



**Mayacamas Fire Safe Council**

## **Mayacamas Community Wildfire Protection Plan**

**April 10, 2019**

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## DISCLAIMER

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view(s) of any governmental agency, organization, corporation or individual with which the authors may be affiliated.

This publication is designed to provide accurate and authoritative information in regard to the subject matter covered. This Community Wildfire Prevention Plan (the Plan) is a work in progress. Various changes are anticipated throughout the Plan over the next several years.

Readers are urged to consult with their own agencies having jurisdiction regarding the use or implementation of this Plan, as well as their own legal counsel on matters of concern.

While the publisher and authors have used their best efforts in preparing this Plan, they make no representations or warranties with respect to the accuracy or completeness of the contents and specifically disclaim any implied warranties of merchantability or fitness for a particular purpose. No warranty may be created or extended by receiving this publication. The advice and strategies contained herein may not be suitable for your specific situation. The publisher, sponsors and authors shall not be liable for any loss of profit or any other damages, including but not limited to, special incidental and/or consequential damages.

This Plan is not to be construed as indicative of project “activity” as defined under the “Community Guide to the California Environmental Quality Act, Chapter Three; Projects Subject to CEQA.” Because the Mayacamas CWPP does not legally commit any public agency to a specific course of action or conduct and thus, is not a project subject to CEQA or NEPA.

However, if and once grant funding is received from state or federal agencies and prior to work performed pursuant to the Mayacamas CWPP, or prior to issuance of discretionary permits or other entitlements by any public agencies to which CEQA or NEPA may apply, the lead agency must consider whether the proposed activity is a project under CEQA or NEPA. If the lead agency makes a determination that the proposed activity is a project subject to CEQA or NEPA, the lead agency must perform environmental review pursuant to CEQA or NEPA.

## MAYACAMAS COMMUNITY WILDFIRE PROTECTION PLAN:

This document shall be known as the Mayacamas Community Wildfire Protection Plan (MCWPP) and has been developed by the Mayacamas Fire Safe Council (MFSC). Upon the approval of local and state agencies with jurisdictional responsibilities for the area serviced by the Mayacamas Volunteer Fire Department of Glen Ellen and surrounding environs, this plan will continue to implement projects contained within it.

The community intends to assess the progress annually and invite agencies and landowners to submit projects that provide community protection. Additional projects will be displayed in an updated appendix to this plan.

## DECISION MAKERS:

The MFSC is comprised of community volunteers and its members are the decision makers for the MCWPP. The initial MFSC was drawn from individuals attending a community-wide meeting organized by the Mayacamas Volunteer Fire Department on November 4, 2017, shortly after the October 2017 Nuns Complex Fire. As the Council membership periodically changes, current community MFSC members are listed in Appendix A, made part of this Plan but not subject to formal revision of the Plan.

The MFSC operates as a subcommittee of the Mayacamas Volunteer Fire Department (MVFD), which is a registered 501(c)3 corporation.

## FEDERAL AGENCIES:

There are no federal agencies with jurisdictional responsibilities in the Glen Ellen Mayacamas area.

## STATE AND LOCAL AGENCIES:

The state and local agencies and the designated representatives with jurisdictional responsibilities in the MVFD are listed in Appendix B. As individuals representing the agencies periodically change, the current names of agency representatives are listed in Appendix B, made part of this Plan but not subject to formal revision of the Plan.

## COMMUNITY DESCRIPTION:

The Mayacamas community is comprised of residents located in a wildland-urban interface (WUI), where natural vegetation and vineyards intermingle with structures, yards, and residential use of the land. Specifically, the area is in the Mayacamas Mountains in Glen Ellen, California. Within the boundaries of the area, there are 12 miles of main access roadways and 177 dwellings (pre-2017 Fire), totaling 7200 acres.

## ACCESS:

Typical of most wildland-urban interface areas, access in the area is poor. It's difficult to get to and travel within the area. There are two main roads: Trinity Road and Cavedale Road. They both are quite steep in locations. Trinity Road is comprised of two narrow lanes, while Cavedale Road is one lane. Both roads have limited locations for passing.

Most structures are served by spur roads including Nicolini and Jensen, and long driveways, which are also narrow and windy. These spur roads dead-end, leaving many homes with one way in and out. Most of the narrow roads are made narrower by heavy vegetation on both sides. There are many gates, which pose a problem for fire responders. Addressing is almost all compliant with CAL FIRE codes, which requires a reflective lettering of at least 4-inch height.

Vegetation is abundant along public roads and spurs, and currently, much of the vegetation consists of piles of dead material. This makes the access and evacuation even more challenging as passing is more difficult and dangerous during a wildfire.

## TERRAIN:

The land form within the area covered by the MFSC generally slopes from over 2200 feet in elevation along its eastern border to 300 feet in elevation near the valley floor to the west. The western exposure receives abundant afternoon sun and efficiently heats the fuels.

Topography plays an important role in determining the direction and speed of fire spread. Strong westerly winds with hot, dry conditions are common.

The area within the boundaries of the MFSC has several long, deep canyons, including Hooker, Whitman, Stuart and Agua Caliente. Strong diurnal winds move air up and down these canyons, due to the change in elevation and different times the sun hits the mountainside. Winds are aligned with these canyons, guiding fire spread. This can overwhelm fire containment efforts. In addition to the distinct canyons, other landforms are in a varied arrangement with no particular pattern. This often results in unpredictable wind flows during a wildfire.

Pronounced ridges, such as along Trinity Road, or the north-south ridge line separating Sonoma and Napa Counties, usually block winds.

## FUELS:

Biomass and building materials literally fuel a wildfire. While it is not practical to alter topography or weather, fuels can be modified to change fire behavior. Natural vegetation, landscaping, and buildings can all be designed and retrofitted to achieve fire safety.

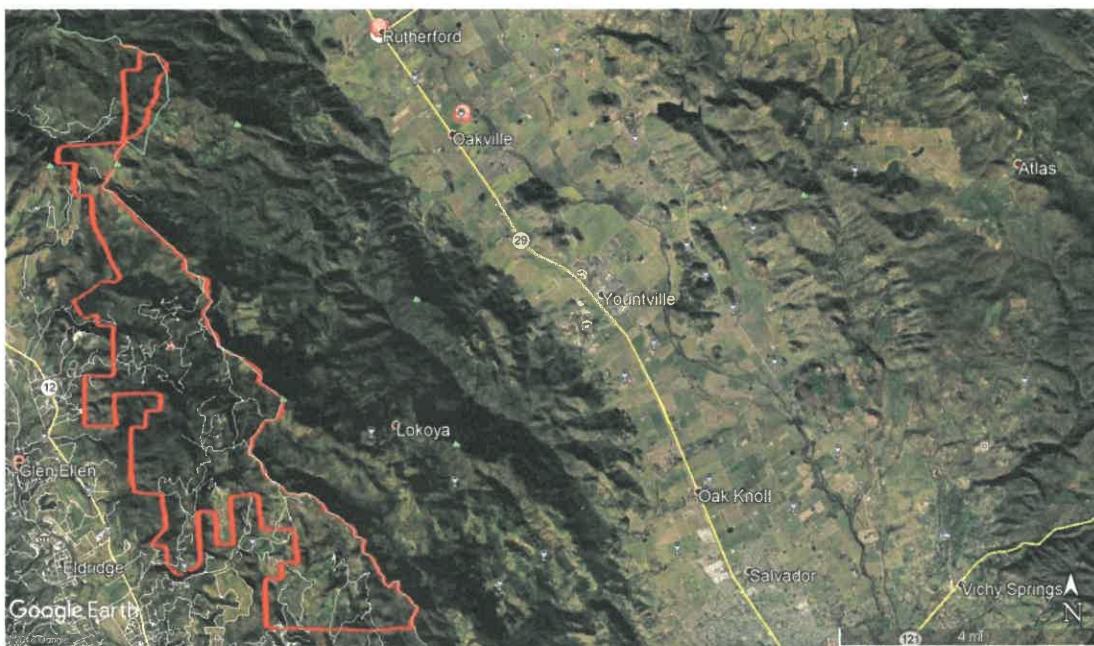
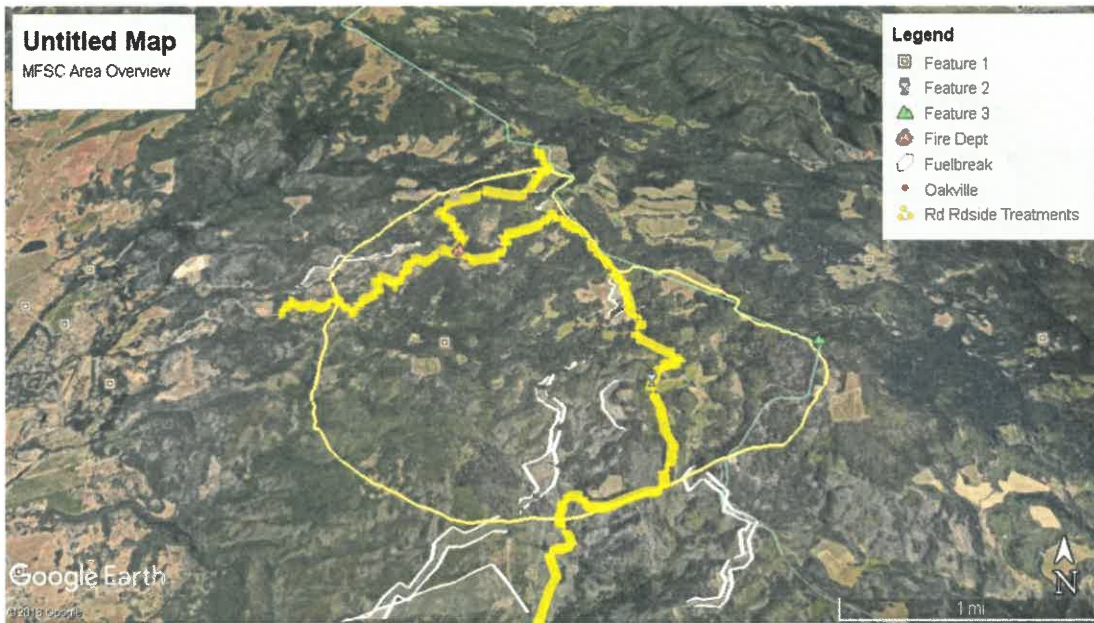
The vegetation is comprised of a mixture of oak woodlands, Douglas fir, chaparral, vineyards, and farms. A few pockets of knobcone pine are found, which is a remnant of a soil-erosion project after the 1964 Nuns Canyon Fire.

Oak woodlands are typically found on the north-facing slopes and in the bottom of canyons. Douglas fir is present within the oak woodlands on the higher elevations. Chaparral is prevalent on steep west- and south-facing slopes, irrespective of elevation.

Chaparral and all shrubby vegetation types burn quite rapidly and produce very hot fires. Fuels associated with oak woodlands can be among the most compatible with fire safety, if the undergrowth is absent and the lower branches of the forest are high off the ground. However, the most common circumstance in the area is that the oak woodland undergrowth is comprised of shrubs. These promote hotter fires and enable the fire to reach to tree canopy. When tree canopies are involved, flame lengths are often twice the height of the forest (potentially a hundred feet) and produce and distribute embers well ahead of the fire perimeter.

Vineyards are often found on more gentle terrain; however, they also cling to steep west- and south-facing slopes. These vineyards can buffer fire intensity as they have less biomass than chaparral or oak woodlands, and thus less fuel to burn. Some small farms perform similarly during a wildfire.

## MAPS:



## COMMUNITY BASE MAP:

Highlighted on the map are:

- The inhabited areas at potential risk of wildland fire and include:
  - Trinity Road, Cavedale Road and adjoining spur roads within the boundaries outlined in the Mayacamas Volunteer Fire Department service area in Glen Ellen, California.
- Areas containing critical human infrastructure, such as escape routes, municipal water supplies, power or communication structures include:
  - Trinity Road and Cavedale Road are the only two escape routes for the area. Trinity Road also serves as an escape route for Dry Creek Road in adjacent Napa County. PG&E primary transmission towers and lines, above-ground PG&E secondary transmission lines, various cell phone towers and internet service provider links are located within the area.
- Areas of Community importance, including:
  - Mayacamas Volunteer Fire Department Station One & Station Two which hold firefighter vehicles and act as staging areas in the case of a major event.
  - Trinity Road is a heavily traveled road connecting commuters and visitors between Sonoma County and Napa County.
  - The area beside the border of Nuns Canyon is recognized as a Wildlife Corridor.

## OTHER INTERESTED PARTIES:

The parties from our community that have shown interest in forest/fire management or may be interested in this CWPP are:

| Interested Parties           | Date Invited to Participate |
|------------------------------|-----------------------------|
| Landowners                   | 11/2017                     |
| Sonoma Land Trust            | 11/2018                     |
| Mt. Veeder Fire Safe Council | 12/2017                     |
| Audubon Canyon Ranch         | 1/2019                      |
|                              |                             |

## COMMUNITY HAZARD REDUCTION TREATMENTS, COMMUNITY EDUCATION PLANS AND SAFETY PRIORITIES:

The Mayacamas Fire Safe Council, with input from CAL FIRE, the Mayacamas Volunteer Fire Department and a professional forester, has developed the following project recommendations outlined below. (Appendix C)

Priority ratings have been assigned to each project. The ratings are based on both the importance and the ability to accomplish the project with the resources and volunteers currently available.

### PRIORITY RATINGS

1 = High Priority

2 = Medium Priority

3 = Low Priority

### PROJECT TYPE CODES

E = Help evacuation and access

I = Reduce ignitions

P = Reduce property damage

C = Assist containment

#### CAVEDALE ROADSIDE TREATMENTS PHASE 1

**PRIORITY:** 1

**PROJECT TYPE:** E//P/C

**AREA:** Within County easement along Cavedale Road and associated spurs

**GOAL:** Improve the ingress and egress of the road system to allow for the safe evacuation of the public and the ability of fire equipment and emergency vehicles to access the area

**ACTIONS:** In wildlands, chip all dead material, remove (cut, pull and/or spray) understory shrubs and prune lower branches of trees.

**PARTICIPANTS:** Licensed contractors, Fire Safe Council, property owners

**SCHEDULE:** November 2019 through April 2021. Best in the fall, OK anytime but avoiding nesting season and red flag days

#### TRINITY ROADSIDE TREATMENTS PHASE 1

**PRIORITY:** 1

**PROJECT TYPE:** E//P/C

**AREA:** Within County easement along Trinity Road and associated spurs

**GOAL:** Improve the ingress and egress of the road system to allow for the safe evacuation of the public and the ability of fire equipment and emergency vehicles to access the area

**ACTIONS:** In wildlands, chip all dead material, remove (cut, pull and/or spray) understory shrubs and prune lower branches of trees

**PARTICIPANTS:** Licensed contractors, Fire Safe Council, property owners

**SCHEDULE:** November 2019 through April 2021. Best in the fall, OK anytime but avoiding nesting season and red flag days

## CAVEDALE ROADSIDE TREATMENTS PHASE 2

**PRIORITY:** 1

**PROJECT TYPE:** E//P/C

**AREA:** From 30 feet up to 100 feet along Cavedale Road and associated spur roads

**GOAL:** Improve the ingress and egress of the road system to allow for the safe evacuation of the public and the ability of fire equipment and emergency vehicles to access the area

**ACTIONS:** In wildlands, chip all dead material, remove (cut, pull and/or spray) understory shrubs and prune lower branches of trees

**PARTICIPANTS:** Licensed contractors, Fire Safe Council, property owners

**SCHEDULE:** November 2020 through April 2021. Best in the fall, OK anytime but avoiding nesting season and red flag days

## TRINITY ROADSIDE TREATMENTS PHASE 2

**PRIORITY:** 1

**PROJECT TYPE:** E//P/C

**AREA:** From 30 feet up to 100 feet along Trinity Road and associated spur roads

**GOAL:** Improve the ingress and egress of the road system to allow for the safe evacuation of the public and the ability of fire equipment and emergency vehicles to access the area

**ACTIONS:** In wildlands, chip all dead material, remove (cut, pull and/or spray) understory shrubs and prune lower branches of trees

**PARTICIPANTS:** Licensed contractors, Fire Safe Council, property owners

**SCHEDULE:** November 2020 through April 2021. Best in the fall, OK anytime but avoiding nesting season and red flag days

#### EDUCATE COMMUNITY ON IMPORTANCE OF DEFENSIBLE SPACE

PRIORITY: 1

PROJECT TYPE: E//P/C

AREA: All property owners within boundaries of district

GOAL: Have property owners take responsibility for creating defensible space around their homes, buildings and businesses to avoid property loss, create space for responders to fight fires and save lives

ACTIONS: Install educational signage, conduct workshops, produce educational newsletter, share CAL FIRE existing resources

PARTICIPANTS: Property owners, MFSC, MVFD, CAL FIRE

SCHEDULE: Ongoing

#### INSTALL KNOX BOX AT ALL GATED ENTRIES

PRIORITY: 3

PROJECT TYPE: E/C

AREA: All gated entries within boundaries of district

GOAL: Allow emergency responders to access private residences

ACTIONS: Homeowners to purchase; possible bulk purchase

PARTICIPANTS: Homeowners

SCHEDULE: Anytime

#### *EDUCATE COMMUNITY REGARDING EVACUATIONS*

PRIORITY: 1

PROJECT TYPE: E/C

AREA: All property owners within boundaries of district

GOAL: Educate community on how to prepare for and execute evacuations

ACTIONS: Establish and identify evacuation routes, install educational signage, conduct workshops for community members utilizing Ready, Set, Go principals, teach self-sufficiency and how to identify "safety zones" for sheltering in-place

PARTICIPANTS: Property owners, MFSC, MVFD, CALFIRE, Sonoma County Sheriff

SCHEDULE: Ongoing

#### *CALL 'EM ALL/NIXLE SIGN-UP*

PRIORITY: 1

PROJECT TYPE: E/C

AREA: All property owners within boundaries of district

GOAL: Alert community members of emergencies and communicate disconcerting non-emergencies

ACTIONS: Develop protocols and standard operating procedures (SOPs) for CALL'EM ALL and sign-up community members. Educate community on how to participate in Nixle and other county communication tools used for emergency notifications

PARTICIPANTS: Every resident

SCHEDULE: Anytime

#### RIDGELINE FUEL BREAK FROM TED LOU RANCH TO 5800-5780 CAVEDALE

PRIORITY 3

PROJECT TYPE: E//P/C

AREA: From 5800 to 5780 Cavedale, from road east to ridgeline

GOAL: Establish fuel break treatment projects to modify fire behavior to reduce property damage and aid in suppressing wildfires

ACTIONS: Obtain permission of landowners to thin forest of conifers and remove understory brush

PARTICIPANTS: Landowners, outside contractors managed by MFSC

SCHEDULE: Best in the fall, OK anytime but avoiding nesting season and red flag days

#### EXPAND FIRELINE IN TO FUEL BREAK ALONG NICOLINI ROAD TO CAVEDALE ROAD

PRIORITY 2

PROJECT TYPE: E//P/C

AREA: From end of Nicolini Road to Cavedale Road

GOAL: Establish fuel break treatment projects to modify fire behavior to reduce property damage and aid in suppressing wildfires

ACTIONS: Obtain permission of landowners to thin forest of conifers and remove understory brush and guide landowners guide revegetation to fire-safe fuel type

PARTICIPANTS: Landowners, outside contractors managed by MFSC

SCHEDULE: Best in the fall, OK anytime but avoiding nesting season and red flag days

#### RIDGELINE FUEL BREAK AT TOP OF TWO MAJOR DRAINAGES

PRIORITY 3

PROJECT TYPE: E//P/C

AREA: At 4614 Cavedale Road to top of two major drainages

GOAL: Establish fuel break treatment projects to modify fire behavior to reduce property damage and aid in suppressing wildfires

ACTIONS: Obtain permission of landowners to thin forest of conifers and remove understory brush

PARTICIPANTS: Landowners, outside contractors managed by MFSC

SCHEDULE: Best in the fall, OK anytime but avoiding nesting season and red flag days

#### COMPLIANT HOME ADDRESS AT ROAD

PRIORITY: 2

PROJECT TYPE: E/P/C

AREA: All property owners

GOAL: Allow emergency responders to respond and follow directions to property addresses

ACTIONS: Install reflective address numbers at the base of each access driveway

PARTICIPANTS: MFVD, MFSC, residents

SCHEDULE: Ongoing

#### JENSEN ROAD ROADSIDE TREATMENTS

PRIORITY: 3

PROJECT TYPE: E//P/C

AREA: 30 feet both sides of Jensen Road

GOAL: Improve the ingress egress of the road system to allow for the safe evacuation of the public and the ability of fire equipment and emergency vehicles to access the area

ACTIONS: In wildlands, chip all dead material, remove (cut/pull) understory shrubs and prune lower branches of trees

PARTICIPANTS: Outside contractors and property owners

SCHEDULE: Best in the fall, OK anytime, but avoid nesting season and red flag days

#### PRODUCE AND DISTRIBUTE GLEN ELLEN MAYACAMAS RECOVERY GUIDE

PRIORITY: 3

PROJECT TYPE: P

GOAL: Guide vegetation growth to be more fire-safe and provide residents resources

ACTIONS: Identify residents' information gaps, gather already-existing material, organize material and publish

PARTICIPANTS: MFSC Committee

SCHEDULE: Anytime

#### SHIFT FOREST SPECIES COMPOSITION TO WOODLAND FROM CONIFER

PRIORITY: 2

PROJECT TYPE: I/P/C

AREA Wildland areas with conifers within boundaries of MFSC

GOAL: Modify fuel characteristics of forest to burn with less intensity

ACTIONS: Plant oak trees and thin Douglas fir trees

PARTICIPANTS: Private landowners, private contractors and volunteers

SCHEDULE: Plant oaks in early winter when soil is saturated. Thin trees-best in fall, but anytime, avoiding nesting season and high fire danger

#### "HOW TO BURN" WORKSHOPS FOR NON-COMMERCIAL PROPERTY OWNERS

PRIORITY: 1

PROJECT TYPE: I/P/C

AREA: All residents

GOAL: Reduce understory and chipped debris

ACTIONS: Hold demonstration workshops, create and publish procedure checklists for property owners

PARTICIPANTS: Property owners, MVFD, CAL FIRE, MFSC

SCHEDULE: Ongoing, with a focus on burn season

#### NEIGHBORS IN NEED PROGRAM

PRIORITY: 3

PROJECT TYPE: E/I/P/C

AREA: All property owners

GOAL: Provide financial assistance to community members for defensible space projects around their properties

ACTIONS: Create a criteria and program and implement in 2020

PARTICIPANTS: Residents, landowners, MVFD, MFSC, CAL FIRE, Community agencies and nonprofits

SCHEDULE: Anytime

#### EXPAND FIRELINE FUEL BREAK FROM AKOMA ZOUME WINERY TO 4440 CAVEDALE ROAD

**PRIORITY:** 1

**PROJECT TYPE:** E//P/C

**AREA:** Property owners within and bordering the fuel break

**GOAL:** Establish fuel break treatment projects to modify fire behavior to reduce property damage and aid in suppressing wildfires

**ACTIONS:** Obtain permission of landowners, remove dead material and guide revegetation to fire-safe fuel types

**PARTICIPANTS:** Landowners, private contractors, MVFD and MFSC as project managers

**SCHEDULE:** Best in the fall, OK anytime but avoiding nesting season and red flag days

#### MVFSC LEGACY FIRE ROAD #1 17-FP-LNU-2053

**PRIORITY** 2

**PROJECT TYPE:** E//P/C

**AREA:** Bald Mountain shaded fuel break

**GOAL:** Establish fuel break treatment projects to modify fire behavior to reduce property damage and aid in suppressing wildfires

**ACTIONS:** Collaborate with the Mt Veeder Fire Safe Council to gain understanding of how to execute this type of project

**PARTICIPANTS:** Mt. Veeder Fire Safe Council, MFSC, CAL FIRE, property owners

**SCHEDULE:** Begin in 2019

#### MVFSC LEGACY FIRE ROAD #3 17-FP-LNU-2064

PRIORITY 2

PROJECT TYPE: E//P/C

AREA: Mt Veeder Summit Road

GOAL: Establish fuel break treatment projects to modify fire behavior to reduce property damage and aid in suppressing wildfires

ACTIONS: Collaborate with the Mt Veeder Fire Safe Council to gain understanding of how to execute this type of project

PARTICIPANTS: Mt. Veeder Fire Safe Council, MFSC, CAL FIRE, property owners

SCHEDULE: Begin in 2019

#### COMMUNITY OUTREACH – INSTRUCTIONS 17-FP-LNU-2055

PRIORITY 1

PROJECT TYPE: E//P/C

AREA: All

GOAL: Create community outreach plan and educational coordination. Develop detailed property database to include water sources, accessibility matrix, and structure count

ACTIONS: Collaborate with the Mt Veeder Fire Safe Council on shared areas of interest and properties

PARTICIPANTS: Mt. Veeder Fire Safe Council, MFSC, CAL FIRE, property owners

SCHEDULE: Begin in 2019

#### CREATING WILDFIRE ADAPTIVE HOMES AND LANDSCAPES

PRIORITY: 1

PROJEC TYPE: E//P/C

AREA: All

GOAL: Protect homes from ignitions during wildfires following guidelines from Fire Safe Sonoma published in the document "Creating Wildfire Adaptive Homes & Landscapes (Appendix D)

ACTIONS: Ongoing education of residents and homeowners on how to design and modify stuctures to withstand wildfire utilizing existing educaitonal and resource materials.

PARTICIPANTS: MFSC, property owners, CAL FIRE, Fire Safe Sonoma

## SUMMARY OF RISK RANKINGS

| Community,<br>structure or area<br>at risk | Fuel<br>Hazard | Risk of<br>Wildfire<br>Occurrence | Structural<br>Ignitability | Firefighting<br>capability | Overall<br>Risk |
|--------------------------------------------|----------------|-----------------------------------|----------------------------|----------------------------|-----------------|
| Residential homes                          | High           | High                              | High                       | Medium                     | High            |
| Residents                                  | High           | High                              | High                       | Low                        | High            |
| Primary Escape<br>Roads/Routes             | High           | High                              | High                       | Medium                     | High            |
| MFVD Station 1                             | High           | High                              | Medium                     | High                       | High            |
| MFVD Station 2                             | High           | High                              | Medium                     | High                       | High            |

## FINALIZED COMMUNITY WILDFIRE PROTECTION PLAN:

The Mayacamas Fire Safe Council has finalized their Mayacamas Community Wildfire Protection Plan in accordance with the guidelines set forth by the Healthy Forests Restoration Act.

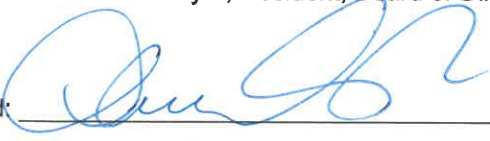
- It was collaboratively developed. Interested parties including residents, CAL FIRE, Mayacamas Volunteer Fire Department, Sonoma Valley Fire and Rescue Authority and the County of Sonoma have been consulted.
- It identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect the Mayacamas mountain community, located in Glen Ellen, California.
- It recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.
- It educates the community on the benefits of and how to create defensible space for property owners and the community at-large.

## SIGNATURES OF SUPPORT FROM STAKEHOLDERS

The following entities mutually agree with the contents of this Community Wildfire Protection Plan:

Agreed:  Date: 4/12/19

Roberta MacIntyre, President, Board of Directors, Fire Safe Sonoma

Agreed:  Date: 4/12/19

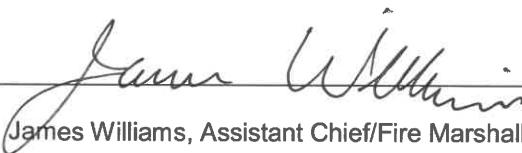
Allison Ash, President, Board of Directors, Mayacamas Volunteer Fire Department

Agreed:  Date: 4/16/19

Chief Michael Jablonowski, Mayacamas Volunteer Fire Department

Agreed:  Date: 4/11/19

Chief Steve Akre, Sonoma Valley Fire and Rescue Authority

Agreed:  Date: 4/12/19

James Williams, Assistant Chief/Fire Marshall, Sonoma County Permit Sonoma Fire Prevention Division

Agreed:  Date: 4/17/19

CAL FIRE, Sonoma-Lake-Napa Unit Chief, Shana Jones

Agreed:  Date: 4/12/19

Supervisor Susan Gorin, Sonoma County, First District

## APPENDIX A

### CURRENT MFSC BOARD MEMBERS AS OF 2/1/2019

Kristen Drummond, Co-Chairperson

Lisa Warner, Co-Chairperson

Geoffrey Herrick, Treasurer

Jennifer O'Mahony, Secretary

Roberta Acker, Board Member

## APPENDIX B

### STATE AND LOCAL AGENCIES

- Local Government: Susan Gorin, County Supervisor
- County: James Williams, Assistant Chief/Fire Marshall, Sonoma County Permit Sonoma Fire Prevention Division
- Local Fire Chief: Chief Michael Jablonowski, Mayacamas Volunteer Fire Department
- Local Fire Chief: Chief Steve Akre, Sonoma Valley Fire and Rescue Authority
- CAL FIRE Battalion Chief, Kirk Van Wormer, Glen Ellen Battalion
- CAL FIRE, Sonoma-Lake-Napa Unit Chief, Shana Jones

## APPENDIX C

COMMUNITY RISK ASSESSMENT, PREPARED BY CAROL RICE, OCTOBER 2018

## APPENDIX D

"CREATING WILDFIRE ADAPTIVE HOMES & LANDSCAPES" – PUBLISHED BY FIRE SAFE SONOMA



## APPENDIX C



***COMMUNITY RISK ASSESSMENT***

***October, 2018***

## MAYACAMAS FIRESAFE COUNCIL COMMUNITY DESCRIPTION

The Mayacamas FireSafe Council is located in a wildland-urban interface (WUI), where natural vegetation and vineyards intermingle with structures, yards, and residential use of the land.

Several aspects that affect the fire safety of the community are discussed here. Several factors support fire response and evacuation, such as access, addressing and signage, as well as water supply. Others affect the behavior of a wildfire itself; these are topography, weather and fuels. Some are inter-connected; topography influences both wind flows and ease of building roads.

### Access

Typical of most wildland urban interface areas, access in the area is poor. It's fairly difficult to get to and travel within the area. Two main roads, Trinity Road and Cavedale Road both are quite steep in locations. Trinity Rd is comprised of two narrow lanes, while Cavedale Road is often more narrow, with some locations for passing.

Most structures are served by spur roads and long driveways, which are also narrow and windy. These spur roads dead end, so serve many homes on one way in and out. Most of the narrow roads are made more narrow by lots of vegetation on both sides. There are lots of gates – which pose a problem for fire responders. Addressing is almost all compliant with CAL FIRE codes, which requires a reflective lettering of at least 4 inch height.

Vegetation is abundant along roads, and currently much of the vegetation consists of piles of dead material. This makes the access even less effective as passing is more difficult and dangerous during a wildfire.



Figure 1. Map of County roads in  
Mayacamas FireSafe Council

### Terrain

The land form in the Mayacamas FireSafe Council generally slopes from over 2200 feet in elevation along it's eastern border, to 300 elevation near the valley floor to the east. The western exposure receives abundant afternoon sun and efficiently heats the fuels.

Topography plays an important role in determining the direction and speed of fire spread.

Strong westerly winds with hot, dry conditions are common.

In addition, there is a strong set of diurnal winds, those that move air up and down the canyons, due to the obvious change in elevations, and different times the sun hits the mountainside.

The area in the Mayacamas FireSafe Council has several long, deep canyons, including Hooker, Whitman, Stuart and Agua Caliente. Winds are aligned with these canyons, guiding fire spread. This can overwhelm fire containment efforts.

Pronounced ridges, such as along Trinity Road, or the north-south ridgeline separating Sonoma and Napa Counties, usually block winds.

In addition to the distinct canyons, other land forms are in a confused arrangement with no particular pattern. This often results in unpredictable wind flows during a wildfire.

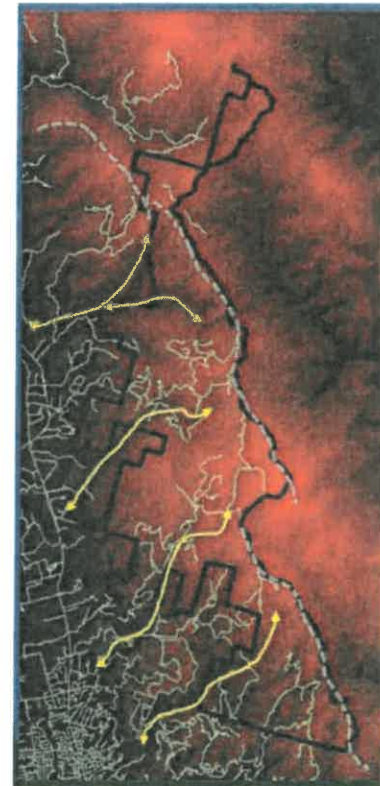


Figure 2. Diagram of topography and canyon alignment

## Fuels

Biomass and building materials literally fuel a wildfire. While it is not practical to alter topography or weather, fuels can be modified to change fire behavior. Natural vegetation, landscaping, and buildings can all be designed and retrofitted to achieve fire safety.

The vegetation is comprised of a mixture of oak woodlands, Douglas fir, chaparral, vineyards, and farms. A few pockets of knobcone pine are found, which is a remnant of a soil-erosion project after the 1964 Nuns Canyon Fire.

Oak woodlands are typically found on the nor-facing slopes and in the bottom of canyons. Douglas fir grew within the oak woodlands on the higher elevations. Chaparral is prevalent on steep west- and south-facing slopes, irrespective of elevation.

Chaparral and all shrubby vegetation types burn quite rapidly, and produce quite hot fires. Fuels associated with oak woodlands can be among the most compatible with fire safety, if the undergrowth is absent and the lower branches of the forest are high off the ground. However, the most common circumstance in the area is that the oak woodland undergrowth is comprised of shrubs. These promote hotter fires and enable the fire to reach to tree canopy. When tree canopies are involved, flame lengths are often twice the height of the forest (potentially a hundred feet) and produce and distribute embers well ahead of the fire perimeter.

Vineyards are often found on more gentle terrain, however, they also cling to steep west- and south-facing slopes. These vineyards can buffer fire intensity as they have less biomass than

chaparral or oak woodlands, and thus less fuel to burn. Some small farms perform similarly during a wildfire.

All structures observed had fire-resistant roofs. Older residences are generally built with wood siding, whereas newer structures (including wineries and structures associated with vineyard operations) use fire-resistant materials.

### Fire Behavior Simulation

A fire behavior prediction software, FARSITE, is used routinely during wildland firefighting efforts throughout the nation. This same program can be used to inform communities and fire departments of potential fire spread patterns and the utility of fuel modification.

Four simulations were conducted, each with high temperatures and low humidities. The temperature was 105 degrees F, and the relative humidity as 19 percent.

Wildfire suppression normally hampers fire spread, however these scenarios assumed an emphasis on evacuation precluded effective fire suppression.

#### Simulation 1

In the scenario selected, the winds were assumed to be 23 miles per hour, and the direction was blowing uphill, from the west. This direction was observed during the 2017 wildfire. The location was selected to be south of Trinity Road, off Margie Road, simulating a person who started a wildfire from mowing dry grass.

After 30 minutes, the fire grew to 2 acres in size, and involved the nearby structure.

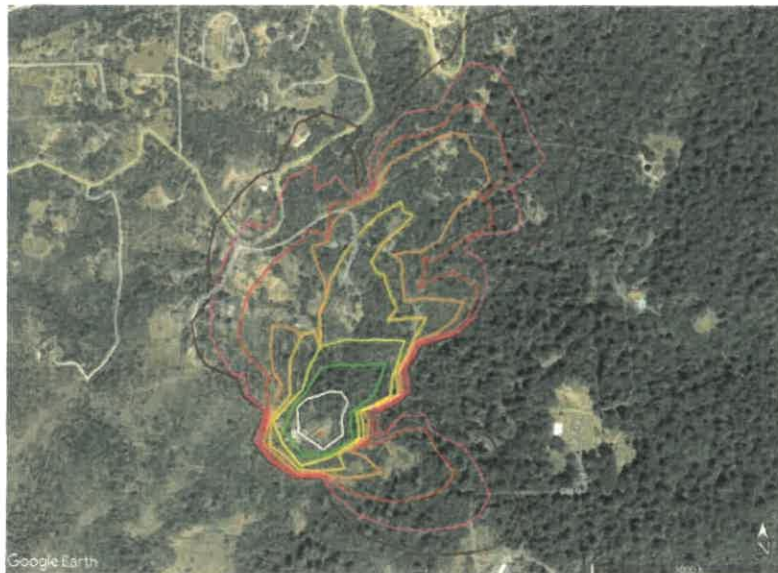


Figure 3. Simulation #1. Location of simulated wildfire spread and direction of wind.



**Figure 4. Simulation #1. Area encompassed by wildfire after 120 from ignition. Lines indicate location of fire perimeter every 30 minutes. White = after 30 minutes, Green = 60 minutes, yellow 90 minutes, light orange = 120 minutes.**

After 120 minutes from ignition, the simulated fire spread to 15 acres, and more importantly, started 23 new fires from embers flying ahead of the fire front. At this point, more structures are involved. The woodland tended to limit fire's spread to the east even though the wind is driving the fire uphill, to the northeast.



**Figure 5. Simulation #1. Area encompassed by wildfire 270 minutes from ignition. Lines indicate location of fire perimeter every 30 minutes. White = after 30 minutes, Green = 60 minutes, yellow 90 minutes, light orange = 120 minutes, Dark Orange = 180 minutes, Red = 210 minutes, Purple = 240 minutes, Brown = 270 minutes**

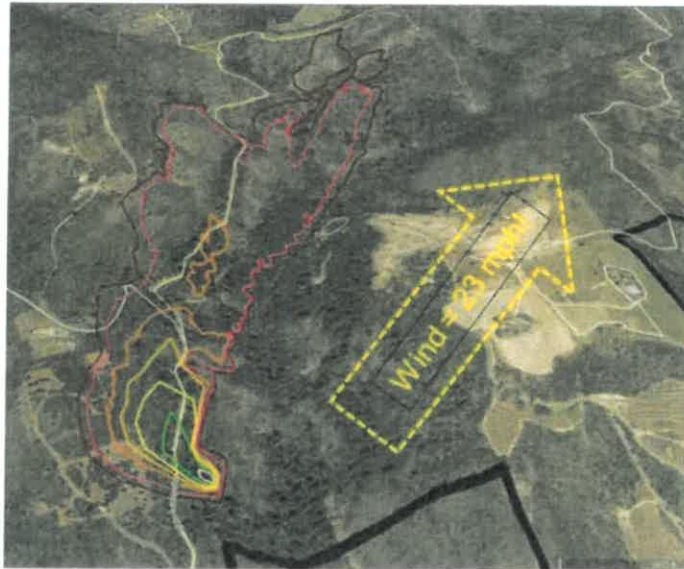
After three hours, the fire was 40 acres, with 52 new spot fires. The pattern of growth indicates faster fire spread in shrubs and grassy areas. Multiple structures were likely to be burning.

The fire simulation stopped after 3.5 hours, when it doubled in size during the previous hour, to 80 acres. The fire started 55 new fires in ahead of the fire perimeter and is advancing north and uphill to the east.

### Simulation 2

For the second simulation, the winds also were selected to blow uphill at 23 miles per hour, in slightly different fuels conditions. This ignition scenario was of a car fire resulting from an accident on Cavedale Rd.

After 3 hours the fire burned approximately 60 acres, advancing uphill and to the north of the ignition location. The creekbed and moister vegetation tended to limit fire spread to the east, and new spot fires outside the fire perimeter were not observed until after two hours from ignition.

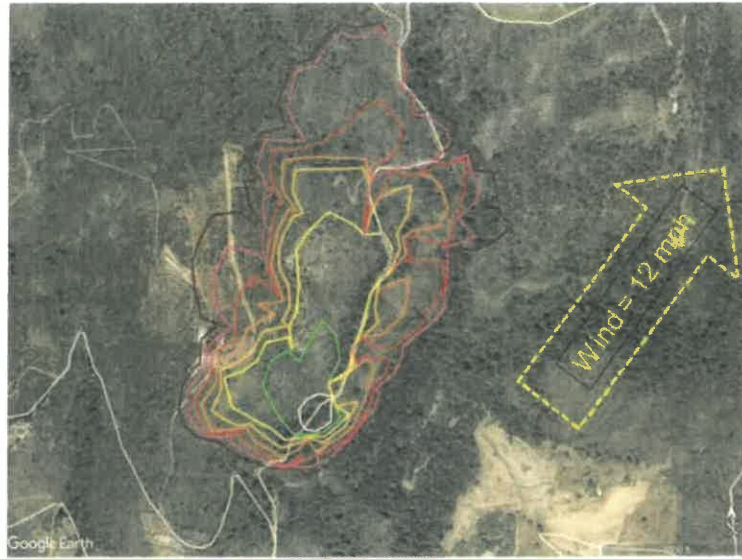


*Figure 6. Simulation #2. Area encompassed by wildfire 270 minutes from ignition. Lines indicate location of fire perimeter every 30 minutes. White = after 30 minutes, Green = 60 minutes, yellow 90 minutes, light orange = 120 minutes, Dark Orange = 180 minutes, Red = 210 minutes, Purple = 240 minutes, Brown = 270 minutes*

### Simulation 3

In this simulation, the wind was assumed to be only 12 mph, but still aligned with a canyon east of Cavedale Road.

After 3.5 hours, the fire burned 53 acres, and created 21 new fires ahead of the fire perimeter. This scenario illustrates the potential for the use of ridgeline, with less abundant fuels as potential containment locations.



**Figure 7. Simulation #3 Area encompassed by wildfire 270 minutes from ignition. Lines indicate location of fire perimeter every 30 minutes. White = after 30 minutes, Green = 60 minutes, yellow 90 minutes, light orange = 120 minutes, Dark Orange = 180 minutes, Red = 210 minutes, Purple = 240 minutes, Brown = 270 minutes**

#### **Simulation 4**

The simulation was performed to illustrate not every fire is expected to spread quickly. This simulation used the same weather conditions, but assumed a wind blew from the northeast, from near to top of the Mayacamas mountains. Due to the topography and fuels are the ignition site, little fire spread was observed.



**Figure 8. Simulation #4. Area encompassed by wildfire 270 minutes from ignition. Lines indicate location of fire perimeter every 30 minutes. White = after 30 minutes, Green = 60 minutes, yellow 90 minutes, light orange = 120 minutes, Dark Orange = 180 minutes, Red = 210 minutes, Purple = 240 minutes, Brown = 270 minutes**

## **Conclusions**

The potential for large fires is always present. Big fires have occurred and will occur again in the Mayacamas Region. The topography, fuels and access combine to create a condition where fire behavior is intense and containment opportunities are limited.

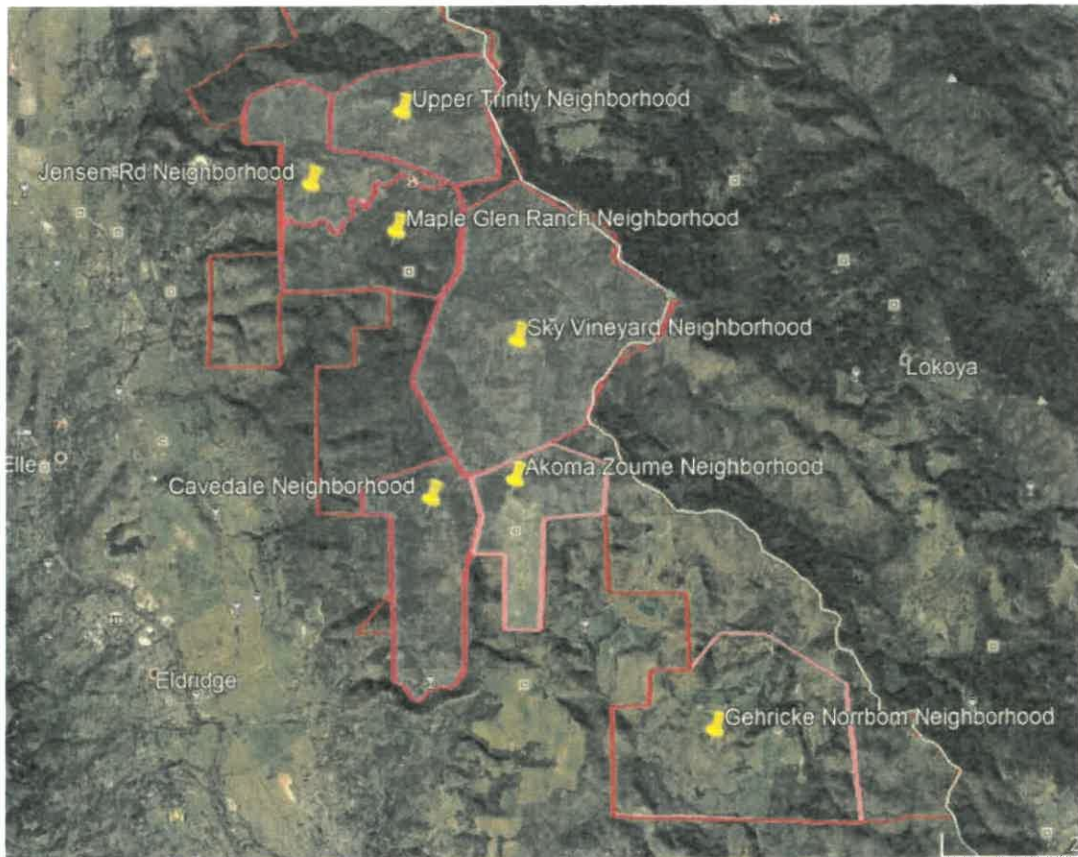
There is not a linkage between fire size and damage; big fires don't have to be damaging, and fires don't have to be big to be damaging.

Fire behavior can be changed through fuel management, with a few considerations

- Be aware of wind flow patterns
- Keep in mind the influence of topography on wind flow
- Manage fuels to limit spotting potential ahead of the fire
- Limit flame length to reduce damage loss

Projects to manage vegetation can create more containment options and make access more effective.

## **MAYACAMAS FIRESAFE COUNCIL NEIGHBORHOOD ASSESSMENT**



*Suggested Neighborhoods of Mayacamas FireSafe Council Red outline is Mayacamas FireSafe Council boundary, Pink outline are the boundaries of the neighborhoods*

There are seven suggested neighborhoods in the area encompassed in the Mayacamas FireSafe Council.

1. Jensen Rd
2. Upper Trinity
3. Maple Glen Ranch
4. Sky Vineyard
5. Moon Mountain Retreat (Now Akome Zouma)
6. Cavedale
7. Gehricke Norrbom

These neighborhoods were delineated based on groupings of structures, access to the neighborhood and land use. The neighborhoods are listed starting from the north and proceeding south.

All sections of the road within the MVFD are extremely narrow, steep and windy. Most sections are one-lane with sporadic passing opportunities.

## Neighborhood #1: Jensen Rd.



**Access** This is the most heavily roaded neighborhood, with three spur roads leading north off Trinity Rd. Each spur road has several branches. The roads are fairly wide, paved and short, compared to those on the rest of the Mayacamas FireSafe Council. All roads and driveways have adequate turnarounds.

**Terrain:** The slopes in this neighborhood fall to the north, to Calabeza (Nuns) Canyon, however, the terrain at the top of the slope is confused, and inconsistent. Several knolls and shallow valleys are associated with the developed portion of the neighborhood.

**Defensible Space conditions:** Defensible space is generally good, with large bare patches and parking lots associated with businesses.

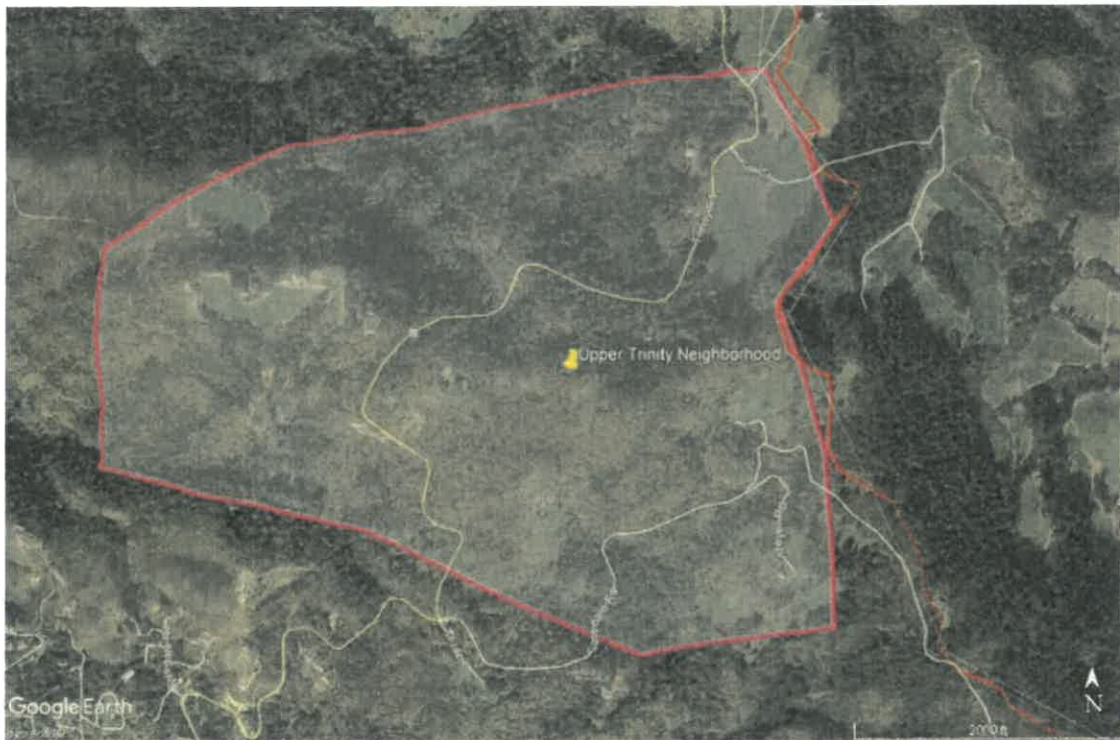
**Pattern of development and how it relates to fire safety:** Many of the lots seemed to have been developed in the last 10 years. The developed lots are generally smaller than 40 acres, whereas larger lots to the north are still wildlands.

**Adjacent fuels:** Vineyards are fairly common on the southern third; fuel modification and thinned forests are present near many of the residences. A thick

forest and chaparral intermix is found on the lower, northern two-thirds of the neighborhood, and on the west-facing slopes.

**Unusual wind conditions, cause, likely spread:** None are likely.

## **Neighborhood #2: Upper Trinity**



**Access:** All access is off Trinity Rd. Most of the neighborhoods nearly a dozen residences or businesses have long driveways. Roads are suitable for vineyard equipment and large trucks. All are relatively steep.

**Terrain:** The neighborhood is on the top of the Mayacamas Mountain's north-south ridgeline. Terrain is among the flattest in the Mayacamas FireSafe Council, although side slopes can exceed 60% on the northwest aspects.

**Defensible Space conditions:** Defensible space was generally good, reinforced with vineyards and parking lots.

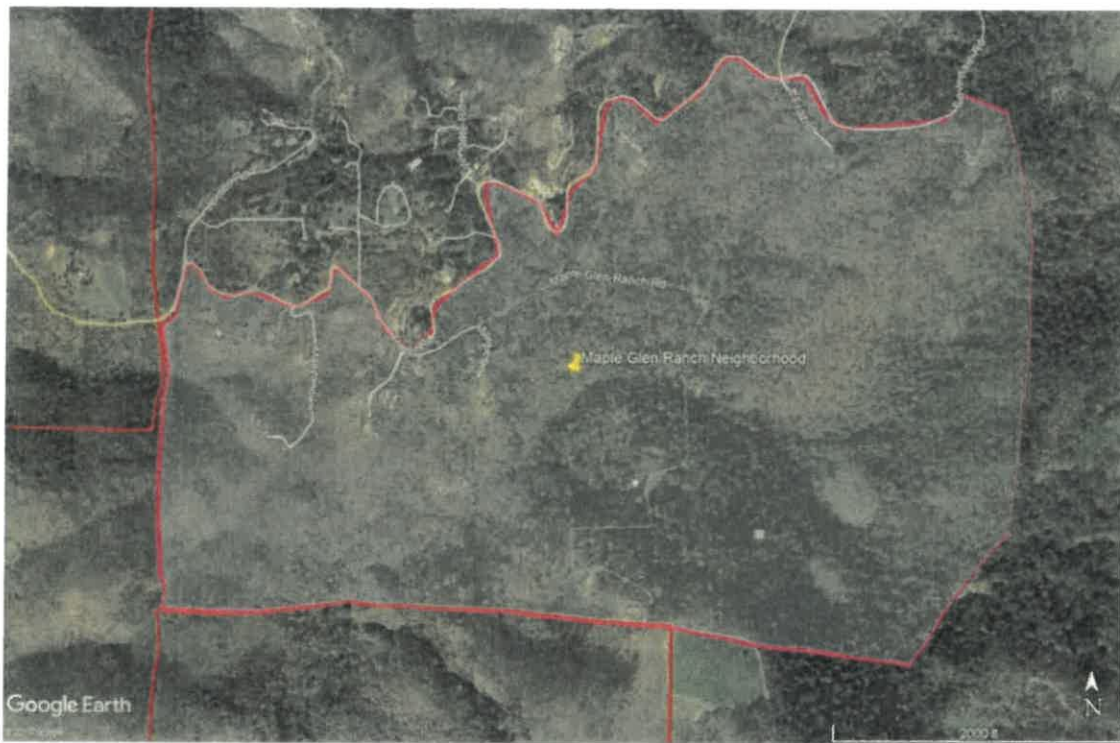
**Pattern of development and how it relates to fire safety:** The large lots in this neighborhood support vineyards, ranchettes, and big yards.

**Adjacent fuels:** Some vineyards are found in the northern portion of the neighborhood, and can moderate fire behavior in adjacent lands. Elsewhere

dense woodlands, and chaparral cover the west-facing portion, and Douglas fir and dense mixed evergreen forests are found in the northern and eastern portion of the neighborhood.

**Unusual wind conditions, cause, likely spread:** The northern portion of the neighborhood would be affected by daily uphill/downhill low in the Nuns/Calabazas Canyon. The topographic notch at the top of the ridge along Trinity Rd. can accelerate east-west windflow during a wildfire.

### **Neighborhood #3: Maple Glen**



**Access:** Access is off Trinity Road, via a few spur roads, such as Manzanita Rd. Maple Glen Road is a long spur road off Trinity Rd. serving approximately a dozen structures. The access road are generally narrow and windy, of moderate steepness. Driveways are also narrow and windy, but relatively short.

**Terrain:** The neighborhood starts at the ridgeline following Trinity Road and slopes to the southwest to Stuart Creek. The southern portion of the neighborhood forms the other side of Stuart canyon. A large topographic knoll, or hill is located in the middle of the neighborhood. The ridgeline along Trinity Road would normally block strong northerly surface winds.

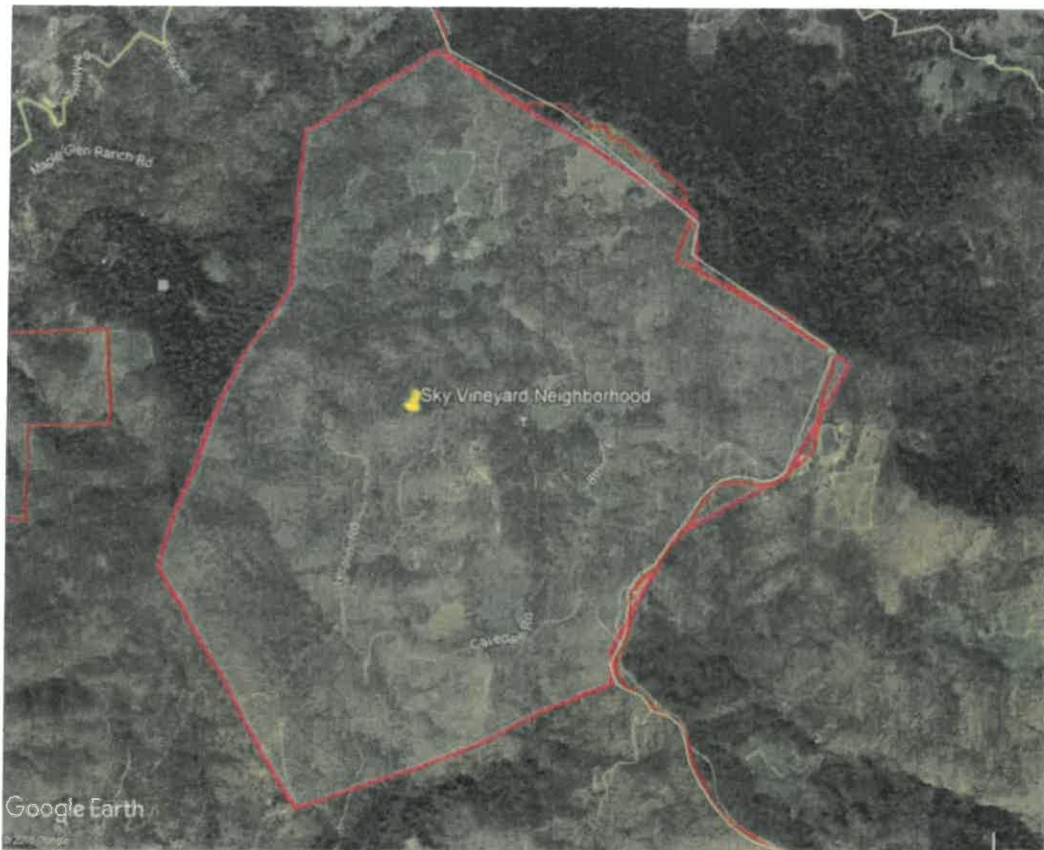
**Defensible Space conditions:** A few structures had adequate defensible space, however, abundant vegetation was apparent in older Google Earth satellite images.

**Pattern of development and how it relates to fire safety:** The structure density of this neighborhood is among the highest in the Mayacamas. The lots are still large enough that the fuels in between houses are significant vectors of fire. Most lots are situated mid-slope, however those on Manzanita Rd. are at the top of the ridge, with increased exposure to high winds and pre-heating air during a wildfire. Vineyards are not a significant fuel type in this neighborhood.

**Adjacent fuels:** Fuels are a mixture of oak woodland in valleys, and knobcone pine stands on the highest knolls and ridges. Only a few small vineyards are found in this neighborhood.

**Unusual wind conditions, cause, likely spread:** The forks of Stuart Canyon divide in this neighborhood, and could have caused spurious winds and unpredictable fire behavior as the wind flow in the canyon shifts between rising from the valley floor to the west, and flowing downhill with the northeasterly Diablo winds.

## Neighborhood #4: Sky Vineyard



**Access:** Access is off Cavedale Rd., with a few spur roads, such as Nicolini, 8th St., and an unnamed spur leading to Akome Zouma winery, and one leading to structures on 2980-303 Cavedale Rd. While a few residences are accessed via long driveways many structures are accessed on short driveways off the long spur roads. This neighborhood is in the middle of the length of Cavedale Rd, and response time from the valley floor is at its longest (a MVFD station is within this neighborhood).

**Terrain:** This neighborhood contains the highest elevations in the Mayacamas FireSafe Council, and among the most gentle terrain. The terrain varies from rolling hills on the east to steep slopes and narrow valleys in the western portion, especially along Nicolini Rd.

**Defensible Space conditions:** Defensible space is usually adequate, sometimes formed by farming, vineyards, and agricultural industry.

**Pattern of development and how it relates to fire safety: Land Use Pattern:** Scattered large residences, except for a cluster on Nicolini Rd., Vineyards are common on the northern portion of the neighborhood, residences on the southern portion. Some farming is conducted in the middle of the neighborhood.

**Adjacent fuels:** Adjacent fuels: Vineyards on northern portion, which provides a buffer, and moderates fire behavior in adjacent lands, otherwise, fuels in western portion of the neighborhood are a mixture of oak woodland with Douglas fir, and chaparral, which are co-mingled enough to burn as one fuel type. Douglas fir and dense mixed evergreen forest was most common east of Cavedale Rd., Fuels are sparse, comprised of grass and short shrubs along Nicilini Rd.

**Unusual wind conditions, cause, likely spread:** The convoluted terrain will support erratic winds and unpredictable fire spread patterns.

### **Neighborhood #5: Akome Zoume**

*Hedson area*



**Access:** A secondary access is available off through Cavedale Rd., which is 1.5 lanes wide. Access is off Cavedale Rd. with a one-lane dirt road. The main access is also off Cavedale Road, at a junction near the top of Mayacamas Mountain. The

access road is unnamed, and is dirt. The unnamed access road runs along the ridge of Mayacamas Mountain dividing Napa and Sonoma.

Lots and vineyards are accessed with long driveways and dirt roads. Because the roads are suitable for vineyard equipment and large trucks, width is generally adequate and sharp curves are absent. The roads are moderately steep, and there are places to turnaround at most of the road ends.

**Terrain:** A broad terrace sits 600-ft above a well-defined, steep canyon (Hooker Canyon). This canyon acts as a topographic chimney that facilitates air flow up and down the canyon during a wildfire.

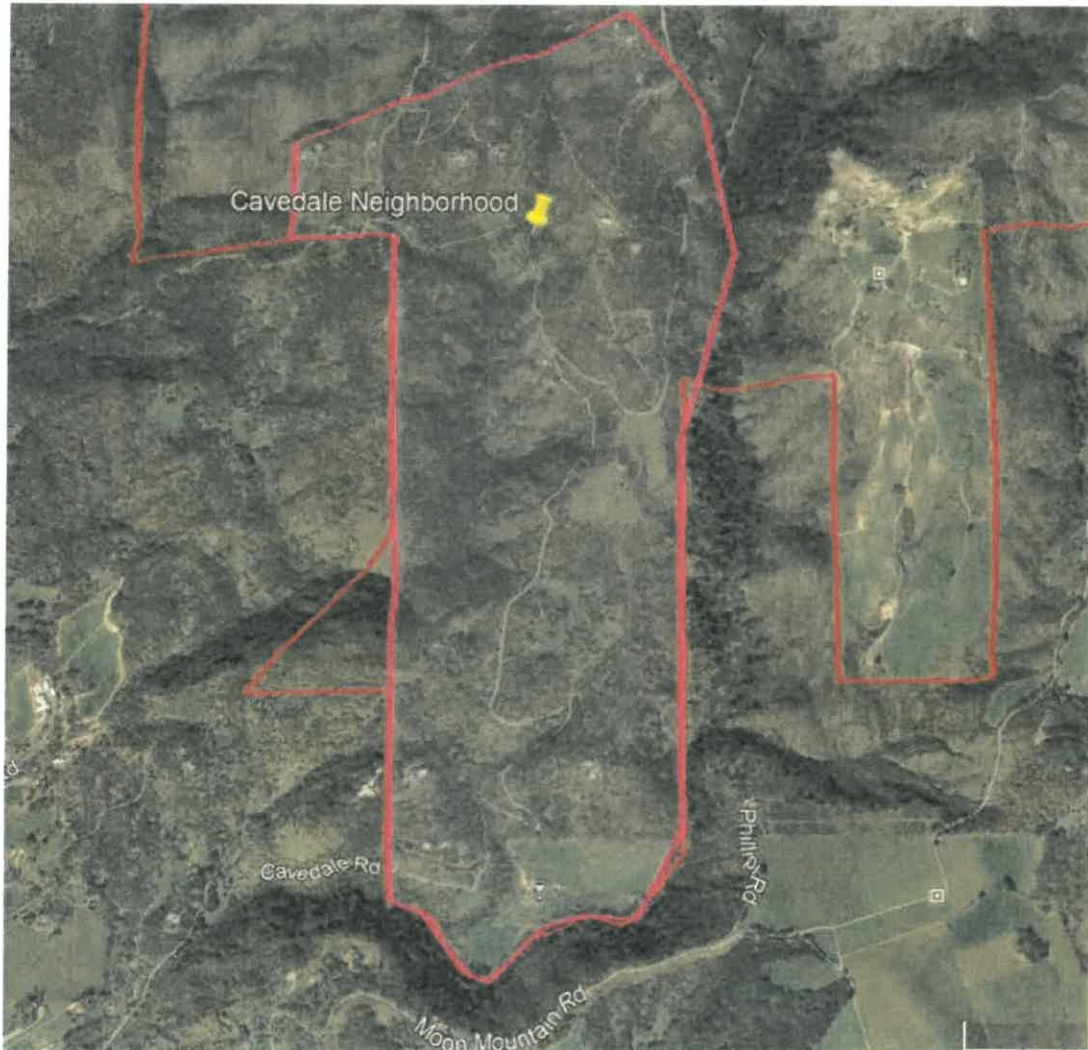
**Defensible Space conditions:** Few residences and structures are in this neighborhood, most have defensible space, however, some were nestled near heavily wooded locales.

**Pattern of development and how it relates to fire safety:** Land use is a mixture of large residential properties, and vineyards. All structures surrounded by vineyards survived the 2017 fires; All those structures had ample defensible space. Structures were located at the top of the slope, near broad ridgeline. Those structures closest to the oak woodlands were lost.

**Adjacent fuels:** Natural vegetation consisted of oak woodlands with a shrubby understory, and chaparral, north coastal scrub, with some Douglas fir, especially in the canyon east of Cavedale Rd.. The structures are located on the broad terrace, on flatter terrain; however these vineyards are on steep south-facing slopes on the broad ridge south of the terrace. Fuels on the north portion of this neighborhood are north coastal scrub and oak woodlands, which are interspersed.

**Unusual wind conditions, cause, likely spread:** The exposed nature of the top of the broad ridge results in exposure to high winds. Additionally, the western portion of the neighborhood is aligned with a steep-sided canyon that directs air flow (and spread) during a fire.

## Neighborhood #6: Cavedale



**Access:** Access is via Cavedale Road which is the neighborhood's only access. The road is typically 1.5 lanes wide, with sporadic, occasional passing opportunities. The road is steep, hardly ever flat, but not more than 8% grade. Cavedale Road is several miles long, leading to the neighborhood either from the north or south with a few spurs and wider intersections. The number of structures in this neighborhood is less than 20, however, Cavedale Road serves the entire Mayacamas community and thus has greater traffic than for 20 residences and businesses. Long, steep driveways provide access to structures, with one exception: the residences at 2805-2933 Cavedale are within a hundred feet of Cavedale.

**Terrain:** Hooker canyon and Whitman Canyon to the north are significant topographic features. Cavedale Rd. travels up the spine of the ridge separating

the two canyons. Both canyons are significant chimneys for heat moving up and down the elevation gradient. Vineyards and large residences are generally located on flatter portions of the neighborhood, and steep sided canyons are the rule elsewhere, especially north of Cavedale Loop.

**Pattern of development and how it relates to fire safety.** Almost all lots below Cavedale Loop are at least 40 acres in size, At the beginning of Cavedale Loop, there is a collection of smaller lots, most with a structure. Parcels around Cavedale Loop are smaller, but still at least 10 acres in size. Structures are widely spaced. Some vineyards are found on the east side of Cavedale Rd., which can act as a buffer and reduce fire intensity in the surrounding land.

**Defensible Space Conditions:** Defensible space is adequate: few to none structures were lost in this neighborhood during the 2017 fire.

**Adjacent fuels:** Vegetation is comprised of a mixture of oak woodland and chaparral in a matrix that burned as one vegetation type, was fast-moving, intense fire behavior.

**Unusual wind conditions, cause, likely spread:** Winds flowing down Hooker and Whitman Canyon likely acts as chimneys facilitating spread.

## Neighborhood #7: Gehricke-Norrbon



**Access:** Gehricke Rd. Access is only via Gehricke Rd. from the south, off Lovall Valley Rd., As such, this neighborhood is separated from the rest of the Mayacamas Neighborhoods. Gehricke Rd is several miles long, with no alternative route to/from the structures. At the top, it almost meets Redwood from Napa Co. Norrbom Rd. originates in downtown Sonoma and travels up several miles to the north. It splits into three branches at the northern extent. These bigger lots have longer driveways, requiring a bigger firefighting resource commitment to protect each structure.

The lack of access is likely to have played a role in the damage from a fire spreading from the north.

**Terrain:** The area slopes down to the south. This allows normal daily winds to flow up and down from the bay, receiving moisture from the bay. The canyon orientation also facilitates accelerating subsiding winds from the north. Gehricke Rd. ascends from 200 to 1000 ft along its route. Norrbom Rd. extends to 800-ft elevation from 200ft at its origin. Extremely convoluted terrain, with many small peaks and short valleys. This would create spurious winds and hamper fire suppression efforts.

The most significant canyon is Agua Caliente Canyon, which follows Norrbom Rd., and extends from an unnamed loop stemming from Cavedale Rd., and is aligned with a northern windflow.

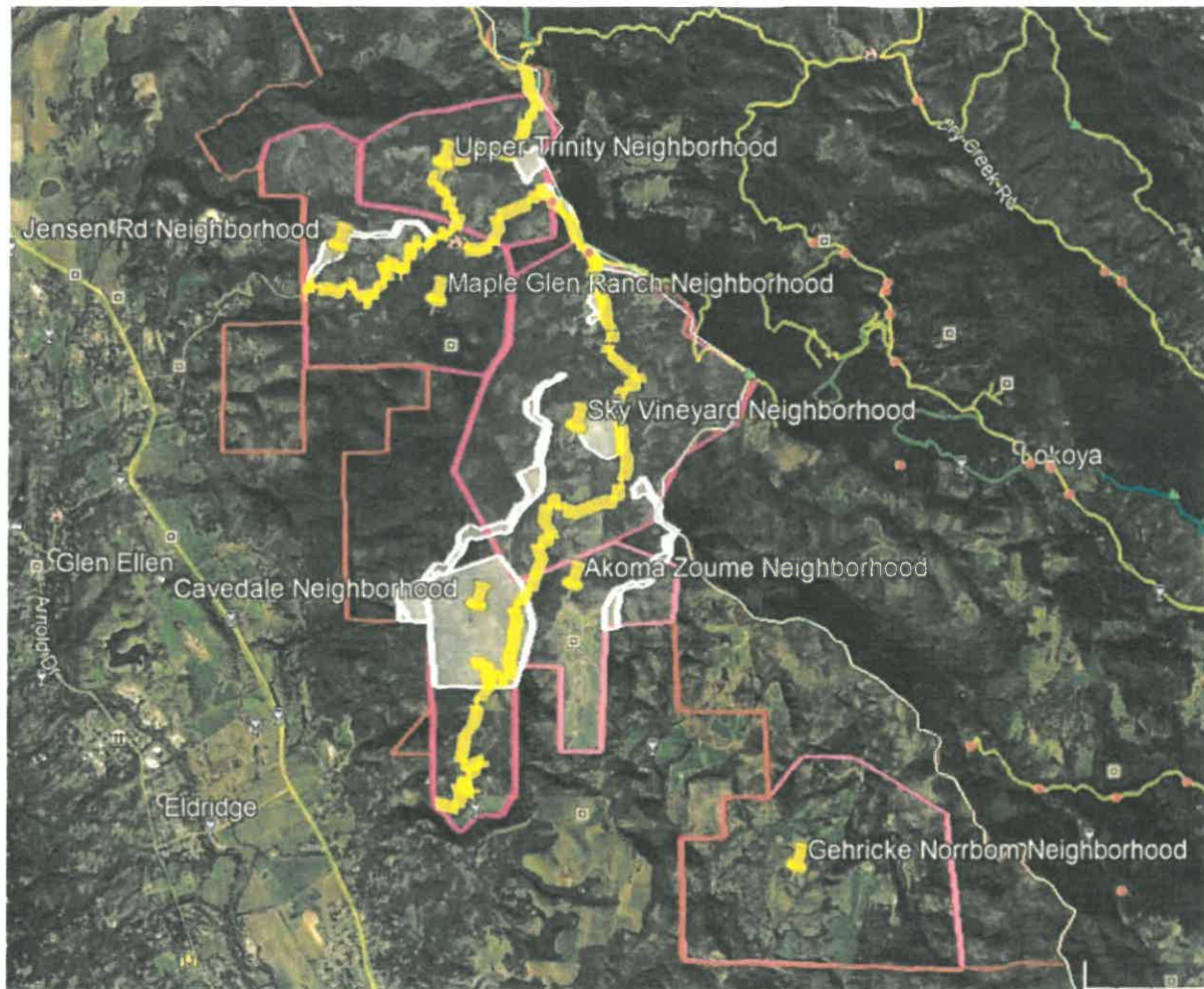
**Defensible Space conditions:** Defensible space is generally, good, and most structures survived the 2017 wildfire.

**Pattern of development and how it relates to fire safety:** Land use is rural, with most lots being large (5 acres to 140 acres). Some parcels have several structures on the, and some are no structures. Land use is vineyards, even a Cristian Hermitage. Structure density decreases with elevation, and distance up Gehricke Rd. Large estates and large residences are the norm. All development is scattered, most with narrow deep lots that create large areas of wildland spaces and fuel management challenges.

**Adjacent fuels:** Fuels along Norrbom and east to Gehricke Rd are comprised on grass/shrub mixture with oak woodlands in valleys. Vineyards span both sides of Gehricke Rd; the Away from the road, fuels are oak woodlands on east-facing slopes and shrub/grass/oak moisture elsewhere.

**Unusual wind conditions, cause, likely spread:** Discussed in section describing terrain.

## MAYACAMAS FIRESAFE COUNCIL POTENTIAL PROJECTS



Potential projects within the Mayacamas FireSafe Council. Yellow lines indicate roadside treatments, white polygons indicate fuelbreaks or area-wide fuel treatments. Red line shows the outline of the Mayacamas Firesafe Council boundary.

There are 15 recommended projects, of which 7 do not have a project delineated on the map. These projects include actions as installation of compliant gates, establishing a communication system, and installing safety zones for residents and firefighters along the main roads. One project targets increasing education about post-fire actions, and another supports biomass waste handling. The other eight projects are distributed in six of the seven neighborhoods. The Gehricke Norrbom Neighborhood is the only neighborhood that does not have a project located in its boundary. The attached spreadsheet indicates the justification of treatments in terms of specific goals, spanning Assist Evacuation and Emergency Response, Reduce Ignition Potential, Reduce Property Damage, and Assist Fire Containment. Of the projects, most projects are aimed at helping evacuation and emergency response, and supporting fire containment.

| PROJECTS FOR MAYACAMAS FIRESAFE COUNCIL |                                                                                                                        | Help Evacuation and Access | Reduce Ignitions | Reduce Property Damage | Assist Containment | KMZ file name                 | Neighborhood                                       |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------|------------------------|--------------------|-------------------------------|----------------------------------------------------|
| <b>Project 1</b>                        | Install knox box at gated entries                                                                                      | X                          |                  |                        | X                  | None                          | All                                                |
| Area                                    | Throughout Mayacamas                                                                                                   |                            |                  |                        |                    |                               |                                                    |
| Goal                                    | Allow emergency responders to respond and follow directions based on addresses                                         |                            |                  |                        |                    |                               |                                                    |
| Actions                                 | HO's to purchase compliant addresses. Possible bulk purchase & installation                                            |                            |                  |                        |                    |                               |                                                    |
| Participants                            | Homeowners                                                                                                             |                            |                  |                        |                    |                               |                                                    |
| Schedule                                | Now, any time                                                                                                          |                            |                  |                        |                    |                               |                                                    |
| <b>Project 2</b>                        | Compliant addresses at road and home                                                                                   | X                          | X                | X                      |                    | None                          | All                                                |
| Area                                    | Throughout Mayacamas                                                                                                   |                            |                  |                        |                    |                               |                                                    |
| Goal                                    | Allow emergency responders to respond and follow directions using aerial observations                                  |                            |                  |                        |                    |                               |                                                    |
| Actions                                 | Approach County Public Works to paint street names on roads                                                            |                            |                  |                        |                    |                               |                                                    |
| Participants                            | Willing members of Mayacamas FireSafe Council                                                                          |                            |                  |                        |                    |                               |                                                    |
| Schedule                                | Now, any time                                                                                                          |                            |                  |                        |                    |                               |                                                    |
| <b>Project 3</b>                        | Call 'em All/Nixel Sign-up                                                                                             | X                          |                  |                        |                    | None                          | All                                                |
| Area                                    | Throughout Mayacamas VFD                                                                                               |                            |                  |                        |                    |                               |                                                    |
| Goal                                    | Alert community members of emergencies, and communicate disconcerting non-emergencies                                  |                            |                  |                        |                    |                               |                                                    |
| Actions                                 | Obtain phone numbers of volunteers, subscribe to service                                                               |                            |                  |                        |                    |                               |                                                    |
| Participants                            | Every resident                                                                                                         |                            |                  |                        |                    |                               |                                                    |
| Schedule                                | Now, any time                                                                                                          |                            |                  |                        |                    |                               |                                                    |
| <b>Project 4</b>                        | Trinity Roadside Treatments                                                                                            | X                          | X                | X                      |                    | Trinity Rd Rdside Treatments  | Jensen, Maple Glen Ranch, Upper Trinity            |
| Area                                    | 30-ft both sides of Trinity Road                                                                                       |                            |                  |                        |                    |                               |                                                    |
| Goal                                    | Enable passage of evacuees and emergency vehicles                                                                      |                            |                  |                        |                    |                               |                                                    |
| Actions                                 | In wildlands, chip all dead material, remove (cut, pull and/or spray) understory shrubs, prune lower branches of trees |                            |                  |                        |                    |                               |                                                    |
| Participants                            | Hand crews (CDC), property owners, +/- vendors for machinery                                                           |                            |                  |                        |                    |                               |                                                    |
| Schedule                                | Best in the fall, OK anytime but avoiding nesting season and red flag days                                             |                            |                  |                        |                    |                               |                                                    |
| <b>Project 5</b>                        | Cavedale Roadside Treatment                                                                                            | X                          | X                | X                      |                    | Cavedale Rd Rdside Treatments | Akoma Zoume, Cavedale, Sky Vineyard, Upper Trinity |
| Area                                    | 30-ft both sides of Cavedale Road                                                                                      |                            |                  |                        |                    |                               |                                                    |
| Goal                                    | Enable passage of evacuees and emergency vehicles                                                                      |                            |                  |                        |                    |                               |                                                    |
| Actions                                 | In wildlands, chip all dead material, remove (cut, pull and/or spray) understory shrubs, prune lower branches of trees |                            |                  |                        |                    |                               |                                                    |
| Participants                            | Hand crews (CDC), property owners, +/- vendors for machinery                                                           |                            |                  |                        |                    |                               |                                                    |
| Schedule                                | Best in the fall, OK anytime but avoiding nesting season and red flag days                                             |                            |                  |                        |                    |                               |                                                    |
| <b>Project 6</b>                        | Trinity Road Safety Zones                                                                                              | X                          |                  | X                      |                    | None                          | All                                                |
| Area                                    | Selected area of low fire hazard (by reservoir, vineyards, wide valley of low vegetation, intersection of roads)       |                            |                  |                        |                    |                               |                                                    |
| Goal                                    | Provide a place of refuge for people (and responders) when road is blocked                                             |                            |                  |                        |                    |                               |                                                    |
| Actions                                 | Mow grass, Inform neighborhood of location, annual drills/picnics                                                      |                            |                  |                        |                    |                               |                                                    |
| Participants                            | Property owners                                                                                                        |                            |                  |                        |                    |                               |                                                    |
| Schedule                                | Best to have gathering on site in early spring                                                                         |                            |                  |                        |                    |                               |                                                    |

|                   |                                                                                                                                       |   |   |   |   |                                |                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|--------------------------------|-----------------------------|
| <b>Project 7</b>  | <b>Cavedale Road Safety Zones</b>                                                                                                     | X |   |   | X | None                           | All                         |
| Area              | Selected area of low fire hazard (by reservoir, vineyards, wide valley of low vegetation, intersection of roads)                      |   |   |   |   |                                |                             |
| Goal              | Provide a place of refuge for people (and responders) when road is blocked                                                            |   |   |   |   |                                |                             |
| Actions           | Mow grass, inform neighborhood of location, annual drills/picnics                                                                     |   |   |   |   |                                |                             |
| Participants      | Property owners                                                                                                                       |   |   |   |   |                                |                             |
| Schedule          | Best to have gathering on site in early spring                                                                                        |   |   |   |   |                                |                             |
| <b>Project 8</b>  | <b>Purchase a chipper and All-Power Lab gasifier for chips</b>                                                                        | X | X | X | X | None                           | All                         |
| Area              | Located at MVFD, or central commercial facility (i.e. winery)                                                                         |   |   |   |   |                                |                             |
| Goal              | Facilitate removal of dead material, then live small trees and brush                                                                  |   |   |   |   |                                |                             |
| Actions           | Purchase a new chipper and gasifier to generate electricity to facilities; apply for CAL FIRE CCI grant                               |   |   |   |   |                                |                             |
| Participants      | MVFD members, to minimize liability concerns                                                                                          |   |   |   |   |                                |                             |
| Schedule          | Write grant application in Aug-Sept, purchase ~ November, 2018                                                                        |   |   |   |   |                                |                             |
| <b>Project 9</b>  | <b>Ridgeline fuelbreak from Ted Lu Ranch to 58000-57800 Cavedale</b>                                                                  |   |   |   | X | Northern Cavedale Rd Fuelbreak | Sky Vineyard, Upper Trinity |
| Area              | From 58000 to 57800 Cavedale, from road east to ridgeline                                                                             |   |   |   |   |                                |                             |
| Goal              | Ease fire containment                                                                                                                 |   |   |   |   |                                |                             |
| Actions           | Obtain permission of landowners, thin forest of conifers, understory brush with CDCR crews, private contractors                       |   |   |   |   |                                |                             |
| Participants      | Landowners, CDCR crews, private contractors, MFVD as contract managers                                                                |   |   |   |   |                                |                             |
| Schedule          | Best in the fall, OK anytime but avoiding nesting season and red flag days                                                            |   |   |   |   |                                |                             |
| <b>Project 10</b> | <b>Ridgeline fuelbreak at top of two major drainages</b>                                                                              |   |   |   | X | Mid-Cavedale Rd Fuelbreak      | Sky Vineyard                |
| Area              | At 4614 Cavedale Rd. to top of two major drainages                                                                                    |   |   |   |   |                                |                             |
| Goal              | Ease fire containment                                                                                                                 |   |   |   |   |                                |                             |
| Actions           | Obtain permission of landowners, thin forest of conifers, understory brush with CDCR crews, private contractors                       |   |   |   |   |                                |                             |
| Participants      | Landowners, CDCR crews, private contractors, MFVD as contract managers                                                                |   |   |   |   |                                |                             |
| Schedule          | Best in the fall, OK anytime but avoiding nesting season and red flag days                                                            |   |   |   |   |                                |                             |
| <b>Project 11</b> | <b>Jensen Rd Roadside Treatments</b>                                                                                                  | X | X | X | X | Jensen Rd Fuelbreak            | Jensen                      |
| Area              | 30-ft both sides of Jensen Road                                                                                                       |   |   |   |   |                                |                             |
| Goal              | Enable passage of evacuees and emergency vehicles                                                                                     |   |   |   |   |                                |                             |
| Actions           | In wildlands, chip all dead material, remove (cut, pull and/or spray) understory shrubs, prune lower branches of trees                |   |   |   |   |                                |                             |
| Participants      | Hand crews (CDC), property owners, +/- vendors for machinery                                                                          |   |   |   |   |                                |                             |
| Schedule          | Best in the fall, OK anytime but avoiding nesting season and red flag days                                                            |   |   |   |   |                                |                             |
| <b>Project 12</b> | <b>Produce and distribute Mayacamas-specific recovery guide (ala "After the Vision Fire")</b>                                         |   |   |   | X | None                           | All                         |
| Area              | Throughout Mayacamas VFD, targeting burned locations                                                                                  |   |   |   |   |                                |                             |
| Goal              | Guide vegetation growth to be more fire-safe, provide residents resources                                                             |   |   |   |   |                                |                             |
| Actions           | Identify residents information gaps, gather already-existing material, organize material, publish                                     |   |   |   |   |                                |                             |
| Participants      | 1-3 volunteers                                                                                                                        |   |   |   |   |                                |                             |
| Schedule          | Any time, soon                                                                                                                        |   |   |   |   |                                |                             |
| <b>Project 13</b> | <b>Shift forest species composition to woodland from conifer</b>                                                                      | X | X | X |   | Mid-Cavedale Rd Fuelbreak      | Upper Trinity               |
| Area              | Wildland areas with conifers                                                                                                          |   |   |   |   |                                |                             |
| Goal              | Modify fuel characteristics of forest to burn with less intensity                                                                     |   |   |   |   |                                |                             |
| Actions           | Plant oak trees (with funding from NCRS), thin Douglas fir trees                                                                      |   |   |   |   |                                |                             |
| Participants      | Private landowners, private contractors, volunteers                                                                                   |   |   |   |   |                                |                             |
| Schedule          | Plant oaks in early winter when soil is saturated, thin trees best in fall, but anytime, avoiding nesting season and high fire danger |   |   |   |   |                                |                             |

|                     |                                                                                                   |          |          |          |                                        |                                 |
|---------------------|---------------------------------------------------------------------------------------------------|----------|----------|----------|----------------------------------------|---------------------------------|
| <b>Project 14</b>   | <b>Expand fireline into fuelbreak along Nicolini Road to Cavedale Rd.</b>                         | <b>X</b> | <b>X</b> | <b>X</b> | <b>Nicolini Rd. Fuelbreak</b>          | <b>Cavedale, Sky Vineyard</b>   |
| <b>Area</b>         | From end of Nicolini Rd to Cavedale Rd.                                                           |          |          |          |                                        |                                 |
| <b>Goal</b>         | Ease fire containment                                                                             |          |          |          |                                        |                                 |
| <b>Actions</b>      | Obtain permission of landowners, remove dead material, guide revegetation to fire-safe fuel types |          |          |          |                                        |                                 |
| <b>Participants</b> | Landowners, CDCR crews, private contractors, MFVD as contract managers                            |          |          |          |                                        |                                 |
| <b>Schedule</b>     | Best in the fall, OK anytime but avoiding nesting season and red flag days                        |          |          |          |                                        |                                 |
| <b>Project 15</b>   | <b>Expand fireline into fuelbreak from Akoma Zoume winery to 4440 Cavedale Rd.</b>                |          |          | <b>X</b> | <b>Akoma Zoume Ridgeline Fuelbreak</b> | <b>Akoma Zoume Sky Vineyard</b> |
| <b>Area</b>         | Akoma Zoume Ridgeline Fuelbreak                                                                   |          |          |          |                                        |                                 |
| <b>Goal</b>         | Ease fire containment                                                                             |          |          |          |                                        |                                 |
| <b>Actions</b>      | Obtain permission of landowners, remove dead material, guide revegetation to fire-safe fuel types |          |          |          |                                        |                                 |
| <b>Participants</b> | Landowners, CDCR crews, private contractors, MFVD as contract managers                            |          |          |          |                                        |                                 |
| <b>Schedule</b>     | Best in the fall, OK anytime but avoiding nesting season and red flag days                        |          |          |          |                                        |                                 |

## APPENDIX D

# Creating Wildfire Adapted Homes and Landscapes





# Creating Wildfire Adapted Homes and Landscapes

## What Can Be Done to Reduce Structure Loss from Wildfire?

Since the 1960s, researchers and firefighters have analyzed the causes of home loss in wildland fires. Their work clearly has indicated that to effectively reduce home loss, **we must treat BOTH the VEGETATION surrounding the buildings and the BUILDINGS themselves.**

### Treating the Vegetation: Defensible Space

Defensible space is crucial for three reasons: to save lives of residents and firefighters, to keep fires that start in structures from escaping into the wildland, and to prevent home loss in a wildfire. Reducing vegetation helps protect structures by ensuring that intense radiant heat is far enough away from the sides of the building that the heat doesn't ignite the structure. Defensible space also ensures that flammable brush does not act as kindling allowing direct transmission of flames to the structure. ***“Defensible space” does not mean “moonscape.”*** A good defensible space is likely to have trees, but low branches and brush has been modified to remove the “ladder fuels” that increase fire behavior. Your defensible space landscape should be even more beautiful and wildlife friendly than before treatment. But there is much more to the picture than vegetation.



*Embers and firebrands are a significant cause of home ignition.*

### Treating the Structure: Protecting Homes through Better Design and Materials

Additionally, we must construct buildings that can withstand the multiple threats of wildfire without igniting. Reducing the question of structural ignition to its simplest possible terms, we can say that a house won't burn in a wildfire if it doesn't ignite in the first place. The major ignition threat is firebrands—burning embers that can be carried for miles on the wind to fall on or near the house. This threat is addressed by treating the house so that even if firebrands fall on it, it is much less likely to ignite. Homes can be constructed or modified to greatly increase their chances of surviving a wildfire with minimal damage.

Please use this document as a starting place to learn how to make your home and surroundings more wildfire compatible. There's a lot you can do to protect both your home and surrounding wildlands!

|                                                                                     |                    |
|-------------------------------------------------------------------------------------|--------------------|
| <i>Two Crucial Elements for Home Survival .....</i>                                 | <i>Page 2</i>      |
| <i>Homes are fuel too! Improving buildings' ability to withstand wildfire .....</i> | <i>Pages 3-12</i>  |
| <i>Vegetation Management &amp; Creating Defensible Space .....</i>                  | <i>Pages 13-15</i> |
| <i>Other important Safety Factors &amp; Regulations.....</i>                        | <i>Pages 16-17</i> |
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# Protecting Your Home from Wildfire: Two Crucial Elements

Modifying **both** surrounding **vegetation** and **buildings and outbuildings** will tremendously improve the odds that your home can survive a wildfire, as well as provide an additional margin of safety for you, your family, and any firefighters who may actively defend your property.

Though firefighters will do all they can to defend homes, all residents in California's Wildland-Urban Interface (WUI) areas should be aware that, in the event of a large catastrophic fire, there simply are not enough fire engines and crews to protect all threatened homes. This observation is not meant to dishearten WUI residents or to imply that California firefighting agencies are not capable of carrying out their crucial role. However, clearly it is...

**BAD ODDS:** To assume that the firefighters will be on scene to defend your property.

**GOOD ODDS:** To take actions far in advance of a wildfire that will prepare you and your property to safely survive a wildfire event, even if firefighters can't make it to your home.



## What actions can you take to better your chances to WIN in a wildfire?

Modify **Structures** so that burning embers and blowing around during wildland fires cannot easily cause ignition.



### AND

Modify **Vegetation** within 100 feet of buildings and outbuildings so that there is less fuel available to transmit heat and flames and cause ignition.

We realize that for some Sonoma County homes, nearby fuels conditions are such that improving your odds may seem impossible. We often encounter those who think: "This home is a goner anyway, why should I do anything?" Here are just a few of the reasons that every resident of wildland areas should do everything they can to prepare for wildfire:

- ▲ Even small modifications to home can make a big difference in home survival.
- ▲ In the event that you are trapped by a wildland fire and cannot safely evacuate, a well-prepared home could save your life.
- ▲ A minimum 100' of defensible space is required by law.
- ▲ During a wildland fire, firefighters perform "triage" to determine which homes can be effectively and safely defended. Homes with surrounding vegetation that presents a danger to firefighters will likely be passed up in favor of homes that have been improved. Support your firefighters by providing a safe and defensible space.
- ▲ A well-treated wildland is a healthy wildland. Fuels treatment projects should improve overall health of surrounding vegetation, provide better habitat for wildland creatures, and be even more beautiful.

First we'll address structure improvements. Then we'll look at vegetation and defensible space.

# Protecting Your Home from Wildfire: Buildings

Ongoing research on home loss in wildland fires shows that two out of three houses destroyed were ignited by wind-dispersed embers and not the actual flames of the wildfire.<sup>1</sup> As you look at the structures on your property, keep a vision in your mind of a blizzard, but rather than snow, burning bits of debris are flying around. Some embers are the size of a grain of sand, some the size of a dinner plate or larger. Ask yourself, “If a burning hunk of charcoal landed here, would it ignite? Can embers blow into that vent? Would this hole in the siding allow embers to accumulate or blow into the house walls?”

Luckily, there are many actions you can take to protect your home from embers and wildfire. While it is effectively impossible to make a structure “fire proof,” there is a lot you can do to make it much more wildfire safe. This section provides merely a brief introduction. Use it to launch your own investigations.

This section has been adapted from the work of fire researcher Dr. Steve Quarles. We sincerely thank him for his support. His research has been pivotal in increasing understanding of wildland structure ignition and how homeowners might prevent it.



*Ember blizzard.*

## Six Priorities to Protect Homes

Quarles has identified six priority areas for making changes to existing homes in fire hazard zones. The priorities correlate to where and how your house is most vulnerable. As you go through the list, we suggest you prioritize it yourself by what you can do most immediately. For instance, if you need

to replace your roof (Priority One), but just can’t take on that project right now, take on something else on the list that you can do as soon as possible. Some of the items listed in Priorities Two and Three, for example, can be done easily at little or no cost, and are also very important. However, if you have an untreated wood shake roof and don’t replace it, almost anything else you do will be for for not.



<sup>1</sup> Quarles, Steve, et.al. “Home Survival in Wildfire-Prone Areas: Building Materials and Design Considerations.” UC ANR Publication 8393, May 2010. <http://ucanr.org/freepubs/docs/8393.pdf>, p.1.



*Existing homes can and should be made fire resistant too.*

**Approved building products for the WUI are listed by the Office of the State Fire Marshal on their web site at [http://osfm.fire.ca.gov/licensing-listings/licenselisting\\_bml\\_search-cotest.php](http://osfm.fire.ca.gov/licensing-listings/licenselisting_bml_search-cotest.php)**

In 2008, California Building Codes were revised to require that new construction in Wildland Urban Interface (WUI) areas have increased wildfire safety measures.

The WUI code addresses the elements of construction most vulnerable to wildland fire and ensures that homes constructed in California after 2008 will have safety features built in. However, the new WUI building code doesn't address homes constructed before 2008. Unless you are undertaking a large remodeling project, there is no legal requirement to upgrade to the new building code's provisions. Voluntary upgrading to meet some of the requirements, however, will increase the likelihood that your home can survive.

While some structural improvements might be rather expensive, there is a lot that homeowners can do for minimal expense. Creating and maintaining a "Non-Combustible" zone five feet from house walls is critical. Making covers for eave, gable or foundation vents is cheap and may be more beneficial than much more expensive projects. Taking a close look at your home and making a prioritized list of the projects that you can realistically take on could reduce the vulnerability of your home and property.

Dr. Steve Quarles of the **Insurance Institute for Business and Home Safety (IBHS)**, is the leading expert in wildland home ignition. The publications on the IBHS website are an excellent resource. A wide variety of important publications including a Homeowners Checklist, can be found at [www.disastersafety.org/wildfire](http://www.disastersafety.org/wildfire)

## PRIORITY ONE: Roofs

The roof of your home is exposed to sun, rain, wind, and potentially wildfire-generated embers. If your roof is in poor shape or is untreated wood shingle, it will increase risk of home loss more than any other single component, and would be your highest priority.

Performance of a roof in a wildfire will depend on a number of factors, including:

- ▲ **Material classification:** A Class A fire rating simply means that the material will withstand exposure to burning materials for one hour without burning through. There are two ways to think about the Class A fire rating:

**Covering alone** (“stand alone Class A”): For example, Asphalt Comp (“three-tab” shingles) have a “stand alone” Class A rating: it doesn’t matter what kind of materials (sheathing and underlayment) are used under the roofing material.

**By covering and underlying materials** (“assembly rated Class A”). For example, aluminum roofing materials must have a specific underlayment to achieve the Class A rating.

It can be difficult to tell if you have a Class A roof. If you are not sure, schedule an inspection with a professional roofer to find out. When you replace, replace with Class A fire rated materials.

**Condition (age):** A Class A roof is only Class A for the time specified for that particular roofing material. Age and UV exposure degenerate some materials, reducing resistance to fire. Maintenance is crucial throughout the life of your roof: make sure you repair any wind damage, and replace the roof before it reaches the end of its service life.

**Roof Shape:** Home designs that have roof-to-vertical-wall intersections (e.g., at a dormer or chimney chase) can allow debris and embers to accumulate where they have the potential to ignite vulnerable vertical walls, bypassing the protection provided by a fire-rated



*Though it may have originally had a Class A rating, this old, weathered asphalt composition shingle roof would no longer provide adequate protection against embers and heat.*



roof. If your house has a complex roof, be vigilant about keeping it clean, and consider replacing combustible siding located on vertical roof to roof-to-wall locations.

**Keeping the roof clear of debris is crucial during fire season.** Don’t let needles and leaves pile

up on the roof or in gutters. Even if your roof has a Class A fire rating to withstand burning materials without penetration into the building, flaming debris exploits any vulnerabilities on the roof and exposed exterior walls, and can roll off the roof to ignite materials on the ground.

### Roof Edge:

In open eave construction, the edge of the roof, and the places where the roof meets other materials such as dormers, are the most vulnerable. There are two primary ways that the edge of the roof is exposed:

1. While the top of the roof is covered with (hopefully) fire-rated roof covering, the very outer edge and underside of the roof decking is often uncovered, with the plywood underlayment exposed. This edge is vulnerable to flaming debris in the gutter. Angle flashing should be used to cover the outer edge of the plywood decking.

If you have open rafter/eave construction, inspect the blocking. Caulk around the joints and seal any gaps. In future years inspect the blocking caulk at the beginning of every fire season and replace as needed.

Debris buildup in gutters can allow flames to enter the structure between the wall and the roof, and expose the roof edge. Always keep the gutters and the roof clear of debris during fire season! Investigate products that can keep gutters from filling up with leaves.



2. Large openings at the roof edge, such as those formed by barrel tile roofing, provide spaces where combustibles can accumulate. For example, these openings make the perfect place for birds to build nests. Needless to say, dry bird's nests are extremely combustible. Easily ignited by embers from a nearby wildfire, they can expose the roofing felt and sheathing beneath the roofing material to sufficient heat and flames to burn through and penetrate into the home's attic space. Tile roofs with "bird stops" at the edge should be inspected annually to make sure the stops are still in place.



Upgrading to a Class A roof should be the first priority for anyone with a wood shake or old, deteriorated roof covering. However, because the roof and siding are dominant features on houses, many homeowners get a false sense of security when they install Class A roofs and siding. Each year, many of the homes are lost in wildfires that had Class A roofing and non-combustible siding. This clearly illustrates that some less obvious fire-protection elements are also quite important.



*Debris on the outside can lead to flames on the inside!*



Foundation vent



Through-roof vent



Gable end vent

## PRIORITY TWO: Vents

The second item on Quarles' priority list is vents. Unless a code-approved non-vented crawl space or attic design is used, vents for crawl spaces under homes or for attics are required by building codes to control moisture, which can lead to mold growth and decay in building materials. Yet vents that allow for sufficient air circulation also provide an easy entry point for burning embers and flames. During a wildland fire, embers, which can be smaller than a grain of rice, can blow in through vents and accumulate to ignite debris or stored items, and subsequently the house itself, setting the home ablaze from within.

What kind of venting do you have, and does it expose your home to ember ignition?

California building code generally requires that vents be covered with 1/8-inch mesh, which should be sufficient to allow air movement that will prevent moisture problems. Unfortunately, there is some evidence that even 1/8-inch mesh is wide enough to allow for intrusion of embers (See Quarles, *Home Survival in Wildfire Prone Areas*). The importance of vents in wildfire resistance has led to the development of vents de-

signed to limit ember intrusion while still allowing sufficient air flow for ventilation. Some have been accepted for use by the Office of the State Fire Marshal for use in wildfire prone areas. See [http://osfm.fire.ca.gov/licensinglistings/licenselistings\\_bml\\_searchcotest](http://osfm.fire.ca.gov/licensinglistings/licenselistings_bml_searchcotest), select 8165--"Vents for WUI" and search to see approved products.



*This vent uses fine screen and intumescent paint to prevent both ember and flame intrusion. See the State Fire Marshal Buildings Materials Listings for information about WUI building products (web link p.16).*

### Vents: What you should do:

- Replace with WUI approved vents if possible.
- Check existing vents frequently to make sure screens are intact and clear from debris buildup.
- It is possible to make vent covers out of a non-combustible solid material such as fiber cement, or plywood and a thin metal plate. The covers can be quickly installed over vents if a wildfire threatens. Assemble all you'll attach the vent cover, and have everything you need ready and in one place. Number vent covers and vents so you can very quickly get the right cover on the right vent. You could even use duct or metal tape as a last-minute effort.

## PRIORITY THREE: The critical five-foot noncombustible zone and Defensible Space



*Though it charred the siding, luckily, the broom didn't fully ignite this building.*

Defensible space is the area between an oncoming wildland fire and a building where the vegetation has been modified to reduce the intensity of an oncoming wildfire. Defensible Space is usually thought of in zones radiating from the house walls. Zone 1 goes from the house walls out to 30 feet. Zone 2 goes from 30 to 100 feet or the property line. Creating and maintaining defensible space in both Zone 1 and Zone 2 should be considered as very high priority projects for home survival. **You can read more about defensible space Zones 1 and 2 later in the document.**

Research about home loss from wildland fires increasingly shows that having a noncombustible zone from the exterior house walls out to 5 feet is extremely important to reduce home ignitions. Though not currently a “Defensible Space” requirement in California, the 0 to 5 foot noncombustible zone is recommended by several of the most influential outreach and education groups, including the IBHS, Nevada’s Living with Fire Program, and NFPA’s Firewise Program. The closer combustible items and vegetation are to buildings, the more likely they are to contribute to home ignition.

As you create your defensible space, it is very highly recommended to start at the house and work outwards to 100 feet. First, work on creating your noncombustible zone 0–5 feet from house walls. Then tackle vegetation in the 30 foot “Lean Clean and Green” zone. Then work on to fuels reduction in Zone 2, from 30–100 feet or the property line.

Throughout fire season, identify and re-move any items near structures that may catch fire from embers, radiant heat, or direct flame contact. Surprisingly often, it’s the little things around the house that ignite to spread flames to the building. Most of us have lots of the “Stuff of Daily Life” around our homes, which we don’t think of as wild-fire risks.

It is not unusual for firefighters to successfully defend a home during the initial impact of a wildfire, only to return hours or even days later to find that the house has burned down. This is usually because small fires started after the worst part of the fire front had passed, and slowly grew to sufficient size to ignite the buildings. Recognizing and eliminating the “little things” that cause these fires to ignite are critical for your overall wildfire prevention plan.



*Create non-combustible space between the wood fence and the house walls with metal gates, and similar material. This fence would have burned to the house walls had firefighters not arrived to extinguish the fire.*

## The 0–5 foot noncombustible zone

The objective of this zone is to reduce the chance that an ignition will occur nearer the home, and result in flames directly contacting the building. The noncombustible zone includes everything from building walls out five feet, including the areas under decks or other building attachments (such as stairs).

First, do a slow walk around your structures to look critically for anything that might ignite and spread flames to the structure. Look critically at both vegetation and stuff. Think of things like wood piles, wooden planter boxes, combustible decorative items, natural-fiber door mats, brooms, etc.

If you can reasonably move it away from where it will expose the house to direct flame contact, or replace it with a noncombustible alternative, do so.

Ask yourself: Would this ignite if a burning chunk of charcoal dropped on it? If so, replace it with a non-combustible material or move it far enough away so that if it ignites, it won't spread fire to your structures. There may be risky items that have to stay near structures because that is where we use them, such as patio furniture. If that is the case, make a list of things that you will relocate to inside a building or away from the structure if a wildfire threatens to come near or during red-flag warning weather conditions. Making a list helps you think clearly and move fast when you must.



Wood trellis

## In the 0–5 foot noncombustible zone

- ▲ **Install hard surfaces** such as concrete walkways, or use non-combustible mulch products, such as rock. Bare mineral soil is an option if erosion is not an issue. Do not use wood or combustible mulches in this area.
- ▲ **Vegetation:** Use only highly fire resistant plants in this area, such as irrigated lawn or low-growing non-woody plants. Shrubs and trees, particularly conifers, are not recommended. Maintain all plants free of dead and dying material throughout the fire season. Plants adjacent to combustible siding and foundation vents, under or next to windows, or under soffit vents or inside corners, present the greatest risks.
- ▲ **Firewood and wood piles:** One cord of wood will produce 20-million BTUs, the equivalent of 160 gallons of gas. Move firewood piles 30' away from buildings during fire season.
- ▲ **Wood fences** can act like a wick to bring the wildfire straight up to your home. Ideally, wooden fences should be located no closer than 10' from structures. If you have a wood fence that attaches to the house, break the continuity with a noncombustible element next to the house.
- ▲ **Needle litter, leaf debris and mulch:** Make sure that combustible materials don't pile up in the 5 foot non combustible zone or on the building—roofs, decks, stairs, etc.
- ▲ **Wood trellises** are commonly installed beneath decks to hide all of the stuff that accumulates underneath (a major no-no), or to support potentially combustible vegetation against house walls. Consider a trellis made of a noncombustible material. If the trellis is primarily used as under-deck screening, make sure to remove any combustible items under the deck! The trellis will not prevent embers from blowing onto flammable items. If the trellis is used to support a plant, make sure that the plant is a low combustible species, well main-tained and irrigated, and, or better yet, remove it.

### Other Important considerations near the home:

- ▲ **Garages:** Older garage doors typically have large gaps along the perimeter that embers can blow through. Typically, combustibles are stored in the garage, so it is important to make sure that gap is well sealed. **Safety note:** If you have an electric garage door, make sure you know how to open it if the power goes out. Practice opening it with your car parked in the garage as it normally would be. Consider purchasing a garage door opener with a battery back up. Not being able to open the garage door during a fire is a serious life safety concern.
- ▲ **Windows and Screens:** Look around your home to find any place that embers may enter. If you leave the house with the windows open in the summer time, make sure your screens have no gaps. According to an Australian study, bronze screening is best at stopping embers. However, screening will not stop penetration of flames or radiant heat if windows are open, exposing vulnerable interior items such as curtains.
- ▲ **Pet doors** can blow open to let embers in. If you have to evacuate, make sure to block them closed before you leave.

## PRIORITY FOUR: Windows

The next priority should be windows. Glass can break when exposed to radiant heat or flames; a broken window provides an entry point for flames and embers. Consequently, having windows that can withstand the brief but intense blast of heat from a wildfire is very important. In dual pane windows, the outer pane protects the inner pane; the inner pane heats up more slowly and uniformly, and therefore may not break even though the outer pane does. Tempered glass is much stronger than annealed glass and fails at a higher temperature, so it provides more protection. The 2008 revision of the California Building Code for new construction in the WUI requires dual pane windows with at least one tempered glass pane.

Research has shown that by far the most important factor in determining the vulnerability of windows in a wildfire is the glass, not the frame. Since the type of frame doesn't make much difference in a fire, it can be selected based on cost, aesthetics, energy efficiency, and other factors.

As with vents, homeowners can fabricate window covers out of a noncombustible material or even plywood. Cut to size, have everything ready to attach them to the house and mark them clearly so they can be installed quickly over windows in the event of an approaching wildfire. Manufactured shutters might also be considered.



*A structure fire at the arrow burned into nearby trees. Radiant heat cracked the window shown in the red circles.*



## PRIORITY FIVE: Decks

Post-wildfire research has shown that the initial ignition point for many homes is on or under a deck. An ignited deck endangers many portions of a structure and is often adjacent to large windows or sliding glass doors that can break and permit the fire to enter the house.

How vulnerable the deck is to ignition depends on what it's made of and its condition (rotten wood is much more ignition prone), as well as combustible or flammable items kept on and under the deck and the amount and condition of vegetation near the deck.

Although most common decking materials are combustible, there are some noncombustible alternatives, such as metal decking, lightweight concrete and Class A composites. However, testing has indicated that combustible decking products are likely to ignite from other fuel sources (such as firewood, ignition-prone furniture, vegetation or debris) that are on, under or near the deck.<sup>1</sup>

If you can replace your wooden deck, there are several options that will resist combustion, including using tile, some composite materials, etc. You will need to do some homework to find the best option for your home. However, if you can't replace the deck, you can reduce the ignition risk posed by your combustible deck:

- ▲ Ensure that the deck is kept clean of debris both above and below.
- ▲ Limit the number of combustible items you keep on the deck—think of door mats, plants in baskets, wicker furniture, patio umbrellas and such items.
- ▲ On top of or under a deck is a bad place to keep flammable items such as firewood or a gasoline can.
- ▲ Embers tend to accumulate where the deck surface meets the wall. To protect vulnerable siding, install 18" of metal flashing between edge of deck and siding, tucked in behind the lap joint where it terminates.



*Consider replacing ground level wooden decks with non-combustible patio materials such as brick, stone or concrete.*



*Keep needles and debris from accumulating between deck boards or between deck and siding.*



*If items stored under the deck can ignite from embers, deck and structure will follow along. Don't store combustibles under decks!*

## PRIORITY SIX: Siding

There are several noncombustible siding products on the market: fiber cement boards and panels, traditional three-coat stucco, and so on.

Well-maintained wood siding, though certainly more vulnerable than products such as stucco or fiber cement, is not as big a risk as you might think, assuming that defensible space standards for vegetation have been maintained. However, some wood siding is better than others. For example, plain bevel lap joints are more vulnerable to flame penetration at the joint than are more complicated lap joints, such as a shiplap joint.

Take a hard look at your siding. Combustible siding such as wood panels and clapboard should be carefully inspected annually for gaps and filled with a high-quality caulk to prevent hot embers lodging and burning. Partly decayed wood is more vulnerable. If your siding is starting to show signs of aging, you may need to consider replacement.

Do you know what is between your siding and the studs? In research trials, good quality sheathing—which is installed underneath the siding—is a key to protecting the home's studs. Combustible siding in combination with inadequate sheathing may have a higher priority for replacement.

If you have an ignition-prone siding like wood shake, but can't afford to replace it, you may want to consider investing in a gel fire retardant. Gels hold water in suspension on the walls, decreasing likelihood that an ember will cause the siding to burn. These products are applied to the structure when a fire threatens, preferably no more than four hours before the flame front hits—something that may be impossible if the fire is moving very fast and residents need to evacuate immediately. Several products are currently available on the market. Do some research and talk with your local CAL FIRE or Fire Department representative, both with questions about the products and to let them know that it is available on your property.



Plain bevel lap joint

Shiplap joint



Home on left is vulnerable to wildfire because of its aging, shrinking wood siding and single pane windows. Home on right was retrofitted with fire-resistant siding, boxed eaves, metal-clad fascia and double-paned windows.

# What is Defensible Space?

Defensible Space is a radius of 100+ feet (or up to the property line) around buildings where vegetation has been modified so that an approaching wildfire's power is diminished. Defensible space does **not** mean that all vegetation has been removed. It just means that it has been treated so that there is less fuel available to transmit heat and flames directly to structures or into the tops of trees.

Creating an effective defensible space means developing a series of **management zones** in which you do greater or lesser fuel modifications. Develop defensible space around each building on your property. Include detached garages, storage buildings, well houses, barns, and other structures in your plan.



*Defensible space need NOT be a moonscape. Thoughtful landscaping can be beautiful and safe.*



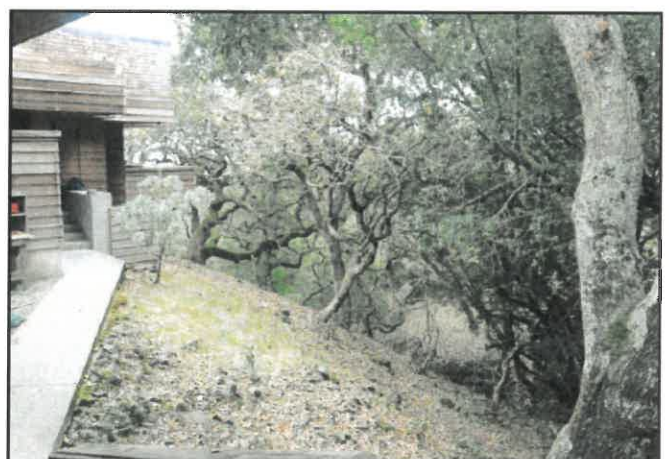
**Defensible space: before ...**



**... and after.**



**Defensible space: before ...**



**... and after.**

## Shaping Your Defensible Space Zones

The actual design and development of your defensible space depends on several factors. A defensible space radius needn't be a perfect circle, it should be shaped to reflect the nature of the property and structures. Consider:

- ▲ **Size and shape of buildings:** Your defensible space radius is not the center of the structures, but starts at the outer edges of structures and decks, and extends out.
- ▲ **Materials used in construction:** If your buildings are constructed of combustible materials, increase defensible space distances to compensate.
- ▲ **Slope of the ground on which structures are built:** Fire moves faster and behaves more aggressively when it is moving uphill. If your house is on a slope, you may need to increase your defensible space radius downhill from structures.
- ▲ **Surrounding topography:** Natural features such as drainages can funnel fire towards structures. Your defensible space zone should compensate.
- ▲ **Sizes and types of vegetation on your property:** Not all vegetation burns with equal vigor. Take the time to learn about risky vegetation around your home.

## Defensible Space as Management Zones

**Start near the home with the easiest** and least expensive actions. **Keep working** outwards and on the more difficult items until you have completed your entire project.



**Zone 1:** Begin closest to your house and move outward. Create a “clean, lean and green” **30’ low fuel zone around all structures.**

- ▲ Replace or remove highly combustible plants.
- ▲ Remove all dead materials on the ground or in trees adjacent to or overhanging a building.
- ▲ Thin and prune trees. Remove dead and dying woody surface fuels.
- ▲ Remove “ladder fuels” that fire can use to climb from the ground into the crowns of trees.
- ▲ Clean the roof of the structure free of leaves, needles or other dead vegetation.
- ▲ Remove any portion of any tree within 10’ of a chimney outlet or stovepipe and make sure that there is a screen over the stovepipe or chimney outlet. The screen should be of non-flammable material with openings of one-half inch or less.

**Zone 2:** at **30’-60+’** from structures create a **Reduced Fuel Zone.**

- ▲ Thin and prune trees. Remove dead and dying woody surface fuels.
- ▲ Remove “ladder fuels” that fire can use to climb from the ground into the crowns of trees.
- ▲ Break up the “horizontal continuity” of fuels so breaks occur between plants that will reduce fire intensity and decrease likelihood that fire will move from plant to plant straight to structures

**Zone 3:** at **60’-100+’** work on **wildlands vegetation management.**

- ▲ Thin, prune and limb up trees and shrubs and reduce horizontal and vertical continuity, but it can be left a bit more wild.

Homeowners interested in learning how to create defensible space can find information in Fire Safe Sonoma’s publication, **Living with Fire in Sonoma County** (available at [www.firesafesonoma.org](http://www.firesafesonoma.org)) and/or consult with local firefighters.

## **Other Factors for Safety**

### **Can the Fire Department Find You?**

Too frequently, emergency responders have trouble finding homes in rural areas because roads and/or house addresses are not clearly marked. 85% of emergency responses are for medical problems, where seconds can matter for your health and survival. Make sure firefighters can find you! Mark access roads with reflective signs containing numbers and letters at least 4” in height, and make sure signs are visible from both directions. Use reflective or illuminated numbers for your house. If your home is accessed from a long driveway, also put a reflective street number sign at the base of the driveway that is visible from both directions.

### **Can the Fire Department Safely Drive the Access Roads to Your House?**

Vegetation-clogged roads present a multitude of dangers for both you and incoming firefighters. Fire trucks are large, so make sure your driveway has at least 15’ of vertical clearance and is at least 10’ wide. Access roads clogged with vegetation pose enormous risks to evacuating residents and incoming firefighters. Make sure you can get out safely, and firefighters can get in to help you.

## Water Supply

The more water you can store, the better. Mark water supplies for firefighters. Sonoma County Code requires a minimum of 2500 gallons of water in reserve for firefighter use or a hydrant system approved by fire inspectors.

## Costs of Creating Defensible Space

By choosing to live in the beautiful wildland-urban interface, we are also choosing to take responsibility for keeping our homes wildfire safe. Creating and maintaining defensible space is simply one of the costs of living in the WUI.

Unless you do the work yourself, creating defensible space can be an expensive prospect for homeowners, especially those who live in forested environments. Tree diseases such as Sudden Oak Death can force homeowners to do the same work year after year as more trees die. Typically, a five person crew with a 15" chipper costs about \$2,250 per day. While one day with a crew can be enough to clear defensible space, cost estimates can greatly increase if large trees and/or large numbers of trees need to be removed.

Before you get bids on your job, make sure you know exactly where your property lines are, and decide what needs to be done. You may want to consult with an expert to determine which vegetation should be removed. Always consider erosion for any vegetation management! Remember that you can only work on your own property, even if your defensible space is impacted by issues that are over the property line. If possible, work with neighbors to arrive at mutually acceptable solutions.

Check for current licenses and insurance of anyone you hire to work on your property. Ask to be sure they have sufficient experience to safely do the job. Check references!

The Sonoma County Fire and Emergency Services Department currently has a seasonal free curbside chipper program for residents in some areas at risk to wildfire. The program sends a chipper and crew to chip woody materials that have been cut and stacked by residents. You can find out about the program at [www.sonomacounty.ca.gov/FES/Fire-Prevention/Curbside-Chipper-Program](http://www.sonomacounty.ca.gov/FES/Fire-Prevention/Curbside-Chipper-Program) or by calling 707-565-6070.

## Regulations



*Defensible space: before...*



*... and after.*

Timber Harvest? Riparian alteration? Endangered species? Such issues are rarely a concern for homeowners creating defensible space, but it's good to know what the laws and regulations are.

If and grant funding is received from state or federal agencies and prior to work performed pursuant to a CWPP, or prior to issuance of discretionary permits or other entitlements by any public agencies to which CEQA or NEPA may apply, the lead agency must consider whether the proposed activity is a project under CEQA or NEPA. If the lead agency makes a determination that the proposed activity is a project subject to CEQA or NEPA, the lead agency must perform environmental review pursuant to CEQA or NEPA.

If a landowner conducts a commercial timber operation while removing commercial tree species from protection zones around homes to comply with PRC 4291, a 1038(c) exemption permit from CAL FIRE must first be submitted. No permits are required if there is no commercial sale of timber (unless local ordinances restrict tree cutting—check with local authorities).

The laws relating to wildfire prevention and loss reduction can be found in Public Resource Code 4290-4299. In addition to setting standards for defensible space, the code also addresses other crucial wildfire safety issues.

Other regulations may also apply, including the Threatened and Endangered Species Act and California Environmental Quality Act.

California Department of Fish and Wildlife reviews all timber harvest plans for compliance with section 1600 and the California Endangered Species Act (CESA). Fish and Wildlife may issue permits for road construction across streams and incidental lake permits when endangered species habitat is involved.

CESA usually comes up in bigger forestry projects and isn't usually a concern for landowners creating defensible space. CESA allows the Department to authorize project proponents to take state-listed threatened, endangered, or candidate species if certain conditions are met.

Fish and Wildlife's 1600 jurisdiction includes the clearing of brush in the riparian corridor of stream/river. Section 1600-1616 of the Fish and Game Code, called a Lake or Streambed Alteration Agreement is required for any project that will:

- ▲ Substantially divert or obstruct the natural flow of any river, stream or lake;
- ▲ Substantially change or use any material from the bed, channel, or bank of any river, stream or lake;
- ▲ Deposit or dispose of debris, waste, or other material containing crumbled, flaked or ground pavement where it may pass into any river, stream or lake.

Sonoma County regulations may also apply to vegetation management in riparian areas. Contact Permit Sonoma for further information.

## Resources

Research over the last 20 years has led to a wealth of information about how to reduce structural ignitions from wildland fires. This document provides an introduction to the basic concepts, and is intended to inspire readers to further research. Here are just a few of the great resources out there.

**Steve Quarles** is a researcher for **The Insurance Institute for Business and Home Safety**. See the Southern California Guide for information relevant to Sonoma County. Download these materials at [www.disastersafety.org/wildfire](http://www.disastersafety.org/wildfire)

**Home Survival in Wildfire-Prone Areas: Building Materials and Design Considerations** Stephen L. Quarles, et al. UC ANR Publication 8393, May 2010. <https://anrcatalog.ucanr.edu/pdf/8393.pdf> This publication is a great place to start for anyone interested in learning a lot more about the design methods and materials that can help your home survive a wildfire. Also from the UC Cooperative Extension, the **Homeowner's Wildfire Mitigation Guide** [ucanr.edu/sites/wildfire/](http://ucanr.edu/sites/wildfire/) provides easily accessible information about each vulnerable part of a structure.

**CAL FIRE's** website at [www.fire.ca.gov](http://www.fire.ca.gov) provides up to date information about wildfires as well as a wealth of information about forestry issues, grants and wildfire safety and preparation, including access to the excellent **READY SET GO** program materials [www.readyforwildfire.org](http://www.readyforwildfire.org)

The **California Office of the State Fire Marshal** regularly updates the **Buildings Materials Listings**, which lists homebuilding products approved for Wildland /Urban Interface areas. [http://osfm.fire.ca.gov/licensinglistings/licenselist\\_bml\\_searchcotest.php](http://osfm.fire.ca.gov/licensinglistings/licenselist_bml_searchcotest.php)

**Firewise Communities USA** [www.firewise.org](http://www.firewise.org). "The National Fire Protection Association's (NFPA) Firewise Communities program encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from the risk of wildfire." The "Firewise You Can Use" section on their website contains a wealth of great information.

Our own **Fire Safe Sonoma** has excellent information specific to our region. [www.firesafesonoma.org](http://www.firesafesonoma.org)

**Fire Safe Marin** has a truly excellent website. See the excellent plant list! [www.firesafemarin.org](http://www.firesafemarin.org)

The **California Fire Safe Council's** offers great information as well as access to the Grants Clearinghouse, which provides funding for projects in WUI areas. [www.cafiresafecouncil.org](http://www.cafiresafecouncil.org).

This document was created by Fire Safe Sonoma, Sonoma County's non-profit fire safe council. Our

mission:  
**To promote fire safety and protect natural and man-made resources in Sonoma County through education, information exchange, resource sharing and community cooperation.**

You can learn more about Fire Safe Sonoma at [www.firesafesonoma.org](http://www.firesafesonoma.org) or by calling 707.206.5467. Join with us to make Sonoma County a Wildfire Adapted Community!

