

# FIREHARD CANADA

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## TB-05: Wildfire Hardening for First Nations Communities

*A practical guide to protecting buildings on reserve from wildfire | Technical Bulletin TB-05*

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[firehard.ca](https://firehard.ca)

### **About This Document**

This guide is offered freely to First Nations communities across Canada. It was developed by FireHard Canada, a volunteer-led building science initiative based in Smithers, BC, in the traditional territory of the Wet'suwet'en people. FireHard does not presume to understand the full context of any individual community. This document provides technical building science information that communities can adopt, adapt, or set aside according to their own priorities and governance. All FireHard specifications and guides are free to download and use at [firehard.ca](https://firehard.ca).

# 1. Why First Nations Communities Face Greater Wildfire Risk

First Nations reserves across Canada face wildfire exposure that is disproportionate by every measure. This is not speculation. The data is clear, well-documented, and deeply troubling.

## The Numbers

- **80% of First Nations communities** are located in or near forests that burn frequently (UNDRR, 2024).
- **32% of reserves** are directly in or adjacent to the wildland-urban interface (UNDRR, 2024).
- **19% of on-reserve residents** live in higher fire risk areas, compared to only 2.4% of the non-reserve population (UNDRR, 2024).
- **Evacuation rates during the 2023 wildfires were 8 times higher** for First Nations than for the general population (UNDRR, 2024).
- **People in First Nations are 10 times more likely to die in a fire** than the general Canadian population (CBC Indigenous).
- **Less than half of reserves have fire departments.** Those that do often rely on volunteers with personal vehicles and hand pumps (McGee et al., 2021).

## Why Buildings on Reserve Are More Vulnerable

Several factors compound wildfire risk for buildings on reserves:

**Tight community layouts.** Many reserves have housing clustered in patterns that create high structure-to-structure exposure. In FireHard terms, this is a Close Neighbour Exposure Level (CNEL) problem. When buildings are 4–6 metres apart, fire can jump between them through radiant heat alone, even without a wildfire front reaching the community. This is the most common suburban scenario in Canada, and on many reserves the separations are tighter still.

**No enforceable building code.** Provincial building codes generally do not apply on reserve. Federal funding requires National Building Code compliance for new construction, but enforcement is inconsistent. Many older homes were built to no particular standard. There is no wildfire-specific construction requirement in any Canadian building code, on or off reserve.

**Aging housing stock.** Much of the on-reserve housing stock is older wood-frame construction with vinyl siding, exposed eaves, unscreened vents, and combustible decks and fences — all features that are highly vulnerable to ember attack and radiant heat.

**Limited fire response.** Remote communities may have no structural fire department. Provincial wildfire services prioritize timber and populated centres. Federal emergency management focuses on evacuation rather than prevention. When fire arrives, many communities have no local capacity to defend structures.

**Insurance barriers.** Many on-reserve buildings are uninsured or underinsured. Insurers classify remote communities as high-risk. Older housing built to earlier standards is viewed as riskier. Without insurance, every structure lost is a total loss with no recovery path.

The result is a compounding of vulnerabilities: buildings that are more exposed, less protected, harder to insure, and harder to rebuild. Every dollar invested in prevention goes further here than almost anywhere else in Canada.

## 2. What FireHard Offers — and What It Does Not

### What FireHard provides

- A free, comprehensive wildfire construction guidance system (WER and CNEL) that any community can download and use without cost or permission.
- Self-assessment tools that let homeowners and housing managers evaluate their buildings without hiring a specialist.
- Detailed construction modules covering every part of the building envelope: openings, roof, vents, decks, fencing, and walls.
- Design guides for new construction that builders can follow without interpretation.
- Technical bulletins on specific topics including subdivision design (TB-04), which is directly relevant to community planning on reserves.

### What FireHard does not provide

- Emergency management, evacuation planning, or wildfire suppression guidance. Use existing ISC and provincial resources for these.
- Vegetation management programs. Use FireSmart Canada, which has dedicated First Nations programming through ISC.
- Funding. FireHard is a specification system, not a funding body. However, the specifications can support applications to ISC, CMHC, and provincial adaptation funding programs.
- Cultural guidance or community-specific recommendations. Each community's needs, priorities, and governance are their own.

### 3. First Steps — High-Impact, Low-Cost Hardening

Not every wildfire hardening measure requires a renovation budget. The following actions are listed in order of cost and complexity, starting with measures that can be done this week with minimal materials. Each one meaningfully reduces the chance of a building igniting during a wildfire event.

These priorities are based on how buildings actually ignite in wildfires. Research consistently shows that ember attack is the primary ignition mechanism — not direct flame contact. Small embers, sometimes travelling kilometres ahead of the fire front, enter buildings through gaps and ignite combustible materials inside. The low-hanging fruit is about closing those gaps.

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#### Step 1: Screen or Replace Attic and Soffit Vents

**Cost:** \$5–15 per vent

**Skill:** Basic hand tools

**Impact:** **Critical**

Unscreened attic vents are the single most common entry point for embers. A burning ember the size of a fingernail can enter an unscreened soffit vent, land on insulation or stored materials in an attic, and ignite the house from the inside while the wildfire is still a kilometre away.

What to do:

- Walk around every building and identify all vents: soffit vents, gable vents, ridge vents, turbine vents, dryer vents, bathroom exhaust vents.
- Any vent without metal mesh screening (not fibreglass or plastic) is a vulnerability. Replace or retrofit with 2mm (1/12") corrosion-resistant metal mesh. Hardware cloth from any building supply store works.
- For dryer and bathroom vents, install dampered (flap-closing) terminations if not already present. A vent that stays open when not in use is an ember entry point.
- If replacing vents, choose ember-resistant models with integral screening. These are commercially available and cost no more than standard vents.

This single action addresses the most likely ignition pathway in any WUI fire event. FireHard Module 3: Vents & Penetrations has complete specifications.

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#### Step 2: Clear Combustibles Within 1.5 Metres of Buildings

**Cost:** \$0 (labour only)

**Skill:** None required

**Impact:** **High**

Embers that land on the ground ignite what they find there. If that is dry grass, firewood, lumber scraps, propane tanks, or stored materials leaning against the building, the building wall becomes the next fuel.

What to do:

- Move firewood, lumber, pallets, and stored materials at least 10 metres from any building. This is the single most effective free action.
- Remove dead grass, leaves, and debris from within 1.5 metres of the building perimeter. Gravel or bare soil in this zone is ideal.
- Move propane tanks as far from buildings as practical. If a tank cannot be moved, clear all vegetation and combustibles from around it.
- Remove combustible items stored under decks and stairs. Under-deck storage is one of the highest-risk features identified in wildfire research (NIST).

This overlaps with FireSmart Zone 1 guidance, which is an excellent companion to this step. If your community has a FireSmart coordinator or program, this work is complementary.

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### Step 3: Enclose Open Eaves and Soffits

**Cost:** \$3–8 per linear foot

**Skill:** Basic carpentry

**Impact:** High

Open eaves — where the roof overhang is open and you can see the underside of the roof sheathing — are an ember trap. Burning embers lodge in the gap between the wall and the roof, igniting the fascia, sheathing, or roof structure.

What to do:

- Identify any building with exposed rafter tails or open eaves (you can see up under the roof overhang to bare wood).
- Install soffit panels (fibre cement, aluminum, or metal) to close the underside of the eave. Vinyl soffit is better than nothing but will melt and expose the space it was protecting.
- If installing vented soffit (to maintain attic ventilation), ensure it has integral ember-resistant mesh (2mm metal).

See FireHard Module 2: Roof & Eaves for complete specifications including the hot roof alternative for severe exposure.

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### Step 4: Replace or Repair Damaged Roofing

**Cost:** Varies (moderate)

**Skill:** Roofing trade

**Impact:** Critical

The roof is the largest horizontal surface on any building and the largest ember-catching area. A roof with missing shingles, exposed underlayment, or gaps at ridges and edges gives embers direct access to combustible sheathing.

What to do:

- Survey all roofs in the community. Any roof with missing, curled, or damaged shingles is a priority.
- When reroofing, use Class A rated roofing (metal or asphalt shingles with Class A rating). Metal roofing is the strongest option and is already common in many First Nations communities.
- Ensure ridge caps, hip caps, and edge flashings are intact with no gaps. Embers concentrate at roof edges and ridges.
- Clear gutters and roof valleys of leaves, needles, and debris. Accumulated organic debris on a roof is fuel waiting for an ember.

See FireHard Module 2: Roof & Eaves for complete roofing specifications by WER level.

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## Step 5: Address Combustible Fencing Connected to Buildings

**Cost:** \$0–50

**Skill:** Basic tools

**Impact:** High

A wooden fence attached to a building acts as a fuse. NIST research (TN 2228) demonstrated that a burning fence can deliver enough radiant heat to ignite vinyl siding at distances under 2 metres. If the fence connects to the house, the house ignites.

What to do:

- Identify any combustible fence (wood, vinyl) that connects directly to a building.
- The simplest fix: detach the fence from the building with a 1.5-metre noncombustible gap (metal gate, metal fence section, or simply remove the connecting section).
- If the fence must remain connected, replace the section within 1.5 metres of the building with metal or noncombustible material.

See FireHard Module 5: Fencing, Landscaping & Site for complete fencing specifications and the research behind them.

## 4. The Close Neighbour Problem on Reserves

This is where FireHard offers something that no other Canadian program currently addresses.

Many reserve housing layouts were not designed with fire separation in mind. Houses may be 3–6 metres apart, and in some communities even closer. At these distances, a fire in one building can ignite the neighbouring building through radiant heat alone — no flying embers needed, no wildfire front required. A single house fire can become a multi-structure event in minutes.

FireHard's CNEL (Close Neighbour Exposure Level) system is specifically designed for this problem:

- **CNEL-1 (Moderate, 6–10m):** Noncombustible ground cover between buildings, noncombustible fencing, enclosed soffits.
- **CNEL-2 (High, 4–6m):** Noncombustible cladding on the facing wall, tempered glazing, wildfire shutters recommended. This is the most common scenario on Canadian reserves.
- **CNEL-3 (Severe, 2.4–4m):** Full hardened assembly with Type X sheathing, mineral wool insulation, and mandatory wildfire shutters.

A housing manager or band council can measure the separation between buildings in the community and immediately determine which CNEL level applies to each pair of facing walls. The specifications then tell you exactly what hardening measures are needed on each wall.

For communities planning new housing, FireHard TB-04: Subdivision Design provides guidance on how layout decisions — lot widths, setbacks, road patterns — directly affect CNEL ratings and therefore hardening costs. Better planning at the layout stage can eliminate the need for expensive wall hardening later.

## 5. A Community-Level Approach

Individual home hardening matters, but the greatest value comes from a coordinated community approach. A single hardened building in a row of unhardened buildings is still at risk from its neighbours. A community that hardens systematically protects everyone.

### Suggested community-level steps

1. **Walk the community.** Using the FireHard Self-Assessment guide, survey every building. Record: vent screening status, eave condition (open or enclosed), roofing condition, combustibles within 1.5m, fencing connections, and building-to-building separation distances. A spreadsheet or paper form is sufficient.
2. **Map the CNEL exposure.** Measure the separation between every pair of neighbouring buildings. Any pair under 10 metres has a CNEL rating. Plot these on a community map. You will quickly see where the highest-risk clusters are.
3. **Prioritize by vulnerability.** Start with the buildings that have the most compounding risk factors: unscreened vents + open eaves + combustible fencing + close neighbours. These are the ignition multipliers.
4. **Do the free and low-cost work first.** A community cleanup day focused on clearing combustibles from building perimeters, moving firewood, and screening vents can materially reduce community-wide fire risk in a single weekend.
5. **Integrate with existing programs.** If your community participates in ISC's FireSmart program, the vegetation management work done through FireSmart complements the building hardening work described here. FireSmart reduces the wildfire reaching your buildings. FireHard reduces the damage if it does.
6. **Use the data to support funding applications.** A completed community survey with WER and CNEL ratings for every building is a powerful document to attach to ISC infrastructure funding requests, CMHC housing program applications, or provincial adaptation grants. It demonstrates need, specificity, and a clear plan.

## 6. New Construction on Reserve

For communities building new housing, the greatest opportunity is to build fire-hardened from the start. Adding wildfire hardening at the design stage costs a fraction of what retrofitting costs later.

### Key decisions that cost little or nothing extra

- **Choose metal roofing over asphalt shingles.** Many remote communities already prefer metal for longevity. It is also the best wildfire roofing choice. The cost difference for new construction is minimal and the service life is much longer.
- **Specify enclosed eaves in the design.** There is no cost difference between open eaves and enclosed eaves at the construction stage. Enclosing eaves after construction is far more expensive.
- **Use fibre cement or metal cladding instead of vinyl siding.** The material cost is moderately higher but the durability is substantially better, and the wildfire performance is incomparably better. Vinyl melts at low temperatures and exposes the wall sheathing to embers and radiant heat.
- **Specify ember-resistant vents.** These cost no more than standard vents when specified at the construction stage.
- **Set building separations at 6 metres minimum where possible.** This keeps the community at CNEL-1 (moderate) and avoids the need for expensive wall-hardening measures. See TB-04 for subdivision design guidance.
- **Use noncombustible fencing within 1.5 metres of buildings** or design fence layouts that do not connect to buildings.

The FireHard WER New Construction Design Guide provides a complete specification package that can be handed directly to builders and contractors. It is written to be used as-is, without interpretation.

## 7. Resources

### FireHard documents (free at firehard.ca)

<b>WER Self-Assessment for Existing Homes</b>	Walk-through assessment tool for evaluating any building
<b>WER New Construction Design Guide</b>	Complete specification for builders constructing new homes
<b>WER-1 through WER-4 Design Guides</b>	Detailed specifications by exposure level
<b>Module 1: Openings</b>	Windows, doors, glazing
<b>Module 2: Roof &amp; Eaves</b>	Roofing materials, eave enclosure, hot roof
<b>Module 3: Vents &amp; Penetrations</b>	Ember-resistant vent screening
<b>Module 4: Decks &amp; Attachments</b>	Deck materials, skirting, building junctions
<b>Module 5: Fencing, Landscaping &amp; Site</b>	Fence materials, hardscape perimeters
<b>Module 6: Exterior Walls &amp; Cladding</b>	Cladding classification, wall assemblies
<b>Close Neighbour Exposure Package</b>	CNEL assessment and hardening guide
<b>TB-04: Subdivision Design</b>	How layout affects CNEL and hardening costs
<b>Component Assembly Reference</b>	Quick-reference approved assemblies by WER level

### Partner organizations

**First Nations Emergency Services Society (FNESS):** [fness.bc.ca](http://fness.bc.ca) — Emergency management services for BC First Nations, including wildfire mitigation and FireSmart programming.

**National Indigenous Fire Safety Council (NIFSC):** [nifsc.ca](http://nifsc.ca) — Fire safety program support, training, and incident reporting for First Nations communities.

**First Nations National Building Officers Association (FNNBOA):** [fnnboa.ca](http://fnnboa.ca) — Housing resources, building inspection support, and free architectural drawings for on-reserve construction.

**Indigenous Services Canada — FireSmart Program:** [sac-isc.gc.ca](http://sac-isc.gc.ca) — Federal funding for vegetation management, fireguard installation, emergency planning, and training on reserves.

**FireSmart Canada:** [firesmartcanada.ca](http://firesmartcanada.ca) — Community-level wildfire awareness and vegetation management programming.

**NRC National Guide for WUI Fires:** [nrc-cnrc.gc.ca](http://nrc-cnrc.gc.ca) — The national scientific framework for wildland-urban interface fire protection.

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*All FireHard documents are free to download and use.*