



March 2, 2018

# Fire Protection Plan (Report)

## Marinda Heights Sub-Division

Prepared for:  
Timberstone 4038T LLC

Presented to:  
Ross Valley Fire Protection District

Prepared by:  
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ESH Consultants  
Fire Protection Engineers

## **Introduction:**

This report has been prepared to meet the request from the Ross Valley Fire Protection District for a Fire Protection Plan as defined in Chapter 49 of the California Fire Code (2016). As defined in Chapter 49, the purpose of the plan is to describe ways to minimize and mitigate potential for loss from wildfire exposure. This report will discuss the fire hazard severity zone(s), building construction requirements (Chapter 7A of the California Building Code), fire flow and sprinkler protection. This report will not specifically describe the methods used for hazardous vegetation and fuel management, or defensible space as this is already part of the Vegetation Management Plans that have been prepared for each site.

It should be noted that based upon the recent wildfires in Napa, Santa Rosa, and southern California, the rules and regulations for construction in the wildland-urban interface will probably change in 2018 resulting in more stringent regulation for new construction and materials of construction.

The proposed project is the construction of 10 new residential single-family homes on a 100-acre site. Each home will be situated on an approximately 10 acres parcel. The site is located in a current open space designated location in the City of Fairfax jurisdiction, Marin County, California.

## **Fire Hazard Severity Zones:**

The fire hazard severity zones are established on maps prepared by the State Fire Marshal's Office indicating areas of state or local responsibility. Most of the City of Fairfax is located in the Local Responsibility Area High Hazard Severity Zone (see map at the end of the report). According to the client provided documentation, the site is located in the Very High Severity Zone. A final determination is left to the fire department as there is a conflict between the published severity zone maps and the information provided with the vegetation management plans.

## **Vegetation Management Plan:**

A vegetation management plan has been prepared for each of the ten home sites. The requirements for the plan are included on the site plan for each lot. A sample of the plan wording is included with this report. The plan includes information on vegetation management, fuel reduction fire apparatus clear zones, landscaping and maintenance, etc.

## **Typical Building Descriptions:**

There will be ten single family homes in this project. The following is a list of each property and the proposed size of the homes. At the time of final building plan approval, the actual areas may be different than the areas report in the table below. The total area for each home includes 500 square feet for garages. The garages are either part of the home, or attached to the home. The values were obtained from the architectural drawings (available in December 2017).

Property Address	Lot #	Building Area (SF)	Garage Area (SF)	Total Structure Area (SF)
321 Marinda	#1	4501	500	5001
351 Marinda	#2	4735	500	5235
400 Marinda	#3	4922	500	5422
501 Marinda	#4	4293	500	4793
551 Marinda	#5	4789	500	5289

Property Address	Lot #	Building Area (SF)	Garage Area (SF)	Total Structure Area (SF)
611 Marinda	#6	4969	500	5469
630 Marinda	#7	4268	500	4768
650 Marinda	#8	4887	500	5387
680 Marinda	#9	4912	500	5412
Ridgeway Residence	#10	4937	500	5439

**Wildfire Exposure:**

The project site is located in the Local Responsibility Area High Hazard Severity Zone and as such is subject to the requirements of CFC Chapter 49, CBC Chapter 7A, and local jurisdiction (City of Fairfax, Ross Valley Fire Protection District, RVFPD). Chapter 7A of the CBC provides the construction requirements. The following indicates the construction requirements and whether the plans indicate compliance with those requirements:

The following are requirements from the California Building Code, Chapter 7A, and the California Fire Code Chapter 49.

*Ignition-Resistant Construction*

CBC Chapter 7A requires ignition-resistant construction. This can be obtained with a Type V construction using non-combustible exterior walls and a Class A roof. Or, Type III construction which consists of non-combustible exterior construction that allows combustible construction of the structural framing members. Per communications with the developer, the buildings will be constructed as Type V-A.

*Roofing*

CBC 7A contains the requirements for the roof coverings and valleys, and a requirement to comply with CBC Chapter 15. The roof for the building will be a Class A roof assembly (CBC 1505.2).

*Vents*

The code provides requirements for vent openings into the attics, eave soffit spaces, rafter spaces at the point where the ceilings are applied directly to the underside of the roof rafters, and for under floor ventilation. This will need to be clearly shown on the construction plans.

*Exterior Covering*

The code has specific requirements for exterior wall coverings, wall assembly, exposed underside of roof eave overhangs and soffits, exposed underside of porch ceilings, floor projections, and any exterior underfloor areas. Per the architectural drawings, the construction of the exterior walls is of noncombustible materials. For some of the homes, there is a wood siding material. To meet CBC 7A, Section 707A, this exterior wall covering can be allowed if placed upon one layer of 5/8<sup>th</sup> inch Type X gypsum sheathing, or the exterior walls shall be of 1-hour fire resistive assembly designed for exterior fire exposure and include assemblies using gypsum panels and sheathing products listed in the Gypsum Association Fire Resistance Design Manual. The architect will need to show this compliance on the project design drawings. It is very possible that these methods will no longer be

allowed if the code is changed. In that instance all exterior wall coverings would need to be of fire resistive materials.

#### *Exterior Windows and Doors (CBC 708A.2 and 708.3)*

Exterior door glazing and windows shall meet specific code criteria. The exterior doors are required to be of noncombustible or ignition resistant covering materials, or shall have a 20-minute fire rating when tested per NFPA 252, or shall meet the performance requirements of SFM Standard 12-7A-1. All the doors will have non-combustible or ignition resistant covering materials (metal doors). Windows will be tempered glass.

#### *Sections 709A and 710A*

Where there is as deck at a house, the decking shall meet the requirements of CBC 7A Section 709A. Basically the decking must be of fire resistive or non-combustible materials. Section 710A does not apply as there are no accessory structures.

#### **Water Supply:**

Water supply requirements are obtained from Table B105.1(1) and Table B105.1(2) of the CFC. The required minimum fire flow is based upon the area of the building, the construction of the building, and whether the building is protected by an approved fire sprinkler system. With a fire protection sprinkler system, the CFC allows a reduction in fire flow and duration.

Table B105.1(1) indicates with the use of an NFPA 13D sprinkler system, the minimum fire flow for houses greater than 3,601 ft<sup>2</sup> is ½ the value obtained from Table B105.1(2). With the largest structure being less than 8,200 ft<sup>2</sup> and with all ten of the buildings being Type V-A construction, the required fire flow is 1,750 GPM reduced to 875 GPM (due to the installation of an NFPA 13D sprinkler system). The minimum acceptable pressure is 20 PSI at any hydrant on the project site. The flow duration is one hour or 52,500 gallons of water.

The proposed water supply is a 70,500-gallon private water supply tank based upon 52,500 gallons for fire flow and an additional 18,000 gallons per RVFPD wildland requirements. Lot 10 will derive its water supply from MMWD public water supply hydrants if it is possible to supply 750 GPM at 20 PSI. If this is not possible then an additional 2,000 gallons must be added to the tank capacity.

For sprinkler use, the tank elevation relative to the lots near the tank may not be able to provide sufficient pressure for either the hydrant flow or the sprinkler systems. This is being evaluated by the project Civil Engineer. Per CFC Table C102.1, the maximum distance from any point on the street or road frontage to the hydrant may not exceed 250 feet. Thus, it is not necessary to have a fire hydrant at the highest elevation lot. Locating the hydrant away from the highest lot may increase the elevation differential resulting in a minimum residual pressure of 20 psi at the required hydrant flow. When there is insufficient pressure for the sprinkler systems, the house can be provided with a residential fire sprinkler pump to boost the pressure. An alternative would be to provide an approved fire pump system at the tank. This could result in other design issues involving the domestic water supply system.

The developer is proposing the tank be used for both domestic and fire protection water supply purposes. As such, the domestic supply cannot be connected to the bottom of the tank, and must be

installed at such a tank elevation to prevent depletion of the fire protection water supply. This design is the responsibility of the developer and the Civil Engineer.

Fire hydrants will be located on the Civil drawings by the Civil Engineer. The fire hydrants shall meet the make and model requirements of the RVFPD.

**Automatic Sprinkler Protection:**

Each house shall be provided with an NFPA 13D sprinkler system. Sprinklers will also be installed for the exterior eaves.

**Fire Department Access:**

Fire Department access to the houses is indicated in CFC Appendix D. Section D107 only requires a single fire apparatus access road as the development is less than 30 homes.

All roads to be used by the fire department shall be capable of supporting a fire apparatus weighting at least 75,000 pounds. The access roads shall be a minimum of 20 feet wide except at the fire hydrants where the roads shall be 26 feet wide.

All dead ends shall be limited to 150 feet. If more than 150 feet but less than 501 feet, then either a hammerhead, "Y" or cul-de-sac must be provided (Table D103.4). If 501 feet to 750 feet, the same requirements apply; however, the road shall be not less than 26 feet wide. If any dead-end road exceeds 750 feet in length, special approval is needed from the fire department.

From the drawings it appears that proper fire department turnarounds are provided where needed. Also, the Civil Engineer has stated that the paved road into the development (a dead-end) will be connected to an existing fire service road (to be upgraded). As a result, fire apparatus will be able to use the fire service road as a means of egress without the use of a turnabout.

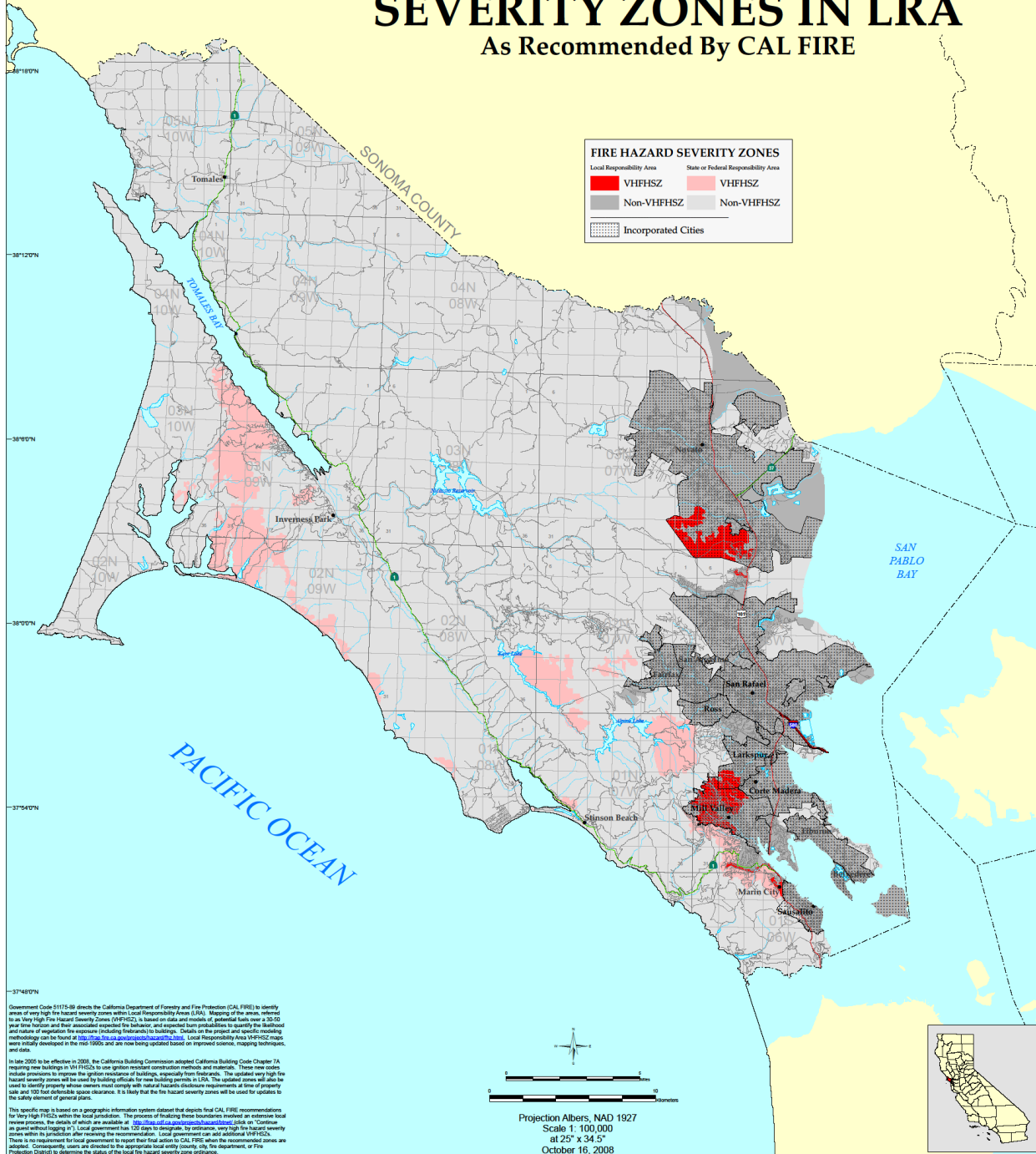
**Conclusions:**

If the developer meets or exceeds the items identified in this report, and CBC 7A and CFC 49, it should then be acceptable, from a fire protection point of view, to allow construction of the houses.



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## VERY HIGH FIRE HAZARD SEVERITY ZONES IN LRA As Recommended By CAL FIRE



Government Code 51732-50 directs the California Department of Forestry and Fire Protection (CAL FIRE) to identify areas of very high fire hazard severity zones within Local Responsibility Areas (LRAs). Mapping of the areas, referred to as Very High Fire Hazard Severity Zones (VHFHSZ), is based on data and models of potential fuels over a 35-100 year fire horizon and their associated expected behavior, and expected burn probabilities to quantify the likelihood and nature of vegetation exposure (including firebrands) to buildings. Details on the project and specific modeling methodology can be found at <http://www.fire.ca.gov/resources/safety/51732>. Local Responsibility Area VHFHSZ maps were initially developed in the mid 1990s and are now being updated based on improved science, mapping techniques, and data.

In late 2005 to be effective in 2006, the California Building Commission adopted California Building Code Chapter 7A requiring new buildings in VHFHSZs to use ignition resistant construction methods and materials. These new codes include provisions to improve the ignition resistance of buildings, especially from firebrands. The updated very high fire hazard severity zones will be used by building officials for new building permits in LRA. The updated zones will also be used to identify property whose owners must comply with natural hazard disclosure requirements at time of property sale and 100 foot defensible space disclosure. It is likely that the fire hazard severity zones will be used for updates to the safety element of general plans.

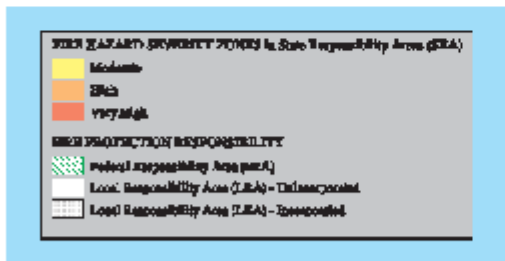
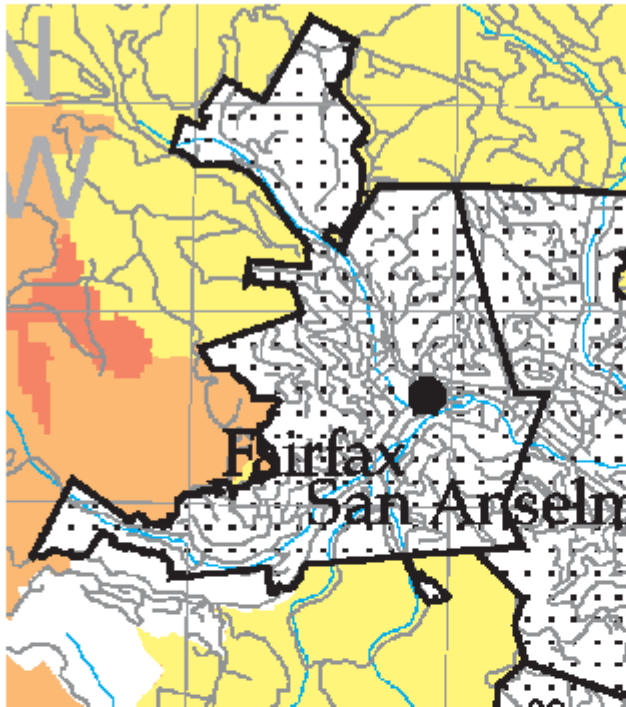
This specific map is based on a geographic information system dataset that depicts final CAL FIRE recommendations for Very High Fire Hazard Severity Zones within the local jurisdiction. The process of finalizing these boundaries involved an extensive local review process, the details of which are available at <http://www.fire.ca.gov/resources/safety/51732> as well as without logging in. Local government has 120 days to designate, by ordinance, very high fire hazard severity zones within its jurisdiction after receiving the recommendation. Local government can add additional VHFHSZs. There is no requirement for local government to report their final action to CAL FIRE when the recommended zones are adopted. Consequently, users are directed to the appropriate local entity (county, city, the Department, or Fire Protection District) to determine the status of the local fire hazard severity zone ordinance.

The State of California and the Department of Forestry and Fire Protection make no representations or warranties regarding the accuracy of data or maps. Neither the State nor the Department shall be liable under any circumstances for any direct, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of data or maps.

Obtain FRAP maps, data, metadata and publications on the Internet at <http://frap.cdf.ca.gov>  
For more information, contact CAL FIRE-FRAP, PO Box 944246, Sacramento, CA 94244-2460, (916) 327-3939.

Arnold Schwarzenegger, Governor,  
State of California  
Mika Chrisman, Secretary for Resources,  
The Resources Agency  
Ruben Grijalva, Director,  
Department of Forestry and Fire Protection

MAP ID: FHSZL\_MAP  
DATA SOURCES  
CAL FIRE Fire Hazard Severity Zones (FHSZ1.00\_3)  
CAL FIRE State Responsibility Areas (SRADC\_5)  
CAL FIRE Incorporated Cities (Incorp07\_3)  
PLSS (1:100,000 USGS, Land Grants with CAL FIRE grid)



**PROPOSED FIRE HAZARD SEVERITY ZONES IN SRA**



**TREATMENT RECOMMENDATIONS**

**VEGETATION FUELS MANAGEMENT STRATEGIES**

Strategy: Select fire resistant plants

**Actions:**

- Remove any and all pyrophytic shrubs within the indicated Defensible Space Zone.
- Select listed fire resistant species, or consult the VMP specialist for other fire resistant landscaping plant recommendations.
- When replanting, select species with low surface to volume ratios (i.e., southern magnolia, tulip tree, rhododendron, Myoporum or English laurel vs trees like acacia, eucalyptus, pine, fir and juniper).
- Select broadleaf vs. needle-leaf species.
- Select clean looking species with stout branches and twigs (non-twiggly).
- Select species listed as pest and disease resistant.
- Select deciduous trees and shrubs with supple, moist foliage.
- Select species without volatile oils in their leaves (use the smell test). Sap is water-like and does not have a strong oil odor.

Strategy: Reduce fuel volumes.

**Actions:**

- Remove all deadwood from trees and shrubs.
- Thin oaks to reduce production of ground litter and debris.
- Remove shrubs beneath and around existing and emerging trees.
- Use low-growing, non-pyrophytic (fire resistant) shrubs and ground cover as replacement plants.
- Remove/reduce all lofty or loosely compacted litter accumulations, especially large debris such as branches and replace with compact, small particle mulch to prevent invasion of noxious weeds and elevate the live fuel moisture of retained plants.
- Vines, which tend to accumulate dead material, should be removed from trees and the home.

Strategy: Reduce fuel flammability.

**Actions:**

- Irrigate plants, appropriate to species, to maintain high live fuel moisture content.
- Use fire resistant mulch to increase ground and live fuel moisture.
- Remove dead material and leaf litter from all shrubs.
- Cut all grasses when 50% cured (dried), or no later than June 1.
- Replace any grasses with plants that do not cure (dry out).
- Remove deadwood in trees and shrubs.
- Remove all dead and downed material each year by June 1, leaving compact leaf litter or mulch to a depth of not more than 2".
- Remove shrubs that have a dead sub-canopy inside the surficial green canopy.
- Remove sick, dying, and dead shrubs and trees.

Strategy: Establish/maintain fuel discontinuity.

**Actions:**

- Remove/reduce "ladder" fuels (grass, to brush, to trees, low to high branches, lose flammable bark).
- Remove any and all poplar, acacia, eucalyptus, Douglas fir and Monterey pine reproduction.
- Create shrub/grass mosaics from continuous masses by installing hardscape where possible.
- Remove shrubs from beneath and around existing and emerging trees.
- Thin thickets of small trees and tree reproduction from large tree understories.
- Create low fuel zones near structural vulnerabilities such as windows, decks, and large structural overhangs.

Strategy: Reduce the possibility of fire traveling through tree crowns.

**Actions:**

- Separate overlapping tree and large shrub canopies.
- Thin fire-prone tree canopies (acacia, eucalyptus, Douglas fir and Monterey pine) to open canopy structure. To maintain tree health, remove no more than 30% of foliage per-year.
- Ensure that no shrubs or immature trees are allowed to grow beneath mature trees where they would create a fuel ladder.
- Remove all conifer reproduction on property. Retain existing conifers as recommended, with treatment (limb to recommended height and remove all deadwood).
- Prune out low hanging fire-available branches and twigs up to 3 inches in diameter to a minimum of 10 feet above ground under any portion of the canopy or to an elevation 10 feet above the highest ground elevation.
- Where it is not possible to separate crowns by at least 10 feet, prune low hanging fire-available branches and twigs up to 3 inches in diameter to a minimum of 10 feet above ground under any portion of the canopy or to an elevation 10 feet above the highest ground elevation if the height of the tree allows.
- Perform fuel volume reduction actions mentioned above.

**FIRE APPARATUS CLEAR ZONE (FACZ)**

Management Recommendations:

- The FACZ is critical to safe access/egress during a wildfire event.
- All trees within 10' of roadways and driveways should be maintained so that no part of the tree's canopy extends laterally across the roadway or meets an opposing tree's canopy. This provides increased roadway clearance, and decreases the potential for flame impingement on the roadway.
- Tree canopy, where it extends over the roadway, should be raised to a minimum of 15 feet above the paved road surface to provide safe clearance for fire apparatus, and should not meet and opposing canopy.
- Vegetation within 10 feet of roadways should be restricted to fire resistant species (See attached list of fire resistant screen species). Plants should have low surface to volume ratio (Ex: pine is high, and magnolia is low) and should have low concentration of volatile oils, waxes, and fats (pine, fir & bay have high volatile oil content, redwood & oak have low volatile oil content, acacias have high volatility).
- All brush and brambles (blackberries) should be removed within 10 feet of roads to maintain the FACZ.
- Remaining roadside vegetation should be regularly deadwooded and irrigated where the plants are tolerant of summer water (even intolerant plants will tolerate infrequent deep irrigation).
- All dead and down material should be removed.
- Cured grasses and herbs should be cut to less than 4" from June 1 to November 1 or the onset of rain.

**DRIVEWAY SIDE FUELS MANAGEMENT ZONE**

- Trees adjacent to the driveway should be maintained to meet the same standards as the FACZ roadway, with 15' of vertical clearance from the driveway base, and 5' laterally.
- All down and dead debris should be removed.
- Cured grasses and herbs should be cut to less than 4" from June 1 to November 1 or onset of rains.
- Brush, shrubs, and undergrowth should be removed at least 10' from the sides of the driveway.

**LANDSCAPING AND MAINTENANCE**

Landscaping:

The final landscape plans, including a detailed species list, shall be provided to the fire prevention consultant for suitability evaluation. Should any additional landscaping be installed in connection with this project or at a later date, all plants installed shall be fire resistant plants either listed in Appendix A (Fire Resistant Plants), or in compliance with fire resistant plant characteristics and approved by the urban forester/fire ecologist. The urban forester/fire ecologist shall consult, review, and approve any future landscape plan and assure its compliance with State and local codes.

- All pyrophytic (fire-prone) shrubs should be removed inside the Defensible Space zone.
- In the defensible space zone, all shrubs will be maintained to a height of less than two feet where they might preheat aerial fuels or form ladder fuels to tree canopies. Shrubs shall be spaced so that no continuity exists between the ground fuels and tree crowns, to reduce the likelihood that a ground fire will extend into the tree canopy. Shrubs or shrub islands (no greater than 15 feet in diameter) shall be spaced a distance apart of two times the actual height of the shrub.
- Native grasses will be maintained, cut to a height of less than 4" from June 1 –October 31. Grasses may need to be cut more than once per season depending on ground moisture and annual growing conditions.
- A compact chipped wood mulch to a depth of 2 inches is recommended and may be applied throughout the landscape to provide water conservation, weed control, healthier and increased moisture content soil environment, increased plant health and higher live vegetation fuel moisture.
- Fire resistant woody plants shall be placed a distance apart at least equal to the mature height of the plants.
- If trees are planted they shall be planted such that when mature, their crowns will be separated by at least 10 feet.
- Only use fire resistant landscaping plants either listed in Appendix A (Fire Resistant Plants), or in compliance with fire resistant plant characteristics, or approved by the urban forester/fire ecologist.

Maintenance:

The vegetation fuels in the Defensible Space Zone, FACZ, and the Driveway Side Fuel Management Zone, shall be maintained as recommended in this report, on an annual basis, prior to June 1 of each year or prior to the beginning of the stated fire season as determined by the Marin County Department Fire Chief. The peak of leaf fall coincides with the peak of the fire season risk. Roofing, including rain gutters and valleys, should be maintained completely free of all leaf litter, needles, and dead vegetation during the fire season.

Irrigation systems should be inspected annually to ensure adequate moisture content is maintained in landscaping plants.

**NARRATIVE**

- The subject property is located within the "Very High" Fire Hazard Severity Zone. Paved access to the site is limited to one access point from Marinda Dr.
- The average slope on site is approximately 20 degrees.
- The Hazard Assessment Score was assessed at 11, requiring 30'x50'x50'x50' of defensible space around the home.
- Existing vegetation within the defensible space zone consists of predominantly native tree and shrub species and grasses. The predominant tree species on site are valley oak (*Quercus agrifolia*) and Italian stone pine (*Pinus pinea*).
- Landscape/ Irrigation plans have not yet been made available for review. If new plant material is proposed within the defensible space zone, it shall be fire resistant and irrigated. Refer to the Fire Safe Marin fire prone versus fire resistant plant lists website.

HAZARD ASSESSMENT MATRIX-WEST FACING SLOPE									
Hazard Points	1	2	3	4	5	6	7	8	Points
Aspect	NE, E	NW, W	SE,	S	SW				
Slope		0-10		11-20		21-30		31+	3
Fuel 0-30	Specimen Garden	Hardwood	Grass	Mostly Grass	Mostly Brush	Pyrophytic Hardwoods, Chaparral		Conifer with Brush	3
Fuel 31-100	Grass, Mostly	Mostly Brush		Pyrophytic Hardwoods, Chaparral	Conifer with Brush				1
Total Hazard Points									11

Hazard points	
1 2 3 4 5 6 7	8 9 10 11 12 13 14 17 18 19 20 21 22 23 24 25 >
30x30x30 ft.	30x30x50 ft. 50x50x100 ft.

Fuel Types:	
Specimen Garden:	A well-maintained ornamental garden, usually irrigated. Trees and shrubs are well spaced or clustered, thinned and free of deadwood. The lawn is mowed and clean. No pyrophytic plants within 10 ft. of house.
Hardwood:	Broadleaf(non-pyrophytic)treessuchasoaks,maples,ash,etc.
Grass:	Wild field grass dominates; trees and shrubs occupy less than 1/3 of the
Mostly Grass:	Brush and tree reproduction occupy more than 1/3 and less than 2/3 of
Mostly Brush:	Brush and tree reproduction occupies 2/3 of the area. Includes young chaparral, coastal scrub and broom stands.
Pyrophytic Hardwoods:	Broadleaf trees that is high in volatile oils, which produce heavy debris
Chaparral:	Six foot and taller old, pyrophytic brush with excessive deadwood. Includes mixed chaparral of Manzanita, scrub oak, chaparral pea, tall ceanothus, chamise, etc. Often has some young Douglas fir or pines.
Conifer:	Needleleaf trees typically with heavy litter, low branches and plentiful deadwood. Often mixed with some hardwoods or even pyrophytic
Conifer with Brush Understory:	hardwoods, but conifers dominated and carry the fire. Pine and Douglas Fir with heavy brush and down & dead branches and suppressed trees in the understory.