

## USGBC-LA Wildfire Defense Education & Tours Program

# Wildfire Defense Toolkit for California Homeowners

June, 2022

This toolkit compiles essential wildfire defense resources from experienced professionals including Ready, Set, Go! – developed by the California Department of Forestry and Fire Protection (CalFire) Ready, Set, Go!, and resources made available by the Federal Emergency Management Agency (FEMA), National Fire Protection Association (NFPA), and others. Contact your local fire and building department for specific requirements or recommendations for your community or feel free to contact us at [info@usgbc-la.org](mailto:info@usgbc-la.org) for more information or guidance.



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525 S. Hewitt St. Los Angeles, CA 90013

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# INTRODUCTION

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Spurred by climate change, California's incredibly costly 365-day fire season is here to stay.

Fire scientists and policy makers understand that the building industries play direct and critical roles in whether or not the inevitable fires take lives and structures. Yet, many in our industry do not understand we have the ability to mitigate our communities' most painful losses through effective urban planning and site selection, defensive design and building practices, and proactive property management. This toolkit is designed to close that gap.

This comprehensive guide to wildfire defense for the building professions connects best practices for fire-defense to those we use to support our communities' overall resilience.

## Why USGBC-LA Cares

Building professions can play a critical role in preventing the loss of lives and properties. USGBC-LA is leveraging its distinctive ability to stimulate necessary change amongst building professionals, from planning and development, design, construction and landscaping, and through to property maintenance. The organization has already harnessed these experienced service providers to support homeowners in the fire-impacted communities of Los Angeles, Ventura and San Bernardino Counties.

USGBC-LA's proven capacity to influence the building communities involves setting aspirational standards, driving policy change, and educating the market of building owners and users. Our thought-leading efforts on the environmental protection front have been so successful that California's standard building codes now exceed the LEED standards most of the country still sees as aspirational.



# INTRODUCTION (CONT'D)

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## Understanding Wildfire

We begin by establishing how fire moves and common sources of ignition, thus allowing us to better understand the green building and landscaping strategies that can be fire-defensive.

### How It Moves

Wildfire follows known paths (aka fire regimes). In recent years, these paths have expanded. Wildfire advances in three ways:

- **Flying embers** – Wind-driven embers from a home or wildfire can destroy homes miles away without igniting anything in between. They are responsible for as many as 90 percent of building ignitions ([Source: IBHS](#)). They are of greatest danger when they can gain access to a home's interior.
- **Direct flames** – A wildfire front can overtake a home.
- **Radiant heat** – High heat from proximate fire can ignite some home exterior materials. It can also compromise windows to gain access to highly-flammable home interiors.

### Common Sources of Ignition

Think of what it takes to build a campfire. Fine, dry and combustible materials ignite easily. Hydrated materials must be dried to burn. It takes greater heat to ignite large materials than fine materials.

Beyond fuels like firewood, gasoline, propane and fertilizers, the most easily ignitable objects on our property tend to be our creature comforts. For example, exterior, our cushions, furnishings, tools and toys). Outdoor structures made of wood (fences, decks), as well as dead or dried plants can build heat sufficient to ignite a home or structures.

### Key Take-Aways

- Myth: Losses are inevitable.
- Myth: Wildfire is natural and unpredictable.
- Myth: Fire “walks” up to homes.
- Myth: Foliage endangers homes.
- Myth: Fire-defensive building is onerous.
- Fact: There is much we can do to improve wildfire safety.
- Fact: Our building choices increase or decrease wildfire.
- Fact: Fire flies, bounces and rolls in the form of embers.
- Fact: Embers attack homes, foliage can defend them.
- Fact: Simple, inexpensive strategies can go a long way.

Sources:

[CalMatters: How Much do Wildfires Really Cost California's Economy? \(\\$148.5 Billion\)](#)

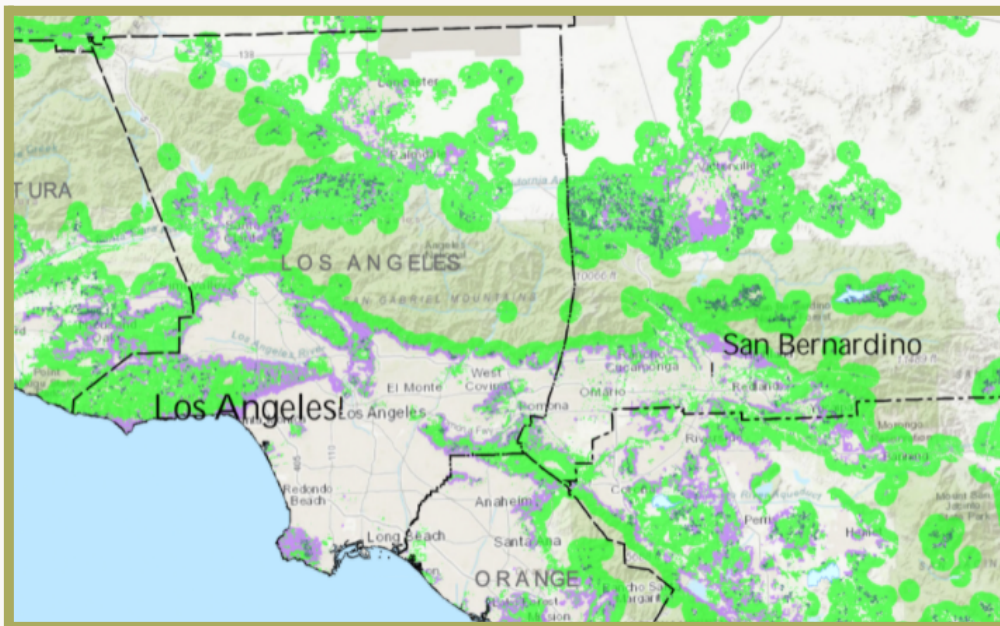
# INTRODUCTION

## What is the WUI?

According to [FEMA](#), the Wildland Urban Interface (WUI) is the zone of transition between unoccupied land and human development. While WUI is not a designation of potential wildfire severity, the term refers to an area where urban development meets undeveloped lands at risk of wildfires. It is the zone where structures and other human development meet undeveloped wildland or vegetative fuels.

Statistics show that more than 46 million residences in 70,000 communities in the United States are at risk for WUI fires.

The California WUI map can be downloaded from the [CalFire](#) website.



Source: [https://frap.fire.ca.gov/media/10300/wui\\_19\\_ada.pdf](https://frap.fire.ca.gov/media/10300/wui_19_ada.pdf)

## WILDLAND URBAN INTERFACE (WUI)



This dataset was developed for the 2015 Assessment of Forest and Rangelands. It is derived from several data sources, including housing density (input\_isn\_HousingDensity12\_2), Fire Hazard Severity Zones (FHSZ\_Assessment11\_1), Unimproved Parcels (input\_UnimprovedParcels16\_1), and Vegetation Cover (input\_FVEG15\_2). The current dataset is appropriate for displaying the overall pattern of WUI development at the county level, and comparing counties in terms of development patterns. Until the dataset is refined through a field review process, it is not suited for WUI designations for individual houses or neighborhoods.

Housing Density Classes used in the WUI definitions:

- 1 - Less than one house per 20 acres
- 2 - One house per 20 acres to one house per 5 acres
- 3 - More than one house per 5 acres to 1 house per acre
- 4 - More than 1 house per acre

Wildland Urban Interface is dense housing adjacent to vegetation that can burn in a wildfire and must meet these criteria:

- Housing density class 2, 3 or 4
- In moderate, high, or very high Fire Hazard Severity Zone
- Not dominated by wildland vegetation (i.e., lifeform not herbaceous, hardwood, conifer or shrub)
- Spatially contiguous groups of 30m cells that are 10 acres and larger

Wildland Urban Intermix is housing development interspersed in an area dominated by wildland vegetation subject to wildfire and must meet these criteria:

- Not Interface
- Housing density class 2
- Housing density class 3, 4 dominated by wildland vegetation
- In Moderate, High or Very High Fire Hazard Severity Zone
- Improved parcels only
- Spatially contiguous groups of 30m cells 25 acres and larger

Wildfire Influence Zone is wildfire susceptible vegetation up to 1.5 miles from Wildland Urban Interface or Wildland Urban Intermix and must meet these criteria:

- Wildland vegetation up to 1.5 miles from Interface or Intermix

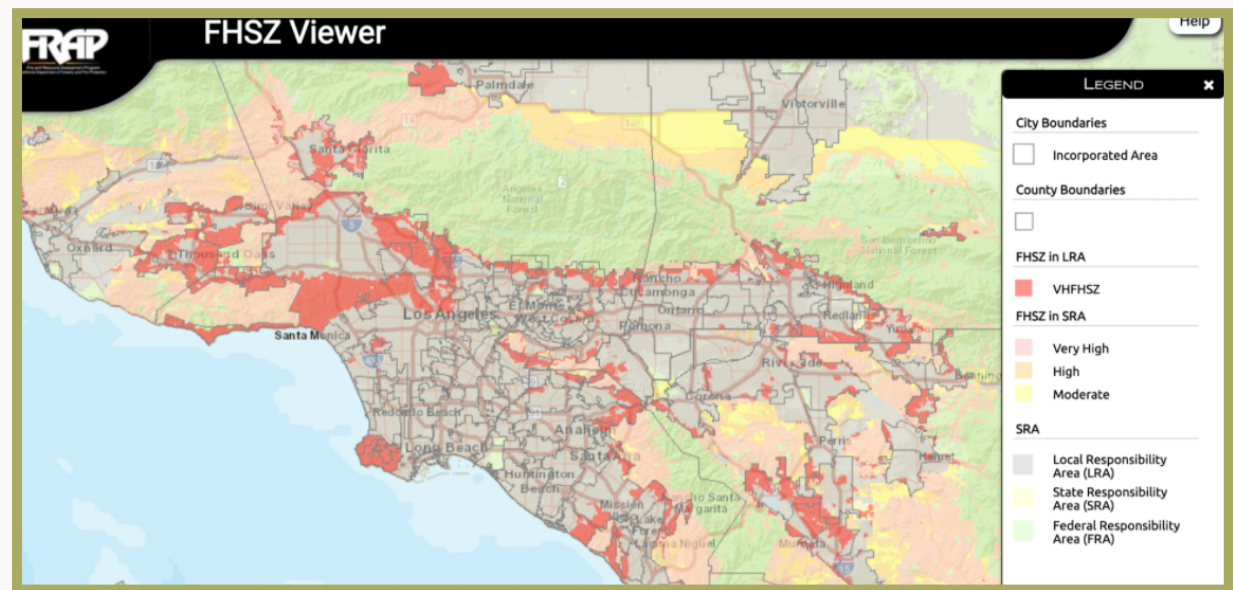
# INTRODUCTION

## Fire Hazard Severity Zones

The Fire Hazard Severity Zones (FHSZ) maps assigns a hazard ranking based on fire likelihood and fire behavior, evaluating criteria such as fire history, existing and potential vegetation over a 30 to 50 year time horizon, local climate, topography, and ember production and blowing.

The maps show three levels of hazard in the State Responsibility Areas: Moderate, High and Very high. Also, properties can be searched by address on the Fire Hazard Severity Zones maps to learn about their fire hazard severity. The map below was developed by CalFire and shows FHSZ statewide:

These designations mandate how people construct buildings and protect property to reduce risk associated with wildland fires. The CalFire map, last updated in 2007–2010, is currently being updated to incorporate improved fire science, data and mapping techniques. Also, CalFire indicated the updated map will mark lands where the state has financial responsibility for wildland fire protection as State Responsibility Area (SRA) and lands where local governments have financial responsibility for wildland fire protection as Local Responsibility Area (LRA). Per law, only lands zoned as Very High Fire Hazard Severity are identified within local responsibility areas.



Source: <https://egis.fire.ca.gov/FHSZ/>

More detailed and localized FHSZ maps are available on the [CalFire website](#), on a countywide basis.



# INTRODUCTION

## Measures the Building Professionals (and Homeowners) Can Take

Wind-driven embers are the primary source of home ignition. The Los Angeles County Fire Department estimates that embers caused the ignition of over 50% of the homes that burned in recent wildfires. Carried by strong winds, embers fly through the air and rain down on vulnerable homes, often miles ahead of flames. (Source: [RCDSMM](#))

“Embers are responsible for most damage during wildfires. Embers can be forced into gaps in the home (e.g. attic vents or an open or broken window) and burn the home from the inside out. When this happens, there can be little damage to the surrounding vegetation, leaving people puzzled as to what caused the home to burn.”  
Source: CalFire

According to CalFire, applying home hardening strategies, maintaining an effective defensible space, and adopting fire-resistant landscaping strategies are the most effective ways to increase the chances of a property surviving a wildfire. The key takeaway here--thinking home first is an effective approach to reducing your property's overall fire risk.

### HOME HARDENING



Use fire-resistant building materials to protect your home from wildfires.

→ Hardening a home means using fire-resistant site-selection, structure orientation, and construction materials and practices that can help a home resist ember storms and high heat.

### CREATE YOUR DEFENSIBLE SPACE



Create and maintain 100 feet of Defensible Space around your home.

→ Defensible space is the buffer that helps to keep the fire away from a home.

### FIRE RESISTANT LANDSCAPING



Surround your home with fire resistant landscaping.

→ Fire-defensive vegetation, which is well-maintained, properly hydrated, ideally native to its location and appropriately spaced and placed, contributes to making defensible space effective.

Source: <https://survey123.arcgis.com/share/77d52e2c982e480990320eb5bd53f5fc>

# HOME HARDENING STRATEGIES

Homes contain the most flammable materials especially inside. House fires create embers that pose the greatest danger to other homes. "What's most alarming is that home fires have become more dangerous and devastating recently because of the flammability of the materials in the house. Thirty years ago, you had on average about 14 to 17 minutes to escape a house fire, according to Consumer Safety Director John Drengenberg of Underwriters Laboratories (UL). "Today, with the prevalence of synthetic materials in the home, occupants have roughly 2 to 3 minutes to get out," said Drengenberg. Fire testing conducted by UL has found a home with mostly synthetic-based furnishings can be entirely engulfed in less than 4 minutes." (Source: [This Old House](#))

"If a garage, shed, your neighbor's house, or the property line is closer than 100 feet, it is especially important to harden your home **to reduce vulnerability to radiant heat and to work together with your neighbors to reduce risk**—a great way to build community while protecting assets." CA Fire Safe Council

Communities located in wildfire-prone areas need to take safety measures. As homes are often the most flammable objects on a property, the first step in fire defense is to "harden" them via strategies that boost their chances of resisting ignition.

## These strategies include:

1. Effective positioning on the site
2. Creating an impermeable envelope
3. Building with fire-resistant materials

Source: FormLA Landscaping - "Think Home First" - <https://www.formlainc.com/resources/firesandslides/>



# HOME HARDENING STRATEGIES (CONT'D)

A few examples of actions from simple and low cost to complex and high cost for new and existing buildings:

	New Building	Retrofits & Renovations
Lowest Cost	Home Ignition Zone Evaluation (sometimes provided for free by public entity)	
Low Cost	Using all native plants (water and fertilizer costs much lower than in other landscaping)	<ul style="list-style-type: none"> <li>Replacing vent screens with those that meet ember resistant standards</li> <li>Covering gutters and chimneys with fire resistant material</li> <li>Regular self conducted or contracted brush/debris clearances</li> </ul>
Medium Cost	Design a defensible space	<ul style="list-style-type: none"> <li>Window replacement (multi-pane windows are more expensive but will also help save on energy costs)</li> <li>Fencing replacement to non combustible material</li> <li>Roof replacement to Class A materials</li> </ul>
High Cost	Ensure proper road access to your home, build more if necessary	<ul style="list-style-type: none"> <li>Upgrading siding/porches &amp; decks to fire resistant material</li> <li>Completing thorough garage upgrades that include backup battery for door</li> </ul>
Highest Cost	<ul style="list-style-type: none"> <li>Purchase highest end fire resistant material for windows, roofing, and siding,</li> <li>Building to highest standards throughout home</li> </ul>	<ul style="list-style-type: none"> <li>Designing and installing a defensible space (includes clearing brush, purchasing gravel, and redoing whole landscape to all native plants)</li> <li>Building or widening access roads to your home</li> </ul>

**Tip:** What is more flammable than a home? Not much, but our creature comforts are generally easier to ignite. When they do, they are often well-positioned to ignite a structure.

Those living in areas of fire need structures that encourage smart property management behaviors, including distant storage for petroleum products (gas, oil, paint, fertilizers), tools, toys, cushions, mats and rugs, etc and some outdoor artwork.

Sources:

- Home Hardening Demonstration: <https://www.rcdsmm.org/what-we-do/fire-resilient-home/>
- Home Ignition Zone Evaluations: <https://www.rcdsmm.org/what-we-do/home-ignition-zone-evaluations/>



# HOME HARDENING STRATEGIES

## Building a Fire Resistant Structure

### Roof and Rain Gutters

The roof can be the most vulnerable part of your home. Homes with wood or shingle roofs are at high risk of being destroyed during a wildfire. Roof covering fire ratings are Class A, B, C, or unrated. Providing the best fire protection, Class A options include asphalt fiberglass composition shingles, concrete and flat/barrel-shaped tiles, metal, clay, or tile.

### Maintenance best practices include:

- Block any spaces between the roof decking and covering to prevent embers from catching.
- Remove accumulated vegetative debris from the roof and from the rain gutters.
- Inspect shingles or roof tiles and replace or repair those that are loose or missing.
- Install a noncombustible gutter cover on gutters to prevent the accumulation of leaves and debris.
- Screen roof and attic vents to prevent ember entry.
- Install a corrosion-resistant and noncombustible metal drip edge for additional protection on your roof's edge.

The [NFPA Fact-sheet: Roofing Materials](#) contains detailed information on fire-resistant roofing materials and best practices to reduce ignition risk during wildfires.



# HOME HARDENING STRATEGIES

## Vents

Vents on homes create openings for flying embers. Although building codes require vent openings to be covered by corrosion-resistant metal screens, it's important to ensure that a proper metal mesh is installed. Vents that meet the flame- and ember-resistant standard are listed on the [California Office of the State Fire Marshal Building Materials Listing Program](#) website.

### Safety measures to consider:

- Cover all vent openings with 1/16-inch to 1/8-inch metal mesh.
- Do not use fiberglass or plastic mesh because they can melt and burn.
- Use ember and flame resistant vents (WUI vents).
- Do not store combustible items (e.g., cardboard boxes, newspapers) near attic or any other vents on the building.
- Inspect vents to make sure they are in good condition.
- If you have enough preparation time before a wildfire, use metal tape to temporarily seal up vents from the inside of the house.



Source: <https://disastersafety.org/wildfire/wildfire-ready/>



**WILDFIRE RESEARCH FACT SHEET**

## Attic and Crawl Space Vents

**Windblown embers can enter attics and crawl spaces through vents.**

**INSTALLING THE RECOMMENDED MESH SCREENING AND ELIMINATING STORAGE IS CRITICAL TO REDUCING BUILDING IGNITIONS DURING A WILDFIRE.**

**VENTS IN ATTICS AND CRAWL SPACES**  
Attic and crawl space vents, and other openings on the vertical wall of a home, serve important functions, including providing ventilation to remove unwanted moisture from these typically unoccupied spaces and oxygen for gas appliances such as hot water heaters and furnaces. Wind-blown embers are the principal cause of building ignition and can readily enter these spaces, which are often hot and dry. Providing air for ventilation, while also keeping out embers can present a dilemma. Dry materials are more easily ignited by embers, so limiting the entry of embers into attic spaces is critical. Adding to the problem are the combustible materials we tend to store in these spaces (e.g., cardboard boxes, old clothes and other combustible materials) because embers accumulate against them and they can be easily ignited.

**HOW VENTS FUNCTION**  
Ventilated attic spaces have openings in two locations. Inlet air comes from vents located in the under-eave area at the edge of your roof. Exiting air leaves through vents located on the roof or at the gable ends of your home. If your home is built over a crawl space, you will typically have vents on each face of your home to provide cross-ventilation. Experiments conducted at the IBHS Research Center demonstrated that regardless of whether a vent had an inlet or outlet function, when wind blows against its face, it is an inlet vent. Therefore, any vented opening on your home should be able to resist the entry of embers. Unvented attic and crawlspace designs are available for some areas of the country. These designs are more easily implemented with new construction. Check with local building code officials to see if this is an option where you live.

**USE MESH SCREENING TO REDUCE EMBER ENTRY INTO VENTS**  
Building codes require vent openings to be covered by corrosion resistant metal screens, which are typically 1/4-inch to keep out rodents. However, research shows that embers can pass through 1/4-inch mesh and ignite combustible materials, particularly smaller materials such as saw dust. Embers also can enter smaller screening, such as 1/16-inch, but cannot easily ignite even the finer fuels; however, this size screening is more easily plugged with wind-blown debris and is easily painted over if you are not careful when re-painting your house. Installing 1/8-inch mesh screening is suggested in wildfire prone areas, as it effectively minimizes the entry of embers. It's important to note that 1/8-inch screening only minimizes the size and number of embers and does not eliminate them entirely; making it very important to reduce what's stored in the attic and crawl space.

**BEST CHOICES FOR VENTS TO RESIST EMBER ENTRY:**

- 1 For (under-eave) inlet vents, opt for a soffited eave design. IBHS research demonstrates that gable end vents and other vent openings are vulnerable to wind-blown embers when the face of the vent is perpendicular to the wind flow, while embers are less likely to pass through vents with a face that is parallel to the wind flow. Therefore, soffited eave construction is preferred to open eave.
- 2 For outlet vents, opt for a ridge that is rated to resist wind driven rain. These vents have an external baffle at the vent inlet. Vents that have been approved for use by the California Office of the State Fire Marshal.
- 3 Turbine vents also help keep embers out, but you should attach a piece of 1/8-inch mesh to the bottom of the roof sheathing at the opening for the vent.

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The [NFPA Fact-sheet: Attic and Crawl Spaces Vents](#) contains detailed information on how to prevent embers from entering the attic through vents, and, maintenance best practices.

# HOME HARDENING STRATEGIES

## Eaves and Soffits

The eave overhang protects your home from rain and sun. These structural components, if neglected, can increase susceptibility to heat from flames and allow fire to spread through attic vents. Eaves should be boxed in (soffit-eave design) and protected with ignition-resistant or noncombustible materials.

\*Soffited-Eave Construction: Material connecting and enclosing the space between the edge of the roof and the exterior wall.

The [NFPA Fact-Sheet: Under-Eave Construction](#) explains the difference between types of under-eave construction and illustrates a few examples of best practices vs. unrecommended practices.

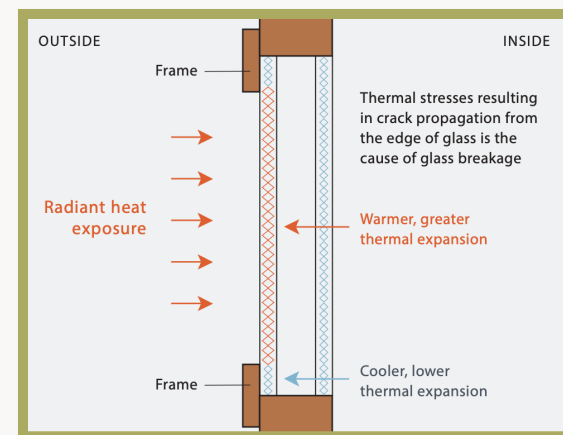
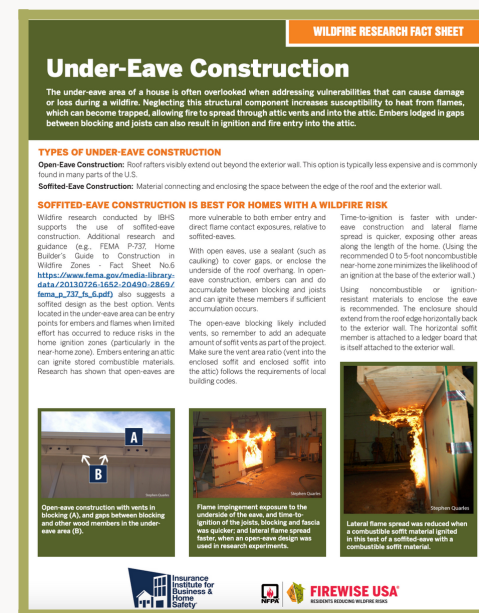
## Windows

Windows can be a vulnerable component of a home if the framing material ignites or deforms, or if the glass breaks and falls out, both allowing embers or flames to enter the home. Single-paned and large windows are particularly vulnerable.

### Important to consider:

- Install multi-paned windows with one pane of tempered glass.
- Consider limiting the size and number of windows that face large areas of vegetation.
- Install metal window screens in all windows to increase ember resistance and decrease radiant heat exposure.

Source: [http://www.readyforwildfire.org/wp-content/uploads/Wildfire\\_Home\\_Retrofit\\_Guide-1.26.21.pdf](http://www.readyforwildfire.org/wp-content/uploads/Wildfire_Home_Retrofit_Guide-1.26.21.pdf)



This illustration available on the [Wildfire Home Retrofit Guide](#) shows how a dual-pane window will resist fire exposure.



# HOME HARDENING STRATEGIES

## Skylights

Skylights are a great way to bring daylight into homes, but special attention should be given to this component in wildfire-prone areas as they are another entry point for embers and/or flames. The shape of the skylight, the building materials, and a maintenance routine are key factors that will influence the level of protection of your home for this component. Skylights on low-slope (flatter) roofs are more prone to the accumulation of vegetative debris (especially flat-style skylights).

### SKYLIGHTS

Skylights can compromise a home's ability to survive a wildfire when precautions are not implemented to prevent them from being an entry point for embers and/or flames.

**Construction Materials/Placement**  
During a wildfire, a skylight can be vulnerable if subjected to an extended radiant heat exposure, or to flames when embers have ignited vegetative debris on top of the skylight. Most guidance recommends using a flat glass skylight rather than a plastic dome style because the plastic is combustible. However, there are situations, based on the slope of the roof, where a flat glass could be more vulnerable.

Vegetative debris can more easily land and stay on a low-slope roof, leading to increased risks. As seen in **Photos 1 and 2** of a low-slope roof, debris is more likely to accumulate on top of a flat glass skylight, and less likely to accumulate on a plastic dome skylight. Typical flame temperatures resulting from a wind-blown ember ignition of the debris would be high enough to break even tempered glass, the type of glass commonly used as the outer pane in a flat glass skylight.

**Steep-Slope Roofs**  
Flat skylights are less vulnerable on a steep-slope roof because vegetative debris is less likely to accumulate. A steep-slope roof will act more like an exterior wall in terms of its response to a radiant heat exposure. Because of this increased resistance of glass over plastic to a radiant heat exposure, a glass skylight is a better choice on steep-slope roofs. The vulnerability of a domed skylight will depend on the potential for an extended radiant heat exposure, which in turn depends on the amount of vegetation and other combustibles near it (**Photo 3**).

**Dual-Pane Glass Benefits**  
Newer skylights feature dual-pane systems, like multi-pane windows in an exterior wall. The outer pane uses tempered glass and the inner pane uses laminated safety glass. This type of skylight is less likely to fail.

**Maintenance**  
Both domed and flat skylights have similar framing systems (bases). Each uses a metal flashing to protect the wood framing members from both moisture- and ember-related damage (**Photo 4**). This flashing helps the skylight survive when threatened, but should be maintained to avoid risks.

**Prior to an Evacuation**  
Similar to windows, skylights that can open should be closed when a wildfire threatens. They also should incorporate a screen to resist the intrusion of embers in case the skylight happens to be left open (**Photo 5**).

**Photo 1.** Accumulation of vegetative debris on top of a glass-type skylight on a low-slope roof.

**Photo 2.** Minimal accumulation of vegetative debris accumulated on these dome-style skylights on this low-slope roof.

**Photo 3.** The vulnerability of skylights on a steep-slope roof will depend on the potential for an extended radiant heat exposure to the roof and skylight unit.

**Photo 4.** Metal flashing protects the framing members of a skylight from moisture, a direct ember ignition, or flames from ember-ignited vegetation debris.

**Photo 5.** Operable skylights should be closed when a wildfire threatens. Similar to windows, they should incorporate a screen to resist the intrusion of embers (also good for insects!).

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### What to do to reduce the vulnerability of skylights:

- Remove vegetative debris from the roof and skylights on a regular basis.
- On sloped roofs, opt for glass skylights due to the increased likelihood of exposure to radiant heat (plastic skylights may melt and burn when exposed to heat from a wildfire)
- If the skylight can open, consider adding a 1/16-inch noncombustible corrosion-resistant-metal mesh screening to reduce ember intrusion into the home in case the skylight cannot be closed before evacuation.

[The NFPA fact-sheet: Skylights](#) has comprehensive guidance and examples of what to do and what to avoid.

# HOME HARDENING STRATEGIES

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## **Walls and Other Siding Materials**

Commonly used siding materials such as solid wood, wood composite, or plastic/vinyl, are flammable and therefore not good choices for fire-prone areas. Combustible siding can be ignited from direct-flame contact, radiant heat exposure from nearby burning structures, or from contact with embers, especially if the embers interact with combustible materials close to the home. If the siding ignites, a fire can penetrate through the stud cavity into the home and spread up, enter windows, vents, and expand into the attic at a gable-end vent or an under-eave area.

### **Safety Measures include:**

- Build or remodel your walls with non combustible materials, such as stucco, fiber cement wall siding, brick or stone veneer. Extend materials from the foundation to the roof.
- If you cannot replace all the siding, replace the lowest one foot of siding, ensuring the material extends below ground level with brick or stone veneer.
- An exposed concrete foundation in the lowest foot provides similar risk reduction.
- The use of a one-hour wall design (additional fire resistant layer is used in the wall assembly) provides additional protection when a more vulnerable siding material is used.
- Replace wood mulch products within five feet of all structures with noncombustible products such as dirt, stone, or gravel.
- It is not recommended to use fire-retardant coatings, such as fire-retardant paint, to provide fire protection for combustible siding.

# HOME HARDENING STRATEGIES

## Decks and Porches

A burning deck can ignite siding or break the glass in doors or windows, allowing fire to gain entry into the house. By adopting strategies to make decks less vulnerable to wildfires, homeowners also make their houses less vulnerable. These strategies include approaching building materials and design features, as well as maintaining a noncombustible zone around and under the deck.

### Some other measures include:

- Never store flammable materials underneath decks or porches. Remove dead vegetation and debris from under decks and porches and between deck board joints.
- If a deck overhangs a slope, create and maintain an effective defensible space downslope of the deck.
- When building a new deck, use metal joists and a fire-resistant walking surface like fire-rated composite deck materials, aluminum, or lightweight concrete.
- On existing decks, apply metal flashing or foil-face bitumen tape on top of and a few inches down the side of the support joists. This is an effective strategy to minimize fire growth when a deck is ignited by embers or flames.

[The NFPA Fact-Sheet - Decks](#) provides guidance to homeowners on best strategies to reduce the vulnerability of decks to wildfire. Another [NFPA Fact-Sheet - Fire Spread on Ember-Ignited Decks](#) covers strategies to minimize risk from wind-blown embers to decks. A list of approved deck building materials in California can be found on the [CalFire website](#).





# HOME HARDENING STRATEGIES

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## Garage

Commonly used for storage, garages are a familiar resting place for combustible materials. Whether attached to the home or not, garages are vulnerable to wildfires since embers can easily enter poorly sealed garage doors.

### Highly Recommended Measures

- **Secure a fire extinguisher, shovel, rake, bucket, and hose for fire emergencies.**
- Add a battery backup to the garage door motor so that the garage can be operated if power is out.
- Install weather stripping around and under the garage door to prevent embers from blowing in.
- Store all combustible and flammable liquids away from ignition sources.
- Treat windows and vents in the garage the same way as if it was a part of the house.

## Fences

When connected to a home, fencing can provide a direct path of ignition if surrounding vegetation or embers combust. The best practice is to separate the fence from the house or upgrade the last 5-feet of the fence to a noncombustible material to reduce the chance of the fence bringing the fire to the home.

- **Privacy fences** are the most vulnerable in terms of ignition because embers can accumulate in the horizontal to vertical intersection and ignite the fence.
- **Good neighbor** (planks alternating) are more porous and difficult to ignite via ember exposure.
- **Vinyl fences** are not as vulnerable to embers, but can ignite through direct flame exposure if vegetative debris has accumulated at its base.

\*All fences are more vulnerable when vegetative debris has accumulated at their base.

# HOME HARDENING STRATEGIES

## Other best practices include:

- Clean up the base of the fence on a regular basis removing vegetative debris that can accumulate at the base.
- Do not use fences as a trellis for plants as they can create and trap ignitable vegetative debris.

**The NFPA Fact-Sheet: Fencing** provides guidance on material, installation and maintenance costs choices.



### Fencing

Insurance Institute for Business & Home Safety  
©University of California, Agriculture and Natural Resources

#### WILDFIRE RESEARCH FACT SHEET

**RESEARCH FINDINGS:**

- 1 Use a noncombustible fence section when it's attached to a building.
- 2 The area at the base of the fence should be kept clear of debris. Flame spread to the building will be more likely if fine vegetative fuels (e.g., pine needles, leaf litter and small twigs) have accumulated. Avoid placement of combustible mulch near the fence.
- 3 A fence design that allows for greater air flow, such as a single panel lattice fence, makes it more difficult for wind-blown embers to accumulate at plank, or lattice panel to horizontal support locations. If an ignition occurs, it's also more difficult for lateral flame spread to occur in the fencing material. Fence ignitions from wind-blown embers are more likely to occur at locations where vertical fencing planks attach to horizontal support members. The most vulnerable fencing from this perspective is a "privacy" fence, where the fence planks are on the same side as the horizontal support members.
- 4 A fence built from lattice that's applied to both sides of the support posts may be desired for privacy or other landscaping purposes, but should be avoided in wildfire-prone areas. Recent research at NIST has demonstrated that fire growth and lateral flame spread are much greater in this design style.
- 5 Vinyl fencing is not vulnerable to ember exposures alone, but did burn when subjected to flaming exposures from burning debris. Vinyl fencing will deform if subjected to radiant heat.

#### Material, Installation and Maintenance Choices

**NONCOMBUSTIBLE FENCING PRODUCTS REDUCE POTENTIAL HOME IGNITIONS**  
Many wildfire educational programs, along with the Insurance Institute for Business & Home Safety (IBHS) recommend noncombustible fencing products when placed within five feet of a building. As a necessary component, fencing located within the zero to five-foot noncombustible zone should be constructed of noncombustible materials.

A noncombustible zone minimizes the likelihood of wind-blown embers igniting fine fuels (such as bark mulch) located close to the building. Ember-ignited mulch can result in a radiant heat and/or flaming exposure to the building's exterior. Using noncombustible fencing where it attaches to the building reduces the opportunity of a burning fence igniting the exterior of the structure. Fencing products are often available in eight-foot pieces and use of that full section of noncombustible material is recommended. Observations made during the 2012 Waldo Canyon fire in Colorado Springs, CO provided evidence that burning fencing generates embers that can result in additional ignitions down-wind.

**PERIMETER FENCING**  
When neighboring buildings are located within 20 feet of each other, use of steel fencing for the perimeter area can serve as a radiant barrier, providing added protection should a neighboring building ignite and burn. Research in Australia demonstrated the ability of panelized steel fencing to resist a radiant heat exposure.

**RESEARCH FINDINGS TO HELP AVOID FENCE IGNITIONS**  
Recent research conducted by IBHS and the National Institute of Standards and Technology (NIST), both independently and in a collaborative project, provided additional information about the vulnerability of combustible fencing.

**Photo Captions:**  
**A** Flame spread to the building when combustible debris was at the base of the fence.  
**B** Gates made from noncombustible materials should be used where a fence is attached to the home. Source: University of California, Agriculture and Natural Resources  
**C** Ignition from ember accumulation at the intersection of the vertical planks and horizontal support member.



# HOME HARDENING STRATEGIES

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## Chimneys

Chimneys and stovepipes are another entry point for fire embers if they are incorrectly installed, cleaned, or maintained.

A few measures need to be taken in order to reduce the vulnerability of chimneys:

- Cover your chimney and stovepipe outlets with a non-flammable screen with openings no smaller than 3/8-inch and no larger than 1/2-inch, thus preventing embers from escaping and igniting a fire.
- The use of metal step flashing at the roof-to-siding intersection (flashing extending up the wall) can reduce the vulnerability to embers.
- Close the fireplace flue during fire season when the chimney is not in use.



## Driveways and Access Roads

- Consider maintaining access roads with a minimum of 10 feet of clearance on either side, allowing for two-way traffic.
- Ensure that all gates open inward and are wide enough to accommodate emergency equipment.
- Trim trees and shrubs overhanging the road to allow emergency vehicles to pass.
- Make sure your address is clearly visible from the road.

## Water Supply

Consider having multiple garden hoses that are long enough to reach all areas of your home and other structures on your property. If you have a pool or well, consider getting a pump.



# HOME HARDENING STRATEGIES

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## Additional Resources on Home-hardening Strategies

### Incentive Program for Homeowners

The CPUC's Self-Generation Incentive Program (SGIP) offers rebates for installing energy storage technology at both residential and non-residential facilities in communities located in high fire-threat areas. These storage technologies include battery storage systems that can function during a power outage. Visit CPUC website for more information on the application process.

### Sources:

- [Living with Fire Home Hardening Guide](#) (Source: Living with Fire) Great example of illustrations, glossary
- Chaparral Institute Home Hardening Booklet - <https://californiachaparral.org/fire/protecting-your-home/>
- RCDSMM's demonstration structure - <https://www.rcdsmm.org/what-we-do/fire-resilient-home/>
- RCDSMM's education platform on home hardening - [www.defensiblespace.org](http://www.defensiblespace.org)
- Chaparral Institute: <https://www.californiachaparral.org/fire/protecting-your-home/>
- <https://www.plantprefab.com/wildfire-help/>
- <https://www.sweiskloss.com/fire> (home first orientation)
- CA Insurance Commissioner [Safer from Wildfire](#) (and [LA Times re Safer from Fire](#))
- The Atlantic: [People Deserve to Know Their Homes Will Burn](#)
- [https://disastersafety.org/wp-content/uploads/2019/03/Wildfire-Retrofit-Guide-California\\_IBHS.pdf](https://disastersafety.org/wp-content/uploads/2019/03/Wildfire-Retrofit-Guide-California_IBHS.pdf)
- <https://defensiblespace.org/house/house-new/>
- <https://headwaterseconomics.org/wp-content/uploads/building-costs-codes-report.pdf>
- <https://ucanr.edu/sites/fire/Prepare/Building/>

# DEFENSIBLE SPACE ZONES

In the state of California, defensible space is categorized by zones: Zones (30 feet); and Zone 2 (100 feet) and is [currently required by law](#) for properties located in State Responsibility Area (SRA). A third zone - Zone 0 - passed into law in 2020 and a new ember-resistant zone within 0 to 5 feet of the home will be required by future regulations.

**Below are some measures homeowners and residents can adopt within each Zone according to CalFire and FEMA:**

Zone 0 - Ember Resistant	Zone 1 - Lean, Clean, and Green	Zone 2 - Reduce Fuel Zone
<b>0-5 feet</b> from buildings structures	Extends <b>30 feet</b> from buildings structures or to the property line, whichever is closer	<b>30 feet to 100 feet</b> from buildings structures or to the property line, whichever is closer
<ul style="list-style-type: none"> <li>• Use hardscape like gravel, pavers, concrete, and other noncombustible mulch materials.</li> <li>• Remove all dead and dying weeds, grass, plants, shrubs, trees, branches, and vegetative debris.</li> <li>• Check your roofs, gutters, decks, porches, stairways, etc.</li> <li>• Consider relocating garbage and recycling containers outside this zone.</li> <li>• Consider relocating boats, RVs, vehicles, and other combustible items outside this zone.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove all dead plants, grass and weeds (vegetation), dead or dry leaves, and pine needles from your yard, roof, and rain gutters.</li> <li>• Remove branches that hang over your roof, flammable plants near windows, and keep dead branches 10 feet away from your chimney.</li> <li>• Trim trees regularly to keep branches a minimum of 10 feet from other trees.</li> <li>• Relocate wood piles to Zone 2.</li> <li>• Remove vegetation and items that could catch fire from around and under decks, balconies, and stairs.</li> <li>• Create a separation between trees, shrubs, and items that could catch fire, such as patio furniture, wood piles, swing sets, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Mow annual grass down to a maximum height of 4 inches.</li> <li>• Create horizontal space between shrubs and trees.</li> <li>• Create vertical space between grass, shrubs, and trees.</li> <li>• Remove fallen leaves, needles, twigs, bark, cones, and small branches.</li> <li>• All exposed wood piles must have a minimum of 10 feet of clearance.</li> <li>• Use driveways and paved or gravel walkways or patios to create firebreaks throughout the yard.</li> <li>• Plant fire-resistant, low-volume vegetation that retains moisture.</li> <li>• Distance detached structures such as a garage, pump house, pergola from the home by at least 50 feet. Increase the distance if combustible materials are stored.</li> </ul>

☆ An additional **Zone 3** is recommended by FEMA to reduce fuels that are farther than 100 feet from the building by thinning and pruning vegetation horizontally and vertically. The goals in Zone 3 are to improve the health of the wildlands and help slow an approaching wildfire.

# DEFENSIBLE SPACE ZONES

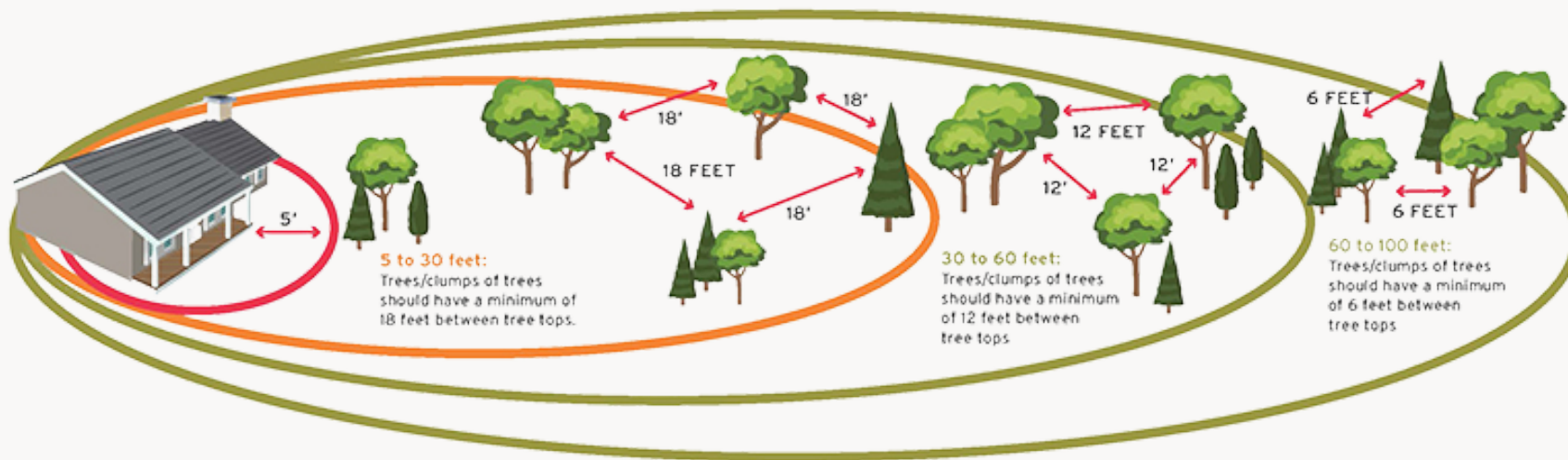
## Plant and Tree Spacing

Plant and tree spacing, vertically and horizontally, is applicable to all Zones and determined by the type, height and size of brush and trees, as well as the slope of the land. Removing all tree branches at least 6 feet from the ground is a general rule.

The formula to determine proper spacing can be found on the [CalFire](https://www.calfire.ca.gov/) website.

**Tip:** When planting, consider the full size of the plant, then factor in the needed space for fire safety. This will save onerous maintenance and annual “brush clearance,” as everything will be ready.

### TREE SPACING



Source: <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire>

Source: <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire>



# DEFENSIBLE SPACE ZONES

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## Create a Defensible Space

Dry and unhealthy vegetation surrounding a building or structure can fuel a fire. Strategic, consistent landscape maintenance is the key to creating good **defensible space**.

According to CalFire, defensible space is where firefighters will work to defend your home. It must be clear of flammable items and also anything that might inhibit their safe movement through the space.

A good rule of thumb is to keep 5-10 feet of such space around your structure(s), but it is wise to check with your local department. The most protective size will vary based upon your home's location, the topography and prevailing winds, your home's position on your site, as well as the proximity of other homes and foliage.

When creating defensible space, start by thinking home first. Reference the home's structural vulnerabilities that you cannot or do not intend to mitigate. Then, look for ways to defend those vulnerabilities from flying and rolling embers, and, where relevant, keep potentially flammable items distant.

Source: <https://www.houzz.com/magazine/fire-wise-landscapes-can-help-keep-your-home-and-property-safe-stsetivw-vs~73300990>



# DEFENSIBLE SPACE ZONES

## Property Management Spotlight

Anchored by wildfire defense experts, USGBC-LA's tours showcase specific risk reduction strategies, including the latest home-hardening and firewise landscaping strategies.



Tour of the Defensible Space Project led by The Resource Conservation District of Santa Monica Mountains, USGBC-LA Thought Leadership Series: Reducing California's Fire Risk, June 2021.



Innovative Protective Solutions and the Role of Nature Tour led by: The Chaparral Institute, USGBC-LA Thought Leadership Series: Reducing California's Fire Risk, June 2021.



Fire Defensive Landscape Tour led by: FormLA Landscaping, USGBC-LA Thought Leadership Series: Reducing California's Fire Risk, June 2021.

# DEFENSIBLE SPACE ZONES

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## **Additional Measures for an Effective Defensible Space**

- Mow before 10 a.m., and never on a hot or windy day. String trimmers are a safer option (vs. lawnmowers) for clearing vegetation.
- Ensure that patio furniture is either made of noncombustible material such as metal or is at least 30 feet away from the building.
- Store fuel tanks away from a structure at the minimum distance that is required by code or greater and place it underground or on a noncombustible pad.
- Maintain your defensible space by pruning and removing dead branches and leaves.
- Regularly clean your roof, gutters, decks, and the base of walls.
- Ensure that all combustible materials are removed from underneath, on top of, or within 5 feet of a deck.
- Remove vegetation or other combustible materials that are within 5 feet of windows and glass doors.
- Replace wood mulch products within 5 feet of all structures with noncombustible products such as dirt, stone, or gravel.
- Remove all dead or dying grass, plants, shrubs, trees, branches, leaves, weeds, and pine needles within 30 feet of all structures.

Full recommendations on how to create a defensible space and home hardening strategies can be found on the [Wildfire is Coming, Are you Ready? brochure](#). Developed by CalFire, the brochure is a wildfire action plan with valuable information that helps educate people living in fire-prone areas about the importance of improving their property resistance to wildfires by creating defensible space and home hardening strategies. The plan also includes an evacuation plan for residents to leave their houses in a safe manner.

The [Home Builder's Guide to Construction in Wildfire Zones](#) developed by FEMA provides guidance on how to create a fire-resistant zone that can reduce the potential for damage to homes from wildfires.



# DEFENSIBLE SPACE ZONES

A [defensible space self-assessment](#) is available on the CalFire website to help homeowners and residents to determine how prepared their homes are for a wildfire and what measures they can adopt in order to reduce the chances of the fire reaching their homes.

- This [homeowners checklist](#) created by CalFire compiles the best strategies to make a home fire safe, covering defensible space, landscaping, home hardening, and more.
- The County of Los Angeles Fire Department provides a list of fire reduction service providers on their [Fire Hazard Reduction Program](#) website, which includes: brush clearance (defensible space) and goat vendors.

## OUTSIDE

### 1 Design/Construction

(For new Wildland Urban Interface Construction or Remodels)

- Use ignition resistant construction (effective January 1, 2008) for roofs/roof assemblies, gutters, vents, decks, exterior walls, exterior windows.
- Enclose the underside of eaves, balconies and above ground decks with fire resistant materials
- Show your 100 feet Defensible Space on plot plan
- Build your home away from ridge tops, canyons and areas between high points of a ridge
- Consider installing residential sprinklers
- Make sure that electric service lines, fuse boxes and circuit breaker panels are installed and maintained per code
- Contact qualified individuals to perform electrical maintenance and repairs

### 2 Access

- Make sure that your street name sign is visibly posted at each street intersection
- Post your house address so it is easily visible from the street, especially at night
- Address numbers should be at least 3 inches tall and on a contrasting background
- Identify at least two exit routes from your neighborhood
- Clear flammable vegetation at least 10 feet from roads and five feet from driveways
- Cut back overhanging tree branches above access roads
- Construct roads that allow two-way traffic
- Make sure dead-end roads, and long drive ways have turn-around areas wide enough for emergency vehicles
- Design bridges to carry heavy emergency vehicles
- Post clear road signs to show traffic restrictions such as dead-end roads, and weight and height limitations

### 3 Roof

- Install a fire resistant roof. Contact your local fire department for current roofing requirements
- Remove dead leaves and needles from your roof and gutters
- Remove dead branches overhanging your roof and keep branches 10 feet from your chimney
- Cover your chimney outlet and stovepipe with a nonflammable screen of 1/2 inch or smaller mesh

### 4 Landscape

- Create a **Defensible Space** of 100 feet around your home. It is required by law
- Create a **"LEAN, CLEAN and GREEN ZONE"** by removing all flammable vegetation within 30 feet immediately surrounding your home
- Then create a **"REDUCED FUEL ZONE"** in the remaining 70 feet or to your property line

You have two options in this area:

**A. Create horizontal and vertical spacing between plants. The amount of space will depend on how steep your property is and the size of your plants.**

**B. Large trees do not have to be removed as long as all of the plants beneath them are removed.**

- Remove lower tree branches at least six feet from the ground
- Landscape with fire resistant plants
- Maintain all plants with regular water, and keep dead branches, leaves and needles removed.
- When clearing vegetation, use care when operating equipment such as lawnmowers. One small spark may start a fire; a string trimmer is much safer

### 5 Yard

- Stack woodpiles at least 30 feet from all structures and remove vegetation within 10 feet of woodpiles
- Above ground Liquefied Petroleum Gas (LPG-gas) containers (500 or less water gallons) shall be located a minimum of 10 feet with respect to buildings, public ways, and lot lines of adjoining property that can be built upon. - CFC 3804.3
- Remove all stacks of construction materials, pine needles, leaves and other debris from your yard
- Contact your local fire department to see if debris burning is allowed in your area; if so, obtain a burning permit and follow all local air quality restrictions

### 6 Emergency Water Supply

- Maintain an emergency water supply that meets fire department standards through one of the following:
  - a community water/hydrant system
  - a cooperative emergency storage tank with neighbors
  - a minimum storage supply of 2,500 gallon on your property (like a pond or pool)
- Clearly mark all emergency water sources
- Create easy firefighter access to your closest emergency water source
- If your water comes from a well, consider an emergency generator to operate the pump during a power failure

California Department of Forestry and Fire Protection

# Homeowners Checklist

**How To Make Your Home Fire Safe**

For more information contact your local CAL FIRE office, fire department or Fire Safe Council for tips and assistance.  
www.fire.ca.gov

**Get Your Community Involved**  
www.firecouncil.org or www.firewise.org

# SITE SELECTION

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Wildfire follows known paths at previously predictable intervals (aka fire regimes). In recent years, we have seen these territories expand and the intervals quicken. With climate change making wildfires even more unpredictable, it is essential that planners and developers conduct their own intensive research before beginning any code, parceling, or project proposals and updates. Some regions and cities will have more data available than others.

## What should planners consult when zoning?

As California seeks to build more affordable housing, and post-pandemic homebuyers seek lower-density developments, we can save lives by carefully zoning and siting new communities. Despite the state's current shortage of affordable housing and recent trends favoring low density development, planners must concentrate growth in areas less susceptible to environmental hazards with multiple evacuation routes. Planners should review the most updated maps of fire regimes and avoid any development in areas within dangerous WUI. CalFire posts a map of [Fire Hazard Severity Zones](#) across the state level and by city. Other state level resources include The US Forest Service's [regime table](#), with data on fire regimes in California by habitat. The US Geological Survey has published a 2020 paper with maps of California [wildfire regimes](#). However, planners should conduct their own research on the smallest scale of data available pertaining to their jurisdictions, finding or creating maps down to the parcel level with wildfire susceptibility information where possible.

Some local governments and planning departments have already commissioned wildfire studies, standards, or emergency plans. Such informative content should be identified and reviewed prior to any new site planning. Organizations in the Santa Monica mountains provide good examples of these documents and programs. Planning departments should avoid developing near the forest, which might require deforestation and further environmental degradation, or flammable hillside brush. Minimizing any expansion of WUI is a top priority, as is ensuring that homes already in the WUI undergo wildfire protection upgrades as detailed in this guide and other resources such as the National Fire Protection Association (NPFA) Standards linked below.

# SITE SELECTION (CONT'D)

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Additionally, planners should include rigorous [standards](#) for home hardening and defensible space into the design code for fire prone areas. The added costs of these requirements may help deter developers, though financial assistance grants and programs for adhering to wildfire code should be widely promoted among existing residents.

## **What should developers consider when purchasing land?**

Developers should have their own internal protocols for site selection that avoid wildfire risk. It is in the private interest to do so, as property values are already negatively affected by wildfire potential. Recent CEQA lawsuits have prevented development in wildfire areas that lack quality evacuation routes, even where developments offered thousands of jobs. Without careful site selection and planning, developers can lose millions preparing proposals and hiring architects before being denied legal authorization to build.

Like planners, developers should review [NFPA standards](#), [regime tables](#), and maps published periodically by agencies like [CalFire](#) and [USGS](#) and also identify any localized fire data source, design guidelines, and plans. They should also review news stories and avoid developing in areas where other developments have been struck down out of wildfire precaution.

For land already in developers' portfolios, any future development must adhere to strict wildfire design guidelines as outlined in this document and prescribed by NFPA or local plans and requirements. By prioritizing land that has already been subdivided or that exists as urban/suburban infill, developers will increase chances of profit and mitigate risk. Building in any kind of open space that threatens habitat or requires deforestation will be hard to accomplish in today's regulatory environment.

### **Did you know?**

After July 2021, homeowners selling a property located in a high or very high fire hazard severity zone, are enforced by law – [Assembly Bill 38](#) – to document a Defensible Space Inspection. An inspection can be required online by filling out [this form](#) on the CalFire website.

The CalFire – Fire and Resource Assessment Program (FRAP) determines the fire hazard severity zones in the state of California and a map can be found online at <https://egis.fire.ca.gov/FHSZ/>.



# DEFENSIBLE LANDSCAPE DESIGN

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A fire-resistant landscape uses fire-resistant plants that are strategically planted and maintained to resist the spread of fire to the home. Fire-resistant plants are those that do not readily ignite from a flame or other ignition sources. These plants are not fire-proof and can be damaged or even killed by fire, however, they do not significantly contribute to the fuel intensity. Plant moisture content, age, total volume, dead material, and chemical content are factors that influence the fire characteristics of plants.

## Plants Selection

CalFire recommends homeowners get professional advice on fire-resistant plants that are suited for their area and adopt the following fire defense strategies:

- Create fire-resistant zones with stone walls, patios, decks, and roadways.
- Use rock mulch, flower beds, and gardens as ground cover for bare spaces.
- Keep the garden free from dry and dead wood, dry grasses, and leaf litter, especially near any structures.
- Prune plants to provide horizontal and vertical space throughout your garden and surrounding structures.
- Eliminate fire ladders. A grass fire can move up into shrubs and then into trees.
- Hydrate plants with a water-wise irrigation system. Use noncombustible mulches near the house.
- Select fire-resistant shrubs such as hedging roses, bush honeysuckles, currant, cotoneaster, sumac, and shrub apples.
- Plant hardwood, maple, poplar, and cherry trees that are less flammable than pine, fir, and other conifers.
- Select high-moisture plants that grow close to the ground and have a low sap or resin content.
- Choose fire-retardant plant species that resist ignition such as rockrose, ice plant, and aloe.

Source: <https://www.readyforwildfire.org/prepare-for-wildfire/get-ready/fire-resistant-landscaping/>

# DEFENSIBLE LANDSCAPE DESIGN(CONT'D)

A comprehensive list of California native fire-resistant plants can be found on the [Sustainable Defensible Space](https://defensiblespace.org/) website, but before selecting the plants, homeowners and gardeners should consider a few factors:

- Local area fire history
- Site location and overall terrain
- Prevailing winds and seasonal weather
- Property contours and boundaries
- Native vegetation



**Monkey Flower**  
**Mimulus sp.**

- California native
- Drought tolerant



**Island Bush Snapdragon**  
**Galvezia speciosa**

- Evergreen year round
- Attract hummingbirds



**Bladderpod**  
**Isomeris arborea**

- California native
- Attract bees, butterflies and hummingbirds

Source: <https://defensiblespace.org/plants/>

# DEFENSIBLE LANDSCAPE DESIGN

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## Watering

- Choose the right irrigation system. Your plant selection and water availability will determine the right system for you.
- Consider drip irrigation for watering most of your landscape. It's effective and conserves water because it targets where the water goes and how much gets there.
- Use sprinklers for lawns or turf landscaping. Sprinklers on timers ensure your lawn is getting the right amount of water to keep it healthy and fire-resistant.

## Tall Shrubs & Trees

Trees should have their limbs trimmed so all branches, leaves, or needles are above 15 feet or your house's roofline, whichever is tallest.

- Consider using only one tall shrub or tree within 30 feet of your home. If you plant more than one, make sure there is a minimum of 10 feet of space between them.
- Do NOT plant within the Home Ignition Zone (5 feet) or any area where the tree may eventually overhang your roof at its largest size. This could lead to a buildup of flammable debris on your roof.

**Avoid:** Palm trees can ignite and help fire travel.



Source: <https://www.formlainc.com/resources/fire-defensive-landscapes/>

# DEFENSIBLE LANDSCAPE DESIGN

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## Additional Comprehensive Resources:

- 11 Fire-Defensive Actions - <https://www.formlainc.com/resources/fire-defensive-landscapes/>
- Fire-resistant Plants for Home Landscapes: <http://www.firefree.org/wp-content/uploads/2016/02/Fire-Resistant-Plants.pdf>
- <https://disastersafety.org/wildfire/fire-resistant-landscaping-for-your-home/>
- <https://defensiblespace.org/plants/>
- LADWP smart gardening tech sheet: [https://dpw.lacounty.gov/epd/sg/tech\\_sheets/fwg\\_info.pdf](https://dpw.lacounty.gov/epd/sg/tech_sheets/fwg_info.pdf)



# EMERGENCY PREPAREDNESS AND EVACUATION

In order to prepare for a wildfire emergency, CalFire recommends that homeowners and households put together a Wildfire Action Plan, an Emergency Supply Kit, and an Evacuation Plan.

## Wildfire Action Plan

A Wildfire Action Plan must be prepared in advance of a wildfire, and be familiar to all household members and includes an evacuation plan with clear instructions.

As part of the Wildfire Action Plan, homeowners should prepare for a possible wildfire by taking the following actions:

- Ensure your fire extinguisher has been recharged and replaced as needed.
- Locate the home's gas, electric, and water shut-off controls and understand how to shut them off in the event of an emergency.
- Assemble an emergency supply kit for each household member and keep an additional kit in the car.
- Buy a portable radio or scanner to stay updated on the fire.
- Have a list of emergency contact numbers near the phone.
- Sign up for alerts using the [FEMA app](#).



# EMERGENCY PREPAREDNESS AND EVACUATION

## Wildfire Action Plan

### Emergency Supply Kit

As mentioned above, homeowners should assemble an **Emergency Supply Kit** for each member of the household. The emergency kit should be easily accessible in the event of an emergency and light enough to carry. As recommended by CalFire, an emergency kit will include:

As recommended by CalFire, an emergency kit will include:

- Face masks
- 3-day supply of non-perishable food
- 3 gallons of water per person
- Map with evacuation routes
- Prescriptions or medication
- Change of clothing
- Extra eyeglasses or contact lenses
- A set of car keys, credit cards, cash, or traveler's checks
- First aid kit
- Flashlight
- Battery-powered radio and extra batteries
- Sanitation supplies
- Copies of important documents, including birth certificates and passports
- Cell phone charging device
- Pet food and water (as needed)



# EMERGENCY PREPAREDNESS AND EVACUATION

## Evacuation

Households should also develop an Evacuation Plan to prepare for the event of a wildfire.

An effective evacuation plan will include:

- A designated meeting location outside the fire hazard area
- Multiple escape routes from the house and surrounding area
- Evacuation plan for pets and livestock
- An out-of-state point of contact that household members can call if they are separated

In the event that a wildfire does occur in the area, households should be ready to evacuate. It's important to understand the local community's emergency response plan and know where to go when it is time to evacuate and which routes to take.



**Wildfires can be monitored on the [CalFire Incidents website](#).**



It is important to stay informed and alert so you know when to evacuate. Officials will determine the areas to be evacuated and plan escape routes while law enforcement officials will typically enforce the evacuation order.

Evacuation orders can be announced on TV or radio and mobile alerts. When evacuating, it is recommended to cover up for protection against heat and embers by wearing long-sleeved shirts, long pants, a hat, goggles/glasses, and a bandana to cover the face.

# EMERGENCY PREPAREDNESS AND EVACUATION

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If there is time, homeowners can prepare their homes for evacuation by following the Home Pre-Evacuation Checklist:

## Inside the House

- Have your Emergency Supply Kit ready in your vehicle
- Shut all windows and doors but leave unlocked
- Remove flammable window curtains and close metal shutters
- Move flammable furniture to the center of the room, away from windows
- Shut off gas at the meter and turn off pilot lights
- Shut off the air conditioning

## Outside the House

- Gather flammable items and bring them inside or place them in the pool if there is one – These include patio furniture, children's toys, doormats, trash cans, etc.
- Turn off propane tanks
- Move propane BBQ appliances away from structures
- Connect garden hoses to outside water valves or spigots for firefighters to use
- Fill water buckets and place them around the house
- Turn off sprinklers or any running water
- Back your car into the driveway with the vehicle loaded and all doors and windows closed. Carry your car keys with you.
- Have a ladder available and place it at the corner of the house for firefighters to access the roof
- Seal attic and ground vents with pre-cut plywood or commercial seals.
- Patrol your property and monitor the fire situation. Don't wait for an evacuation order if you feel threatened.
- Check on neighbors and make sure they are preparing to leave.
- Keep your pets nearby and prepare to transport farm animals



# EMERGENCY PREPAREDNESS AND EVACUATION

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## **Returning Home:**

Homeowners should return home only when they are authorized by officials to do so. Stay safe when returning home by:

- Looking for downed power lines and other hazards
- Checking for hidden embers or smoldering fires
- Turn on gas only after checking propane tanks, regulators, and gas lines. If you smell gas, immediately leave the house.
- Check floor and roof for structural damage

Homeowners can also financially prepare for a wildfire by maintaining homeowner insurance, which can provide money to rebuild after a wildfire, replace lost belongings and pay for temporary housing if needed. Homeowners should discuss policy limits and coverage with their insurance company annually to ensure the policy reflects the correct house square footage and assets and to ensure they understand exactly what the policy covers. If home improvements were made, you should update your policy to include these. If you are renting, you can purchase renters insurance, which can often be bundled with auto insurance. To make replacing items easier, homeowners and renters should create a home inventory by taking photos and videos of each room. You should note expensive or important items and save receipts for big purchases.

## **Additional Resources on Emergency Preparedness**

- Complete evacuation guide can be found at <https://www.ready.gov/wildfires>
- A personalized preparedness plan can be created using the CalFire app: <https://plan.readyforwildfire.org/>

# GLOSSARY

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- **CERT:** A Community Emergency Response Team (CERT) helps educate residents about hazards in their community and executes education and action pertaining to wildfire preparedness, evacuation processes, search and rescue, and disaster medical operations.
- **Class A (Etc) Materials:** Class A materials are those verified to better withstand fire. Commonly used for roofing. Includes metal, concrete, clay tiles, and slate.
- **Ember/Ember Cast:** An ember is a small, glowing piece of coal or wood. Can exist within, cause, or follow a fire. An ember cast refers to embers falling from the sky, caused by flames nearby or even miles away. An ember cast can quickly ignite a new fire. It is best to evacuate immediately where there is an ember cast.
- **Envelope:** The entire barrier separating interior from exterior of a building. Includes walls, windows, roof, foundation, and doors.
- **Fire Defensive:** Fire defensive refers to action that reduces a structure or community's susceptibility to wildfire, such as implementing home hardening and defensible space strategies.
- **Fire Smart:** Fire Smart is using design and construction processes as the first step for combatting fire.
- **Fire Resilient, Fireproof:** Fire resilient and fireproof both mean that something has a better ability to withstand fire compared to other items of its kind (plant, house, material, etc;). Although fireproof may at times imply more fire resistance than the term fire resilient, it is important to note that nothing is entirely able to withstand fire.
- **Firewise:** Firewise refers to a NPFA initiative for teaching people how to adapt to living with wildfire, particularly by building strong communities and equipping them with proper educational resources.

## GLOSSARY (CONT'D)

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- **Hardened:** A house or structure made of the most fire resistant materials available. A hardened structure contains a defensible space and is correctly oriented on the site for best resistance to fire.
- **Home Hardening:** Using site-selection, structure orientation, retrofitting, and construction materials and practices that can help a home resist ember storms and high heat.
- **Invasive Plant:** A non-native species introduced by humans to a habitat. Tend to wreak havoc on ecosystems and can worsen the effect of phenomena like wildfires or fire regimes.
- **Native Plant:** A plant that existed in a region and habitat prior to human introduction. Generally better adapted to their ecosystems than invasive species.
- **Prescribed fire and cultural burning:** Also called a “controlled burn,” prescribed fires were used by indigenous tribes throughout the Western United States to keep vegetation levels and wildfire magnitudes in check. Fire plays an important role in many ecosystems, with some even having frequent fire regimes. Prescribed burns are now implemented by the US Park Service as a way to use smaller and more easily managed fires as a means for preventing larger and more destructive fires caused by over accumulated debris.
- **Regime:** The patterns of fire occurrences expressed in frequency, size, and severity in a given area or ecosystem. Fire regimes are cycles estimated from past fire occurrences.
- **WUI:** The Wildland Urban Interface (WUI) is a term used by the National Park Service to label any area where human settlement borders vegetation with little clearance.



U.S. GREEN BUILDING COUNCIL LOS ANGELES

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For more information please contact us at [ben@usgbc-la.org](mailto:ben@usgbc-la.org) or [fernanda@usgbc-la.org](mailto:fernanda@usgbc-la.org).

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