating providing enhanced performance when exposed to fire is intumescent paints (i.e., they form a film when dry). When an intumescent coating is heated by elevated levels of radiant heat, or flames, it can swell up to 20 times the original dry-film thickness; creating an insulation layer that protects the combustible building component.

Intumescent coatings are commonly used in interior applications. However, caution is advised - when these products are used in an exterior application. Researchers at the USDA Forest Service Forest Products Laboratory reported that fire-retardant coatings have an uncertain "shelf life" when used in an exterior location and would therefore need to be reapplied regularly.

If an intumescent coating is being considered, ensure the manufacturer has provided test results demonstrating enhanced performance, either after a defined accelerated weathering period or an extended natural weathering period. Acknowledging their uncertain performance when used in exterior applications, the use of coatings is not allowed for compliance with provisions of the California Building Code, Chapter 7A, which provides requirements for building in wildfire-prone areas in California.

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WILDFIRE RESEARCH FACT SHEET

EXTERIOR SPRINKLER SYSTEMS

Are exterior sprinkler systems an option for protecting a home during a wildfire, after residents have evacuated the property?

Functionality and Installation

The function of an exterior sprinkler system is to minimize the opportunity for ignition by wetting the home and surrounding property. Sprinkler systems should be able to protect a home against the three basic wildfire exposures: wind-blown embers, radiant heat and direct flame contact.

Sprinklers systems can be mounted in one or more locations, including:

- The roof (Photo 1).
- Under the eave at the edge of the roof.
- On the property, in which case the sprinklers are directed at the home from multiple locations surrounding it.

Ember ignition of combustibles located on or near the home can result in a radiant and/or flame contact exposure (Photo 2). Water should reach all vulnerable areas for the system to have maximum effect both on and near the home (Photo 3).

Photo 1. Roof mounted sprinkler.

Photo 2. In order to be effective, external sprinklers must be able to wet all areas where ignition can occur, or be sufficiently effective in quenching embers that approach the home so they won't have enough energy to ignite combustible items.

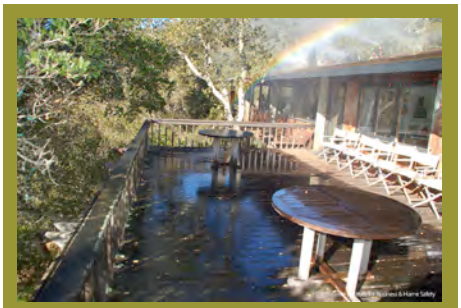

Photo 3. Roof-edge mounted sprinkler. Note these sprinklers did not deliver water in the near-home area. With this scenario, a sufficient number of wind-blown embers would have to be quenched in order to avoid ignition of the siding and decking in this zone, particularly at the deck-to-wall intersection.

Potential Issues

Post-fire assessments have shown exterior sprinkler systems can be effective in helping a home survive a wildfire, but potential issues exist with their use. These issues include:

- The water supply should be adequate to deliver water, when needed, for the time embers could threaten a home. This period could be up to 8 hours.
    - Check with your local fire department if your sprinkler system uses water from a municipal supply; they may have suggestions to help minimize water consumption.
- The effectiveness of a sprinkler system is questionable when a neighboring home is burning, since this would result in an extended radiant heat and/or contact exposure to the home.
- These systems can be activated manually or by an automated device, such as a sensor that detects heat or flame, or by an SMS-enabled cell phone. The ability of these systems to activate based strictly on an ember exposure has not been determined. Since wind-blown embers can be transported for up to a mile from the flame front of a wildfire, this may be a limitation.
- The most threatening wildfires occur during high-wind events and the homeowner should consider how the distribution/transport of water droplets may be influenced by elevated wind speeds.

Recommendations

Given the potential issues regarding performance, it's recommended that use be a supplement to, and not a replacement for, already proven mitigation strategies, such as the reduction of potential fuels throughout the home ignition zones, along with removal of roof and gutter debris, and use of noncombustible and fire/ember-ignition resistant building materials and installation design details.

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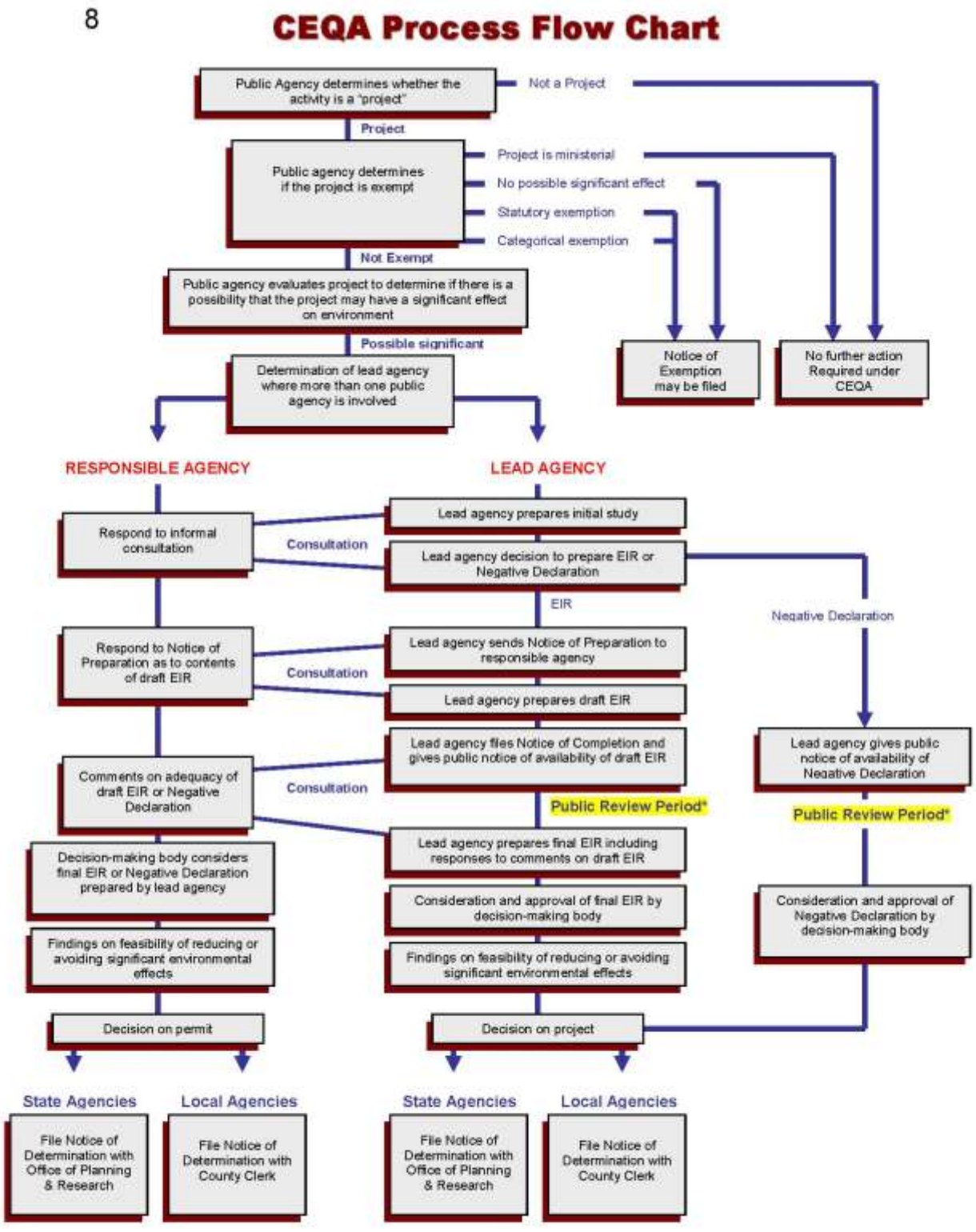
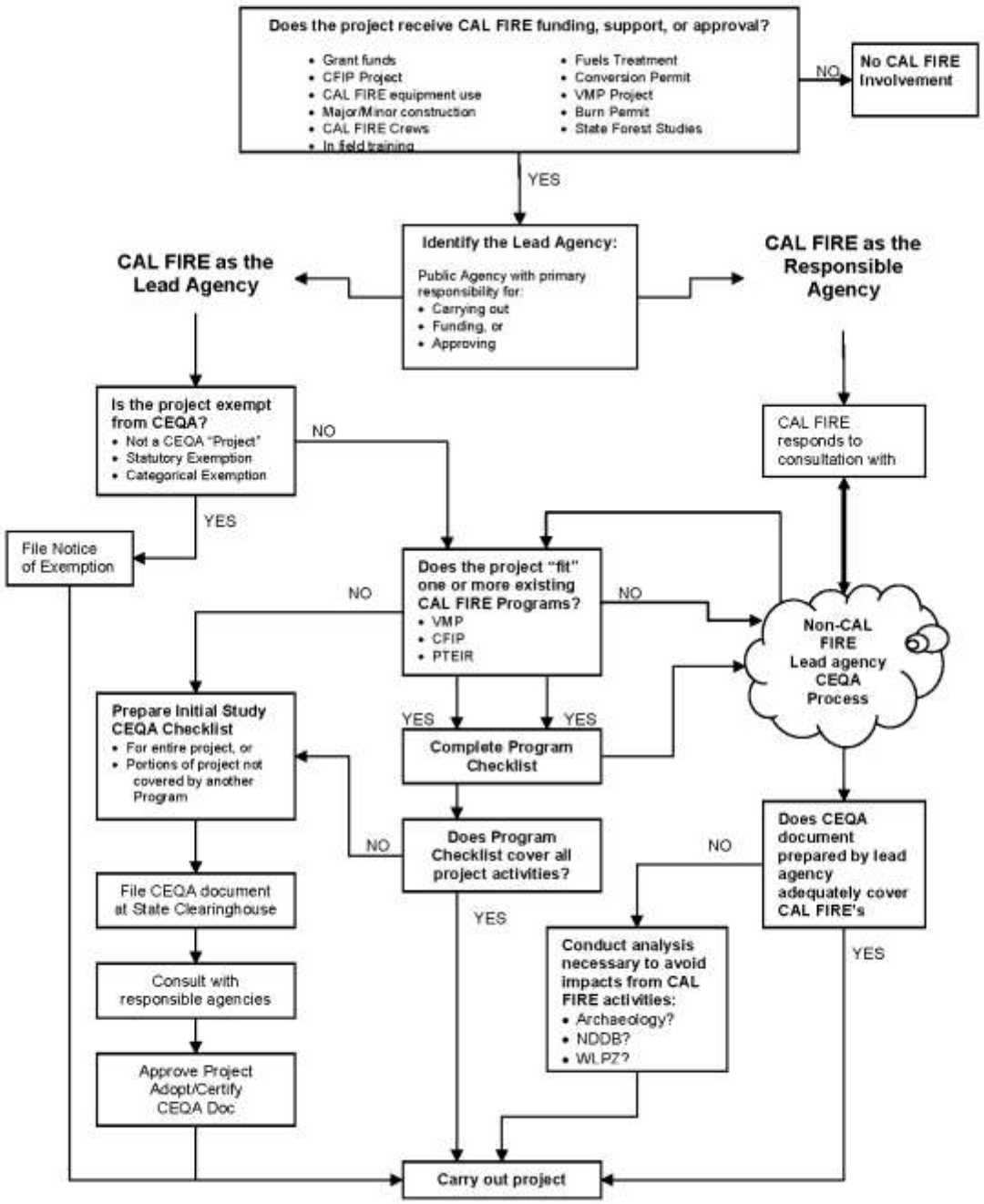
Appendix D. CEQA and NEPA Processes

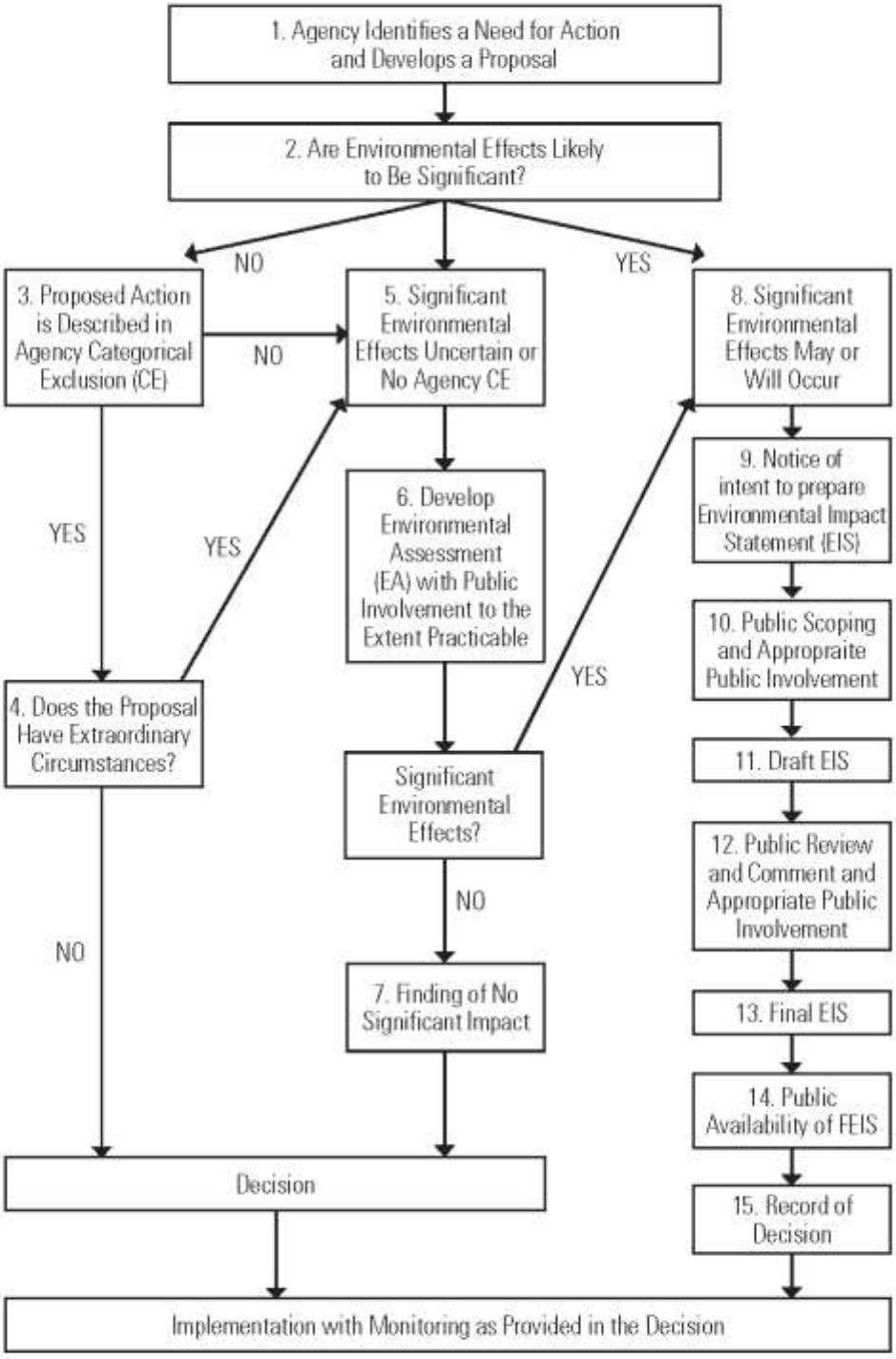


Source: California Environmental Resources Evaluation System, http://ceres.ca.gov/topic/env_law/ceqa/flowchart/index.html
* The public review and comment period shall not be less than 30 days and nor should it be longer than 60 days, per the CEQA Guidelines at http://ceres.ca.gov/topic/env_law/ceqa/guidelines/

CEQA Compliance Flow Chart
General Responsibility for CEQA Compliance on Projects



The NEPA Process



**Significant new circumstances or information relevant to environmental concerns or substantial changes in the proposed action that are relevant to environmental concerns may necessitate preparation of a supplemental EIS following either the draft or final EIS or the Record of Decision (CEQ NEPA Regulations, 40 C.F.R. § 1502.9(c)).*

Appendix E. Fuel Treatment Priority Process

Fuel Treatment Priority by Community

Relative Risk Rating	Low	Moderate	High	Very High
Grand Total (All treatment areas)	37.80%	17.75%	32.35%	12.08%

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
East Camino Cielo (All)	71.86%	18.70%	9.35%	0.09%	
Existing	83.00%	8.76%	8.24%	0.00%	
East Camino Cielo Road	83.00%	8.76%	8.24%	0.00%	4
Proposed	50.82%	29.44%	18.55%	0.38%	
East Camino 1	64.73%	31.65%	3.50%	0.00%	5
East Camino 2	70.83%	7.87%	21.27%	0.01%	2
East Camino 3	1.78%	0.00%	98.24%	0.00%	3
East Camino 4	0.57%	56.40%	42.14%	1.09%	1

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
Lower Paradise/Stagecoach (All)	51.12%	9.18%	19.57%	20.13%	
Existing	46.54%	10.62%	23.53%	19.31%	
Fremont Fuelbreak	6.73%	14.61%	26.99%	51.68%	2
HWY154	72.65%	4.47%	20.30%	2.58%	6
Stagecoach Road East	27.72%	0.16%	63.20%	8.92%	5
Stagecoach Road West	50.41%	16.16%	14.96%	18.49%	3
Planned	58.77%	6.79%	12.85%	21.49%	
Fremont Firebreak Road	3.54%	8.55%	18.63%	69.08%	1
Paradise Road Clearance	64.30%	8.51%	12.36%	14.83%	4

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
Old San Marcos Road (All)	63.09%	6.56%	15.63%	15.92%	
Existing	84.65%	4.54%	6.06%	4.75%	
Old San Marcos Road	84.65%	4.54%	6.06%	4.75%	2
Proposed	10.97%	11.11%	36.85%	41.08%	
Old San Marcos Fuelbreak	10.97%	11.11%	36.85%	41.08%	1

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
Painted Cave (All)	33.80%	20.13%	42.26%	3.81%	
Existing	25.48%	21.35%	48.76%	2.41%	
FRA Upper PC South Fuelbreak	2.98%	20.86%	54.78%	21.38%	1
Lower PC Rd	61.85%	22.59%	15.57%	0.00%	10
Private Completed Fuel Treatments 050117	33.54%	21.13%	43.34%	1.12%	5
Upper PC Rd	63.12%	17.81%	19.07%	0.00%	9
Upper PC South Fuelbreak	43.21%	17.87%	30.43%	8.45%	3
Upper PC South Shaded Fuelbreak	40.07%	46.53%	5.25%	7.77%	4
Planned	16.10%	14.35%	57.83%	11.72%	
Painted Cave	16.10%	14.35%	57.83%	11.72%	2
Proposed	44.62%	20.07%	35.31%	0.00%	
Painted Cave 1	56.39%	29.87%	13.73%	0.00%	11
Painted Cave 2	68.60%	30.40%	0.99%	0.00%	12
Painted Cave 3	52.56%	14.16%	33.28%	0.00%	8
Painted Cave 4	3.59%	0.00%	30.41%	0.00%	6
Painted Cave 5	30.18%	15.38%	54.44%	0.00%	7

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
Paradise Canyon (All)	53.97%	18.77%	23.34%	3.96%	
Existing	52.45%	17.58%	26.53%	3.43%	
Fremont CG	88.12%	7.76%	8.12%	0.00%	18
Fremont Lane	72.44%	20.46%	7.10%	0.00%	17
Gest House El Gaucho	80.25%	17.13%	2.63%	0.00%	19
Los Prados Compound	65.36%	23.52%	6.84%	6.62%	4
Lower Oso CG	28.67%	23.50%	47.27%	0.22%	9
Lower Oso North CG	42.43%	27.04%	30.43%	0.00%	15
LP Boys Camp	54.72%	36.62%	9.29%	0.38%	8
Mercantile Lane	67.91%	14.62%	17.87%	0.00%	16
Patrera Lane	58.59%	8.39%	31.68%	0.00%	18
Private Completed Fuel Treatments 050117	23.88%	19.41%	45.03%	11.70%	2
Rancho Oso Road	75.56%	13.67%	11.68%	3.16%	6
Sage Hill CG	14.96%	20.25%	64.40%	0.00%	11
Snyder Fuelbreak	3.21%	20.40%	76.39%	0.00%	10
Upper Oso CG	38.29%	20.12%	41.61%	0.00%	13
White Rock Sunshine	90.41%	8.90%	7.29%	3.86%	5
Planned	63.63%	25.96%	7.53%	2.88%	
Aliso Watertanks	27.69%	27.13%	45.19%	0.00%	12
Arroyo Burro Road	69.80%	24.00%	3.29%	2.92%	7
Lower Camuesa Road	49.69%	26.66%	3.92%	15.56%	1
Paradise Road Clearance	38.15%	61.85%	0.00%	0.00%	21
Paradise Road FRA	71.78%	15.38%	8.19%	3.60%	4
Paradise Road South Side/Shaded FB	70.62%	27.37%	2.01%	0.00%	20

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
Rosario Park (All)	46.83%	36.80%	16.40%	0.00%	
Existing	46.71%	20.82%	32.47%	0.00%	
Stagecoach Rd SRA	46.71%	20.82%	32.47%	0.00%	1
Proposed	46.95%	53.05%	0.00%	0.00%	
Rosario Park South Fuel Break	46.95%	53.05%	0.00%	0.00%	2

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
San Marcos Foothills (All)	42.42%	26.06%	21.17%	10.34%	
Existing	43.55%	19.29%	24.43%	12.73%	
Camino Del Rio Shaded Fuel Break	81.95%	17.59%	0.13%	0.00%	17
HQ Fuelbreak	26.11%	25.76%	48.13%	0.00%	8
HWY154	84.25%	15.07%	0.67%	0.00%	15
Private Completed Fuel Treatments 050117	13.86%	13.21%	31.07%	41.84%	2
San Antonio Creek Shaded Fuel Break	48.52%	26.04%	21.93%	3.60%	3
Shadow Hills Shaded Fuel Break	61.36%	27.77%	10.67%	0.00%	10
Tucker's Grove Defensible Space	37.33%	15.53%	47.15%	0.00%	6
Via Regina Park	47.27%	43.11%	9.62%	0.00%	13
Windy Gap Fuelbreak	8.52%	13.62%	17.30%	57.78%	1
Planned	28.23%	61.06%	5.70%	0.00%	
Via Regina Fuelbreak	25.23%	61.08%	5.70%	0.00%	12
Proposed	41.04%	50.33%	6.94%	0.79%	
La Espada Fuelbreak	46.39%	52.66%	0.85%	0.00%	16
La Rata Fuelbreak	7.83%	81.99%	10.18%	0.00%	11
SAC 154 Fuelbreak	79.86%	4.30%	12.29%	3.60%	4
Via Chertas Fuelbreak	28.65%	64.85%	6.50%	0.00%	14

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
San Marcos Pass/Kinevan (All)	64.01%	5.85%	23.78%	6.56%	
Existing	66.97%	3.98%	22.77%	6.61%	
East Camino Cielo Road	51.29%	0.03%	34.37%	14.34%	3
HWY154	82.50%	0.20%	14.55%	2.40%	4
Stagecoach Rd SRA	31.51%	12.40%	37.59%	17.87%	2
West Camino Cielo Rd SRA	13.40%	27.48%	59.04%	0.07%	8
Planned	68.84%	7.23%	22.02%	1.91%	
Kinevan Rd SRA	68.84%	7.23%	22.02%	1.91%	5
Proposed	6.02%	20.85%	45.94%	27.99%	
East Camino 8	6.02%	20.05%	45.94%	27.99%	1

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
San Marcos Trout Club (All)	20.86%	45.10%	20.35%	13.66%	
Existing	20.16%	45.09%	19.86%	14.90%	
HWY154	78.39%	20.02%	1.59%	0.00%	6
Old San Marcos Road	95.69%	1.12%	0.00%	3.20%	4
TC Defensible Space	12.87%	43.81%	23.17%	20.15%	1
Trout Club Fuelbreak 1	12.69%	56.54%	16.61%	14.20%	2
Trout Club Fuelbreak 2	18.85%	50.17%	20.90%	10.05%	3
Planned	28.58%	45.67%	25.75%	0.07%	
San Marcos Trout Club North	28.50%	45.67%	25.75%	0.07%	5
Stagecoach Road East	89.61%	20.11%	40.28%	0.00%	4
Proposed	58.05%	28.83%	13.13%	0.00%	
Cold Springs Tavern SRA	65.76%	15.16%	19.09%	0.00%	6
San Marcos Camp Access Road	59.41%	40.09%	0.00%	0.00%	6
San Marcos Camp FRA	40.29%	37.18%	22.53%	0.00%	5

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
Twin Ridge (All)	42.25%	0.77%	3.83%	53.04%	
Existing	97.91%	2.07%	0.02%	0.00%	
Old San Marcos Road	97.91%	2.07%	0.02%	0.00%	2
Proposed	8.97%	0.00%	6.27%	84.76%	
Twin Ridge Fuelbreak	8.97%	0.00%	6.27%	84.76%	1

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
West Camino Cielo (All)	20.46%	10.73%	19.82%	48.98%	
Existing	18.74%	7.93%	17.86%	55.46%	
Private Completed Fuel Treatments 050117	15.76%	6.73%	18.08%	59.37%	4
West Camino Cielo Rd SRA	57.97%	22.95%	14.57%	4.11%	15
Planned	28.83%	13.73%	43.42%	14.02%	
Honey Trust East	0.00%	1.45%	63.8%	31.73%	3
Honey Trust West	34.07%	16.18%	49.75%	0.00%	17
Kinevan Rd SRA	100.00%	0.00%	0.00%	0.00%	18
West Camino Cielo FRA	30.23%	0.00%	69.77%	0.00%	16
Proposed	21.48%	17.94%	14.25%	46.10%	
West Camino 1	9.87%	18.08%	14.37%	57.88%	9
West Camino 10	31.22%	18.57%	6.13%	44.03%	7
West Camino 11	0.00%	0.00%	0.00%	100.00%	1
West Camino 12	0.08%	45.04%	49.02%	5.88%	13
West Camino 2	13.80%	20.81%	26.28%	39.15%	9
West Camino 3	0.00%	0.00%	7.62%	92.38%	2
West Camino 4	25.35%	13.07%	7.64%	53.52%	6
West Camino 5	18.18%	16.67%	24.90%	40.26%	8
West Camino 6	36.28%	44.16%	11.44%	8.13%	12
West Camino 7	27.85%	25.51%	14.58%	28.06%	10
West Camino 8	31.10%	28.28%	20.02%	4.69%	14
West Camino 9	57.44%	8.05%	19.09%	16.61%	11

Community > Status > Project Name	Low	Moderate	High	Very High	Priority
Non-community Based (All)	27.79%	16.50%	43.18%	12.53%	
Existing	27.54%	15.19%	46.25%	11.03%	
Arroyo Burro Fuelbreak	12.86%	21.38%	64.79%	1.09%	12
Brush Peak Fuelbreak	56.29%	20.99%	22.64%	0.08%	18
Camino Cielo Fuelbreak	20.60%	16.69%	58.36%	7.07%	6
East Camino Cielo Road	71.56%	5.76%	22.68%	0.00%	29
Fremont Fuelbreak	5.87%	17.97%	72.04%	4.12%	10
HWY154	72.12%	22.06%	5.49%	0.39%	29
Lower PC Rd	74.07%	13.59%	8.80%	4.50%	9
Old San Marcos Road	66.25%	14.12%	13.38%	6.28%	8
Private Completed Fuel Treatments 050117	13.22%	9.47%	19.81%	57.50%	3
Snyder Fuelbreak	4.88%	15.51%	79.68%	0.00%	17
Stagecoach Rd SRA	66.63%	2.97%	32.41%	0.00%	22
Stagecoach Road East	25.21%	9.71%	62.65%	2.43%	11
Upper Oso CG	30.11%	0.00%	67.89%	0.00%	18
Upper PC Rd	83.90%	7.06%	9.04%	0.00%	28
West Camino Cielo Rd SRA	78.31%	11.26%	10.43%	0.00%	27
Windy Gap Fuelbreak	3.72%	7.17%	26.90%	62.21%	2
Planned	30.56%	24.40%	23.87%	21.18%	
Arroyo Burro Road	53.23%	32.25%	14.52%	0.00%	24
Fremont Fire Access Road	6.47%	18.33%	68.88%	6.32%	7
Honey Trust East	1.43%	15.58%	11.58%	71.45%	1
Honey Trust West	72.58%	18.38%	9.32%	0.00%	26
Kinevan Rd SRA	54.72%	0.00%	45.28%	0.00%	19
Paradise Road Clearance	27.59%	67.59%	4.82%	0.00%	30
San Marcos Trout Club North	7.90%	0.00%	92.10%	0.00%	16
West Camino Cielo FRA	48.72%	12.24%	17.89%	25.15%	5
Proposed	13.18%	22.77%	46.36%	17.83%	
East Camino 8	1.27%	0.00%	38.73%	0.00%	15
Old San Marcos Fuelbreak	0.00%	63.04%	36.96%	0.00%	21
Rosario Park South Fuel Break	5.89%	77.35%	17.80%	0.00%	25
Twin Ridge Fuelbreak	0.00%	3.78%	61.70%	34.51%	4
West Camino 13	31.07%	30.86%	38.06%	0.00%	20
West Camino 2	0.00%	0.00%	100.00%	0.00%	14

Appendix F. Sensitive Habitats and Species known to Exist within the Planning Area.

Environmental Habitats - Within the Project Area ONLY

Santa Barbara County ESH's

	Acres
ESH	1,186.12
RIPARIAN_CORRIDOR	172.29
Grand Total	**1,358.41**

CNDDB

Federal Listing

				Acres
Species	Endangered	None	Threatened	Grand Total
California red-legged frog			4.95	4.95
least Bell's vireo	3,403.88			3,403.88
Santa Ynez false lupine		279.68		279.68
tricolored blackbird		450.05		450.05
Grand Total	**3,403.88**	**729.73**	**4.95**	**4,138.56**

State Listing

					Acres
Species	Candidate Endangered	Endangered	None	Rare	Grand Total
California red-legged frog			4.95		4.95
least Bell's vireo		3,403.88			3,403.88
Santa Ynez false lupine				279.68	279.68
tricolored blackbird	450.05				450.05
Grand Total	**450.05**	**3,403.88**	**4.95**	**279.68**	**4,138.56**

Federal Critical Habitat

	Miles
Species	**Grand Total**
Steelhead (Oncorhynchus (=Salmo) mykiss)	**6.74**
	6.74

Appendix G. EGVCP Environmental Protection Polices and Standards

Applicable Environmental Resources Protection Policies and Development Standards from Eastern Goleta Valley Community Plan

The following summarizes applicable policies and development standards. Additional policies may be required, including those addressing restoration in the event vegetation is cleared without permits when permits are required, or more vegetation is removed than the minimum prescribed by SBC Fire and consistent with this CWPP.

- DevStd FIRE-EGV-1C – (INLAND) Within high fire hazard areas, vegetation management practices within Environmentally Sensitive Habitat (ESH)/Riparian Corridor (RC) overlay and setback areas should be limited to the following activities to balance environmental resources preservation against wildfire protection: (pages 63-64)
    - Removal of non-native trees or immature native trees
    - Removal of surface debris
    - Removal of invasive non-native plants as defined and listed in the California Invasive Plant Council's "California Invasive Plant Inventory"
    - Removal of vegetation in non-riparian oak woodland or forest within the minimum defensible space area from structures as required by the County Fire Department
    - Selective limb removal of mature trees away from structures within minimum defensible space area as required by the County Fire Department
    - Thinning, pruning or mowing of vegetation (except trees) to no less than that required to meet fuel modification criteria (in no case less than 4 inch stubble) and leaving the roots intact
- Policy ECO-EGV-2.3 – (INLAND) Where sensitive plan and sensitive animal species are found pursuant to the review of a discretionary project, the habitat in which the sensitive species is located shall be preserved to the maximum extent feasible … (page 134).
    - DevStd ECO-EGV-2A – (INLAND) If potentially suitable habitat exists for a sensitive plan species prior to any grading or vegetation clearing for future projects in the plan area, focused rare plant surveys shall be conducted … (page 134).
    - DevStd ECO-EGV-2B - (INLAND) … prior to any grading or vegetation clearing for future projects in the plan area, focused presence/absence shall be conducted … (page 134).
    - DevStd ECO-EGV-2C - (INLAND) If sensitive species, suitable nesting habitat, or other sensitive areas are found on or adjacent to a project site in the Plan area and have potential to be impacted by implementation of the project, the following avoidance and mitigation measures would apply (see pages 135 – 138 for specifics).
- OBJECTIVE ECO-EGV-3: Preserve and enhance the ecological value and function of habitats of Eastern Goleta Valley (page 143).

- Policy ECO-EGV-3.1: Habitats that shall be preserved and enhanced include, but are not limited to: (page 143)
    - Creeks, streams, and waterways, and fish passage.
    - Wetlands and vernal pools.
    - Riparian vegetation.
    - Wildlife corridors between habitat areas.
    - Roosting, nesting, and foraging habitat for bird species.
    - Nesting and foraging habitat for subterranean species.
- Policy ECO-EGV-4.1: (INLAND) Protecting Existing Trees: Existing trees in Eastern Goleta Valley shall be preserved to the maximum extent feasible, prioritizing "protected trees." Protected trees are defined for the purposes of this policy as mature native, naturalized, or roosting/nesting trees that are healthy, structurally sound, and have grown into the natural stature particular to the species (Species list page 144).
- Policy ECO-EGV-4.2: (INLAND) All existing "protected trees" shall be protected from damage or removal, except in cases where preservation of trees would preclude reasonable use of a parcel, or threaten life and/or property (page 145).
    - DevStd ECO-EGV-4A: (INLAND) Where development may damage or destroy existing trees, a Tree Protection Plan shall be required by the County when either the project site contains protected trees per Policy ECO-EGV-4.1 (page 145).
    - DevStd ECO-EGV-4C: To the extent feasible, fuel modification practices involving mature oaks and other native trees shall be limited to removing dead trees and materials, proper pruning, mowing the understory, and limbing up the branches. Fuel modification practices shall not result in the removal or substantial risk of loss of protected trees (page 146).

Environmentally Sensitive Habitat (ESH) and Riparian Corridor (RC)

- Policy ECO-EGV-5.4: (INLAND) ESH Habitat Types: In the Urban, Inner-Rural, EDRNs and Mountainous Areas, the following habitats shall be considered environmentally sensitive and shall be protected and preserved through provisions of the ESH Overlay (Full list pages 149-150). … RC Habitat Types: On lands designated Agriculture in the Rural Area, the following habitats shall be considered environmentally sensitive and shall be protected and preserved through the provisions of the RC Overlay. … riparian woodlands and riparian corridors.
- Policy ECO-EGV-5.5: (INLAND) Minimum Buffer Areas for ESH: (pages 152-153)
    - ESH areas within the Urban Area and EDRNs: a minimum setback of 50 feet from either side of top-of-bank of creeks or existing edge of riparian vegetation, whichever is further.
    - ESH areas within the Mountainous-GOL zone district: a minimum buffer of 200 feet from the edge of existing riparian vegetation.
- DevStd ECP-EGV-5B: Storage of equipment, supplies, vehicles, or placement of fill or refuse shall not be permitted within an established ESH setback or buffer area. Except in rural areas designated for Agriculture, P&D may require installation of a temporary protective fence along the outer boundary of an established ESH buffer, at the applicant's expense, prior to initiation of any grading or development activities to prevent disturbance of the buffer (page 153).

Specific Habitat Area Protection Policies

- Policy ECO-EGV-6.1: Native woodlands, native grasslands, and coastal sage scrub shall be preserved and protected as viable and contiguous habitat areas (page 158).
- DevStd ECO-EGV-6B: Native Woodland Buffer Areas: Within urban areas and existing developed rural neighborhoods, native woodlands shall be preserved by providing a minimum 25-foot buffer around the respective habitat area. Within areas zoned Mountainous-GOL, the buffer around native woodlands will be 50 feet (page 158).
- DevStd ECO-EGV-6C: Native Grassland and Coastal Sage Scrub Buffer Areas: Native grasslands and coastal sage scrub shall be preserved by providing a minimum 25-foot buffer vegetated with native species and by placing the project outside of the buffer rather than in or through the middle of the habitat area (page 158).
- DevStd ECO-EGV-6E: (INLAND) Any construction, grading or development within 200 feet of known or historic butterfly roosts shall be prohibited during the months between November 1 and April 1 (page 158).
- Policy ECO-EGV-6.3: Riparian vegetation shall be protected and shall not be removed except where clearing is necessary for the maintenance of free flowing channel conditions, the removal of invasive exotic species, the provision of essential public services, or where protection would preclude the reasonable use of a parcel (page 160).
- Policy GEO-EGV-2.2: No development shall be allowed on slopes of 30 percent or greater. Avoid ground disturbances and development on slopes of 20 percent or greater unless such avoidance would preclude reasonable use of the parcel (page 167).