

**FOUNTAINGROVE II
WILDLAND / URBAN INTERFACE FIRE THREAT
and
MITIGATION RECOMMENDATIONS**

**Prepared for
The Fountaingrove II Open Space Maintenance Association**

Fountaingrove II Safety Committee/Fire Safety Working Group

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What a wildland fire raging in the hills northeast of Santa Rosa might look like at night

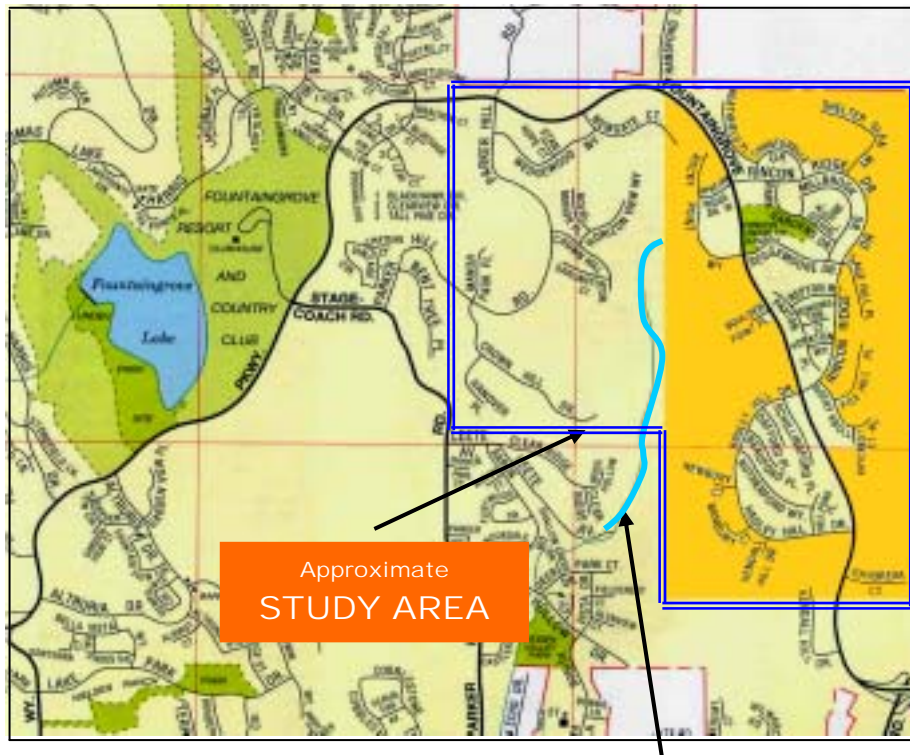
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FOUNTAINGROVE II SUBDIVISION

The **Fountaingrove II Subdivision** lies within the Santa Rosa City Limits. The tentative subdivision map indicates that the subdivision is approximately twelve years old and appears to be reaching build out. Fountaingrove II is divided into three areas: East, West & the Summit, and is adjacent to the Fountaingrove Ranch Subdivision on the west. (This study considered only the East & West areas.) There is adjacent unincorporated county area that contains similar wildland urban interface fire threat. Both Fountaingrove II and Fountaingrove Ranch have concerns regarding the threat of wildfire from the surrounding environment.



Notice the seasonal creek bed.
The arrow denotes the canyon bottom

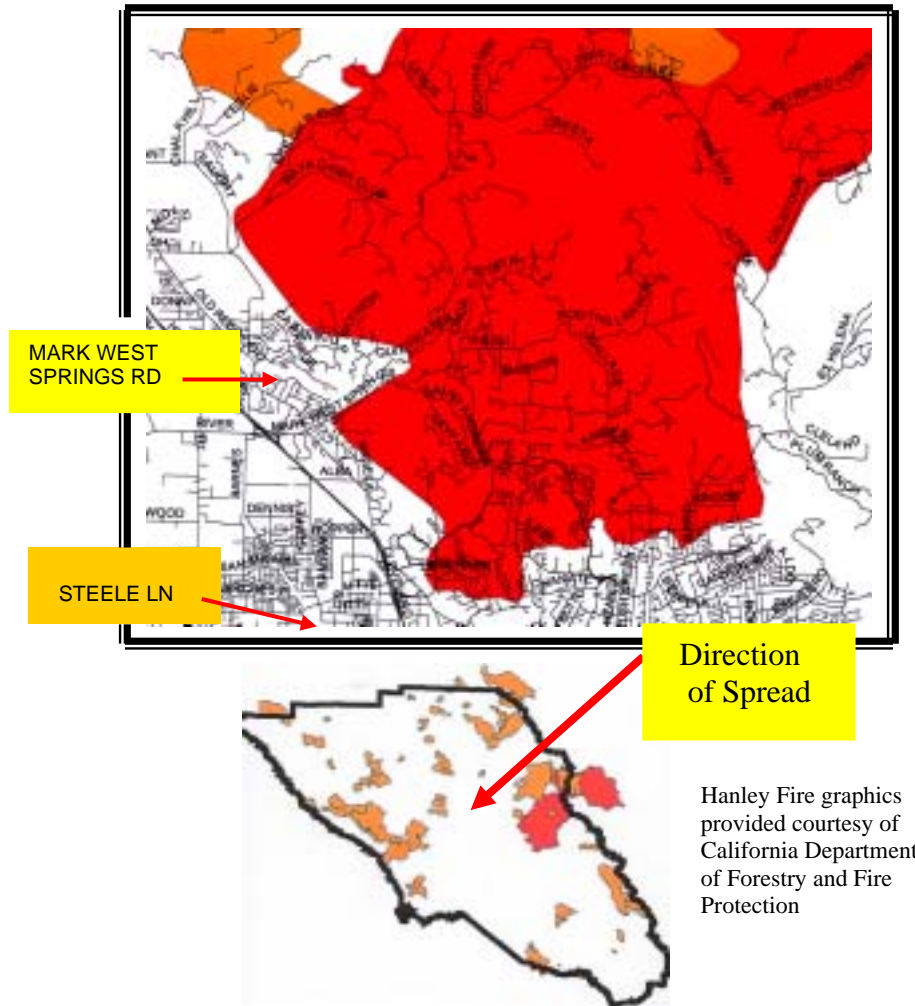
ASSESSMENT & MITIGATION

This document attempts to assess the wildland urban interface fire threat and provide mitigation recommendations based on generally accepted standards and personal experience. A complete study would of necessity include fire behavior modeling utilizing programs such as “Behave” or “Farsite” to forecast specific fire behavior under various fire weather scenarios, GIS plotting, other advanced fire behavior tools, or a combination thereof. The results of a comprehensive study would most likely produce similar results.

FIRE HISTORY

Fire history can be an indicator of future fires and can also define the age and composition of fire fuels in the study area.

HANLEY FIRE SEPTEMBER 19, 1964 55,960 ACRES



In 1964, the Hanley Fire burned 55,960 acres from Calistoga to the Sutter Hospital in Santa Rosa. This fire was probably driven during a Foehn wind event. Often called “Santa Anna Winds,” these north and east winds are strong, hot and dry, and usually occur in late Fall. Historically major fires have probably visited the area on a fifty to one hundred year cycle. Smaller fires occur with greater frequency. However with the impact of human activity, historic fire periodicity cannot be relied upon for future predictions.

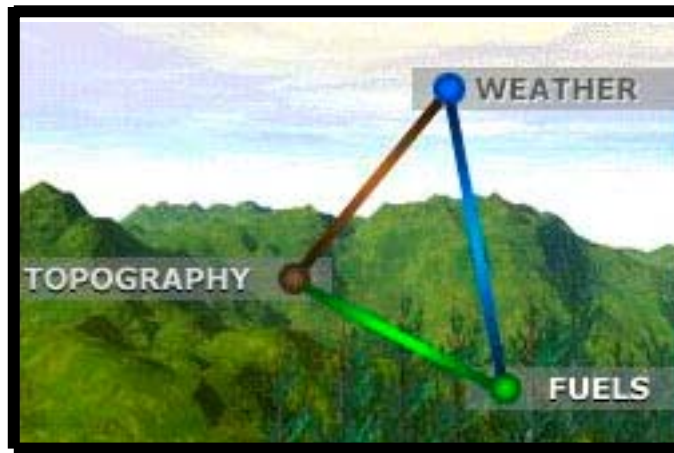
LEGAL

The Fountaingrove II Subdivision is designated as being within a “Very High Fire Hazard Severity Zone,” the designation of which is required by AB 337, the “Bates Bill,” 1994. There may be certain LRA (Local Responsibility Area – incorporated cities) codes and / or regulations relating to the establishment and enforcement of wildland fire threat requirements that are the responsibility of local government to enforce, and the individual citizen’s duty to comply with. (See Appendix “D”) As such, certain extraordinary requirements may apply. Check with the City of Santa Rosa for specific requirements.

The City of Santa Rosa may have adopted additional codes and ordinances such as the California Edition of the Uniform Fire Code by reference, and may have periodically updated incorporated local wording into those codes. Such codes and ordinance may provide certain minimum powers and requirements for wildland urban interface areas. Notwithstanding uniform state or regional codes and ordinances, jurisdictions have the power to adopt more stringent requirements and often do so.

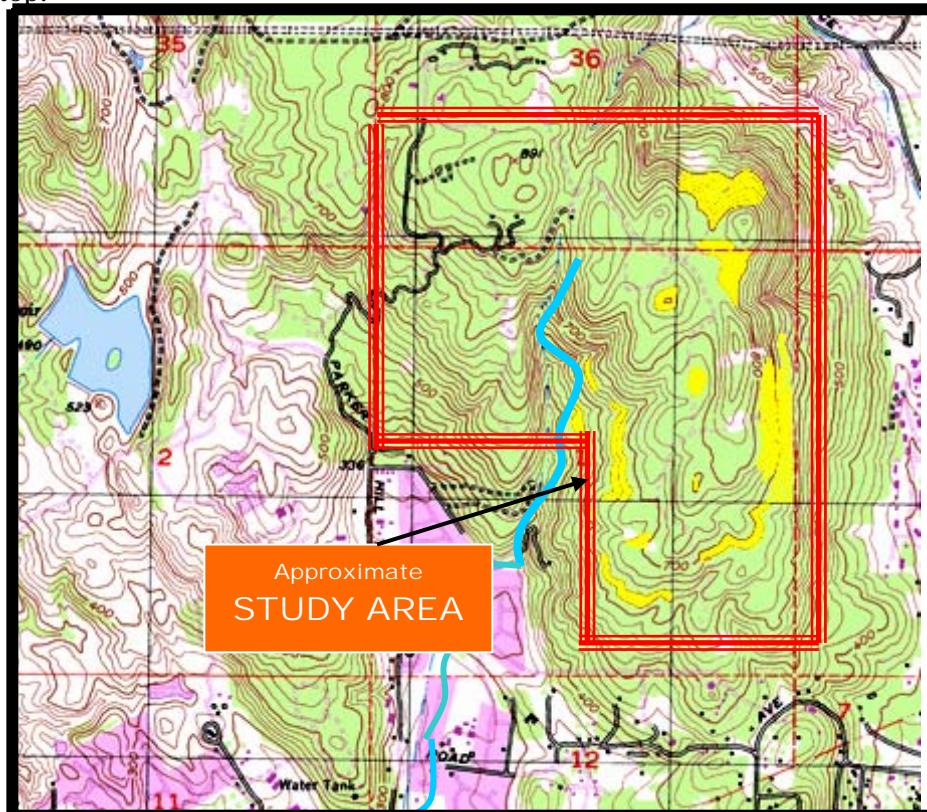
FACTORS INFLUENCING FIRE BEHAVIOR

THE FIRE BEHAVIOR TRIANGLE



Topography

Fountaingrove II is essentially a ridge top subdivision. It is a complex of a main ridge and a number of spur ridges that the planners appear to have taken advantage of to maximize the usable amount of land available for construction and to provide a scenic viewscape to the greatest number of homes. Nearly every home constructed along the perimeter of the subdivision boundary / wildland urban interface zone is sited on a down slope parcel off the edge of the ridge top.



Slope is a major component in the rate of spread in wildland fires. The areas outside and below the subdivision contain steep down slope areas averaging 30% to 50% and greater. A fire will spread twice as fast on a 30% slope than it will on level ground.

“Defensible Space on Slopes – Structures adjacent to slopes over 30% will need additional vegetation management clearances in order to mitigate the radiant and convective heat currents and flame lengths. The slope area should be type converted to drought and fire resistant plantings. A minimum clearance of 100 - 200 feet of defensible space fuel break between the structure and any vegetation is indicated.” A total of 200 feet outside the fence lines is recommended in combination with up to 100 feet rear yard defensible space treatment by the homeowner.



Canyons & Drainages - There are a number of canyons and drainages leading up to the subdivision. Canyons and drainages typically act as “chimneys” during a wildland fire and tend to channel or direct the fire up them.

Aspect* is another topographic feature that influences fire behavior. A large portion of the subdivision located at the head of a large, wide valley that has a south facing aspect ranging southwest to southeast.

Aspect relates to solar radiation and the rate at which the vegetation dries during the “Fire Day.” Fire fuels tend to dry earlier in the year and earlier in day when situated on a southerly aspect. *See effects of aspect on fire fuels under “Fuel.”

Building sites located around the perimeter of Fountaingrove II are situated downslope from the ridge tops. As discussed elsewhere, probably to maximize land use and provide additional scenic viewscapes. Fire planners are aware that homes built on slopes are at greater risk than those built back 30 feet or more from the top edge of a ridge. This must be considered as a negative component in the overall wildland fire hazard assessment equation.

Weather

Sonoma County enjoys a Mediterranean climate, one that has long hot, summers without significant moisture often lasting for seven or eight months. This climate type is ripe for wildland fire.

Prevailing winds are another factor in fire behavior and rate of spread. During the summer months, on-shore westerly winds are prevalent in the afternoons. They can carry marine moisture (fog) inland but it is probably not a significant factor in Fountaingrove.

More importantly the summer afternoon westerlies influence fire spread, particularly on the northwest to southwest facing slopes below Fountaingrove. In the afternoon, the land has heated and we expect upslope, up canyon winds as the air heats.

In the fall of the year, Foehn (Santa Anna) winds that bring hot dry north and easterly off-shore winds, and associated high fire danger in the area may be expected to occur on average during five to fifteen periods usually of two or three days in duration that bring “Red Flag Warnings” for high fire danger. These winds develop due to a high-pressure area over the great basin in Utah and heat as they flow toward a Pacific low over the ocean. Foehn winds further dry already tinder dry fire fuels and often cause catastrophic fires such as those seen recently in Southern California.

Fuel

Vegetation as fire fuel is the third factor in the fire behavior triangle, and the one that we can have influence over. The native plants in our region are adapted to the climate and compensate for the lack of moisture during the dry months in various ways. What we need to understand is that many of those native plants are inevitably “pyrophytic” or “fire” plants. These are plants that tend to high in volatile oils, ignite easily, burn readily.

Structure, arrangement and volume are important features to evaluate in terms of flammability, and modification of fire fuels. Volume of fire fuel in this area can be described as being several tons per acre or more depending on the type being measured. Much of that volume is available to burn.

*Aspect plays a role in the type of fire fuels that might be encountered in various areas of the Fountaingrove Subdivision. For example, on south facing slopes we tend to find lighter flashier fuels ranging from grass to brush. On north facing slopes, slopes that enjoy somewhat greater amounts of moisture and lesser amounts of solar radiation, we typically find heavier fuels including greater concentrations of trees.

Dominant Vegetation Types - We are concerned with four major vegetation types, or “Fuel Models”:

Chaparral - For the purposes of this report is characterized as dense tall brush ranging from four to fifteen feet in height, typically older and in a decadent state. It contains a significant amount of dead material within the crowns and the litter layer on the ground.

Conifer with undergrowth - Conifer, predominantly fir with mixed evergreens such as bay, oak, madrone, heavy brush, fir saplings. The Douglas Fir is an invasive species that in time will crowd out other plant types.

Notice the changes in the vertical arrangement and the horizontal continuity in forest stand structure below. While this example portrays a Ponderosa Pine Forest, note the invasive transition to short needle conifer (Douglas fir?).

The photos below illustrate the exclusion of fire in this environment. The wildland vegetation, both trees and chaparral adjacent to Fountaingrove exhibit the same trends due primarily to fire exclusion.



1909

1948

1989

USDA Forest Service
Gen. Tech. Report
RMRS-G7R-120.2004

Pyrophytic and other Hardwoods - Consists of various oak types, old growth mature bay, immature bay, madrone and other broadleaf species with a heavy understory of brush and ladder fuel arrangement. This lends itself to the construction of shaded fuel breaks once the understory fuels have been removed and trees have been limbed up.

Invasive Species of Plants - Within the study area, we have observed a number of exotic and invasive plants and trees that require aggressive treatment and control. Plants observed include douglas fir, french broom, pampas grass, plants of the thistle family and poison oak. All of these invasive, opportunistic plants enjoy the newly changed environment of sunny grass covered or disturbed soils to establish themselves in. Additionally, the Douglas fir, if not controlled will eventually crowd out other more desirable plants. Douglas fir, if left unattended, will eventually convert the entire area to a heavy douglas fir forest. Douglas fir in its juvenile stages is particularly flammable – a pyrophyte!

FUEL BREAKS

“Fuel breaks are generally constructed to separate communities from native vegetation in order to protect both the developing area and the adjacent wildlands.” Fuels within fuel breaks are reduced in volume through thinning or pruning, or are changed to vegetative types that burn with lower intensity and offer less resistance to fire control efforts.” (Fire Safe Guides for Residential Development in California, California Department of Forestry & Fire Protection, 1993)

The Zone Approach to Constructing Fuel Breaks

This document recommends the use of a zone approach for construction of fuel breaks within the Fountaingrove wildland / urban interface defensible space areas:

Zone I: Should include the utilization of private rear yards as the first stage of vegetation management for defensible space. Containment of rear yard vegetation needs to commence immediately to prevent the planting of inappropriate vegetation and thus compromising the effectiveness of this zone. Rear yards for defensible space are the responsibility of the homeowner.

Zone II: Includes that area extending 100 feet beyond outside of the rear yard fence lines. This zone will be heavily treated to reduce fire fuel volume by 75% or more. This can be accomplished through fuel reduction and/or fuel replacement. Conversion to 90% annual grass is recommended. Exceptions may apply where fuel types preclude conversion to grass.

Zone III: Includes that area extending an additional 100 feet beyond the 100 foot Zone II, to create a full two hundred feet of treated vegetation beyond the private property fence lines.

Established Fuel Breaks: There are currently 23,066 lineal feet X 30' in width, or approximately 15.88 acres of existing well constructed, well maintained fuel breaks in 11 individual segments, extending beyond the rear property/fence lines in the interface zone. They consist of open grass areas and shaded fuel breaks with oak overstory.

In addition the backyards of most homes adjacent to the interface range from 50 feet to 100 feet deep and complement the dedicated fuel breaks to create an effective existing maximum fuel break width ranging from 80 feet to 130 feet.

THIS REPRESENTS A HUGE ASSET IN TERMS OF INDIVIDUAL AND CUMULATIVE DEFENSIBLE SPACE BETWEEN THE HOMES AND THE WILDLAND URBAN INTERFACE!

“If the opportunity to maintain rear yards as a component of the community fuel breaks is lost, then a major opportunity for fire safety will also have been lost.”

The success of the individually maintained rear yard fuel breaks is wholly contingent on each homeowner's responsibly and cooperation in maintaining the area with low volume, well irrigated, well separated fire resistant plants and a very few single specimen ornamental trees.

This cooperation must become an integral element of the overall fire safety plan! It was noted in the review of the various fuel breaks that most homes do not yet have dense fire prone vegetation established in the rear yards. There are a few homes that have several conifers in the rear yards and some with native brush that either was never removed or has re-established it self. **It may be prudent to offer financial incentive for removal.**

The builder(s) appear to have agreed to establish 100 foot, Zone II fuel breaks in open area outside the property lines in their new or under construction areas, FB 13 & FB 14.

BUILDING CONSTRUCTION

All homes appear to be well constructed and in compliance with modern building codes. The exterior surface of the homes is stucco, with double pane windows, probably with low-E reflective qualities; minimal application of rear decks and overhangs, and Class “A” fire resistant roofing.

This type of construction combined with the deep back lots will resist failure due to fire longer than wood exterior construction and is a positive component of overall fire resistance in the interface areas. However, once ignited (in wildland fires, usually through window openings that are first to fail) the structures become part of the fire fuel and can move from structure to structure due to narrow side yards, wind conditions and other factors.

PROPERTY AND BOUNDARY LINES

There appear to be either property or boundary line issues adjacent to some of the OSMA Fuel Breaks that may compromise the construction of the full recommended Fuel Break Zones. Permission to encroach on the property of others or acquisition of an easement for the purposes of constructing the minimum recommended fuel break widths is strongly advised.

GOALS & RECOMMENDATIONS

To reduce the threat of wildfire creating damage to life and property within the Fountaingrove II community through proactive fire fuel reduction, fuel break construction and continuing aggressive annual maintenance.

Short-Term Goals - One Year

- Priority - FB areas based on risk and resources available. It is difficult to prioritize any one “Fuel Break” area over another as each contains individual requirements due to terrain and fuel types, etc.. In all probability, practical and economic forces will sort out a formula for treatment that will in the end benefit every property that is affected.
- HEAVY EMPHASIS ON CONTROL OV INVASIVE SPECIES i.e. Douglas fir seedlings and saplings, French broom, thistles, poison oak, pampas grass. All Douglas fir seedlings and saplings should have a high priority for removal!
- Continue to provide aggressive maintenance of all existing fuel breaks as currently constructed. OSMA is reviewing the present twice-per-year fuel break maintenance with the goal of reducing it to a once-per -year single treatment. Single treatment application with proper timing in late spring to provide cost savings that can be applied to fuel break construction and the future additional maintenance that it will create. Monitor to determine if effective.
- Begin planning to widen fuel breaks to Zone II level.
- Begin widening fuel breaks not later than 2005.

- Develop a “Firewise” community plan, possibly with sanctions, that encourages ALL homeowners with property backing to the wildland urban interface fuel breaks to plan and maintain their rear yards for fire safety. Provide individual training, resources and resource materials as needed.

Islands:

There are four “islands” within the subdivision that have potential to ignite during a wildland fire incident outside the subdivision from flaming brands or so-called spotting. These are just as important as the areas along the perimeter of the subdivision. Were any of these areas to ignite from flaming brands from without, or an accidental fire within, the islands and homes would be at risk and additional firefighting resources might be required, if available.

The two parks sites although undeveloped, are areas of human activity and present an increased risk from a fire perspective.

- P-1. City owned parks – Create a 30-foot fuel break perimeter adjacent to all roads and all private property lines in 2004. Additional requirements apply beyond 2004. See below under specific recommendations.
- P-2. City owned parks – Create a 30-foot fuel break perimeter adjacent to all roads and all private property lines in 2004. Additional requirements apply beyond 2004. See below under specific recommendations.

The two **Common Area Islands** should also be categorized as areas of human activity in terms of greater access and proximity of homes bordering on them.

- FB-2 (Island) Treat similar to City owned parks. See below under specific recommendations.
- FB-9 (Island) Treat similar to City owned parks. See below under specific recommendations.

Building Permits

ALL future building permits issued by the City of Santa Rosa adjacent to the wildland urban interface zones in Fountain Grove II, should require that as a condition of approval, the builder shall construct a minimum 100-foot Zone II fuel break beyond the rear property line of each home a permit is applied for. Consider requesting Zone III 200’ fuel break.

Intermediate Goals & Recommendations - Two to Five Years

- Begin to double the width of all existing fuel breaks from 30 feet to 50 / 60 feet with the goal to complete Zone II; 100' beyond the private property fence lines feet by year five or sooner.

In all probability, practical and economic forces and consultation with your contractor will sort out a formula for treatment and determination of the most cost effective approach. that will in the end benefit every property that is affected.

The expanded fuel break area will require treatment and associated periodic maintenance. No reproduction curve for the regeneration of chaparral and various broad leaf and needle leaf tree species has been determined. Annual inspection will be the best indicator of periodic maintenance needs.

- Emphasize removal all fir saplings, control all invasive species such as broom and pampas grass, etc
- Continue to provide aggressive annual maintenance program of all existing fuel breaks on an “as needed” basis. Annual grasses will require annual attention in late spring just be they are cured. Every treatment area may require differing periods between maintenance treatment.

Long Range Goals & Recommendations – Beyond Five Years

- Create an average perimeter fuel break of 300 feet. Enlarging the fuel break to 300' Zone III, would be a prudent measure, and one that we believe should be a component of your long range planning. Increasing the perimeter fuel break areas FB-2 - FB-14 surrounding Fountaingrove from 200' to 300' feet can increase structural survivability during wildland fire incidents exponentially.



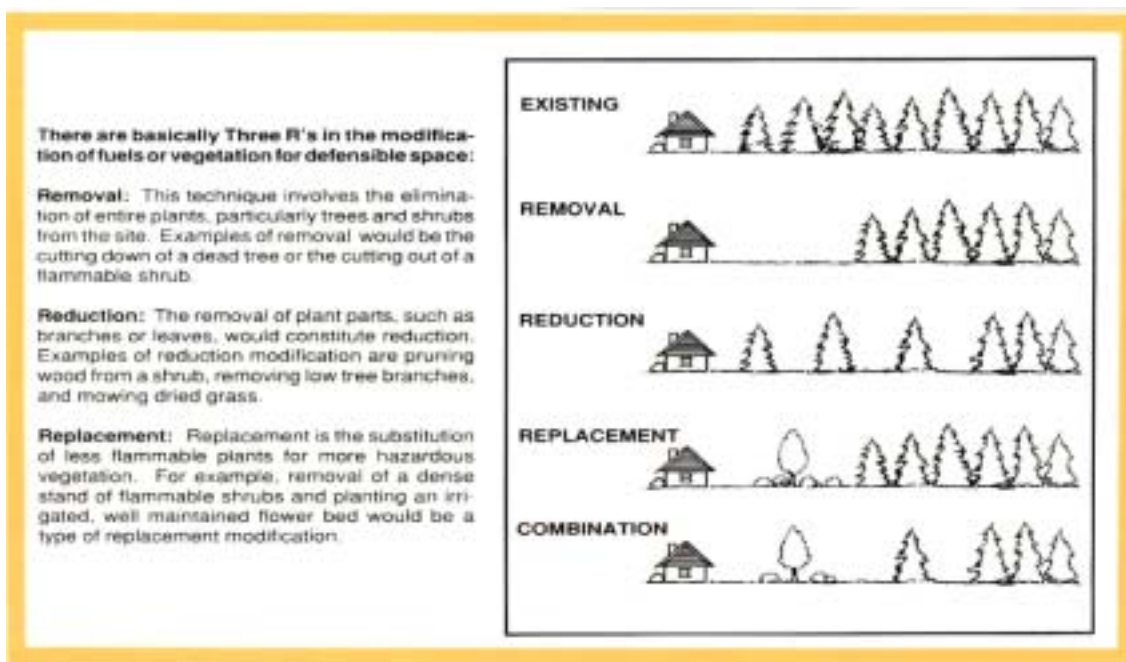
A 300-foot (zones I, II, III) fuel break should be expected provide a reasonable degree of fire safety along the wildland urban interface areas of Fountaingrove II. Wildland fires are unpredictable and there may be rare and extreme incidents where all bets are off.

- Create a 200-foot fuel break, (Zones II & III) outside residential property line boundaries. This zone, from 100' to 200' need not be treated as aggressively. Increasing the treated fuel break width to 200 feet would create an average effective 300-foot fuel break if rear yard cooperation is included.
- Continue to provide aggressive annual maintenance program of all existing fuel breaks.

METHODS OF TREATMENT

This project will require the use of manual labor and power tools such as chain saws, weed eaters and the like. There will be minimal opportunity for use of chippers within the modification areas of this project except at extraordinary cost. There may be an opportunity for the use of light machinery in several areas. Use of this type of equipment would contribute to cost savings.

Various fuel types will require differing techniques of fuel modification. The current methods that have been applied to date appear to follow accepted standards for fuel break construction. It is recommended that these techniques be continued.



FUEL REMOVAL

This involves the elimination of entire plants, something that will be done in the course of modifying the fuel break areas to reduce the fire threat. Removal is necessary for tree crown separation, shrub and brush separation, volume reduction and the creation of shaded fuel breaks.

FUEL REDUCTION

Fuel arrangement – The goal is to disrupt the horizontal continuity and vertical arrangement and density (volume reduction) of fire fuels through thinning, removal, separation, raising crowns, removal of dead wood.

Understory Fuels – Are described as low growing vegetation (herbaceous, brush or reproduction) growing under stands of trees as opposed to overstory fuels that are described as that portion of the trees in a forest which forms the upper or uppermost layer. Understory fuels are also ladder fuels, and are best if totally removed where a shaded fuel break can be constructed. Understory fuels also act as ladder fuels.

Remove all Dead Trees & Brush - within the project area.

Ladder Fuels - Remove ladder fuels from all areas where they influence fire spread.



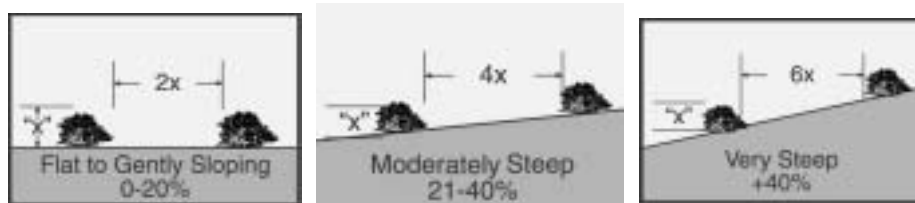
Fuel / Brush Islands – The concept of brush islands is to retain islands of brush not more than twenty feet in diameter, or smaller as the area to be modified dictates. Brush islands may be used when it is difficult to remove cut vegetation from the site, or in some instances, to create a more visually appealing landscape not devoid of vegetation. **Brush islands are not recommended within the 100' Zone II fuel break.** *For the purposes of this document, the 100' zone begins at the rear yard fencelines.*

Mosaic - In outer areas of a WUI such as Fountaingrove is establishing, it is often useful to use a mosaic or checkerboard pattern of fuel removal or modification to disrupt the horizontal continuity of the native vegetation. Brush islands are often employed with this strategy.

Tall Brush / Chaparral (more than four feet high) - should be reduced by 65% or more, removing dead plants first and retaining only healthy plants with adequate crown separation and dead wood removed.

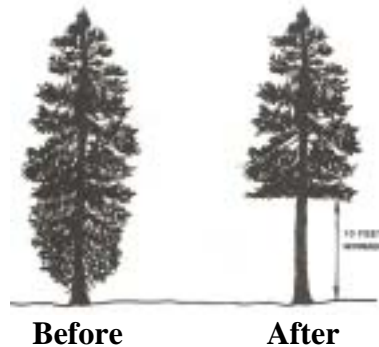
Recommended Separation Distances for Shrubs / Brush / Chaparral	
Slope	Separation
0-20%	2 X Height
21-40%	4 X Height
41% +	6 X Height

Recommended Separation Distances for Shrubs / Brush / Chaparral



When retaining a brush island, a significant reduction in volume and dead material must occur. Selectively thin up to 50% or more if indicated to deny fire fuel and maintain healthy plants. Separation between one brush island and another depends on slope and proximity to valued property. A minimum of twenty feet separation for twenty-foot diameter brush islands on level terrain is required. Slope increase requires additional separation.

Raise Tree Crowns - 15' - 20' in mature conifers. Most mature conifers reaching for sunlight usually contain only dead limbs at these levels. Dead limbs should be removed. A minimum of 8' - 10' for broad leaf and deciduous trees but higher if the slope requires it and the arrangement of the tree allows.



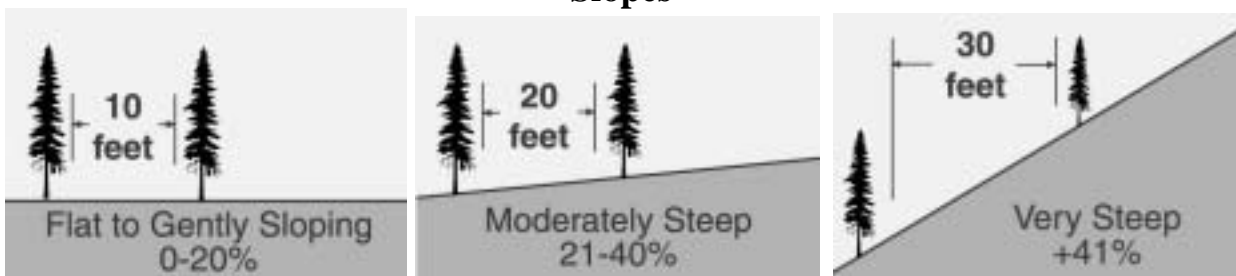
Pruning should remove the live and dead branched a minimum of 10 feet from the ground on level ground. This reduces the probability of surface fires spreading into the crown, particularly when ladder fuels have been removed.

Create Proper Crown Separation – Proper crown separation is required on level ground and slopes. Slope influences both the requirement for raising crowns and crown separation.

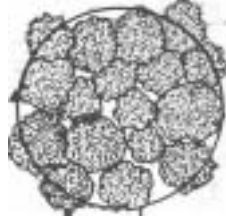
Recommended Separation Distances between Tree Canopies	
Slope	Separation
0-20%	10 feet
21-40%	20 feet
41% +	30 feet

Recommended Crown Separation on Various

Slopes



CROWN DENSITY & SEPARATION



Near Complete Cover



<35% Crown Cover

Stands should be thinned to reduce crown cover to less than 35% and to a minimum of 10 ft between crowns. This greatly reduces the probability of fires spreading laterally from CROWN TO CROWN. (Cultural Practices That Can Reduce Fire Hazards to Homes in the Interior West. Wyman C. Schmidt & Ronald H. Wakamoto. USDA, Forest Service, Intermountain Research Station. Gen. Tech. Report – 251, September 1988.)

Density - Reduction of up to 65% of existing trees in conifer stands in some areas may be appropriate.

Remove Dead Wood & Limbs in live trees.

Avoid Needle Leaf Trees in favor of broad leaf deciduous types

FULL MATURE SIZE! When viewing a plant or tree to be retained or replaced, always look at it with its full mature size in mind. Treat the surrounding vegetation accordingly to what will be required for crown separation, etc., when the plant in mind reaches its full mature size.

Remove Every Tree up to 6" Diameter at Breast Height - *Forecast the future forest density, the point at which trees reach full mature size. If crowding or loss of adequate separation will occur at maturity remove the trees now while cost is low!* Trees that are part of shaded fuel breaks or are individual trees with good crown separation need not be included within the spirit of this rule. This may apply to some oak types.

FUEL REPLACEMENT

The method used to construct a large portion of the existing 30' fuel breaks has employed the technique of removal and replacement. Whatever native vegetation that formerly existed has been replaced with annual grasses. The replacement vegetation is easy to maintain with once-a-year mowing/whipping, and provides virtually no fuels to feed a wildland fire.

This method of treatment could easily be extended to the outer boundary of the 100' zone. It would not necessitate total removal of all existing shrubs and trees, but would provide a very effective and adequate fuel break.

Heritage Trees – The City of Santa Rosa requires a permit for removal of most trees identified as “Heritage Trees” with a diameter at breast height of 4” or greater. This requirement is in conflict with recommendations contained within this report. Approval must be obtained from the city for removal of these trees, many of which will be light deprived, stunted, and unhealthy. See Appendix “C” for City of Santa Rosa Heritage Tree requirements.

Single Ornamental Specimen Trees – Single ornamental specimen trees are permitted within residential landscaping areas that are required to maintain defensible space perimeters. A single ornamental specimen tree is one that will have no adjacent trees or structures within twenty feet of its crown at full mature growth. This requirement should be applied to ALL rear yards within Fountaingrove II.

Concerns -

- Fir seedling and sapling proliferation.
- Areas designated as “Sensitive Plant Areas.” In particular, manzanita and ceonothus have been identified as sensitive plants.
- Potential for exotic weed species invasion due to disturbed soil, warmer ground temperatures and additional sunlight. For the purposes of this report, Douglas Fir s seedlings and saplings should be included as an invasive plant and regeneration should be discouraged. Other invasive species observed are French Broom., pampas grass, thistles and poison oak.
- Sudden Oak Death - SOD

Control of Invasive Species - Such as fir, broom, acacia, pampas grass, thistle, poison oak, etc. Fir and other conifer seedlings and saplings should be removed annually to prevent them from reaching adolescence let alone adulthood (full mature size) while they are inexpensive or cost free to remove and will not contribute to the fire fuel loading.

Cut Annual or Perennial Grasses - To 3” or less when cured and maintain throughout summer fire season.

Emergency Apparatus Clear Zone - Vegetation shall be cleared a minimum of 10’ on either side (beyond the useful road surface) of every road or driveway and 14 feet in height within the project area.

Erosion – The potential for erosion is a consideration when modifying fuel on Slopes. In project areas where root systems are disturbed, repair is required to mitigate future erosion.

DISPOSAL OF CUT VEGETATIVE MATERIAL.

The removal of cut vegetation presents the greatest impediment to constructing fuel breaks and fire fuel reduction work. Cost of removal in most areas of this project is prohibitive and it consumes limited dollars that could be used for actual fire fuel reduction and fuel break construction.

There are few options, each with varying costs, limitations and benefits.

1. Chip on site where possible and broadcast chips on ground.
2. Use of light tractor to pull chipper adjacent to work site where access and slope allow. There are a number of easements that might be used for this purpose. Chip and broadcast on ground.
3. Removal to a chipping site. Use chips for mulch in local planting strips, parks, etc
4. Remove to staging area and haul to landfill.
5. Reduce cut volume and mulch on site.* See Appendix A.
“*MULCHING/COMPOSTING AS A POSSIBLE SOLUTION*“ below.

ANNUAL MAINTENANCE

All the vegetation management in the world is of no use if aggressive annual maintenance is not conducted!

Annual maintenance need not include the entire area that has been modified or converted into fuel break. Many treated fuel break areas may only require attention periodically depending on the fuel type involved as regrowth is usually a slow process that should be monitored for need. The same holds true with shaded fuel breaks. **Treated brush areas and shaded fuel breaks should be inspected as each year’s annual maintenance plan is being formulated and maintained as the need indicates.**

Invasive species such as fir seedlings and saplings, broom, acacia, pampas grass, thistles and poison oak **require annual removal** to control spread

OSMA currently conducts two maintenance rounds per season and is considering one well-timed maintenance round that may be as effective and reduce maintenance costs. As the size of the annual maintenance load increases, a single annual treatment will become an even greater consideration.

FIRE SAFETY PLAN

- A fire safety plan is required.
- It should include a reliable method of communication on site at all times with a list of any additional emergency numbers other than 9-1-1.
- Proper use of gasoline driven tools including storage of gasoline and safe refueling of hot engines including a minimum 10 - BC rated fire extinguisher and at least two shovels at each refueling location.
- Hot engines can ignite during fueling. Engines should be allowed to cool before refueling.
- All engines, whether small saws, weed eaters, or chippers operating along the fuel breaks shall, as required by state law, be equipped with approved spark arrestors.
- Crews should be reminded that sparks from power tools can and have ignited fire fuel that is in the process of being removed.
- Restriction of work during high fire danger days, or average days with high temperatures and winds, particularly after 12:00 Noon. OSMA may wish to establish specific restrictions in consultation with the Santa Rosa Fire Department or CDF.

SELECTION OF EXPERIENCED CONTRACTORS

To conduct the actual modification of the vegetation will not be discussed within this report as the Fountaingrove II OSMA has defined their requirements elsewhere.

FB-2 West Side Sage Hill Place / Fox Hill Place (Island)

SLOPE: 30 / 40%

ASPECT: WEST

TOPOGRAPHIC FEATURES No specific features noted.

FUEL: Fir, bay, Manzanita, tall brush 10'+

FUEL BREAK LENGTH: 630'

BOUNDARY LINE CONFLICT: Y

COMMENTS:

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

- YEAR 1 –
- Treat similar to city owned parks. Focus on upslope side
 - Enlarge fuel break to 30' each side adjacent to private property lines. This is an action item for 2004.
 - Urgent attention to removal of fir seedlings and saplings throughout island or a fir forest will soon develop. Attention also to the proliferation of French broom.
 - Create a 30 foot fuel break perimeter upslope from Rincon Ridge Drive, adjacent to all roads and all private structures.

- **Begin planning for expanded width of Zone II fuel break to 100 feet.**

YEARS 2 –5

- Reduce fuel volume by 50%.
- Enlarge fuel breaks to 50 feet.
- Focus on fir sapling and seedling removal to 100' ASAP
- Continue aggressive removal of all fir saplings, control other invasive species such as broom and pampas grass, thistles, poison oak.
- Continue annual maintenance as necessary.

FB-3 East Side Sage Hill Place and Fox Hill Place

SLOPE: 30 /
40%

ASPECT: EAST

TOPOGRAPHIC FEATURES: No specific features noted.

FUEL: Heavy chaparral – 10' in height! Ladder fuels, fir seedlings

FUEL BREAK LENGTH: 2890 North – south orientation

BOUNDARY LINE CONFLICT: N

COMMENTS: Some rear yards adjacent to this fuel break contain significant amounts of manzanita. This should be reduced and maintained. Difficult access for fuel break maintenance except near point of entry.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

- YEAR 1 -
- Maintain 30' existing fuel break.
 - Attention to invasive plants, fir seedlings & saplings, thistles, poison oak.

Begin planning for expanded width of Zone II fuel break to 100 feet.

- Work with neighbors who have significant amounts of Manzanita / pyrophytic native plants in rear yards to remove as part of overall fuel break system
- Ladder fuels
- Raise crowns
- Remove fir seedlings / saplings

- YEARS 2 –5
- Begin extending Zone II fuel break width out to 100'.
 - Consider shaded break within this break
 - Focus on fir sapling and seedling removal to 100' ASAP!
 - Attention to invasive plants
 - Ladder fuels
 - Dead wood
 - Raise limbs
 - Crown separation
 - Raise crowns

FB-4 East side of Rincon Ridge Drive and Shelter Glen Way.

SLOPE: 35-45%

ASPECT: EAST NORTHEAST TO SOUTHEAST – AVERAGE ASPECT = EAST

TOPOGRAPHIC FEATURES No specific features noted.

FUEL: Oak, Bay, Fir, Fir saplings, somewhat shaded break.

FEL BREAK LENGTH: 2640

BOUNDARY LINE CONFLICT: Y

COMMENTS: No work done in this area yet. Disposal an issue

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

YEAR 1 - • Establish and/or maintain 30' fuel break

Begin planning for expanded width of Zone II fuel break to 100 feet.

- Ladder fuels
- Raising crowns
- Remove fir seedlings / saplings
- Invasive species
- Seek approval to encroach on open lands outside subdivision boundaries.
(THIS IS CRITICAL)

YEARS 2 –5 • Begin extending Zone II fuel break width out to 100'.
• Consider shaded break within this break
• Focus on fir sapling and seedling removal to 100' ASAP!
• Ladder fuels
• Invasive species
• Dead wood
• Raise limbs
• Crown separation
• Raise crowns

FB-5 East of Heathfield Place, South of Chanterelle Circle - ISLAND

SLOPE: 35-45%

ASPECT: NORTH NORTHWEST TO NORTHEAST,, AVERAGE = NORTH

TOPOGRAPHIC FEATURES: Narrow North / South steep canyon

FUEL: Oak, some fir, madrone. Shaded fuel break at head of canyon near homes

FEUL BREAK LENGTH: 1420

BOUNDARY LINE CONFLICT: Y

COMMENTS: Shaded break at head of canyon near homes.
Requires greater crown separation.
There are few structure exposures.
Good access for fuel break maintenance.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

YEAR 1 -

- Maintain 30' existing fuel break
- Remove fir seedlings and saplings
- Invasive species

• **Begin planning for expanded width of Zone II fuel break to 100 feet.**

YEARS 2 –5

- Begin extending Zone II fuel break width out to 100'.
- Consider shaded break within this break
- Upper end of canyon
- Greater crown separation
- Raising crowns
- Invasive species
- Remove fir seedlings / saplings
- Seek approval to encroach on open lands outside subdivision boundaries.
(THIS IS CRITICAL)
- Ladder fuels
- Dead wood
- Raise limbs

FB-6 Parcel L / West of Rocky Point Way.

SLOPE: 35%

ASPECT: SOUTH

TOPOGRAPHIC FEATURES Deep SE / NW canyon

FUEL: Bay, oak, manzanita, chaparral 10;+

FEL BREAL LENGTH: 845'

BOUNDARY LINE CONFLICT:

COMMENTS: A fuel break must be established / maintained along North end non-OSMA property. Difficult access for fuel break maintenance.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

- YEAR 1 -
- Maintain 30' existing fuel break
 - Remove fir seedlings and saplings
 - Invasive species

 - Determine rear property line to base beginning of OSMA Zone II fuel break construction point

 - **Begin planning for expanded width of Zone II fuel break to 100 feet.**
- YEARS 2 –5
- Begin extending Zone II fuel break width out to 100'.
 - Crown separation
 - Raising crowns
 - Remove fir seedlings / saplings
 - Invasive species
 - Ladder fuels
 - Dead wood
 - Raise limbs

FB-7 Around Boulder Point Place (open space area) South of Rocky Point

SLOPE: 30-40%

ASPECT: SOUTH

TOPOGRAPHIC FEATURES No specific features noted.

FUEL: Bay, oak, chemise, fir, chaparral 10'+

FUEL BREAL LENGTH: 1745'

BOUNDARY LINE CONFLICT: Y

COMMENTS: Difficult access for fuel break maintenance.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

- YEAR 1 -
- Fuel break looks good
 - Maintain 30' existing fuel break
 - Remove fir seedlings / saplings
 - Invasive species

- YEARS 2 –5
- **Begin planning for expanded width of Zone II fuel break to 100 feet.**
 - Possible shaded breaks

- Southwest side:
- Begin extending Zone II fuel break width out to 100'.
 - Crown separation
 - Raising crowns
 - Invasive species
 - Remove fir seedlings / saplings
 - Ladder fuels
 - Dead wood
 - Raise limbs

- Southeast side:
- Determine rear property line to base beginning of OSMA Zone II fuel break construction point
 - Begin extending Zone II fuel break width out to 100'.
 - Crown separation
 - Raising crowns • Raise limbs
 - Remove fir seedlings / saplings
 - Invasive species
 - Ladder fuels
 - Dead wood

FB-8 North & West of Hadley Hill Dr. from FG Parkway, South to 3720 Hadley Hill Dr.

SLOPE: 25-35%

ASPECT: SOUTHWEST

TOPOGRAPHIC FEATURES: North / South canyon

FUEL: Heavier fuels w/ fir trees, dead wood, fir saplings, ladder fuels. Heavy fir forest below, high potential to carry fire

FUEL BREAK LENGTH: 630'

BOUNDARY LINE CONFLICT:

COMMENTS: Deep rear yards. Heavy fir forest in canyon below – high potential.
Good access for fuel break maintenance.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

- YEAR 1 -
- Maintain 30' existing fuel break
 - Remove fir seedlings / saplings
 - Invasive species
 - Understory & ladder fuels
 - Focus on fir sapling and seedling removal to 100' ASAP!
- **Begin planning for expanded width of Zone II fuel break to 100 feet.**
- YEARS 2 –5
- Begin pushing fuel break width out to 100'.
 - Possible shaded break
 - Focus on fir sapling and seedling removal to 100' ASAP!
 - Invasive species
 - Concentrate on lighter fuels first
 - Ladder fuels
 - Dead wood

FB-9 Vistara Interior (Island surrounded by homes) Shillingford, Dafford, Beauford Helford Places / Rutherford Way

SLOPE: 25%

ASPECT: SOUTHWEST

TOPOGRAPHIC FEATURES: No specific features noted.

FUEL: Fir, oak, Manzanita, chaparral

FUEL BREAK LENGTH: 1,600'

BOUNDARY LINE
CONFLICT:

COMMENTS: Good access for fuel break maintenance.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

- YEAR 1 -
- Maintain 30' existing fuel break
 - **Begin planning for expanded width of Zone II fuel break to 100 feet.**
 - Treatment similar to City owned parks. Maintain and/or create 30-foot fuel break perimeter down slope, adjacent to all roads and all private property lines.
 - LOWER SIDE REQUIRES 30-FOOT BREAK IN 1st YEAR! This is an action item for 2004.
 - Raise tree crowns on mature trees.
 - Remove dead wood /dead limbs
 - Focus on fir sapling and seedling removal throughout area ASAP!
 - Control invasive species

YEARS 2 –5

- Add 30' – 50' perimeter fuel break zone with less intense fuel reduction.
- Remove dead wood, ladder fuels
- Expand crown separation.
- Control invasive species
- Reduce total fuel volume in remaining vegetation by 50%.
- Remove all fir saplings; control other invasive species such as broom and pampas grass. Continue aggressive annual maintenance as necessary.

FB-10 East of Newbury Court (cul-de-sac) & Banbury Court (cul-de-sac)

SLOPE: 20%

ASPECT: WEST

TOPOGRAPHIC FEATURES Deep north / south canyon

FUEL: Mature fir & bay
Some shaded break with little ground fuel
Heavy fir forest in canyon below fuel break zones

FUEL BREAK LENGTH: 1,467

BOUNDARY LINE CONFLICT: Y

COMMENTS: Clear full width of open space between Newbury and Banbury lots off Hadley Hill. Rear yards not quite so deep.
Good access for fuel break maintenance.

Trees in access corridor between homes O.K. if dead limbs removed 15' above ground.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

YEAR 1 - Maintain 30' existing fuel break

Begin planning process to expand width of Zone II fuel break to 100 feet.

- Raise bay tree crowns 10'+
- Break crown to crown continuity – separation / conifers
- Cut stems may be embedded in ground to decompose
- Remove dead wood and limbs
- Remove all fir saplings
- Control invasive species
- TREAT Minimum 50' outside fence line

YEARS 2 –5

- Begin expansion of Zone II fuel break to 100'
- Remove dead wood, ladder fuels
- Control invasive species
- Expand crown separation.
- Raise crowns
- Remove all fir saplings; control other invasive species such as broom and pampas grass, thistle, poison oak.
- Continue aggressive annual maintenance.

**FB-11 West Side Parker Hill Rd., South of FG Parkway to 3903
Parker Hill Rd., Parcel N.**

SLOPE: 50%

ASPECT: WEST

TOPOGRAPHIC FEATURES Big North / South canyon / chimney / steep slopes.

FUEL: Fir, Oak, Manzanita, chaparral.

FUEL BREAK LENGTH: 1,670'

BOUNDARY LINE CONFLICT: Y BOUNDARY LINE CONFLICT:

COMMENTS: This is a joint project between Fountaingrove II and neighboring subdivision. There are two separate parcels involved that are owned by OSMA, adjacent subdivision and Santa Rosa City parks.

YEAR 1 - Maintain 30' existing fuel break

- Work to widen OSMA Zone II fuel break to an average of 100' or to the boundary line will be completed in the spring of 2004.
- Reduce total fuel volume in remaining vegetation by 50%
- Provide aggressive annual maintenance by June 30 each year.
(see Santa Rosa City Park - P-2 below for additional requirements)
- Dead Trees – widow makers
- Raise bay tree crowns 10'+
- Break crown to crown continuity – separation / conifers
Cut stems may be embedded in ground to decompose
- Remove dead wood and limbs
- Remove all fir saplings
- Control invasive species

YEARS 2 –5

- Provide cooperative maintenance of this fuel break with adjacent subdivision on an “as needed” basis.
- Control invasive species
- Continue aggressive annual maintenance on an “as needed” basis.

FB-12 Parcel V. West side of Parker Hill Road adjacent to private drive and City owned park site P-s, and Manor Park Place.

SLOPE: 20%

ASPECT: West

TOPOGRAPHIC FEATURES: No specific features noted

FUEL: Fir, oak, manzanita, chaparral

FUEL BREAK LENGTH: 800'

BOUNDARY LINE
CONFLICT:

COMMENTS: This is a joint project between Fountaingrove II and neighboring subdivision. There are four separate parcels involved that are owned by OSMA, adjacent subdivision and Santa Rosa City parks. Good access for fuel break maintenance.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

YEAR 1 – Maintain existing 30' fuel break.

- Work to widen OSMA Zone II fuel break to an average of 100' or to the boundary line will be completed in the spring of 2004.
- City Park P-2, requires an immediate 30-foot fuel break constructed adjacent to all roads and private property lines.
 - Reduce total fuel volume in remaining vegetation by 50%
 - Provide aggressive annual maintenance by June 30 each year.
 - See P-2 below for additional requirements.
- Break crown to crown continuity emphasizing separation. Particular attention to conifers.
- Cut stems may be embedded in ground to decompose.
- Remove dead wood and dead limbs.
- Control invasive species.

YEARS 2 –5

- Provide cooperative maintenance with adjacent subdivision and City of Santa Rosa on an “as needed” basis.
- Control invasive species.
- Continue Aggressive annual maintenance on an “as needed” basis.

FB-13 Parcel "L" not yet accepted by OSMA – 100' fuel break agreed to by Christopherson Homes

SLOPE: 30%

ASPECT: SOUTHEAST

TOPOGRAPHIC FEATURES Deep West side North / South canyon.

FUEL: Oak, manzanita, fir, madrone, chaparral 10'+
Invasive species Particularly French broom needs 1sy year attention

FUEL BREAK LENGTH: 2790'

BOUNDARY LINE CONFLICT: Check

COMMENTS: Not yet accepted by OSMA – 100' fuel break agreed to by Christopherson Homes.
Difficult access for fuel break maintenance.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

YEAR 1 -
• Christopherson Homes installs 100' fuel break
• Special attention to proliferation of french broom

YEARS 2 –5
• Consider need to extend fuel break to Zone III
• Remove all fir saplings; control other invasive species such as broom and pampas grass, thistle, poison oak.
• Continue aggressive annual maintenance as necessary.

FB-14 Parcel “K” within Crown Hill Drive Circle not yet accepted by OSMA – 100’ fuel break agreed to by Christopherson Homes.

SLOPE: 30%

ASPECT: WEST/SOUTHWEST

TOPOGRAPHIC FEATURES

FUEL:

FUEL BREAK LENGTH: N/A

BOUNDARY LINE CONFLICT N

COMMENTS: • Minimum 100’ fuel break is critical for this area
• Represents large “island” of native vegetation
• Shallow rear yards

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

YEAR 1 - • Christopherson Homes installs 100’ fuel break
• BROOM IS “BIG PROBLEM!”

YEARS 2 –5 • Consider need to extend fuel break to Zone III
• Remove all fir saplings; control other invasive species such as broom and pampas grass, thistle, poison oak.
• Continue aggressive annual maintenance as necessary.

P1 – Rincon Ridge Park - City of Santa Rosa Owned Park

SLOPE:

ASPECT:

TOPOGRAPHIC FEATURES

FUEL: Heavy chaparral 10'+ fir, manzanita – NO MAINTENANCE

FUEL BREAK LENGTH: N/A

BOUNDARY LINE CONFLICT:

COMMENTS: THIS IS CITY-OWNER PROPERTY AND CITY SHOULD BE RESPONSIBLE FOR VEGETATION MANAGEMENT FOR FIRE SAFETY ON ITS PROPERTY

One half of this parcel is acceptable with maintenance, **one half requires full attention in year one.**

Park may contain sensitive plant areas that contain Rincon Ridge Manzanita and Rincon Ridge Ceonothus. Care should be exercised to protect these assets while still providing adequate interface fire protection. Selective thinning can protect plants at risk.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

YEAR 1 -

- Some homes at risk – no fuel break on city owned land - immediate attention required!
- Create a 30-foot fuel break perimeter adjacent to all roads and all private property lines..
- Reduce total fuel volume in remaining vegetation by 50%.
- Control and remove invasive species, French broom, fir seedlings and saplings, thistles, poison oak
- Provide aggressive annual maintenance by June 30 each year.

YEARS 2 –5

- Continue to enlarge perimeter fuel break to 50'. 100' is required where park interfaces with private property lines.
- Continue to reduce fuel volume to a minimum of 65% of original volume
- Provide annual control and removal of invasive species such as french broom, fir seedlings and saplings, thistles, poison oak
- Provide aggressive annual maintenance by June 30 each year.

P2 - Parker Hill Park - City of Santa Rosa Owned Park

SLOPE:

ASPECT: SOUTHWEST

TOPOGRAPHIC FEATURES

FUEL:

FUEL BREAK LENGTH:

BOUNDARY LINE CONFLICT: N

COMMENTS: THIS IS CITY-OWNER PROPERTY AND CITY SHOULD BE RESPONSIBLE FOR VEGETATION MANAGEMENT FOR FIRE SAFETY ON ITS PROPERTY. THIS IS RATED AS A “VERY HIGH FIRE SEVERITY ZONE.”

This open space island should be included in the cooperative fuel break and fire fuel reduction project being undertaken by jointly by OSMA and the adjacent subdivision. Failure to cooperate by the land owner (city) will significantly jeopardize the effectiveness of fire fuel treatment in this wildland/urban interface area.

OSMA and adjacent subdivision are advised request full city cooperation for this project in Fuel Treatment Year 2004.

VEGETATION MANAGEMENT AND FUEL MODIFICATION:

- YEAR 1 -
- Create a 30-foot fuel break perimeter adjacent to all roads and all private property lines.
 - Control and remove invasive species, French broom, fir seedlings and saplings, thistles, poison oak
 - Provide aggressive annual maintenance by June 30 each year.
 - Reduce total fuel volume in remaining vegetation by 50%.
 - Provide aggressive annual maintenance by June 30 each year.
- YEARS 2 –5
- Continue to enlarge FULL perimeter fuel break to 50'. 100' is required where park interfaces with private property lines.
 - Continue to reduce fuel volume to a minimum of 65% of original volume
 - Provide continuing control and remove invasive species, French broom, fir seedlings and saplings, thistles, poison oak
 - Provide aggressive annual maintenance by June 30 each year.

APPENDIX A.

Mulching / Composting as a Possible Solution?

This solution would have to be approached as an *experimental method and monitored to determine its long term feasibility.* Additional study appears to be indicated if this process is to attempted and is indeed even feasible.

For the purposes of this document, mulching means the reduction of cut brush piles to smaller size (larger than “chipper” chips) and retaining them in the storage area where the goal is accelerated decomposition. Covering the cut material, possibly with a plastic membrane that will retain moisture and cause more rapid decomposition to a compost-like material is the goal. Eventually the material will become mulch that will retard fire and provide plant nutrients.

While imperfect this may answer the need for cost effective fire fuel reduction which would be to mulch it on-site near the cutting area. In the short term, there will be additional dead material that is fire fuel, but as it slowly decomposes, so to, will the hazard.

1. At the outset, we need to emphasize the fact that “California’s mediterranean-type climate discourages rapid decomposition of dead vegetation.” (Fire Safe Guides of Residential Development in California, California Department of Forestry & Fire Protection, 1993) Slow decomposition of cut and dead material may not provide for short or intermediate-term reduction in fuel loading at or near the proposed storage/mulching/decomposition areas.

However, this may be a cost effective alternative to prohibitively expensive removal of cut vegetation to a chipping site.

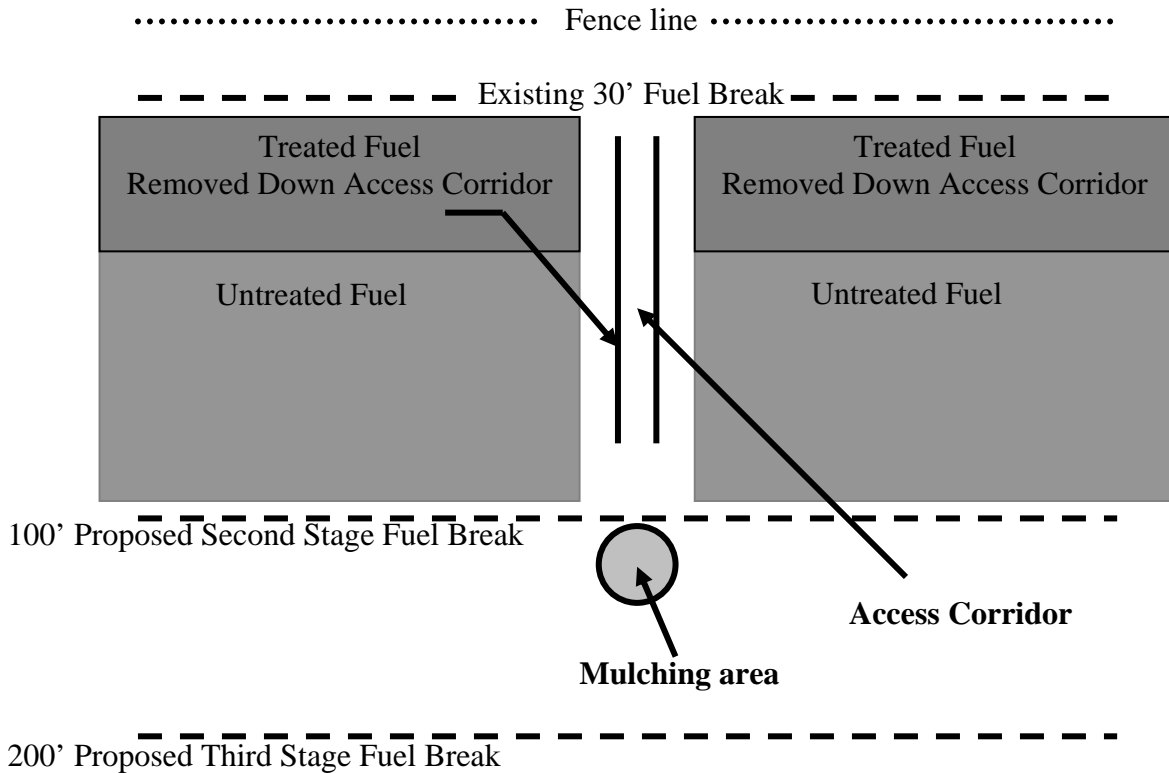
2. A test site should be developed to determine the feasibility of rapid decomposition and mulching of the cut vegetation.
3. Establish a mulching site at intervals of approximately every 100 yards or so to be determined by the fuel reduction crew and/or the Fire Safety Working Group.
4. The site would be located at the 100-foot line of the proposed second stage fuel break and accessed by a 15-20 foot wide corridor.

- The mulching/composting site should be fully cleared to a diameter of approximately 30 to 50 feet and be capable of handling all cut material four inches or less in diameter. Cut material would be piled then mulch or slash cut with chain saws to reduce volume into small 15 or 20 foot diameter compressed piles within the 30 to 50' area.

The biomass would be allowed to decompose over time. Methods to accelerate the decomposition need further study. We can expect it to accumulate faster than it will decompose in the short term, 5 – 10 years.

- Any logs of 4 inches or greater diameter with all limbs removed may be embedded in the soil and left to decompose naturally in an up / down slope configuration to prevent rolling in the event of a wildfire.

- EXPERIMENTAL ON-SITE MULCHING / COMPOSTING SYSTEM -



APPENDIX B

Shaded Fuel Break

Excepted in part, from the Placer County Fire Safe Alliance Report
About the “Auburn Shaded Fuel Break”

A modified shaded fuel break is defined as “A defensible location to be used by fire suppression resources to suppress oncoming wildfires.” Fuel breaks are strategically located to maximize their effect in protecting an area as well as to provide an improved fire suppression location.

Any fuel break by itself will NOT stop a wildfire. It is a location where the fuel has been modified to increase the probability of success for fire suppression activities:

- Ground resources can use the location for direct attack or firing out.
- Air resources can use the location for fire retardant drops.
- The public and fire resources can use the location for more efficient ingress and egress.

Objectives:

- To prevent fire from burning the tree canopies by fire jumping tree to tree.
- To remove ladder fuels to prevent fire from burning up into the trees.
- To protect the structures along the canyon rim from wildfires that would otherwise burn, or would be more difficult to suppress, without the treatment.
- To produce a fire environment that allows the ground fuels to burn so firefighters can fight the fire.
- To create canopy openings to allow air tanker retardant to reach the ground.
- To provide enough shading to reduce unwanted brush species from easily regenerating.

Concerns:

- Seedlings and sapling regeneration which will thrive because of the brushing efforts.
- Rare, threatened or endangered plant species.
- Potential for exotic plant species invasion due to warmer ground temperatures and soil disturbance..
- Sprouting (crown sprouts) stumps that will come back.

Modified Shaded Fuel Break Prescription Example:

Implementation consists of removing or pruning trees, shrubs, brush, and other vegetative growth on the project area. For site protection, all work should be completed by use of hand crews supported by chippers. This project could accommodate the use of light machinery in the treatment areas and should be seriously considered where applicable.

Appendix B (continued)

Fuels: Understory fuels over 1 foot in height are to be removed in order to develop vertical separation and low horizontal continuity of fuels. Individual plants or groups of plants up to 10 feet in canopy diameter may be retained provided there is a horizontal

separation between plants of 3 to 5 times the height of the residual plants and the residual plants are not within the drip lines of an overstory tree.

Mid-story Fuels: Only trees up to the 6-inch diameter class (at breast height (dbh)) may be without permission of the Santa Rosa Community development department. Exception to this size limit shall be trees that have significant defect. Trees shall be removed to create horizontal distances between residual tree crowns from 10 to 30 feet, drip line to drip line depending on slope. Larger overstory trees (>10 inches dbh) do count as residual trees and, in order to reduce ladder fuels, shall have vegetation within their drip lines removed. Prune branches off of all residual trees from 8 to 10 feet off the forest floor, not to reduce the live crown ratio below 1/2 of the height of the tree.

Species intolerant to shade have a higher preference to retain, because their seed will be less likely to germinate in the understory.

Conifers: Immature juvenile conifers, i.e. douglas fir to a diameter of 6 inches at breast height (DBH) should be removed. Mature Douglas fir, the dominant conifer in the area may be retained if limb up 15 – 30 feet, all dead limbs removed, and ladder fuels are removed to a distance of 10 feet beyond the drip line

Hardwoods: All juvenile trees with a DBH of 6 inches or less shall be removed. Trees with a DBH of 6 inches more or less, may be retained if – crowns are raised to 15 – 20 feet, dead wood and limbs are removed and ladder fuels within 10 feet of the driplines of each tree are removed

Brush: It is desirable to remove as much brush as possible within shaded fuel break areas. However, if individual plants or pairs of plants are desired to be left, leave plants with the following characteristics: young healthy plants less than 5 feet tall and individual or pairs of plants that are no more that 5 feet wide. See rules for brush and crown separation elsewhere in this document.

APPENDIX C

Santa Rosa Heritage Trees

HOW DO WE PRESERVE OUR TREES?

Trees play a significant role in the desirability of Santa Rosa as a place to live, work, and play. Toward that end the City Council adopted an ordinance on October 2, 1990, regulating the removal of large and/or significant trees. Following are common questions and answers regarding this ordinance and tree preservation in Santa Rosa.

What are the major changes in the new ordinance from previous requirements?

Heritage trees in R-1 (Single Family Residential) Districts are now regulated; replacement trees are required for those removed by new development; and fines and penalties are included for removing trees without a permit.

What is a heritage tree?

A heritage tree is a tree or grove of trees designated by the Planning Commission as having a special significance requiring review before removal may be permitted.

The following trees are native to Sonoma County and are considered heritage trees when their diameter or circumference is of a size specified in the ordinance:

- Valley Oak
- Live Oak
- Black Oak
- Oregon or White Oak
- Canyon Oak
- Blue Oak
- Interior Live Oak
- Redwood
- Bay
- Madrone
- Buckeye
- Douglas Fir
- Red Alder
- White Alder
- Big Leaf Maple

When are permits required?

A permit is required to remove/alter heritage trees in all zoning districts.

Non-heritage trees which are 4" or greater in diameter require a permit except in the following zones:

R-1, R-1-6, R-1-7.5, R-1-9, PRD, and R-1-PD (unless the specific PD policy requires compliance with the tree ordinance, e.g., the Junior College PD) if the property is incapable of being further subdivided. (It may also be exempt if further subdivision is determined unlikely by the Director of Community Development.)

Appendix C continued

On Undeveloped Property

Permits are required for removal, alteration or relocation of all trees with a 4" or greater diameter in all zoning districts where development is being proposed or may occur in the future.

What is a protected tree?

A protected tree is any tree, including a Heritage tree, indicated to be preserved on an approved development plan, an approved tentative map or tentative parcel map, or other approved development.

Are any trees exempt from permits?

The following trees are exempt from permit requirements in all zoning districts, whether the parcel is developed or not:

Acacias, silver maple, poplars, ailanthus, hawthorn, fruitless mulberry, ligustrums, pyracantha, Monterey pine, Monterey cypress, and fruit and nut trees (except walnuts).

Are street trees governed by this ordinance?

Yes, both planting and removal are addressed. Street tree planting must comply with the City's street tree list as specified by the City Parks Department (543-3422). Street tree removal requires a permit from the City Parks Department.

Are there penalties for violations of the tree ordinance?

Yes, both civil fines and/or criminal penalties may apply. Please see the tree ordinance for details.

Are there replacement requirements?

Yes, replacement trees may be required under specific conditions. Please see the tree ordinance for details.

How are permits obtained?

A completed [tree removal application form](#) must be filed with the Department of Community Development. It will be processed within two weeks for developed properties. Processing for undeveloped properties will occur along the proposed project under review. There is no processing fee required.

For additional information, please contact the Department of Community Development at 543-3223 TDD # 543-3031

APPENDIX D

“Bates Bill”

VERY HIGH FIRE HAZARD SEVERITY ZONING (LRA) REGULATIONS SUMMARY

Assembly Bill 337 (Bates) became law January 1, 1993, adding Government Code Sections 51175 et seq., and amended Health and Safety Code Section 13108.5

Regards Very High Fire Hazard Severity Zones (VHFHSZ) within Local Responsibility Areas (LRA)

CDF designated lead agency to determine areas within LRA which meet established criteria for a VHFHSZ

Participation of local authority entirely discretionary. Local authority may disagree classification and choose not to adopt, or make the contention that its jurisdiction meets or exceeds Bates

If local jurisdictions desire to participate in the Bates project, they must adopt a local ordinance which requires at least a class B roof for all new construction, and when at least 50% of the existing roof is Replaced; along with a number of other fire safe measures as 30-foot minimum clearances, additional clearances of 30-40 feet, screens over chimneys, no overhanging branches, and the like

Model ordinance, as developed by the State Fire Marshal, can be adopted as a local ordinance which complies with Bates

Once local jurisdictions are notified by CDF that such a zone exists within their jurisdiction, they have 120-days to enact the more restrictive ordinance, unless the jurisdiction already has in place an ordinance which meets or exceeds that required by Bates

If the local authority chooses to exclude an area from the requirements to maintain vegetation clearances as prescribed in Bates, that local authority must make findings supported by substantial evidence in the record that the requirements of Government Code Section 51182 are not necessary for effective fire protection within the area

In contrast to the above, the local authority can also include areas within the VHFHSZ in their respective jurisdictions which were not identified by CDF, following findings supported by substantial evidence in the record

Changes made by the local authority to the recommendations of CDF shall be final and are not rebuttable by the Director

The term Very High Fire Hazard Severity Zone need not necessarily be used in local ordinances to describe this area

Assembly Bill 3819 became law on September 25, 1994, adding Government Code Sections 51178.5 and 51189, and amending Health and Safety Code Sections 13108.5 and 13132.7.

Requires that local agencies allow for public review of identified VHFHSZ in the form of maps within 30 days of notification by the CDF director

Requires that the State Fire Marshal's Office develop a Model Ordinance that provides for comprehensive space and structure defensibility, including building design and construction requirements.

GLOSSARY

AERIAL FUELS – All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.

BRUSH – A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low growing trees. A more or less continuous cover of leaves and branches in a forest, usually formed by the crowns of dominant and codominant trees.

CANOPY - A layer or multiple layers of branches and foliage at the top or crown of a forest's trees.

CHAPARRAL – A highly flammable, seasonal plant community consisting of shrubs. Trees and brush species found in the west and southwestern states. Ranges in height from 4 to 15 feet, often older and decadent condition with large amounts of dead woody material within the crowns and on the ground.

CODOMINANT TREE - a tree with its crown in the upper level of the canopy of surrounding trees, and receiving direct sunlight from above but are crowded on the sides and receive comparatively little sunlight from the sides.

CONIFER – Cone bearing trees and shrubs, needle leaf as opposed to broad leaf types, mostly evergreens such as pines, spruce and firs.

CRITICAL FIRE WEATHER – Is a set of weather conditions (usually a combination of high temperature, low relative humidity and strong winds) whose effects on fire behavior make control difficult and threaten firefighter safety.

DBH – Diameter at Breast height.

DEFENSIBLE SPACE - Is an area either natural or man-made, where material capable of allowing fire to spread unchecked has been treated, cleared or modified to slow the rate and intensity of an advancing wildfire and to create an area for fire suppression operations to occur.

DOMINANT TREES - Larger-than-average trees with broad, well-developed crowns. These trees receive direct sunlight from all sides and above.

DRIPLINE – The outer circumference of a tree or shrub, the dripline.

EXTREME FIRE BEHAVIOR - "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

FIRE BEHAVIOR - The manner in which a fire reacts to the influences of fuel, weather and topography.

FIRE BREAK - A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work. Any nonflammable barrier used to slow or stop fires. Several types of firebreaks are mineral soil barriers; barriers of green, slow-burning vegetation; and mechanically cleared areas.

FIRE RESISTANT LANDSCAPING – Vegetative management that removes flammable fuels from the around a structure to reduce exposure to radiant heat. The flammable fuels may be replaced with green lawn, gardens, ivy, certain individually spaced green, ornamental shrubs; univocally spaced and pruned (single ornamental) trees, decorative stone or other non-flammable or flame resistant materials.

FIREWISE COMMUNITIES –



Firewise is a national organization dedicated to creating educational training programs, materials and resources for the homeowner, neighborhoods, communities and governmental agencies.

Firewise provides a wealth of information on their website and hard copy materials such as videos and printed publications are available.

Their URL is: <http://www.firewise.org/>

FLAME HEIGHT - The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind or slope.

FLAME LENGTH - The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

FLAMING FRONT - The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front.

FORB - A non-grasslike herbaceous plant; a broadleaved herb.

FOREST – A plant community.

FUEL - Combustible material. Includes, vegetation, such as grass, leaves, ground litter, plants, shrubs and trees, that feed a fire.

FUEL BREAK - Is an area, strategically located for firefighting anticipated fires where the native vegetation has been permanently modified or replaced so that fires burning into it can be more easily controlled. For the purposes of this document, the fuel break represents an area

where the fuel has been reduced to a level that fire is either denied and/or fire fuel is so reduced that the intensity will not threaten areas of improved property.

FUEL MODIFICATION - Is a method of modifying fuel load by reducing the amount of nonfire-resistive vegetation or altering the type of vegetation to reduce fuel load.

FUEL TYPE – An identifiable association of fuel elements of distinctive species, form, size, arrangement or other characteristics that would cause a predicable rate of spread or difficulty of control under specified weather conditions.

GREENBELTS – A facility or land-use, designed for a use other than fire protection, which will slow or resist the spread of a wildfire. Includes parking lots, irrigated or landscaped areas, parks and playgrounds.

HERBACEOUS VEGETATION : non-woody plants, for example, grasses, forbs, wildflowers and ferns.

HORIZONTAL CONTINUITY - Refers to the types, sizes, species and distribution of trees and other plants across the land surface. Density, separation, volume.

INTERMEDIATE TREES - Medium-sized trees with small crowns below the general level of the canopy. Intermediate trees receive little direct light and should be removed during thinning operations. These light deprived trees are often in a state of poor health and contribute to understory fire hazard.

INVASIVE SPECIES – For the purposes of this document, invasive species refer to undesirable plants that may be pyrophytic, may modify a general fuel type, crowd out more desirable plants, are fast growing and opportunistic. Plants in this category that have been observed in Fountaingrove II, in clued douglas fir, fir seedlings and saplings, french broom, acacia, pampas grass, thistles and poison oak.

LADDER FUELS – Fuels that provide vertical continuity between strata. Fire is able to carry from surface fuels into crowns of trees or shrubs with relative ease and helps assure initiation and continuation of crowning.

LRA - “LOCAL RESPONSIBILTY AREA.” This refers to incorporated cities and the attendant responsibility of the local; jurisdiction. V This refers to incorporated areas within areas of the county or state for the purposes of fire prevention and fire suppression.

MATURE TREE - A tree that has reached a desired size or age for its intended use. Size, age, or economic maturity varies depending on the species and intended use.

MULCHING – For the purposes of the above document, mulching means the reduction of cut brush piles to smaller size (probably larger than chips) and retaining in the storage area. Covering the storage area, possibly with a plastic membrane, that will cause more rapid decomposition to a compost-like material is the goal..

OVERSTORY – That portion of the trees in a forest that forms the upper or uppermost layer.

OSMA – Open Space Management Association.

PYROPHYTE – “Fire Fuel.” Pyrophytes are plants that ignite readily, burn intensely, and typically share certain characteristics:

- They are usually blade-leaf or needle-leaf evergreens.
 - They have stiff, woody, small or fine, lacey leaves.
 - Their leaves and wood usually contain volatile waxes, fats, turpenes or oils.
Crushed leaves have strong aromatic odors.
 - Their sap is usually gummy, resinous and has a strong odor.
 - They usually contain plentiful fine, twiggy, dry or dead materials.
 - They may have pubescent (hair covered) leaves.
 - They may have loose or papery bark.
 - These plants flame (not smolder) when preheated and ignited with a match.
- (Pyrophytic Vs. Fire Resistant Plants, U.C. Cooperative Extension, Ray Moritz & Pavel Svihra)

PYROPHYTIC FUEL - In pyrophytic fuel types, i.e. chaparral, the foliage or leaf coverage on fuel stock is usually heavily laden with waxes, turpenes and resins that, when preheated, extremely flammable and will add tremendous thermal outputs to a fire.

REPRODUCTION - (a) The process by which young trees grow to become the older trees of the future forest. (b) The process of forest replacement or renewal through natural sprouting or seeding or by the planting of seedlings or direct seeding.

SPECIES - A group of related organisms having common characteristics capable of interbreeding. Loblolly and Virginia pine are common species that can be interbred.

SRA - “STATE RESPONSIBILITY AREA.” This refers to unincorporated areas within unincorporated areas of the county or state for the purposes of fire prevention and fire suppression.

STAND – A community of trees or other vegetation that is sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities. An easily defined area of the forest that is relatively uniform in species composition or age and can be managed as a single unit.

STORY: a roughly horizontal layer (or strata) of vegetation in a plant community; in forests these generally correspond to canopy layers. See “overstory” and “understory.”

STRATIFICATION: Division of a forest, or any ecosystem, into distinct layers (or strata) of vegetation. See “canopy,” “herbaceous vegetation,” and “understory.”

STRUCTURE: The presence, size, and physical arrangement of any given vegetation. The presence, size, and physical arrangement of vegetation in a stand. Vertical structure refers to the variety of plant heights, from the canopy to the forest floor. Horizontal (continuity) structure refers to the types, sizes, and distribution of trees and other plants across the land surface. Forestlands with substantial structural diversity provide a variety of niches for different wildlife species.

SUDDEN OAK DEATH (SOD) – Sudden Oak Death is widespread in California and is commonly found in tanoak and the understory of redwoods, and in evergreen hardwood forests dominated by oaks, madrone, and California bay. Sudden Oak Death (SOD) is a disease of wildlands and naturally occurring trees. A federal and state quarantine is in effect prohibiting the movement of any plant material which may carry SOD.

For further information visit www.suddenoakdeath.org

SUPPRESSED OR OVERTOPPED TREES - Small trees that grow below the tree canopy and receive no direct sunlight from any direction. See “Intermediate Trees.”

VERTICAL ARRANGEMENT - Refers to the vertical composition of various vegetation types. It includes size in height, density of vegetation both in single plants and stands, height of the crown (overstory) and lower branches or limbs dead or alive.

Fuels that provide vertical continuity between strata. Fuels such as ladder fuels that begin with low-growing grasses or plants that transition into brush the transitions into trees. The trees often have low growing limbs that contribute to the vertical continuity. Trees may have healthy or dead lower limbs and a healthy overstory crown. Fire is able to carry from surface fuels into crowns of trees or shrubs with relative ease and helps assure initiation and continuation of crowning.

TREE CROWN- consists of the primary and secondary branches growing out from the main stem together with the twigs and foliage.

UNDERSTORY – Low-growing vegetation (herbaceous, brush, or reproduction) growing under a stand of trees, Also a portion of trees in a forest stand below the overstory. The layer formed by the crowns of smaller trees in a forest. (b) The trees beneath the forest canopy.

WUI – Wildland Urban Interface