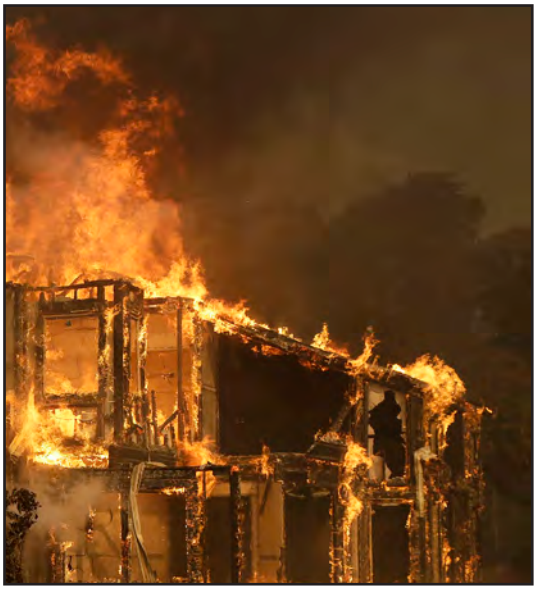
Creating Wildfire Adapted Homes and Landscapes

FireSAFE SONOMA

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**.



Embers and firebrands are a significant cause of home ignition.

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.

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!

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.[1] 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.

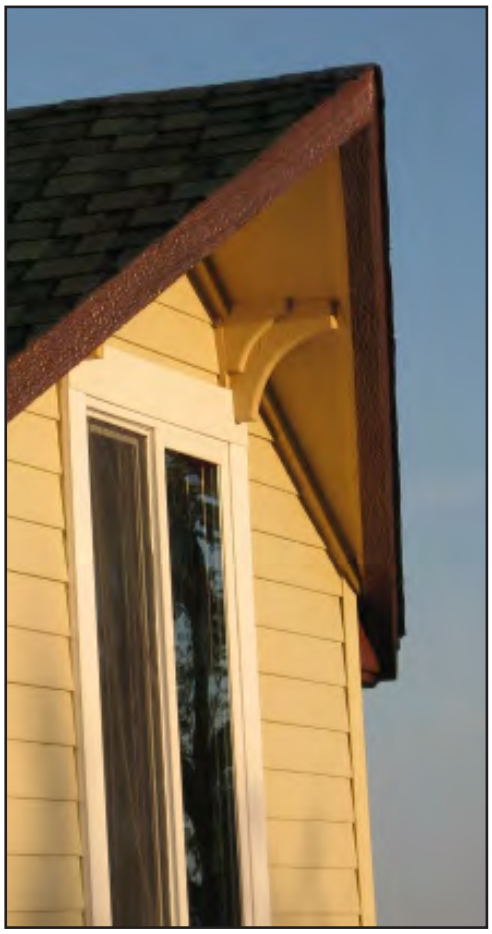
This section has been adapted from the work of fire researcher Dr. Steve Quarles. We sincerely thank him for his support. His research has been pivotal in increasing understanding of wildland structure ignition and how homeowners might prevent it.

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.

1 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*

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 webiste are an excellent resource. A wide variety of important publications including a Homeowners Checklist, can be found at *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 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.

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.

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 the protection provided by a fire-rated roof. If your house has a complex roof, be vigilant about keeping it clean, and consider replacing combustible siding located on vertial 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.

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

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.

Foundation vent

Through-roof vent

Gable end vent

PRIORITY TWO: Vents

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).

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 designed 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/licenselisting_bml_searchcotest*, select 8165--"Vents for WUI" and search to see approved products.

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. Recoginzing and eleminating 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


Wood trellis

The objective of this zone is to reduce the chance that an ignition will occur neaer 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.

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, particurarly 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.

Reseach 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.[1]

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

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.

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

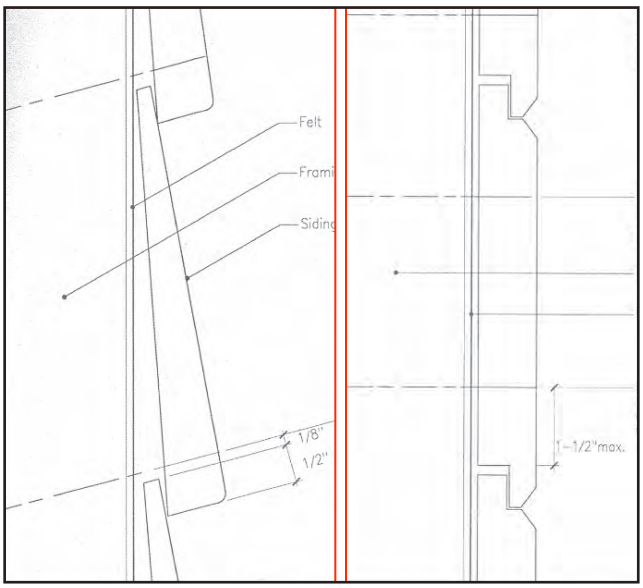
If items stored under the deck can ignite from embers, deck and structure will follow along. Don't store combustibles under decks!

1 Quarles, et. al., *Home Survival in Wildfire Prone Areas*, p. 13.

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.



Plain bevel lap joint *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.

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.

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

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: before ...

... and after.

Defensible space: before ...

... and after.

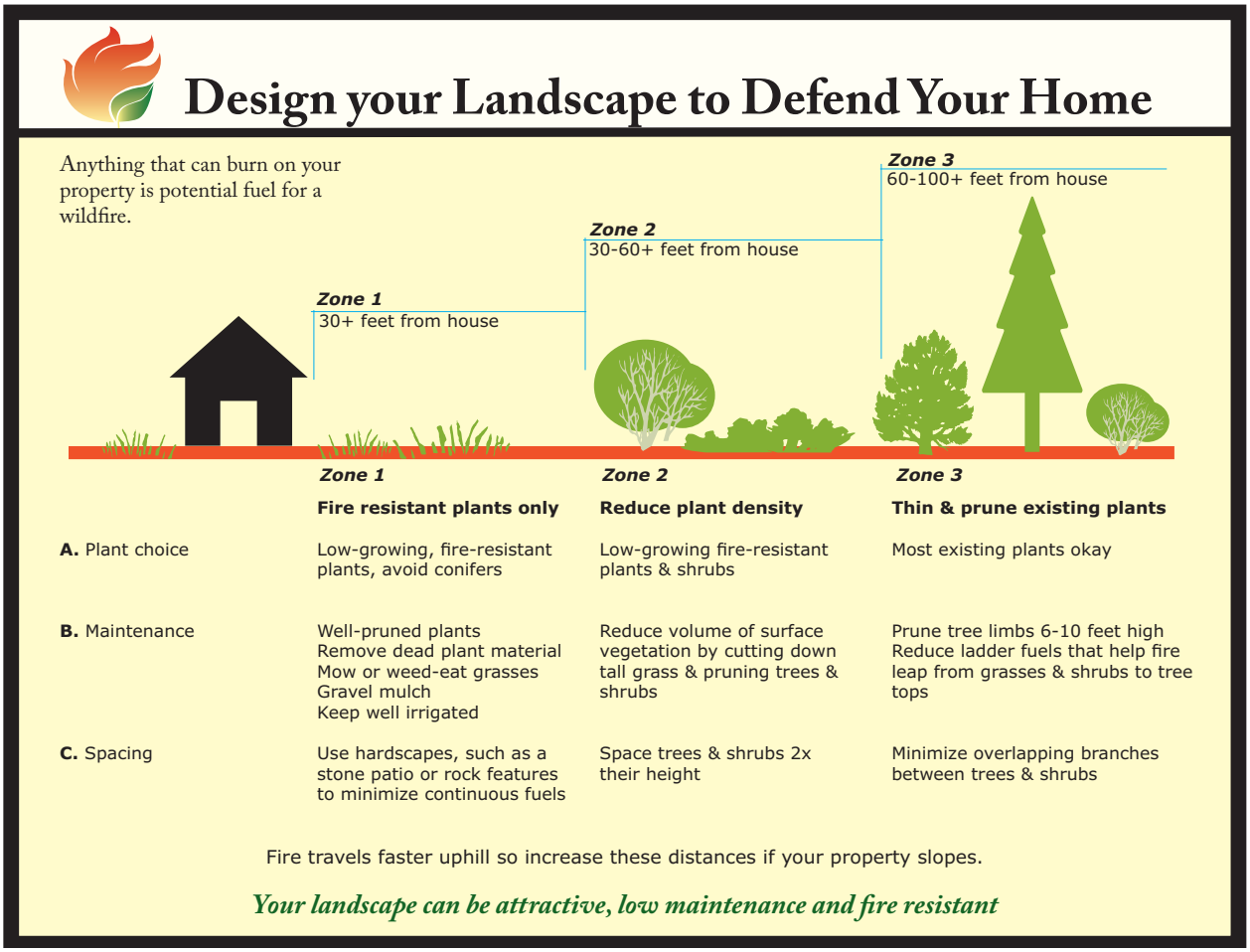
Shaping Your Defensible Space Zones

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) 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* 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 pursu-ant 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*

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/* provides easily accessible information about each vulnerable part of a structure.

CAL FIRE's website at *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*

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/licenselisting_bml_searchcotest.php*

Firewise Communities USA *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*

Fire Safe Marin has a truly excellent website. See the excellent plant list! *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***.**

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* or by calling 707.206.5467. Join with us to make Sonoma County a Wildfire Adapted Community!