

Selecting the Construction Site



FEMA

Purpose

To help property owners who plan to build homes or other structures in wildfire zones understand the relationship between wildfire behavior and fuels, weather, and topography so they can select construction sites that minimize the potential for damage from wildfires. The guidance listed in this Fact Sheet applies only to new buildings.

Key Issues

- Wildfires spread more quickly on upsloped terrain than on level terrain (see Figure 1). Topographic features such as slopes, saddles, ridges, and canyons can therefore influence wildfire behavior (see below for a description of these features). The interaction of wind and radiant heat with some of the features is also an important factor in wildfire behavior.
- The direction a slope faces influences the growth of vegetation, and vegetation influences wildfire behavior because it provides fuel for the wildfire.
- Implementing the fire-mitigation measures described in the other Fact Sheets cannot entirely offset the potential for damage from a wildfire at high-risk sites with topographic and vegetation features that can contribute to extreme fire behavior.

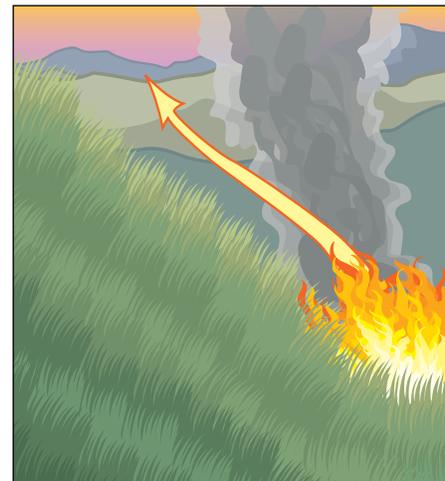


Figure 1. Fire spreads more quickly on upsloped terrain than on level terrain.

Topography

- **Sloped terrain.** Wind-driven wildfires follow wind direction and are minimally influenced by topography. In the absence of a strong wind, wildfire follows topography, burning primarily upslope and up-canyon. Wildfires spread upslope quickly because heat rises and preheats and ignites fuels such as buildings and vegetation.
- **Saddles.** Where a valley crosses a ridge, a saddle is created between two peaks (see Figure 2). Saddles act as wind funnels and are one of the most hazardous locations for homes in terms of wildfire.

Fuel, topography, and weather are the three principal environmental elements that affect wildfire behavior. Fuels (vegetation) and local topography should be considered when choosing a site for a home to increase the chance the home will survive a wildfire.

- **Ridgetops and hilltops.** Wind speeds on ridgetops and hilltops can be unpredictable but tend to be higher than those in the surrounding lower areas because of the higher elevation and because wind speed increases as it flows over abrupt changes in topography. Buildings in these locations can have 360-degree downhill exposure to wildfire.
- **Canyons.** A wildfire at the bottom of a vegetated canyon can lead to extremely hazardous conditions upslope. A canyon acts like a chimney, collecting hot gases and directing superheated convection and radiant heat upslope. Canyons funnel winds (see Figure 3) that can fan a fire and lead to extreme fire behavior (rapid spread of the wildfire and ignition of an entire area). An entire canyon can pre-heat from rising hot air and gases and explode in flames, creating a firestorm.

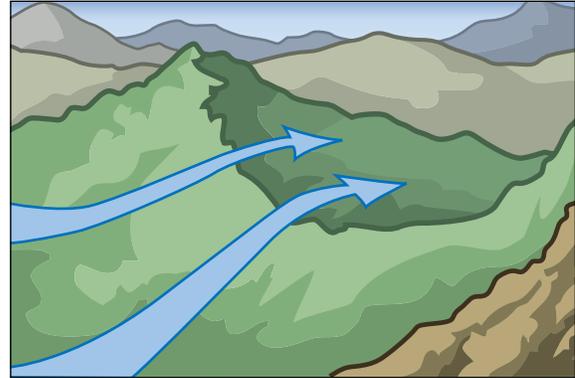


Figure 2. Wind behavior over a saddle.

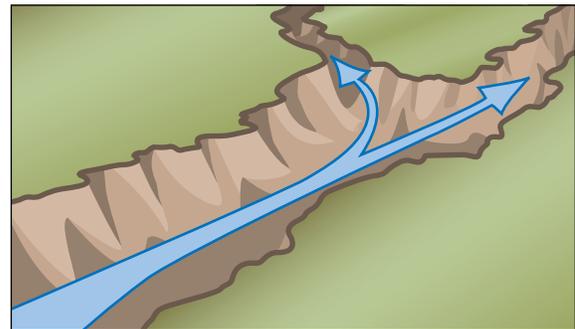


Figure 3. Wind behavior through a canyon.

Vegetation

- Vegetation acts as a fuel for wildfires. Vegetation both on and adjacent to a site can affect the probability of damage to a building from a wildfire. Characteristics of vegetation such as density, continuity, and type can influence wildfire behavior (see Fact Sheet #4, Defensible Space, for more information).
- South- and west-facing slopes generally retain less moisture, produce less vegetation, and dry out earlier in the year than north- and east-facing slopes. Fires on dryer slopes tend to ignite more easily, travel more rapidly, and burn out faster as light fuels are consumed. The more heavily vegetated moist slopes have a lower potential for ignition but can sustain a more intense fire of longer duration than dry slopes.

Guidance

By understanding how topography and vegetation can influence wildfire behavior, property owners can select construction sites in wildfire zones that reduce the potential for damage to a building from a wildfire. Following the guidance listed below can increase the probability that a building will survive a wildfire.

- Avoid selecting a construction site along a gully or in a narrow canyon.
- Avoid selecting a construction site in or adjacent to a saddle or narrow mountain pass.
- Avoid constructing a home adjacent to or on a steep slope. If a ridgetop site is selected, choose

an area that allows for a minimum 50-foot setback from wildland vegetation on the downslope side (see Figure 4). Increase the setback at sites with heavier fuels such as in a forested environment. Implement the measures in Fact Sheet #4, Defensible Space; Fact Sheet #12, Foundations; and Fact Sheet #13, Decks.

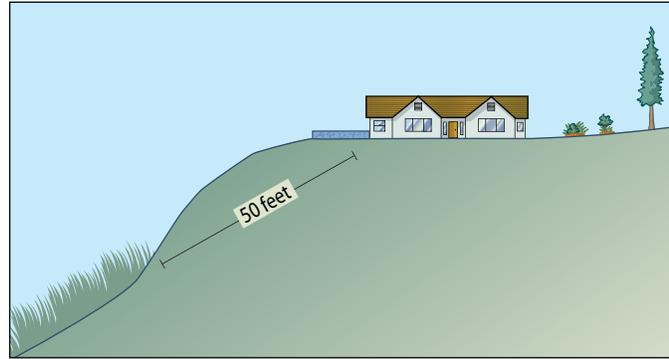


Figure 4. Example of setback from wildland vegetation.

- Orient the narrowest wall of the building toward the likely path of a wildfire to minimize the risk of structural ignition. Orient the building based on wind and fuels so that debris, embers, and firebrands do not accumulate next to the building's walls, especially near the inside corners of entries and other off-set walls.
- Minimize the number of windows on the side of the building facing the likely path of a wildfire to reduce the risk of radiant heat or firebrands and flying debris breaking the windows, allowing the fire to enter the building.

Considerations

- Consider the vegetation characteristics on and adjacent to the site including density, continuity, and type. If the site has heavy, continuous vegetation, a vegetation management plan may be needed to reduce the hazard. Creating a defensible space can enhance fire resistance (see Fact Sheet #4, Defensible Space).
- Consider access to the home. Steep driveways and narrow roads can limit accessibility by fire-fighting equipment (see Fact Sheet #17, Community Infrastructure).
- Evaluate the vulnerability to fire of neighboring properties. If the neighboring properties have fire hazards but the neighbors are unwilling to cooperate in developing a mutual defensible space, consider that information in selecting fire-resistance measures for the building.

Effectiveness

The effectiveness of the recommended measures can vary significantly, depending on the interaction of fuels, weather, topography, and wildfire behavior.

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.

California Department of Forestry and Fire Protection. www.fire.ca.gov.

California Fire Safe Council. www.firesafecouncil.org.

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

National Wildfire Coordinating Group. www.nwcg.gov.

Slack, P. 2000. *Firewise Construction Design and Materials*. Colorado State Forest Service.