

FIREHARD FOR COMMUNITIES

A Guide for Local and Regional Governments

Integrating Wildfire-Resistant Construction
into Community Planning

Version 1.0 | February 2026

Prepared by FireHard | firehard.ca | A Wildernest Systems Inc. project

Developed in Smithers, BC by Wildernest Systems Inc.,

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We live and work in wildfire country.

DISCLAIMER

This guide is published by FireHard Canada for general educational and informational purposes. It provides guidance on integrating wildfire-resistant construction practices into community planning, based on current Canadian building science, standards, and research. This guide is subject to the following conditions:

Not professional advice: This guide does not constitute professional engineering, architectural, planning, or legal advice. It is not a substitute for the services of a licensed engineer, planner, or other qualified professional.

Building code responsibility: Building codes vary by jurisdiction. Compliance is the responsibility of the property owner, their professionals, and local building authorities.

Site-specific conditions: Actual wildfire resistance depends on site-specific conditions including topography, wind, vegetation, climate, neighbouring structures, and access to fire suppression services.

No guarantee of wildfire survival: Compliance with recommendations does not guarantee survival. Wildfire outcomes depend on fire intensity, duration, wind, ember density, suppression response, terrain, vegetation, and other factors beyond building construction. No building is fireproof.

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1. The Problem

Canada lost \$8.5 billion in insured wildfire losses in 2024. The 2023 fire season burned 18.5 million hectares — seven times the 25-year average. Communities that had never experienced wildfire were evacuated: Halifax, Kelowna, Yellowknife. The trend is accelerating.

The research is consistent. Post-fire investigations by NIST, IBHS, CSIRO, and NRCan find the same patterns: homes are lost not because firefighters aren't trying, but because the buildings themselves are vulnerable. Ember attack — burning fragments carried 1 to 10 kilometres ahead of the fire front — is the primary ignition mechanism. Embers find gaps: unscreened vents, open eaves, combustible debris in gutters, vinyl siding that melts and exposes wall cavities.

The solutions are known. Australia has mandated wildfire-resistant construction standards (AS 3959) since 1991. California has required Chapter 7A compliance in WUI zones since 2008.

Canada has the NRC National Guide for Wildland-Urban Interface Fires (2021) and the FireSmart Canada program. What Canada has not had is a specification-grade construction standard that translates the research into practical building specifications a homeowner, contractor, or building official can use.

2. What Already Exists

2.1 NRC National Guide for WUI Fires (2021)

The National Research Council's National Guide (Bénichou et al., 2021) is the most comprehensive Canadian reference for WUI fire planning. It covers hazard assessment, construction recommendations, vegetation management, and community planning. It provides a framework of four exposure levels and four construction classes. It is voluntary and deliberately general — the authors note that specification-grade construction detail was left to others to develop.

The NRC Guide's Chapter 4 addresses community-level planning in detail: access and egress routes, road widths for fire apparatus, water supply infrastructure, utilities, demographics, and evacuation planning. This is essential work that FireHard does not duplicate.

2.2 FireSmart Canada

FireSmart Canada is the established national program for vegetation management and defensible space. The FireSmart Community Recognition Program provides a structured process for community-level wildfire preparedness. FireSmart covers the landscape around the building. It does not provide specification-grade construction detail for the building itself.

2.3 Provincial Building Codes

The Canadian Building Code is a life safety standard. Its fire requirements are designed to give occupants time to escape and firefighters time to respond. A 1-hour fire-rated wall assembly can perform exactly as designed — maintaining integrity for 60 minutes — and the building can still be a total loss. This is acceptable under the code because everyone got out alive. The code's job is life safety during evacuation. It assumes fire starts inside the building. It assumes fire department response. It does not address external wildfire exposure.

Provincial building codes include spatial separation rules for structure-to-structure fire but these assume fire department response within minutes — an assumption that fails during WUI events when departments are overwhelmed by simultaneous ignitions across a community.

2.4 Emergency Management Programs

Most Canadian provinces have established emergency management frameworks. BC has the Emergency Program Act and regional district emergency plans. The NRC National Guide Chapter 4 provides detailed guidance on community emergency planning for WUI fires, including evacuation routes, apparatus access, water supply, and communications. FireHard does not duplicate or replace any of these established pathways. They work.

3. The Gap FireHard Fills

FireHard provides the specification-grade construction detail that the NRC Guide deliberately left to others. It is not a replacement for the NRC Guide, FireSmart, or provincial building codes. It is the construction specification bridge between these frameworks.

The NRC Guide tells you that a building in a high-exposure area needs fire-resistant construction. FireSmart tells you how to manage the vegetation around it. The building code tells you how to get people out alive. FireHard tells you exactly what materials, products, and assembly details to specify for the building envelope — from the fastener size to the membrane type to the vent mesh aperture — so the building is still standing after the fire passes.

For a local government, this means FireHard provides the technical specifications that can be referenced in building permit conditions, development permit areas, or incentive programs without requiring staff to develop construction specifications from scratch.

4. How the WER System Works

The Wildfire Exposure Rating (WER) system assigns a building one of four levels based on its wildfire exposure: WER-1 (basic ember protection, less than 10 kW/m²), WER-2 (moderate radiant heat, 10-19 kW/m²), WER-3 (high exposure, 19-40 kW/m²), and WER-4 (extreme flame zone, greater than 40 kW/m²). Each level has a corresponding Design Guide with complete construction specifications.

The WER level is determined by vegetation type, distance, and slope. A formal slope correction table adjusts the effective WER level per building face based on uphill gradient. The Close Neighbour Exposure Level (CNEL) system addresses structure-to-structure fire spread for any building with a neighbouring structure within 10 metres.

5. Implementation Options for Communities

5.1 Awareness and Education (No regulatory change)

Make FireHard's free self-assessment guide available through municipal websites, building permit counters, and community halls. Distribute at FireSmart community events. Include in new homeowner packages for WUI-adjacent developments. Cost: zero.

5.2 Incentive Programs

Offer property tax credits, rebates, or grant funding for homeowners who complete WER-rated hardening. Partner with insurers for premium discounts. ICLR data shows returns of approximately \$4 saved per \$1 spent, with benefit-cost ratios as high as 30:1 for new construction in high-hazard areas.

5.3 Development Permit Area (DPA) Conditions

Under the Local Government Act (BC), communities can designate Development Permit Areas for wildfire hazard protection. DPA guidelines can reference WER levels as minimum construction standards. Example language: 'All new construction within the Wildfire DPA shall comply with FireHard WER-2 specifications as a minimum, or the WER level determined by a professional assessment, whichever is higher.' This leverages existing legislative authority without requiring building code changes.

5.4 Building Permit Conditions

Building officials can require a WER assessment as part of the building permit application for properties in identified WUI zones. The WER assessment and design guide specifications can be referenced as conditions of the building permit.

5.5 Zoning Bylaw Integration

For communities with political will, zoning bylaws can require WER compliance as a condition of development in designated WUI zones. This is the strongest implementation but requires the most community engagement.

6. The CNEL System: Addressing Urban Fire Spread

The CNEL system deserves special attention because it addresses the urban fire spread problem that Canadian codes do not. In subdivisions where homes are 1.5 to 6 metres apart, a fully involved neighbouring structure produces 20 to 80 kW/m² of radiant heat — enough to cascade ignitions through a block. The Canadian Building Code's spatial separation rules assume fire department response within minutes. During a WUI event, that assumption fails.

Three CNEL tiers provide incremental protection based on separation distance. No other international wildfire standard — not AS 3959, not IWUIC, not California Chapter 7A — provides this level of detail on structure-to-structure fire protection. For communities with dense residential development, CNEL may be more immediately relevant than vegetation-based WER levels.

7. Community and Site Planning

While FireHard's primary focus is the building envelope, the WER system also addresses site-level planning elements that directly affect building survivability:

Vegetation management: The WER self-assessment incorporates FireSmart defensible space zones. Effective vegetation management within the 10-metre non-combustible zone and 30-metre fuel-reduced zone can reduce the effective WER level for a property. FireHard Module 5 (Fencing, Landscaping, and Site) provides specifications for non-combustible ground cover, landscaping materials, and perimeter zones.

Fencing and accessory structures: Combustible fencing between homes is one of the highest-risk features identified by NIST research. FireHard specifications include fence material transitions (non-combustible within 2.4 metres of any structure) and accessory structure separation requirements.

Deck and under-deck management: Raised decks with combustible storage underneath are identified by IBHS as having 7× higher ignition probability. FireHard specifications address deck surface materials, under-deck enclosure, and storage clearance.

Subdivision layout: For new developments, site planning that considers prevailing wind directions, slope orientation, fuel load proximity, and structure separation distances can significantly reduce community-wide wildfire risk. The WER system provides the technical framework for specifying construction requirements that vary by lot position within a development.

For comprehensive community-level planning guidance beyond building construction — including road widths, apparatus access, water supply, utilities, and evacuation routes — the NRC National Guide Chapter 4 remains the authoritative Canadian resource.

8. Working With Existing Programs

FireHard is designed to complement, not compete with, existing programs:

FireSmart covers the landscape. FireHard covers the building. They are two halves of the same solution. Communities already participating in the FireSmart Community Recognition Program can add FireHard as the construction specification component.

The NRC National Guide provides the national framework for community-level WUI planning. FireHard provides the construction specification detail that the NRC Guide authors identified as needed.

The building code is a life safety standard — it gets people out alive. FireHard is a property protection standard — it keeps the building standing after the fire passes. These are different objectives that require different construction approaches. FireHard builds on the code; it does not replace it.

Provincial emergency management frameworks cover evacuation and response. FireHard covers prevention through building design. Each program does what it does well.

9. The Cost-Benefit Case

For new construction, wildfire hardening adds 3-7% at WER-2 and 8-15% at WER-3 to envelope cost. ICLR data shows benefit-cost ratios of 30:1 for new construction in high-hazard areas and 4:1 for retrofits. These are extraordinary returns for any public safety investment.

For communities, the benefit exceeds individual homes. Every home that hardens reduces ignition risk for neighbouring homes. In dense subdivisions, cluster hardening creates fire-resistant blocks that stop urban fire spread. The community benefit exceeds the sum of individual benefits because of this network effect.

10. Getting Started

1. Review the WER Technical Document at firehard.ca for the full system specification and research basis.
2. Complete a WER self-assessment on representative properties in your community to understand the range of exposure levels present.
3. Identify existing wildfire programs (FireSmart, emergency management, DPAs) and determine how WER specifications complement them.
4. Consult building department staff about implementation options — from informational to regulatory.
5. Engage with your community on the appropriate level of adoption.
6. Contact FireHard at firehard.ca for technical support. P.Eng. assessment services available through Bulkley Valley Engineering Services (EGBC No. 1001683) in Smithers, BC.

11. Resources

FireHard Canada (all free): firehard.ca

WER Technical Document: firehard.ca/pdf/FireHard_WER_Technical_Document_v1-0.pdf

Self-Assessment for Existing Homes: firehard.ca/assess/

Design Guides (WER-1 through WER-4): firehard.ca/assess/

Close Neighbour Package (CNEL): firehard.ca/pdf/FireHard_Close_Neighbour_Package.pdf

Global Standards Comparison: firehard.ca/compare/

External Resources:

NRC National Guide for WUI Fires (2021): nrc.canada.ca

FireSmart Canada: firesmartcanada.ca

Canadian Wildfire Information System (CWFIS): cwfis.cfs.nrcan.gc.ca

ICLR Wildfire Research: iclr.org

We will never tell you your community is safe from wildfire. No building is fireproof. Wildfire is an unpredictable natural hazard influenced by weather, wind, fuel, terrain, suppression response, and factors beyond anyone's control.

What we will tell you is that known, tested, affordable construction measures can dramatically reduce the probability of structure loss — and that every home that hardens makes every neighbouring home safer.

Get involved: firehard.ca/partners

Contact: info@firehard.ca | Web: firehard.ca

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