

Building for Wildfire Resilience in Hawai'i

A guide for builders and homeowners

cpaw.headwaterseconomics.org | October 2024



For the people and places of Hawai'i and the Pacific
to be wildfire-ready and wildfire-resilient.
<https://www.hwmo.org>



Working with communities to reduce wildfire risks through
improved land use planning, compelling communication, and
applied research. <https://cpaw.headwaterseconomics.org>



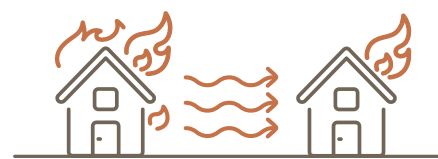
Building a home with wildfire in mind.

Wildfire risk reduction measures to a home and property, including using wildfire resistant building materials and managing vegetation, can increase a home's chances of surviving a wildfire. Many commonly used building materials are wildfire resistant and provide better long-term maintenance and durability.

Homes burn down from wildfires in one of three ways:



Embers: Traveling far ahead of a wildfire front, embers can directly threaten a home by landing on combustible (flammable) material on or around a home, such as the roof or open window.



Radiant heat: Exposure from radiant heat occurs when nearby combustible materials and fuels ignite, such as a neighboring home. Influenced by duration and intensity, radiant heat can ignite a combustible material like wood siding or break the glass of windows and doors.



Direct flame contact: Direct flame contact occurs when combustible material provides a continuous pathway for flames to touch a building or home.

A home's characteristics, including its building materials, design, and relation to its immediate surroundings principally determine its potential to burn. By using wildfire resistant building materials and managing the vegetation around your home, you can reduce exposure from potential ignitions.

Discussing wildfire risk reduction strategies with your neighbors can also increase your community's overall resilience, especially in areas where homes are closely situated. Reducing the amount of combustible materials between homes, such as fences and vegetation, breaks up fuel continuity and can interrupt fire pathways leading from one home to another. By applying this full systems approach, homes, neighborhoods, and communities can be better prepared for wildfire.

Own Your Zone 0 – Exterior Home Protection



1	Roof	Install a Class A-rated roof such as asphalt shingles or metal panels	\$\$\$
2	Exterior Walls	Use non-combustible siding, such as fiber-cement cladding	\$\$\$
		Replace at least the lower foot of wood or vinyl siding with fiber-cement board, stucco, brick, or stone	\$\$
3	Windows	Use dual-paned, tempered glass in windows and doors with metal clad frames	\$\$\$
4	Doors	Use fiberglass or metal exterior doors	\$\$
5	Eaves	Enclose open eaves with noncombustible soffit material	\$\$\$
		Install metal soffit vents backed by 1/8" or smaller wire mesh	\$\$
6	Gutters	Install metal gutters with guards or covers made of non-combustible materials	\$\$
7	Deck & Porch	Use composite or other non-combustible decking material; enclose under-deck area with 1/8" wire mesh screening	\$\$\$
8	Near Home Landscaping	Use gravel or bare earth to create a 5-foot buffer zone around the home	\$

\$ - Inexpensive \$\$ - Moderately expensive (may need a contractor) \$\$\$ - Investment (professional install)

Roof

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Action Items:

- Use Class A-rated roofing material like asphalt shingles or metal.
- Install metal roof vents. Consider a fire- or ember-resistant vent.
- Add a metal drip edge around your roof's edge.
- If installing skylights, choose flat, tempered glass with metal clad frames.

Why this matters:

- Roofs are highly vulnerable because they have a large, horizontal surface.
- The edges of the roof, including gutters and places where the roof meets walls (like dormers) can ignite from embers.
- Complex roof shapes add to the risk. Valleys, places where the roof meets walls, joints, and other features can trap debris, which can then be ignited by embers.

BONUS: Asphalt shingles are affordable, durable, and low-maintenance.

Windows

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Action Items:

- Install windows with double-pane, tempered glass and metal clad frames.
- Use 1/8" or smaller metal window screens.
- If you are using exterior shutters, opt for solid metal.

Why this matters:

- Glass is one of the most vulnerable parts of a home during a wildfire.
- The glass can break if it is exposed to intense heat from nearby burning vegetation or buildings.
- Once the glass breaks, flames and embers can get inside the house and ignite flammable material like carpets and furniture.
- Wood and vinyl framed windows can burn or melt when exposed to heat or flames.
- Fiberglass or plastic screens can melt and expose the window frame to heat. Metal screens can help keep embers out.

BONUS: Metal clad window frames are low-maintenance, energy-efficient, and highly durable.

Exterior Walls

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Action Items:

- Use non-combustible siding, such as fiber cement.
- Install metal flashing where your deck or porch meets your walls.
- In gable and wall vents, install wire mesh with openings no larger than 1/8".
- Enclose the area under your home, porch, or deck with wire mesh with openings no larger than 1/8".
- Do not store combustible items under the house, porch, or deck.

Why this matters:

- Intersections where the exterior wall meet the deck or ground can ignite from embers that collect at the base of the wall.
- When fire ignites exterior siding, it can spread to other parts of the wall and can expose the eaves, doors, and windows to ignition.
- Embers can also get under your home and ignite anything flammable stored underneath the home and/or deck.

BONUS: Fiber cement siding is low-maintenance, durable, and stands up well to insects and moisture.

Doors

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Action Items:

- Use fiberglass or metal exterior doors.
- Install a metal garage door with garage door seal kit.
- Install weather stripping around all doors.

Why this matters:

- During a wildfire, a door can be damaged by intense heat from nearby burning vegetation or structures.
- Debris like dead leaves often accumulate around doors, creating a place for embers to land and ignite the base of the door, frame, siding, or deck.
- Embers can accumulate in the small gaps between the door and frame, igniting the door frame.
- Once the door (or its window) fails, flames and embers can get inside the house and ignite flammable material like carpets and furniture.

BONUS: Metal and fiberglass doors resist warping in humid climates.

Eaves

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Action Items:

- For enclosed eaves, install noncombustible soffit material and metal vents backed with wire mesh with openings no larger than 1/8"
- For open eave design, install circular noncombustible vents and apply fire-rated caulk at all gaps in blocking between rafters.

Why this matters:

- Eaves can trap heat and embers and fire can spread quickly across the side of the home and to the roof.
- Embers can enter the attic through vents in the eaves. Maintaining a noncombustible zone 0-5' around the home is important in reducing exposure of the exterior wall and eaves.

BONUS: Soffit vents typically have a screen attached to them to prevent rodents from entering attic.

Deck & Porch

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Action Items:

- Use composite decking material (e.g., Trex).
- Install metal flashing where your deck meets the wall (at least 6").
- Enclose the area under your deck with wire mesh with openings no larger than 1/8".

Why this matters:

- The large, flat surface of a deck can be easily exposed to flames from below and to wind-blown embers.
- Flammable material stored on top of the deck (like furniture) can be easily ignited by embers.
- The space under the deck is especially at risk for ember buildup, which can ignite any flammable items stored there.
- If the deck catches fire, it can expose the house to intense heat and flames.

BONUS: Composite decking is more durable and easier to maintain than traditional hardwoods.

Gutters

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Action Items:

- Install metal gutters.
- Install metal drip edge behind the gutter.
- Use noncombustible gutter guards or covers to reduce debris buildup in the gutters.

Why this matters:

- Leaves and pine needles can gather in the gutter and catch fire from wind-blown embers.
- Gutters on higher floors of your home are harder to clean, making debris buildup more likely.
- If debris in the gutter ignites, it can damage the roof edge, fascia, and roof sheathing.
- Plastic gutters can melt and fall, spreading fire along the home.

BONUS: Metal gutters are noncombustible and will stay in place during a wildfire.

Near-Home Landscaping

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Action Items:

- Use gravel or bare earth in the 5-foot zone around your home to reduce the risk of embers igniting.
- Avoid using any flammable plants in the 5-foot zone around your home.
- Use a metal fence panel or gate where the fence connects to your home (minimum of 5' length).

Why this matters:

- Embers are responsible for most home loss during a wildfire. Reducing places for embers to land and ignite within five feet of the home is especially important.
- Flammable materials near your home, like mulch or plants, can ignite from embers and spread to your home.
- Wooden or plastic fences can carry fire to the home.

BONUS: Gravel helps retain soil moisture and has a much longer lifespan than bark or organic mulch.

You can tackle many effective wildfire-resilient projects in a weekend.



Some of the most effective strategies for safeguarding your home can be done yourself but must be regularly maintained, including:

- Keep your roof and gutters clean.** Clear away pine needles, leaves, and other debris from your roof, especially in the valleys, and clean out your gutters regularly.
- Secure the area under your home, porch, and deck.** If your home is raised or if you have a deck or porch, don't store combustible items underneath. Clear out any debris or flammable materials and use 1/8" wire mesh (instead of wood lattice) to close off the area. This helps keep out debris and prevents embers from getting underneath the deck area.
- Move flammable items away from your home.** During fire conditions, take flammable items like furniture and barbecue grills off your deck or porch. Make sure things like RVs and trailers are parked at least 30 feet from your home.
- Maintain your yard.** Regularly remove dead plants, grass, and leaves. Trim tree branches so they are at least 10 feet from other trees. Create space between trees, shrubs, and any items that could ignite, like patio furniture or sheds.



With a vision of wildfire-ready and wildfire-resilient people and places in Hawai'i and across the Pacific, our mission is to serve as the primary hub for wildfire planning, mitigation, research, and collaboration in the Hawai'i-Pacific region.

For more information contact admin@hawaiiwildfire.org or call (808) 885-0900.



The information in this document is based on research by Headwaters Economics. For more information, see <https://cpaw.headwaterseconomics.org> or email doug@headwaterseconomics.org.

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Throughout this report, we use the term "flammable" to mean combustible and/or flammable.

The recommendations in this document are general suggestions aimed at reducing the risk of wildfire damage to a single-family home. Implementing these suggestions does not guarantee the prevention of damage. Every property and situation is unique, and we recommend consulting with local fire authorities or professionals for advice tailored to your specific conditions. The organizations that produced this report are not liable for any damages or losses that may occur if following these recommendations.