Defensible Space

FEMA

Home Builder's Guide to Construction in Wildfire Zones **Technical Fact Sheet No. 4**

Purpose

To provide information about creating a defensible space to reduce the potential for damage to homes from wildfires. Guidance pertains to both new and existing buildings.

Background

A defensible space is an area around a building in which vegetation, debris, and other types of combustible fuels have been treated, cleared, or reduced to slow the spread of fire to and from the building. Information about local vegetation, weather, and topography is used to determine the Fire Severity Zone of an area, which can help determine the most effective design of a defensible space.

A defensible space is one of the most cost-effective ways to protect a building from a wildfire and can often be created by the property owner.

Key Issues

- Wildland vegetation such as grass, brush, and timber can be extremely combustible. The vegetation can burn with great intensity and produce firebrands and burning embers that can become wind-driven hazards.
- Landscape vegetation can be as combustible as wildland vegetation.
- Combustible plants have these characteristics:
  - Volatile resins and oils (generally aromatic when crushed)
  - Narrow leaves or long, thin needles such as conifer needles
  - Waxy or fuzzy leaves
  - An accumulation of dead leaves and twigs on and under the plant
  - Loose or papery bark

Figure 1. Fire spreads vertically through vegetation (Anchor Point Group, Boulder, CO).

- A wildfire can move horizontally from shrub to shrub and tree to tree.
- A wildfire can also travel vertically from the ground up into the treetops, resulting in a catastrophic crown fire (a fire that can travel at an incredible pace through the top of a forest). Figure 1 shows a fire that is spreading vertically from grasses to shrubs to low branches.
- Accessory buildings and structures and other items commonly found in yards that are made

of combustible materials can also put an otherwise fire-resistant building at risk of ignition and destruction.

- Combustible vegetation and materials around a building (see Figure 2) can:
  - Increase the risk of building ignition
  - Restrict the space necessary to provide firefighters a relatively safe place to protect a building
  - Increase the chance that a building on fire will ignite adjacent wildlands

Figure 2. Combustible materials adjacent to a building create a hazard (Anchor Point Group, Boulder, CO).

Guidance

- Assess both the horizontal and vertical aspects of vegetation when designing the defensible space.
- To prevent the horizontal spread of wildfire, thin shrubs and trees so the crowns do not intersect and there is space between individual shrubs and trees.
- To prevent the vertical spread of wildfire, keep the lowest tree branches pruned and trimmed to maintain vertical separation from the top of shrubs and grasses to the lowest tree branches. The vertical distance needed will vary significantly, depending on the species of tree and composition of the understory.
- Create three concentric zones around the building (see Figure 3). Zone 1, the zone closest to the building, normally has the greatest need for fuel modification with progressively less modification in the other two zones. The higher the Fire Severity Zone, the larger the concentric zones should be. Consult the local or state fire agency for assistance. The three zones are discussed further below.

Zone 1

- Eliminate all combustible materials in Zone 1 (within 30 feet of the home) such as fire-prone vegetation, firewood stacks, combustible patio furniture, umbrellas, and dimensioned lumber decking (see Figure 4). Desirable substitutions include irrigated grass, rock gardens, stone patios, metal patio furniture, and noncombustible decking (see Fact Sheet #13, Decks and Other Attached Structures).
- Before fire season begins, remove combustible litter on roofs and gutters and trim tree branches that overhang the roof and chimney (see Fact Sheet #9, Gutters).

Zone 2

- Ensure that Zone 2 includes only individual and well-spaced clumps of trees and shrubs and/or a few islands of vegetation that are surrounded by areas with noncombustible materials.

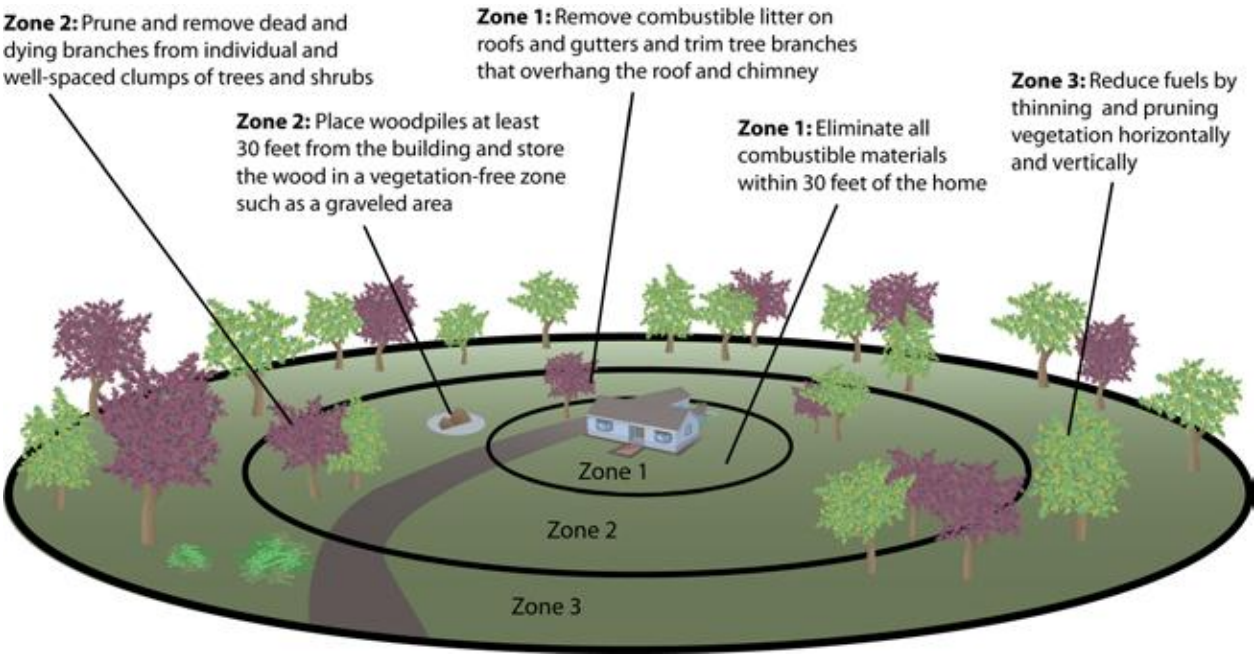

Figure 3. The three concentric zones of defensible space.

- Use hardscape features such as driveways and paved or gravel walkways or patios to create firebreaks throughout the yard.
- Plant fire-resistant, low-volume vegetation that retains moisture well and needs minimum maintenance such as pruning and removing dead and dying branches.
- Separate auxiliary structures such as a detached garage, pump house, pergola, and utility shed from the home by at least 50 feet. Increase the distance if the structure is used for the storage of combustible materials.
- Comply with recommended construction practices related to fire resistance for auxiliary structures. See Fact Sheets #5 to #16 for guidance on planning and designing a structure in a wildfire zone.
- Ensure that patio furniture is either made of noncombustible material such as metal or is at least 30 feet away from the building. Store patio furniture in a location that is protected from ignition by a wildfire.
- Place woodpiles at least 30 feet from the building and store the wood in a vegetation-free zone such as a graveled area.
- Store fuel tanks away from a structure at the minimum distance that is required by code or greater (see Fact Sheet #16, Utilities) and place underground or on a noncombustible pad.

Figure 4. A noncombustible ground cover in Zone 1 helped this home survive a wildfire (Anchor Point Group, Boulder, CO).

Zone 3

Reduce fuels that are farther than 100 feet from the building by thinning and pruning vegetation horizontally and vertically as discussed above. Thinning and pruning in Zone 3 can be more limited than in Zone 2. The goals in Zone 3 are to improve the health of the wildlands and help slow an approaching wildfire. Zone 3 is also an aesthetic transition between the more heavily modified Zone 2 and the unmodified surroundings.

Considerations

- Consult the local or state fire agency or qualified fire management specialist about codes, requirements, and standards related to defensible space. Codes, requirements, and standards normally represent the minimum that should be done. Consideration should be given to providing enhanced protection measures beyond the minimum recommended or required.
- Maintaining a defensible space requires routine maintenance of vegetation, which includes pruning and removing dead branches and leaves. Characteristics of low-maintenance plants are:
  - Drought-resistant
  - Pest-resistant
  - Native to the area
  - Noninvasive
  - Slow-growing
  - Wind-resistant
  - Sustainable without supplemental fertilization
- Vegetation modification must be performed in compliance with local, state, and federal environmental regulations.

Effectiveness

All mitigation measures listed in this Fact Sheet are effective in all Fire Severity Zones.

Resources

Barkley, Y.C., C. Schnepf, and J. Cohen. 2005. *Protecting and Landscaping Homes in the Wildland/Urban Interface.* Station Bulletin #67. Moscow, Idaho: Idaho Forest, Wildlife and Range Experiment Station. www.treesearch.fs.fed.us/pubs/22257.

Firewise Communities Program. www.firewise.org/newsroom/faq.htm.

National Fire Protection Association (NFPA) 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire. 2008. http://dnrc.mt.gov/forestry/Fire/Prevention/documents/WUIrewrite/ NFPA1144.pdf.

National Wildfire Coordinating Group. www.nwcg.gov.