Angelus Oaks

Community Wildfire Protection Plan Update

2018

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2131 UPLAND AVENUE
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MUTUAL AGREEMENT PAGE

This Community Wildfire Protection Plan developed by the Inland Empire Fire Safe Alliance and the Angelus Oaks Fire Safe Council:

- Was collaboratively developed. Interested parties, fire management agencies 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 communities in the study area.
- This plan recommends measures to reduce ignitability of structures throughout the area addressed by the plan.

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

Angelus Oaks Fire Safe Council, by Norm Cione

Inland Empire Fire Safe Alliance, by Laura Dyberg, Chairman

County of San Bernardino Fire, by Kathleen Oplinger, Assistant Chief

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

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

INTRODUCTION

This CWPP update was developed by the Inland Empire Fire Safe Alliance (IEFSA) and the Angelus Oaks Fire Safe Council (AOFSC) with guidance and support from San Bernardino County Fire Department (SBCFD), 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.

This document is the result of a study to identify and quantify changes in conditions or values at risk that could affect fire protection planning and response in the Wildland-Urban Interface (WUI) and Wildland Intermix (WI) portions of the study area. The WUI is also known as the Urban Edge Ember Zone. It is the area where encroaching wildland fuels could create a fire hazard to what would in a different setting be an urban development. The WI consists of communities where homes are surrounded by wildland fuels. As such, it neither replaces nor intends to duplicate information found in the 2006 CWPP.

Information regarding a current analysis of the probability of a severe fire occurrence and expected severity of fire effects using updated technology has been included as well as a detailed discussion of structural ignitability. New information on values at risk and progress on past projects has also been captured. This information allows for the prioritization of mitigation efforts. From an analysis of this data, solutions and mitigation recommendations are offered that will aid land managers, residents, fire officials and other collaborators in planning and implementation. This format is designed to help communities clarify and refine priorities for the protection of life, property, and critical infrastructure in the WUI/WI. It can also lead community members through valuable discussions regarding management options and implications for the surrounding watershed and any areas of special interest.

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 Wildfire 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 citizens 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 development.

Collaboration: Community and Agencies

Organizations involved in the development of the Angelus Oaks CWPP are listed below with their roles and responsibilities.

Angelus Oaks Fire Safe Council and Inland Empire Fire Safe Alliance

Primary development of the CWPP and community outreach. Provides information regarding community values. Coordinates the development of community protection priorities and community input regarding the feasibility and desirability of fuels treatment project areas and methods.

County of San Bernardino, Fire and Public Works

Aids in the planning and approval of the CWPP process and minimum standards. Provides information regarding critical infrastructure, fire suppression resources, and current and planned 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 input and 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.
6. Quantify any significant changes related to hazards or Values at Risk that have taken place since the original CWPP was written in 2006.

AOFSC recognizes the potential for complex problems associated with the mission of achieving fire safety and healthy forest management throughout communities in the San Bernardino Mountains and a need to balance this mission with environmental and economic concerns of the residents.

Study Area Overview

Communities

The study area has been divided into two "hazard zones" which comprise the most densely populated portions of the WI (Figure 1). These communities are not based on political or traditional neighborhood boundaries, but rather on factors relating to wildfire propagation and impacts. In the case of the Angelus Oaks area, the hazard zones are divided principally by their access from CA-38 and the change in aspect, elevation and vegetation between the two areas.

Residential and business concentration is located in one moderately dense Wildland Intermix (WI) area (Hazard Zone A, the town of Angelus Oaks) and a smaller, less populated WI area (Hazard Zone B, Seven Oaks) within the San Bernardino National Forest. These areas of residential concentration occupy approximately 250 acres. Primary access is via CA-38. Hazard Zone A encompasses approximately 315 homes, an unspecified number of special use recreational cabins, two lodges (one is an elder care facility) and a commercial center with a small number of enterprises. The Camp Angelus Cal-Trans Maintenance Station, San Bernardino County Fire Station 98, Camp Angelus United States Forest Service (USFS) Ranger Station and the Glen Martin Mutual Water Company are also located here. Hazard Zone B has approximately 20 full time residences and includes a seasonal resort and camping.

Vegetation in and around the residential zones of the study area is primarily mixed conifer forest and woodland. These forests are generally dense and have a diversity of canopy tree species. At least two conifer species co-dominate and can include incense cedar, white fir, ponderosa pine, sugar pine, and big-cone Douglas fir. Black oak, canyon live oak and juniper species are also present in the sub-canopy (see Figure 2). In Hazard Zone B, riparian hardwood species become dominant along some portions of the drainage bottom, but the surrounding vegetation is otherwise similar.

Areas of Special Interest

The Barton Flats Area is approximately seven miles east of the town of Angelus Oaks on CA-38 and is home to a number of summer camps. Approximately 20 organized camps and retreats exist in this area along with Forest Service camps and a seasonal information center. During the summer months thousands of visitors may be camping in the Barton Flats area. Figure 3 shows some of the major facilities. More information on the major camps and facilities in the Barton Flats area can be found at www.bfcacamps.org or on the Inland Empire Community Wildfire Mitigation Planner (WMP) website.

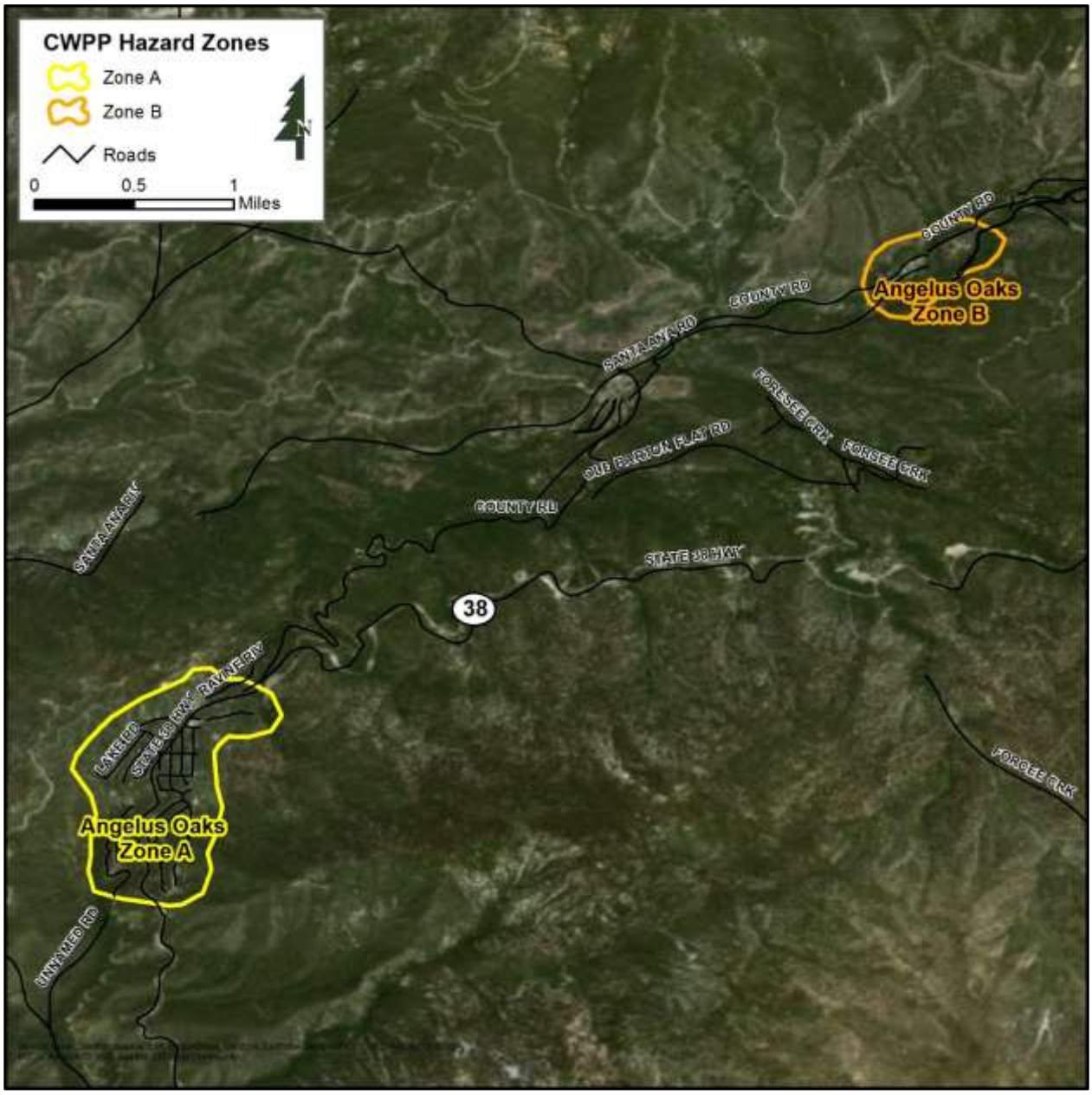


Figure 1 Residential Hazard Zones

Figure 2 Typical vegetation in and around Angelus Oaks

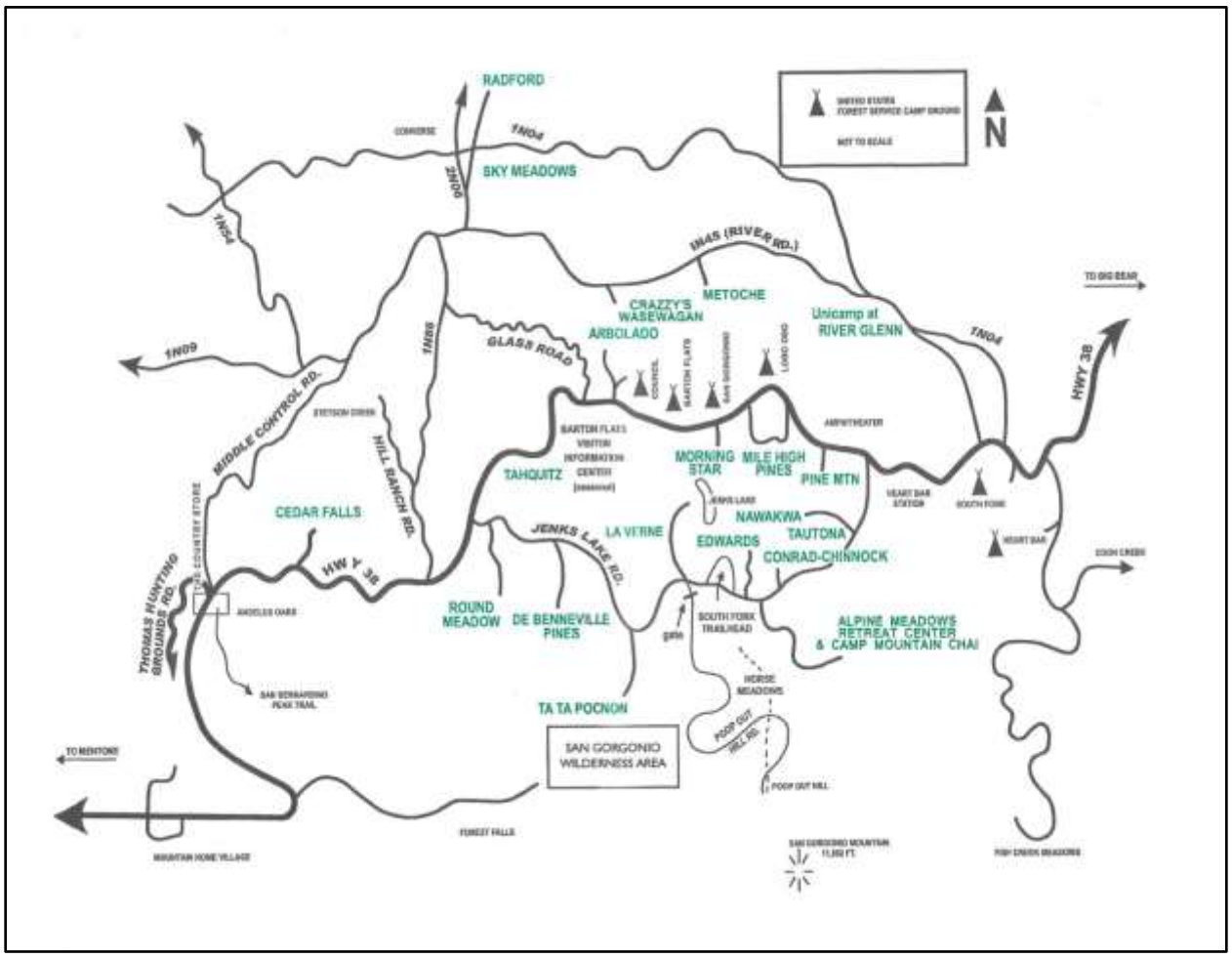


Figure 3 Barton Flats area

VALUES AT RISK

Life Safety, Homes and Commerce

The Angelus Oaks study area consists of approximately 335 homes (315 in Angelus Oaks and 20 in Seven Oaks). The Angelus Oaks Fire Safe Council in an April 2018 interview put the current population at 524. In addition to the permanent population, in the summer months thousands of visitors may be staying at various camps, seasonal cabins and other resort lodging between Angelus Oaks and Onyx Summit. USFS estimates there are over 100 seasonal camps that can hold 10,000 visitors along this stretch of CA-38. Many of these facilities are frequently filled to capacity in the summer.

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 No-HARM Frequency modeling.

This area has an active fire history. Major fires (greater than 500 acres) that burned within three miles of the study area from 2005 to 2015 include Lake (2015), and Thurman (2005). These two fires burned over 32,000 acres. In 2006 the Emerald fire, burned 2,129 acres in the Morton Peak area about five miles southwest of the study area. Figure 4 shows the perimeters of some of the larger fires in the general area from 2000 to 2017.

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 (modeling shows repeated fires in the same area) 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 1 shows the hazard zones in the concentrated residential areas of the Angelus Oaks study area. In Hazard Zone A the No-HARM Frequency analysis rates this area as 49.5 out of 50 (very high probability for a significant fire in this location). In Hazard Zone B the model rates this area as 44 out of 50 (also an area with very high probability for a significant fire). 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 significant fires.

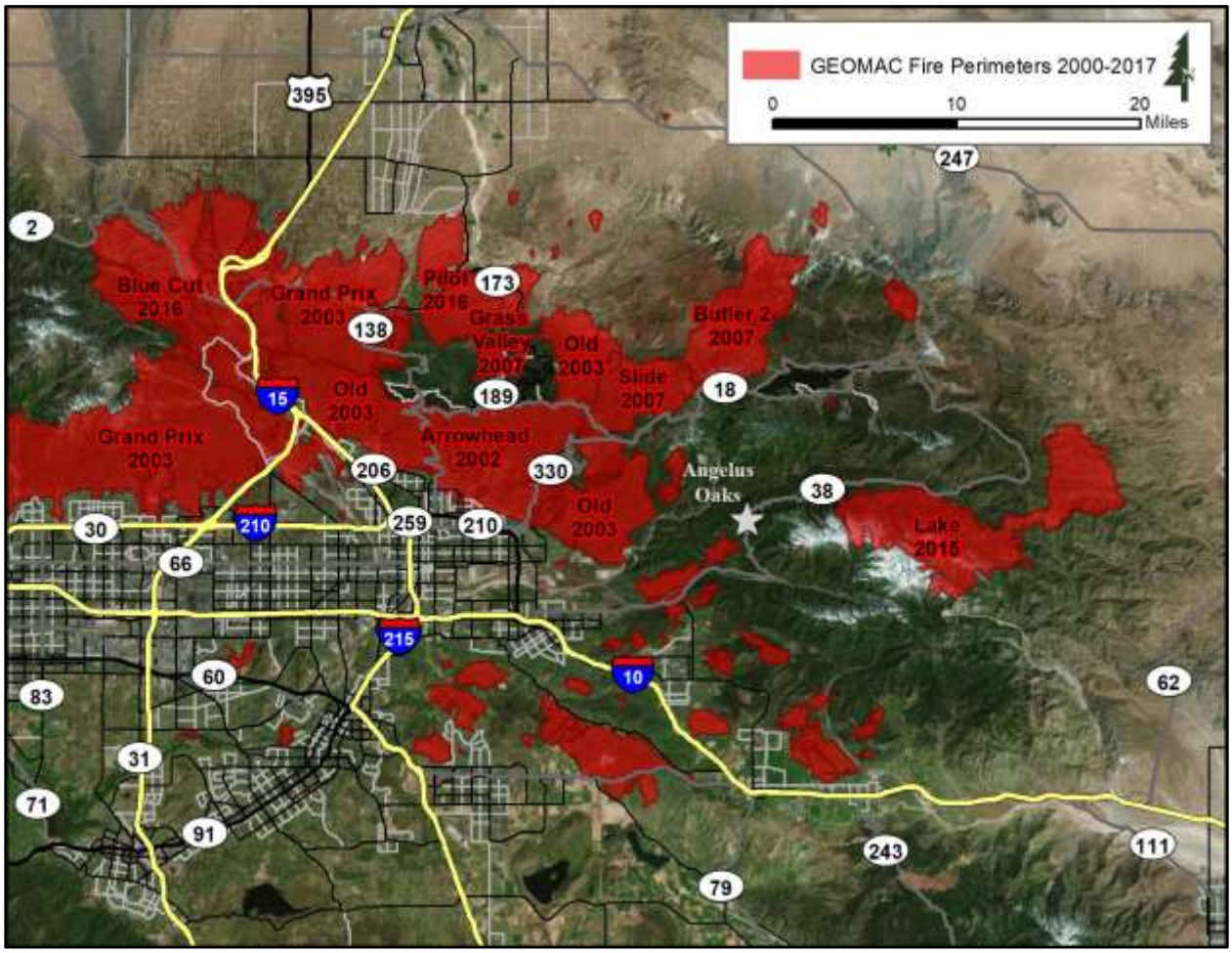


Figure 4 Major Fire Perimeters 2000-2017

No-HARM Severity and Risk 50 Ratings

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 (see Figure 1) an aggregate value of 48.5 (very high) for Severity and a Risk 50 rating of 50 (the highest possible) has been calculated. It is important to note there is no true WUI (urban fringe) in the study area. Homes are located in wildland fuels and even the most densely populated areas should be considered WI. Fuels are relatively heavy and continuous throughout the area which contributes to the high rating.

In Hazard Zone B an aggregate value of 33 (high) for Severity and a Risk 50 rating of 50 (the highest possible) has been calculated. Zone B is similar in vegetation type and density except along the drainage bottom where more riparian species may be found. Although much of the development is along the drainage bottom, the topography on both sides is steep and the effect of ember cast should not be underestimated. Please see the WMP website for more details.

Firefighting Capabilities and Local Preparedness

The communities of the study area are serviced by San Bernardino County Fire Department (SBCFD) and CAL FIRE. Initial response to all fire, medical and associated emergencies in the residential areas of Angelus Oaks and Seven Oaks is the responsibility of SBCFD.

SBCFD has one fire station located in the study area. Initial response is the responsibility of Paid Call Firefighters (PCFs) working out of SBCFD Station 98 at 5766 Frontage Road in Angelus Oaks. Nine Paid Call Firefighters live in Angelus Oaks. The closest full-time professional staffed SBCFD station is Mentone Station 9 at 1300 Crafton Ave. SBCFD 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*.

Wildfire 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 resources throughout the state when CAL FIRE resources are stretched thin or depleted.[1]

Wildland fire responsibilities within the San Bernardino National Forest (BDF) are managed by the USDA Forest Service (USFS). The study area falls under the jurisdictions of the Front County Ranger District and Mountain Top Ranger District. The nearest ranger station is the Camp Angelus Ranger Station located in the town of Angelus Oaks. The San Bernardino National Forest Headquarters is located at 602 S. Tippecanoe Avenue in San Bernardino. The Front Country District Office is located at the Lytle Creek Ranger Station, 1209 Lytle Creek Road, which is 45 miles away. The Mountaintop District Office is located at 40971 North Shore Drive, Highway 38 in Fawnskin. USFS maintains a visitor center at Mentone and one at Barton Flats, however the Barton Flats information center is only manned in the summer.

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. The Greyback citizen disaster response group is active in Angelus Oaks and maintains several fire caches with hose and other supplies. For more information on Greyback see the 2006 Angelus Oaks CWPP.

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 following recommendations 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 federal, state and local resources.
- Consider agreements that allow for cooperative training between volunteers (Paid Call Firefighters) SBCFD professional firefighters and county, state and federal responders. Joint training exercises are desirable and recommended in many other plans.
- 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 personal protective equipment (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 Federal Emergency Management Agency (FEMA) Assistance to Firefighters Grant Program.[4]
- Acquire additional wildland fire packs that are fitted for new generation fire shelters and retire from service any wildland fire pack designed for the older fire shelters as these are not compatible with new generation shelters.
- Familiarize all firefighters with the Inland Empire Community Wildfire Mitigation Planner website (WMP). This tool is helpful for communicating with residents, resort staff and guests.

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. 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 the town of Angelus Oaks and Zone B includes the residential and resort development in Seven Oaks. Zone A received an extreme hazard rating and Zone B received a very high hazard rating.

Structural Ignitability Discussion – Hazard Zone A

Figure 5 Hazard Zone A

Hazard Rating:	**Very High**
Utilities Above or Below Ground:	Primarily above ground, see text.
General Construction:	Primarily combustible siding with ignition resistant roofs
Average Lot Size:	< 1 acre
Dual Access Roads:	No, see text
Road Widths, Slope and Surface:	Variable
Water Supply:	Some hydrants, see text.
Proximity to Fire Station:	Station 98, mean distance <1 mile

Zone Characteristics and Hazards

Single-family homes on small lots are the dominant structures. The average lot size is 0.33 acres. Most of the homes are older construction and the dominant construction type is combustible siding with an asphalt roof. Some homes have flammable decks, projections or fences. Many homes have flammable ornamental plantings too close to the structure. Heavy loads of wildland fuels are continuous throughout the area. Prolonged drought has resulted in high vegetative mortality. Utilities are above ground except in the Sugar Pine neighborhood where power is underground. This zone has some hydrants supplied by three water tanks. The hydrants have good pressure and flow, but are fairly far apart. The terrain is generally steeply sloping. Most roads are paved, but some are dirt. Many roads are narrow and steep. Turnarounds for apparatus would be difficult in many areas. Primary access is via CA-38. There is one dirt road that is the only alternate access from below if CA-38 is blocked. This road is in fair condition and would be passable for high clearance 2WD in dry conditions, however it is not recommended for evacuation use. CA-38 from Big Bear City is the only access to this area from the north.

Structural Ignitability Discussion – Hazard Zone B

Figure 6 Hazard Zone B

Hazard Rating:	**High**
Utilities Above or Below Ground:	Above ground
General Construction:	Primarily combustible siding with ignition resistant roofs
Average Lot Size:	> 5 acres
Dual Access Roads:	No, see text
Road Widths, Slope and Surface:	Variable
Water Supply:	Possible draft
Proximity to Fire Station:	Station 98, mean distance approx. 11 miles

Zone Characteristics and Hazards

Single-family homes and resort buildings are the dominant structures. Although statistically the average lot size is large, this is misleading. In the area surrounding the resort, where most of the structures are, buildings are fairly close together. Most of the homes are older construction and the dominant construction type is combustible siding with an asphalt or metal roof. Some structures have flammable decks, projections or fences. Some buildings have native vegetation and/or ornamental plantings close to the structure. Throughout most of this area vegetative fuels are fairly continuous. Utilities are above ground. There are no hydrants in the area and no community-wide water supply for fire suppression. It may be possible to draft from the Santa Anna River where it crosses Seven Oaks Road. Most of the terrain where homes are located is a relatively flat drainage bottom, but the area is surrounded by steep slopes. This area can only be accessed from CA-38. Glass Road/Seven Oaks Road is the primary access and is paved up to the resort. From the resort Seven Oaks Road continues, turning to dirt and eventually becoming 1N09, which connects back to CA-38. Although this route is closer to Angelus Oaks it is not recommend for evacuation because it's rough and slow. Most roads and driveways near structures have adequate turnarounds for apparatus, but there are some long, narrow dirt driveways.

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 areas of Angelus Oaks and Seven Oaks 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 in included with this report as *0Appendix B - San Bernardino County Fire* Hazard Abatement Ordinance. Enforcement of this ordinance in the study area is key to limiting damage and possible loss of life should a large fire move through the populated areas.

Along with the reduction of flammable fuels and the creation of defensible space around the structures, ignition resistant, native 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 implementing proper planting practices will provide the following benefits:

- Reduce the fire risk by limiting 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 four 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 flammable ornamental plantings near and between structures with ignition resistant, native 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. (See Figure 7). Cooperation between neighbors and SBCFD to promote development of linked defensible spaces is strongly encouraged to protect homes in Angelus Oaks and Seven Oaks.

The general measures listed below should be noted and practiced through the study area. Some 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 an irrigated greenbelt 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 pruned 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 or no more than 1/3 the tree height, whichever is less. This includes both conifers and deciduous trees.
8. Maintain the defensible space around buildings by:
    a. Mowing grass and weeds to a height of four inches or less
    b. Removing any branches overhanging roofs or chimneys.
    c. Removing 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 year round. For more information, please see *Appendix A, Creating Defensible Space*.

Figure 7 Defensible Space Examples

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.
Structure hardening is critically important in areas where homes are built with flammable materials on small lots. Most of the homes in the town of Angelus Oaks (Hazard Zone A) are on lots of less than 0.35 acres. In such areas house-to-house transmission could become the primary carrier of fire. The authors and stakeholders of this report recognize the difficulty involved in coordinating the significant number of owners in Angelus Oaks; 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) ***Error! Reference source not found.***; however 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 Angelus Oaks are on lots of less than 0.35 acres. In general, these homes are too close together and lots too small for individual parcel assessments to yield much actionable information. For that reason, we recommend individual parcel assessments only for areas where the average lot size is one acre or greater. Throughout the areas of residential development in Angelus Oaks dominated by small lots we recommend focusing on reducing HIZ ignition potential through linked defensible space and structure hardening tactics which are discussed in this section and the previous one. In Seven Oaks (Hazard Zone B), however, average lot sizes are larger and the small permanent population makes individual parcel assessments both valuable and more practical.

Figure 8 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.

Angelus Oaks is fortunate in that flammable roofs are a rarity (if they exist at all). 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.

Some 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 Angelus Oaks 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 in these areas 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 eves and soffits should be covered with a non-combustible mesh with openings ¼" or smaller. Any open eves should be enclosed to prevent them from becoming a trap for heat and embers. When enclosing an open eve, 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; 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 (Figure 9). 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. In this report when distances are given they are intended as minimums. Depending on the fuels and topography, larger treatment areas may be necessary. 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 9 CAL FIRE shaded fuelbreak

Current and Planned Projects

Figure 10 shows USFS fuels reduction projects near the study area. Units 1-4 have been completed. Unit 5 is planned for treatment, but as of spring 2018 has not been treated. These treatments will be effective in reducing the intensity of wildland fire in fuels to the north, west and east of Angelus Oaks by reducing understory ladder fuels. When Unit 5 has been completed we recommend the Angelus Oaks Fire Safe Council and SBCFD work with the Forest Service to ensure the continued maintenance of these fuelbreaks.

According to the Angelus Oaks Fire Safe Council there is a project scheduled for April through October of 2018 to remove manzanita and other understory species from the edge of CA-38 near Angelus Oaks. This project is important as it will help protect the access to the study area by reducing ladder fuels. This project should be continued from Glass Road (the access to Seven Oaks) down to Forest Falls in any section where fuels encroach CA-38. Southern California Edison owns an easement along CA-38 that should be included in this roadside thinning project. We recommend CAL FIRE and SBCFD seek an agreement with Southern California Edison for initial and maintenance thinning of fuels in their easement.

A similar project should be considered for Glass Road and Seven Oaks Road to help protect the primary access to Seven Oaks, however considering the number of homes and residences affected we consider the CA-38 roadside thinning to be a higher priority.

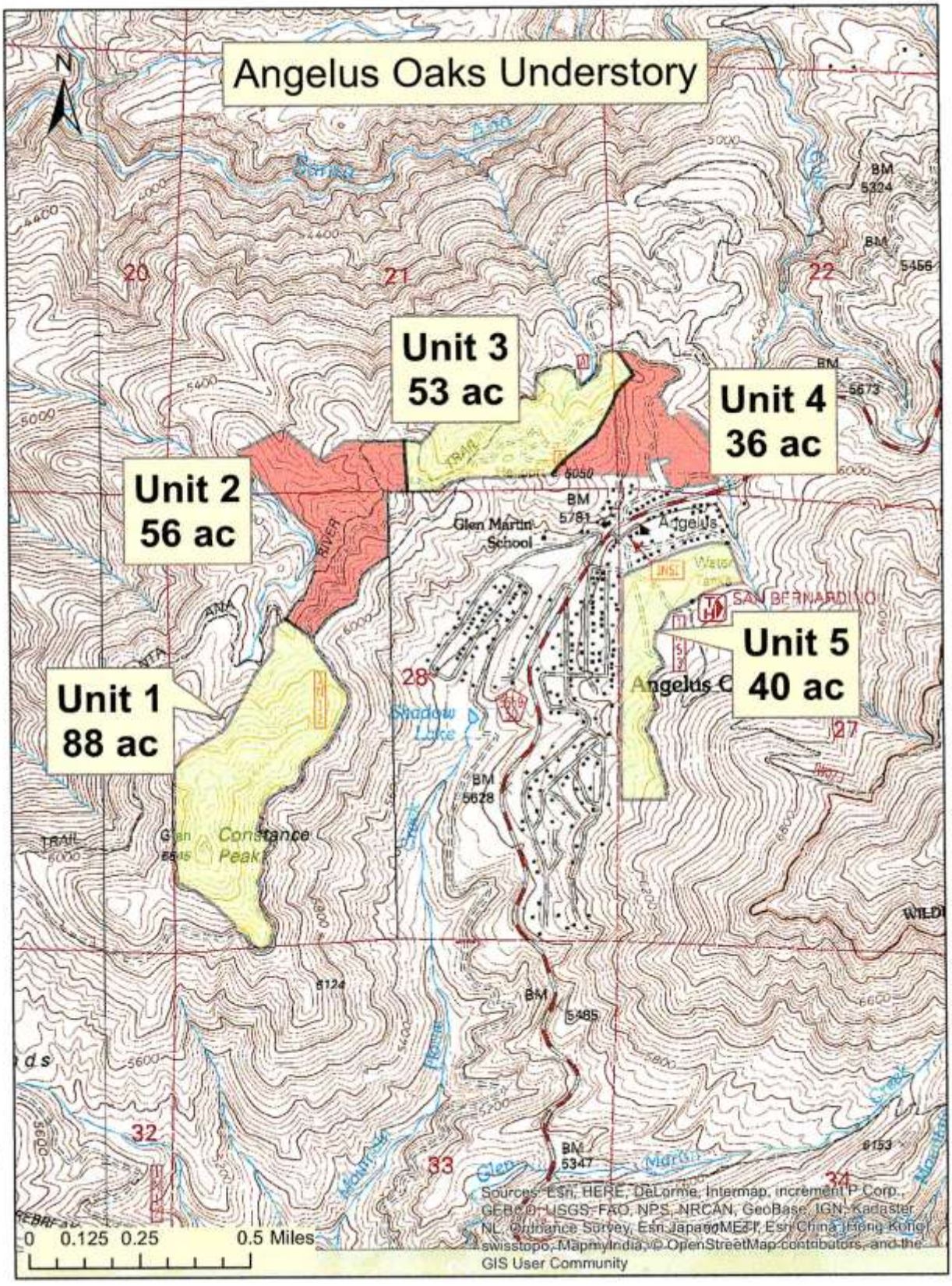


Figure 10 USFS understory fuels treatments near Angelus Oaks

Recommendations

Work with property owners adjacent to national forest lands to create defensible space to their property lines. (See the linked defensible spaces description on page 23). If this could be accomplished AOFSC could request fuels reduction on forest lands under the Good Neighbor Authority that could be used to create a shaded fuelbreak bordering the community. This could be accomplished on the east side of Angelus Oaks by combining linked defensible spaces with an enlargement of the USFS Unit 5 treatment area. Such an arrangement would require on-going cooperation between private property owners and the USFS, but would provide a buffer between the east side of Angelus Oaks and heavy fuels on the slopes above.

Linked defensible spaces and thinning west (downhill) of CA-38 are critical needs on the west side of Angelus Oaks to reduce the potential of structural ignition caused by ember cast from fires traveling up heavy fuels in the drainage to the south.

The work that has been completed by USFS can be seen in the WMP. Revisiting these areas is important as fine fuels and ladder fuels grow back quickly. Additional projects can tie into existing work, to create larger fuelbreaks and landscape scale treatments.

Access/Egress Routes & Evacuation Recommendations

In the residential areas of Angelus Oaks streets are generally good and of adequate width, although some are steep and some sections may be difficult for apparatus turnaround. There are a few homes in Seven Oaks where access from Seven Oaks Road is long, unpaved and not well marked. For these properties it will be critical to maintain a good, all-weather driving surface as well as an adequate clearing for emergency vehicles.

CA-38 is the only reliable access to the study area. The primary access is from the south, but CA-38 also continues north over Onyx Summit providing access from Big Bear City. Although there is a dirt road that can used to bypass CA-38 to the south of Angelus Oaks, it is steep in spots and travels through heavy fuels. It is therefore not recommended as an evacuation route. If fires in the vicinity cut off CA-38 south of Angelus Oaks under most circumstances it would be safer for residents to evacuate north on CA-38 to Big Bear City.

Glass Road/Seven Oaks Road is the only paved access into Seven Oaks. Although Seven Oaks Road continues through the most developed area of Seven Oaks and eventually connects back to CA-38 as 1N09, this road is generally poor, travel times are long and heavy fuels make this route undesirable for evacuation. While this and other area roads and trails may be useful for resources fighting wildland fires, most would not be desirable for structure protection access.

Recommendations

Street signage is generally good in the study area; however, missing or inadequate address markers are an issue. Many homes do not have an address marker visible from the street and those that do 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 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 the study area is still desirable. We recommend SBCFD, area government, and property owners work together to create and implement a consistent system of reflective address markers.

Evacuation is the first priority for homes in either hazard zone threatened by wildfire. In the event residents became trapped by a fire that cut off Glass Road or CA-38 before evacuation could be completed, safety zones could be essential to life safety. SBCFD, and the Greyback citizen disaster response group should collaborate to create a pre-plan to identify safety zones that could be used as a last resort if all attempts at evacuation fail. Areas that are to be considered

should be large enough to hold all of the intended residents and still represent a minimum buffer of 1.5 times the average fuel height. For safety zones to be effective, trigger points must be established at which fire resources would prepare the area and notify residents. Places in Hazard Zone A that could be considered are the baseball diamond and the logging deck above the fire station if it were properly prepared and maintained. In Hazard Zone B the Seven Oaks Resort might be a possibility. With any of these options pre-fire planning, preparation and maintenance is critical to success.

Water Supply for Fire Suppression

Fire hydrants in Angelus Oaks are gravity fed by three water tanks located on the slopes above the town. The original supply lines were cast iron. The water company has been replacing the iron distribution pipes with PVC to improve their reliability. The hydrants fed by these tanks have good pressure and flow, but they are far apart. The Greyback citizen emergency response group maintains several fire caches with hose and other supplies (see Figure 11).

Although there is no dedicated water supply for fire suppression in Seven Oaks it may be possible to draft from the Santa Ana River.

Recommendations

The additional hose in the Greyback fire caches is critical to ensuring hose lays long enough to reach from the hydrants to some of the homes in Angelus Oaks. We recommend the supplies in these caches be inspected annually to be sure all the hose and equipment is in good condition and ready for deployment.

The program of replacing the cast iron supply lines with PVC is critical to ensure the continued reliability of the hydrant system. SBCFD should partner with the water company to be sure this project continues until all of the iron plumbing and fittings are replaced.

Hydrant tests and visual inspection of the water tanks and all exposed plumbing should be conducted on an annual basis.

In Seven Oaks consider the construction of a water tank of at least 1,500 gallons fitted with appropriate connectors for SBCFD fire apparatus. If possible, selecting a location that could be accessed from Seven Oaks Road near enough to the Santa Ana River for the tank to be resupplied by a pump from the river would allow for greater flexibility. If access to the Santa Ana River is possible for fire apparatus a dry hydrant should also be considered.

If there is not one already there, consider stationing a water tender at the Angelus Oaks fire station (Station 98) at all times.

Figure 11 Greyback fire cache

AREAS OF SPECIAL INTEREST RECOMMENDATIONS

Barton Flats Area

As mentioned in the study area overview, there are an estimated 100 campgrounds and seasonal facilities between Angelus Oaks and Onyx Summit. The Barton Flats area, approximately seven miles east of the town of Angelus Oaks on CA-38, is home to the greatest concentration of these seasonal facilities. Approximately 20 organized camps and retreats exist in this area along with forest service camps and a seasonal information center. During the summer months thousands of visitors may be camping in the Barton Flats area. A graphic showing some of the major facilities, shown earlier in this report, has been reproduced below for the convenience of the reader as Figure 12. More information on the major camps and facilities in the Barton Flats area can be found at http://www.bfcacamps.org/ - or on the WMP website.

Recommendations

SBCFD should partner with the Barton Flats Camp Association and USFS to ensure evacuation plans exist for all the organized camps in the Barton Flats area. Emergency evacuation plans should have redundant solutions considering the evacuation of thousands of visitors could become necessary. These plans should be reviewed on an annual basis to ensure they remain accurate.

Fire danger signs should be posted at the Mentone and Barton Flats visitor's centers as well as on CA-38 in Angelus Oaks near the fire station to remind visitors of the area's high potential for wildfire. USFS and SBCFD personnel should check these signs on a daily basis to ensure they reflect the current conditions.

Responder pre-attack planning should be coordinated between SBCFD and USFS for all summer camps and conference centers that do not already have a plan in place. These plans should be reviewed every two to five years to ensure they are still relevant and accurate.

Run time to arrival scenarios for first responders to these camps and facilities is also recommended to determine if further recommendations for responders should be considered.

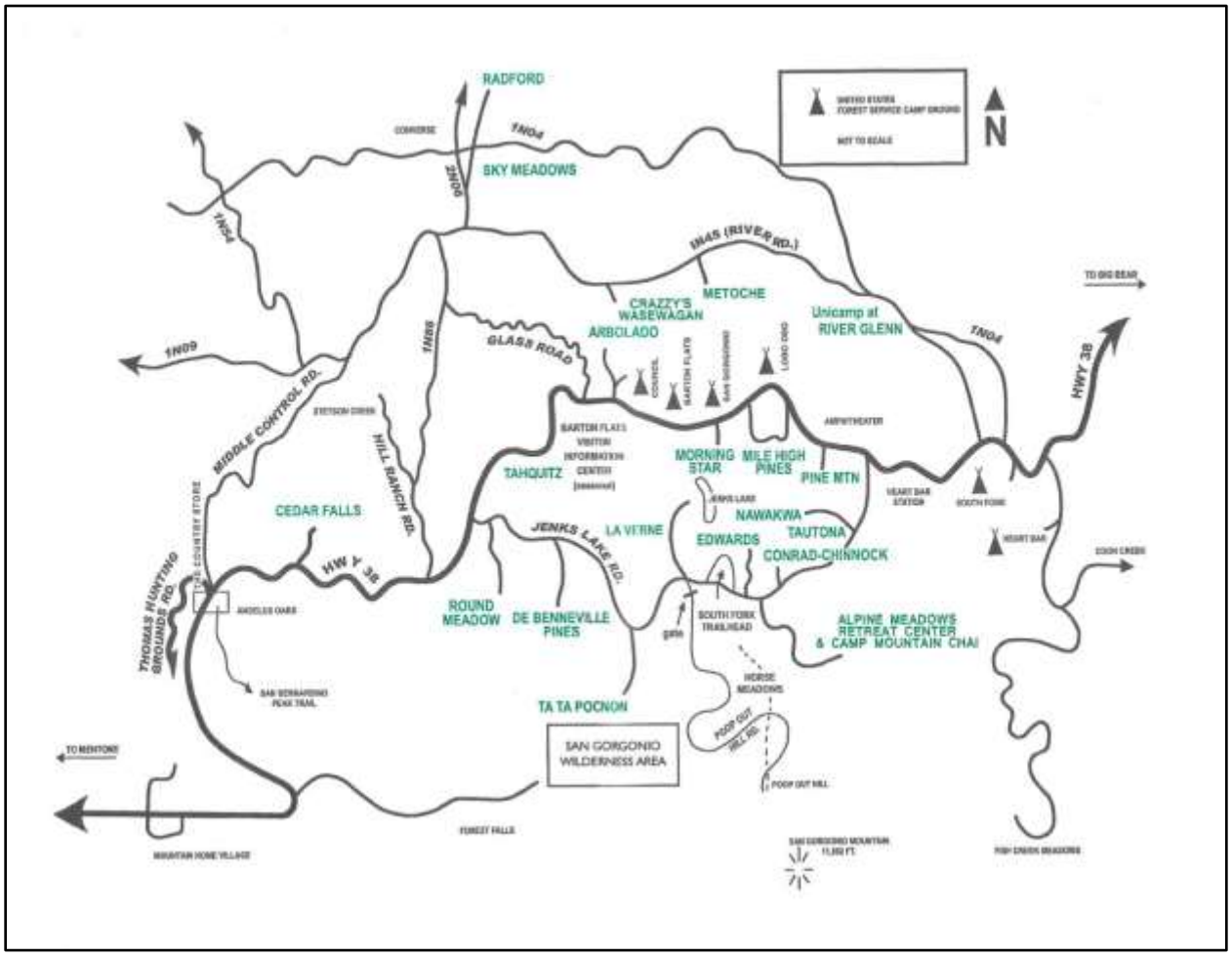


Figure 12 Barton Flats area facilities

CONCLUSION

The scientific and historical analysis performed during the preparation of this report shows the entire study area to have a high likelihood for continued wildfires. Furthermore fires in this area have a high potential for loss of life and damage to property. This especially true in light of the popularity of this area as a summer getaway. In addition to the residents, literally thousands of visitors could be endangered by wildfire. The following summary is a distillation of what we think should be the highest priority actions to preserve life and property:

- Individual property owners must realize the survival of their homes will rely heavily on their ability and willingness to create defensible space and harden their structures to the greatest extent practical against ignitability from embers and firebrands.
- SBCFD and CAL FIRE should support mitigation efforts of residents by advising and assisting those efforts wherever possible and by ensuring the existing statutes regarding fire hazard abatement are enforced, even if property owners are not residents of the area. This should include periodic code inspections to ensure compliance with State Code PRC 7291 and San Bernardino County Ordinance 4058.
- Comprehensive evacuation plans with redundant solutions should be developed not just for the residents of Angelus Oaks and Seven Oaks, but for all of the major camping facilities between Angelus Oaks and Onyx Summit. Since most of these campgrounds and seasonal facilities are located in the Barton Flats area, SBCFD, CAL FIRE and USFS should engage the Barton Flats Camp Association to be sure plans exist and are reviewed annually so they will remain current.
- Efforts to remove dangerous fuel loads along CA-38 that could force closure of the highway should be a priority. These efforts must continue on an ongoing basis to be effective.

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

- **California Climate Investment (CCI) Fire Prevention Grant**

  Purpose: provides funding for projects related to fuel (vegetation) hazard reduction, fire prevention education and training, and fire prevention planning. Projects funded by the grant 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/grants**

Natural Resources Conservation Grants

- **Environmental Quality Improvement 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.
- **https://www.fs.fed.us/spf/coop/programs/loa/**

REFERENCES/CITATIONS

[1] http://calfire.ca.gov/communications/downloads/fact_sheets/CoopResponse.pdf
[2] http://calfire.ca.gov/communications/downloads/fact_sheets/CoopResponse.pdf
[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 Angelus Oaks WUI/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. Although this information was accurate at the time it was written, the latest defensible space requirements should be reviewed by visiting www.readyforwildfire.org .

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

A. Purpose of Guidelines

Effective defensible space

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.

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, which ever 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-space 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

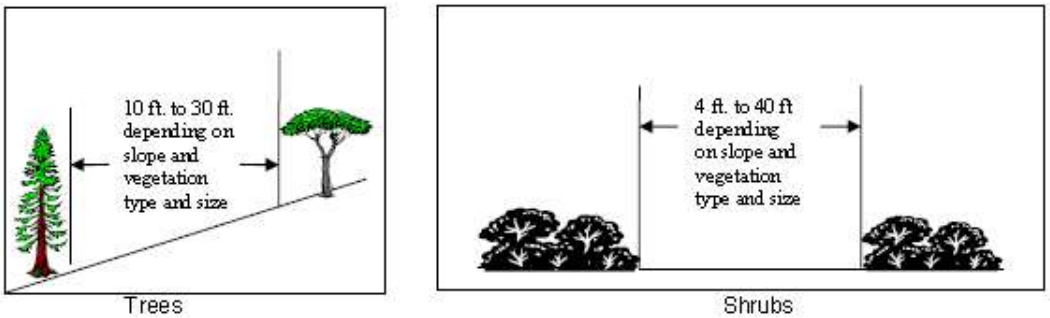
In conjunction with General Guidelines 1., 2., and 3., above, minimum clearance between fuels surrounding each building or structure will range from 4 feet to 40 feet in all directions, both horizontally and vertically.

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.

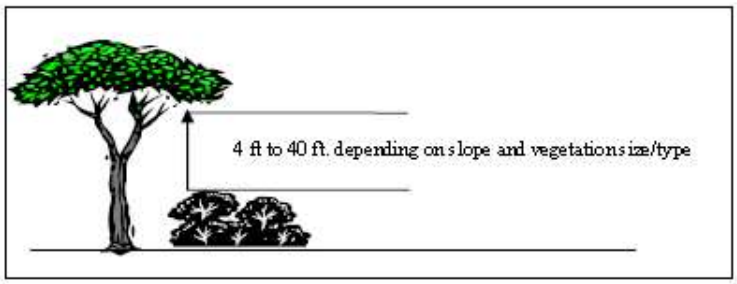
Clearance requirements include:

- 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.

Defensible Space retaining continuous trees

Photo Courtesy Plumas 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

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

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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IMM:jaf

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

(c) Property owners who do fuel reduction activities that remove or dispose of vegetation should make every effort to properly reuse and/or recycle the resultant materials either on site or at an appropriate off site facility, without creating additional fire hazards and 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.

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

23.0304 Mountain Area Fire Hazard Abatement.

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

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

(1) All foliage and branches within six (6) feet from the ground on trees over twelve (12) feet in height that stand within one hundred (100) feet of structures. Limbs should be cut no less than one quarter (¼) inch from the trunk of the tree to preserve the health of the tree.

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

smaller than four (4) inches in diameter that stand within ten (10) feet from other trees, not to include ornamental trees that are pruned and free of dead or damaged foliage.

(3) All shrubs that are within fifteen (15) feet of structures that produce high-energy-release components and are considered high fire fuels, not to include low energy release deciduous ornamental plants that are well-pruned, well-spaced and free of dead or damaged foliage. High-energy-release shrubs include, but are not limited to, Manzanita, Service Berry, Mountain Whitethorn, Sage, Ironwood, Juniper Shrubs, Spanish Broom and other species as determined by the County Fire Chief/Fire Warden or their designee to constitute a fire hazard.

(4) All high-energy-release shrubs that are spaced together less than double the size of the height of the tallest shrub and stand between fifteen (15) and thirty (30) feet of structures, (eg. a 4 foot high shrub should be spaced 8 feet or more away from the next shrub, providing that the 4 foot high shrub is the tallest of the two shrubs), not to include ornamental plants that are well-pruned, well-spaced and free of dead or damaged foliage. Planting of native, fire-wise, drought-resistant species is encouraged for the health of the forest.

(5) Lower foliage measured at least eighteen (18) inches up from the ground and all leaf litter and dead vegetation on and under all shrubs that stand within one hundred (100) feet of all structures.

(6) Dead branches and leaf litter in and under all plants, trees, foliage and shrubs and all flammable vegetation at all heights within one hundred (100) feet of all structures.

(7) Tree limbs (not trunks) less than ten (10) feet away from chimneys and stovepipes.

(8) Grass over four (4) inches in height.

(9) Pine needles, leaf litter or chipped/ground mulch on the ground over two (2) inches in depth.

(10) Trunks or branches on the ground less than four inches in diameter, not including split and neatly stacked fire wood.

(c) "Fire Hazard in the Mountain Area" means:

(1) Flammable vegetation within ten (10) feet of a road.

(2) Combustible rubbish, waste or discarded materials.

(3) Leaves, needles or other dead vegetative growth on roofs or structures.

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

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

23.307 Enforcement.

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

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

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

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

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

23.0308 Notice and Order to Abate.

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

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

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

(3) By posting the property.

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

(1) List of hazards.

(2) List of locations.

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

(4) Appeal rights.

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

(6) Parcel number of affected property.

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

(d) A ten (10) day extension for compliance is sent when the owner has removed greater than 51% of the fire hazard and notified the agency that the hazard has been abated, but nevertheless the agency determines the fire hazard still exists. A ten (10) day extension for compliance shall be placed in the mail by the issuing agency at least ten (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

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

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

PAUL BIANE, Chairman
Board of Supervisors

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

DENA M. SMITH, Clerk of the
Board of Supervisors

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN BERNARDINO)

I, DENA M. SMITH, Clerk of the Board of Supervisors of the County of San Bernardino, State of California, hereby certify that at a regular meeting of the Board of Supervisors of said County and State, held on the 7th day of October, 2008, at which meeting were present Supervisors: Mitzelfelt, Biane, Hansberger and Gonzales, and the Clerk, the foregoing ordinance was passed and adopted by the following vote, to wit:

AYES: SUPERVISORS: Mitzelfelt, Biane, Hansberger, Gonzales

NOES: SUPERVISORS: None

ABSENT: SUPERVISORS: Ovitt

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