

Wildfire Risk Mitigation Considerations

Compiled by Scott Williams

The intent of this document is to provide information about commonly used mitigation actions that can be taken to reduce wildfire risk affecting Fly Ranch. It does not address building fire codes since project construction permitting would be under the authority of state and county jurisdictions and compliance the responsibility of the Nevada State licensed architect of record. The Washoe County Development Code addresses fire protection. For information purposes the State of Nevada Fire Marshal has adopted the following wildland urban interface fire codes:

- International Wildland-Urban Interface Code, 2012 edition
- NFPA 1141: Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas, 2012 edition
- NFPA 1142: Standard on Water Supplies for Suburban and Rural Fire Fighting, 2012 edition
- NFPA 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire, 2013 edition

(Nevada Administrative Code Chapter 477 – Fire Marshall, General Provisions, <https://www.leg.state.nv.us/NAC/NAC-477.html>)

The State of Nevada sponsors the Living With Fire website that provides public wildland fire safety information and outreach. A fire safety checklist from the website is included below.



<http://www.livingwithfire.com>

The Fly Ranch's structures intermingle with or are surrounded by native and non-native desert vegetation. The grasses, herbaceous plants, shrubs and trees are mostly fire resistant during the spring green-up period when the plants are growing. When many of the plants go dormant in late spring they become highly flammable until the next growing season.

Fly Ranch Wildfire Risk

Homes make up the vast majority of structures that have been damaged or destroyed by wildfires and the vast majority of wildland fire safety research has concentrated on protecting homes. Numerous public and private organizations have conducted building safety research over many years. Research shows generally that most structures are damaged or destroyed by wildfires due to ignitions caused by embers or firebrands, following by direct flame contact and radiant heat ignition.

Wildfire risks are similar whether we are considering homes, commercial buildings or extraordinarily beautiful site-specific public art installations that have the added benefit of large-scale clean power, water, shelter, food, and regeneration.

Fire Embers or Fire Brands can cause combustible materials to ignite out ahead of the main wildfire. Embers are small pieces of windblown burning material that are generally produced in large numbers at the flaming front of a wildfire from burning leaves, needles, dry grass/herbaceous plants, shrubs, trees or other heavy fuel loading sources such as wood piles and structures. Fire embers can ignite combustible materials several hundred feet from their source. Compared to embers, fire brands are larger pieces of burning material such as pine needles and tree bark that can be carried by strong winds long distances up to one mile or more before landing and igniting spots fires long distances out ahead of the main fire.

Direct Flame Contact Ignition occurs when flames impinge combustible materials.

Radiant Heat Ignition occurs when combustible materials are heated from a nearby heat source to the point of ignition. Such as the radiant heat from burning buildings igniting adjacent or nearby buildings. The point of ignition for wood products is 300 C or 570 F.

The following videos show fire ember shower tests and they illustrate how embers ignite structures.

Testing Wildfire Ember Characteristics at the IBHS Research Center



<https://vimeo.com/169107237>

IBHS Research Center: Ember Test Highlights 2011



<https://vimeo.com/22751346>

The Importance of Defensible Space



<https://vimeo.com/374166028>

Fire in California - Preparing Your Home

The University of California maintains a fire safety website for builders and home owners and it presents detailed information about vents, decks, windows, eaves, siding and vegetation surrounding structures. The website covers fire resistant building materials, construction techniques, building maintenance and actions that can be taken to protect structures when wildfires strikes. The table below is a summary and you can link to in depth information by clicking on the individual priorities.

<https://ucanr.edu/sites/fire/PrePost/Building/>

Priority	Function and Wildfire Vulnerability	Recommendations
<p data-bbox="272 386 344 412">Vents</p> <p data-bbox="176 755 429 841">https://ucanr.edu/sites/fire/PrePost/Building/Vents/</p>	<p data-bbox="455 342 1055 565">Vents provide two important functions. Vents allow for air circulation to reduce the heat in your attic and allow moisture to escape that can lead to moisture degradation issues over time. Embers can easily slip through foundation, roof, or attic vents. Once inside, embers can ignite debris and items stored inside the house.</p>	<p data-bbox="1121 342 1896 396">Move combustible items away from vents both inside and outside the house.</p> <p data-bbox="1121 428 1927 514">Replace 1/4" mesh vents with 1/8" mesh or install vents that meet new ember and flame resistant requirements. Regularly check vents and remove materials that may plug vent openings.</p> <p data-bbox="1121 547 1944 667">Prepare temporary plywood vent covers to install prior to the approach of a wildfire, if you have sufficient preparation time. Or consider using metal tape to temporarily seal up vents from the inside of the house.</p>
<p data-bbox="272 954 344 980">Decks</p> <p data-bbox="176 1323 429 1409">https://ucanr.edu/sites/fire/PrePost/Building/Deck/</p>	<p data-bbox="455 911 1046 1170">Decks are vulnerable to fires from embers igniting vegetation or stored materials igniting below the deck or ignition of the top of the deck. Leaves and needles can build up in gaps between deck boards, creating targets for embers to ignite. On top of decks embers can also land wood furniture, door mats, brooms, umbrellas, or plants that are easily ignitable.</p> <p data-bbox="455 1195 1046 1252">If the deck ignites, it will provide a flame exposure to either the exterior wall and under-eave area.</p>	<p data-bbox="1121 911 1896 997">Clean and maintain the deck by removing debris that can accumulate on the deck and in the between deck board gaps. Do not store combustible materials under the deck.</p> <p data-bbox="1121 1029 1885 1115">Before evacuating bring combustible door mats, brooms and furniture cushions inside. Move deck furniture off the deck. Move bar-b-que propane tanks away from the house.</p> <p data-bbox="1121 1148 1896 1205">For new deck installation, when non-fire retardant treated wood is used:</p> <ul data-bbox="1172 1237 1932 1393" style="list-style-type: none"> <li data-bbox="1172 1237 1932 1263">Increase the gap between deck boards from 1/8 inch to 1/4 inch. <li data-bbox="1172 1268 1789 1294">Increasing joist spacing from 16 inches to 24 inches. <li data-bbox="1172 1299 1906 1393">Applying a foil-faced self-adhering adhesive flashing tape (foil-faced bitumen tape) on the top of each joist. Foil tape should extend down each side of the joist 2-3 inches.

Priority	Function and Wildfire Vulnerability	Recommendations
<p data-bbox="251 331 363 358">Windows</p> <p data-bbox="176 545 427 634">https://ucanr.edu/sites/fire/PrePost/Building/Windows/</p>	<p data-bbox="455 269 953 626">As a fire approaches, close all windows and skylights to prevent ember entry. The glass is the most vulnerable part of the window. Multi-pane tempered glass is best because it distributes the heat load and provides a second layer of protection if the first pane fails. Larger windows are more vulnerable than smaller windows. For vinyl windows confirm there is a vertical or horizontal reinforcement bar.</p>	<p data-bbox="1012 269 1689 297">Install or upgrade to multi-pane tempered glass windows.</p> <p data-bbox="1012 334 1678 362">Remove vegetation immediately outside of the windows.</p> <p data-bbox="1012 399 1932 496">When a neighboring home or building is within 30 feet of your home; consider installing noncombustible shutters to close upon evacuation or cover your windows with temporary plywood covers prior to evacuating.</p>
<p data-bbox="268 764 346 792">Eaves</p> <p data-bbox="176 976 427 1065">https://ucanr.edu/sites/fire/PrePost/Building/eaves/</p>	<p data-bbox="455 699 966 927">The eave overhang protects your home from rain and sun. Depending on design, it also can trap heat and allow embers to enter through under-eave attic vents. With open-eave construction gaps between the rafter tails and the blocking can be vulnerable to ember entry.</p> <p data-bbox="455 964 953 1024">Soffited eaves (boxed-in) are more robust to embers.</p>	<p data-bbox="1012 699 1927 829">With open-eave construction inspect eaves for gaps around rafter roof tails and blocking. Plug or caulk gaps. If possible, create a soffited eave where an open-eave design exists. Vents should be upgraded to 1/8" metal mesh screening.</p> <p data-bbox="1012 867 1725 894">Remove vegetation and combustible materials below eaves.</p>

Priority	Function and Wildfire Vulnerability	Recommendations
<p data-bbox="272 321 346 354">Siding</p> <p data-bbox="176 971 431 1060">https://ucanr.edu/sites/fire/PrePost/Building/Siding/</p>	<p data-bbox="453 280 974 573">Siding is vulnerable if exposed to flames or radiant heat for extended periods. A carefully developed and maintained home ignition zone will minimize the potential for this exposure. Where neighboring homes are within 30 feet of your home, use of a noncombustible or ignition resistant materials would reduce the vulnerability of your home.</p> <p data-bbox="453 605 974 1092">Gaps and joints in siding can create places where flame penetration can occur. Poorly maintained or degraded siding is also vulnerable to flame penetration. Many homes with stucco, cinder block, or fiber cement siding are lost to wildfire because other design and maintenance considerations have not been followed or have been overlooked, allowing embers to either ignite external materials or penetrate into the building. In general, combustible panels and horizontal siding with more complicated lap joints (e.g., tongue and groove and ship lap) are more resistant to flame penetration into the stud cavity.</p>	<p data-bbox="1006 280 1857 378">Along with the 5' noncombustible horizontal zone, maintain a 6" noncombustible vertical zone between the ground (and other horizontal surfaces) and the start of the siding.</p> <p data-bbox="1006 402 1623 435">Inspect all siding and plug or caulk gaps and joints.</p> <p data-bbox="1006 459 1944 557">If a neighbor's house or an outbuilding is close to the house, a fire-retardant gypsum board can be installed under the siding to increase the fire-resistance of the wall should the siding ignite.</p> <p data-bbox="1006 573 1921 638">Gel coatings are difficult to install and are limited in the number of hours that they provide protection; therefore, they are not recommended.</p>

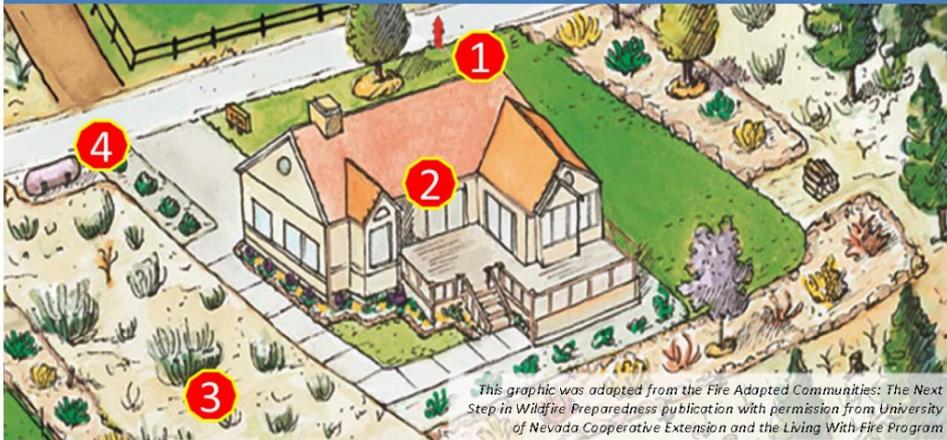
Priority	Function and Wildfire Vulnerability	Recommendations
<p data-bbox="242 337 374 363">Vegetation</p> <p data-bbox="178 1256 429 1344">https://ucanr.edu/sites/fire/PrePost/Building/Plants/</p>	<p data-bbox="455 295 885 717">All plants can burn during a wildfire. Placement of landscaping vegetation and combustible mulch immediately around your home, and under windows, eaves, and vents can provide a way for fire to enter the home. Embers can easily be blown across a green lawn and ignite vegetation adjacent to the house. Leaf litter and needles can accumulate in or on rooves, gutters, decks, porches, and next to the house.</p> <p data-bbox="455 743 885 971">The same challenges apply to outbuildings, sheds, and detached garages. In addition to your home, vegetation management treatments should also be given to these structures using the same zone approach.</p>	<p data-bbox="1306 295 1570 321" style="text-align: center;">Home Ignition Zones</p>  <p data-bbox="915 737 1255 763">Three home ignition zones</p> <p data-bbox="915 792 1944 987">Zone 1. 0-5 feet. This is highest priority zone. Start with the house and work outwards by creating a 5-foot wide noncombustible zone around the entire house (and under the deck) to reduce the potential for an ignition by wind-blown embers. If ignited, these materials will result in a direct flame contact to the house. Use hardscape (pavers or crushed rock), maintained lawn, or low-cut grass. Cut tree branches that overhang the house.</p> <p data-bbox="915 1010 1944 1205">Zone 2. 5-30 feet. Lean and green zone. The goal is to reduce the intensity of the fire and potential for ember generation from the landscape. Trees and taller vegetation should be well-maintained separated from the house and each other. Remove vegetation under trees to prevent fire from climbing to the top of the trees. Prune mature trees up to 6-10 feet from the ground. Landscaping in this area should include low growing, open structured, less resinous, higher moisture content plants.</p> <p data-bbox="915 1227 1944 1390">Zone 3. 30-100. feet or property line. Reduced fuel zone. The goal is to interrupt the fire and keep flames on the ground. Remove or dispose of tree needles or leaves, remove dead trees, thin out small trees and shrubs creating islands of vegetation, limb and prune mature trees up to 6-10 feet. Thin mature trees so that canopies do not touch.</p>



Nevada State Fire Marshal Division

Homeowners Checklist

How To Make Your Home Fire Safe



This graphic was adapted from the Fire Adapted Communities: The Next Step in Wildfire Preparedness publication with permission from University of Nevada Cooperative Extension and the Living With Fire Program

FIRE SAFETY OUTSIDE

1 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 gallons 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

2 Built Environment

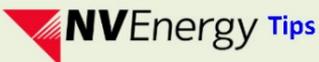
- Use ignition resistant construction for roofs/ roof assemblies, gutters, vents, decks, exterior walls, exterior windows
- Enclose the underside of eaves, balconies and above ground decks with fire resistant materials
- Show your 100 feet of defensible space on plot plan
- Build your home away from 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
- 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 non-flammable screen of ½ inch or smaller mesh

3 Defensible Space

- Stack woodpiles at least 30 feet from all structures and remove vegetation within 10 feet of wood piles
- Above ground Liquefied Petroleum Gas (LP 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 – NAC 477
- 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
- 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 up to your property line. You have two options in this area:
 - 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
 - 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 lawn mowers. One small spark may start a fire; string trimmers are much safer

4 Access

- Make sure that your street name sign is visibly posted at each street intersection
- Post your house address so it 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
(Check with your local Fire Department for specific requirements)
- Post clear road signs to show traffic restrictions such as dead-end roads, and weight and height limitations



- Call before you Crane – 702-227-2929 (All of NV)
- Call before you Dig - 811

- Keep vegetation and trees at least 10 feet from electric utility lines, poles, and transformers. If you need assistance trimming back overhead trees, call your local power company for assistance.

Northern NV – 775-834-4444
Southern NV – 702-402-5555



**IN CASE OF
EMERGENCY
Call 911**

FIRE SAFETY INSIDE

1 Garage

- Mount a working fire extinguisher in the garage
- Have tools such as a shovel, hoe, rake and bucket available for use in a wildfire emergency
- Install a solid door with self-closing hinges between living areas and the garage
- Dispose of oily rags in Underwriters Laboratories approved metal containers
- Store all combustibles away from ignition sources such as water heaters
- Disconnect electrical tools and appliances when not in use
- Allow hot tools such as glue guns and soldering irons to cool before storing
- Properly store flammable liquids in approved containers and away from ignition sources such as pilot lights

2 Kitchen

- Keep a working fire extinguisher in the kitchen
- Maintain electric and gas stoves in good operating condition and keep clean
- Keep baking soda on hand to extinguish stove top grease fires
- Turn the handles of pots and pans away from the stove burners
- Install curtains and towel holders away from stove burners
- Store matches and lighters out of reach of children
- Make sure that electrical outlets are designed to handle appliance loads

3 Living Room

- Install a screen in front of fireplace or wood stove
- Store the ashes from your fireplace (and barbecue) in a metal container and dispose of only when cold
- Clean fireplace chimneys and flues at least once a year

4 Hallway

- Install smoke detectors between living and sleeping areas
- Test smoke detectors monthly and replace batteries twice a year, when clocks are changed in the spring and fall
- Replace electrical cords that do not work properly, have loose connections, or are frayed

5 Bedroom

- If you sleep with the door closed, install a smoke detector in the bedroom
- Turn off electric blankets and other electrical appliances when not in use
- Do not smoke in bed
- If you have security bars on your windows or doors, be sure they have an approved quick release mechanism so you and family can get out in case of fire

6 Bathroom

- Disconnect appliances such as curling irons and hair dryers when done; store in a safe location until cool
- Keep items such as towels away from wall and floor heaters

* Disaster Preparedness

- Maintain at least a three-day supply of drinking water, and food that does not need refrigeration and generally does not need cooking
- Maintain a portable radio, flashlight, emergency cooking equipment, lanterns and batteries
- Outdoor cooking appliances such as barbecues should never be taken indoors for use as heaters
- Maintain first aid supplies to treat the injured until help arrives
- Keep a list of valuables to take with you in an emergency; if possible, store these valuables together
- For safety, securely attach all water heaters and furniture such as cabinets and bookshelves to walls
- Have a contingency plan to enable family members to contact each other. Establish a family/friend phone tree
- Designate an emergency meeting place outside your home
- Practice emergency exit drills in the house (EDITH) regularly, STOP, DROP AND ROLL also



For more information contact the Nevada State Fire Marshal Division, your local Fire Department or Living With Fire for tips and assistance.

Get Your Community Involved

www.fire.nv.gov • www.LivingWithFire.info • www.forestry.nv.gov/fire-adapted-communities/