Spring Trails Fire Protection Plan

Spring Trails Development
San Bernardino, California

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Spring Trails Fire Protection Plan

Introduction

This report is provided to the San Bernardino City Fire Department (SBFD) in an effort to clearly communicate the risks factors, analysis, systems design and development features needed to create a project that is defensible and safe for its residents. This report is a vegetation wildfire analysis, to justify the landscaping performance of the fuel modification installation and maintenance program for the planned community. The study takes into consideration many factors such as the vegetative fuels, topography, weather, and wind/structure placement alignments during a wild fire burning towards the development from the surrounding perimeter areas. This report will show the severity level in which a wild fire under these factors could impact the proposed development and why fuel modification is one of the major fire protection features for a residential development.

The fire behavior analysis in this report projects fire behavior results based on a worst case scenario for this development. By using the worst case scenario fire conditions, we expect that future fires with less extreme factors than we are projecting would produce reduced fire behavior spread and intensity. A scientific approach was used to describe a fire hazard assessment and expected wildland fire behavior results. Computer projections simulate a fire burning within the native vegetative fuels directly outside the boundaries of the fuel modification zones because the entire fuel modification zone is replanted and permanently irrigated. This report will also demonstrate how code conforming fuel modification zones will do their part to help protect the future community.

The report also describes how the development meets or exceeds requirements set forth in the Foothill Fire Zone Building Standards (Chapter 15.10 of the San Bernardino Municipal Code), Building Safety Enhancement Area Building Standards (Chapter 15.11 Municipal Code), City Of San Bernardino Development Code (Chapter 19.15),), and City Fire Code (Chapter 15.16).

The Spring Trails project is proposed for to be approximately 353 acres of mostly hillside home sites located in San Bernardino County east of the community of Devore in the community of Verdemont. The location is within the Sphere of Influence of the City of San Bernardino. The site is in the foothills of the San Bernardino Mountains and is bounded on the north, northwest and east by the San Bernardino National Forest. Rural residential properties bound the project site to the west and south.

The project area is rural residential. Current access to the site is from Martin Ranch Road, that begins at an intersection with Meyers Road then travels northerly into the project site, providing access to a small number of rural residences on large, multi-acre lots. This road would remain a private road and continue to provide access to those existing homes and properties not a part of the proposed project. For proposed project, two new access roads that would allow project traffic to access the site without using existing Meyers Road where it traverses a single family neighborhood immediately west of Little League Drive. A secondary access other than Martin Ranch Road will also be provided.

The project site is located in an area subject to periodic high wind conditions and has a history of wildland fires. The project site is also traversed by Southern California Edison transmission lines.

The objective of a fire protection plan is to assist the developers, builders, homeowners, and special districts/associations, in understanding and complying with the approved features of the development. When implemented, the fire protection plan would help the local fire agency provide fire, rescue and EMS services to this project in an effective and efficient manner.

This Fire Protection Plan includes:

1. Fire Risk Assessment;
2. Fuel Modification Zones;
3. Vegetation Management Guidelines;
4. Allowed And Undesirable Plant Palettes;
5. Planting Maintenance and Spacing Guidelines;
6. Construction Phasing Management Plan;
7. Infrastructure/Structural Construction Features And Requirements; and
8. Compliance Matrix listing all of the building and development standards to be applied to the project.

The fire protection plan has been prepared based upon the requirements in the city's various codes:

Chapter 15.10	Foothill Fire Zone Building Standards
Chapter 15.16	Amended Fire Code
Chapter 19.15	Foothill Fire Zone Overlay District
Chapter 19.17	Hillside Management Overlay District
Chapter 19.30	Subdivision Regulations

This plan is based on what would be considered to be the "ultimate" site conditions, not unlike those recorded prior to the in 2003 Old fire or the 1980 Panorama fire. Current conditions on-site show considerable re-growth occurring in line with expected chaparral conditions.

1. Fire Risk Assessment

Fire History

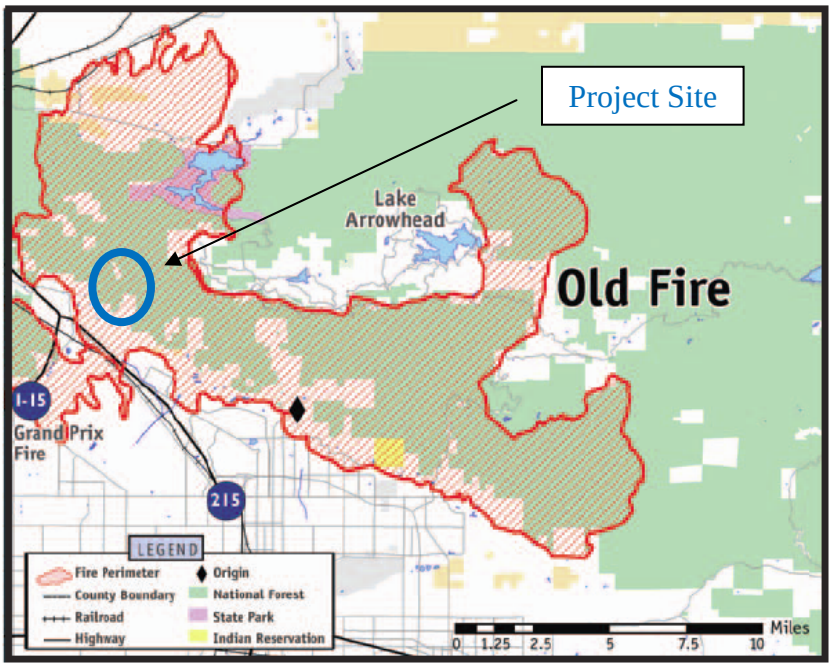
The project site is surrounded on three sides by portions of the San Bernardino National Forest. This site has a history of vegetation fires that spans many years, and most probably this trend will continue. Examples of fires in this area include the 1980 Panorama Fire and 2003 Old Fire. Both burned across the project site.

The project site is within a Very High Fire Severity Zone. Portions of the site have steep terrain and the adjacent National Forest contains vegetation that is highly combustible; chaparral. The area is subject to periods of low rainfall and high winds which in combination with the topography and fuels have the ability to produce large disastrous wildland fires. Such fires have caused extensive damage in various parts of the City on numerous occasions most recently the 2003 Old Fire.

CalFire (California Department of Forestry and Fire Protection) has records for wildland fires over 300 acres that date back to the early 1900. The data indicate that fires occur on a regular basis in some areas called fire corridors. The Cajon Pass and surrounding canyons are such an area. Records indicate that very large fires occur fairly regularly; approximately once per decade. This is likely due to weather patterns and the nature of the fuel beds. Most experts agree that the age of the vegetation, and more importantly the accumulation dead material spreads fire faster than newer growth. Chaparral has the ability to replace its self very quickly. In Southern California it is not uncommon for replacement stands of Chaparral to grow four to five feet tall in just seven years after a fire. This growth is dependent on the amount of rainfall but occurs on a regular basis except during drought conditions.

In the past, fire seasons generally had a pattern. In most areas, at least a decade would pass with few fires followed by a decade with many large fires. However, these estimated patterns are no longer used as planning tools due to extended droughts and potential effects of climate change. Large fires continue to occur at all times of the year in areas that have receptive fuel beds; in some cases, burning several times with only a few years in between. The occurrence of the large fires also corresponds to periods of extremely high wind conditions. This was the case in the 2003 Old Fire. The largest fires in recent history at or near the project site include:

<u>Old Fire (2003)</u> On Sunday, October 25, 2003, a vegetation fire was reported in the area of Old Waterman Canyon Road, north of the City. The Old Fire, as it called, began to rapidly spread since it was being fanned by north winds gusting to 30 mph, 90-degree temperatures and 6 percent humidity. The fire burned approximately 91,000 acres of wildland and in the City of San Bernardino itself, 330 homes were destroyed and property damage was over 126 million dollars.



Panorama Fire (1980) The Panorama Fire started on November 24 and raged for six days. This fire scorched 24,000 acres (97 km sq), left four dead, destroyed 284 homes, and damaged 49 others.

Three unnamed fires in 1979, 1970 and 1938 (12,493 acres) also burned through this area. The burn areas overlapped in most cases, including the area burned in the Old Fire.

Three factors drive risk of fire in wildland interface areas: 1) topography, 2) weather, and 3) fuels (chaparral in this case). The amount of dead and dying materials within the fuel bed have a significant impact on the ability of a fire to establish and on the rate of spread/heat produced by that fire. To remove older vegetation and subsequent build-up of dead fuels, the USFS conducts prescribed burns along the San Bernardino Mountain hillsides. Fuel beds adjacent to development can and do manage the risk with Fuel Modification Zones.

Applicable Law, Code, Ordinances, Regulations, Requirements and Standards

After the Panorama fire, the City of San Bernardino, together with the County of San Bernardino, the California Department of Forestry and Fire Protection (CalFire), the Foothill Fire Protection District, the West End Resources Conservation District, the East Valley Resource Conservation District, the US Soil Conservation Service, and the US Forest Service, all participated in the preparation of the "Foothill Communities Protective Greenbelt Program." This project was completed in 1983. The program is designed to reduce fire, flood, and erosion losses in the wildland/urban interface in the foothills of the San Bernardino Valley.

The City of San Bernardino recommendations were as follows:

City of San Bernardino

Recommend that the Mayor and Common Council adopt by resolution the "Foothill Communities Protective 'Greenbelt' Program.

Recommend that the Mayor and Common Council direct the appropriate city department or agencies to establish the following:

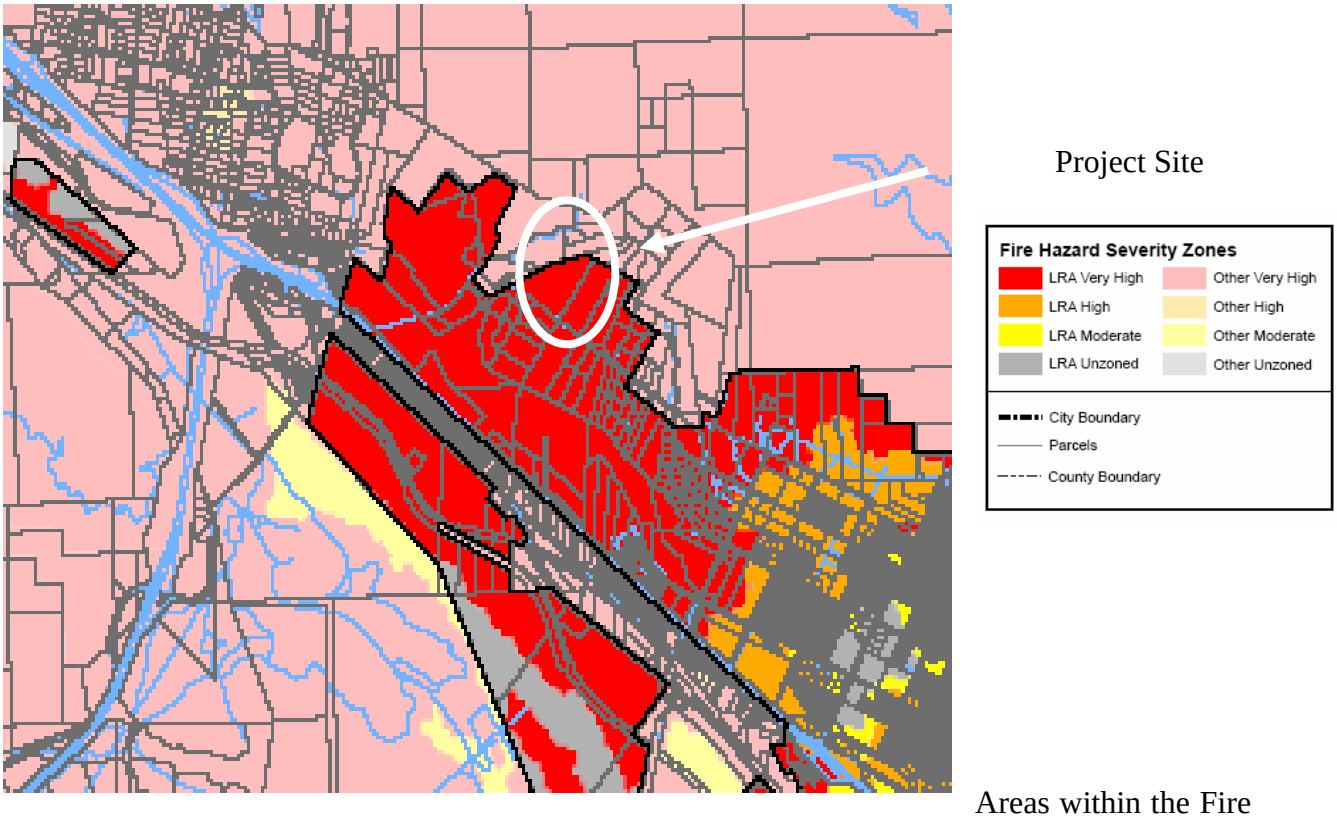
1. *Amend the existing General Plan to incorporate 'Greenbelt' program policies as an interim measure until the revision of the plan is completed.*
2. *Included the 'Greenbelt' program policies as an integral part of the revised General Plan and all area plans.*
3. *Amend the City's existing High Fire Hazard Ordinance incorporating the Greenbelt Plan development standards where more restrictive.*
4. *Direct the Building and Safety and Planning Department to establish procedures for compliance with new development standards for new construction, rehabilitation and remodeling of existing structures within the Foothill Fire Zone.*
5. *Establish procedures by which all new development occurring within the Foothill Fire Zone will be reviewed by the City's Development Review Committee (DRC). The Committee will determine the adequacy of proposed erosion control, fuel modification, landscaping, building materials, water availability and fire flow.*
6. *Consider requiring hazard notification as a condition of approval for new subdivisions located in the Foothill Fire Zone.*
7. *Investigate the possibility of placing hazard notification deed restrictions for all existing lots within the Foothill Fire Zone.*
8. *Utilize the 'Greenbelt' public relations program to develop public awareness of the 'Greenbelt' Plan.*
9. *Explore the feasibility of transfer of development rights for properties within the 'Greenbelt' Plan.*
10. *Study the establishment of assessment district for Foothill Fire Hazard area in need of more extensive fire protection measures, such as additional facilities, equipment and personnel.*
11. *Explore the utilization of water from waste water treatment, the California State Water Project, and residential and municipal water storage for irrigation and fire protection.*
12. *Strictly enforce existing fire inspection, weed abatement and code compliance programs.*
13. *Establish a program to upgrade existing substandard fire flow facilities (pipes and hydrants) to current standards.*
14. *Establish a program to improve the secondary streets for those areas with substandard means of access.*
15. *Provide city equipment to assist the California Department of Forestry in the Vegetation Management Program.*

These recommendations would later be enacted into the city's current Development Code, specifically the FF (Foothill Fire Zones Overlay) District.

Fire Hazard Severity Zone

The State of California establishes risk for the wildland interface areas. This risk assessment is done for the SRA (State Responsibility Areas) and for the LRA (Local Responsibility Areas). Federal lands, such as the national forest, are rated as "Other Areas".

Map from CalFire Fire Hazard Severity Zones for Project area



Areas within the Fire Hazard Severity Zones must comply with the California Building Code Chapter 7A and California Fire Code Chapter 47

Through its General Plan, the City of San Bernardino establishes goals, policies, and implementation measures to govern land use. This project is within the City Sphere of Influence and will be subject to these measures.

City of San Bernardino General Plan

Goal 10.11 Protect people and property from urban and wildland fire hazards.

Policies

10.11.2 Work with the U.S. Forest Service and private landowners to ensure that buildings are constructed, sites are developed, and vegetation and natural areas are managed to minimize wildfire risks in the foothill areas of the City.

10.11.3 Require that development in the High Fire Hazard Area, as designated on the Fire Hazards Areas Map (Figure S-9) be subject to the provisions of the Hillside Management Overlay District (HMOD) and the Foothill Fire Zones Overlay.

10.11.4 Study the potential acquisition of private lands for establishment of greenbelt buffers adjacent to existing development, where such buffers cannot be created by new subdivision.

10.11.5 Continue to require that all new construction and the replacement of 50% and greater of the roofs of existing structures use fire retardant materials.

City of San Bernardino Development Code

The City's Development Code includes standards and regulations associated many aspects of the proposed project. Included in this code are the accessibility to the site, building construction features that are intrinsically safer in fire conditions, location and siting of structures in areas that are not prone to fire damage, vegetation management and establishment of a wet fuel modification zones also known as greenbelts.

The City's Development Code (Chapter 19.15) established the Foothill Fire Zones Overlay District. The purpose of this district is to mitigate the spread of fire, minimize property damage, and reduce risks to public health and safety. The "FF-Foothill Fire Zones Overlay District" designates three zones within the wildland interface:

Fire Zone A (Extreme Hazard) - characterized by slopes over 30 percent
Fire Zone B (High Hazard) - characterized by slopes 15-30 percent
Fire Zone C (Moderate Hazard) - characterized by slopes less than 15 percent slope

This project has approximately 121 acres in Fire Zone A (Extreme Hazard); 112 acres in Fire Zone B (High Hazard); and 119 acres in Fire Zone C (Moderate Hazard).

The Overlay District specifies development standards relating to the following issues:

1) Access and Circulation;
2) Site and Street Identification;
3) Roadside Vegetation;
4) Water Supply;
5) Erosion Control;
6) Construction and Development Design; and
7) Miscellaneous items including property transfer disclosures, and maintenance of firebreak fuel modification zones.

The development code is Chapter 19.15, of the city code, entitled, FF-Foothill Fire Zones Overlay District, and is provided in Appendix A.

Hillside Management Overlay District - Chapter 19.17

The Foothill Fire Zones Overlay District and the Hillside Management Overlay District both require that street right-of-ways provide for adequate clearance when parking is permitted on one or both sides. A 48.5 foot right-of-way with 40 feet of paved width is required if parking is allowed on both sides and the roadway has a sidewalk on one side in the A and B Fire Zones. The right-of-way can be 40.5 feet with 32 feet of paved width if parking will only be allowed on one side of the street in these same zones.

The Hillside District also limits the street grade on collector and arterial streets to 8% grade or less in all three Fire Zones (A+B+C), unless otherwise approved in writing by the Public Services, Fire, and Public Works Departments. Hillside residential local streets cannot exceed 15% grade in these same areas.

Dead end streets are not allowed over 150 foot in length unless a fire department turnaround is provided. Cul-de-sacs to a maximum of 750 feet in length may be permitted with a maximum of 30 dwelling units, and to a maximum of 1,000 feet in length with a maximum of 20 dwelling units in Fire Zones A and B.

The use of retaining Walls/Fences is also restricted with upslope retaining walls being limited to one wall per lot and not to exceed 8 feet in height. Downslope retaining walls are similarly restricted to one wall per lot and are not to exceed 42 inches in height

The Hillside Management Overlay District is Chapter 19.17, of the city code and is provided in Appendix B.

Foothill Fire Zone Building Standards - Chapter 15.10

The first item within the Foothill Fire Zone Building Standards is the adoption of the California Building Code Chapter 7A by reference. In addition, more specific and restrictive requirements are set for fencing, fascias, patios, exterior trim and other elements that are required to be of approved noncombustible or ignition-resistant materials.

Vinyl window frame assemblies when used with the District must meet additional requirement to insure that the frames shall have welded corners and metal reinforcement in the interlock area; duel-paned insulated glazed units are used with at least one pane of tempered glass; that the frame and sash profiles are certified in AAMA Cert Program and that the unit are certified and labeled to ANSI/AAMA/NWWDA 101/I.S.2-97 for structural requirements.

The Foothill Fire Zone Building Standards require that attic and underfloor vents be protected by corrosion-resistant noncombustible wire mesh with a maximum 1/8 inch opening or equivalent. The attic vents cannot be placed facing wildland exposures. Roof mounted turbine vents are not permitted and all roof covering must be non-wood materials with a Class A fire rating. The attic and ventilated spaces of structures in this district cannot use paper-faced insulation.

All new residential structures within Fire Zones A, B and C abutting wildlands zones must be protected with automatic fire sprinklers.

The Foothill Fire Zone Building Standards are included as Chapter 15.10 in the city code and is provided in Appendix C.

Amended Fire Code – Chapter 15.16

The City of San Bernardino adopts the California Fire Code with certain amendments and changes as are appropriate for local conditions. These amendments are found in Chapter 15.16 of the city code. Those amendments that are applicable to the project site are summarized below.

Automatic fire extinguishing systems shall be installed in all newly constructed buildings where the square footage is 5,000 square feet or more, and throughout all occupancies. While all of the residential units within the project will be constructed with automatic fire sprinklers, this section will apply to any community facilities.

Prior to combustible construction beginning, the project will need to construct and maintain concrete or asphalt roadways that will support the imposed loads of emergency apparatus in all weather conditions.

Fire apparatus access roads will be required for every building constructed and these access roadways will need to be provided to within one hundred fifty (150) feet of all portions of the exterior walls of the first story of any building. For multiple story buildings or when the natural grade between the access road and building is in excess of thirty percent (30%) an access road will need to be provided within fifty (50) feet. The Fire Chief can authorize built-in fire protection where the access roadway cannot be provided.

Fire apparatus access roads will need to be marked in accordance with the amended fire code and the specification of the Fire Marshal's office. In addition, each premise (building address) will need to be identified with approved numbers, a minimum of 6" high if the building is within 100 lineal feet or less on the street or if greater than 100 lineal feet, the numbers will need to be a minimum of 12" high.

Firewood and combustible material will not be stored in unenclosed spaces beneath buildings or structures, or on decks or under eaves, canopies or other projections or overhangs. Storage of firewood and combustible material stored in the defensible space shall be located a minimum of 20 feet from structures and separated from the crown of trees by a minimum horizontal distance of 15 feet.

The Fire Code requires the clearance of brush or vegetative growth from structures/roads. Persons owning, leasing, controlling, operating or maintaining buildings or structures in the Hazardous Fire Area, and persons owning, leasing or controlling land adjacent to such buildings or structures, are required to:

1. Maintain an effective firebreak by removing and clearing away flammable vegetation and combustible growth from areas within 100 feet of such buildings or structures;

   Exception: Single specimens of trees, ornamental shrubbery or similar plants used as ground covers, provided that they do not form a means of rapidly transmitting fire from the native growth to any structure.

2. Maintain additional fire protection or firebreak by removing brush, flammable vegetation and combustible growth beyond the 100 feet from such buildings or structures, when required by the fire code official because of extra hazardous conditions causing a firebreak of only 100 feet to be insufficient to provide reasonable fire safety.

   Exception: Grass and other vegetation located more than 100 feet from buildings or structures and less than 18 inches in height above the ground need not be removed where necessary to stabilize the soil and prevent erosion.

3. Remove portions of trees which extend within 10 feet of the outlet of a chimney.

4. Maintain trees adjacent to or overhanging a building free of deadwood.

5. Trees shall be trimmed to provide a minimum of 10-foot ground clearance.

6. Trees shall be cut/pruned at the angle of the slope in which they reside.

7. Irrigated surface fuels shall be maintained at a height not to exceed 18 inches.

8. Maintain the roof of a structure free of leaves, needles or other dead vegetative growth.

9. Debris and trimmings shall be removed from the site, or chipped and converted into mulch then evenly dispersed in the same area to a maximum depth of three (3) inches.

10. Deadwood and tree litter shall be regularly removed from trees.

11. Tree crowns extending to within 10 feet of any structure shall be pruned to maintain a 10-foot clear horizontal distance.

12. Brush or vegetation growth within 10 feet on each side from roadways. shall be cleared of flammable vegetation and other combustible growth.

    Exception: Single specimens of trees, ornamental shrubbery or cultivated ground cover such as green grass, ivy, succulents or similar plants used as ground covers, provided that they do not form a means of readily transmitting fire.

The Amended Fire Code is Chapter 15.16, of the city code and is provided in Appendix D.

Fire Department Response Time

The project site is served by the City of San Bernardino Fire Department. The closest fire station to the site is Fire Station 232 at 6065 Palm, near the 215 Freeway. This fire station currently responds to about 2 to 3 calls for service per day, which is a low call volume. The response distance is approximately two miles (2.07) to the intersection of Meyers Road and the project entrance. Fire Station 232 is staffed by four firefighters and responds as a Paramedic Engine Company on a Type 1 engine. The station also houses a Type 3 brush fire engine, which is normally "cross-staffed."

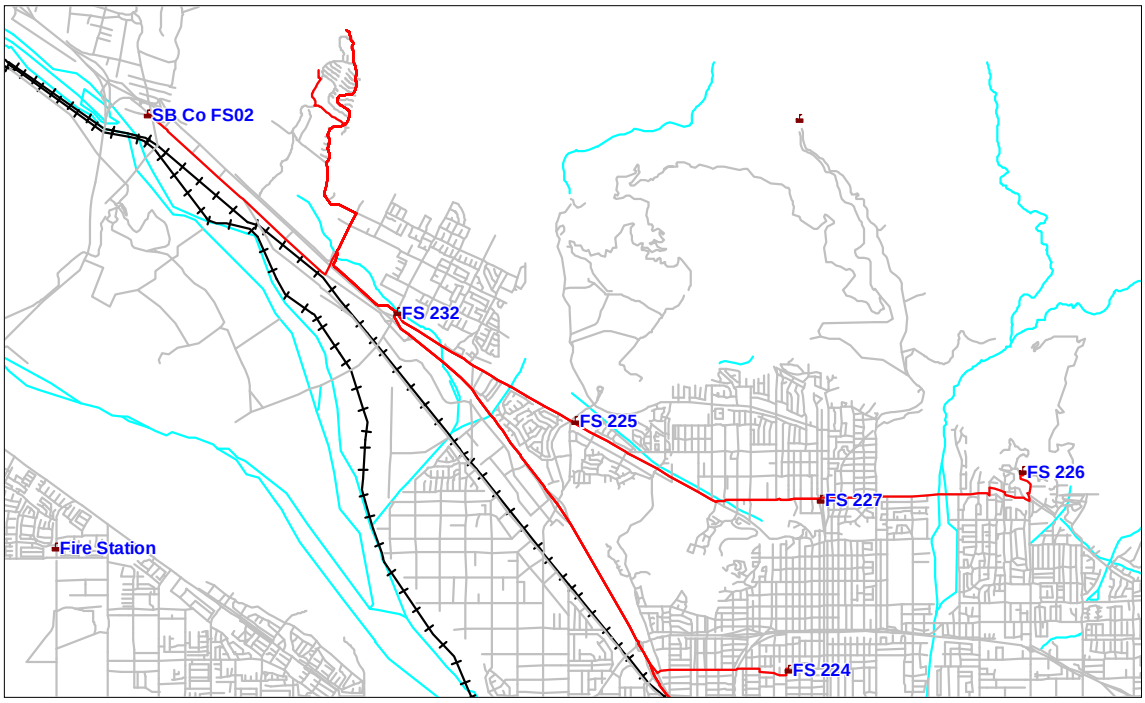
The second due Fire Engine Company comes from Station 225 at University and Kendall, with three firefighters. Station 225 also has a Type 3 engine. This station is an additional two miles farther than the first due company, or approximately four miles (4.13) to project entrance.

An effective response force (three fire engines, one aerial ladder truck and a chief officer with a minimum of fifteen personnel) needed to effectively combat a structure fire would need to be capable of being assembled at points within the project site. The third engine and aerial ladder truck to complete an effective response would come from station further away. The third engine company could be from Fire Station 227 located at 282 West 40th St (6.75 miles from project entrance) or from San Bernardino County Fire Station 2 (3.75 miles from project entrance), located in Devore. While the San Bernardino County station is physically closer, additional time and effort would be required to coordinate with the County, which could delay the response. Either would come with a minimum of three firefighters. The aerial ladder truck, with four firefighters, would come from Fire Station 224 located at 2641 E Street (7.85 miles from project entrance). A Fire Battalion Chief would also be dispatched. A detailed response time analysis is provided in Appendix E.

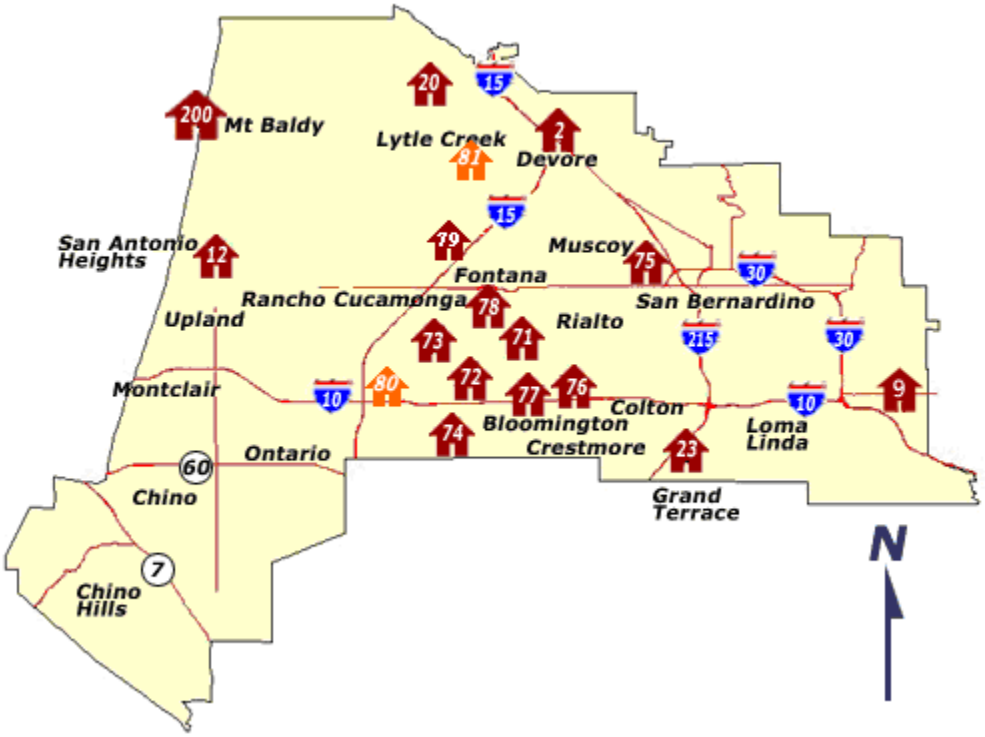
In the case of a major fire or a wildland fire, other City Fire Stations would respond as needed. The City of San Bernardino Fire Department has five Type 3 (wildland) engines which are deployed at Fire Stations 225, 226, 227, 228 and 323. The three closest fire stations to this project have wildland engines.

In addition, there is a County/CDF Fire Station nearby in Lytle Creek (Fire Station 20) and a new County Fire Station will be built as part of a new development in the southern Lytle Creek area, south of the Glen Helen Regional Park in Devore. The new station is dependent on development in the area and may be delayed with changes in the housing market. Vegetation fires result in a multi agency response, which would also include the CalFire and the U.S. Forest Service (USFS).

City Fire Station Locations



County Fire Station Locations



Fire Threat Analysis

Wildfires on adjacent national forest land and undeveloped properties could threaten residential development on the project site. This is a significant potential impact unless mitigated through the use of fuel modification, construction enhancement and the provision of defensible space.

Wildfires are a normal part of the environment in those areas along the base of the San Bernardino and San Gabriel Mountains, and in the adjacent San Bernardino National Forest that surround the majority of the site. When the winds are high, such as during a Santa Ana wind event, there is a risk of a fire that could pose a threat to the project residences.

Construction of this project, with 300+ single family lots, would expose future project residents and structures to potentially dangerous wildfire(s) from the wildland located to the northeast, northwest and/or the southwest of the project if mitigation measures are not taken.

The northeast exposure is a mixed chaparral with a few larger trees (most of which did not survive the 2003 fire but will grow back). The topography is primarily up slope from the structures with only a small amount of a level with or down slope. This area only presents a problem during a northeast (Santa Ana) wind. Topography and fuel driven fires would move away from the project area. Fires from the northeast may race down the slope and other small drainages. This type of fire would be primarily burning dead material in mixed chaparral plants, and on some highly combustible species such as chamise that go dormant during drought conditions. In dormancy, the chamise plant creates a waxy outer covering to keep as much moisture as possible within the plant. This outer covering increases the plants combustibility significantly. The Old Fire (October 2003) came from the northeast and east of the project site. Vegetation in this portion of the project site, prior to the fire, was dense with continuous horizontal and vertical fuel beds. Limited precipitation for several years yielded a low fuel moisture content that contributed to the fire spread. High winds by carrying sparks and burning debris deep into the project site.

The southeast exposure is also mixed chaparral. However, as it has no real northern aspects to the topography that will increase fuel loading, and also has no wind shelter, the fuel in this area is much scraper. and does not tend to have the old growth, closed canopy fuel type that can be found in other areas adjacent to the project. This exposure also has small pockets of Sycamore Alluvial Woodland, Ceanothus Crassifolius Chaparral, Chamise Chaparral, Southern Willow Scrub and California Walnut Woodlands. All of these areas to the immediate east of the project site are in the drainage bottom or will be graded and replanted with appropriate vegetation. The fuels that will remain, after the completion of the project will be mostly in the downstream drainage of Meyers Canyon and outside of the fuel modification zones that will be created.

The large majority of the vegetation that would pose a threat will be removed by grading and/or replaced with manufactured slopes. In the southwest exposure, the drainage is relatively shallow and does not flow year round. A northeast wind event would take fire away from the structures in this area. The only potential wind driven fire in this area that would pose a significant risk would be from a heat generated on shore wind. These winds, while predominate, tend to be less

intense and generally higher in moisture content. There is not a continuous fuel bed for a large fire to run up to the project from the southeast.

The southwest exposure runs across a combination of developed and open, undeveloped land. Fires originating off-site in this area would be fueled by mixed native/non-native grass and shrub lands. The fire would approach the project site from the southwest and could spread and intensify if reached the tree canopies under future conditions if vegetation is not managed. Compliance with current city standards for weed abatement and brush clearance should keep this area safe. The southwest exposure only presents fire issues during a SW wind event which, like the southeast exposure, tends to be less intense and generally higher in moisture content.

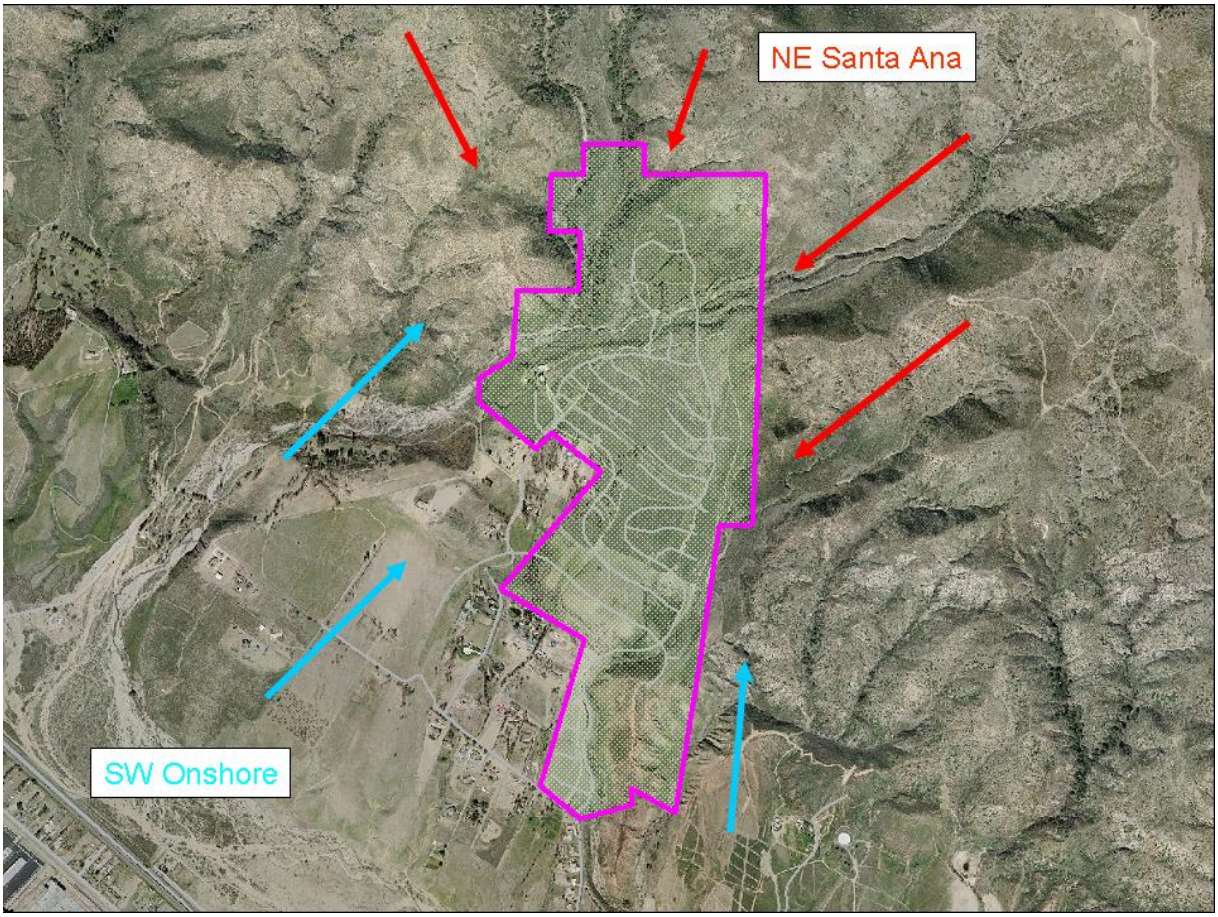
The northwest exposure is the most significant risk to the project. During a NE wind, the Cable Creek drainage and Cable Canyon will channel winds, and fire in a wildfire scenario, down to the area below the project site. This drainage is deep and full of native and non-native vegetation. Fuel modification zones in this area will need to be increased to provide adequate safety to the structures. The bottom of this drainage adjacent to the project site has vegetation that has obviously survived all of the recorded fire history. The vegetation is lush and receives natural irrigation year round. Vegetation in the bottom of the drainage will not be a problem but the vegetation on the side of the drainage is primarily northern mixed chaparral and riversidian sage scrub.

While riversidian sage scrub does not tend to have closed canopies, northern mixed chaparral is a broad-leaved shrub, ranging from 6 to 12 feet tall. It forms dense, often nearly impenetrable fuel bed. Plants are typically deep-rooted and there is little or no understory vegetation. A considerable accumulation of leaf litter is normally found. Northern mixed chaparral has adapted to repeated fires, to which many species respond by stump sprouting. A dense cover of annual herbs may appear during the first growing season after a fire, followed in subsequent years by perennial herbs, short-lived shrubs and finally the re-establishment of dominance by the original shrub species. The northwest exposure will present the highest risk to the project site.

One of the best summaries of the chaparral/fire interplay was prepared by *Jack Ainsworth & Troy Alan Doss* as a presentation to the Post-Fire Hazard Assessment Planning and Mitigation Workshop at the University of California, Santa Barbara, August 18, 1995. Here is a portion of that presentation.

> Chaparral habitat covers only about 8.5 percent of California, and only ranges in elevation from near sea level to over 5,000' in Southern California, and up to 3,000' in Northern California. Yet, it is considered by many to be the most characteristic vegetative community of the state (Hanes 1987). This is especially true in Southern California. Chaparral communities experience long dry summers, and receive most of their annual precipitation, 10 to 32 inches per year, from winter rains (Radtke 1983). Although chaparral is commonly referred to as one community there are two distinct types; hard chaparral and soft chaparral, more commonly referred to as chaparral and coastal sage scrub respectively.
>
> It is commonly believed that fire has been an important component of chaparral communities for at least 2 million years; however, the true nature of the "fire cycle" has been subject to interpretation. In a period of 750 years, it was generally thought that fire occurs once every 65 years in coastal drainages, and once every 30 to 35 years inland (Barro and Conard 1990). Many wildland blazes of the interior mountains of California are the cause of lightning. With the advent

of fire suppression, fires in this region now occur predominately between late fall and early winter, coinciding with the Santa Ana winds. These fires differ in intensity from the summer blazes as Santa Ana conditions result in lower than normal humidity levels and produce high wind speeds which further intensify a wildfire to a point where it produces its own weather conditions creating what is commonly referred to as "*firestorm*". These fires are often too intense to control until fuels are either consumed, weather conditions change, or the fire reaches the sea.



The map above indicates the two wind events that are common to the project site. An off shore northeast wind, Santa Ana event, caused by a high pressure system generally over the "four corners" area of the western united states and a southwest, on shore, wind produced by thermal heating in the Mojave desert areas. Both of these wind events will be channeled by the canyons which will increase and concentrate the effects of the winds.

In order to minimize risk to public health and safety the project applicant has prepared a Fire Protection Plan and a detailed Fuel Modification Plan that indicates the rationale and modeling used to determine the Fuel Modification Zone in the Fire Protection Plan.

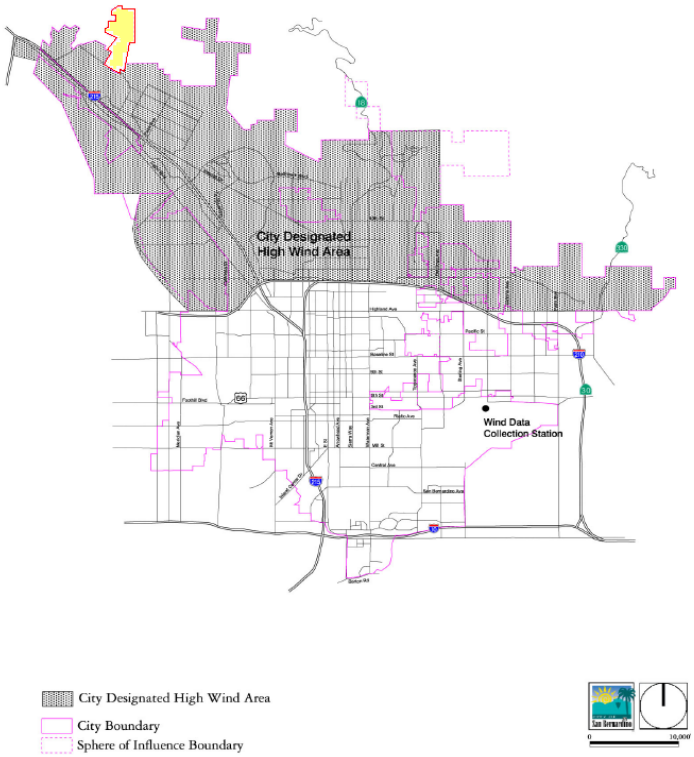
Fire Risk Factors

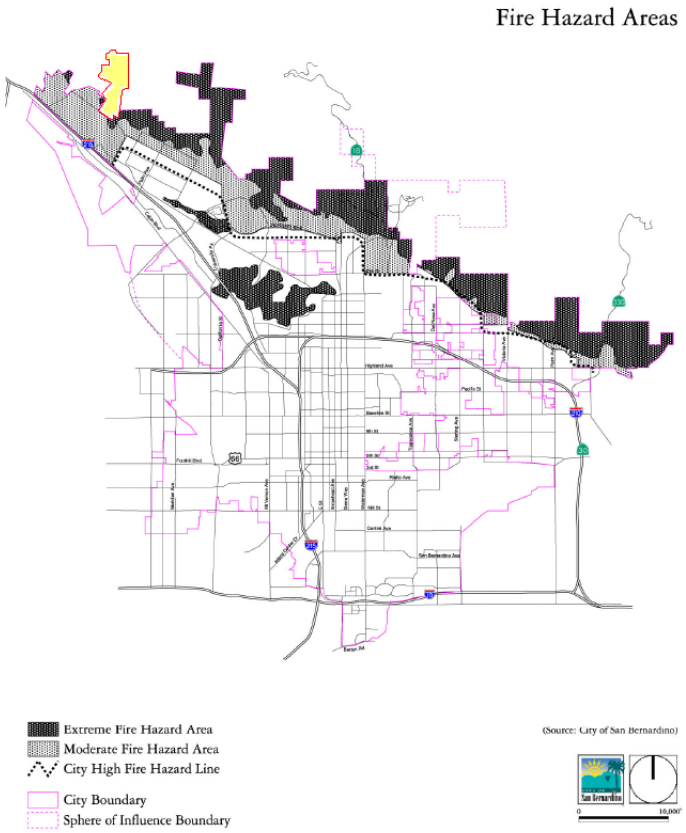
As discussed earlier, the project site and lands surrounding the site were all burned during the 1980 Panorama Fire and the 2003 Old Fire. The vegetation on the site and the surrounding National Forest lands has returned in a relatively predictable fashion, with fuels that are of the same type and location on the hillside, returning at the same "rate of growth" and "species composition" throughout the burn area. Data has been used from previous assessments, specifically those prior to the Old Fire where the vegetation had about twenty years to mature and grow. The chaparral which burned in the fire will return. The risk assessment is based on the return of such vegetation.

Prior to the 2003 Old Fire, native vegetative fuels along the northern and eastern boundaries were classified as "old growth" by previous evaluations. Previous assessments noted that, "These fuels were in a 45-degree vector, with the predominant uphill slope and in direct alignment with any high velocity winds coming from the northeast or east." Santa Ana wind events in this area are frequent in the fall of each year but can occur at any time of year. Several of the previous reports have indicated that 60 to 80 miles per hour winds are common in this area during the Santa Ana wind events. The combination of Santa Ana wind conditions and volatile fuels can create a rapid rate of spread and high to very high fire intensity on any fire ignited under these circumstances. Witness accounts of the October 2003 Old Fire support this.

The City General Plan has designated the project area are being within two specific hazard zones. The first is the High Wind Areas and the second is the Fire Hazard Areas. These are shown on maps below with the project site highlighted in yellow.

Wind Hazards





A review of weather data from the nearby Devore RAWS (Remote Access Weather Station) indicates that the worst-case fire condition would be during a late summer or fall wind event (Santa Ana Winds). During this type of event, the relative humidity will fall, temperate and winds will increase dramatically. These events normally last for several days. A fire under these conditions that would present a threat to the project would most likely occur on the north, northeast and east sides of the proposed development but could occur in any exposure with a chaparral interface.

When modeled, the lesser threat of a fire during a southwest or south wind event (onshore), in vegetation other than Fuel Model 4 (chaparral) or even chaparral, produced flame lengths significantly less than the Fall (Santa Ana Winds Event) scenario chosen to be the design criteria for this project.

The BEHAVE, Computer Fire Behavior Prediction and Fuel Modeling System is the most accurate method for predicting wildland fire behavior. The BEHAVE fire behavior computer modeling system is utilized by wildland fire experts nationwide. The fuel models in the computer program, are also referenced from the book titled, "Aids to Determining Fuel Models for Estimating Fire Behavior." The fuel models were designed to aid in determining fuel types and are used in calculating and estimating fire behavior. We used BEHAVE to measure the intensity of a fire moving towards this development.

The fire model describes the fire behavior only within the flaming front of the fire. The primary moving force in the fire is dead fuel less than ¼" in diameter. These are the finest fuels that carry the fire. Fuels larger than ¼" contribute to fire intensity, but not necessarily to fire spread as much as the fine fuels. The BEHAVE fire model describes a wildfire spreading through surface fuels, which are the burnable materials within 6' of the ground and contiguous to the ground.

This type of modeling will demonstrate that the best fire defense system for the propsed development is based on adequate fuel modification zones. The Modeling shows that the structures are significantly further away than the most extreme flame lengths and intensity that would be produced. Instead of estimating with the exact fuel model inputs for calculating fire behavior, we will use worst case scenario fuel model inputs to ensure a further safety cushion in the computer fire behavior calculations and result analysis.

Extremes were used to create a design scenario. Fuel Model 4 (chaparral) and extreme weather conditions, which could be encountered during a Santa Ana Wind event, were used to illustrate the most dangerous fire that is likely to occur at this site. The modeling has assumed that the dead fuels within the area are at the recorded minimums. One hour fuels were modeled at three percent (3%) fuel moisture, ten hour fuels at four percent (4%) fuel moisture and 100 hour fuels at five percent (5%) fuel moisture. In addition, live fuels were assumed to be at critical levels as well. Live Herbaceous vegetation, when appropriate (not Fuel Model 4), was modeled at 30% and Live Woody vegetation at 60%. This is extremely important as these factors determine the amount of live fuel that will be calculated in the fire model. In this case, the percentages used will model the maximum fuel load transfer from the live fuel to the fire. This is the case when live fuels are completely consumed by a fire leaving nothing but ash (usually white in color). This is the hottest, fasting moving fire modeled.

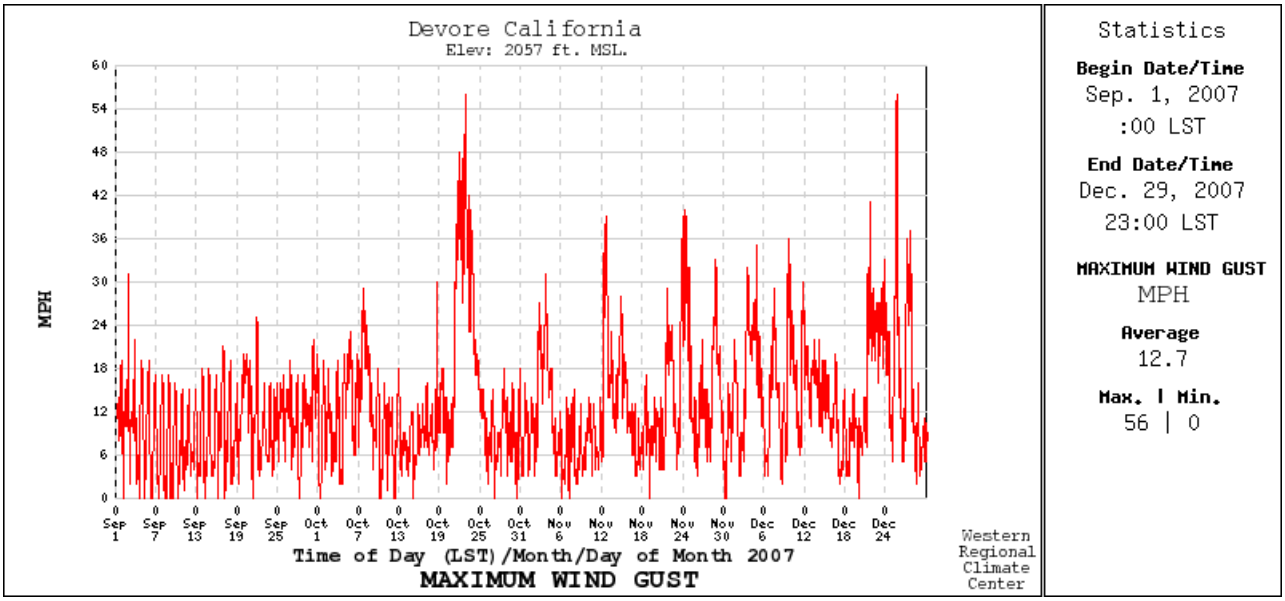
Winds in the project areas can be very strong. A review of the RAWS data showed wind gusts up to 71 mph (November 2002) in the past nine years; however, the average mean wind speed is around 5 mph. High wind events and the associated gusts are not the norm. In the data reviewed, temperatures ranged from 28 degrees to 110 degrees are the ends of the spectrum. In the fall fire scenario, temperatures would normally be in the 80's or low 90's.

The final weather related input that needs to be discussed is the relative humidity (RH). The RH will determine the amount of moisture that is available within the dead fuels. Live fuel moistures are impacted by RH but more closely driven by the amount of precipitation. Dead fuels (one hour, ten hour and one hundred hour) are highly impacted by the daily changes in HR.

Dead fuels are categorized into classes by the diameter of the fuels, based on a principle called timelag. During the time period reviewed for this modeling, minimum RH's were found to be two percent (2%). While this was rare, it did occur. The *Maximum Wind Gust* chart shows the interrelationship between these factors in a typical fall weather pattern with several (6) Santa Ana events in 2007.

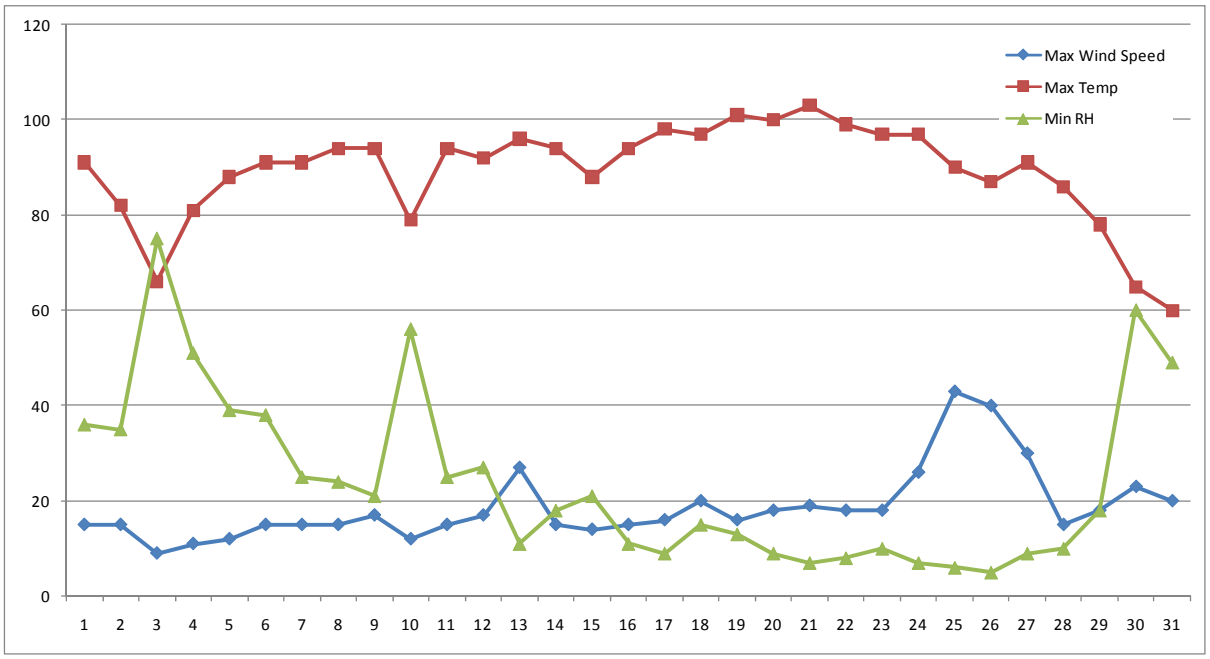
Wind gusts follow the same pattern as the mean wind speed. A cycle of six wind events occurred in the fall of 2007. Two of these had significant winds.

MAXIMUM WIND GUST



While the wind events have a significant impact on deal fuel moisture, they do not always produce high temperatures. Fuel moisture bottoms out with each wind event but air temperatures still trended cooler with smaller spikes from the wind events. As can be seen in the *Relationship Between Wind/Temperature and Relative Humidity* chart, dead fuel moisture can be at or near minimums even when the actual temperatures are nowhere near their peaks.

Relationship Between Wind/Temperature and Relative Humidity



It should also be noted that temperature can actually drop during the early phases of the major wind event, similar to the wind event that created the Old Fire, with temperature increasing only slightly near the end of the event. This is typical in that these wind events are actually created by cold, sinking air over the four corners area of the United States. The air is then compressed as it descends in elevation, which causes it to heat slightly and makes it very dry in the process. For this reason, extreme temperatures such 110 degrees were not modeled; instead, typical Santa Ana conditions at approximately 85 degrees were modeled. In the modeling, RH and fuel moisture are much more important than the actual air temperature.

Live fuels are typically divided into two categories: herbaceous and woody. Herbaceous fuels include grasses, forbs, and ferns as well as other herbaceous plants. Woody fuels refer to the leaves, needles, and twigs of small woody shrubs. Live fuels in general refer to naturally occurring fuels whose moisture content is controlled by physiological processes within the plant. For this project area, woody fuel will be used in the modeling. Modeling has been accomplished using 60 percent fuel moisture for live woody fuels.

In addition to wind and fuels, topography needs to be addressed in the modeling. In this case, the wind speeds are so high that slope has little effect on the actual flame lengths.

Effects of Wind/Slope of Worst Case Fire Scenario

BehavePlus 3.0.2 Tue, Oct 14, 2008 at 12:26:07 Page 2													
Midflame Wind Speed mi/h (Unprotected)	20 foot wind speed	ROS (max) ch/h	ROS (max) ft/sec	Flame Length ft	Spread in mph	ROS (max) ch/h	ROS (max) ft/sec	Flame Length ft	Spread in mph	ROS (max) ch/h	ROS (max) ft/sec	Flame Length ft	Spread in mph
-	-	7	0	7	0.1	77	1	22	1.0	285	5	39	3.6
5	10	126	2	27	1.6	196	4	33	2.5	405	7	46	5.1
10	20	327	6	42	4.1	396	7	46	5.0	605	11	56	7.6
15	30	576	11	54	7.2	645	12	57	8.1	854	16	65	10.7
20	40	862	16	66	10.8	932	17	68	11.6	1,141	21	74	14.3
25	50	1,181	22	76	14.8	1,251	23	78	15.6	1,460	27	83	18.2
30	60	1,528	28	85	19.1	1,598	29	87	20.0	1,806	33	92	22.6
35	70	1,900	35	94	23.8	1,970	36	96	24.6	2,179	40	100	27.2
40	80	2,296	42	103	28.7	2,365	43	104	29.6	2,574	47	108	32.2
45	90	2,712	50	111	33.9	2,782	51	112	34.8	2,991	55	116	37.4
50	100	3,149	58	119	39.4	3,219	59	120	40.2	3,427	63	124	42.8
55	110	3,604	66	126	45.1	3,674	67	128	45.9	3,882	71	131	48.5
60	120	4,077	75	134	51.0	4,147	76	135	51.8	4,355	80	138	54.4
		0% slope				60% slope				120% slope			
Dead fuel		3,4,5				3,4,5				3,4,5			
Live fuel		60				60				60			

As shown in the Effects of Wind/Slope of Worst Case Fire Scenario chart, when wind speed reaches a certain point, slope has very little impact on flame length. If we look at a 70 mph 20 foot wind, with no slope, a 94 foot flame length is produced. That same wind at a 60% slope produces a 96 foot flame and at 120% slope, the flame length is 100 feet long. The six foot difference is minor in the overall risk to the structures involved. Obviously, without the strong wind, slope has a dramatic effect. With no wind, the fire burns with a 7 foot flame length in the flat and a 39 foot flame length at the maximum slope producing an increased risk factor of 5.5 times. This is significant. For the worst case scenario used to design the fuel modification

zones, slope will have little to no effect. However, increased protection would be required along the project slopes nonetheless.

There is also a potential for burning Eucalyptus trees. Most of these will be removed from the project site but some will remain on adjoining properties. They can produce fire brands that can fall onto a structure and cause ignition if steps are not taken to insure that this does not occur. Finally, the duration and intensity of the fire that this project would be exposed to was also estimated in the model. The estimated residence time for the fire at any one structure would probably be less than 10 minutes. However, residual fire can be present for over an hour.

Based on the more detailed risk analysis and Behave modeling (provided in Appendix F), the maximum anticipated flame lengths for this site would be 100 feet long. This is based on the worst case scenario and extreme weather conditions. This type of fire occurs in the fall in chaparral vegetation, with approximately 16 tons per acre, at 6-10' in depth, producing 8,000 BTU/lb of fuel. Model runs were completed using BEHAVE version 3.0.2. Fuel Model 4 - Chaparral. As discussed in the previous section, weather data was obtained from the RAWS site at Devore.

The Inputs to the models are as follows:

1 Hour Fuel Moisture	**10 Hour Fuel Moisture**	**100 Hour Fuel Moisture**	**Live Woody Moisture**	**20' Wind Speed Upslope**	**Air Temperature**
3%	4%	5%	60%	70 mph gusts 35 mph Midflame	85° f

The outputs from the model at the maximum slope of 120% produced the following:

Flame Length	**Rate of Spread**	**Spotting Distance Downwind**	**Fireline Intensity**
100.3'	27.2 mph (40'/sec)	1.4 miles	127,104 Btu/ft/s

2. Fuel Modification Zones

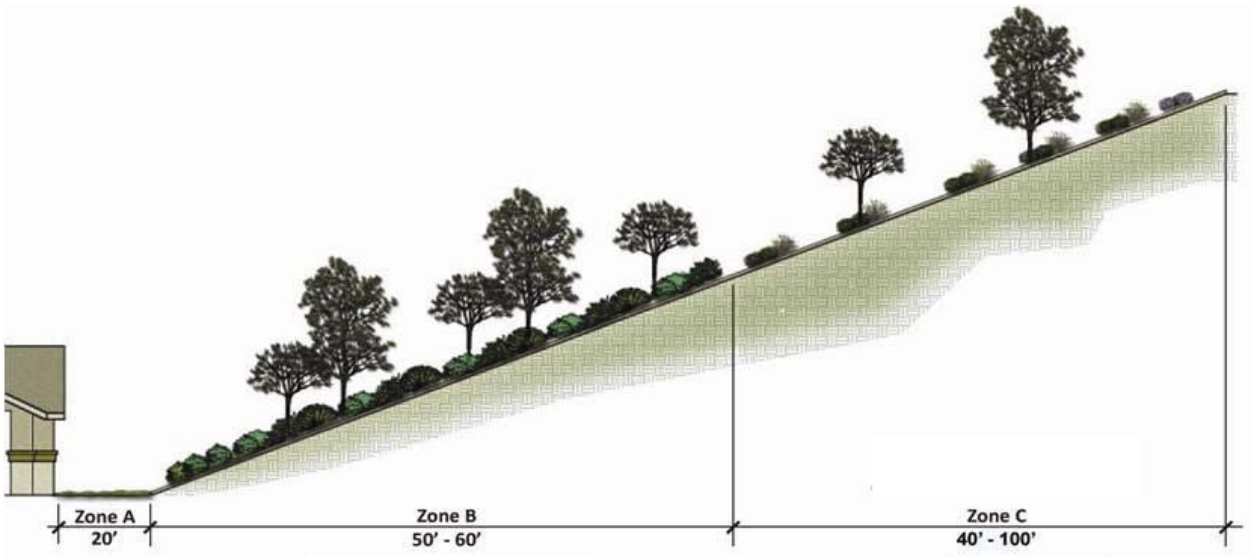
The previous draft EIR (2006) for this area stated, "Statistics gathered by wildland fire agencies indicate that as residential development occurs in an area of wildland vegetation, the number of ignitions increase (risk). As the brush grows back after a large fire, the intensity of a fire in the area will also increase (hazard). When homes and other amenities are added to the same area (value), the need for increased fire protection and fuel modification becomes apparent."

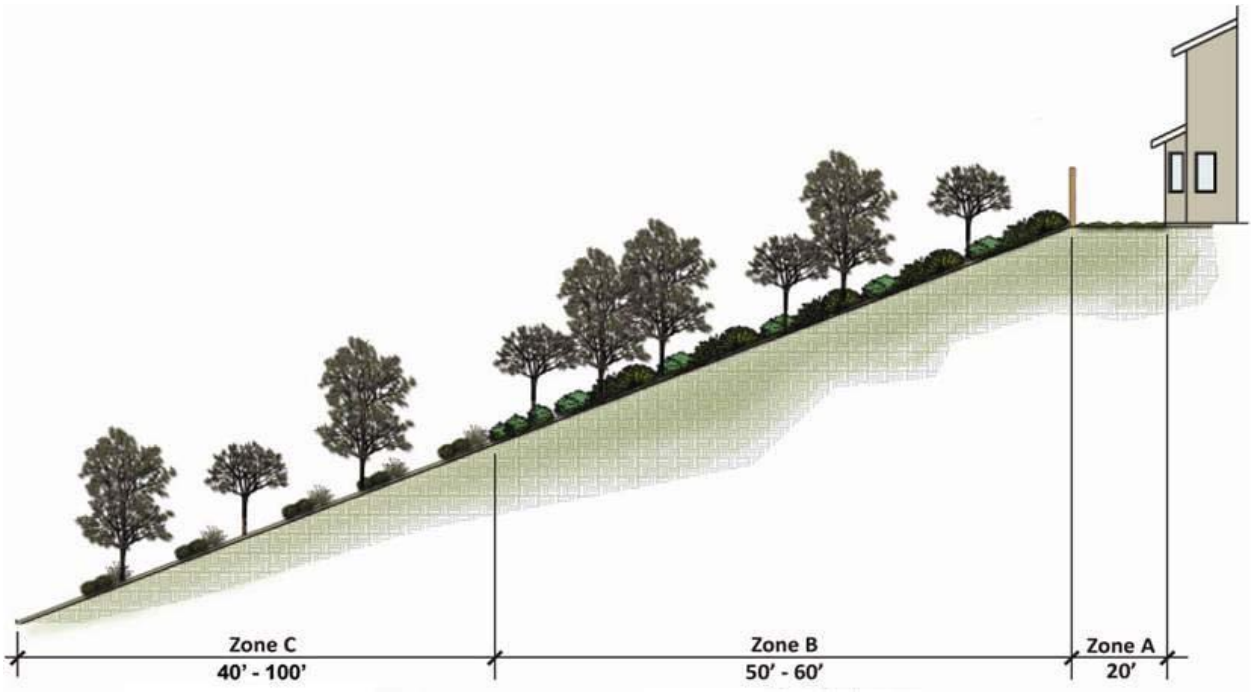
It concluded, rightfully so, that the assessment of these factors for this project showed that the site has a combination of high risk, high hazard and high value requiring significant mitigation measure in order to make the project safe for the residents and the fire suppression personnel

who may have to protect the homes during a wildfire. One of the components of the wildland fire defense system will be the use of Fuel Modification Zone to reduce the impacts of fire on the proposed protect.

Fuel Modification Zone Definitions

Three Fuel Modification Zones have been established within the fuel modification area (those building site that have wildland areas adjacent to them) as shown in the examples below:





Specifically, the Fuel Modification Zones will be designed as follows:

Fuel Modification Zone A (flat) - Non-Combustible Construction
20'-0" to 35'-0" setback zone for non-combustible construction only. Fuel Modification Zone A shall be maintained by the Homeowner or the HOA. At no time will the Fuel Modification Zone A be less than 20'.

Fuel Modification Zone B - Wet Zone (100% removal of undesirable plant species as shown on Appendix I)
First 50'-0" to 200'-0" from Fuel Modification Zone A. Fuel Modification Zone B shall be permanently irrigated, fully landscaped with approved drought tolerant, deep rooted, moisture retentive material as container shrub material or hydro-seeded per SBFD Approved Plant List, refer to Appendix I for approved SBFD plant list. Hand-seeding of bare areas may need to be performed six months after hydro-seeding establishment period. Fuel Modification Zone B area shall be maintained by the Homeowner, HOA or LMD as appropriate.

Fuel Modification Zone C - Dry Zone (50% thinning of the acceptable existing plant material)
40'-0" - 185'-0" Fuel Modification Zone C shall be a non-irrigated area. Removal of all flammable undesirable species as listed in Appendix I. Specimen and trees shall be retained as directed by the owner's representative but must be thinned a minimum of 50% including removal of all low hanging foliage within (3x) three times the height of the understory shrubs or (10)-ten feet, whichever is greater, along with dead or broken branches. All accumulated plant debris on the ground shall be removed. Fuel Modification Zone C area shall be maintained by the LMD. Note this project does not contain any 30% thinning "D" Fuel Modification Zones.

A detail map of the specific location and size of all Fuel Modification Zones in the project are shown on large scale map in Exhibit 1 (attached to this report)

Building Setbacks
Additionally, buildings not on the wildland interface/fuel modification zones, will be setback from the adjacent property lines or any natural area adjacent to the homes by a 25' - 50' building setback. This zone will have no combustible construction allowed within it.

There are two lots within Spring Trails that would not be developable due to deficient Fuel Modification distances. These lots are Lot 30 and 233, along the eastern boundary of the project site. Without mitigation, these lots would remain undevelopable.

Systems Approach
The concept behind this and most other fuel modification plans is to create a Fuel Modification Zone in which the fire is systematically deprived of available fuel to reduce the size of the flame and the amount of heat that would be generated. The maximum flame length of 100 feet is achieved at the junction of the wildland and Fuel Modification Zone C. For this reason, the Fuel Modification Zone C is a minimum of 100 feet in width (measured in the flat plane so that it cannot be less than 100 feet regardless of the slope) *(Note: In some cases Fuel Modification Zone B will be extended and the Fuel Modification Zone C decreased; regardless, the combined Fuel Modification Zones will not be less than 150 feet in width).* Fuel Modification Zone C has 50% of the available fuel that was in the wildland. It also has little to no dead materials or fine fuels. This will reduce the flame lengths to a manageable size. When the flame front arrives at the

junction of Fuel Modification Zones B and C, it should be reduced by 50%. Fuel Modification Zone B is a minimum of 50 foot in width and it is irrigated. The combination of the distance and the heat sink effect of the moist vegetation, should keep flames from reaching the Fuel Modification Zone A/B junction, but just in case they do, a minimum 20 foot setback zone (Fuel Modification Zone A) is established with no combustible construction being allowed in this Fuel Modification Zone at any time. Additionally, advanced construction features are used to prevent convected or radiant heat from igniting the structure. Other features are used to prevent fire brands from causing fires within the community.

In areas where fuels, topography, slope and aspect align, additional depth has been added to the fuel modification zones. This occurs on the upper portions of the project where vegetation is below the structures and on the east side of the project where canyon winds may be channel and thus intensified. The final area for an increased fuel modification zone is on the east side of the project, located on the only cul-de-sac where total alignment can occur. These areas are depicted on the Fuel Modification Plan map in Exhibit 1. A complete Fuel Modification Plan is provided as a separate document. See Appendix G for detailed graphics of fuel modification zones.

3. Vegetation Management Guidelines

Roadside Brush Clearance
20' removal of all undesired plant species and thinning of at least 50% of all existing vegetation from curb face. Any plant material installed must be fully irrigated and from the SBFD approved plant list, refer to Appendix I for the SBFD Approved Plant List. This area will be maintained by the existing Homeowner or Landscape Maintenance District (LMD).

Fuel Modification Zone Plant Palette
Plant material within the Fuel Modification Zone must be on the SBFD approved plant palette, refer to Appendix I for SBFD approved plant list. No plant material from the undesirable plant list shall be allowed in any Fuel Modification Zone, refer to Appendix I for undesirable plant list. This area shall be irrigated and must be maintained per the maintenance standards set forth on the Fuel Modification Plan.

Brush Clearance
Brush clearance shall consist of removal of all dead, dying shrubs and all plant material from the undesirable plant list around the project water tanks, and will be maintained by the LMD.

Irrigated Manufactured Slope
Planted and irrigated manufactured slope, shall be maintained on year round basis by the LMD.

4. Allowed and Undesirable Plant Palettes

All Eucalyptus, and any conifers, should be removed from the property.

The objective is to reduce flammable vegetation, reduce the potential for fire to spread to trees from vegetation on the ground, reduce potential for fire to spread to and through vegetation and

then to the structure, and to preclude invasion of highly flammable exotic vegetation. Any shrubs or trees must be properly spaced, limbed and pruned and have all dead material removed.

Fuel Modification Zone A is an irrigated wet zone with landscaped vegetation. Grasses must be less than 4 inches high. Ground cover must be low profile, less than 6 inches. There should be no vegetation within 10 feet of any chimney and no tree canopies within 10 feet of structures. No shrubs or plants should be planted under trees. The first 20 feet from the structure should consist of well irrigated, well spaced, approved, fire resistive groundcover, shrubs, or lawn. Fire resistant plants and shrubs must be kept to a maximum height of 18 inches.

Any single specimen of approved trees (see Appendix I for list of approved landscape material) must be properly located, spaced, limbed and pruned up to 1/3 the height or six feet from the ground.

No dry grasses, acacia, eucalyptus, palm, juniper, cypress, conifer (pine, cedar, etc) pepper, olive, camphor, bottlebrush, pampas grass, chaparral, sage, sagebrush, salvia spp, chamise, coyote bush, California buckwheat or manzanita would be allowed in Fuel Modification Zone A. No vegetation from the list of undesirable plants in Appendix I would be allowed. No chipped biomass or wood bark shall be allowed within 30 feet of structures.

Fuel Modification Zone B is an irrigated wet zone of low fuel volume, high fuel moisture, drought tolerant, fire resistive, low profile vegetation. Grasses must be less than 4 inches high. Ground cover must be low profile, less than 6 inches. It may also include certain properly mowed, thinned, limbed, pruned and spaced natural existing vegetation with the exception of vegetation which is prohibited in this plan. No dry grass is allowed.

Trees must be properly limbed up (1/3 height or six feet), 40 feet between mature canopies. Dead fuels must be removed, and any flammable understory removed, and must be well spaced. No acacia, eucalyptus, palm, juniper, pepper, olive, camphor, bottlebrush, cypress, conifer (pine, cedar, etc), or pampas grass would be allowed in Fuel Modification Zone B, nor any dry grass, chaparral, sage, chamise, salvia spp, sagebrush, coyote bush, California buckwheat, or manzanita. No vegetation from the list of undesirable plants (Appendix I) would be allowed. Approved fire resistant plants and shrubs may be used if properly spaced, similar to Fuel Modification Zone A. Fire resistant plants and shrubs must be kept to a maximum height of 18 inches high.

Areas within this Fuel Modification Zone must be kept free of all flammable vegetation (including flammable trees) such as are prohibited in the Fuel Modification Plan.

Fuel Modification Zone C is a thinning zone. This Fuel Modification Zone will not need to be irrigated. Fuel Modification Zone C will also require that flammable vegetation be significantly separated, thinned, limbed up and pruned. Any continuous fuel beds must be broken up, all dead fuel from vegetation must be removed, and trees must be limbed up to 1/3 of their height or up to six feet to stop the path between ground and aerial fuels. Twenty feet of clearance shall be provided between large shrubs and tree groupings. Trees, or groupings of up to three trees as allowed by the Fire Marshal, will need to be spaced 40 feet between mature canopies. Grasses

must be cut to four inches high or less. No groundcover over eighteen inches high would be allowed. A certain amount of naturally occurring vegetation is needed to help maintain erosion control and soil stability, but must be thinned, modified, and kept to a well spaced and properly maintained condition. No vegetation from the list of undesirable plants shall be allowed.

5. Planting Maintenance and Spacing Guidelines

The objective is to enclose each structure and/or access roadway on the wildland interface within the vegetation management zone into a safety envelope. To accomplish this, it is necessary to remove as much flammable vegetation as possible, remove any continuous fuel beds, remove ladder fuels, and to slow down or stop fire from spreading to structures, and means of ingress and egress. Any vegetation (including trees and shrubs) must be approved by the Fire Department and shall be properly spaced, configured and maintained. It is imperative that a defensible space around the structures is created to assist firefighters in protecting the structures.

All vegetation in all zones, including on private lots, parks, common areas, streets, slopes, and on any manufactured slopes or in any open space within this development, must be maintained twice annually, and more often as needed. This is done by removing undesirable combustible vegetation, pruning ornamental vegetation, removing dead fuels, eliminating ladder fuels, eliminating invasive vegetation and controlling the volume/arrangement of fuels to the satisfaction of the Fire Department. Private lot owners shall be responsible to follow the requirements of this plan when approved, initially and on an ongoing basis.

The HOA shall assure that Fuel Modification on private lots and in common areas is done on an initial and ongoing basis, in accordance with this plan and shall retain annually a qualified wildland fire safety inspector to inspect all zones and all lots, including interior lots, annually prior to fire season (May 1) and again after the final curing of fine deal fuels but prior to seasonal winds (Sept 1) for compliance with this plan and submit a report to the Fire Marshal.

Caution must be used not to cause erosion or ground (including slope) instability or water runoff due to landscaping, vegetation removal, maintenance, management, or irrigation. No uprooting is necessary. Proper cutting to meet the objective should be utilized.

Permission will be required from resource agencies prior to fuel modification in sensitive areas or areas of critical habitat. Written, legal, permission is needed from offsite landowners and the Forest Service where applicable, before any offsite vegetation management or removal is done.

The vegetation management requirements in this plan are made based upon the understanding that the entire project and all structures will be in strict, ongoing, compliance with all Fire Department requirements, and all Building and Safety requirements, including Municipal Code Chapter 15.10/11, Chapter 19.15 of the City of San Bernardino Development Code, and the City Fire Code Chapter 15.16.

Homeowners/HOA shall also be responsible to assure the block walls on private lots and along perimeter of the tract are properly maintained, and not pierced, broken or removed.

Vegetation in any planters, calming devices, median strips, streets, areas between split or multi-level roadways, and any manufactured slopes, shall be fire resistive in compliance with the Fire Protection Plan and shall not obstruct access in any way. Trees or shrubs on streets shall not be of a type prohibited by the Plan. Street trees must be spaced 20 feet between mature canopies and pruned to 14 feet-6 inches high, so that 14 feet-6 inches clear space is maintained over streets. Trees shall not intrude into required road widths. Trees such as Coastal Live Oak, Sycamores, Plums and Liquid Amber may be used as street trees, if otherwise deemed suitable, by the landscape architects, for the high winds and temperatures. Shrubs under street trees must be fire resistant, of low fuel volume and high fuel moisture, have a low dead to live fuel ratio, and maintained to a height of 18 inches or less.

6. Construction Phasing Management Plan

All vegetation management shall be done on private lots prior to work beginning on those lots and prior to any combustible construction materials being brought on site. Vegetation management in all common areas, parks, construction sites, medians, planters, roadsides, etc., shall be done as required in this plan at the start of the construction phase and continued throughout the project. Adequate fuel breaks, acceptable to the San Bernardino Fire Department, shall be created around all grading, materials storage areas, laydown areas, site work and other construction activities in areas adjacent to the vegetation.

7. Infrastructure/Structural Construction Features and Requirements

Foothill Fire Zone Building Standards:
All structures on lots within 200' of the Fuel Modification edge shall receive “enhanced construction” on all four (4) sides per San Bernardino Municipal Code Chapter 15.10 and 19.15.

Roofing and Venting and Rain Gutter Requirements:
All structures on lots within in the project beyond the 200' Foothill Fire Zone shall receive "enhanced construction" on all four (4) sides per 2007 California Building Code Chapter 7A regarding roofing, venting and rain gutters only.

Development of Lots 30 and 233 shall only occur when the following conditions are met. No development shall occur on these two lots without the review and approval of the San Bernardino Fire Chief.

- The onsite fuel modification shall consist of irrigated “Zone A” and “Zone B” that will remain within the Spring Trails property. An irrigated “Zone A” shall be a non-combustible setback zone within the pad area between the residential structure and the wildland urban interface area, traditionally the furthest portion of the pad. “Zone B” shall be a landscaped irrigated zone beyond “Zone A” and terminating at the project boundary, with non-combustible construction which will act as a “heat-sink” from an impending wild fire. “Zone C” shall extend offsite as fuel modification. “Zone C” will be a temporary off-site fuel modification until the adjoining property is, or will be, developed. If this is the scenario an easement will be required for maintenance of the “Zone C”. If the adjoining property is developed prior to the development of the Spring Trails project,

then the off-site fuel modification will not be required for Lots 30 and 233. The total fuel modification distance for lots 30 and 233 will be a minimum of 170 feet.

- For Lot 30, Zone A shall have a minimum/maximum distance of 20 feet, Zone B shall have a minimum distance of 101 feet and a maximum distance of 111 feet, and Zone C shall have a minimum distance of 40 feet and a maximum distance of 49 feet. For Lot 30 the off-site Zone C shall be approximately a total of 12,567 square feet (0.288 acres).
- For lot 233, Zone A shall have a minimum/maximum distance of 20 feet, Zone B shall have a minimum distance of 68 feet and a maximum distance of 112 feet in width, and Zone C shall have a minimum distance of 43 feet and a maximum distance of 80 feet. For lot 233 the offsite Zone C shall be approximately a total of 20,706 square feet (0.475 acres).

8. Compliance Matrix

Private lot owners and the Landscape Maintenance District (LMD) will be responsible for ongoing fuel modification in compliance with the approved Fire Protection Plan and SBFD requirements, and shall also comply with all legal constraints of the resource agencies concerning fuel modification. The project will be required to form an LMD as a vehicle for completing required maintenance and upkeep on the required Fuel Modification Zones and other aspects of the wildland fire defense system required as conditions of approval for this project. As part of the plan implementation, the developer, lot owners and the LMD must provide annual written assurance and documentation to the Fire Marshal that ongoing Fuel Modification in the Fuel Modification Zones (FMZs) will be done per the plan.

The matrix below attempts to summarize the various requirements of city, county and state regulations related to fire protection for this project.

	Requirement	**Required by SBMC CH 15.10, 15.11, 15.16 or 19.15**	**Complies**
1	*All exterior elements free of exposed wood.(i.e. 7/8" stucco) Exception entry doors, windows, and door and window jambs*	15.10, 19.15	Yes
2	*Vinyl window frames prohibited unless comply with 15.10;Sec. A-2, 15.11*	15.10, 15.11	Yes
3	*All glazing to be double pane or tempered*	15.10,15.11	Yes
4	*No attic vent facing foothills/wildland. 1/8" mesh screen*	15.10,15.11	Yes
5	*No roof mounted turbine vents*	15.10, 15.11	Yes
6	*Roof coverings non wood; Class A or B. Ends of high profile roofs capped*	15.10, 15.11	Yes

	Requirement	**Required by SBMC CH 15.10, 15.11, 15.16 or 19.15**	**Complies**
7	*Open ends of high profile roofs capped*	15.1	Yes
8	*Fire sprinklers*	15.1	Yes
9	*Paper backed insulation prohibited in ventilated spaces*	15.10,15.11	Yes
10	*Exterior walls non combustible or 1 hour*	15.11	Yes
11	*Eaves enclosed with 7/8" stucco*	15.11	Yes
12	*Garage doors non combustible or fire retardant treated*	15.11	Yes
13	*Gutters and downspouts to be non combustible*	15.11	Yes
14	*Fences within 5' of structure to be non combustible or 1 hour rated*	15.11	Yes
15	*Fire spread models required*	19.15	Yes
16	*Roads: Row 48.5' with 40' paved width and parking both sides; sidewalk one side, or 40.5 ' ROW, paved width 32' with parking, sidewalk one side*	19.15	Yes
17	*Fire truck access to wildland areas behind structures; 2 options*	19.15	Yes
18	*No dead end streets. Temporary cul-de-sac required*	19.15	Yes
19	*Cul-de-sac turnarounds/curves; min. radius 40' to curb face. No parking in bulb*	19.15	Yes
20	*Cul-de-sac: maximum 750' with 30 dwelling units; 1000' if 20 units*	19.15	Yes
21	*Driveways length and grade*	19.15	Yes
22	*Collector and arterial streets not to exceed 8% grade. Residential streets not to exceed 15%*	19.15	Yes with written permission from City
23	*Two different standard means of ingress and egress*	19.15	Yes
24	*Non-combustible. Reflective street markers legible 100'*	19.15	Yes
25	*Building addresses 4" high; legible 100'*	19.15	Yes
26	*Roadside vegetation clearance 10'*	19.15	Yes

	Requirement	**Required by SBMC CH 15.10, 15.11, 15.16 or 19.15**	**Complies**
27	*15' clear access each side static water sources/hydrants*	19.15	Yes
28	*Two hose bibs on houses*	19.15	Yes
29	*Blue reflective markers for hydrants*	19.15	Yes
30	*Hydrant on cul-de-sac over 300'*	19.15	Yes
31	*Minimum single hydrant fire flow 1000 GPM*	19.15	Yes
32	*Location and setback of structures*	19.15	Yes
33	*No structures in narrow canyon mouths or ridge saddles*	19.15	Yes
34	*Spacing between structures; 60' in Zone A, 30' in Zone B*	19.15	Yes
35	*Fuel Modification Plan; 150'. Fuel Model*	19.15	Yes
36	*Disclosure of high fire hazard*	19.15	Yes
37	*Fuel Mod Zone Maintenance*	19.15	Yes
38	*Spark arrestor: approved, 1/2" mesh, visible from grade*	15.16	Yes

New buyers would be required to sign an acknowledgement that they have read and agree to implement and maintain the requirements in the Fire Protection Plan. Requirements of the Fire Protection Plan/Fuel Modification Plan will be included in the CC&R's for the project. The Plan(s) will be disclosed to new buyers.

Summary

The Fire Department will require that all detailed plans and submittals for the proposed project shall be consistent with, and implement the requirements set forth in, the Fire Protection Plan. Developer, builders, designers, and/or homeowners may submit alternative methods to Fire Department for review, if there is a practical difficulty, or some other reasonable constraint, in complying with recommendations in the plan, as long as equivalent fire safety is provided to approval of Fire and Building officials.

Risk Mitigation Measures

Mitigation Measure 1

The Fire Protection Plan must be approved by the San Bernardino Fire Department prior to commencement of grading. The Fire Marshal shall have the authority to modify, increase or reduce the necessary size and location of any of the recommended FMZs and setbacks, based on a lot-by-lot inspection at time of grading. A minimum of 170 feet of fuel modification plus enhanced structural treatments listed in the Fire Protection Plan are needed to provide a safe buffer between the wildland and the structures.

Mitigation Measure 2

Prior to introduction of combustible materials on any lot, the developer or builder shall clear all flammable vegetation, including weeds to 4 inches in height or below (leave enough vegetation to allow for erosion control). All cut vegetation and dead vegetation shall be removed from the site. The builder shall maintain each site in this condition until the homeowner takes responsibility and installs irrigation and fire resistive landscaping as approved by the Homeowners Association (HOA). All landscaping must be in compliance with the guidelines in the approved Fire Protection Plan. All manufactured slopes, or internal common areas and open spaces, shall comply with the criteria set forth in the Fire Protection Plan, and shall not have any vegetation of the type prohibited in this plan (undesirable plant list).

Mitigation Measure 3

The HOA shall assure that all fuel modification on private lots is in accordance with the requirements in the plan.

Mitigation Measure 4

A Landscape Maintenance District (LMD) shall be created to assure proper vegetation maintenance is done on an ongoing basis, in compliance with the plan, in common areas, beyond private lots, manufactured slopes, open space, roadsides, parks, etc.

Mitigation Measure 5

An annual inspection of the property, for compliance with the approved plan, shall be done by the HOA with a written letter of compliance sent to the San Bernardino Fire Department. Every five years, an approved Wildland Fire Protection consultant funded by the HOA, shall inspect the site and a report shall be submitted to the San Bernardino Fire Department.

Mitigation Measure 6

Written, legal, permission is required by offsite landowners in order to do any fuel modification outside of this tract.

Mitigation Measure 7

Vegetation shall be modified and/or cleared, either by the LMD or the HOA on each side of any on site road in accordance with the approved Fire Protection Plan..

Mitigation Measure 8

Undesirable vegetation within the power line easement shall be removed, on an ongoing basis, except for that needed for erosion control and soil stability.

Appendix A

CHAPTER 19.15
FF (FOOTHILL FIRE ZONES OVERLAY) DISTRICT

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19. 15.030	Definitions	II-224
19.15.040	Standards	II-225

19. 15.010 PURPOSE

The purpose of the fire zone overlay district is to mitigate the spread of fire, to help minimize property damage and to reduce the risk to the public health and safety

19.15.020 APPLICABILITY

This overlay district identifies 3 foothill fire zones that have different degrees of hazard based on slope, type of fuel present and natural barriers. The foothill fire zones are: A-Extreme Hazard, B-High Hazard, and C-Moderate Hazard. Fire Zones A and B shall be determined by the slope analysis, submitted with the project application. A reference map specifying identified fire zones within the City is on file with the Department.

19.15.030 DEFINITIONS

Fire Model. A computer generated model done by an independent contractor, company or firm to demonstrate the effects of an urban - wildland interface fire. This model is designed to demonstrate the minimum required fuel modification necessary to protect existing or proposed structures in the high fire hazard areas. All factors are taken into account including, but not limited to structure(s), amount and arrangement of surrounding vegetation, topography and annual climatic conditions.

Fire Zone A. Fire Zone A is determined based on slope. Fire Zone A includes areas with slopes of 30% or greater.

Fire Zone B. Fire Zone B is also determined based on slope. Fire Zone B includes area with slopes between 15-30%.

Fire Zone C. Fire Zone C includes those areas with slopes of 0 to 15%.

Fire Zone C, Abutting Wildlands. Fire Zone C, Abutting Wildlands is defined as those lots on the perimeter of a tract that are adjacent to wildlands.

Fuel Modification. Fuel modification is a wide strip of land where flammable native vegetation has been removed or modified, and partially or totally replaced with drought tolerant fire-resistive plants. Fuel modification provides a more acceptable level of risk from wildland fires and provides a more acceptable level or risk from wildland fires and provides a safer area in which to take fire suppression action.

Wildlands. Any area of land that is essentially unimproved, in a natural state of hydrology, vegetation and animal life, and not under cultivation.

19.15.040 STANDARDS

The following standards shall apply to all, or some, of the foothill fire zones as noted by the letter(s) in parenthesis following the standard.

1. ACCESS AND CIRCULATION

A. Local hillside street standards shall be used to minimize grading and erosion potential while providing adequate access for vehicles, including emergency vehicles. The right-of-way shall be 48.5 feet with 40 feet of paved width and parking on both sides and a sidewalk on 1 side. (A + B)

B. Streets shall have a paved width of 32 feet with parking and sidewalk on 1 side of the street only and right-of-way of 40.5 feet, subject to review and recommendation by the Fire Chief and the City Engineer, with approval by the Commission. (A + B)

C. Subdivisions shall be designed to allow emergency vehicle access to wildland areas behind structures. This is to be accomplished in either of 2 ways:

1. Provide a perimeter street along the entire wildland side of a development; or

2. Provide a fuel-modified area, a minimum of 150 feet in depth from the rear of the structure, adjacent to the subdivision and connected to the interior street by flat 12 foot minimum access ways placed no more than 350 feet apart. If designed as a gated easement, access ways may be part of a side yard. (A + B, and C where abuts wildlands.)

D. No dead-end streets are permitted. Temporary cul-de-sacs are required.(A+B+C)

E. All permanent cul-de-sac turnarounds and curves shall be designed with a minimum radius of 40 feet to the curb face. No parking shall be allowed on the bulb of a cul-de-sac. (A+B+C)

F. Cul-de-sacs to a maximum of 750 feet in length may be permitted with a maximum of 30 dwelling units, and to a maximum of 1,000 feet in length with a maximum of 20 dwelling units. (A+B)

G. Driveways to residential garages of more than 30 feet in length shall extend for a minimum distance of 20 feet from the garage, on a maximum grade of 5%. Driveways less than 30 feet in length shall have a maximum grade of 8% for a minimum distance of 20 feet from the garage. No portion of a driveway shall exceed a grade of 15%, unless approved by the Fire Chief and City Engineer. Driveways shall be designed so that the algebraic difference in grades will not cause a vehicle to drag or hang-up. (A+B+C)

H. Hillside collector and arterial streets shall not exceed 8% grade. Hillside residential streets shall not exceed 15% grade. Grades of streets shall be as provided in this subsection, unless otherwise approved in writing by the Public Services, Fire, and Public Works Departments. (A+B+C)

I. A tentative tract or parcel map shall provide for at least 2 different standard means of ingress and egress which provide safe, alternate traffic routes subject to approval by the Fire Department. The two separate means of access shall be provided pursuant to Section 19.30.200 of this Development Code. (A+B+C)

2. SITE AND STREET IDENTIFICATION

A. Non-combustible and reflective street markers shall be visible for 100 feet pursuant to City standards. (A + B + C)

B. Non-combustible building addresses of contrasting colors shall be placed on the structure fronting the street. Four inch high (residential) and 5 inch high (commercial) lettering and numbers visible at least 100 feet are required. (A+B+C)

3. ROADSIDE VEGETATION

All vegetation shall be maintained and all dead plant material shall be removed for a distance of 10 feet from curbline. (A+B+C)

4. WATER SUPPLY

A. Static water sources such as fire hydrants and wells shall have clear access on each side of at least 15 feet. (A+B+C)

B. A minimum of 2 private spigots facing the foothills/wildlands shall be required for each structure. (A+B+C)

C. Fire hydrants shall be identified with approved blue reflecting street markers. (A+B+C)

D. Each cul-de-sac greater than 300 feet in length shall have a minimum of 1 hydrant. (A+B+C)

E Minimum fire flow shall be 1,000 gallons per minute. (A+B+C)

5. EROSION CONTROL

A. All fills shall be compacted. (A+B+C)

B. For all new projects, erosion and drainage control plans must be prepared by a licensed civil engineer, and be approved prior to permit issuance. (A+B+C)

C. The faces at all cut and fill slopes shall be planted with a ground cover approved by the City Engineer. This planting shall be done as soon as practicable and prior to final inspection. Planting of any slope less than 5 feet in vertical height, or a cut slope not subject to erosion due to the erosion-resistant character of the materials, may be waived by the City Engineer. An automatic irrigation system shall be installed for planted slopes in excess of 15 feet in vertical height, unless recommended otherwise in the preliminary soils report or waived by the City Engineer. If required by the City Engineer, a recommendation for types of planting materials shall be obtained from a Landscape Architect. The Landscape Architect shall, prior to final inspection, provide the City Engineer with a statement that the planting has been done in compliance with recommendations approved by the City Engineer. (A+B+C)

D. Erosion landscaping plans shall incorporate the use of fire resistant vegetation. (A+B+C)

E. All parties performing grading operations, under a grading permit issued by the City Engineer, shall take reasonable preventive measures, such as sprinkling by water truck, hydroseeding with temporary irrigation, dust pallative, and/or wind fences as directed by the City Engineer, to avoid earth or other materials from the premises being deposited on adjacent streets or properties, by the action of storm waters or wind, by spillage from conveyance vehicles or by other causes. Earth or other materials which are deposited on adjacent streets or properties shall be completely removed by the permittee as soon as practical, but in any event within 24 hours after receipt of written notice from the City Engineer to remove the earth or materials, or within such additional time as may be allowed by written notice from the City Engineer. In the event that any party performing grading shall fail to comply with these requirements, the City Engineer shall have the authority to engage the services of a contractor to remove the earth or other materials. All charges incurred for the services of the

contractor shall be paid to the City by the permittee prior to acceptance of the grading. (A + B + C)

6. CONSTRUCTION AND DEVELOPMENT DESIGN

A. Building standards governing the use of materials and construction methods for structures contained within the Foothill Fire Zones shall be in accordance with the San Bernardino Municipal Code Section 15.10.

B. A slope analysis shall be filed with all discretionary applications for all projects in Fire Zones A & B consistent with the Hillside Management section of the General Plan and Section 19.17.080(2) of this Development Code. (A+B)

C. Structures shall be located only where the upgraded slope is 50% or less. If the building pad is adjacent to a slope which is greater than 50% and is greater than 30 feet in height, a minimum pad setback of 30 feet from the edge of the slope is required. The setback may be less than 30 feet only when the entire slope, or 100 feet adjacent to the building pad, whichever is less, is landscaped with fire resistant vegetation and maintained by an automatic irrigation system. (A+B)

D. All proposed property lines shall be placed at the top of slopes, except where the original parcel's exterior boundary line does not extend to the top of the slope. (A+B+C)

E. Development on existing slopes exceeding 30% or greater may occur if in conformance with all applicable ordinances, statutes and California Environmental Quality Act (CEQA) review. (A)

F. Structures shall be permitted in narrow canyon mouths or ridge saddles, only if approved by the City Engineer and Fire Department. (A+B)

G. All new structures requiring permits, including accessory structures, guest housing or second units shall conform to all applicable fire zone standards. (A+B+C)

H. Excluding openings, all exterior elements, including walls, garage doors, fences, etc., shall be free of exposed wood (as defined in Chapter 15.10). (A+B, and C where abuts wildlands.)

I. The minimum distance between structures shall be 60 feet in Zone A and 30 feet in Zone B, unless otherwise approved by the Fire Chief with concurrence by the Development Review Committee. (A+B)

J. A fuel-modification plan, or a reasonable equivalent alternative as approved by the Fire Chief is required. The plan, shall include a "wet zone" of a minimum depth of 50 feet of irrigated landscaping behind any required setback and "thinning zones" of a minimum depth of 100 feet of drought tolerant, low volume vegetation, adjacent to any natural area behind structures and provisions for maintenance. A fire model shall be prepared pursuant to Section 19.30.200(6)(D)(3). (A+B, and C where abuts wildlands.)

K. Retrofitting of any element is required when more than 25% replacement of that element occurs; i.e., roofing, fencing. (A+B+C)

7. MISCELLANEOUS

A. All future transfers of property shall disclose to the purchaser at the time of purchase agreement and the close of escrow the high fire hazard designation applicable to the property. (A+B+C)

B. Firebreak fuel modification zones shall be maintained, when required, through home owner associations, assessment districts or other means. (A + B + C)

Appendix B

CHAPTER 19.17
HM (HILLSIDE MANAGEMENT OVERLAY) DISTRICT

Section		Page
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19. 17.030	Applicability	II-245
19.17.040	Permitted and Conditionally Permitted Uses	II-245
19.17.050	Conditional Use Permit Required	II-245
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19. 17.010 PURPOSE

The purpose of this overlay district to provide for low-density residential development in the City's hillside areas and to assure that this development occurs in a manner which protects the hillside's natural and topographic character and identity, environmental sensitivities, aesthetic qualities, and the public health, safety, and general welfare.

This protection is obtained by insuring that development does not create soil erosion, silting of lower slopes, slide damage, flooding problems, and severe cutting or scarring.

It is the intent to encourage a sensitive form of development while still allowing for residential uses which complement the natural and visual character of the City and its hillsides.

19. 17.020 POLICIES

The regulations, development standards, and design guidelines set forth in this section are based on the following policies:

1. To minimize the effects of grading and insure that the natural character of hillside areas is retained;

2. To preserve the most visually significant slope banks and ridgelines in their natural state by providing for low density development;

3. To encourage variety in housing types, padding techniques, grading techniques, lot sizes,

site design, density, arrangement, and spacing of homes and developments;

4. To encourage innovative architectural, landscaping, circulation, and site design;

5. To discourage mass grading of large pads and excessive terracing;

6. To provide for safe circulation of vehicular and pedestrian traffic to and within hillside areas, and to provide adequate access for emergency vehicles necessary to serve hillside areas;

7. To take into account unstable slopes, or slopes subject to erosion and deterioration, in order to protect human lives and property;

8. To encourage design and building practices to assure maximum safety from wild fire hazard; and

9. To preserve visually significant rock outcroppings, native plant materials, and natural hydrology.

19.17.030 APPLICABILITY

This District is intended to be the approximate location of the hillside areas along the foothills in the northern area of the City. The foothill area is defined as that area of 15% or greater slope as shown on the General Plan Land Use Plan map on file in the Department.

Areas of 15% natural slope or less along the external border of the District at the base of the hillsides, as determined by the preparation of a slope map by a licensed civil engineer, may be excluded from the density and development provisions of this section. Those areas excluded shall revert to the underlying land use district density and development standard provisions.

The standards contained in this section apply to all subdivisions, uses, and structures within the District and are in addition to those of the underlying land use district.

19. 17.040 PERMITTED AND CONDITIONALLY PERMITTED USES

Uses permitted or conditionally permitted within the HM Overlay District shall be the same as those for the underlying district.

A Conditional Use Permit shall be required for all tentative tract and parcel maps and non-residential uses.

19. 17.050 CONDITIONAL USE PERMIT REQUIRED

A Conditional Use Permit, in accordance with the requirements of Chapter 19.36 of this Development Code, shall be required for all applicable uses and structures permitted in this

overlay district except in-fill single family homes on existing lots of record which will require a Development Permit.

19. 17.060 DEVELOPMENT STANDARDS

1. DENSITY

Notwithstanding the density allowed by the underlying land use district or the amenities or Senior Citizen and Senior Congregate Care density bonus provisions, the maximum density on any parcel to which this section applies shall not exceed the units per acre for each of the average percent slope ranges indicated below.

Average Slope (%)	Units Per Acre
0 to 15	2.0
15+ to 25	1.0
25+ to 30	0.5
30+ and above	0.1

(Note: For areas with an average slope above 40%, density transfer is encouraged.)

The computation of the maximum number of lots is intended solely to set up an absolute maximum. A lesser number of units may prove to be the maximum permitted based upon compliance with other hillside development and grading requirements.

2. DENSITY TRANSFER

Within a project, in the Hillside Management Overlay District, a density transfer may be granted when permitted development is transferred from one slope category to a lower slope category. In consideration for such a transfer of development, the allowable density of the lower slope category may be increased by 50%. For example, if density/ development is transferred from the 25% to 30% slope category (from the above table) to the next lower category (15% to 25%), the allowable density of the lower category, 1.0 dwelling units per acre, may be increased to 1.5 units per acre. Similarly, if development is limited from the 30% and above slope category and transferred to the 0% to 15% slope category, the allowable density may be increased by 50%, or from 2 units per acre to 3 units per acre.

In no situation shall the total number of units permitted for any project exceed the number of units that would have been permitted without any transfer of density.

A project may transfer density outside the Hillside Management Overlay District, if the project area is included in a Specific Plan. A General Plan Amendment may also be necessary.

Areas from which density is transferred shall be restricted from future development in an appropriate manner.

3. MINIMUM PARCEL SIZE

No absolute minimum parcel size, widths and depths are specified.

4. SETBACKS

Front, side, and rear setbacks shall be determined based upon the precise development plan and environmental studies and in conformance with FF (Foothill Fire Zones) Overlay requirements.

5. BUILDING HEIGHT

Applicable only to in-fill single family residential construction of more than 1 story on existing lots of record, if there is a grade separation of more than 8 feet and less than 20 feet between the average level of the lot proposed for construction and the immediately uphill lot.

A. The maximum height of a proposed structure shall not exceed the midpoint of the structure on the immediately uphill lot.

B. Where there is no structure on the immediately uphill lot, the maximum height shall not exceed a point 8 feet above the average ground level of the uphill lot.

C. "Immediately uphill lot" shall mean an adjacent lot, whether or not separated by streets, easements, or the like, which has an average ground level higher than the average ground level of the subject lot. If more than one lot meets the definition of "immediately uphill lot" then the measurements required by this section shall be made against the lower lot.

D. "Midpoint" shall be that point equidistant from the foundation at ground level to the apex of the roof, but not including roof structures, stairways, tanks, ventilating fans, or similar equipment required to operate and maintain the building and fire or parapet walls skylights, towers, flagpoles, chimneys, smokestacks, wireless and television masts, or similar structures.

E. Nothing in this section shall be construed to allow the height of a structure, including a single family residence, to exceed that allowed in the underlying land use district, or to prohibit a single story residence.

6. INGRESS AND EGRESS

A tentative tract or parcel map shall provide for at least 2 different standard routes for ingress and egress. Standard ingress/egress road is a route which is dedicated to the City and has a minimum paved width of 24 feet.

7. STREET STANDARDS

Streets in this overlay district shall conform to the following standards:

A. Local hillside street standards shall be used to minimize grading and erosion potential while providing adequate access for vehicles, including emergency vehicles. The right-of-way shall be 48.5 feet with 40 feet of paved width and parking on both sides and a sidewalk on 1 side.

B. Streets shall have a paved width of 32 feet with parking and sidewalk on 1 side of the street only and right-of-way 40.5 feet, subject to review and recommendation by the Fire Chief and the City Engineer, with approval by the Commission.

C. Grades of streets in the hillside management areas shall be as provided in this subsection, unless otherwise approved in writing by the Public Services, Fire, and Public Works Departments. Hillside collector and arterial street shall not exceed 8%. Hillside residential local streets shall not exceed 15%.

D. Minimum horizontal curve of streets shall be in accordance with Caltrans computational methods using design speed estimated by the Public Works Department.

E. One way streets may be permitted where it can be shown that they reduce the overall amount of cut and fill required.

F. Cul-de-sacs to a maximum of 750 feet in length may be permitted with a maximum of 30 dwelling units, and to a maximum of 1,000 feet in length with a maximum of 20 dwelling units and shall terminate with a turn around area not less than 40 feet in radius to curb face.

G. Sidewalks on only 1 side of a street may be permitted in hillside areas subject to the approval of the City Engineer.

H. All other street improvement standards shall conform to the standard plans and specifications of the City Engineer.

19. 17.070 DEVELOPMENT PERFORMANCE STANDARDS

The following minimum performance standards are required for any development within this Overlay District. Necessary information shall be provided with the Conditional Use Permit application as prescribed in Chapter 19.36 to determine compliance with these standards.

1. SOILS/GRADING

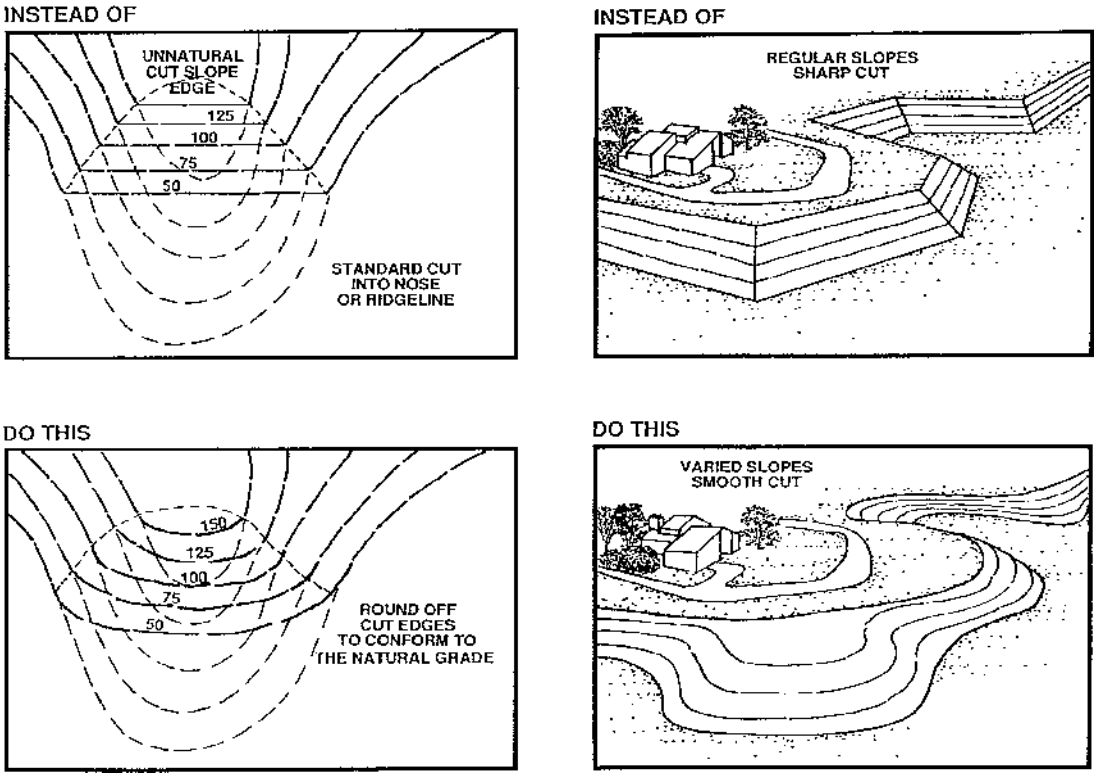
A. Grading of any site shall conform to the following grading standards, based upon the percent of the natural slope. The City Engineer shall review and make recommendation to the Planning Commission on the proposed grading.0 - 15%. Redistribution of earth over large areas may be permitted.

1. 15 + - 25%. Some grading may occur, but landforms must retain their natural character. Padded building sites may be allowed, but custom foundations, split level designs, stacking and clustering is expected to mitigate the need for large padded building areas.
2. 25 + - 30%. Limited grading may occur, however, major topographic features shall retain their natural landforms. Special hillside architectural and design techniques are expected in order to conform to the natural land form, by using techniques such as split level foundations of greater than 18 inches, stem walls, stacking and clustering.

3. Greater than 30%. Development and limited grading can only occur in this category if it can be clearly demonstrated that safety, environmental, and aesthetic impacts will be avoided. Use of larger lots, variable setbacks and variable building structural techniques such as stepped or pole foundations are expected. Structures shall blend with the natural environment through their shape, materials and colors. Impact of traffic and roadways is to be minimized by following natural contours or using grade separations.

B. Grading shall be designed to:

1. Conserve natural topographic features and appearances by means of land sculpturing to blend graded slopes and benches with natural topography.



2. Retain major natural topographic features such as canyons and prominent landmarks.

C. All graded areas shall be protected from wind and water erosion through acceptable slope stabilization methods such as planting, walls, or netting. Interim erosion control plans shall be required, certified by the project engineer, and reviewed and approved by the Public Works Department.

D. Slopes created by grading of the site shall not exceed 50 percent or 2:1, without a soils report and stabilization study indicating a greater permissible slope; or shall not exceed 30 feet in height between terraces or benches; except that the Planning Commission may permit slopes exceeding these dimensions where the slopes will result in a natural appearance and will not create geological or erosion hazards.

2. PUBLIC SAFETY

A. FIRE SAFETY

All developments in this overlay zone shall comply with the standards of the FF (Foothill Fire Zones) District. In the course of the review for a project in this overlay zone, the City will be reviewing each project to determine compliance with fire safety standards. The standards cover such items as, but not limited to:

1. Number of access points and street designs for each development;

2. Driveway lengths and widths;

3. Distances between dwellings;

4. Fuel modification plan;

5. Water flow and fire hydrant requirements;

6. Fire retardant building materials;

7. Residential sprinkler requirements as provided in the Foothill Fire Zone Overlay standards.

B. GEOTECHNICAL

1. Any subdivision within the Alquist-Priolo "Special Studies Zone" shall conduct a geologic study in conformance with the requirements of the Zone. This study shall be prepared by a certified engineering geologist.

2. No structure for human occupancy shall be permitted within 50 feet of an active or potentially active fault trace. Sensitive and high occupancy structures as defined in the General Plan shall maintain a minimum 100 foot setback.

3. No emergency facilities, community facilities, or places of general public assembly (not including open space areas) shall be permitted within the Alquist-Priolo Zone.

4. All structures within the trace shall require the seismic features of the structure to be reviewed and approved by a professional engineer specializing in seismic/structural design.

5. The Building Official may require special construction methods of structures where it has been determined to have potential geologic hazards.

6. A statement shall be included at the time of purchase agreement and at the close of escrow to the purchaser of each lot within the development, which informs the prospective owner of the potential for seismic activity, and the potential hazards.

3. WATER/DRAINAGE

A. On-site catch basins or siltation basins, as well as energy absorbing devices, may be required as a means to prevent erosion as well as to provide for ground water recharge.

B. Natural drainage courses should be protected from grading activity.

C. Where brow ditches are required, naturalize with plant materials and native rocks.

D. Maximum coverage of a parcel by impervious surfaces shall not exceed 40% of the gross land area, and such maximum may be reduced by the Director in areas where the slope exceeds 15%.

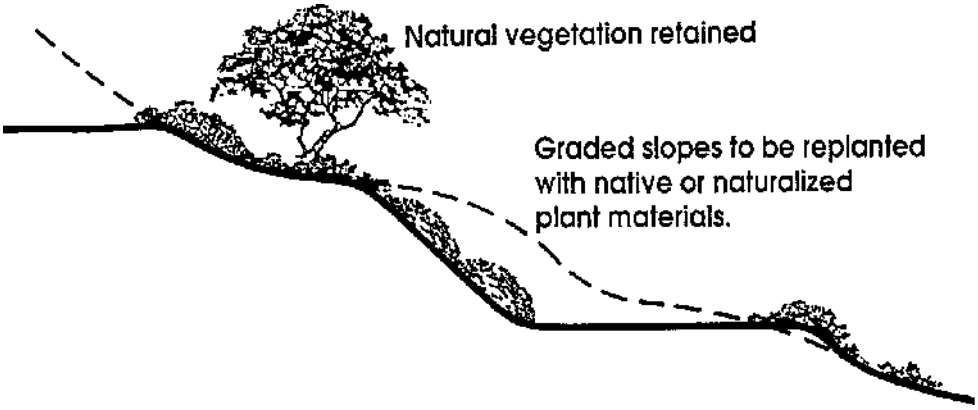
4. ANIMAL AND PLANT LIFE

A. Areas of a site which are identified in the environmental study as having biological significance shall be preserved, unless exempted by the Planning Commission through the Conditional Use Permit process.

B. Natural vegetation shall be maintained wherever possible. If removal is required, reestablishment of a compatible plant material will be required at a ratio of at least 2:1.

C. All exposed slopes and graded areas shall be landscaped with ground cover, shrubs, and trees.

D. Existing mature trees shall be incorporated into the project where feasible.



E. Water and energy conservation techniques shall be utilized, such as special irrigation techniques (e.g., drip irrigation), drought tolerant plant species, alluvial rockscape, etc.

F. Wherever possible, fire resistant native vegetation shall be preserved and planted.

G. Introduction of landscaping within the hillside areas should make maximum use of

texture, color, and be capable of blending in with the natural landscape, and help to soften the effects of buildings, walls, pavement, and grading.

H. Screening along roadways should make maximum use of berming and landscaping but shall not interfere with sight distance.

5 DESIGN

A. Dwelling units and structures shall be compatible with the natural surroundings of the area and shall not dominate the natural environment.

B. Exterior finishes of dwelling units and structures should blend in with the natural surroundings by using earth tone colors and avoiding reflective materials or finishes.

C. Site design should utilize varying setbacks, building heights, innovative building techniques, and building and wall forms which serve to blend buildings into the terrain.

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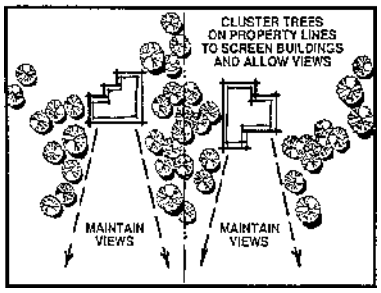

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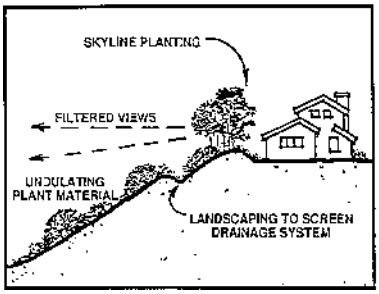

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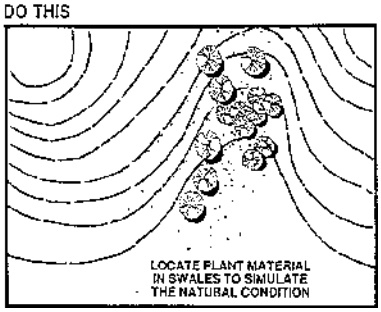
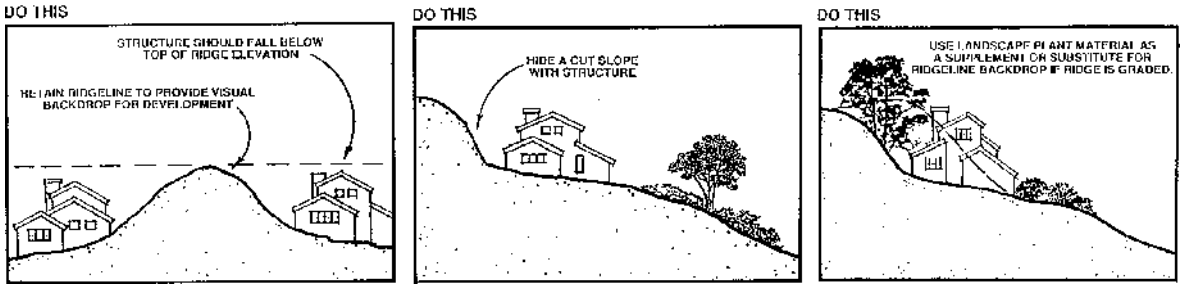


D. Dwelling units and structures shall be sited in a manner that will:

1. Retain outward views from each unit;

2. Preserve or enhance vistas, particularly those seen from public



places;

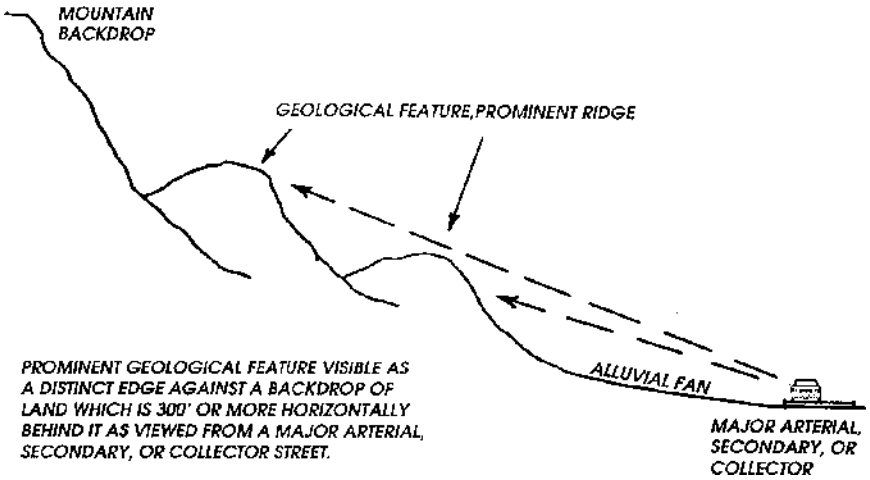
3. Preserve visually significant rock outcroppings, natural hydrology, native plant materials, and areas of visual or historical significance.

E. The highest point of any structure shall not be located above the ridgeline. A ridgeline is a long, narrow, conspicuous elevation which is visible north of Highland Avenue, from a freeway, major arterial, secondary arterial, or collector street, which forms part of the skyline or is seen as a distant edge against a backdrop of land at least 300 feet horizontally behind it. (See graphic.)

1. Use the natural ridgeline as a backdrop for structures;

2. Use landscape plant materials as a backdrop; and

3. Use the structure to maximize concealment of cut slopes.



F. Retaining Walls/Fences

1. Retaining walls shall be used in the following manner:

Upslope - One wall per lot not exceeding 8 feet in

height.

Downslope - One wall per lot not exceeding 42 inches in height may be used.

Lots sloping with the street of access or other conditions - One retaining wall on each side of the lot may be used not exceeding 42 inches in height.

Retaining walls adjacent to driveways - Walls being an integral part of the structure may exceed 8 feet in height if necessary.

2. Exposed retaining walls facing roadways shall be no greater than 5 feet in height.

3. Where retaining walls face roadways, they shall be faced with aesthetically pleasing materials (e.g., rock facing).

19. 17.080 CONDITIONAL USE PERMIT PROCESSING

1. PROJECT INITIATION

To initiate a project on any parcel within the HM Overlay District, the property owner(s) or assignee(s) shall submit a Conditional Use Permit Application to the Department in accordance with the provisions of Chapter 19.36.

The Commission shall have the responsibility for review and approval of said applications, except that the Director shall review and act upon all Development Permits for single family residences on existing lots.

2. CONTENTS OF THE APPLICATION

An application for a Conditional Use Permit within the HM Overlay District shall include the following:

A. A topographic map of the project site and land and structures within 100 feet of the project boundaries. The map shall be drawn to a scale of not less than 1 inch equals 100 feet with a maximum contour interval of 10 feet. The maximum contour interval shall be 5 feet where terrain has a slope of less than 25%.

B. A tree map, drawn to the scale prescribed above, locating existing trees on the project site with a trunk diameter of 6 inches or greater or having a vertical height from ground level to tree-top level of 25 feet or greater. This map shall define the species of such trees and identify their approximate trunk diameter, base elevation, height, and condition. No such trees shall be removed without

prior written approval of the Commission.

C. A site or plot plan of the proposed project, including representations of property lines and recorded and proposed easements and public rights-of-way. Existing structures within 100 feet of the site shall also be shown on the site or plot plan.

D. A preliminary grading plan for the project, drawn to the same scale as required above.

E. Colored maps of existing and final slope, based on the following slope categories: 0-15%; 15+-25%, 25+-30%; 30+% shall be shown using contrasting colors.

F. Sections or elevations of the proposed project. Plans shall indicate those residences which may be affected in terms of view obstruction.

G. A soils engineering report including data regarding the nature, distribution and strengths of existing soils, conclusions, and recommendations for grading procedures, design criteria for and identified corrective measures, and opinions and recommendations regarding existing conditions and proposed grading. This investigation and report shall be performed by a professional soils engineer

experienced in the practice of soil mechanics and registered with the State of California.

H. Any subdivision in Alquist-Priolo shall provide a geology report including the surface and subsurface geology of the site, degree of seismic hazard, conclusions and recommendations regarding the effect of geologic conditions on the proposed development, opinions and recommended design criteria to mitigate any identified geologic hazards. This investigation and report shall be performed by a professional geologist experienced in the practice of engineering geology and registered with the State of California.

I. A hydrology report which shall include areas of possible inundation, downstream effects, natural drainage courses, conclusions, and recommendations regarding the effect of hydrologic conditions on the proposed development, opinions and recommendations regarding the adequacy of facilities proposed for the site, and design criteria to mitigate identified hydrologic hazards. This report shall account for runoff and debris from tributary areas and shall provide consideration for each lot or dwelling unit site in a development. Runoff and debris volumes shall be computed using San Bernardino County Flood Control District criteria. This investigation and report shall be prepared by a registered civil engineer experienced in hydrology and hydrologic investigation.

J. A preliminary landscaping plan showing disposition of existing trees, and the type and extent of proposed vegetation.

K. The applicant may be requested to submit a scaled profile model or an isometric drawing depicting any or all of the site proposed for development. The developer may be required to submit photographs of the site showing the proposed development and its effect.

L. Covenants, conditions, and restrictions (CC & R's), including but not limited to development plans, common area and slope maintenance, private area landscaping and maintenance shall be submitted and approved prior to the recordation of a final tract map.

M. Other information or application materials as may be deemed necessary or desirable by the Director.

3. MODIFICATION OF SUBMITTAL REQUIREMENTS

The requirement to submit any or all of the materials enumerated above may be varied by the Director under the following conditions:

A. Recently completed and satisfactory reports covering the same subject matter of the same site already in existence; or

B. Some or all of the above reports are included as part of an approved Environmental Impact Report or Negative Declaration; or

C. The reports described in 1. and 2. above were previously prepared for a site in close proximity to the project and such other site possesses similar characteristics to the subject project lot or parcel.

4. EVALUATION OF CONDITIONAL USE PERMIT APPLICATION

The Commission shall evaluate the Conditional Use Permit Application based on the following criteria:

A. In general, the project shall be designed to fit the existing topography; the site shall not be graded to accommodate the project.

B. The proposed density does not exceed the maximum allowed density.

C. Final contours and slopes shall generally reflect existing landforms; in particular, building pads and terraces interspersed with slopes shall not be created and ridgelines, knolls, and significant tree masses shall be maintained.

D. The proposed development seeks to avoid significant intrusion(s) into the view from adjoining up-slope residences.

E. Views from public open space areas, rights-of-way, and other public places and of

major public open space areas are not significantly affected.

F. Wide pads or level areas are not created to accommodate roads. Roads should be fit into the existing topography; one-way roads may be preferred over two-way roads to reduce grading, and on-street parking should be parallel to the road, not perpendicular.

G. Buildings, parking, carports, and landscaping shall be arranged so that view corridors from downslope lots are created.

19. 17.090 APPLICABLE REGULATIONS

All uses shall be subject to the applicable regulations of this Development Code, including, but not limited to Article IV, Administration provisions.

Appendix C

Chapter 15.10
FOOTHILL FIRE ZONE BUILDING STANDARDS

Sections:

15.10.020 Purpose.
15.10.040 Scope.
15.10.060 Applicability.
15.10.080 Applicable Building Standards.

15.10.020 Purpose.

The purpose of this Chapter is to promote public safety and welfare by reducing the risk of injury, death, or property damage that may result from wildland fires in the foothill areas of the City. The building standards contained in this Chapter are intended to prevent the ignition of, or otherwise reduce the spread of fire on developed properties, by controlling the use of materials and methods of construction. (Ord. MC-1163, 1-20-04; Ord. MC-1162, 1-05-04; Ord. MC-960, 3-4-96)

15.10.040 Scope.

A. New Structures.

The requirements of this Chapter shall apply to all newly constructed buildings, structures, or appurtenances located in the Foothill Fire Zones, or in designated Very High Fire Hazard Severity Zones pursuant to California Government Code Sections 51177 through 51189.

B. Existing Structures

For existing structures, retrofitting of an element is required when more than 60% replacement of that element occurs. An addition to an existing structure need not comply with these standards if the addition does not exceed 60% of the floor area of the existing structure and the existing structure was not required to meet these requirements when originally constructed. Retrofitting of an entire structure is required when a combination of elements are replaced or other repairs are made equal in value to 60% or more of the replacement cost of the structure as determined by the building official. Repair or replacement of shake shingle roofs that exceed 25% shall conform to Section 15.10.080(E). Alterations made to a structure shall not increase the degree of non-conformity in regards to these standards. (Ord. MC-1262, 12-17-07; Ord. MC-1261, 12-03-07; Ord. MC-1163, 1-20-04; Ord. MC-1162, 1-05-04; Ord. MC-1047, 5-17-99; Ord. MC-960, 3-4-96)

15.10.060 Applicability.

The requirements of this Chapter shall apply to those properties located in Foothill Fire Zones A, B, or C as defined in Chapter 19.15 and those properties located in a Very High Fire Hazard Severity Zone as designated by the State of California. (Ord. MC-1262, 12-17-07; Ord. MC-1 261, 12-03-07; Ord. MC-1 163, 1-20-04; Ord. MC-1162, 1-05-04; Ord. MC-960, 3-4-96)

15.10.080 Applicable Building Standards.

The building standards contained in the California Building Code, Chapter 7A, shall apply in the Foothill Fire Zones and in state designated Very High Fire Hazard Severity Zones. In addition, the following requirements shall apply as noted herein:

A. Fencing, fascias, patios, exterior trim, and other exterior elements shall be of approved noncombustible or ignition-resistant material.

B. Vinyl window frame assemblies shall have the following characteristics:

1. Frames shall have welded corners and metal reinforcement in the interlock area;

2. Dual-paned insulated glazed units with at least one pane of tempered glass;

3. Frame and sash profiles are certified in AAMA Lineal Certification Program (verified by an AAMA product label or a Certified Products Directory);

4. Certified and labeled to ANSI/AAMA/NWWDA 101/I.S.2-97 for structural requirements.

C. Attic and underfloor vents shall be protected by corrosion-resistant noncombustible wire mesh with maximum 1/8 inch openings or provide equivalent protection. Attic vents shall not be placed facing wildlands.

D. Roof mounted turbine vents shall not be permitted.

E. All roof coverings shall be of non-wood materials with at least a Class A fire-retardant rating.

F. All new residential structures located within Foothill Fire Zones A and B, and Foothill Fire Zone C abutting wildlands, (except those rebuilt due to damage or destruction from any one common fire or other catastrophe) shall be provided with automatic fire sprinklers. If the floor area of an existing residential structure is increased more than 60%, then the entire structure must be retrofitted to meet this requirement. The design and installation of fire sprinklers systems shall be approved by the City Fire Department.

G. Paper-faced insulation shall be prohibited in attics or ventilated spaces.
(Ord. MC-1262, 12-17-07; Ord. MC-1261, 12-03-07; Ord. MC-960, 3-4-96; (Ord. MC- 1163, 1-20-04; Ord. MC-1162, 1-05-04; Ord. MC-960, 3-4-96)

Appendix D

Chapter 15.16
UNIFORM FIRE CODE

Sections:

15.16.010 Citation.
15.16.020 Code Adopted.
15.16.030 Definitions.
15.16.040 Amendments.
15.16.045 Liability.
15.16.055 Applicant Appeals.
15.16.060 Fire Prevention Bureau Personnel and Police.
15.16.061 Commencement of Proceedings.
15.16.065 Inspections & Inspection Fees.
15.16.070 New Construction and Alterations.
15.16.075 Authorization to Issue Corrective Orders and Notices.
15.16.080 Stopping Uses and Evacuation.
15.16.086 Citations.
15.16.087 Emergency Abatement/Closure Procedure
15.16.100 All Weather Driving Surface Defined.
15.16.110 Fireworks defined.
15.16.112 Hazardous Fire Area defined.
15.16.118 Suppression and Control of Hazardous Fire Areas.
15.16.120 Spark Arrester defined.
15.16.121 Safe and Sane Fireworks defined.
15.16.135 Fire Department Access.
15.16.140 Maintenance of Access Roadways.
15.16.155 Automatic Fire Extinguishing Systems.
15.16.170 Power Source.
15.16.200 Individual Piles.
15.16.205 Sparks from Chimneys.
15.16.210 Requirements for Use of Candles and Other Open Flame Decorative Devices.
15.16.215 Fire Damage.
15.16.220 False Alarms.
15.16.235 Standby Personnel for Public Gatherings.
15.16.255 Seizure of Fireworks.
15.16.257 Additional Requirements for Tanks Located Within Below-Grade Vaults.
15.16.270 LP-Gas Permits, Plans and Records.
15.16.280 Effectiveness.
15.16.400 Authorized Fire Chief Representative.

15.16.010 Citation.

The Ordinance codified in this chapter and the code and standards adopted by reference in Section 15.16.020 shall be known as the California Fire Code. (Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.020 Code Adopted.

The 2007 Edition of the "California Fire Code" together with the California Code of Regulations, Title 24, and Appendix Chapters 1 and 4, and Appendices B, C, E, F, and H, and the International Fire Code, 2006 Edition published by the International Code Council are adopted by reference into this Chapter, and are hereby collectively declared to be the Fire Code of the City of San Bernardino and are incorporated in the Municipal Code of the City of San Bernardino. The provisions of the California Fire Code, and International Fire Code Standards shall apply to all areas within the jurisdiction of the City of San Bernardino. One copy of the 2007 Edition of the California Fire Code, including California Amendments and Appendices, and one copy of the International Fire Code Standards are on file in the Office of the City Clerk. (Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC- 1048, 5-17-99; Ord. MC-984; 11-4-96)

15.16.030 Definitions.

A. Whenever "jurisdiction" is used in the California Fire Code, it shall mean the City of San Bernardino.

B. Whenever "chief" is used in the California Fire Code it shall mean the Chief of the Fire Department of the City of San Bernardino, hereinafter called "Fire Chief", or the Chief's authorized representative.

C. Whenever "corporation counsel" is used in the California Fire Code, it shall mean the City Attorney of the City of San Bernardino.

D. Whenever "Fire Code Official" is used in the California Fire Code, it shall mean "Fire Marshal" or the Chief's authorized representative.

(Ord. MC1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984; 11-4-96)

15.16.040 Amendments.

The following sections and provisions of the California Fire Code, (2007 Edition) are amended to read as set forth in Sections 15.16.045 through 15.16.300. (Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984; 11-4-96)

15.16.045 Liability.

Section 103.4 Appendix Chapter 1 of the California Fire Code is amended by adding the following:

103.4.2 Cost Recovery.

1. Fire suppression, investigation, rescue, hazardous materials, or emergency medical costs are recoverable in accordance with California Health and Safety Code, Sections 13009 and 13009.1.

2. Any person who negligently or intentionally, or in violation of the law causes an emergency response is liable for the costs of securing such emergency. This shall include but not be limited to situations such as false alarms, traffic accidents, fire watch, or spills of toxic or flammable fluid or chemicals, and the costs related to the investigation of the incident. Expenses incurred by the Fire Department for securing such emergency situation

shall constitute a debt of such persons and is collectable by the Fire Chief in the same manner as in the case of any obligation under contract, expressed or implied.

FINDINGS: A,B,C,D,E,F APPLY(Ord. MC-1259, 11-19-07; Ord. MC-1 130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984; 11-4-96)

15.16.055 Applicant Appeals.

Section 108.1 Appendix Chapter 1 of the California Fire Code is amended to read as follows:

108.1 Appeals. The applicant may appeal the Fire Chief's denial, suspension or revocation of a permit or his/her interpretation of this code to the Fire Commission within ten days from the date of notice of the decision. The Fire Commission shall render its decision and findings in writing to the Fire Chief with a duplicate copy to the applicant.

Appeal Fees. When appeals are filed a processing fee in an amount established by resolution of the Mayor and Common Council shall be paid by the applicant to research and process the appeal. The fee shall be paid to the Fire Department.

108.3 Delete entire section.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.060 Fire Prevention Bureau Personnel and Police.

Section 103.3 Appendix Chapter 1 of the California Fire Code is amended to read as follows:

103.3 The Fire Chief, Fire Marshal and members of the fire prevention bureau shall have the powers of a peace officer as defined in Section 830.37 of the Penal Code, in performing their duties under this code.

The following persons have the duty, and are hereby authorized, to enforce the provisions of this code and make arrests and issue citations as authorized by law:

1. Fire Chief, Fire Marshal, Fire Prevention Supervisor, Arson Investigators, Firefighters, Fire Plans Examiner/Systems Inspector, Fire Prevention Officers and Fire Prevention Technicians.

2. When requested to do so by the Fire Chief, the Chief of Police is authorized to assign such available police officers as necessary to assist the fire department in enforcing the provisions of this code.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1 259, 11-19-07; Ord. MC-1 130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-1 007, 11-17-97; Ord. MC-984, 11-4-96)

15.16.061 Commencement of Proceedings.

Section 110 Appendix Chapter 1 of the California Fire Code is amended by adding the following:

110.5 Abatement Proceedings. Whenever the Fire Chief or his/her designated representative reasonably believes a violation of the California Fire Code exists, he/she shall commence abatement proceedings in accordance with Chapter 8.30 of the San Bernardino Municipal Code. All hearings shall be conducted by the Fire Chief or his/her designee ("Hearing Officer"). The Hearing Officer may hear matters pertaining to both California Fire Code violations and/or public nuisance violations as enumerated in Section 8.30.010.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1015, 1-26-98)

15.16.065 Inspections and Inspection Fees.

Section 105.1.1 Appendix Chapter 1 of the California Fire Code is amended by adding the following:

105.1.1.1 Inspection Fees

These fees shall be set by Resolution of the Mayor and Common Council.

Inspection Fees - An inspection fee may be charged for Fire Department routine inspections and re-inspections of property to cover the costs of such inspections. The amount of the inspection fee shall be established by Resolution of the Mayor and Common Council.

1. The Fire Marshal may authorize refunding of any fee that was erroneously paid or collected. Requests for refunding of any fee paid shall be submitted by written application no later than 180 days after the date of fee payment.

2. The property owner/occupant charged the inspection fee may appeal the imposition or the amount of the fee. Appeals related to fees shall be pursuant to Section 2.64 of the San Bernardino Municipal Code.

FINDINGS: A,B,C,D,E,F APPLY

Section 105.6.15 Delete

Section 105.6.35 Delete Exception

Section 105.6.47 Appendix Chapter 1 of the California Fire Code is amended by adding the following:

4. Auto Wrecking Yards
5. Battery storage
6. Commercial Day Care Facilities
    1. Less than 50
    2. More than 50
7. Convalescent facilities
8. Fireworks booths
9. General inspection/Certificate of Occupancy
10. High Rise

11. Hospitals
    1. Less than 100 beds
    2. More than 100 beds
12. Kitchen Hoods (fixed hood and duct systems)
13. Large Family Day Care
14. New business inspection
15. Pallet Yards > 200 ft3 of wood or plastic storage
16. Radioactive materials
17. Residential board and care
18. Schools, private and vocational

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1 259, 11-19-07; Ord. MC-1 130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-1015, 1-26-98)

15.16.070 New Construction and Alterations.

Section 105.7 Appendix Chapter 1 of the California Fire Code is amended to read as follows:

1. The fire code official is authorized to issue construction permits for work as set forth in Appendix Chapter 1, Sections 105.7.1 through 105.7.13.

2. Approval and Inspection Fees. A fee will be charged for permits, plan checks and/or inspections for construction or work which requires Fire Department approval. The amount of the fee shall be established by Resolution of the Mayor and Common Council.

3. Investigation Fees: Work without a Permit. Whenever any work for which a permit is required by this code has been commenced without first obtaining said permit, a special investigation shall be made before a permit may be issued for such work. An investigation fee, in addition to the permit fee, shall be collected whether or not a permit is then or subsequently issued. The investigation fee shall be equal to the permit fee required by this code. The payment of such investigation fee shall not exempt any person from compliance with all other provisions of this code nor from any penalty prescribed by law. The Fire Marshal may authorize refunding of any fee paid hereunder which was erroneously paid or collected. The Fire Marshal may authorize refunding of not more than 80 percent of the permit fee paid when no work has been done under a permit issued in accordance with this code. The Fire Marshal may authorize refunding of not more than 80 percent of the plan review fee paid when an application for a permit for which a plan review fee has been paid, is withdrawn or canceled before any plan reviewing is done. The Fire Marshal shall not authorize refunding of any fee paid except on written application filed by the original permittee not later than 180 days after the date of fee payment.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1 259, 11-19-07; Ord. MC-1 175, 07-19-04; Ord. MC-1 130, 10-07-02; Ord. MC-1 048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.075 Authorization to Issue Corrective Orders and Notices.

Section 109.2 Appendix Chapter 1 of the California Fire Code is amended to read as follows:

General. When the chief finds in any building or on any premises combustible, hazardous or explosive materials or dangerous accumulations of rubbish; or finds unnecessary accumulations of wastepaper, boxes, shavings or any highly flammable materials which are so situated as to endanger life or property; or finds obstructions to or on fire escapes, stairs, passageways, doors or windows that reasonably tend to interfere with the operations of the fire department or the egress of the occupants of such building or premises; or finds that the effectiveness of any exit door, attic separation or any fire separation wall is reduced; or finds that this code is being violated the chief is authorized to issue orders as necessary, for the enforcement of the fire prevention laws and ordinances governing the same, and for the safeguarding of life and property from fire or any other situation which may effect the health safety of any person occupying buildings or premises.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1 259, 11-19-07; Ord. MC-1 130, 10-07-02; Ord. MC-1 048, 5-17-99; Ord. MC- 1015, 1-26-98; Ord. MC-984, 11-4-96)

15.16.080 Stopping Uses and Evacuation.

Section 110.2 Appendix Chapter 1 of the California Fire Code is amended to read as follows:

Stopping uses, evacuation. The Fire Chief is authorized to order any operation or use immediately stopped or the immediate evacuation of any premises, building or vehicle, or portion thereof, which is a fire, life or health hazard deemed unsafe when such building has hazardous conditions that present imminent danger to building occupants. Persons so notified shall immediately leave the structure or premises and shall not enter or re-enter until authorized to do by the fire official of the fire department official in charge of the incident.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.086 Citations.

Section 109.3 Appendix Chapter 1 of the California Fire Code is amended to read as follows:

Section 109.3 Violation penalties. Persons who shall violate a provision of this code or shall fail to comply with any requirements thereof or who shall erect, install, alter, repair or do work in violation of the approved construction documents or directive of the Fire Marshal, or of a permit or certificate used under the provisions of this code, shall be guilty of a misdemeanor, punishable by a fine not to exceed One Thousand Dollars ($1,000.00) or by imprisonment in the County jail not exceeding six months, or both such fine and imprisonment. Each day that a violation continues after due notice has been served shall be deemed a separate offense.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02)

15.16.087 Emergency Abatement/Closure Procedure.

Section 110.3 of the California Fire Code is amended to read as follows: 110.3 Summary abatement

A. Not withstanding any other provision of this Chapter with reference to the Abatement of California Fire Code violations, whenever the Fire Chief or his/her duly authorized

representative determines that property, a building or structure is structurally unsafe, or constitutes a fire hazard, or endangers the life, health, property or safety of the public or its occupants, and such condition constitutes an immediate hazard or danger, he or she shall, immediately and forthwith abate the existing immediate hazard or danger, including but not limited to the closure of the property.

B. In lieu of the summary abatement hearing procedures for Dangerous Buildings in Section 15.28, the Fire Chief or his/her duly authorized representative shall mail, immediately after such emergency abatement/closure, a Notice of Hearing to the owners of the real property upon which the structure is located. Notice shall be mailed to the address as ascertained from title company records, the latest assessment roll of the County Assessor, or if no address is so shown, to the address of the property as such address may be known by the Fire Chief or duly authorized representative. Such notice shall contain the following information: that a Hearing has been scheduled within twenty (20) days of such emergency abatement/closure action before the Fire Chief or his/her designee ("Hearing Officer") with the date, time and location of such Hearing;

1) that emergency action was taken with regards to the property;

2) the reason why he/she has taken the action.

At the hearing, the Hearing Officer shall consider all relevant evidence, including, but not limited to, applicable staff reports. He or she shall give any interested person a reasonable opportunity to be heard in conjunction therewith. Based upon the evidence so presented, the Hearing Officer shall determine whether the emergency action was warranted. The hearing shall not be conducted according to formal rules of evidence or procedure, but shall be conducted in a manner generally complying with the Administrative Procedure Act at Government Code Section 11370, et seq.

C. The expense of the abatement shall be itemized and, after a hearing, notice of which is given in substantial compliance with Section 8.30.040, relating to the emergency nature of the abatement and the expenses incurred, shall constitute a special assessment and lien against the abated parcel as set forth in Sections 8.30.110, 8.30.120, 8.30.130, and 8.30.150.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02)

15.16.100 All Weather Driving Surface defined.

Section 202 of the California Fire Code is amended by adding the following definition:

ALL WEATHER DRIVING SURFACE is an approved concrete or asphalt covering of sufficient thickness to support the imposed loads of fire apparatus.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.110 Fireworks defined.

Section 202 of the California Fire Code is amended by amending the definition of "Fireworks" to read as follows:

FIREWORKS shall mean and include any combustible or explosive composition, or any substance or combination of substances, or device prepared for the purpose of a visible or audible effect by combustion, explosion, deflagration, or detonation, and shall include blank cartridges, toy pistols, toy cannons, toy canes, or toy guns in which explosives are used, firecrackers, torpedoes, skyrockets, roman candles, daygo bombs, sparklers, or other devices of like construction and any devices containing an explosive substance, except that the term "Fireworks" shall not include auto flares, paper caps containing not in excess of 0.25 grain of explosive content per cap or toy pistols, toy canes, toy guns or other devices for use of such caps, the sale and use of which shall be permitted at all times.

FINDINGS: A,B,C,D,E,F APPLY

15.16.112 Hazardous Fire Area defined.

Section 202 of the California Fire Code HAZARDOUS FIRE AREA is amended by adding the following definition:

HAZARDOUS FIRE AREA is land which is covered with grass, grain brush or forest, whether privately or publicly owned, which is so situated or is of such inaccessible location that fire originating upon such land would present an abnormally difficult job of suppression or would result in great and unusual damage through fire or resulting erosion. Such areas are designated as follows:

That area within the City lying north of a line extending Easterly from the West City limits to the East City limits and bounded on the South side by streets and highways as follows:

Barstow Freeway from West City limits to the intersection of Palm Avenue and the Barstow Freeway; Northerly from the Barstow Freeway on Palm Avenue to Kendall Drive; Easterly on Kendall Drive to 40th Street and transition Easterly from the intersection of Kendall Drive and 40th Street; on 40th Street; and continue Easterly to Mountain Avenue; from the intersection of 40th Street and Mountain Avenue; Southerly on Mountain Avenue to 39th Street; Easterly on 39th Street to Del Rosa Avenue; Southerly from the intersection of 39th Street to Marshall Boulevard; Easterly from the intersection of Del Rosa Avenue and Marshall Boulevard on Marshall Boulevard; Marshall Boulevard to Victoria Avenue; Victoria Avenue to Piedmont Drive; Piedmont Drive East to Diablo Drive; Diablo Drive East to El Toro Street; El Toro Street extending East to Highway 330; Highway 330 South to Highland Avenue; thence East and South-easterly along the centerline of Highland Avenue to the centerline of Church Street.

Inclusive of area beginning at the intersection of Pacific Street and Del Rosa Avenue; Pacific Street West to Perris Hill Park Road; Perris Hill Park Road North in a line to intersect Highland Avenue; Highland Avenue East to Del Rosa Avenue; Del Rosa Avenue South to Pacific Street.

Inclusive of area beginning at the intersection of Little Mountain Drive and Kendall Drive; Kendall Drive East to 40th Street; 40th Street East to Electric Avenue; Electric Avenue South to Thompson Place; Thompson Place West to Mayfield Avenue; Mayfield Avenue South to 36th Street; 36th Street West to "F" Street; "F" Street South to 33rd Street; 33rd Street West to "H" Street' "H" Street

South to Marshall Boulevard; Marshall Boulevard West in a line to intersect Cajon Boulevard; Cajon Boulevard West to University Parkway/State Street; University Parkway North to State Street; State Street North to Morgan Road; Morgan Road East to Little Mountain Drive; Little Mountain Drive North to Kendall Drive.

Hazardous Fire Areas shall be inclusive of any additional land area, whether publicly or privately owned, which the Fire Chief of the Fire Department determines to be so situated or so inaccessible that fire upon said land could present an abnormally difficult task of fire suppression. Such additional land areas shall be designated on
a map available to the public and maintained by the Fire Department at the Central Fire Station, 200 East Third Street, San Bernardino. The Fire Chief shall provide a written description of the boundaries of any additional land area to the City Clerk who shall provide for publication of notice thereof pursuant to the provisions of California Government Code 6061 (Ord. MC-1259, 11-19-07; MC-1023, 5-18-98; Ord. MC-984, 11-4-96)

FINDINGS: A,B,C,D,E,F APPLY

15.16.118 Suppression and control of Hazardous Fire Areas.

Chapter 3 of the 2007 California Fire Code is amended by adding the following: Section 316:

Suppression and control of hazardous fire areas.

Section 316.1 Scope.

> The unrestricted use of grass-, brush-, or forest-covered land in hazardous fire areas is a potential menace to life and property from fire and resulting erosion. Safeguards to prevent the occurrence of fires and to provide adequate fire-protection facilities to control the spread of fire which might be caused by recreational, residential, commercial, industrial or other activities conducted in hazardous fire areas shall be in accordance with this section.

Section 316.2 Definitions. For the purpose of Section 316, certain terms are defined as follows:

1. Tracer is any bullet or projectile incorporating a feature which marks or traces the flight of said bullet or projectile by flame, smoke or other means which results in fire or heat.

2. Tracer Charge is any bullet or projectile incorporating a feature designed to create a visible or audible effect by means which result in fire or heat and shall include any incendiary bullets and projectiles.

Section 316.3 Permits. The fire code official is authorized to stipulate conditions for permits. Permits shall not be issued when public safety would be at risk, as determined by the fire code official.

Section 316.4 Smoking. Lighting, igniting or otherwise setting fire to or smoking tobacco, cigarettes, pipes or cigars in posted areas is prohibited.

Section 316.5 Spark Arrestors. All existing chimneys used in conjunction with fireplaces, barbecues, incinerators or heating appliances in which solid, gas, or liquid fuel is used shall be

provided with a spark arrester constructed with heavy wire mesh or other noncombustible material with openings not to exceed 1/2 inch.

Section 316.6 Tracer Bullets, Tracer Charges, Rockets, and model Aircraft.

1. Tracer bullets and tracer charges shall not be possessed, fired or caused to be fired in the Special Protection Area.

2 Rockets, model planes, gliders and balloons powered with an engine, propellant or other feature liable to start or cause fire shall not be fired or projected in the Special Protection Area without a permit from the fire code official.

Section 316.7 Apiaries. Lighted and smoldering material shall not be used in connection with smoking bees in or upon the very high fire severity zones except by permit from the fire code official.

Section 316.8 Open Flame Devices. Welding torches, tar pots, decorative torches and other devices, machines or processes liable to start or cause fire shall not be operated or used in or upon the Hazardous Fire Area, except by permit from the fire code official.

EXCEPTION: Use within inhabited premises or designated campsites which are a minimum of 30 feet from grass-, grain-, brush- or forest-covered areas.

Flame-employing devices, such as lanterns or kerosene road flares, shall not be operated or used as a signal or marker in the Hazardous Fire Area.

EXCEPTION: The proper use of fusees? at the scenes of emergencies or as required by standard railroad operating procedures.

Section 316.9 Outdoor Fires. Outdoor fires shall not be built, ignited or maintained in the Hazardous Fire Area, except by permit from the fire code official.

EXCEPTION: Outdoor fires within inhabited premises or designated campsites where such fires are built in a permanent barbecue, portable barbecue, outdoor fireplace, incinerator or grill and are a minimum of 30 feet from a grass-, grain-, brush- or forest-covered area.

Permits shall incorporate such terms and conditions which will reasonably safeguard public safety and property. Outdoor fires shall not be built, ignited or maintained in the Special Protection Area under the following conditions:

1. When high winds are blowing,

2. When a person age 17 or over is not present at all times to watch and tend such fire, or

3. When public announcement is made that open burning is prohibited.

Permanent barbecues, portable barbecues, outdoor fireplaces or grills shall not be used for the disposal of rubbish, trash or combustible waste material.

Section 316.10 Incinerators and Fireplaces

Incinerators, outdoor fireplaces, permanent barbecues and grills shall not be used in the Hazardous Fire Area without approval from the fire code official.

Incinerators, outdoor fireplaces, permanent barbecues and grills shall be maintained in good repair and in a safe condition at all times. Openings in such appliances shall be provided with an approved spark arrester, screen or door.

> EXCEPTION: When approved, unprotected openings in barbecues and grills necessary for proper functioning.

Section 316.11 Clearance of brush and vegetative growth from electrical transmission lines.

General. Clearance of brush and vegetative growth from electrical transmission and distribution lines shall be in accordance with Section 316.11.

> EXCEPTION: Section 316.11 does not authorize persons not having legal right of entry to enter on or damage the property of others without consent of the owner.

Section 316.11.1 Support Clearance. Persons owning, controlling, operating or maintaining electrical transmission or distribution lines shall have an approved program in place that identifies poles or towers with equipment and hardware types that have a history of becoming an ignition source, and provides a combustible free space consisting of a clearing of not less than 10 feet in each direction from the outer circumference of such pole or tower during such periods of time as designated by the fire code official.

> EXCEPTION: Lines used exclusively as telephone, telegraph, messenger call, alarm transmission or other lines classed as communication circuits by a public utility.

Section 316.11.2. Electrical Distribution and Transmission Line Clearances General. Clearances between vegetation and electrical lines shall be in accordance with Section 3.16.11.2.

Section 316.11.2.1 Trimming clearance. At the time of trimming, clearances not less than those established by Table 316.11.2 (1) should be provided. The radial clearances shown below are minimum clearances that should be established, at time of trimming, between the vegetation and the energized conductors and associated live parts.

> EXCEPTION: The fire code official is authorized to establish minimum clearances different than those specified in Table 316.11.2 (1) when evidence substantiating such other clearances is submitted to the chief and approved.

Section 316.11.2.2 Minimum clearance to be maintained. Clearances not less than those established by Table 316.11.2 (2) shall be maintained during such periods of time as designated by the chief. The site specific clearance achieved, at time of pruning, shall vary based on species growth rates, the utility company specific trim cycle, the potential line sway due to wind, line sway due to electrical loading and ambient temperature, and the tree's location in proximity to the high voltage lines.

EXCEPTION: The chief is authorized to establish minimum clearances different than those specified by Table A-II-A-2 when evidence substantiating such other clearances is submitted to the chief and approved.

TABLE 316.11.2 (1) MINIMUM CLEARANCES BETWEEN VEGETATION AND ELECTRICAL LINES AT TIME OF TRIMMING

LINE VOLTAGE	MINIMUM RADIAL CLEARANCE FROM CONDUCTOR (feet)
	x 304.8 mm
2,400-72,000	4
72,001-110,000	6
110,001-300,000	10
300,001 or more	15

TABLE 316.11.2 (2) MINIMUM CLEARANCES BETWEEN VEGETATION AND ELECTRICAL LINES TO BE MAINTAINED

LINE VOLTAGE	MINIMUM CLEARANCE (inches)
	x 25.4 MM
750-35,000	6
35,0001-60,000	12
60,001-1 15,000	19
115,001-230,000	30 1/2
230,001-500,000	115

Section 316.11.3 Electrical power line emergencies. During emergencies, the utility company shall perform the required work to the extent necessary to clear the hazard. An emergency can include situations such as trees falling into power lines, or trees in violation of Table 316.11.2(2).

Section 316.11.4 Correction of Condition. The fire code official is authorized to give notice to the owner of the property on which conditions regulated by Section 316.11 exist to correct such conditions.

Section 316.12 Dumping. Garbage, cans, bottles, papers, ashes, refuse, trash, rubbish or combustible waste material shall not be placed, deposited or dumped in or upon hazardous fire areas or in, upon or along trails, roadways or highways in the Hazardous Fire Area.

EXCEPTION: Approved public and private dumping areas.

Section 316.13 Disposal of ashes. Ashes and coals shall not be placed, deposited or dumped in or upon the Hazardous Fire Area.

EXCEPTIONS:

1. In the hearth of an established fire pit, camp stove or fireplace.

2. In a noncombustible container with a tight-fitting lid, which is kept or maintained in a safe location not less than 10 feet from combustible vegetation or structures.

3. Where such ashes or coals are buried and covered with 1 foot of mineral earth not less than 25 feet from combustible vegetation or structures.

Section 316.14 Use of fire roads and firebreaks. Motorcycles, motor scooters and motor vehicles shall not be driven or parked upon, and trespassing is prohibited upon, fire roads or firebreaks beyond the point where travel is restricted by a cable, gate or sign, without the permission of the property owners. Vehicles shall not be parked in a manner which obstructs the entrance to a fire road or firebreak.

EXCEPTION: Public officers acting within their scope of duty. Radio and television aerials, guy wires thereto, and other obstructions shall not be installed or maintained on fire roads or firebreaks unless located 16 feet or more above such fire road or firebreak.

Section 316.15 Use of motorcycles, motor scooters and motor vehicles. Motorcycles, motor scooters and motor vehicles shall not be operated within area closed per section 316.21, without a permit by the fire code official, except upon clearly established public or private roads. Permission from the property owner shall be presented when requesting a permit.

Section 316.16 Tampering with fire department locks, barricades and signs. Locks, barricades, seals, cables, signs and markers installed within special protection area, by or under the control of the chief, shall not be tampered with, mutilated, destroyed or removed. Gates, doors, barriers and locks installed by or under the control of the fire code official shall not be unlocked.

Section 316.17 Liability for damage. The expenses of fighting fires which result from a violation of Section 316 shall be a charge against the person whose violation of Section 316 caused the fire. Damages caused by such fires shall constitute a debt of such person and are collectable by the fire code official in the same manner as in the case of an obligation under a contract, expressed or implied.

Section 316.18 Clearance of brush or vegetative growth from structures.

316.18.1 General. Persons owning, leasing, controlling, operating or maintaining buildings or structures in the Hazardous Fire Area, and persons owning, leasing or controlling land adjacent to such buildings or structures, shall at all times:

1. Maintain an effective firebreak by removing and clearing away flammable vegetation and combustible growth from areas within 100 feet of such buildings or structures;

   Exception: Single specimens of trees, ornamental shrubbery or similar plants used as ground covers, provided that they do not form a means of rapidly transmitting fire from the native growth to any structure.

2. Maintain additional fire protection or firebreak by removing brush, flammable vegetation and combustible growth beyond the 100 feet from such buildings or structures, when required by the fire code official because of extra hazardous conditions causing a firebreak of only 100 feet to be insufficient to provide reasonable fire safety.

   Exception: Grass and other vegetation located more than 100 feet from buildings or structures and less than 18 inches in height above the ground need not be removed where necessary to stabilize the soil and prevent erosion.

3. Remove portions of trees which extend within 10 feet of the outlet of a chimney.

4. Maintain trees adjacent to or overhanging a building free of deadwood.

5. Trees shall be trimmed to provide a minimum of 10-foot ground clearance.

6. Trees shall be cut/pruned at the angle of the slope in which they reside.

7. Irrigated surface fuels shall be maintained at a height not to exceed 18 inches.

8. Maintain the roof of a structure free of leaves, needles or other dead vegetative growth.

9. Debris and trimmings shall be removed from the site, or chipped and converted into mulch then evenly dispersed in the same area to a maximum depth of three (3) inches.

10. Deadwood and tree litter shall be regularly removed from trees.

11. Tree crowns extending to within 10 feet of any structure shall be pruned to maintain a 10-foot clear horizontal distance.

Section 316.19 Clearance of brush or vegetation growth from roadways. The fire code official is authorized to cause areas within 10 feet on each side of portions of highways and private streets which are improved, designed or ordinarily used for vehicular traffic to be cleared of flammable vegetation and other combustible growth. The fire code official is authorized to enter upon private property to do so.

Exception: Single specimens of trees, ornamental shrubbery or cultivated ground cover such as green grass, ivy, succulents or similar plants used as ground covers, provided that they do not form a means of readily transmitting fire.

Section 316.20 Use of Equipment.

1. Except as otherwise provided in this section, no person shall use, operate, or cause to be operated, in, upon or adjoining any Hazardous Fire Area, any internal combustion engine which uses hydrocarbon fuels, unless the engine is equipped with a spark arrester and maintained in effective working order, or the engine is constructed, equipped and maintained for the prevention of fire.

2. Spark arresters affixed to the exhaust system of engines or vehicles subject to this section shall not be placed or mounted in such a manner as to allow flames or heat from the exhaust system to ignite any flammable material.

3. A spark arrester is a device constructed of nonflammable material specifically for the purpose of removing and retaining carbon and other flammable particles over 0.0232 of an inch in size from the exhaust flow of an internal combustion engine that uses hydrocarbon fuels or which is qualified and rated by the United States Forest Service.

4. Engines used to provide motor power for trucks, truck tractors, buses, and passenger vehicles, except motorcycles, are not subject to this section if the exhaust system is equipped with a muffler as defined in the Vehicle Code of the State of California.

5. Turbocharged engines are not subject to this section if all exhausted gases pass through the rotating turbine wheel, there is no exhaust bypass to the atmosphere, and the turbocharger is in effective mechanical condition.

Section 316.21 Restricted entry. The fire code official shall determine and publicly announce when areas within the Hazardous Fire Area shall be closed to entry and when such areas shall again be opened to entry. Entry on and occupation of hazardous fire areas, except public roadways, inhabited areas or established trails and camp sites which have not been closed during such time when the hazardous fire area is closed to entry, is prohibited.

Exceptions:

1. Residents and owners of private property within hazardous fire areas and their invitees and guests going to or being upon their lands.

2. Entry, in the course of duty, by peace or police officers, and other duly authorized public officers, members of a fire department and members of the United States Forest Service.

3. A permit has been issued by the San Bernardino Fire Department to enter a fire-closure area.

Section 316.22 Trespassing on posted property.

1. General. When the fire code official determines that a specific area within the special protection area presents an exceptional and continuing fire danger because of the

density of natural growth, difficulty of terrain, proximity to structures or accessibility to the public, such areas shall be closed until changed conditions warrant termination of closure. Such areas shall be posted as hereinafter provided.

2. Signs. Approved signs prohibiting entry by unauthorized persons and referring to applicable fire code chapters shall be placed on every closed area.

3. Trespassing. Entering and remaining within areas closed and posted is prohibited.

Exception: Owners and occupiers of private or public property within closed and posted areas, their guests or invitees, and local, state and federal public officers and their authorized agents acting in the course of duty.

Section 316.23 Explosives and blasting. Explosives shall not be possessed, kept, stored, sold, offered for sale, given away, used, discharged, transported or disposed

of within the Hazardous Fire Area except by permit from the fire code official.

Section 316.24 Fireworks. Fireworks shall not be used or possessed in the Hazardous Fire Area.

The Chief is authorized to seize, take, remove or cause to be removed fireworks in violations of Section 316.24.

Section 316.25 Unusual Circumstances. The fire code official may suspend enforcement and require reasonable alternative measures designed to advance the purposes of this section if he/she determines in any specific case that any of the following conditions exist:

1. Difficult terrain.
2. Danger of erosion.
3. Presence of plants included in any state and federal resources agencies, California Native Plant Society and county-approved list of wildlife, plants, rare, endangered and/or threatened species.
4. Stands or groves of trees or heritage trees.
5. Other unusual circumstances that make strict compliance with the clearance of vegetation provisions of Section 316 undesirable or impractical.

Section 316.26 Storage of Firewood and Combustible Material. Firewood and combustible material shall not be stored in unenclosed spaces beneath buildings or structures, or on decks or under eaves, canopies or other projections or overhangs. When required by the fire code official, storage of firewood and combustible material stored in the defensible space shall be located a minimum of 20 feet from structures and separated from the crown of trees by a minimum horizontal distance of 15 feet.

FINDINGS:A,B,C,D,E,F APPLY TO THESE AMENDMENTS OF CHAPTER 3 OF THE 2007 CALIFORNIA FIRE CODE

15.16.120 Spark Arrester defined.

Section 202 of the California Fire Code is amended by adding the following definition:

SPARK ARRESTER is a device constructed of stainless steel, aluminum, copper, or brass, woven galvanized wire mesh, nineteen gauge minimum or three-eighths inch minimum to one-half inch maximum openings, mounted in or over all outside flue openings in a vertical or near vertical post, adequately supported to prevent movement and to be visible from the ground.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.121 Safe and Sane Fireworks defined.

Section 202 of the California Fire Code is amended by adding the following definition: **Safe and Sane Fireworks** means any fireworks which do not come within the definition of "dangerous fireworks" or "exempt fireworks" as defined in the California Health and Safety Code.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02)

15.16.126 Premises Identification.

Section 505.1 of the California Fire Code is amended to read as follows:

Section 505.1 Premises Identification. Approved numbers shall be a minimum of 6" high if the building is 100 lineal feet or less on the street elevation. If greater than 100 lineal feet, numbers shall be a minimum of 12" high.
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02)

15.16.135 Fire Department Access.

Section 503.1.1 of the California Fire Code is amended to read as follows:

503.1.1 Required Access. Fire apparatus access roads shall be required for every building hereafter constructed. The access roadway shall be extended to within one hundred fifty (150) feet of, and shall give reasonable access to, all portions of the exterior walls of the first story of any building. An access road shall be provided within fifty (50) feet of all multiple story buildings or when the natural grade between the access road and building is in excess of thirty (30%). Where the access roadway cannot be provided, an approved fire protection system or systems shall be provided as required and approved by the Fire Chief.

More than one fire apparatus access road shall be provided when it is determined by the Fire Chief that access by a single road might be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.

FINDINGS: A,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; MC-1048, 5-17-99; MC-1023, 5-18-98; Ord. MC-984, 11-4-96)

15.16.140 Maintenance of Access Roadways.

Section 503.3 of the California Fire Code is amended to read as follows:

503.3 Marking of fire apparatus access roads. As directed by the Fire Marshal, the owner or the individual in control of emergency access roadways and streets in private developments shall paint curbs red and label in six inch by one-half inch white letters "NO PARKING- FIRE LANE" every twenty feet where parking is not allowed;

and/or

conspicuously post legible, permanent all-weather signs with lettering having a minimum height of two inches and a minimum width of one-half inch every fifty feet. Signs are to read "NO PARKING- FIRE LANE".

FINDINGS: A,B,C,D,E,F APPLY

Section 503.4 of the California Fire Code is amended to read as follows:

503.4 Obstruction of fire apparatus access roads. The required width of the fire apparatus access road shall not be obstructed in any manner, including parking of vehicles. Minimum required widths and clearances established under Section 503.2.1 shall be maintained at all times.

Entrances to roads, trails or other access ways, which have been closed with gates and barriers in accordance with Section 503.5 shall not be obstructed by parked vehicles.

Any obstruction or impedance with reasonable access may be removed or repaired forthwith by any public safety agency. The expense of removal or repair is to be borne by the owner of the roadway. In the case of an obstructing vehicle or object, the expense is to be borne by the owner of said vehicle or object.

Prior to combustible construction, the owner or contractor shall provide and maintain concrete or asphalt roadways that will support the imposed loads of emergency apparatus in all weather conditions.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.1 55 Automatic Fire Extinguishing Systems.

Section 903.2 of the California Fire Code is amended to read as follows:

903.2 Where required. An automatic fire extinguishing system shall be installed in all newly constructed buildings where the square footage is 5,000 square feet or more, and throughout all occupancies as set forth in this section. All portions of the building shall comply. No partial systems allowed. This section shall apply to the following:

1. The existing building square footage is increased to 5000 square feet or more, or the existing square footage is 5,000 or more and any additional square footage or

appendage is added.

2. The existing building is, or exceeds 5000 square feet and the cumulative amount of remodeling, rehabilitation or repairs exceed 50% or more of the total floor area of the building, as determined by the Chief and Building Official.

3. In buildings that are, or exceed 5000 square feet which have been vacant, or lack a verifiable legal occupancy for a period of 365 days. (San Bernardino Municipal Code Title 5 and Title 15)

4. Buildings which are, or exceed 5000 square feet and have a change in use or occupancy classification, which increases the fire hazard of the structure or the life safety of the occupants as determined by the Chief.

5. Buildings which have had an occupancy change and exceed the maximum allowable square footage per occupancy type as set forth in California Fire Code, Chapter 9.

6. Residential in-fill development in areas where the fire flow does not meet the minimum required flow.

Exceptions:

1. Spaces or areas in telecommunications buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided those spaces or areas are equipped throughout with an automatic fire alarm system and are separated from the remainder of the building by fire barriers consisting of not less than 1-hour fire-resistance-rated walls and 2-hour fire-resistance-rated floor/ceiling assemblies.

2. Automatic fire sprinkler protection for fixed guideway transit systems shall be as per Section 903.2.17.

For purposes of this section, fire walls and fire partitions shall not define separate buildings. A clear unattached space of not less than (10) feet shall define separate buildings.

FINDINGS: A,B,C,D,E,F APPLY

Section 903.3.5.1 Delete entire section.
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.170 Power Source.

Section 907.2.10.2 of the California Fire Code is amended to read as follows:

907.2.10.2 Power Source. In new construction, and in newly classified Group R-3.1 occupancies, and when required by the Fire Marshal in existing Group R Occupancies smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms shall emit a signal when batteries are low. The wiring shall be

permanent and without a disconnecting switch other than those required for overcurrent protection. Locations of the smoke detectors shall be determined by the California Building Code.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.200 Individual Piles.

Section 2505.1 of the California Fire Code is amended to read as follows:2505.1 Individual piles. Tires shall be restricted to individual piles not exceeding 2,500 square feet of continuous area. Piles shall not exceed 25,000 cubic feet in volume or 10 feet in height.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1 259, 11-19-07; Ord. MC-1 130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-1 027, 9-8-98; Ord. MC-984, 11-4-96)

15.16.205 Sparks from Chimneys.

Section 603.2 of the California Fire Code is amended by adding the following:

603.2.1 Sparks from Chimneys. Each chimney used in conjunction with any fireplace or any heating appliance in which solid or liquid fuels are used shall be maintained with an approved spark arrester. An approved spark arrester shall mean a device constructed of stainless steel, aluminum, copper, or brass, woven galvanized wire mesh, nineteen gauge minimum or three-eighths inch minimum to one-half inch maximum openings, mounted in or over all outside flue openings in a vertical or near vertical position, adequately supported to prevent movement and to be visible from the ground.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99)

15.16.215 Fire Damage.

Section 110 Appendix Chapter 1 of the California Fire Code is amended by adding the following:

110.6 Fire Damage. The owner, occupant or other persons under his control, having any property, or materials on a property damaged by fire, when access by the public is possible, shall secure the property by boarding up all openings, fencing, barricading or other appropriate measures as determined by the Chief.

All debris and/or damaged materials shall be removed from the property and proof furnished that contractual arrangements have been made for demolition, replacement or repair of all fire damaged structures remaining on property involved in the fire, as determined by the Chief.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99)

15.16.220 False Alarm.

Section 401.3 of the California Fire Code is amended by adding the following:

401.3.4 False Alarms. False alarms shall not be given, signaled or transmitted or caused or permitted to be given, signaled or transmitted in any manner. Failure to comply with this Section will result in penalties charged as prescribed in Section 103.4.2 (Liabilities) of the California Fire Code.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.235 Standby Personnel for Public Gatherings.

Section 403.1 of the California Fire Code is amended to read as follows:

Section 403.1 Standby Personnel. Whenever, in the opinion of the Fire Chief, it is essential for public safety in any place of public assembly or any other place where people congregate, due to the number of persons, or the nature of the performance, exhibition, display, contest or activity, the owner, agent or lessee shall reimburse the Fire Department for one or more qualified persons as required and approved by the Fire Chief to be on duty at such place. Such individuals shall be subject to the Fire Chief's orders at all times when so employed and shall remain on duty during the time such places are open to the public, or when such activity is being conducted. Before each performance or the start of such activity, said personnel shall inspect the required fire appliances provided to determine that such devices are in proper place and in good working order and inspect exits and aisles to ensure such passageways are clear and adequate, and shall keep diligent watch for any safety violations during the time such place is open to the public or such activity is being conducted and take prompt measures for correcting problems that may occur. Such individuals shall not be required or permitted, while on duty, to perform any other duties than those herein specified.

FINDINGS: A,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.255 Seizure of Fireworks.

Chapter 33 of the California Fire Code is amended by adding the following:

Section 3309 Seizure of Fireworks. The Chief or Law Enforcement agency is authorized to seize, take, remove or cause to be removed, at the expense of the owner, all stocks of fireworks offered or exposed for sale, stored or held in violation of Article 78 or the San Bernardino Municipal Code.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99)

15.16.257 Additional Requirements for Tanks Located Within Below-Grade Vaults.

Section 3404.1 of the California Fire Code is amended by adding the following:

3404.1.1 General. Storage of flammable or combustible liquids in tanks located within below-grade vaults shall be in accordance with Section 3404 and the San Bernardino County Fire Chiefs Policy.

FINDINGS: A,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02)

15.16.270 LP-Gas permits, Plans and Records.

Section 3801.3 of the California Fire Code is amended to read as follows:

3801.3 Permits and Plans. When a commercial installation is 125-gallon aggregate water capacity or greater, the installer shall submit plans for such installation.

FINDINGS: A,B,C,D,E,F APPLY
(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.280 Effectiveness.

Section 4701 of the California Fire Code is amended by adding the following:

Section 4701.3 Effectiveness. This entire chapter is effective January 01, 2008 regardless of any delayed implementation date adopted by the office of the California State Fire Marshal California Building Standards Commission.

(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1048, 5-17-99; Ord. MC-984, 11-4-96)

15.16.400 Authorized Fire Chief Representative.

Section 111.2.1.1 (1.1) is amended by adding the following:
Pursuant to California Fire Code Section 111.2.1.1 (1.1) and California Building Code Section 111.2.1.1 (1.2) the Building Official is hereby authorized to act as a representative of the Fire Chief to enforce building standards adopted by the California State Fire Marshal related to new construction or alterations.

(Ord. MC-1259, 11-19-07; Ord. MC-1130, 10-07-02; Ord. MC-1103, 9-4-01)

Appendix E
Fire Department Response Time Analysis

Response times were analyzed for the project using time/distance calculations and the ISO travel time formula. As indicated below, time were then calculated using the actual speed limits for the same travel path. Travel times were equivalent or better using the speed limits. In all cases, the distance/time for resources was within acceptable parameters.

Meyers Entrance

Fire Station	Miles	Time @ 35 mph	Time @ speed limits
232	2.07	0:03:33	0:03:21
SBCo2	3.73	0:06:24	0:05:30
225	4.13	0:07:05	0:06:06
227	6.75	0:11:34	0:11:33
224	7.85	0:13:27	0:10:37
226	9.32	0:15:59	
221	10.37	0:17:47	

Farthest Point

Fire Station	Miles	Time	Time @ speed limits
232	3.74	0:06:25	0:06:13
SBCo2	5.40	0:09:15	0:08:22
225	5.81	0:09:58	0:08:58
227	8.43	0:14:27	0:14:25
224	9.53	0:16:20	0:13:29
226	10.99	0:18:50	
221	12.05	0:20:39	

Existing Ranch House

Fire Station	Miles	Time	Time @ speed limits
232	3.31	0:05:40	0:05:29
SBCo2	4.97	0:08:31	0:07:38
225	5.37	0:09:12	0:08:14
227	8.00	0:13:43	0:13:40
224	9.10	0:15:36	0:12:45
226	10.56	0:18:06	
221	11.62	0:19:55	

The same information shown on the previous page is reformatted here for a better comparison. As indicated below, since all resources travel through the same entrance, all times/distance to the farthest point or the existing home on the site are increased by the same amount.

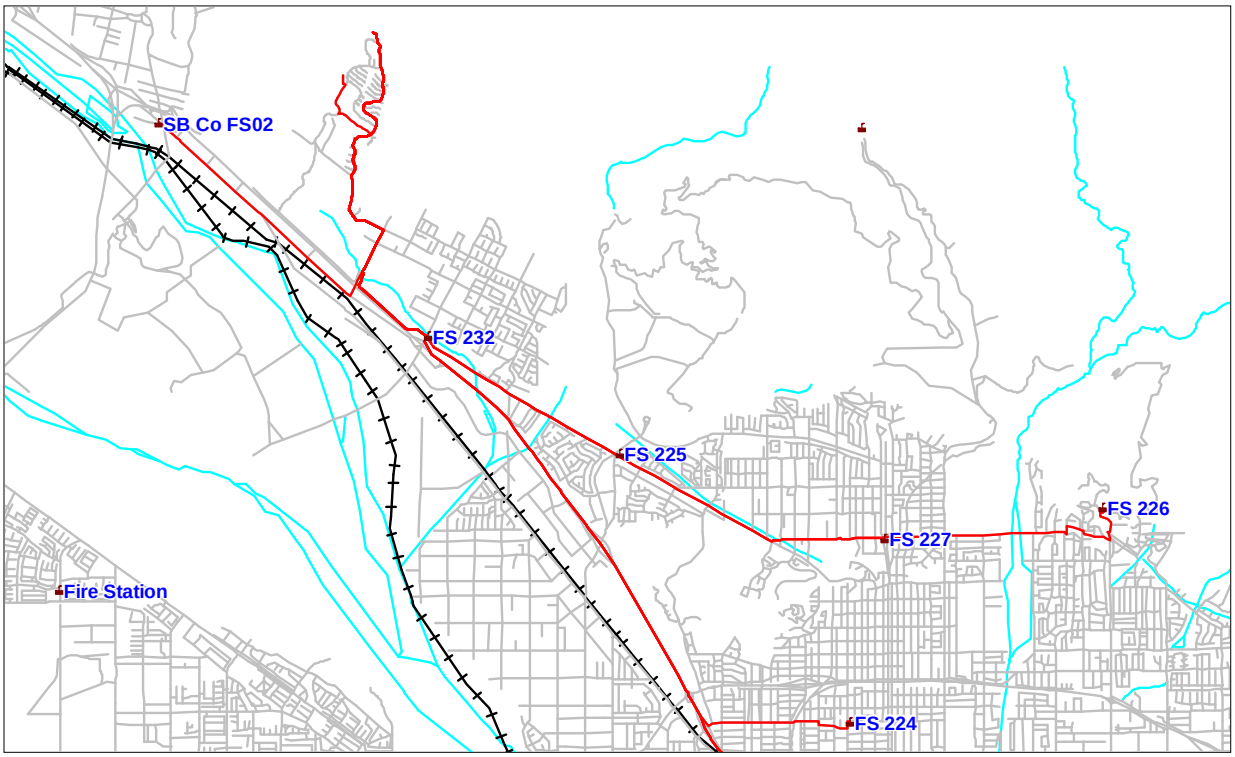
[redacted]

Below are the actual calculations for the speed limit responses.

Station		MPH	Miles	Time
232		45	0.78	0:01:02
		25	0.16	0:00:23
		35	0.43	0:00:44
		35	0.70	0:01:12
	Meyers		2.07	0:03:21
	Farthest		3.74	0:06:13
	Ranch		3.31	0:05:29
225		45	2.06	0:02:45
		45	0.78	0:01:02
		25	0.16	0:00:23
		35	0.43	0:00:44
		35	0.70	0:01:12
	Meyers		4.13	0:06:06
	Farthest		5.80	0:08:58
	Ranch		5.37	0:08:14
227		45	1.02	0:01:22
		45	1.60	0:02:08
		25	2.06	0:04:56
		35	0.78	0:01:20
		35	0.16	0:00:17
		45	0.43	0:00:34
		45	0.70	0:00:56
	Meyers		6.75	0:11:33
	Farthest		8.42	0:14:25
	Ranch		7.99	0:13:40

Station		MPH	Miles	Time
224		35	1.34	0:02:18
		55	4.27	0:04:39
		35	0.18	0:00:19
		45	0.78	0:01:02
		25	0.16	0:00:23
		35	0.43	0:00:44
		35	0.70	0:01:12
	Meyers		7.85	0:10:37
	Farthest		9.52	0:13:29
	Ranch		9.09	0:12:45
SBCo2		45	2.35	0:03:08
		35	1.38	0:02:22
	Meyers		3.73	0:05:30
	Farthest		5.40	0:08:22
	Ranch		4.97	0:07:38

The map below indicates the routes taken for routing purposes.



Appendix F
Behave Modeling

The BEHAVE, Computer Fire Behavior Prediction and Fuel Modeling System is the most accepted method for predicting wildland fire behavior. The BEHAVE fire behavior computer modeling system is utilized by wildland fire experts nationwide. The fuel models in the computer program, are also referenced from the book titled, "Aids to Determining Fuel Models for Estimating Fire Behavior." The fuel models were designed to aid in determining fuel types and are used in calculating and estimating fire behavior. We used BEHAVE to measure the intensity of a fire moving towards this development.

The fire model describes the fire behavior only within the flaming front of the fire. The primary moving force in the fire is dead fuel less than ¼" in diameter. These are the finest fuels that carry the fire. Fuels larger than ¼" contribute to fire intensity, but not necessarily to fire spread as much as the fine fuels. The BEHAVE fire model describes a wildfire spreading through surface fuels, which are the burnable materials within 6' of the ground and contiguous to the ground.

This type of modeling has been used to demonstrate that the Fuel Modification Plan is the best fire defense system for the Spring Trails development. The Modeling shows that the structures are significantly further away than the most extreme flame lengths and intensity that would be produced. Instead of estimating with the exact fuel model inputs for calculating fire behavior, we have used worst case scenario fuel model inputs to ensure a further safety cushion in the computer fire behavior calculations and result analysis. For purposes of modeling fire behavior and fire risk, Fuel Model 4 (chaparral) was used to estimate a worst-case scenario needed to determine the size and configuration of the Fuel Modification Zones.

A review of weather data from the nearby Devore RAWS (Remote Access Weather Station) indicates that the worst-case fire condition would be during a late summer or fall wind event (Santa Ana Winds). During this type of event, the relative humidity will fall, temperate and winds will increase dramatically. These events normally last for several days.

A fire under these conditions that would present a threat to the project would most likely occur on the north, northeast and east sides of the proposed development but could occur in any exposure with a chaparral interface. The lesser threat of a southwest or south fire during an onshore fire in vegetation other than Fuel Model 4; chaparral, produced flame lengths significantly less than the Fall (Santa Ana Winds Event) scenario chosen to be the design criteria for this project.

Fuel Model 4 and extreme weather conditions, which could be encountered during a Santa Ana Wind event, were used to create a design scenario. The modeling has assumed that the dead fuels within the area are at the absolute minimums. One hour fuels were modeled at three percent fuel moisture, ten hour fuels at four percent and 100 hour fuels at five percent. In addition, live fuels were assumed to be at critical levels as well. Live Herbaceous vegetation, when appropriate, was modeled at 30% and Live Woody vegetation at 60%. This is extremely important as these factors determine the amount of live fuel that will be calculated in the fire

model. In this case, the percentages used will model the maximum fuel load transfer from the live fuel to the fire. This is the case when live fuels are completely consumed by a fire leaving nothing but ash (usually white in color). This is the hottest, fasting moving fire modeled.

Winds in the project areas can be very strong. A review of the RAWS data showed wind gusts up to 71 mph (November 2002) in the past nine years but the average mean wind speed is around 5 mph. High wind events and the associated gusts are not the norm. A review of October maximum and average wind speeds reveals:

Year (Oct)	Maximum Wind Gust	Average Wind Speed
2000	48 mph	4.203 mph
2001	41 mph	3.656 mph
2002	28 mph	3.363 mph
2003	43 mph	4.531 mph
2004	31 mph	4.697 mph
2005	36 mph	4.372 mph
2006	39 mph	5.137 mph
2007	56 mph	6.414 mph
2008	50 mph	6.84 mph

In the data reviewed, temperatures ranged from 28 degrees to 110 degrees are the ends of the spectrum. In the fall fire scenario, temperatures would normally be in the 80's or low 90's. A review of the maximum temperature for October during the past nine years (2000 to 2008) shows the following:

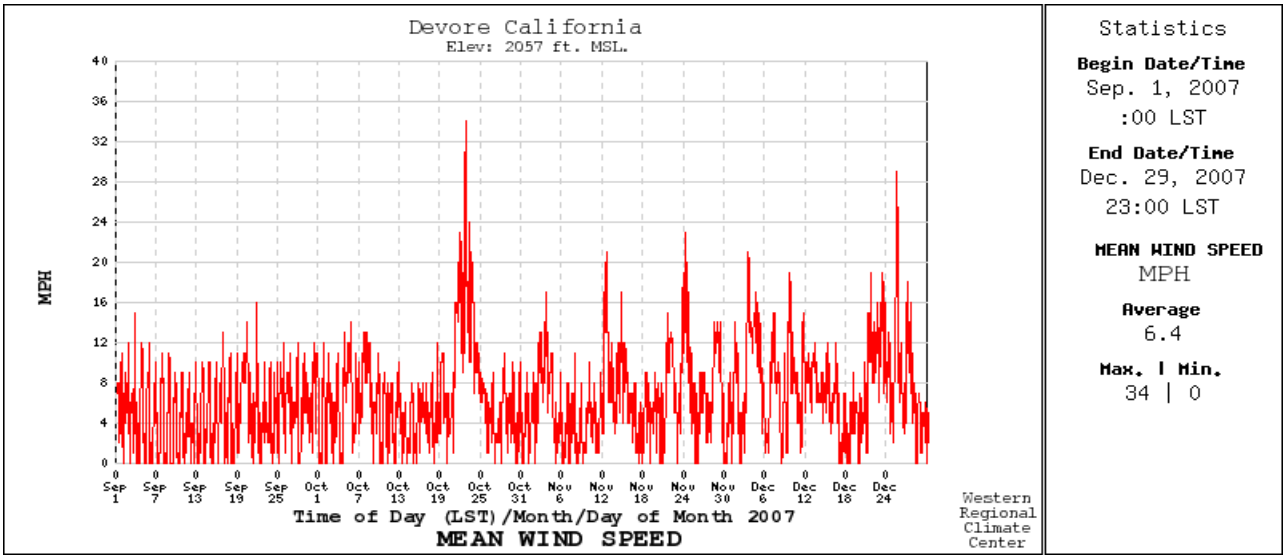
Year (Oct)	Maximum Temp	Average Maximum Temp
2000	92	74.32
2001	98	85.13
2002	96	76.23
2003	103	89.16
2004	99	76.65
2005	96	79.13
2006	87	74.23
2007	91	76.87
2008	96	79.1

The final weather related input that needs to be discussed is the relative humidity or RH. The RH will determine the amount of moisture that is available within the dead fuels. Live fuel moistures are impacted by RH but more closely driven by the amount of precipitation. Dead fuels (one hour, ten hour and one hundred hour) are very impacted by the daily changes in HR.
Dead fuels are categorized into classes by the diameter of the fuels based on a principle called timelag. This principal is based on the fact that the proportion of a fuel particle exposed to weather is related to its size. Small diameter fuels can change rapidly in response to weather changes, while larger diameter fuels are slower to respond. A **timelag** is the time required for a fuel particle to reach 63% of the difference between the initial moisture content and the equilibrim moisture content (or equilibrium with current atmospheric conditions). The

categories are named for the "midpoint" of the response time of each fuel category: **1-hour** fuels respond in less than 2 hours, **10-hour fuels** respond in 2 to 20 hours, **100-hour fuels** respond in 20 to 200 hours, and **1,000 hour fuels** respond in greater than 200 hours.

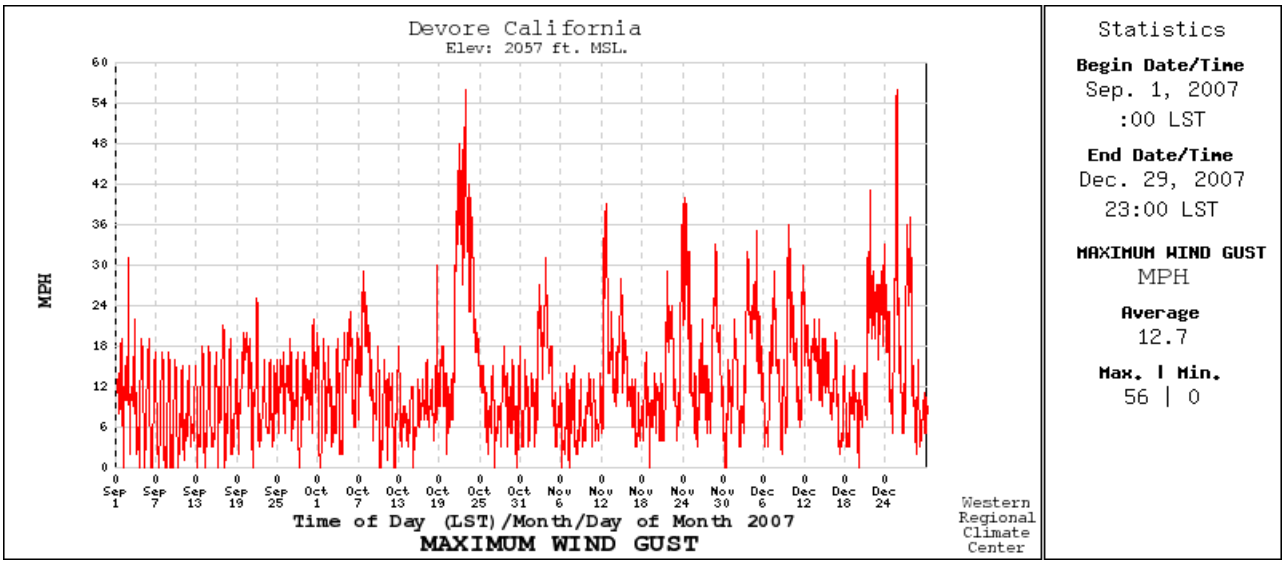
During the time period reviewed for this modeling, minimum RH's were found to be two percent. While this was rare, it did occur. The charts below show the interrelationship between these factors in a typical fall weather pattern with several (6) Santa Ana events in 2007.

MEAN WIND SPEED



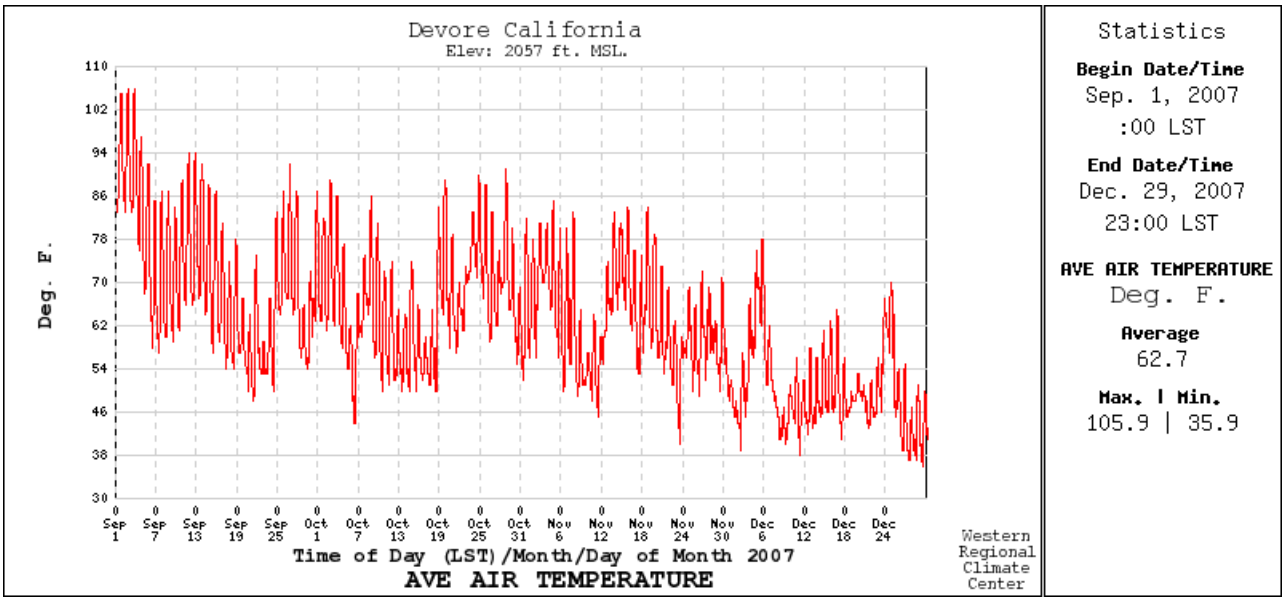
Wind gusts follow the same pattern as the mean wind speed. A cycle of six wind event occurred in the fall of 2007. Two of these had significant winds

MAXIMUM WIND GUST

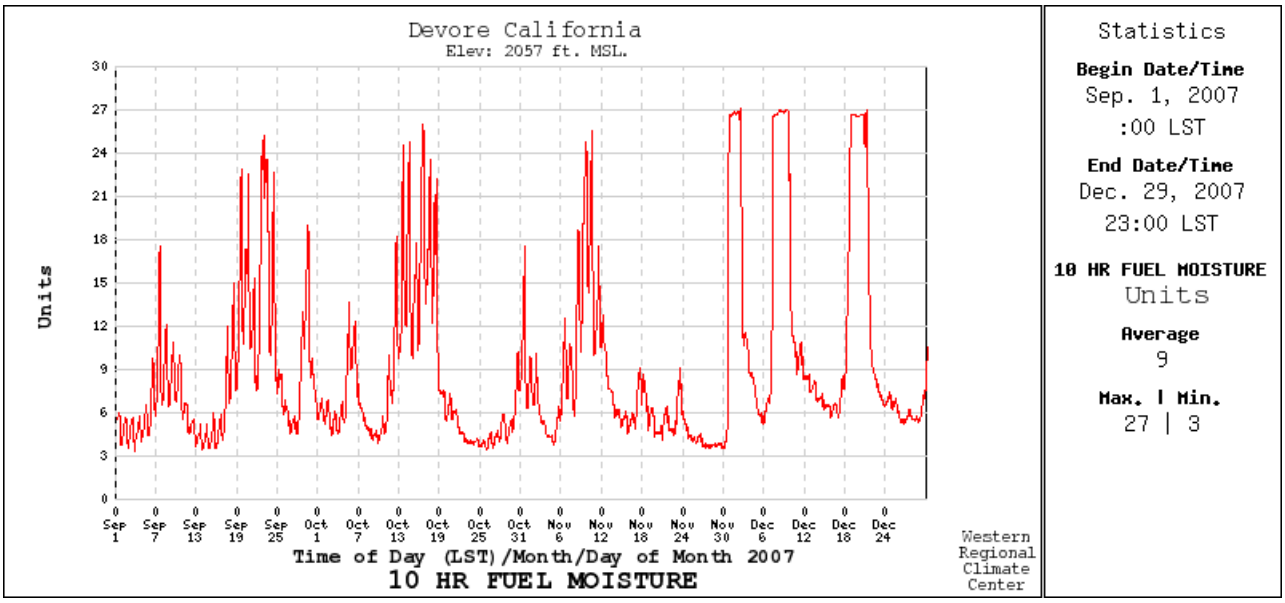


While the wind events have a significant impact on deal fuel moisture, they do not always produce high temperatures. Notice below that fuel moisture bottom out with each wind event but temperature still trend cooler with smaller spikes from the wind events.

AVE AIR TEMPERATURE



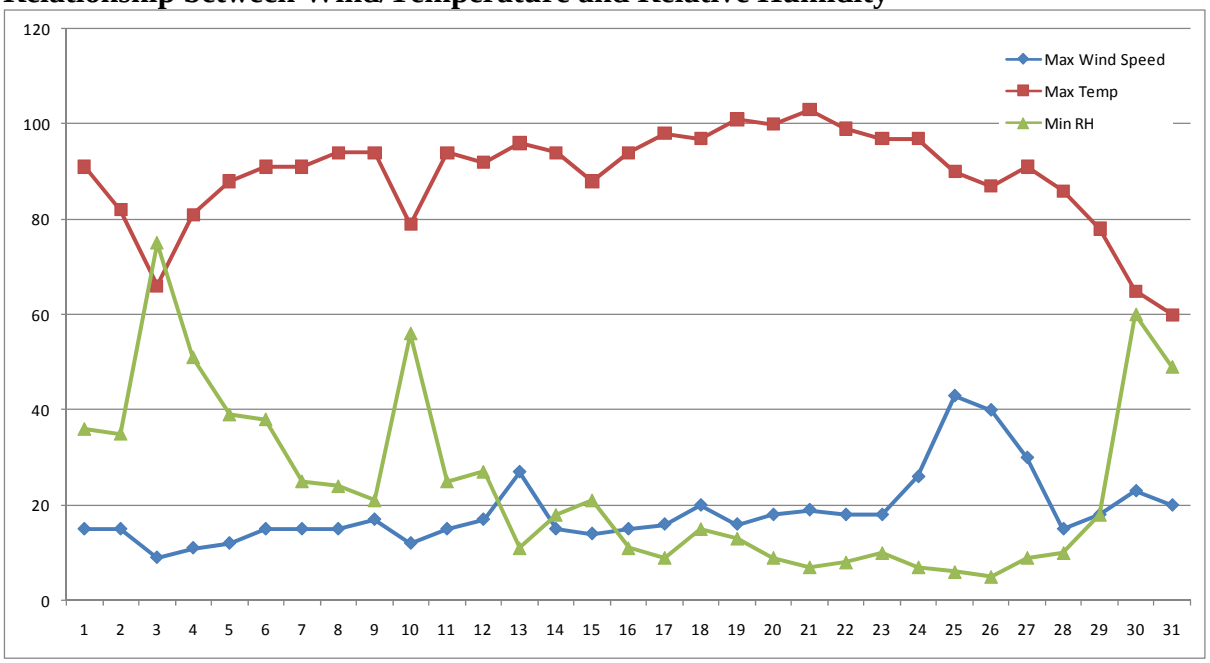
10 HR FUEL MOISTURE



As can be seen above, dead fuel moisture can be at or near minimums even when the actual temperatures are nowhere near their peaks. For example, using October 2003, the same year as the Old Fire, we can examine the relationship between various aspects of the fire model. In this case, we can see a direct relationship between dry wind events and RH. We can also see when

wet/moist weather patterns passed through the area by the increase in RH that is directly related to the decrease in temperature. Three such fronts impact weather in this areas during the month of October 2003. It should also be noted that temperature actually dropped during the early phases of the major wind event that created the Old Fire, with temperature increasing only slightly near the end of the event. This is typical in that these wind events are actually created by cold sinking air over the four corners area of the United States. The air in then compressed as it descends in elevation which causes it to heat slightly but makes it very dry in the process. For this reason, we will not model extreme temperatures such 110 degree but will use 85 degrees as a typical Santa Ana condition. In the modeling, RH and fuel moisture are much more important than the actual air temperature.

Relationship between Wind/Temperature and Relative Humidity



Live fuels are typically divided into two categories: herbaceous and woody. Herbaceous fuels include grasses, forbs, and ferns as well as other herbaceous plants. Woody fuels, for purposes of the National Fire Danger Rating System (NFDRS), refer to the leaves, needles, and twigs of small woody shrubs. Live fuels in general refer to naturally occurring fuels whose moisture content is controlled by physiological processes within the plant. For this project area, woody fuel will be used in the modeling. Modeling has been accomplished using 60 percent fuel moisture for live woody fuels.

In addition to wind and fuels, topography needs to be addressed in the modeling. In this case, the wind speeds are so high that slope has little effect on the actually flame lengths.

Effects of Wind/Slope of Worst Case Fire Scenario

BehavePlus 3.0.2 Tue, Oct 14, 2008 at 12:26:07 Page 2

Midflame Wind Speed mi/h (Unprotected)	20 foot wind speed	ROS (max) ch/h	ROS (max) ft/sec	Flame Length ft	Spread in mph	ROS (max) ch/h	ROS (max) ft/sec	Flame Length ft	Spread in mph	ROS (max) ch/h	ROS (max) ft/sec	Flame Length ft	Spread in mph
-	-	7	0	7	0.1	77	1	22	1.0	285	5	39	3.6
5	10	126	2	27	1.6	196	4	33	2.5	405	7	46	5.1
10	20	327	6	42	4.1	396	7	46	5.0	605	11	56	7.6
15	30	576	11	54	7.2	645	12	57	8.1	854	16	65	10.7
20	40	862	16	66	10.8	932	17	68	11.6	1,141	21	74	14.3
25	50	1,181	22	76	14.8	1,251	23	78	15.6	1,460	27	83	18.2
30	60	1,528	28	85	19.1	1,598	29	87	20.0	1,806	33	92	22.6
35	70	1,900	35	94	23.8	1,970	36	96	24.6	2,179	40	100	27.2
40	80	2,296	42	103	28.7	2,365	43	104	29.6	2,574	47	108	32.2
45	90	2,712	50	111	33.9	2,782	51	112	34.8	2,991	55	116	37.4
50	100	3,149	58	119	39.4	3,219	59	120	40.2	3,427	63	124	42.8
55	110	3,604	66	126	45.1	3,674	67	128	45.9	3,882	71	131	48.5
60	120	4,077	75	134	51.0	4,147	76	135	51.8	4,355	80	138	54.4
		0% slope				60% slope				120% slope			
Dead fuel		3,4,5				3,4,5				3,4,5			
Live fuel		60				60				60			

As shown in the chart above, when wind speed reaches a certain point, slope has very little impact on flame length. If we look at a 70 mph 20 foot wind, with no slope, a 94 foot flame length is produced. That same wind at a 60% slope produces a 96 foot flame and at 120% slope, the flame length is 100 foot long. The six foot difference is minor in the overall risk to the structures involved. Obviously, without the strong wind, slope has a dramatic effect. With no wind, the fire burns with a 7 foot flame length in the flat and a 39 foot flame length at the maximum slope producing an increased risk factor of 5.5 times. This is significant. For the worst case scenario used to design the fuel modification zones, slope will have little to no effect. They will be analyzed and increase protection provide nonetheless.

The Inputs to the models are as follows:

1 Hour Fuel Moisture	10 Hour Fuel Moisture	100 Hour Fuel Moisture	Live Woody Moisture	20' Wind Speed Upslope	Air Temperature
3%	4%	5%	60%	70 mph gusts 35 mph Midflame	85° f

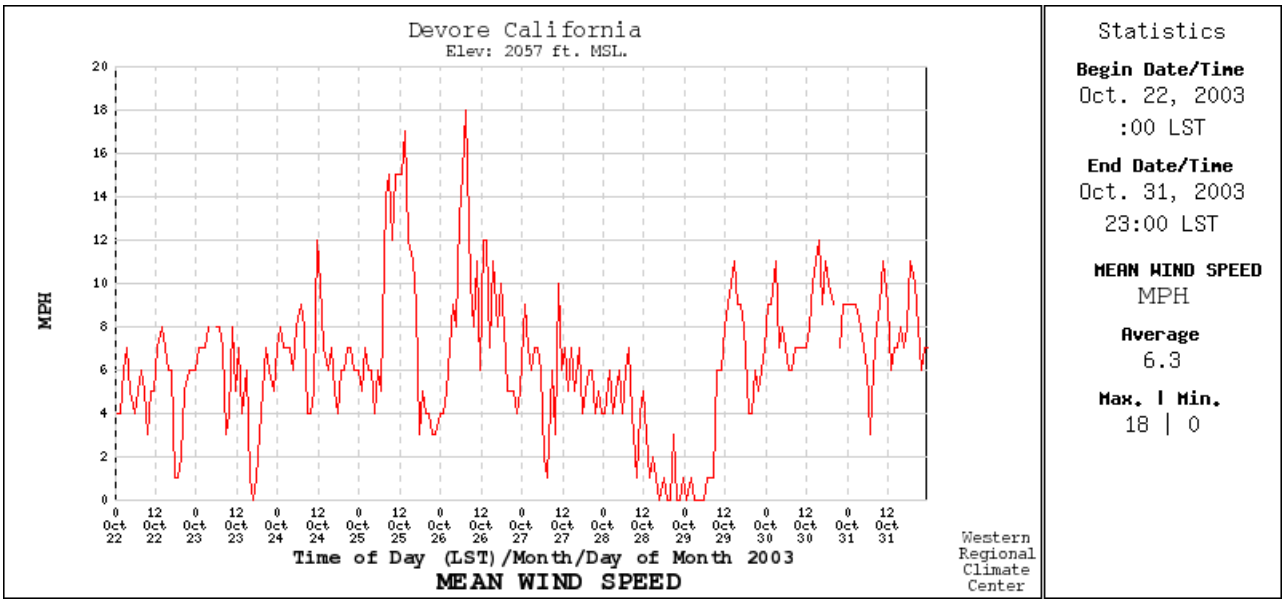
The outputs from the model at the maximum slope of 120% produced the following:

Flame Length	Rate of Spread	Spotting Distance Downwind	Fireline Intensity
100.3'	27.2 mph (40'/sec)	1.4 miles	127,104 Btu/ft/s

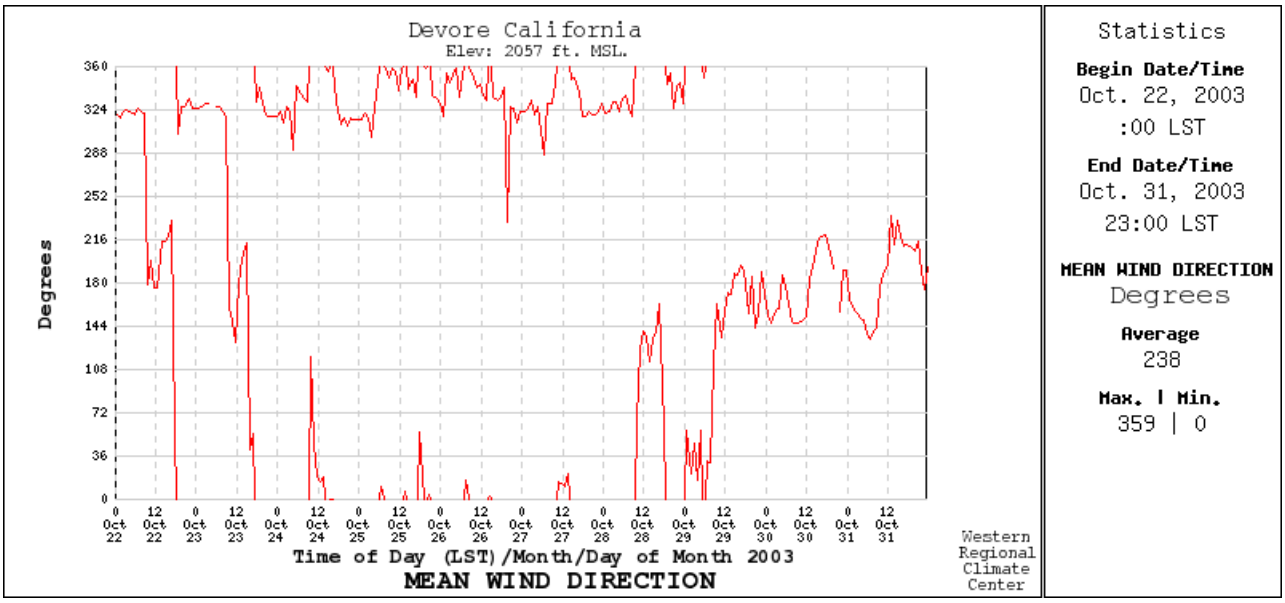
A review of the weather data for the 2003 old fire indicates that at no time during the fire did the actual weather have extremes greater than those that have been modeled in the worst case scenario for this project.

Weather Data for Old Fire

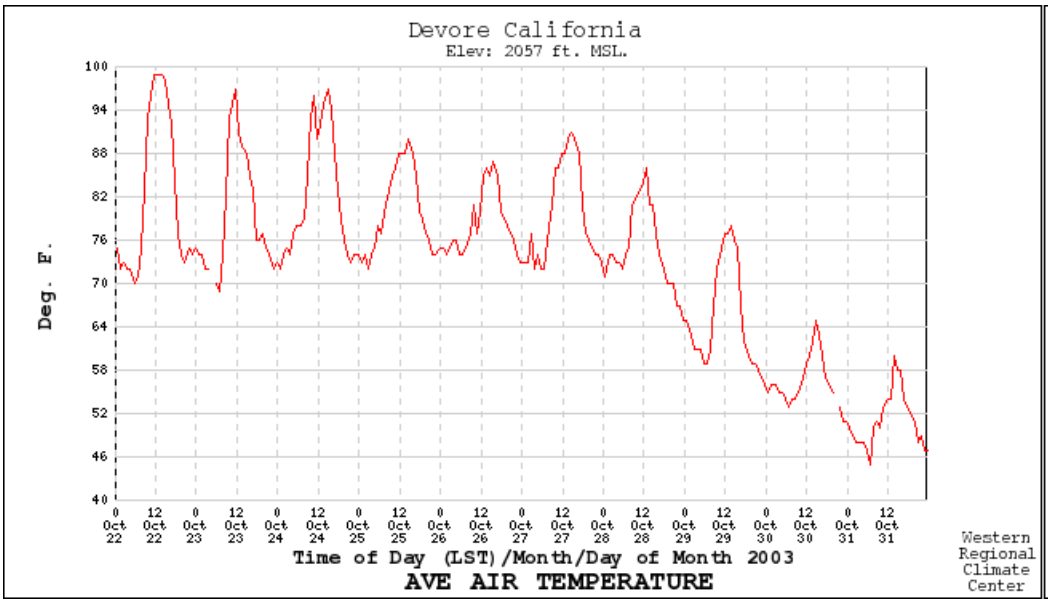
MEAN WIND SPEED



MEAN WIND DIRECTION



AVE AIR TEMPERATURE



Statistics

Begin Date/Time
Oct. 22, 2003
:00 LST

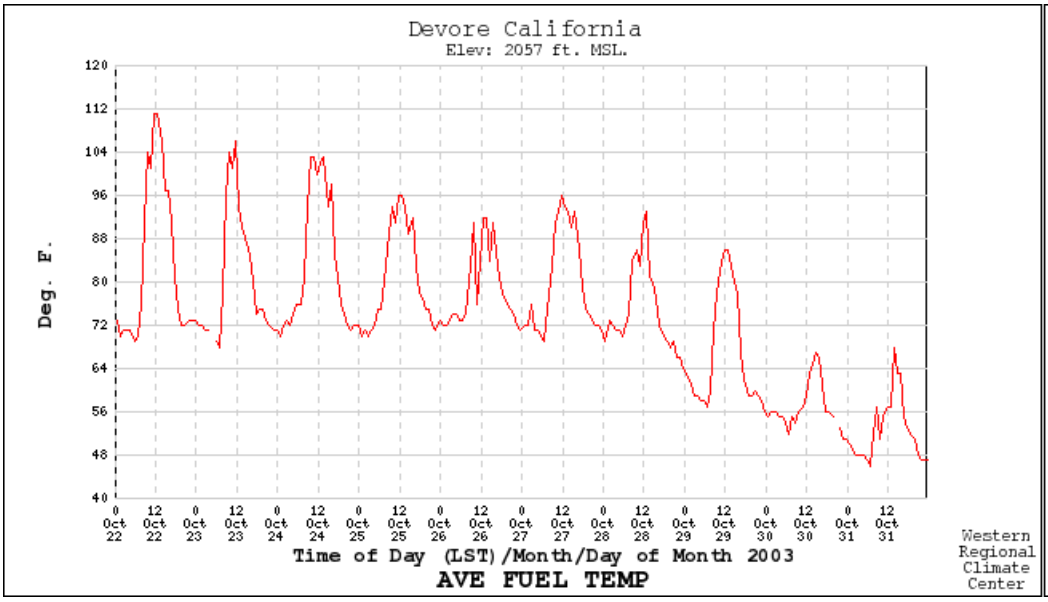
End Date/Time
Oct. 31, 2003
23:00 LST

AVE AIR TEMPERATURE
Deg. F.

Average
72.9

Max. | Min.
98.9 | 44.9

AVE FUEL TEMP



Statistics

Begin Date/Time
Oct. 22, 2003
:00 LST

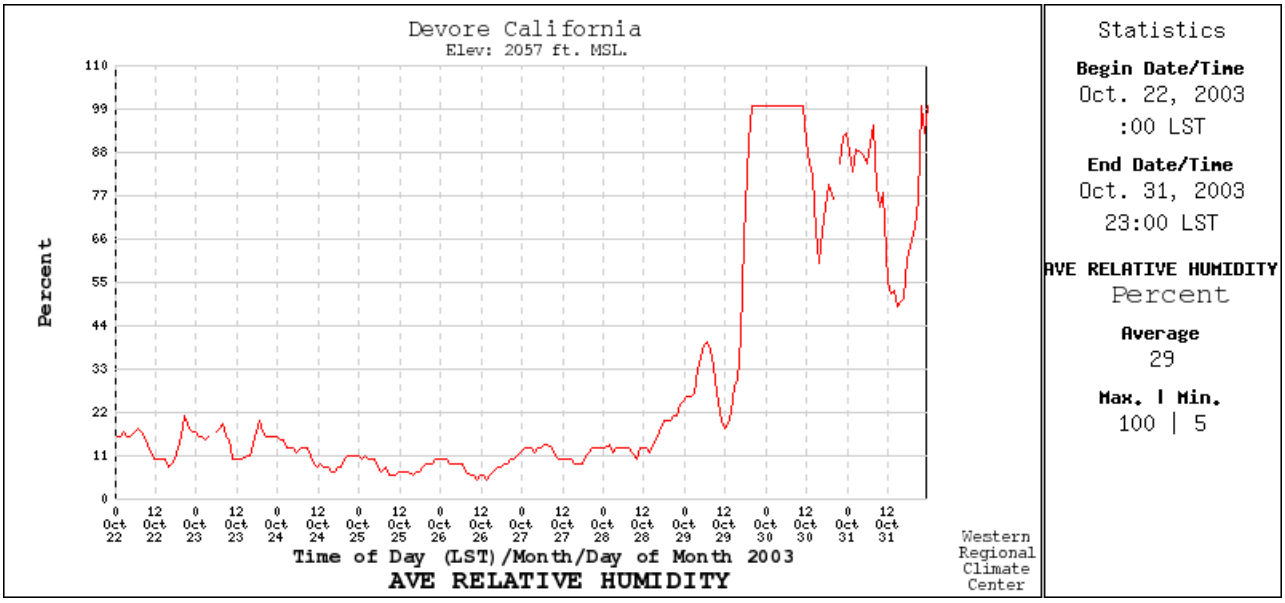
End Date/Time
Oct. 31, 2003
23:00 LST

AVE FUEL TEMP
Deg. F.

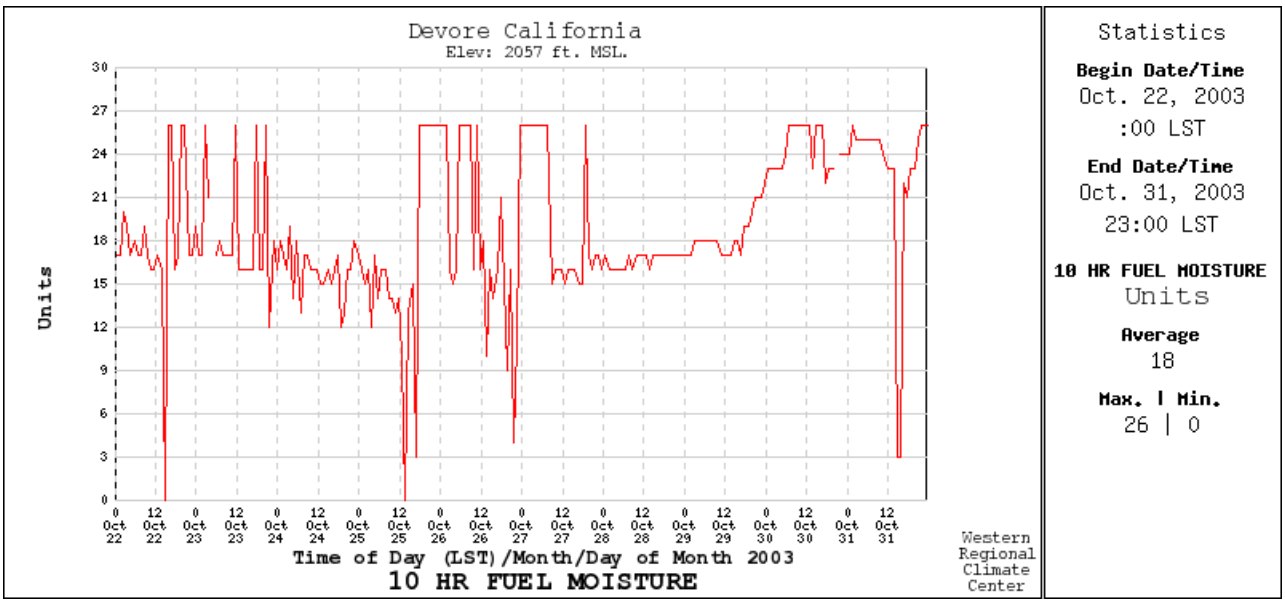
Average
73.6

Max. | Min.
110.9 | 45.9

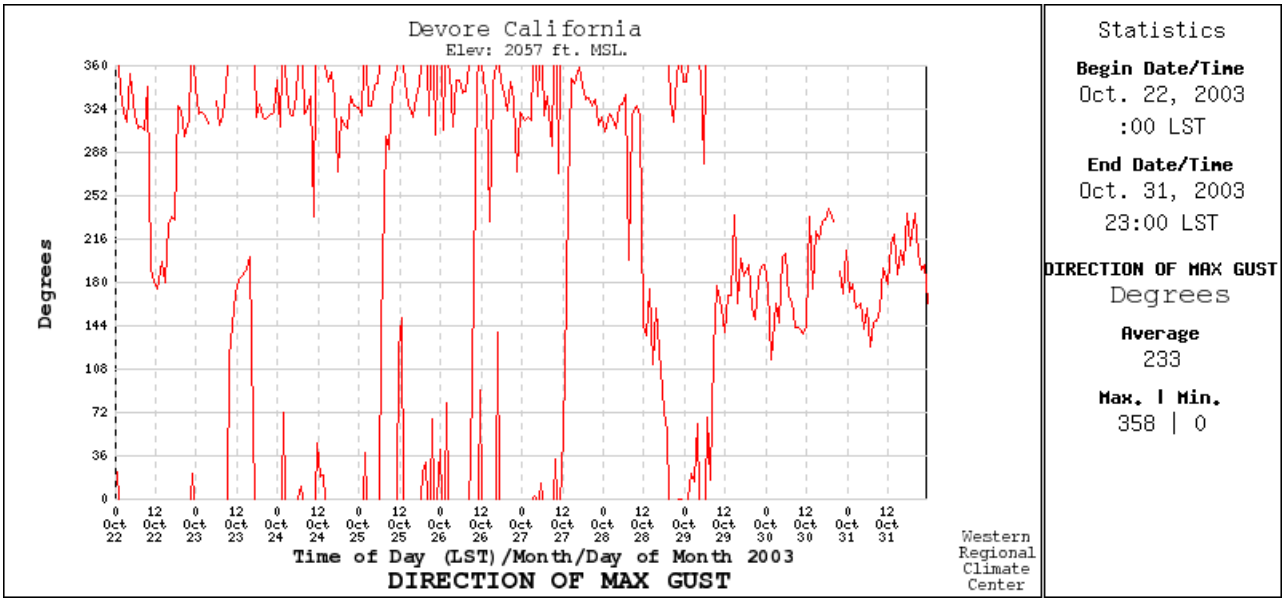
AVE RELATIVE HUMIDITY



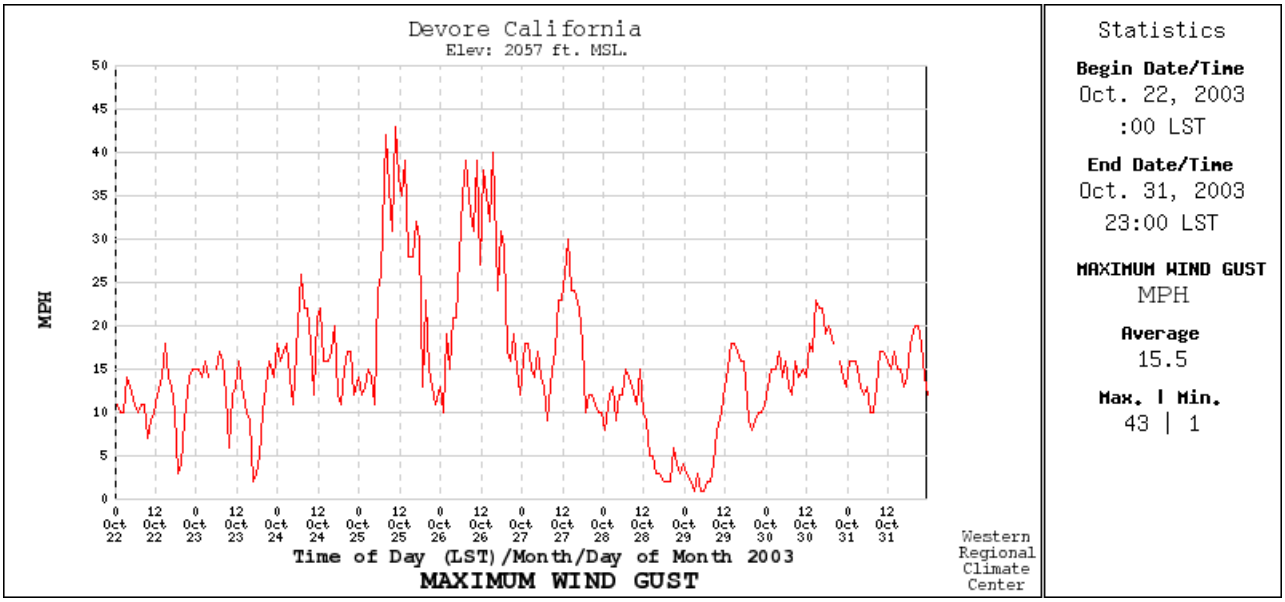
10 HR FUEL MOISTURE



DIRECTION OF MAX GUST

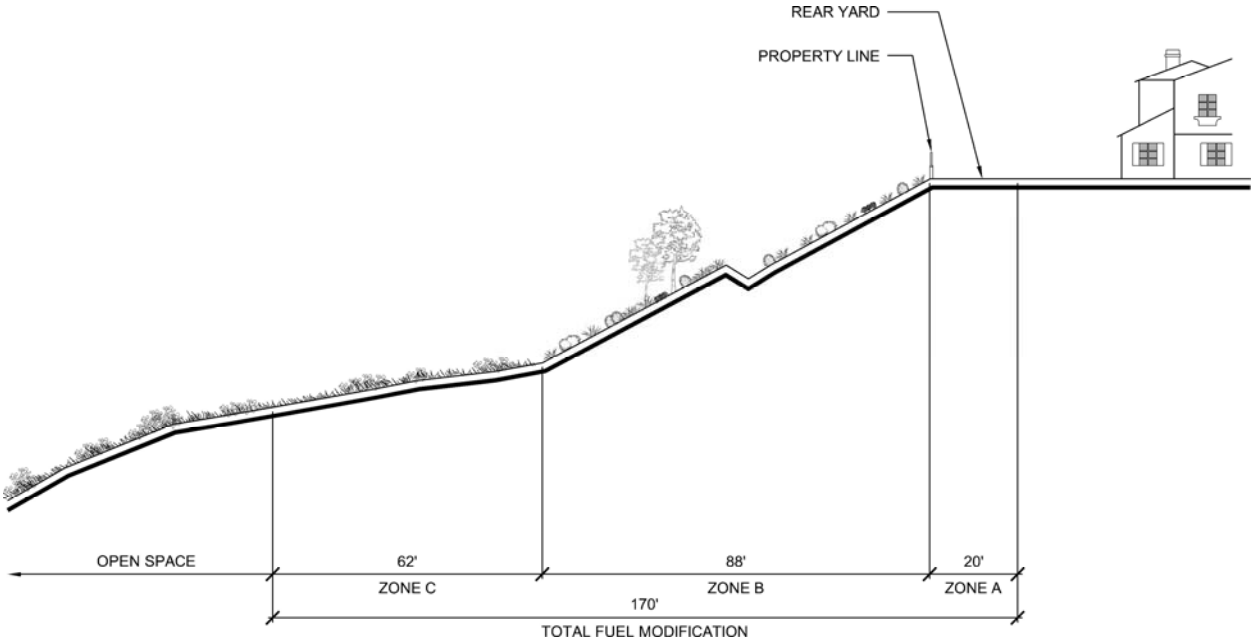


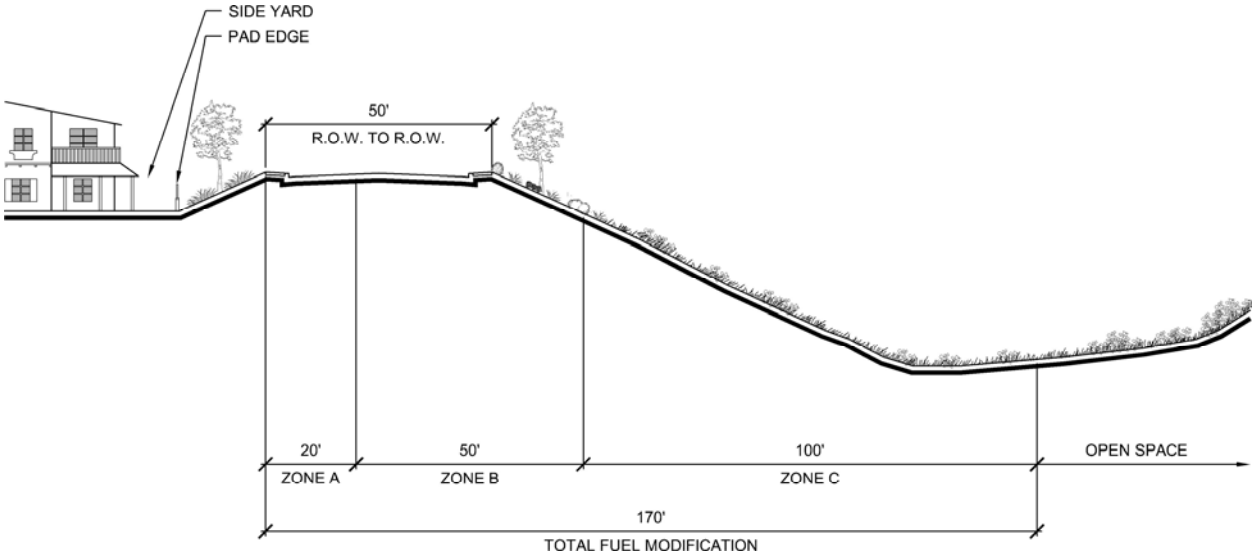
MAXIMUM WIND GUST

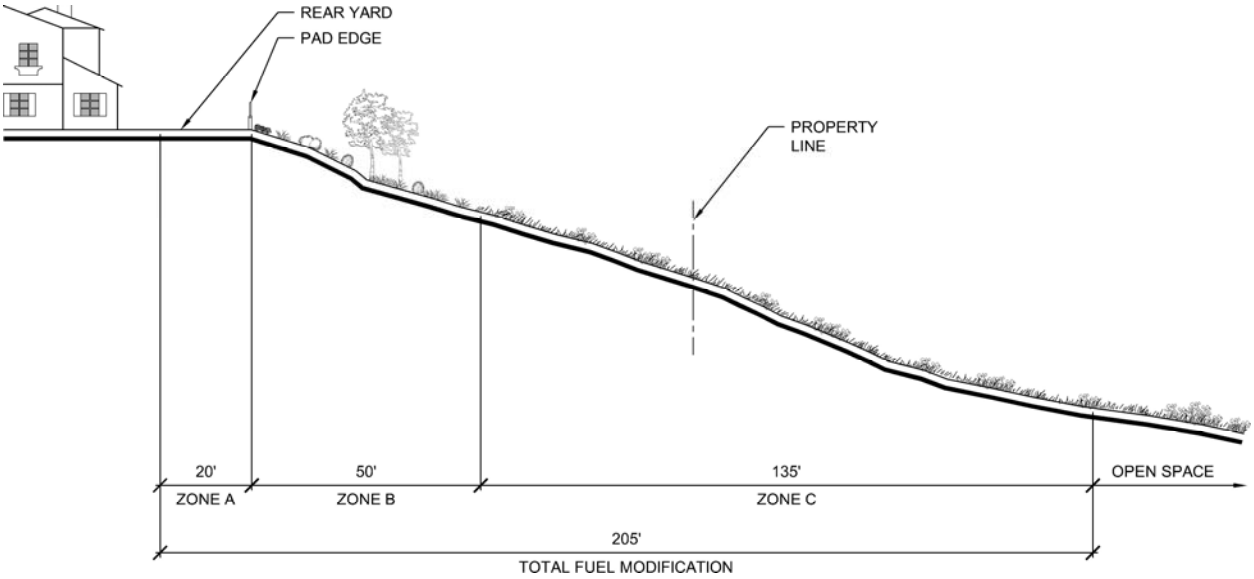


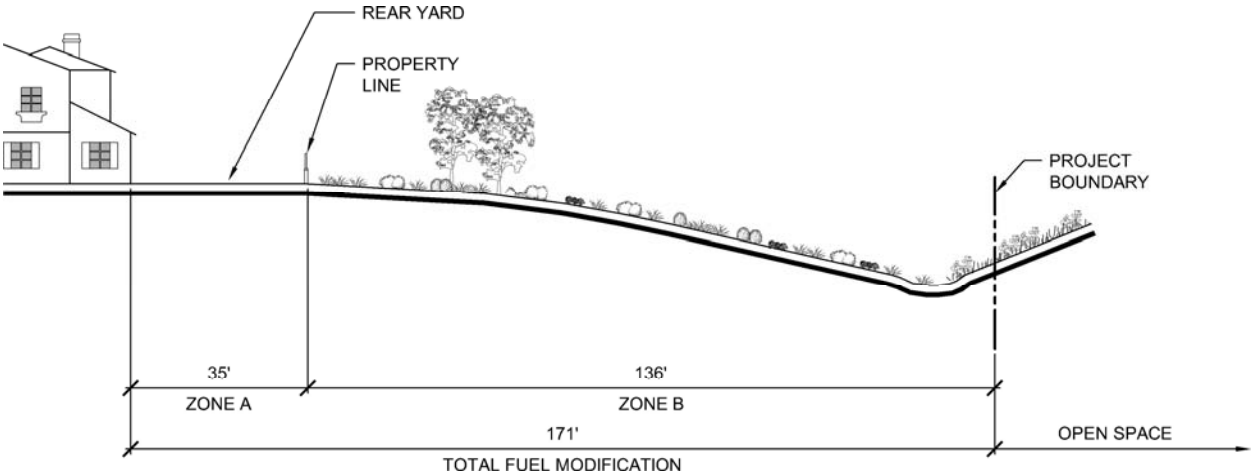
Based on the Behave modeling, the maximum anticipated flame lengths for this site would be 100 foot. This is based on the worst case scenario and extreme weather conditions. This fire occurs in the fall in chaparral with approximately 16 tons per acre, at 6-10' in depth, producing 8,000 BTU/lb of fuel. Model runs were completed using BEHAVE version 3.0.2. Fuel Model 4 - Chaparral. As in the discussion in the previous section weather data was obtained from the RAWS site at Devore.

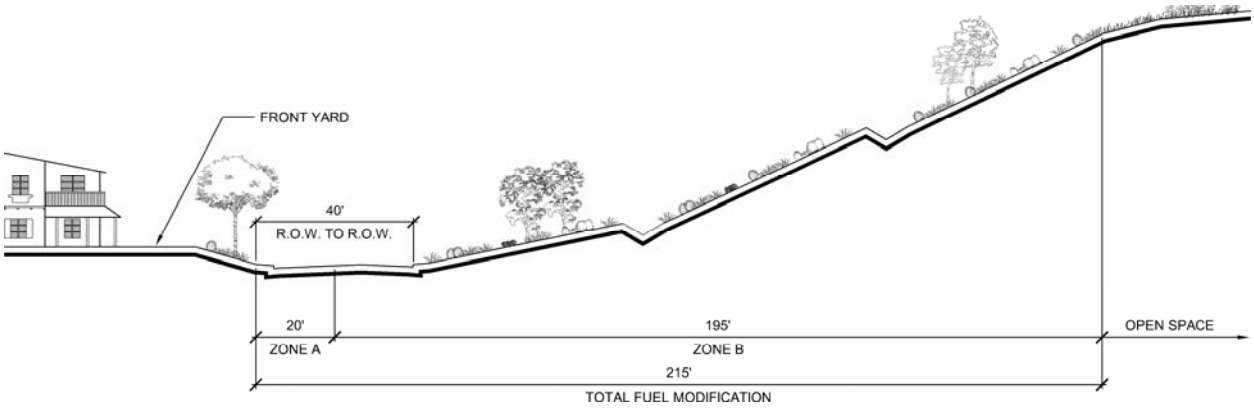
Appendix G
Fuel Modification Zones

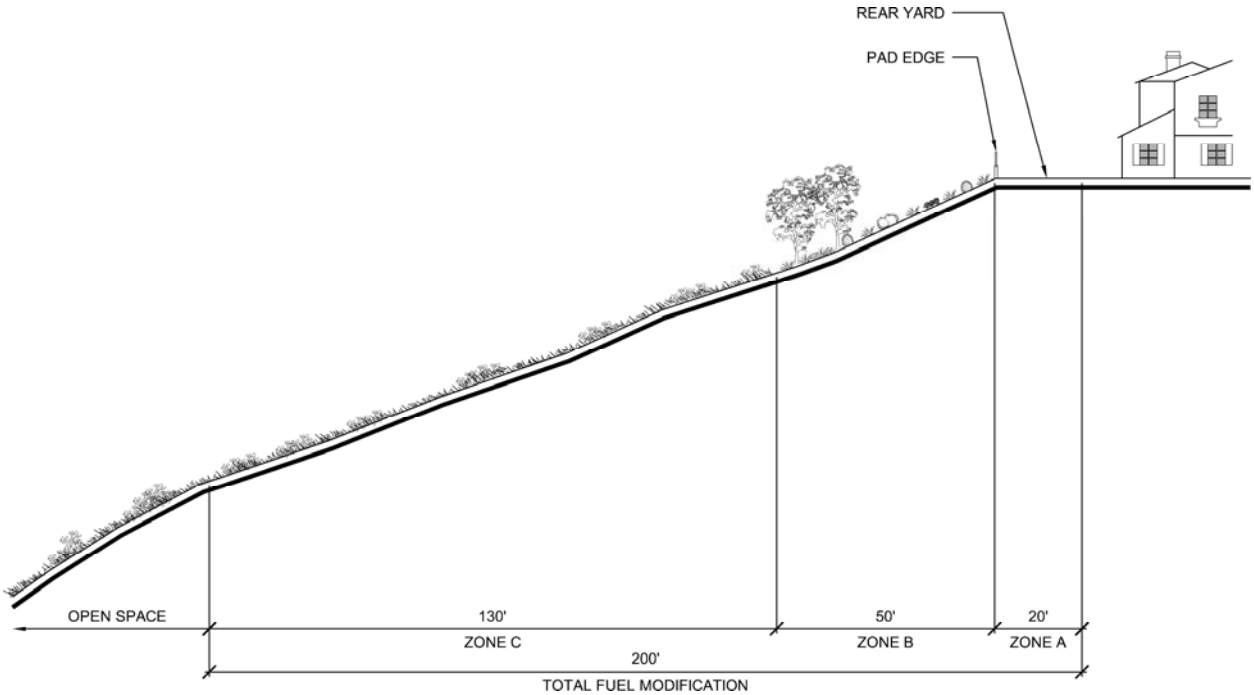





REAR YARD
PAD EDGE
PROPERTY LINE
20'
ZONE A
50'
ZONE B
135'
ZONE C
OPEN SPACE
205'
TOTAL FUEL MODIFICATION

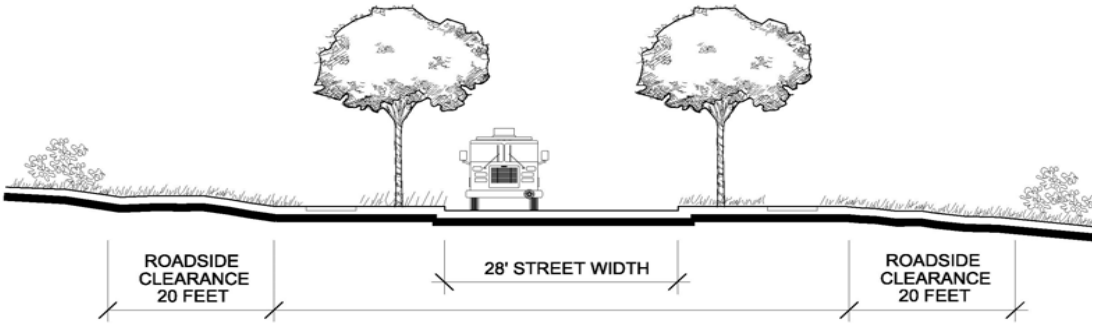

REAR YARD
PROPERTY LINE
PROJECT BOUNDARY
35'
ZONE A
136'
ZONE B
171'
TOTAL FUEL MODIFICATION
OPEN SPACE


FRONT YARD
40'
R.O.W. TO R.O.W.
20'
ZONE A
195'
ZONE B
OPEN SPACE
215'
TOTAL FUEL MODIFICATION

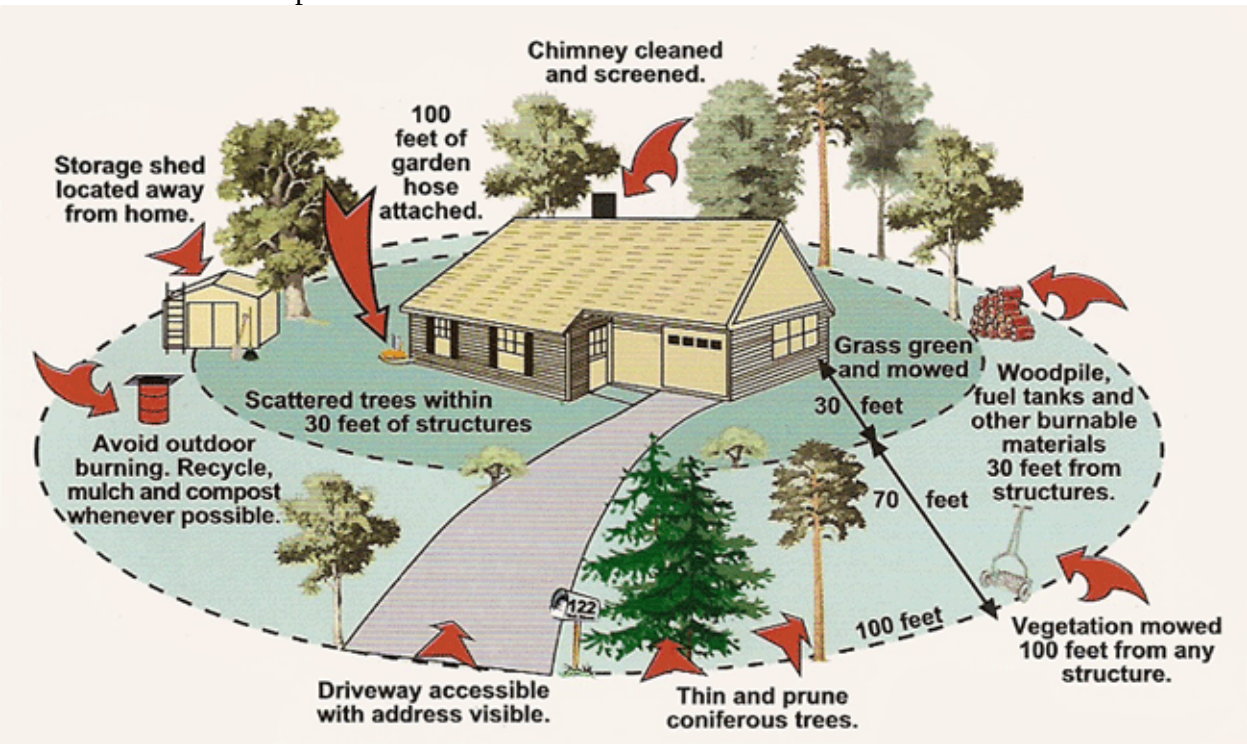

REAR YARD
PAD EDGE
OPEN SPACE
130'
ZONE C
50'
ZONE B
20'
ZONE A
200'
TOTAL FUEL MODIFICATION

Appendix H
Vegetation Management Guidelines

Roadside Clearance Example



Brush Clearance Example



Appendix I

Approved/Undesirable Plant Pallet

FUEL MODIFICATION ZONE APPROVED PLANT LIST

	Code	Botanical Name	Common Name	Plant Form
1.	W	Abelia x grandiflora	Glossy Abelia	Shrub
2.	n	Acacia redolens desert carpet	Desert Carpet	Shrub
3.	o	Acer macrophyllum	Big Leaf Maple	Tree
4.	X	Achillea millefolium	Common Yarrow	Low Shrub
5.	W	Achillea tomentosa	Woolly Yarrow	Low Shrub
6.	X	Aeonium decorum	Aeonium	Ground cover
7.	X	Aeonium simsii	no common name	Ground cover
8.	W	Agave attenuata	Century Plant	Succulent
9.	W	Agave shawii	Shaw's Century Plant	Succulent
10.	N	Agave victoriae-reginae	no common name	Ground Cover
11.	X	Ajuga reptans	Carpet Bugle	Ground Cover
12.	W	Alnus cordata	Italian Alder	Tree
13.	o	Alnus rhombifolia	White Alder	Tree
14.	N	Aloe arborescens	Tree Aloe	Shrub
15.	N	Aloe aristata	no common name	Ground Cover
16.	N	Aloe brevifoli	no common name	Ground Cover
17.	W	Aloe Vera	Medicinal Aloe	Succulent
18.	W	Alogyne huegeii	Blue Hibiscus	Shrub
19.	o	Ambrosia chammissonis	Beach Bur-Sage	Perennial
20.	o	Amorpha fruticosa	Western False Indigobush	Shrub
21.	W	Anigozanthus flavidus	Kangaroo Paw	Perennial/accent

22.	o	Antirrhinum nuttalianum ssp.	no common name	Subshrub
23.	X	Aptenia cordifolia x 'Red Apple'	Red Apple Aptenia	Ground cover
24.	W	Arbutus unedo	Strawberry Tree	Tree
25.	W	Arctostaphylos 'Pacific Mist'	Pacific Mist Manzanita	Ground Cover
26.	W	Arctostaphylos edmundsii	Little Sur Manzanita	Ground Cover
27.	o	Arctostaphylos glandulosa ssp.	Eastwood Manzanita	Shrub
28.	W	Arctostaphylos hookeri 'Monterey Carpet'	Monterey Carpet Manzanita	Low Shrub
29.	N	Arctostaphylos pungens	no common name	Shrub
30.	N	Arctostaphylos refugioensis	Refugio Manzanita	Shrub
31.	W	Arctostaphylos uva-ursi	Bearberry	Ground Cover
32.	W	Arctostaphylos x 'Greensphere'	Greensphere Manzanita	Shrub
33.	N	Artemisia caucasica	Caucasian Artesmisia	Ground Cover
34.	X	Artemisia pycnocephala	Beach Sagewort	Perennial
35.	X	Atriplex canescens	Four-Wing Saltbush	Shrub
36.	X	Atriplex lentiformis ssp. breweri	Brewer Saltbush	Shrub
37.	o	Baccharis emoyi	Emory Baccharis	Shrub
38.	W o	Bacharis pilularis ssp. Consanguinea	Chaparral Bloom	Shrub
39.	X	Baccharis pilularis var. pilularis	Twin Peaks #2'	Ground Cover
40.	o	Baccharis salicifolia	Mulefat	Shrub
41.	N	Baileya Multiradiata	Desert Marigold	Ground Cover
42.	W	Beaucarnea recurvata	Bottle Palm	Shrub/Small Tree
43.	N n	Bougainvillea spectabilis	Bougainvillea	Shrub
44.	N n	Brahea armata	Mexican Blue Palm/Blue Hesper Palm	Palm
45.	N n	Brahea brandegeei	San Jose Hesper Palm	Palm
46.	N n	Brahea edulis	Guadalupe Palm	Palm
47.	o	Brickellia californica	no common name	Subshrub

48.	W o	Bromus carinatus	California Brome	Grass
49.	o	Camissonia cheiranthifiloa	Beach Evening Primrose	Perennial Shrub
50.	N	Carissa macrocarpa	Green Carpet Natal Plum	Ground Cover/Shrub
51.	X	Carpobrotus chilensis	Sea Fig Ice Plant	Ground Cover
52.	W	Ceanothus gloriosus 'Point Reyes'	Point Reyes Ceanothus	Shrub
53.	W	Ceanothus griseus 'Louis Edmunds'	Louis Edmunds Ceanothus	Shrub
54.	W	Ceanothus griseus horizontalis	Yankee Point	Ground Cover
55.	W	Ceanothus griseus var. horizontalis	Carmel Creeper Ceanothus	Shrub
56.	W	Ceanothus griseus var. horizontalis	Yankee Point Ceanothus	Shrub
57.	o	Ceanothus megarcarpus	Big Pod Ceanothus	Shrub
58.	W	Ceanothus prostratus	Squaw Carpet Ceanothus	Shrub
59.	o	Ceanothus spinosus	Green Bark Ceanothus	Shrub
60.	W	Ceanothus verrucosus	Wart-Stem Ceanothus	Shrub
61.	W	Cerastium tomentosum	Snow-in-Summer	Ground cover/Shrub
62.	W	Ceratonia siliqua	Carob	Tree
63.	W	Cercis occidentalis	Western Redbud	Shrub/Tree
64.	X	Chrysanthemum leucanthemum	Oxeye Daisy	Ground Cover
65.	W	Cistus Crispus	no common name	Ground Cover
66.	W	Cistus hybridus	White Rockrose	Shrub
67.	W	Cistus incanus	no common name	Shrub
68.	W	Cistus incanus ssp. Corsicus	no common name	Shrub
69.	W	Cistus salviifolius	Sageleaf Rockrose	Shrub
70.	W	Cistus x purpureus	Orchid Rockrose	Shrub
71.	W	Citrus species	Citrus	Tree
72.	o	Clarkia bottae	Showy Fairwell to Spring	Annual
73.	o	Cneoridium dumosum	Bushrue	Shrub

74.	o	Collinsia heterophyllia	Chinese Houses	Annual
75.	W o	Comarostaphylis diversifolia	Summer Holly	Shrub
76.	N	Convolvulus cneorum	Bush Morning Glory	Shrub
77.	W	Coprosma kirkii	Creeping Coprosma	Ground Cover/Shrub
78.	W	Coprosma pumila	Prostrate Coprosma	Low shrub
79.	o	Coreopsis californica	Califiornia Coreopsis	Annual
80.	W	Coreopsis lanceolata	Coreopsis	Ground Cover
81.	N	Corea pulchella	Australian Fuscia	Ground Cover
82.	W	Cotoneaster buxifolius	no common name	Shrub
83.	W	Cotoneaster congestus 'Likiang'	Likiang Cotoneaster	Ground Cover/Vine
84.	W	Cotoneaster aprneyi	no common name	Shrub
85.	X	Crassula lactea	no common name	Ground Cover
86.	X	Crassula multicava	no common name	Ground Cover
87.	X	Crassula ovata	Jade Tree	Shrub
88.	X	Crassula tetragona	no common name	Ground Cover
89.	W o	Croton californicus	California Croton	Ground Cover
90.	X	Delosperma 'alba'	White trailing Ice Plant	Ground Cover
91.	o	Dendromecon rigida	Bush Poppy	Shrub
92.	o	Dichelostemma capitatum	Blue Dicks	Herb
93.	N	Distinctis buccinatoria	Blood-Red Trumpet Vine	Vine/Climbing vine
94.	N	Dodonaea viscosa	Hopseed Bush	Shrub
95.	X	Drosanthemum floribundum	Rosea Ice Plant	Ground Cover
96.	X	Drosanthemum hispidum	no common name	Ground Cover
97.	X	Drosanthemum speciosus	Dewflower	Ground Cover
98.	o	Dudleya lanceolata	Lance-leaved Dudleya	Succulent
99.	o	Dudleya pulverulenta	Chalk Dudleya	Succulent

100.	W	Elaeagnus pungens	Silverberry	Shrub
101.	o	Encelia californica	California Encelia	Small Shrub
102.	o *	Epilobium canum [Zauschneria californica]	Hoary California Fuschia	Shrub
103.	o	Eriastrum Sapphirinum	Mojave Woolly Star	Annual
104.	N	Eriobotrya japonica	Loquat	Tree
105.	o	Eriodictycon crassifolium	Thick Leaf Yerba Santa	Shrub
106.	o	Eriodictycon trichocalyx	Yerba Santa	Shrub
107.	W o	Eriophyllum confertiflorum	no common name	Shrub
108.	W	Erythrina species	Coral Tree	Tree
109.	N	Escallonia species	Several varieties	Shrub
110.	W o	Eschscholzia californica	California Poppy	Flower
111.	X	Eschscholzia mexicana	Mexican Poppy	Herb
112.	N	Euonymus fortunei	Winter Creeper Euonymus	Ground Cover
113.	N	Feijoa sellowiana	Pineapple Guava	Shrub/Tree
114.	N	Fragaria chiloensis	Wild Strawberry/Sand Strawberry	Ground Cover
115.	o	Frankenia salina	Alkali Heath	Ground Cover
116.	W	Fremontondendron californicum	California Flannelbush	Shrub
117.	X	Gaillardia x grandiflora	Blanketflower	Ground Cover
118.	W	Galvezia speciosa	Bush Snapdragon	Shrub
119.	W	Garrya ellipta	Silktassel	Shrub
120.	X	Gazania hybrids	South African Daisy	Ground Cover
121.	X	Gazania rigens leucolaena	Training Gazania	Ground Cover
122.	o	Gillia capitata	Globe Gilia	Perrenial
123.	W	Gilia leptantha	Showy Gilia	Perrenial
124.	W	Gilia tricolor	Bird’s Eyes	Perrenial
125.	W	Ginkgo biloba	Maidenhair Tree	Tree

126.	o	Gnaphalium californicum	California Everlasting	Annual
127.	W	Grewia occidentalis	Starflower	Shrub
128.	o	Grindelia stricta	Gum Plant	Ground Cover
129.	N n	Hakea suaveolens	Sweet Hakea	Shrub
130.	W	Hardenbergia comptoniana	Lilac Vine	Shrub
131.	N	Heliathemum muutabile	Sunrose	Ground Cover/Shrub
132.	o	Helianthemum scoparium	Rush Rose	Shrub
133.	o	Heliotropium curassavicum	Salt Heliotrope	Ground Cover
134.	X	Helix Canariensis	English Ivy	Ground Cover
135.	W	Hesperaloe parviflora	Red Yucca	Perennial
136.	o n	Heteromeles arbutifolia	Toyon	Shrub
137.	X	Hypericum calycimum	Aaron's Beard	Shrub
138.	N	Iberis sempervirens	Edging Candytuft	Ground Cover
139.	N	Iberis umbellatum	Globe Candytuft	Ground Cover
140.	o	Isocoma menziesii	Coastal Goldenbush	Small Shrub
141.	o	Isomeris arborea	Bladderpod	Shrub
142.	W	Iva hayesiana	Poverty Weed	Ground Cover
143.	N	Juglans californica	California Black Walnut	Tree
144.	o	Juncus acutus	Spiny Rush	Perrenial
145.	o	Keckiella antirrhinoides	Yellow Bush Penstemon	Subshrub
146.	o	Keckiella cordifolia	Heart Leaved Penstemon	Subshrub
147.	o	Keckiella ternata	Blue Stemmed Bush Penstemon	Subshrub
148.	W	Kniphofia uvaria	Red Hot Poker	Perennial
149.	W	Lagerstroemia indica	Crape Myrtle	Tree
150.	W	Lagunaria patersonii	Primrose Tree	Tree
151.	X	Lamprathus aurantiacus	Bush Ice Plant	Ground Cover

152.	X	Lampranthus filicaulis	Redondo Creeper	Ground Cover
153.	X	Lampranthus spectabilis	Trailing Ice Plant	Ground Cover
154.	W	Lantana camara cultivars	Yellow Sage	Shrub
155.	W	Lantana montevidensis	Trailing Lantana	Shrub
156.	o	Lasthenia californica	Dwarf Goldfields	Annual
157.	W	Lavandula dentata	French Lavender	Shrub
158.	W	Leptospermum laevigatum	Australian Tea Tree	Shrub
159.	W	Leucophyllum frutescens	Texas Ranger	Shrub
160.	o	Leymus condensatus	Giant Wild Rye	Large Grass
161.	N	Ligustrum japonicum	Texas privet	Shrub
162.	X	Limonium pectinatum	no common name	Ground Cover
163.	X	Limonium perezii	Sea Lavender	Shrub
164.	W n	Liquidambar styraciflua	American Sweet Gum	Tree
165.	W	Liriodendron tulipfera	Tulip Tree	Tree
166.	X	Lonicera japonica ‘Halliana’	Hall’s Japanese Honeysuckle	Vining Shrub
167.	o	Lonicera subspicata	Wild Honeysuckle	Vining Shrub
168.	X	Lotus corniculatus	Bird’s Foot Trefoil	Ground Cover
169.	o	Lotus hermannii	Northern Woolly Lotus	Perennial
170.	o	Lotus scoparius	Deerweed	Shrub
171.	W	Lupinus arizonicus	Desert Lupine	Annual
172.	W	Lupinus benthamii	Spider Lupine	Annual
173.	o	Lupinus bicolor	Sky Lupine	Flowering annual
174.	o	Lupinus sparsiflorus	Loosely Flowered Annual Lupine/Coulter’s Lupine	Annual
175.	W	Lyonothamnus floribundus ssp. Asplenifolius	Fernleaf Ironwood	Tree
176.	W	Macadamia integrifolia	Macadamia Nut	Tree
177.	W	Mahonia aquifolium ‘Golden Abundance’	Golden Abundance Oregon Grape	Shrub

178.	W	Mahonia nevenii	Nevin Mahonia	Shrub
179.	o	Malacothamnus fasciculatus	Chapparal Mallow	Shrub
180.	X	Malephora luteola	Training Ice Plant	Ground Cover
181.	W	Maytenus boaria	Mayten Tree	Tree
182.	W	Melaleuca nesophila	Pink Melaleuca	Shrub
183.	N	Metrosideros excelsus	New Zealand Christmas Tree	Tree
184.	o *	Mimulus species	Monkeyflower	Flower
185.	o	Mirabilis californica	Wishbone Bush	Perrenial
186.	N	Myoporum debile	no common name	Shrub
187.	W	Myoporum insulare	Boobyalla	Shrub
188.	W	Myoporum parvilfolium	no common name	Ground Cover
189.	W	Myoporum 'Pacificum'	no common name	Ground Cover
190.	o	Nassella (stipa) lepidra	Foothill Needlegrass	Ground Cover
191.	o	Nassella (stipa) pulchra	Purple Needlegrass	Ground Cover
192.	o	Nemophilia menziesii	Baby Blue Eyes	Annual
193.	X	Nerium Oleander	Oleander	Shrub
194.	o	Nolina cismontana	Chapparal Nolina	Shrub
195.	N	Nolina species	Mexican Grasstree	Shrub
196.	W	Oenothera belandieri	Mexican Evening Primrose	Ground Cover
197.	N	Oenothera hookeri	California Evening Primrose	Flower
198.	W	Oenothera speciosa	Show Evening Primrose	Perrenial
199.	X	Ophiopogon japonicus	Mondo Grass	Ground Cover
200.	o *	Opuntia littoralis	Prickly Pear	Cactus
201.	o *	Opuntia oricola	Oracle Cactus	Cactus
202.	o *	Opuntia prolifera	Coast Cholla	Cactus
203.	W	Osmanthus fragrans	Sweet Olive	Shrub

204.	X	Osteospermum fruticosum	Training African Daisy	Ground Cover
205.	X	Parkinsonia aculeata	Mexican Palo Verde	Tree
206.	W	Pelargonium peltatum	Ivy Geranium	Ground Cover
207.	X	Penstemon species	Beard Tongue	Shrub
208.	W	Photinia fraseria	no common name	Shrub
209.	W	Pistacia chinesis	Chinese Pistache	Tree
210.	X	Pittosporum undulatum	Victorian Box	Tree
211.	o	Plantago erecta	California Plantain	Annual
212.	**	Plantago insularis	Woolly Plantain	Annual
213.	X	Plantago sempervirens	Evergreen Plantain	Ground Cover
214.	W	Plantanus racemosa	California Sycamore	Tree
215.	W	Plumbago auritulata	Plumbago Cape	Shrub
216.	o	Popolus fremontii	Western Cottonwood	Tree
217.	X	Portulacaria afra	Elephant's Food	Shrub
218.	o	Potentilla glandulosa	Sticky Cinquefoil	Subshrub
219.	X	Potentilla tabernaemontanii	Spring Cinquefoil	Ground Cover
220.	X	Prunus caroliniana	Carolina Cherry Laurel	Shrub/Tree
221.	o	Prunus ilicifolia ssp. Ilicifolia	Holly Leafed Cherry	Shrub
222.	X	Prunus lyonii	Catalina Cherry	Shrub/Tree
223.	N	Punica granatum	Pomegranate	Shrub/Tree
224.	W	Puya species	Puya	Succulent/Shrub
225.	W	Pyracantha species	Firethorn	Shrub
226.	o	Quercus agrifolia	Coast Live Oak	Tree
227.	o n *	Quercus berberdifolia	California Scrub Oak	Shrub
228.	o n *	Quercus dumosa	Coastal Scrub Oak	Shrub
229.	X	Quercus engelmannii	Engelmann Oak	Tree

230.	X	Quercus suber	Cork Oak	Tree
231.	X	Rhamnus alaternus	Italian Buckthorn	Shrub
232.	o	Rhamnus californica	California Coffee Berry	Shrub
233.	o	Rhamnus crocea	Redberry	Shrub
234.	o	Rhamnus crocea ssp. Ilicifolia	Hollyleaf Redberry	Shrub
235.	N	Rhaphiolepis species	Indian Hawthorne	Shrub
236.	o	Rhus integrifolia	Lemonade Berry	Shrub
237.	N	Rhus lancea	African Sumac	Tree
238.	o n	Rhus ovata	Sugarbush	Shrub
239.	o	Ribes aureum	Golden Currant	Shrub
240.	o	Ribes indecorum	White Flowering Currant	Shrub
241.	o	Ribes speciosum	Fuschia Flowering Goosebberry	Shrub
242.	W	Ribes viburnifolium	Evergreen currant	Shrub
243.	o *	Romneya coulteri	Matilija Poppy	Shrub
244.	X	Romneya coulteri 'White Cloud'	White Cloud Matilija Poppy	Shrub
245.	W n	Rosmarinus officinalis	Rosemary	Shrub
246.	W n	Salvia greggii	Autums Sage	Shrub
247.	W n	Salvia sonomensis	Creeping Sage	Ground Cover
248.	o	Sambucus mexicana	Mexican Elderberry	Tree
249.	W	Santolina chamaecyparissus	Lavender Cotton	Ground Cover
250.	W	Santolina virens	Green Lavender Cotton	Shrub
251.	o	Satureja chandleri	San Miguel Savory	Perennial
252.	o	Scirpis scutus	Hard Stem Bulrush	Perennial
253.	o	Scirpus californicus	California Bulrush	Perennial
254.	X	Sedum acre	Goldmoss Sedum	Ground Cover
255.	X	Sedum album	Green Stonecrop	Ground Cover

256.	X	Sedum confusum	no common name	Ground Cover
257.	X	Sedum lineare	no common name	Ground Cover
258.	X	Sedum x rubrotinctum	Pork and Beans	Ground Cover
259.	X	Senecio serpens	no common name	Ground Cover
260.	o	Sisyrinchium bellum	Blue Eyed Grass	Ground Cover
261.	o	Solanum douglasii	Douglas Nightshade	Shrub
262.	o	Solanum xantii	Purple Nightshade	Perennial
263.	W	Stenicarpus sinuatus	Firewheel Tree	Tree
264.	W	Strelitzia nicolai	Giant Bird of Paradise	Perennial
265.	W	Strelitzia reginae	Bird of Paradise	Perennial
266.	o	Symphoricarpos mollis	Creeping Snowberry	Shrub
267.	W	Tecoma stans (Stenolobium stans)	Yellow Bells	Shrub/Small Tree
268.	X	Tecomaria capensis	Cape Honeysuckle	Ground Cover
269.	N	Teucarium chamedrys	Germander	Ground Cover
270.	N	Thymus serpyllum	Lemon Thyme	Ground Cover
271.	N	Trachelospermum jasminoides	Star Jasmine	Shrub
272.	o	Trichosstems lanatum	Woolly Blue Curls	Shrub
273.	X	Trifolium hirtum ‘Hyron’	Hyron Rose Clover	Ground Cover
274.	X	Trifolium fragerum ‘O’Connor’s’	O’Connor’s Legume	Ground Cover
275.	o	Umbellularia californica	California Laurel	Tree
276.	o	Verbena lasiostachys	Western Vervain	Perennial
277.	N	Verbena peruviana	no common name	Ground Cover
278.	X	Verbena species	Verbena	Ground Cover
279.	X	Vinca minor	Dwarf Periwinkle	Ground Cover
280.	o	Vitis girdiana	Desert Wild Grape	Vine
281.	X	Vulpia myuros ‘Zorro’	Zorro Annual Fescue	Grass

282.	W	Westringia fruticosa	no common name	Shrub
283.	W	Xannithorrhoea species	Grass Tree	Perennial accent/shrub
284.	W	Xylosma congestum	Shiny Xylosma	Shrub
285.	X	Yucca Species	Yucca	Shrub
286.	o	Yucca whipplei	Yucca	Shrub

Legend:

X = Plant species prohibited in wet and dry fuel modification zones adjacent to wildlands. Acceptable on all other fuel modification locations and zones.

W = Plant species appropriate for use in wet fuel modification zones adjacent to wildlands. Acceptable in all other wet and irrigated dry (manufactured slopes) fuel modification locations and zones.

o = Plant species native to local area. Acceptable in all fuel modification wet and dry zones in all locations.

N = Plant species acceptable on a limited basis (maximum 30% of the area) in wet fuel modification zones *adjacent to wild lands*. Acceptable on all other fuel modification zones.

***** = If locally collected.

****** = Not native but can be used in all zones.

n = Plant species acceptable on a limited use basis. Refer to qualification requirements following plant palette.

Approved Plant Palette – Qualification Statements for Select Plant Species

2 Acacia redolens desert carpet: May be used in the upper 1/2 of the "B" fuel modification zone. The plants may be planted at 8-foot on center, maximum spacing in meandering zones not to exceed a mature width of 24 feet or a mature height of 24 inches.

43. Bougainvillea spectabilis (procumbent varieties): Procumbent to mounding varieties may be used in the mid "B" fuel modification zone. The plants may be planted in clusters at 6-foot on center spacing not to exceed eight plants per cluster. Mature spacing between individual plants or clusters shall be 30-foot minimum.

44. Brahea armata: Additional information may be required as directed by the Fire Department.

45. Brahea brandegeel: Additional information may be required as directed by the Fire Department.

46. Brahea edulis: May be used in upper and mid "B" fuel modification zone. The plants shall be used as single specimens with mature spacing between palms of 20-foot minimum.

129. **Hakea suaveolens:** May be used in the mid "B" fuel modification zone. The plants shall be used as single specimens with mature spacing between plants of 30-foot minimum.

136. Heteromeles arbutifolia: May be used in the mid to lower "B" fuel modification zone. The plants may be planted in clusters of up to 3 plants per cluster. Mature spacing between individual plants or clusters shall be 30-foot minimum.

164. Liquidambar styraciflua: May be used in the mid "B" fuel modification zone. The plant shall be used as single specimens with mature spacing between trees and 30-foot minimum.

227. Quercus berberdifolia: Additional information may be required as directed by the Fire Department.

228. Quercus dumosa: May be used in the mid to lower "B" fuel modification zone. The plants may be planted in clusters of up to 3 plants per cluster. Mature spacing between individual plants or clusters shall be 30-foot minimum.

238. Rhus ovata: May be used in the mid to lower "B" fuel modification zone of inland areas only. The plants may be planted in clusters of up to 3 plants per cluster. Mature spacing between individual plants or clusters shall be 30-foot minimum.

245. Rosmarinus officinalis: Additional information may be required as directed by the Fire Department.

246. Salvia greggii: Additional information may be required as directed by the Fire Department.

247. Salvia sonomensis: May be used in the mid to upper "B" fuel modification zone. The plants may be planted in clusters of up to 3 plants per cluster. Mature spacing between individual plants or clusters shall be 15-foot minimum.

UNDESIRABLE PLANT SPECIES (Target Species)

Certain plants are considered to be undesirable in the landscape due to characteristics that make them highly flammable. These characteristics can be either physical or chemical. Physical properties that would contribute to high flammability include large amounts of dead material retained within the plant, rough or peeling bark, and the production of copious amounts of litter. Chemical properties include the presence of volatile substances such as oils, resins, wax, and pitch. Certain native plants are notorious for containing these volatile substances.

Plants with these characteristics shall not be planted in any of the fuel modification zones. Should these species already exist within these areas, they shall be removed because of the potential threat they pose to any structures. They are referred to as target species since their complete removal is a critical part of hazard reduction. These fire-prone plant species are (but not limited to):

FIRE PRONE PLANT SPECIES (MANDATORY REMOVAL)

Native/Invasive Species

Botanical Name	Common Name
Cynara Cardunculus	Artichoke Thistle
Ricinus Communis	Castor Bean Plant
Cirsium Vulgare	Wild Artichoke
Brassica Nigra	Black Mustard
Silybum Marianum	Milk Thistle
Sacsola Austails	Russian Thistle/Tumblewood
Nicotiana Bigelevil	Indian Tobacco
Nicotiana Glauca	Tree Tobacco
Lactuca Serriola	Prickly Lettuce
Conyza Canadensis	Horseweed
Heterothaca Grandiflora	Telegraph Plant
Anthemix Cotula	Mayweed
Urtica Urens	Burning Nettle
Cardaria Draba	Noary Cress, Perennial Peppergrass
Brassica Rapa	Wild Turnip, Yellow Mustard, Field Mustard
Adenostoma Fasciculatum	Chamise
Adenostoma Sparsifolium	Red Shanks
Cortaderia Selloana	Pampas Grass
Artemisia Californica	California Sagebrush
Eriogonum Fasciculatum	Common Buckwheat
Salvia Mellifera	Black Sage

Ornamental:

Botanical Name	Common Name
Cortaderia	Pampas Grass
Cupressus sp	Cypress
Eucalyptus sp	Eucalyptus
Juniperus sp	Juniper
Pinus sp	Pine

Exhibit 1

Fuel Modification Map