

West Cajon Valley

Community Wildfire Protection Plan

2018



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MUTUAL AGREEMENT PAGE

This Community Wildfire Protection Plan developed by the San Bernardino County Fire Department:

- Was collaboratively developed. Interested parties and federal land management agencies managing land in the San Bernardino Mountains have been consulted.
- This plan identifies and prioritizes areas for hazardous fuel reductions treatments and recommends the types and methods of treatment that will aid in protecting residential development in West Cajon valley.
- This plan recommends measures to reduce ignitability of structures throughout the area addressed by the plan.

The following entities attest that the standards listed above have been met and mutually agree with the content of this Community Wildfire Protection Plan:

County of San Bernardino Fire, by Michael Horton, Fire Marshal

CAL FIRE, San Bernardino Unit, by Glenn Barley, Unit/Fire Chief

USDA Forest Service, San Bernardino National Forest, by Jody Noiron, Forest Supervisor

INTRODUCTION

This CWPP was developed by the San Bernardino County Fire Department (SBCFD) with assistance from the California Department of Forestry and Fire Protection (CAL FIRE), and the United States Department of Agriculture Forest Service (USFS). Information in this plan will be provided at the level of specificity determined by the community and appropriate agencies.

The process of developing a CWPP can help a community clarify and refine its priorities for the protection of life, property, and critical infrastructure in the Wildland-Urban Interface and Wildland Intermix (WUI/WI). It can also lead community members through valuable discussions regarding management options and implications for any areas of special interest.

The assessment portion of this document estimates hazards, and the probability of their occurrence associated with wildland fire in proximity to WUI/WI areas. From the analysis of this data, solutions and mitigation recommendations are offered that will aid homeowners, land managers, fire suppression resources and other interested parties in developing short-term and long-term mitigation efforts. This information, in conjunction with identification of the Values at Risk forms a basis for the prioritization of mitigation efforts.

For the purposes of this report the following definitions apply:

FireShed - No-HARM divides the landscape into units based on topography. FireSheds tend to correlate to the vegetation and the direction fires will burn in the absence of wind. FireSheds are useful for dividing the landscape into planning units and providing data in a spatial context that matches fire behavior. FireShed units tend to be roughly 150 to 200 acres in size.

Frequency - A simulation-based prediction of the probability of future wildfire occurrences derived from No-HARM. No-HARM assigns a numeric value of 1-50 where 1 is the least likely for a wildfire occurrence and 50 is the most likely. Frequency is different from probability of ignition in that frequency only considers ignitions likely to develop into fires large enough to create a significant threat to Values at Risk.

Hazard is the combination of the Wildfire Hazard Ratings (WHR) of the WUI/WI neighborhood surveys and the analysis of fire behavior potential, which is derived from No-HARM Severity analysis outputs. Hazard attempts to quantify the severity of undesirable outcomes to the values at risk.

Inland Empire Community Mitigation Planner (WMP) - This web-based application provides capabilities for Fire Safe Councils within the Inland Empire Fire Safe Alliance to define and maintain information related to their CWPPs. This includes capabilities to digitize community boundaries and fuel reduction projects using interactive mapping tools. Utilizing the mapping capabilities provides Fire Safe Councils a way to easily update and maintain information about their mitigation planning activities and achievements. This site is available at www.ie-cwpp.org

No-HARM - The National Hazard and Risk Model (No-HARM) is a decision support tool for wildfire hazard assessment. No-HARM calculates relative fire danger ratings by taking the predicted severity and the predicted frequency of wildfire in a given location and incorporating elements that affect the vulnerability of structures in and around communities. No-HARM gives a comprehensive view of the threat context a structure, or group of structures, is exposed to during a wildland fire. The No-Harm model and its components are displayed visually in the WMP.

Probability - The likelihood of a significant fire occurrence. This is primarily determined by the fire history of the area and a probability model (Frequency) derived from No-HARM.

Risk 50 is the result of the No-HARM composite analysis of Frequency, Severity and other input variables. By combining the likelihood of a significant fire occurrence and the severity of undesirable fire effects to the values at risk, Risk 50 assigns a numeric value to FireSheds where a 1 represents the lowest level of risk and 50 represents the most extreme level of risk.

Severity - An estimate derived from No-HARM of how severe fire behavior would be in the event of an ignition. No-HARM assigns a numeric value of 1-50 where 1 is the lowest severity and 50 is the highest.

Values at Risk are the tangible values identified by residents as being important to sustainable life in the study area (e.g., life safety, property conservation and critical infrastructure.)

Wildfire Hazard Rating (WHR) - A model designed to evaluate communities within the Wildland Urban Interface/Wildland Intermix (WUI/WI) for their relative wildfire hazard. WHR focuses on structural ignitability and suppression factors and uses a different rating system from No-Harm which focuses on the Frequency and Severity of fire in the wildland fuels of the FireSheds.

Wildland Intermix (WI) – Areas of concentrated residential development (communities) where homes are surrounded by wildland fuels. Homes in these areas exist in the context of natural fuels rather than as typical urban development.

Wildland-Urban Interface (WUI) – (AKA Urban Edge Ember Zone). The area where encroaching wildland fuels could create a fire hazard to structures that would normally be considered a traditional urban/suburban development.

This document has the following primary purposes:

1. Provide a scientifically-based analysis of wildfire related hazards and risks in the WUI/WI areas of West Cajon Valley.
2. Support the continued development and maintenance of wildfire mitigation efforts currently practiced by residents and public land managers.
3. Create a CWPP document that conforms to the standards established by HFRA and CAL FIRE.

The National Fire Plan and the Healthy Forest Restoration Act

In 2000 more than 8,000,000 acres burned across the United States, marking one of the most devastating wildfire seasons in American history. One high-profile incident, the Cerro Grande fire at Los Alamos, N.M., destroyed more than 235 structures and threatened the U.S. Department of Energy's nuclear research facility.

Two reports addressing federal wildfire management were initiated after the 2000 fire season. The first report, prepared by a federal interagency group, was titled *Review and Update of the 1995 Federal Wildland Fire Management Policy* (2001). This report concluded among other points, that the condition of America's forests had continued to deteriorate.

The second report, titled *Managing the Impacts of Wildfire on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000*, was issued by the U.S. Bureau of Land Management (BLM) and the U.S. Department of Agriculture's Forest Service (USFS). It became known as the National Fire Plan (NFP). This report, and the ensuing Congressional appropriations, ultimately required actions to:

- Respond to severe fires
- Reduce the impacts of fire on rural communities and the environment
- Ensure sufficient firefighting resources

Congress increased its specific appropriations to accomplish these goals. In 2002 there was another severe wildfire season with more than 7,000,000 acres burned and 1,200 homes destroyed. In response to public pressure, Congress and the Bush administration continued to designate funds specifically for actionable items such as preparedness and suppression. That same year the Bush administration announced the Healthy Forests Initiative, which enhanced measures to restore forest and rangeland health and reduce the risk of catastrophic wildfires. In 2003 the Healthy Forests Restoration Act (HFRA) was signed into law.

Through this piece of legislation Congress continues to appropriate specific funding to address five main categories: preparedness, suppression, reduction of hazardous fuels, burned-area rehabilitation and state and local assistance to firefighters. The general concepts of the NFP blend well with the established need for community wildfire protection in the study area. The spirit of HFRA and the NFP is reflected in the West Cajon Valley CWPP.

This CWPP strives to meet the requirements of HFRA by:

1. Identifying and prioritizing fuels reduction opportunities
2. Addressing structural ignitability
3. Addressing community fire-suppression capabilities
4. Collaborating with stakeholders

COLLABORATION: COMMUNITY AND AGENCIES

Organizations involved in the development of the West Cajon Valley CWPP are listed below with their roles and responsibilities.

County of San Bernardino, Fire and Public Works

Primary development of the CWPP and community outreach. Provides information regarding critical infrastructure, fire suppression resources, and current and planned fuels treatment project areas and methods. Coordinates with the community regarding the feasibility and desirability of fuels treatment project areas and methods.

CAL FIRE

Aids in the planning process and approval of the CWPP process and minimum standards. Provides input and expertise on forestry, fire, fuels, and FireWise concepts. Provides information support for hazard assessment and defensible space. Operates a pre-fire engineering program to reduce or eliminate fire hazards and risks by removing or reducing the heat source, modifying or reducing fuels through the afore mentioned hazard assessment and defensible space assistance programs and modifying acts or omissions that allow a heat source to contact ignitable fuels.

USDA Forest Service

Provides expertise on federal lands, forestry, fire and fuels.

GOALS AND OBJECTIVES

Strategic goals for this project include the following:

1. Enhance life safety of the residents, visitors and responders.
2. Mitigate undesirable fire effects to property and infrastructure.
3. Maintain and enhance existing mitigation efforts.

To accomplish these goals the following objectives have been identified for this report:

1. Establish an approximate level of probability (the likelihood of a significant wildfire event in the study area).
2. Provide a scientific analysis of the fire behavior potential of the study area.
3. Group relatively densely populated areas into residential “Hazard Zones” that represent relatively similar hazard factors.
4. Identify and quantify factors that limit (mitigate) undesirable fire effects to the Values at Risk and recommend actions to reduce those hazards.
5. Evaluate existing mitigation efforts.

Other desired outcomes include:

1. Promote community awareness: Quantifying the study area’s hazards and risk from wildfire will facilitate public awareness and assist in creating public action to mitigate the defined hazards.
2. Improve wildfire prevention through education: Community awareness through education will help reduce the risk of unplanned human-caused ignitions. Education can limit injury, property loss and even unnecessary death.
3. Facilitate and prioritize appropriate hazardous fuel removal projects: Organizing fuel management actions will provide stakeholders with the tools and knowledge to ensure projects are valuable and viable for local residents.
4. Promote improved levels of response: The identification of specific community planning areas and their associated effects on probability and hazard ratings will improve the focus and accuracy of pre-planning and facilitate the implementation of cross-boundary, multi-jurisdictional projects.

STUDY AREA OVERVIEW

The West Cajon Valley is an unincorporated area of the San Gabriel Mountains in San Bernardino County, California. Residential development is concentrated in Cajon Canyon along US-138 between Lone Pine Canyon Road and FS-3N37, approximately one mile south of CA-2 (Angeles Crest National Scenic Byway) and is surrounded by the San Bernardino National Forest. The West Cajon Valley study area includes approximately 7,239 acres encompassing the most densely populated residential areas and a ½ mile buffer. Primary access is via CA-138 from Interstate 15. Access to CA-138 is also possible via CA-2 from the north and Lone Pine Canyon Road from the south.

The study area is an arid environment. Vegetation in and around the study area is primarily composed of desert shrubs and grasses. Common native plants include chaparral, yucca and Joshua trees. The average elevation of the residential portions of the study area is 3,200 feet.

San Bernardino County Fire Department (SBCFD) recognizes the potential for complex problems associated with the mission of achieving fire safety, healthy forest management initiatives, and a need to balance this mission with environmental and economic concerns of residents throughout communities in San Bernardino County.

Residential Hazard Zones

The residential portion of the study area is best characterized as Wildland Intermix (WI). There is no true Wildland Urban Interface in West Cajon Valley. The study area has been divided into two “Hazard Zones” which comprise the most densely populated portions of the WI (see Figure 2). These residential zones are not based on political or traditional neighborhood/community boundaries, but rather on factors relating to wildfire propagation and impacts. In the case of West Cajon Valley these zones are divided principally by the density of structures, type and density of vegetative fuels and topographic position.

VALUES AT RISK

Life Safety, Homes and Commerce

According to tax records, the West Cajon Valley study area encompasses approximately 398 parcels, 196 of them residential. Small ranching and agricultural concerns are the primary economic interests in this area. The study area is also home to a small number of other enterprises, but there are no large concentrated areas of commercial development. The Mormon Rocks area is a popular hiking destination; however, tourism does not appear to be a significant economic factor in West Cajon Valley.

PROBABILITY SITUATION

For the purposes of this report, Probability is the likelihood of a significant fire occurrence. This is primarily determined by the fire history of the area and the No-HARM Frequency model.

This area has an active fire history. Major fires (greater than 1,000 acres) that burned within three miles of the study area from 2000 to 2016 include Louisiana (2002), the 2002 Blue Cut Fire, Runway (2004), Sheep (2009), North (2015) and the 2016 Blue Cut Fire. These fires burned over 64,000 acres. The 2016 Blue Cut fire destroyed homes in the study area. Figure 1 shows the perimeters of some of the larger fires in the area since 2000.

To predict the likelihood of a significant wildfire event, No-HARM inputs 300,000 points of ignition. These simulated fires are run across three weather scenarios. Areas where fires stack indicate an increased likelihood of a significant fire occurrence. No-Harm assigns a value between one and 50 to each FireShed based on an aggregation of all the pixels in that FireShed. A value of one indicates the lowest probability of significant wildfire and 50 the highest. Adjective ratings in No-HARM are as follows: 0-9 = Low, 10-23 = Moderate, 24-35 = High and >35 = Very High.

Figure 2 shows the hazard zones in the concentrated residential areas of West Cajon Valley. In Hazard Zone A fuels are heavier and more contiguous than Hazard Zone B; however, the 2016 Blue Cut Fire burned into both zones. Some structures were lost in both Hazard Zones and the fire was stopped close to the densest area of residential development in Hazard Zone A. The No-HARM Frequency analysis rates both of these areas as 45 out of 50 (very high probability for a significant fire start). See the WMP website for more details.

Based on the fire history and the No-HARM Frequency assessment, the study area should be considered at a very high risk for fire occurrence.

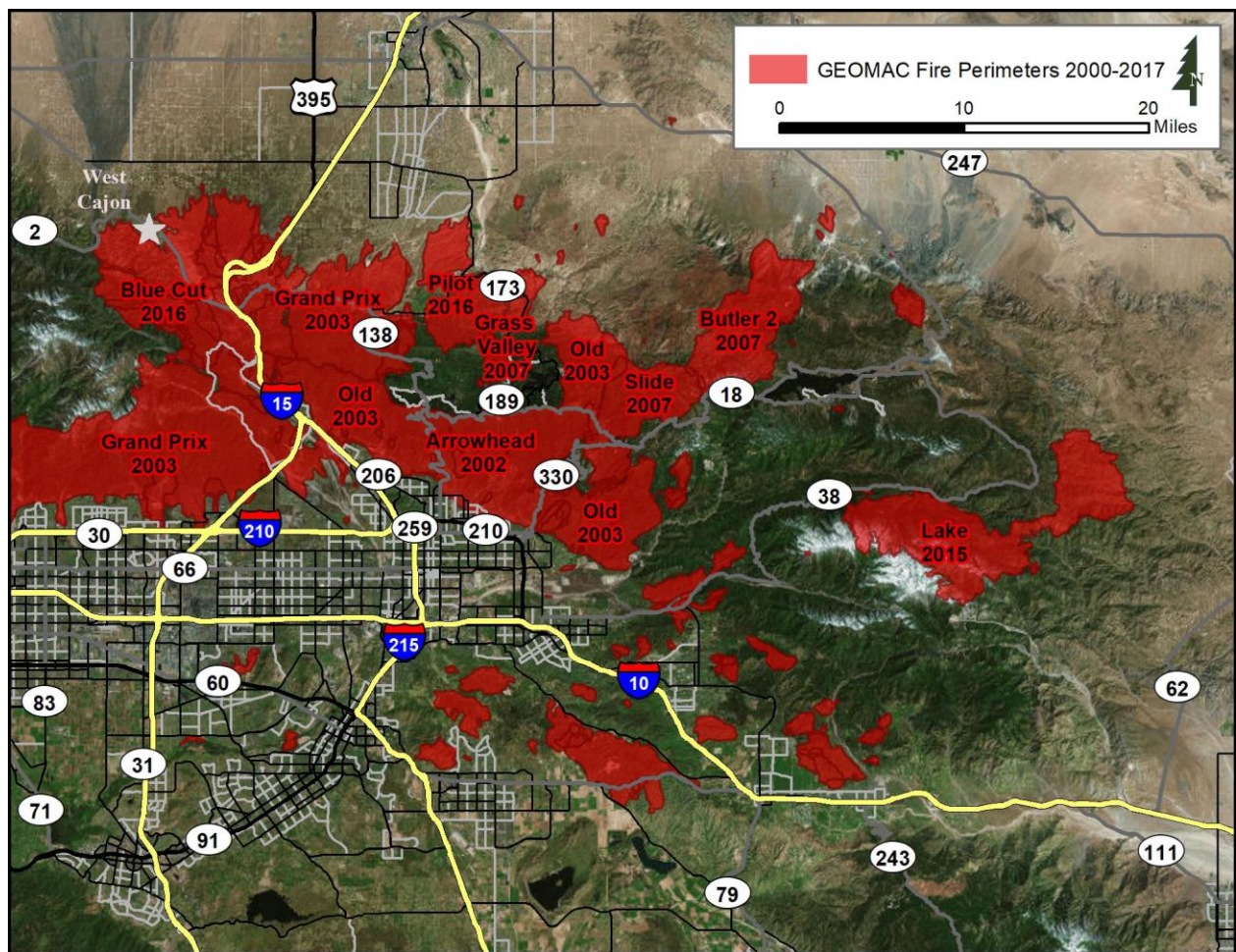


Figure 1 Historic Fire Perimeters

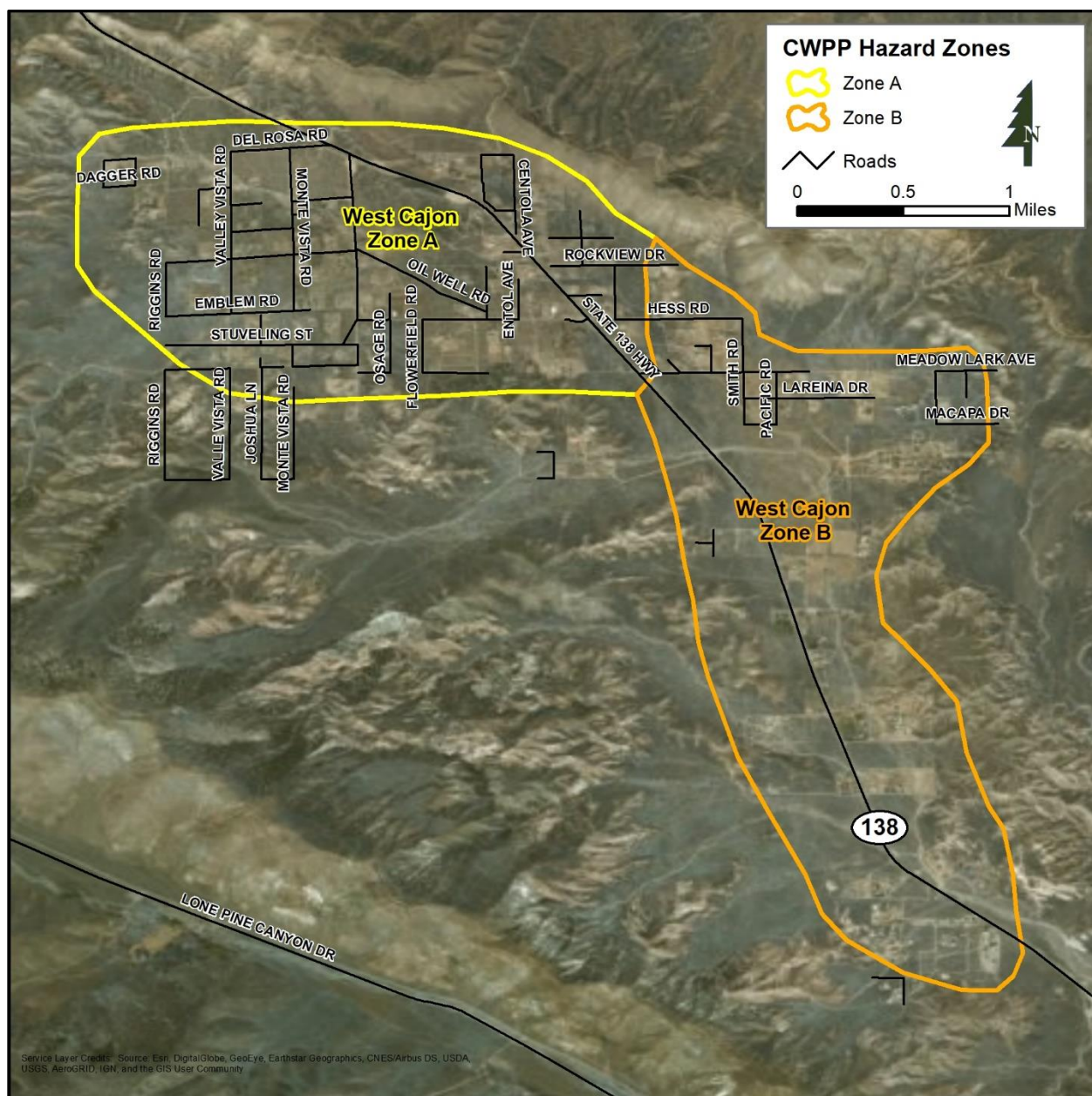


Figure 2 West Cajon community boundaries and residential hazard zones

NO-HARM SEVERITY AND RISK 50 RATINGS

As previously discussed, the mountains surrounding the study area have an active fire history. No-HARM Severity ratings attempt to quantify the severity of fire effects on values at risk and the ecosystem by combining flame length and crown fire development into a single rating. Like other numeric ratings generated by No-HARM, Severity assigns a value between one and 50 to each FireShed based on an aggregation of all the pixels in that FireShed. A value of one indicates the lowest severity of damaging fire effects and 50 the highest. No-HARM is based on an analysis of wildland fire behavior and, other than the exclusion of non-burnable areas, does not take structural flammability into consideration. For a discussion of the impact of structural flammability please see the *Community Ignitability Analysis* section of this report.

The No-HARM Risk 50 rating is a mathematical model combining Severity with Frequency. That is to say the model takes into account both the likelihood of a significant fire developing within the rated FireShed and the severity of damaging fire effects to create a composite rating of fire risk in that FireShed. Although the majority of the weighting in the model is in these two elements, other factors are included in the Risk 50 rating and vary depending on whether FireSheds are located in the Wildland-Urban Interface (WUI), Wildland Intermix (WI) or wildland. As with other No-HARM ratings, a value of one indicates the lowest risk and 50 the highest.

In Hazard Zone A (Figure 2) an aggregate value of 18 (moderate) for Severity and a Risk 50 rating of 43 (very high) has been calculated. It is important to note that although in general the desert fuels in this area produce lower flame lengths than the heavy timber models common in other portions the Transverse Ranges, fuels throughout the most densely populated portions of this Hazard Zone are continuous and exist in moderate to heavy loads. Fire behavior models also do not take crown fire development into consideration in shrub fuel models like the ones in this area. While spatial context of fire behavior in adjacent FireSheds is considered in the No-HARM model, the impact of ember cast may be underestimated.

In Hazard Zone B an aggregate value of 20 (moderate) for Severity and a Risk 50 rating of 38 (very high) has been calculated. Although the Blue Cut Fire reduced some of the fuel load in this Hazard Zone, moderately heavy fuel loads of grasses and shrubs with grass understory are still relatively continuous over most of the populated portions. Shrub fuels and ornamental plantings are heaviest near the homes. Please see the WMP website for more details.

FIREFIGHTING CAPABILITIES AND LOCAL PREPAREDNESS

The communities of the study area are serviced by the following fire departments, San Bernardino County Fire Department (SBCFD) and CAL FIRE. Initial response to all fire, medical and associated emergencies in West Cajon Valley is the responsibility of SBCFD.

The San Bernardino County Fire Department has no fire stations located in the study area. The closest full-time professional staffed SBCFD station is Phelan Station 10 at 9625 Beekley Road, which is approximately four miles from the northern edge of the study area. Wrightwood Station 14 is also a full-time professional staffed station and is six miles from the northern edge of the study area. San Bernardino County Fire has a comprehensive automatic aid system with state and local firefighting resources through the *2014 San Bernardino County Fire and Rescue Mutual Aid Operational Plan*.

Fire protection in all designated State Responsibility Areas (SRA) is handled by CAL FIRE. In addition to suppression resources CAL FIRE provides personnel to develop pre-fire management solutions and implement cooperative projects to reduce the potential of wildfire losses within the study area. CAL FIRE supplies mutual aid to local responders in the study area through the California Master Mutual Aid Agreement. CAL FIRE also maintains an agreement with federal wildfire agencies (such as the USDA Forest Service) to exchange fire protection services. The goal of this agreement is to have the closest agency respond to a wildfire, regardless of jurisdiction. This arrangement also allows CAL FIRE to access federal and state resources throughout the U.S. when CAL FIRE resources are stretched thin or depleted.¹

Wildland fire responsibilities within the San Bernardino National Forest are managed by the USDA Forest Service (USFS). The Front Country Ranger District Office is located at 1209 Lytle Creek Road, which is approximately 17 miles from the southern edge of the study area. The Mormon Rocks Fire Station, at the southern end of the study area, is staffed seasonally from May to November and only responds to wildland fires. If a structure is involved in a fire they respond to they will only engage in exterior attack.

In addition to providing fire suppression resources, the above departments and agencies cooperate in vegetative treatments and wildfire response planning through mutual aid agreements. The Mountain Area Safety Taskforce (MAST) is also actively working to prevent catastrophic wildfire. MAST is a coalition of local, state and federal government agencies, private companies and volunteer organizations in San Bernardino and Riverside counties that are partners in wildfire prevention.

In high severity periods agreements with the California Military Department allow for California National Guard resources to provide aid in wildfire response including their Modular Airborne Fire Fighting System (MAFFS), helicopters, support personnel, communications equipment and other resources.²

Recommendations

CAL FIRE is recognized nationally for its high level of training and equipment. San Bernardino County is the largest county in the contiguous United States. SBCFD is a full-service fire department covering over 19,000 square miles and more than 60 communities/cities.³ Some, perhaps all, of the recommendations below may already be in practice by these departments, therefore the training recommendations in this document focus on maintenance of policy for those entities as well as providing a guideline of recommended minimum standards.

Training/Equipment

- Require or continue to require S130/190 for all firefighters.
- Require or continue to require the annual refresher or certification for all firefighters in the mountainous areas, similar to how CAL FIRE annually certifies their fire season readiness with their Fire Preparedness Exercise every spring.
- Maintain training opportunities sponsored, or funded, by state and federal and local resources.
- Seek agreements that allow for cooperative training between volunteers (Paid Call Firefighters) SBCFD professional firefighters and county, state and federal responders.
- Encourage personnel to take additional beneficial courses including; S-215 *Fire Operations in the Urban Interface*, S-290 *Intermediate Fire Behavior*, L-380 *Fireline Leadership* as well as I-200 *Basic ICS*.
- Encourage personnel to seek higher qualifications and participate in out-of-district assignments.
- Ensure all firefighters have adequate wildland PPE including radios and new generation fire shelters.
- Be sure enough additional PPE is on hand to outfit new recruits.
- Pursue grants and other funding opportunities to purchase additional wildland PPE and apparatus, such as the FEMA Assistance to Firefighters Grant Program.⁴
- Acquire a sufficient quantity of wildland fire packs fitted for new generation fire shelters for all responders. Retire from service any wildland fire pack designed for the older fire shelters as these are not compatible with new generation shelters.

Stations/Apparatus

- Consider locating an unmanned or volunteer (PCF) station in Hazard Zone A that could be used to house a water tender and a water supply of at least 1,500 gallons for fire suppression. This water supply should be a tank fitted with appropriate connections for apparatus. A Type 6 engine could also be located here during periods of high severity or if the demand for initial attack resources increases in the study area.

COMMUNITY IGNITABILITY ANALYSIS

Purpose

The purpose of dividing residential areas into hazard zones is to perform a structural ignitability analysis in order to sort residential areas into hazard categories for prioritization of recommendations. This is accomplished by the use of the Wildfire Hazard Rating (WHR) tool, which is intended to analyze Wildland Urban Interface and Wildland Intermix (WUI/WI) development.

Methodology

WHR was developed specifically to evaluate communities within the WUI/WI for their relative wildfire hazard. The WHR model combines physical infrastructure such as structure density and roads, and the fire behavior Severity modeling of No-HARM, with the field experience and knowledge of wildland fire experts. It has been proven and refined by use in rating thousands of neighborhoods throughout the United States. Much of NFPA 1144 has been integrated into this methodology to ensure compatibility with national standards. Additionally, aspects of NFPA 1142 regarding water supply for rural and suburban firefighting are included in the assessments by looking at proximity and capacity of the water supply.

The model was developed from the perspective of performing structural triage on a threatened community in the path of an advancing wildfire with No-HARM predicted fire behavior for average conditions on a fire season day. The WHR survey and fuel model ground-truthing are accomplished by field surveyors with WUI/WI fire experience. The rating system assigns a hazard rating based on categories such as: No-HARM Severity, topographic position, construction and infrastructure, suppression factors, and other factors including frequent lightning, railroads, campfires, etc. The rankings are also related to what's customary for the area. For example, a high-hazard area on the plains of Kansas may not look like a high-hazard area in the Sierra Nevada. The system creates a relative ranking of community hazards in relation to the other communities in the study area.

Introduction

There are two residential hazard zones in the study area (Figure 2). The WHR model calculates a score that sorts these zones, based on hazard rating, into one of five categories: low, moderate, high, very high and extreme. Zone A encompasses development in the northwest portion of the study area. This area is in a bowl and isolated by ridges. Zone B includes development along the east and south sides of Cajon Canyon near US-138. These zones are different in terms of fuel loading, parcel sizes and topographic position. Hazard Zone A received a very high rating and Hazard Zone B received a high rating.

Structural Ignitability Discussion – Hazard Zone A



Figure 3 Hazard Zone A

Hazard Rating:

Moderate

Utilities Above or Below Ground:

Above ground

General Construction:

Primarily combustible siding with ignition resistant roofs

Average Lot Size:

< 4 acres

Dual Access Roads:

No, see text

Road Widths, Slope and Surface:

Variable, mostly dirt

Water Supply:

None

Proximity to Fire Station:

Phelan Station 10, approximately 4 miles

Zone Characteristics and Hazards

Single-family homes and agricultural compounds on mid-size lots are the dominant structures. The average lot size is 4.6 acres. Most of the homes appear to be mid to late 20th century construction. The dominant construction type is combustible siding with an asphalt roof. Most of the residential lots have multiple outbuildings and other constructions. Storage containers are also common. Metal roofs are common on outbuildings. A few of the homes have flammable decks, projections or fences. Some homes in this area have conforming defensible space, but others have flammable ornamental plantings and native vegetation too close to the structure. Utilities are above ground. Residents are on wells or have water trucked into storage tanks. This water is private, so there is no water supply for fire suppression. There are a few (very few) homes with swimming pools that may be possible to draft from in an emergency. Most of the residences are built in a bowl surrounded by steep slopes, however some homes are built on the steep hillsides. Highway 138 is the only access to this area. Other than Highway 138, access roads are dirt. Although the average road slope is less than 5%, some access roads and driveways are steeper. There are also some narrow roads and long, narrow driveways and some areas where turnarounds for apparatus could be difficult.

Structural Ignitability Discussion – Hazard Zone B



Figure 4 Hazard Zone B

Hazard Rating:

Utilities Above or Below Ground:

General Construction:

Average Lot Size:

Dual Access Roads:

Road Widths, Slope and Surface:

Water Supply:

Proximity to Fire Station:

High

Above ground

Primarily combustible siding with ignition resistant roofs

> 10 acres

No

Variable, mostly dirt

None, see text

Station 10, approximately 4 – 10 miles

Zone Characteristics and Hazards

Single-family homes and agricultural compounds on large lots are the dominant structures. The average lot size is 10.6 acres. Most of the homes appear to be mid to late 20th century construction. The dominant construction type is combustible siding with an asphalt roof. Most of these large lots have multiple outbuildings and other constructions. Storage containers are also common. Metal roofs are common on outbuildings. A few of the homes have flammable decks, projections or fences. Many homes in this area have defensible space, but some have flammable ornamental plantings and native vegetation too close to the structure. Utilities are above ground. Residents are on wells or have water trucked into storage tanks. This water is private, so there is no water supply for fire suppression. Most of the residences are built in the flat to slightly sloping canyon bottom near CA-138, however some homes are built on steeper hillsides further away from the highway. Highway 138 is the only access to this area. Other than Highway 138, access roads are dirt. Although the average road slope is approximately 6%, some access roads and driveways are steeper. There are also some long, narrow driveways. A few of these are steep, but in general, access and turnarounds for apparatus are good. Several structures in this zone were lost in the 2016 Blue Cut Fire.

DEFENSIBLE SPACE AND GENERAL RECOMMENDATIONS

Defensible space is defined as an area around a structure that has been modified to reduce fire hazards. Both natural and manmade fuels are treated, cleared, reduced and/or substituted with ignition resistant species to slow the spread and intensity of fire. Development of defensible space involves zones in which different techniques are deployed. Every structure on the property including detached garages, storage sheds, barns, etc. as well as the home should be considered when creating defensible space zones. Specific design depends on many factors including, but not limited to, the size and shape of buildings, construction materials, topography and vegetative type.

The State of California provides literature regarding creating defensible space in the different ecosystems that present wildfire hazards in the state. This information is targeted toward protecting homes in the interface. It should be used to supplement the information contained in this report and is included as Appendix A. Some of this information will not be directly applicable to the residential area of West Cajon Valley due to the various ecosystems that are represented; however, this information is valuable and well-reviewed.

In addition to California Public Resource Code 4291, all properties in the study area must comply with the San Bernardino County Fire Hazard Abatement Ordinance, to achieve defensible space. The complete text of this ordinance is included with this report as *Appendix B San Bernardino County Fire Hazard Abatement Ordinance*.

Along with the removal of flammable fuels and the creation of non-combustible buffers around the structures, ignition resistant re-vegetation should be considered at least as far as the 100-foot perimeter of the reduced fuels zone (Zones 1 and Zone 2).⁵ In areas where it is practical and desirable, replanting with fire-wise native species and practices will provide the following benefits:

- Reduce the ability of invasive and flammable species to return.
- Protect bare soils from erosion.
- Promote natural beauty and ecological stability without sacrificing adequate wildland fire protection.

Examples of fire-wise planting practices would be to space trees widely to interrupt the continuity of aerial fuels, plant low-fuel volume shrubs (usually no greater than 18 inches in height) and integrate decorative rocks and non-combustible natural features into the landscape architecture design. Deep watering trees through the summer /fall or dry winters will keep trees alive and deter insects. Emphasis should be placed on the use of native drought-resistant plants and irrigation systems in newly planted areas. Existing native plants that are fire adapted do not have to be replaced in order to reduce the fire risk. They just need to be maintained at a “natural” fuel level and arrangement. Healthy, well-irrigated plants are less flammable and irrigation systems can be used to reduce the intensity and spread of surface fires. Vegetation within a fire-wise landscape must also be maintained to continue to provide protection from undesirable fire effects. On-going maintenance should include the removal of dead material, weed control, cutting of grasses to six inches or less in height, and tree and shrub pruning as necessary to

prevent the buildup of ladder fuels and fuel jackpots that could contribute to spotting during fires.

It is clearly not possible to develop fully conforming individual defensible space where homes are spaced very close together on small lots; however, it is possible to develop linked defensible space by building defensible perimeters around clusters of homes and replacing native and flammable ornamental plantings near and between structures with ignition resistant plantings. For the purposes of this report when we use the term “linked defensible space” it is meant to refer to extending Zone 2 (30 to 100 feet from the structure, also known as the “reduced fuel zone”) and Zone 3 (forest health maintenance extending from 100 feet from the structure to the property line, where such distances exist) treatments so they overlap between parcels forming a continuous buffer of modified fuels around a perimeter. Although the larger lot sizes and dispersed nature of properties in this area make this a much less important tactic than in areas where structures are closer together, there are still some parts of the study area where cooperation between neighbors should be considered. This is more likely to be true for properties that abut wildlands.

The general measures listed below should be noted and practiced through the study area. Some or all of these recommendations may already be in place on some properties.

1. Remain aware of the current fire danger in the area.
2. Clean roofs and gutters at least twice a year.
3. Don't store combustibles or firewood under decks or wooden projections.
4. Maintain a non-combustible surface around buildings.
5. Maintain and clean spark arresters on any chimneys.
6. Connect and have available a minimum of 50 feet of garden hose near all buildings to extinguish small fires before they spread. For large buildings two or more hoses may be required to provide adequate coverage.
7. Trees, large shrubs and other vegetation along roads and driveways should be thinned as necessary to maintain a minimum of 15 feet of vertical clearance for emergency vehicle access. Ladder fuels (low-lying branches that allow fire to climb from the ground into trees) should be removed to a height of at least eight feet above the ground for trees taller than 25 feet, or 1/3 the tree height for smaller trees. This includes both conifers and deciduous trees.
8. Maintain the defensible space around buildings by:
 - a. Mowing any grass or weeds to a height of six inches or less
 - b. Removing any branches overhanging roofs or chimneys.
 - c. Remove all trash, debris and cuttings from the defensible space. Debris and cuttings should be completely removed from the area and never dumped into adjacent wildlands or vacant lots.

It is very important to remember creating defensible space is not a one-time job. Defensible space should be maintained on an annual basis. For more information, please see Appendix A, Creating Defensible Space.

STRUCTURE HARDENING RECOMMENDATIONS

One of the most important recommendations in this report is for any new structures in the study area to be built in accordance with California's Wildland-Urban Interface Code and for existing structures to be fire hardened to the greatest extent practical.

Most of the homes in West Cajon Valley are on lots of 4 acres or more. In such areas house-to-house transmission is unlikely; however, structure fires can still produce embers and firebrands that can ignite other homes, especially under windy conditions. The authors and stakeholders of this report recognize the difficulty involved in coordinating the significant number of owners in West Cajon Valley; however, the creation and maintenance of defensible space combined with structure hardening will produce the greatest benefits for the protection of life and the conservation of property from the effects of wildfire. SBCFD and MAST may be able to assist property owners in obtaining grants to aid with outfitting existing homes with ignition resistant siding and roofs. Further information regarding California's Wildland-Urban Interface Code can be found on this website:

http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes

In their 2013 publication *How Risk Management Can Prevent Future Wildfire Disasters in the Wildland-Urban Interface* David E. Calkin, Jack D. Cohen, Mark A. Finney, and Matthew P. Thompson come to the following conclusion:

“The demonstrated inability to suppress wildfires under extreme weather conditions and the fact that many homes are not destroyed when exposed to these wildfires indicates that reducing home ignition potential is key to effectively reducing home destruction. Because home ignitions are primarily determined by conditions on private property, the principal authority, and thus, primary responsibility for preventing WUI home destruction lies with homeowners rather than public land managers.”⁶

Individual home hazard assessments can provide a road map for home owners to reduce the ignition potential of the Home Ignition Zone (HIZ) Figure 5. Individual assessments rely heavily on the evaluation of conditions existing from the structure to a minimum of 100 feet out. As such they are most effective when lot sizes are 1 acre or greater. As mentioned earlier, most of the homes in the study area are on lots larger than four acres. In an area such as this, individual parcel assessments could yield much actionable information. For that reason, we recommend individual parcel assessments for homes throughout the study area as well as focusing on reducing HIZ ignition potential through the defensible space and structure hardening tactics which are discussed in this section and the previous one.

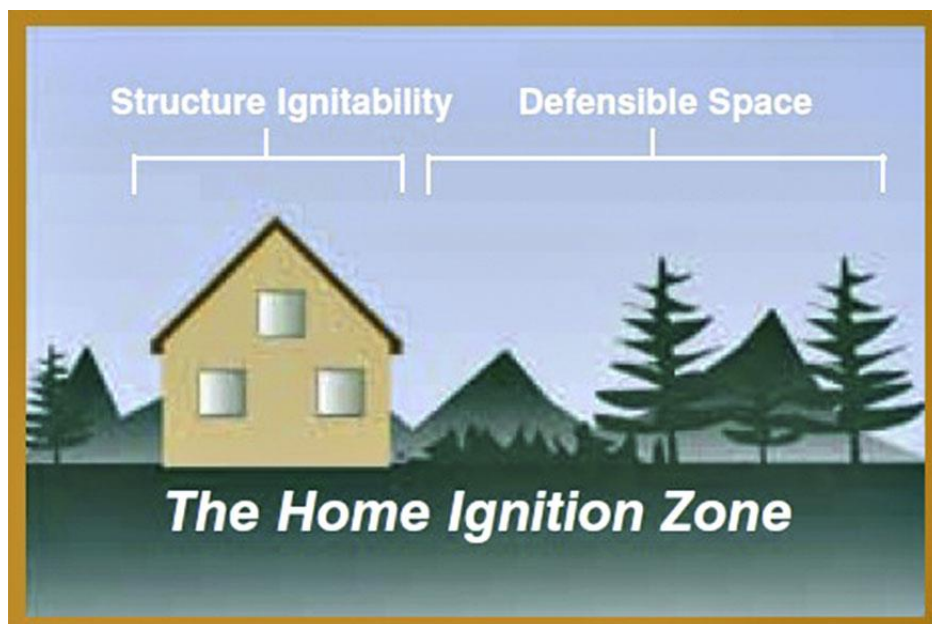


Figure 5 The Home Ignition Zone

Although some of the factors impacting the survivability of structures are best addressed before the home is built, there are still steps that should be taken to improve the survivability of existing homes.

The role of embers in structure losses cannot be overstated. Embers are generated by burning materials and lofted by wind and/or convective heat ahead of the main fire front. Structures are vulnerable to ember penetration in numerous ways. Some of the more common weaknesses are outlined below.

West Cajon Valley is fortunate in that none of the homes have wood shake roofs. The roof of a home has a significant impact on its ignitability as well as the likelihood of house-to-house spread. Class A roofing materials such as asphalt shingles, metal and tile roofs are all considered ignition resistant. We highly recommend any roofing added or replaced to new or existing structures, including outbuildings and other non-residential structures, be constructed of Class A materials.

A few homes in the study area have flammable wooden decks, exterior stairs or other projections. The shape of decks and outdoor stairs makes them excellent traps for heat and embers. Nothing flammable should ever be stored under decks or projections because of this. We recommend that as wooden decks and projections become in need of repair or replacement, non-flammable materials, such as plastic composites or aluminum decking, should be strongly encouraged. The quality and number of choices for wood substitute building materials has grown exponentially in the last decade and homeowners are no longer limited to materials with an inferior look and finish. In addition to reducing fire hazards, these materials usually require much less maintenance than wood. In areas where fire behavior predictions call for low to moderate intensities it's helpful to isolate existing wooden decks from the energy of fires by building a

non-combustible patio and wall below the deck to limit the heat trap effect. The best design is to enclose the deck completely to create a solid form.

Windows quickly fail when exposed to the radiant heat of a wildfire. Once windows have failed they provide a direct path for embers and heat to enter the home and ignite the inside. Although some homes in West Cajon Valley may have newer, more heat resistive windows, such as low E Thermopane (double glazed), and tempered glass patio doors, most of the residences are older constructions which are more likely to have conventional single pane window glass. We recommend replacing single pane windows with modern double pane windows that will improve the resistance to breakage from heat exposure by as much as double the exposure time.⁷ Homes near heavy fuels should consider installing heavy, non-flammable window coverings that will afford the home some additional protection from embers in the event windows break. Homes with heavy loads of trees or shrubs nearby should also consider replacing large windows (2 feet or more wide or tall) with smaller panes more likely to stay in place even if fractured by heat.

Vents are another location where embers can enter the structure. Vents, especially vents on the downhill side of the home, should have flammable vegetation removed as per applicable Zone 1 defensible space standards for the community and be protected by non-flammable landscaping features such as stone or brick that will block the heat path of the fire. Vents in eaves and soffits should be covered with a non-combustible mesh with openings ¼” or smaller. Any open eaves should be enclosed to prevent them from becoming a trap for heat and embers. When enclosing an open eave, a flat soffit is preferred over a sloping soffit to limit the heat trap effect.

To reinforce the message of the research quoted at the beginning of this section, historic fire events have proven that poor construction is linked directly to structure loss. The Insurance Institute for Business and Home Safety (IBHS) wildfire research center has developed a series of videos demonstrating how various home constructions burn (<https://www.youtube.com/watch?v=IvbNOPSYyss>).

More information regarding structure hardening can be found at the following links:

- <http://www.firesafemarin.org/hardening-your-home/siding>
- <https://disastersafety.org/wildfire/ibhs-wildfire-research/> (IBHS videos on embers)
- https://www.fema.gov/media-library-data/20130726-1652-20490-4085/fema_p_737.pdf
- <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1141> National Fire Protection Association (NFPA) 1141, Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas.

LANDSCAPE SCALE RECOMMENDATIONS

When most people think of a fuelbreak they envision a line usually 10 to 30 feet wide where all vegetation has been removed to mineral soil (Figure 6); however, the concept of a fuelbreak can describe any area where fuels have been manipulated to strategically reduce the spread and intensity of wildfire. Since the concept of a fuelbreak is more nebulous than the specific definitions of “fireline” and “firebreak” as used by wildland firefighters, the effectiveness of fuelbreaks has been the subject of debate among fire scientists and forest managers for many years. The concept of a “shaded fuelbreak” is most applicable to forested areas. Unlike firebreaks, which imply the removal of all vegetation down to mineral soil, shaded fuelbreaks are created by altering the surface fuels, increasing the height to the base of the live crown and opening the canopy by removing trees.⁸ It is important to note the purpose of a fuelbreak is not to stop a fire, but to give firefighters a higher probability of successfully attacking the fire.⁹ Once installed, fuelbreaks require regular maintenance to ensure they will perform the task of altering the behavior of fire entering the treated area. Some of the concepts of shaded fuelbreak creation and maintenance may also be applicable to shrub lands, depending on the type, canopy height and density of shrubs.

There is much discussion as to how far fuels modifications must extend for fuelbreaks to be effective. The recommendations in this report are general in nature and the specific design of any fuelbreak should be referred to qualified experts familiar with both the vegetation and fire behavior of the area.



Figure 6 Firebreak in Mendocino County

Recommendations

The 2016 Blue Cut Fire reduced fuel loads in the wildlands surrounding homes in this area; however, in Hazard Zone A, large areas of chaparral still exist with some dense stands of Joshua trees mixed in (see Figure 7). We recommend residents partner with SBCFD to create and maintain a program of thinning these fuels between structures. Since most of this land is private, property owner involvement will be crucial to managing these hazardous fuel loads. Chaparral can be an especially dangerous fuel, and as the Blue Cut Fire proved, desert residents are not immune from the effects of wildfire.



Figure 7 Thick stands of chaparral and Joshua trees in Hazard Zone A

We also recommend where homes border the San Bernardino National Forest and other public lands, residents monitor regrowth from the Blue Cut Fire and where appropriate, engage public land managers to cooperatively create and manage fuelbreaks extending from their properties into the adjacent public lands. The USFS Good Neighbor Policy can be especially helpful to property owners whose land abuts national forest; however, cooperation between neighboring private property owners will be necessary to create and maintain any significant perimeter fuelbreak.

WATER SUPPLY FOR FIRE SUPPRESSION

There is currently no water supply for fire suppression in the study area. The nearest hydrants are located on CA-2 west of CA-138. Residents are on wells or have water trucked into storage tanks. This water is private and not generally available for fire suppression. There are a few (very few) homes with swimming pools that may be possible to draft from in an emergency. A dedicated water supply for fire suppression is a critical need for first responders in West Cajon Valley.

Recommendations

In the *Firefighting Capabilities and Local Preparedness* section of this report we recommended investigating the possibility locating an unmanned or volunteer (PCF) station in Hazard Zone A that could be used to house a water tender and a water supply. If this is not feasible we would still recommend locating a water tank of at least 1,500 gallons for fire suppression somewhere in Hazard Zone A. This tank should be fitted with appropriate connections for SBCFD apparatus.

Investigate the possibility of SBCFD working jointly with the Mormon Rocks Fire Station to construct a similar water tank of at least 1,500 gallons for fire suppression on their property. If possible, a water tender should also be stationed at the Mormon Rocks Fire Station to supply the southern portion of West Cajon Valley with water for fire suppression from this tank.

An inspection of any water tanks installed for fire suppression and all their exposed plumbing should be conducted on an annual basis.

If there is not one already there, consider stationing a water tender at the Phelan Fire Station (Station 10) available for response to fires in West Cajon Valley at all times.

ACCESS/EGRESS ROUTES & EVACUATION RECOMMENDATIONS

There is only one reliable access in and out of the residential areas of West Cajon Valley. CA-138 between CA-2 and Lone Pine Canyon Road is the only access to homes and businesses in the study area. Access into individual properties and neighborhoods of the study area from CA-138 is on dirt roads. Street signage and address markings throughout these dirt roads are generally poor. While most of the main access roads are of adequate width, long, narrow drives are the only access to some properties. Average slope grades for these dirt roads are 4.6 % for Hazard Zone A and 6% for Hazard Zone B; however, there are some streets and driveways with steeper slopes. For all these dirt access roads and driveways, it will be critical to maintain a good, all-weather driving surface as well as an adequate clearing for emergency vehicles.

Recommendations

As mentioned above missing or inadequate street and address markers are an issue. Some streets in the study area do not have any markings at junctions and many homes do not have an address marker visible from the street. Where address markers do exist, they are of all types with no particular system for size or position. Although mapping applications such as Google Map and Waze have made it easier for responders to locate specific structures, reflective addressing that is visible from the street is still desirable. Most applications relying on GPS technology have some difficulty pinpointing addresses from time to time. While some residents may consider reflective street and address signage to be unattractive, it is essential for quick and effective response. The value to responders, especially at night and under difficult conditions, is not to be underestimated. This is especially true during large wildland fires where poor addressing will create an additional challenge for outside responders who do not have local knowledge and training on local access.

Although consistent, reflective address markers seem less important with today's technology it is important to remember that technology does fail and a program of improving address markers throughout West Cajon Valley is still desirable. We recommend SBCFD, San Bernardino County government, contractors/developers and homeowners work together to create and implement a consistent system of reflective street and address markers.

Evacuation would be the first priority for homes in West Cajon Valley threatened by wildfire. Evacuation plans for this area should be reviewed by SBCFD on an annual basis and residents encouraged to perform drills on a semi-annual basis to ensure they are familiar with how to efficiently evacuate during an emergency.

GRANT RESOURCES

One of the biggest obstacles to overcome when trying to implement CWPP recommendations and wildfire mitigation projects is funding. A certified CWPP opens a multitude of funding sources to complete work outlined in the plan. For many mitigation projects, federal, state and county funds are available to begin treatments. The list below is not inclusive, but rather serves as a starting point for the most commonly available sources of funding and outreach.

Federal Emergency Management Agency (FEMA)

- **Assistance to Firefighters Grant Program**
 - Purpose: to improve firefighting operations, purchase firefighting vehicles, equipment and personal protective equipment; fund fire prevention programs; and establish wellness and fitness programs.
 - Necessary information includes a DUNS number, Tax ID number and Central Contractor Registration
 - <https://www.fema.gov/welcome-assistance-firefighters-grant-program>
- **SAFER: Staffing for Adequate Fire and Emergency Response**
 - Purpose: to provide funding directly to fire departments and volunteer firefighter interest organizations in order to help them increase the number of trained, “front line” firefighters available in their communities. The goal of SAFER is to enhance the ability of local fire departments to comply with staffing, response and operational standards established by NFPA and OSHA.
 - <https://www.fema.gov/staffing-adequate-fire-emergency-response-grants>
- **Fire Prevention and Safety Grants (FP&S)**
 - Purpose: FP&S Grants are part of the Assistance to Firefighters Grants and are under the purview of the Grant Programs Directorate in FEMA. Their purpose is to support projects that enhance the safety of the public and firefighters from fire and related hazards.
 - <https://www.fema.gov/fire-prevention-safety-grants>
- **Hazard Mitigation Assistance Grant Program (HMA)**
 - Purpose: to provide grants to state and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The goal of HMA is to reduce the loss of life and property due to natural disasters and enable mitigation measures to be implemented during the immediate recovery from a disaster.
 - https://www.fema.gov/media-library-data/1441133724295-0933f57e7ad4618d89debd1ddc6562d3/FEMA_HMA_Grants_4pg_2015_508.pdf

- **Pre-Disaster Mitigation Grant Program (PDM)**
 - Purpose: to provide funds to states, territories, Tribal governments, communities, and universities for hazard-mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces the overall risks to the population and structures.
 - <https://www.fema.gov/pre-disaster-mitigation-grant-program>

CAL FIRE grants

- **SRA Fire Prevention Fee Grant (SRAFPF)**

Purpose: provides funding for projects related to fuel (vegetation) hazard reduction, fire prevention education and training, and fire prevention planning. Projects funded by the SRAFPF will reduce the risk of fire ignition and spread in and adjacent to communities, educate owners of habitable structures about wildfire risks, or allow for strategic, long-term planning to reduce the risk of wildfire to communities in the SRA throughout the State
- **California Forest Improvement Program (CFIP)**

Purpose: encourage private and public investment in, and improved management of, California forest lands and resources. This focus is to ensure adequate high quality timber supplies, related employment and other economic benefits, and the protection, maintenance, and enhancement of a productive and stable forest resource system for the benefit of present and future generations.
- <http://www.fire.ca.gov/grants>

Natural Resources Conservation Grants

- **Environmental Quality Incentives Program (EQIP)**

Purpose: provides financial and technical assistance to agricultural producers to plan and implement conservation practices that improve soil, water, plant, animal, air and related natural resources on agricultural land and non-industrial private forestland. EQIP may also help producers meet Federal, State, Tribal, and local environmental regulations.

Firewise Communities

- Purpose: a multi-agency organization designed to increase education of homeowners, community leaders, developers, and others regarding the Wildland-Urban Interface and the actions they can take to reduce fire risk to protect lives, property and ecosystems.
- <http://www.firewise.org>

National Volunteer Fire Council

- Purpose: to support volunteer fire protection districts. Includes both federal and non-federal funding options and grant writing help.

- <http://www.nvfc.org/>

National Resources Conservation Service Emergency Watershed Protection Program

- Purpose: to undertake emergency measures including the purchase of flood plain easements for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed.
- <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ewp/>

USFS Cooperative Forestry Assistance

- Purpose: to assist in the advancement of forest resources management, the control of insects and diseases affecting trees and forests, the improvement and maintenance of fish and wildlife habitat, and the planning and conduct of urban and community forestry programs.
- <http://www.fs.fed.us/cooperativeforestry/programs/loa/>

REFERENCES/CITATIONS

¹ http://calfire.ca.gov/communications/downloads/fact_sheets/CoopResponse.pdf

² *ibid*

³ <http://www.sbcfire.org/about/AboutSBCFire.aspx>

⁴ <https://www.fema.gov/welcome-assistance-firefighters-grant-program>

⁵ Zone 1 extends from the structure out to 30 feet and Zone 2 extends from 30 feet from the structure to 100 feet or the property line if that distance is less than 100 feet.

⁶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3896199/>

⁷ <https://www.coloradowildfirerisk.com/Help/FireWiseHome>, Page 30.

⁸ James K. Agee, Benii Bahro, Mark A. Finney, Philip N. Omi, David B. Sapsis, Carl N. Skinner, Jan W. van Wagtendonk, and C. Philli Weatherspoon, "The Use of Fuelbreaks in Landscape Fire Management", <http://www.qlg.org/pub/miscdoc/agee.htm>

⁹ *Ibid*

Appendix A Creating Defensible Space

Purpose

Throughout this report, the focus has been on the importance and effectiveness of creating and maintaining defensible space. This appendix contains information produced by the state of California focused on creating defensible space in the different ecosystems that pose wildfire hazards in the state. This information should be used to supplement the information contained within the body of the report. There will be some crossover of information and techniques regarding how to protect homes from wildfire. Some of the information in this appendix will not be directly applicable to areas within the West Cajon Valley WI due to various ecosystems addressed by this literature and some of the specific challenges related to these communities. This information, however, is valuable and well-reviewed.

General Guidelines for Creating Defensible Space

State Board of Forestry and Fire Protection (BOF)
California Department of Forestry and Fire Protection

Adopted by BOF on February 8, 2006
Approved by Office of Administrative Law on May 8th, 2006



Contents

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A. Purpose of Guidelines

Recent changes to Public Resources Code (PRC) 4291 expand the defensible space clearance requirement maintained around buildings and structures from 30 feet to a distance of 100 feet. These guidelines are intended to provide property owners with examples of fuel modification measures that can be used to create an area around buildings or structures to create defensible space. A defensible space perimeter around buildings and structures provide firefighters a working environment that allows them to protect buildings and structures from encroaching wildfires as well as minimizing the chance that a structure fire will escape to the surrounding wildland. These guidelines apply to any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining any mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or any land that is covered with flammable material, and located within a State Responsibility Area.



Effective defensible space

The vegetation surrounding a building or structure is fuel for a fire. Even the building or structure itself is considered fuel. Research and experience have shown that fuel reduction around a building or structure increases the probability of it surviving a wildfire. Good defensible space allows firefighters to protect and save buildings or structures safely without facing unacceptable risk to their lives. Fuel reduction through vegetation management is the key to creating good defensible space.

Terrain, climate conditions and vegetation interact to affect fire behavior and fuel reduction standards. The diversity of California's geography also influences fire behavior and fuel reduction standards as well. While fuel reduction standards will vary throughout the State, there are some common practices that guide fuel modification treatments to ensure creation of adequate defensible space:

- Properties with greater fire hazards will require more clearing. Clearing requirements will be greater for those lands with steeper terrain, larger and denser fuels, fuels that are highly volatile, and in locations subject to frequent fires.
- Creation of defensible space through vegetation management usually means reducing the amount of fuel around the building or structure, providing separation between fuels, and or reshaping retained fuels by trimming. Defensible space can be created removing dead vegetation, separating fuels, and pruning lower limbs.
- In all cases, fuel reduction means arranging the tree, shrubs and other fuels sources in a way that makes it difficult for fire to transfer from one fuel source to another. It does not mean cutting down all trees and shrubs, or creating a bare ring of earth across the property.
- A homeowner's clearing responsibility is limited to 100 feet away from his or her building or structure or to the property line, whichever is less, and limited to their land. While individual property owners are not required to clear beyond 100 feet, groups of property owners are encouraged to extend clearances beyond the 100 foot requirement in order to create community-wide defensible spaces.
- Homeowners who do fuel reduction activities that remove or dispose of vegetation are required to comply with all federal, state or local environmental protection laws and obtain permits when necessary. Environmental protection laws include, but are not limited to, threatened and endangered species, water quality, air quality, and cultural/archeological resources. For example, trees removed for fuel reduction that are used for commercial purposes require permits from the

California Department of Forestry and Fire Protection. Also, many counties and towns require tree removal permits when cutting trees over a specified size. Contact your local resource or planning agency officials to ensure compliance.

The methods used to manage fuel can be important in the safe creation of defensible space. Care should be taken with the use of equipment when creating your defensible space zone. Internal combustion engines must have an approved spark arresters and metal cutting blades (lawn mowers or weed trimmers) should be used with caution to prevent starting fires during periods of high fire danger. A metal blade striking a rock can create a spark and start a fire, a common cause of fires during summertime.

Vegetation removal can also cause soil disturbance, soil erosion, regrowth of new vegetation, and introduce non-native invasive plants. Always keep soil disturbance to a minimum, especially on steep slopes. Erosion control techniques such as minimizing use of heavy equipment, avoiding stream or gully crossings, using mobile equipment during dry conditions, and covering exposed disturbed soil areas will help reduce soil erosion and plant regrowth.

Areas near water (riparian areas), such as streams or ponds, are a particular concern for protection of water quality. To help protect water quality in riparian areas, avoid removing vegetation associated with water, avoid using heavy equipment, and do not clear vegetation to bare mineral soil.

B. Definitions

Defensible space: The area within the perimeter of a parcel where basic wildfire protection practices are implemented, providing the key point of defense from an approaching wildfire or escaping structure fire. The area is characterized by the establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures.

Aerial fuels: All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush. Examples include trees and large bushes.

Building or structure: Any structure used for support or shelter of any use or occupancy.

Flammable and combustible vegetation: Fuel as defined in these guidelines.

Fuel Vegetative material, live or dead, which is combustible during normal summer weather. For the purposes of these guidelines, it does not include fences, decks, woodpiles, trash, etc.

Homeowner: Any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining any mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or any land that is covered with flammable material, and located within a State Responsibility Area.

Ladder Fuels: Fuels that can carry a fire vertically between or within a fuel type.

Reduced Fuel Zone: The area that extends out from 30 to 100 feet away from the building or structure (or to the property line, whichever is nearer to the building or structure).

Surface fuels: Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branches and downed logs.

C. Fuel Treatment Guidelines

The following fuel treatment guidelines comply with the requirements of 14 CCR 1299 and PRC 4291. **All persons using these guidelines to comply with CCR 1299 and PRC 4291 shall implement General Guidelines 1., 2., 3., and either 4a or 4b., as described below.**

General Guidelines:

1. Maintain a firebreak by removing and clearing away all flammable vegetation and other combustible growth within 30 feet of each building or structure, with certain exceptions pursuant to PRC §4291 (a). Single specimens of trees or other vegetation may be retained provided they are well-spaced, well-pruned, and create a condition that avoids spread of fire to other vegetation or to a building or structure.
2. Dead and dying woody surface fuels and aerial fuels within the Reduced Fuel Zone shall be removed. Loose surface litter, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches, shall be permitted to a depth of 3 inches. This guideline is primarily intended to eliminate trees, bushes, shrubs and surface debris that are completely dead or with substantial amounts of dead branches or leaves/needles that would readily burn.
3. Down logs or stumps anywhere within 100 feet from the building or structure, when embedded in the soil, may be retained when isolated from other vegetation. Occasional (approximately one per acre) standing dead trees (snags) that are well-spaced from other vegetation and which will not fall on buildings or structures or on roadways/driveways may be retained.
4. Within the Reduced Fuel Zone, one of the following fuel treatments (4a. or 4b.) shall be implemented. Properties with greater fire hazards will require greater clearing treatments. Combinations of the methods may be acceptable under §1299(c) as long as the intent of these guidelines is met.

4a. Reduced Fuel Zone: Fuel Separation

In conjunction with General Guidelines 1., 2., and 3., above, minimum clearance between fuels surrounding each building or structure will range from 4 feet to 40 feet in all directions, both horizontally and vertically.

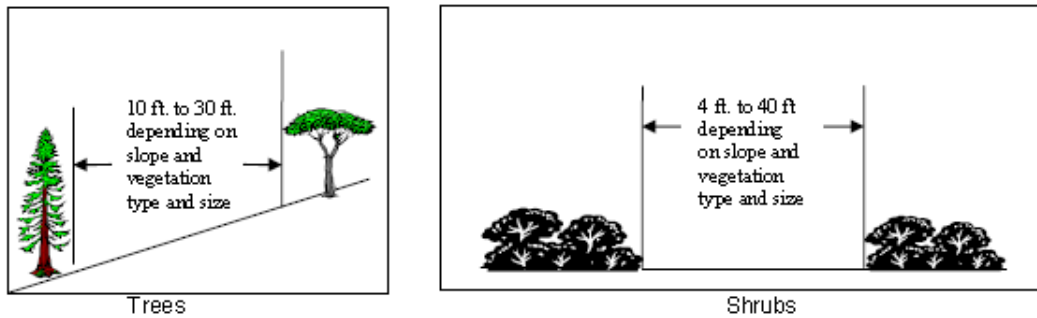
Clearance distances between vegetation will depend on the slope, vegetation size, vegetation type (brush, grass, trees), and other fuel characteristics (fuel compaction, chemical content etc.). Properties with greater fire hazards will require greater separation between fuels. For example, properties on steep slopes having large sized vegetation will require greater spacing between individual trees and bushes (see Plant Spacing Guidelines and Case Examples below). Groups of vegetation (numerous plants growing together less than 10 feet in total foliage width) may be treated as a single plant. For example, three individual manzanita plants growing together with a total foliage width of eight feet can be "grouped" and considered as one plant and spaced according to the Plant Spacing Guidelines in this document.



Grass generally should not exceed 4 inches in height. However, homeowners may keep grass and other forbs less than 18 inches in height above the ground when these grasses are isolated from other fuels or where necessary to stabilize the soil and prevent erosion.

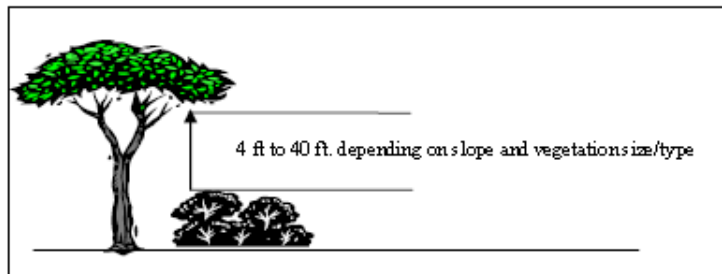
Clearance requirements include:

- Horizontal clearance between aerial fuels, such as the outside edge of the tree crowns or high brush. Horizontal clearance helps stop the spread of fire from one fuel to the next.



Horizontal clearance between aerial fuels

- Vertical clearance between lower limbs of aerial fuels and the nearest surface fuels and grass/weeds. Vertical clearance removes *ladder fuels* and helps prevent a fire from moving from the shorter fuels to the taller fuels.



Vertical clearance between aerial fuels



Effective vertical and horizontal fuel separation
Photo Courtesy
Plumas Fire Safe Council.

Plant Spacing Guidelines		
Guidelines are designed to break the continuity of fuels and be used as a "rule of thumb" for achieving compliance with Regulation 14 CCR 1299.		
Trees	Minimum horizontal space from edge of one tree canopy to the edge of the next	
	Slope	Spacing
	0% to 20 %	10 feet
	20% to 40%	20 feet
	Greater than 40%	30 feet
Shrubs	Minimum horizontal space between edges of shrub	
	Slope	Spacing
	0% to 20 %	2 times the height of the shrub
	20% to 40%	4 times the height of the shrub
	Greater than 40%	6 times the height of the shrub
Vertical Space	Minimum vertical space between top of shrub and bottom of lower tree branches: 3 times the height of the shrub	

Adapted from: Gilmer, M. 1994. California Wildfire Landscaping

Case Example of Fuel Separation: Sierra Nevada conifer forests

Conifer forests intermixed with rural housing present a hazardous fire situation. Dense vegetation, long fire seasons, and ample ignition sources related to human access and lightning, makes this home vulnerable to wildfires. This home is located on gentle slopes (less than 20%), and is surrounded by large mature tree overstory and intermixed small to medium size brush (three to four feet in height).

Application of the guideline under 4a. would result in horizontal spacing between large tree branches of 10 feet; removal of many of the smaller trees to create vertical space between large trees and smaller trees and horizontal spacing between brush of six to eight feet (calculated by using 2 times the height of brush).



Case Example of Fuel Separation: Southern California chaparral

Mature, dense and continuous chaparral brush fields on steep slopes found in Southern California represents one of the most hazardous fuel situations in the United States. Chaparral grows in an unbroken sea of dense vegetation creating a fuel-rich path which spreads fire rapidly. Chaparral shrubs burn hot and produce tall flames. From the flames come burning embers which can ignite homes and plants. (Gilmer, 1994). All these factors results in a setting where aggressive defensible space clearing requirements are necessary.



Steep slopes (greater than 40%) and tall, old brush (greater than 7 feet tall), need significant modification. These settings require aggressive clearing to create defensible space, and would require maximum spacing. Application of the guidelines would result in 42 feet horizontal spacing (calculated as 6 times the height of the brush) between retained groups of chaparral.

Case Example of Fuel Separation: Oak Woodlands

Oak woodlands, the combination of oak trees and other hardwood tree species with a continuous grass ground cover, are found on more than 10 million acres in California. Wildfire in this setting is very common, with fire behavior dominated by rapid spread through burning grass.

Given a setting of moderate slopes (between 20% and 40%), wide spacing between trees, and continuous dense grass, treatment of the grass is the primary fuel reduction concern. Property owners using these guidelines would cut grass to a maximum 4 inches in height, remove the clippings, and consider creating 20 feet spacing between trees.



4b. Reduced Fuel Zone: Defensible Space with Continuous Tree Canopy

To achieve defensible space while retaining a stand of larger trees with a continuous tree canopy apply the following treatments:

- Generally, remove all surface fuels greater than 4 inches in height. Single specimens of trees or other vegetation may be retained provided they are well-spaced, well-pruned, and create a condition that avoids spread of fire to other vegetation or to a building or structure.
- Remove lower limbs of trees ("prune") to at least 6 feet up to 15 feet (or the lower 1/3 branches for small trees). Properties with greater fire hazards, such as steeper slopes or more severe fire danger, will require pruning heights in the upper end of this range.

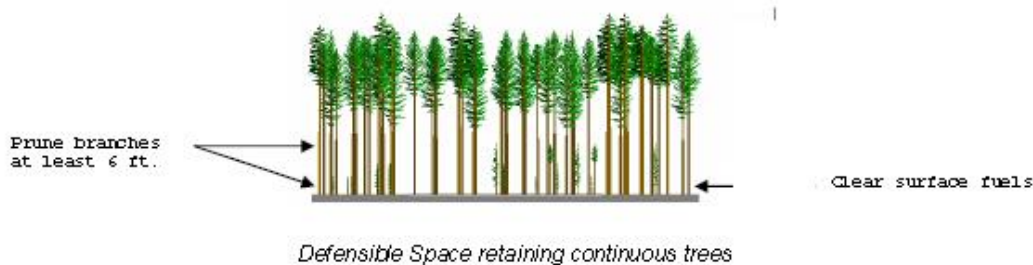


Photo Courtesy Pumas Fire Safe Council.



Defensible space with continuous tree canopy by clearing understory and pruning

Authority cited: Section 4102, 4291, 4125-4128.5, Public Resource Code. Reference: 4291, Public Resource Code; 14 CCR 1299 (d).

Appendix B San Bernardino County Fire Hazard Abatement Ordinance

REPORT/RECOMMENDATION TO THE BOARD OF SUPERVISORS SAN BERNARDINO COUNTY, CALIFORNIA AND RECORD OF ACTION

October 7, 2008

Continued from Tuesday, September 23, 2008, Item 83

**FROM: DENNIS HANSBERGER, Third District Supervisor
Board of Supervisors**

**SUBJECT: 2nd Reading/Final Adoption - ORDINANCE PERTAINING TO THE
ABATEMENT OF FIRE HAZARDS AND HAZARDOUS TREES AND FIRE
ACCESS ROAD OBSTRUCTIONS**

RECOMMENDATION(S)

Adopt **Ordinance No. 4058** amending Sections 23.0301, 23.0304, 23.0307 and 23.0308 of Chapter 3 of Division 3 of Title 2 of the San Bernardino County Code relating to abatement of fire hazards and hazardous trees and fire access road obstructions.

(Presenter: Peter S. Brierty, Assistant Chief/Fire Marshal, 909-936-5533)

BACKGROUND INFORMATION

The proposed ordinance amending relating to abatement of fire hazards and hazardous trees and fire access road obstructions had its first reading on September 23, 2008. The recommendation before the Board of Supervisors today will adopt this ordinance on the consent calendar.

SUPERVISORIAL DISTRICT(S)

All

Page 1 of 1

w/ Ordinance
cc: Co. Fire-Brierty
BOS 3rd-Hansberger
Co. Counsel-Messer
CAO-Thies
ed File-SDD-Fire Districts-SBCFPD
10/8/08
Ordinance No. 4058
ITEM 107

Rev 0706R1

Record of Action of the Board of Supervisors

APPROVED (CONSENT CALENDAR)

COUNTY OF SAN BERNARDINO
Board of Supervisors

MOTION	AYE 1	AYE 2	SECOND 3	ABSENT 4	MOVE 5
DENA M. SMITH, CLERK OF THE BOARD					
BY					

DATED: October 07, 2008

ORDINANCE NO. 4058

AN ORDINANCE OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA,
AMENDING SECTIONS 23.0301, 23.0304, 23.0307 AND 23.0308 OF
CHAPTER 3 OF DIVISION 3 OF TITLE 2 OF THE SAN BERNARDINO
COUNTY CODE, RELATING TO ABATEMENT OF FIRE HAZARDS AND
HAZARDOUS TREES AND FIRE ACCESS ROAD OBSTRUCTIONS.

The Board of Supervisors of the County of San Bernardino, State of California,
ordains as follows:

SECTION 1. Section 23.0301 of Chapter 3 of Division 3 of Title 2 of the San
Bernardino County Code is amended, to read:

23.0301 Duty to Abate Fire Hazards or Hazardous Trees.

Every owner or person in control of any land or interest therein in the unincorporated
area of the County of San Bernardino shall abate all fire hazards and hazardous trees from
such land and from all sidewalks, parkways, road easements and all other easements on
such land. All such fire hazards and hazardous trees are declared to be a public nuisance
for which the costs of abatement may be specially assessed pursuant to Government Code
Section 25845. To provide firefighters defensible space and to minimize the spread of
fire within one hundred (100) feet of a building or structure and pursuant to the California
Public Resources Code Section 4291, every owner and person in control of any buildings
or structures in, upon, or adjoining any mountainous area, forest-covered lands, brush-
covered lands, grass-covered lands, or any land that is covered with flammable material
within the unincorporated area of the County of San Bernardino shall at all times do the
following:

(a) Maintain a firebreak by removing and clearing away, for a distance of
not less than thirty (30) feet on each side of the building or structure or to the property line,
whichever is nearer, all flammable vegetation or other combustible growth. Single
specimens of trees or other vegetation may be retained provided they are well-spaced,
well-pruned as defined in section 23.0304 for mountain areas in this chapter, and create a
condition that avoids spread of fire to other vegetation or to a building or structure.

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1 (b) Provide a fuel break within thirty (30) feet to one hundred (100) feet of
2 a building or structure by disrupting the vertical and/or horizontal continuity of flammable
3 and combustible vegetation with the goal of reducing fire intensity, inhibiting fire in the
4 crowns of trees, reducing the rate of fire spread, and providing a safer environment for
5 firefighters to suppress wildfire and provide structure protection in and around wildland
6 urban interface communities. Additional fire protection or firebreak shall be made by the
7 removal of brush, flammable vegetation, or combustible growth that is located within one
8 hundred (100) feet from the building or structure or to the property line or at a greater
distance if provided by law.

9 (c) Property owners who do fuel reduction activities that remove or
10 dispose of vegetation should make every effort to properly reuse and/or recycle the
11 resultant materials either on site or at an appropriate off site facility, without creating
12 additional fire hazards and are required to comply with all federal, state or local
13 environmental protection laws and obtain permits when necessary. Environmental
14 protection laws include, but are not limited to, threatened and endangered species, water
15 quality, air quality, and cultural/archeological resources.

16 SECTION 2. Section 23.0304 of Chapter 3 of Division 3 of Title 2 of the San
17 Bernardino County Code is amended, to read:

18
19 **23.0304 Mountain Area Fire Hazard Abatement.**

20 (a) "Mountain Area" means that portion of the unincorporated area of the
21 County of San Bernardino located within the Fire Safety Overlay of the General Plan,
22 whether publicly or privately owned, and does include National Forest land.

23 (b) Flammable vegetation which constitutes a fire hazard in the "Mountain
24 Area" means:

25 (1) All foliage and branches within six (6) feet from the ground on
26 trees over twelve (12) feet in height that stand within one hundred (100) feet of structures.
27 Limbs should be cut no less than one quarter ($\frac{1}{4}$) inch from the trunk of the tree to preserve
28 the health of the tree.

(2) All trees that are within thirty (30) feet of structures that are

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- 1 (2) Combustible rubbish, waste or discarded materials.
2 (3) Leaves, needles or other dead vegetative growth on roofs or
3 structures.

4
5 (d) When neighboring persons or properties are especially vulnerable to
6 the effects of fire, including, but not limited to schools, hospitals, mobilehome parks,
7 residential occupancies, it is the responsibility of the property owner to adhere to the
8 provisions of this section when flammable vegetation stands within one hundred (100) feet,
9 measured on the ground, of all neighboring structures. Additional clearance may be
10 required at the discretion of the County Fire Chief/Fire Warden or their designee on
11 buildings listed above that may be used as evacuation centers, medical facilities and/or
12 places of public gatherings and/or critical infrastructure.

13 SECTION 3. Section 23.0307 of Chapter 3 of Division 3 of Title 2 of the San
14 Bernardino County Code is amended, to read:

15 **23.307 Enforcement.**

16 For the purpose of enforcing this chapter, the County Fire Chief/Fire Warden may
17 designate any person as his/her deputy in the performance of the duties enjoined upon him
18 or her by this chapter. In addition, each of the following officers within the County of San
19 Bernardino is hereby designated to perform the same duties within the territory of the
20 political subdivision which they serve. Whenever the term "County Fire Chief" is used in
21 this chapter, the following officers are included in the meaning of such phrase, except that
22 the County Fire Chief/Fire Warden shall coordinate all such officers in the performance of
23 these duties:

24 (a) The Deputy Director of Code Enforcement, Fire Hazard Abatement
25 Program and their designees.

26 (b) The San Bernardino County Land Use Services Director or designee.

27 (c) Other officers hereafter designated by the Board of Supervisors or the
28 County Fire Chief/Fire Warden.

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1 SECTION 4. Section 23.0308 of Chapter 3 of Division 3 of Title 2 of the San
2 Bernardino County Code is amended, to read:

3
4 **23.0308 Notice and Order to Abate.**

5 (a) It shall be the duty of the County Fire Chief/Fire Warden or any
6 designated person, whenever such officer deems it necessary to enforce the provisions of
7 this chapter, to issue a "Notice and Order to Abate" by any or all of the following methods:

8 (1) By mailing a notice to the owner at the address shown on the
9 latest tax roll.

10 (2) By personal service to the owner as shown on the latest tax roll.

11 (3) By posting the property.

12 (b) The form "Notice and Order to Abate Fire" shall include, at a minimum,
13 the following information:

14
15 (1) List of hazards.

16 (2) List of locations.

17 (3) Due date by which abatement must be completed.

18 (4) Appeal rights.

19 (5) Landowner's name and address (situs and assessor's).

20 (6) Parcel number of affected property.

21
22 (c) The Notice and Order to Abate shall be placed in the mail by the
23 issuing agency at least thirty (30) days prior to the "due date" for abatement on the notice.

24 (d) A ten (10) day extension for compliance is sent when the owner has
25 removed greater than 51% of the fire hazard and notified the agency that the hazard has
26 been abated, but nevertheless the agency determines the fire hazard still exists. A ten (10)
27 day extension for compliance shall be placed in the mail by the issuing agency at least ten
28 (10) calendar days prior to the "due date" for abatement on the notice.

 (e) Compliance will be considered "In-Progress" and the Non-Compliance
Notice and Order will be held in abeyance if the responsible property owner contracts with

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1 State or Federal agencies or non profit organizations, such as Forest Care or Fire Safe
2 Councils, that are approved by the County Fire Chief/Fire Warden as capable of providing
3 compliance through said contract.

4
5 SECTION 5. This ordinance shall take effect thirty (30) days from the date of
6 adoption.

7
8 
9 PAUL BIANE, Chairman
Board of Supervisors

10 SIGNED AND CERTIFIED THAT A COPY
11 OF THIS DOCUMENT HAS BEEN DELIVERED
12 TO THE CHAIRMAN OF THE BOARD

13 DENA M. SMITH, Clerk of the
14 Board of Supervisors

15 
16

17
18 STATE OF CALIFORNIA)
19) ss.
COUNTY OF SAN BERNARDINO)

20 I, DENA M. SMITH, Clerk of the Board of Supervisors of the County of San
21 Bernardino, State of California, hereby certify that at a regular meeting of the Board of
22 Supervisors of said County and State, held on the 7th day of October, 2008,
at which meeting were present Supervisors: Mitzelfelt, Biane, Hansberger
23 and Gonzales

24 _____, and the
Clerk, the foregoing ordinance was passed and adopted by the following vote, to wit:

25 AYES: SUPERVISORS: **Mitzelfelt, Biane, Hansberger, Gonzales**

26 NOES: SUPERVISORS: **None**

27
28 ABSENT: SUPERVISORS: **Ovitt**

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1 IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official
2 seal of the Board of Supervisors this 7th day of October, 2008.

3 DENA M. SMITH, Clerk of the
4 Board of Supervisors of the
5 County of San Bernardino,
6 State of California

7 Deputy

8
9 Approved as to Form:
10 RUTH E. STRINGER,
11 County Counsel

12 By: Kenneth C. Hardy
13 Kenneth C. Hardy
14 Deputy County Counsel

15 Date: 9/30/08
16
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