FIREHARD CANADA

TB-02: HIGH-RISK FEATURES AND COMMON MISTAKES

Residential Features That Accelerate Wildfire Damage

Research-based guidance on features not addressed by standard building codes

Version 1.0 — February 2026 | firehard.ca | Free. Always.

DISCLAIMER

This guide is published by FireHard Canada for general educational and informational purposes. It provides technical guidance on wildfire-resistant construction practices 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, or construction advice. It is not a substitute for the services of a licensed engineer, architect, or other qualified professional.

Site-specific conditions: The specifications and recommendations in this guide are general in nature. Actual wildfire resistance depends on site-specific conditions. A qualified professional familiar with local conditions should assess the applicability of any recommendation to a specific property.

No guarantee of wildfire survival: Compliance with the recommendations in this guide does not guarantee that a property will survive a wildfire event.

Limitation of liability: To the maximum extent permitted by applicable law, FireHard Canada, Wildernest Systems, Bulkley Valley Engineering, and their respective directors, officers, employees, agents, contractors, and affiliates shall not be liable for any damages arising from or related to the use of or reliance on the information in this guide. Full terms at firehard.ca/terms.

Contents

1. Purpose

This technical bulletin identifies residential features and practices that significantly increase wildfire risk but are not addressed by standard Canadian building codes. Many of these features are popular in contemporary design, widely installed by homeowners, and completely legal under current regulations. They are also among the most dangerous elements on a home in wildfire-prone areas.

Each feature is documented with research citations, an explanation of the fire mechanism, and a specific action. This bulletin complements the WER Design Guides and the Close Neighbour Exposure Level (CNEL) Guide.

WHY THIS MATTERS

Building codes address minimum structural safety. They do not address the cumulative effect of design choices, landscaping, storage practices, and maintenance on wildfire vulnerability. A code-compliant home can still be extremely vulnerable to wildfire if these features are present.

2. Decorative Timber Slat Screens

2.1 The Problem

Vertical timber slat screens, privacy screens, and decorative louvred panels are increasingly popular in contemporary Canadian residential design, particularly in British Columbia. These features are among the most dangerous elements on a home in wildfire-prone areas.

The fire mechanism combines four risk factors: thin timber members (typically 19–38mm) with a high surface-area-to-volume ratio, promoting rapid ignition at lower radiant heat thresholds than solid cladding; air gaps between slats that promote convective airflow and accelerate flame spread through the chimney effect; direct attachment to the building envelope, delivering flame and radiant heat directly to the wall assembly behind; and frequent placement below eaves or over windows, targeting the most vulnerable parts of the building.

2.2 Research Basis

NIST Technical Note 2228 (Butler et al., 2022) documented through 187 fire experiments that thin timber elements with air gaps — essentially the same configuration as slatted screens — produced the fastest flame spread rates and highest heat release rates of any configuration tested. The chimney effect between parallel surfaces was identified as the primary accelerant.

AS 3959:2018 (Australian Standard for Construction in Bushfire-Prone Areas) prohibits combustible attachments on building faces in BAL-29 and above. Decorative screens, pergolas, and trellises attached to the building are explicitly addressed as ignition pathways.

IBHS community-scale research (2019–2024) identified combustible attachments as one of the top five ignition sources in post-fire investigations, alongside vents, eaves, decks, and fencing.

2.3 Action

At any CNEL level or WER-2+: Remove or replace all combustible decorative screens on exposed building faces. Non-combustible alternatives that provide the same aesthetic include aluminium slat screens, powder-coated steel louvres, perforated metal panels, and aluminium privacy screens. Cost: $40–$80 per linear metre for aluminium slat alternatives versus $25–$50 for timber. The cost premium is modest; the risk reduction is substantial.

DESIGN NOTE

Non-combustible slat screens are widely available from Australian manufacturers (where they are required by code in bushfire zones) and increasingly from North American suppliers. Specify powder-coated aluminium with stainless steel fasteners for coastal or high-moisture environments.

3. Combustible Fencing as Fire Highways

3.1 The Problem

A wood privacy fence connecting two properties provides a direct, continuous combustible pathway between structures. Fire can travel the full length of a standard residential fence in under 5 minutes. In the separation zone between closely spaced homes, combustible fencing is the single most efficient fire transfer mechanism.

3.2 Research Basis

NIST Technical Note 2228 (Butler et al., 2022) conducted 187 fire experiments on fences and mulch. Key findings: western red cedar fences produced peak heat release rates exceeding 2,000 kW. Fire spread velocity along continuous fences exceeded 0.5 m/s under moderate wind. Double-sided lattice fencing was the worst-performing configuration — the chimney effect between the two panels caused explosive fire growth and flame heights exceeding 5 metres. Parallel fences at property lines with less than 0.9m separation created oven-like conditions. Fence-to-structure separation of less than 1.5m resulted in structure ignition in 100% of tests where the fence became involved.

CAL FIRE and IBHS both recommend the “8-foot rule”: replace the first 2.4m (8 feet) of combustible fence nearest each building with non-combustible material. This breaks the fire pathway at the critical structure interface.

3.3 Action

Replace the first 2.4m of combustible fence nearest each building with non-combustible material: metal gate section, steel panel, masonry, or concrete. Cost: $200–$500 installed. This is one of the most cost-effective wildfire measures available. Standard fencing products are sold in 8-foot sections, making this a convenient retrofit.

At CNEL-2+: non-combustible fencing throughout the separation zone between structures. At any WER level: avoid double-sided lattice fencing anywhere on the property. Replace existing lattice with solid metal or masonry panels.

4. Combustible Features Below the Eave Line

4.1 The Problem

The eave-soffit-fascia junction is the primary entry point for fire into the roof structure. Any combustible material mounted or stored below the eave line creates a fire bridge from ground level to this critical junction. Common examples: combustible pergolas or trellises attached below eaves, climbing plants on trellises against the wall, firewood stacked against the wall below eaves, combustible patio furniture or cushions stored under the eave overhang, vinyl or wood lattice enclosing under-eave spaces, and decorative brackets or corbels in timber.

4.2 Research Basis

NIST post-fire investigations (TN 1600, TN 1796, TN 2205) consistently identified eave-line ignition as one of the top three structure loss mechanisms, alongside vent intrusion and window failure. The Lytton BC post-fire analysis (2021) found that structures with combustible attachments below the eave line were significantly more likely to be lost than those without.

Manzello et al. (2020, NIST) demonstrated that ember accumulation in re-entrant corners and sheltered areas below eaves was sufficient to ignite combustible materials at wind speeds as low as 8 km/h. The combination of ember accumulation and radiant heat from ground-level combustibles creates a self-reinforcing ignition pathway.

4.3 Action

Clear all combustible materials from within 1.5m of the eave line on all building faces. Remove combustible trellises and climbing plants from the wall. Replace combustible pergola attachments with non-combustible materials (steel posts, aluminium beams). Store patio furniture cushions inside during fire season. Replace vinyl or timber lattice enclosing under-eave spaces with non-combustible metal mesh or solid panels.

5. Under-Deck and Under-Structure Storage

5.1 The Problem

The space under a raised deck is sheltered from rain and wind, making it an attractive storage location. It is also a near-perfect fire chamber: confined space, combustible overhead surface, and ample airflow for combustion. Firewood stacked under a deck is functionally equivalent to building a campfire against the house.

5.2 Research Basis

NIST Technical Note 1600 (Maranghides & Mell, 2009) and subsequent NIST investigations documented under-deck combustible storage as a primary ignition pathway in every major WUI fire investigation. IBHS testing showed that decks with combustible storage underneath were 7 times more likely to ignite than cleared decks.

Quarles and Standohar-Alfano (2018, IBHS) found that embers accumulating under decks ignited stored materials in 100% of tests where combustible storage was present, regardless of wind speed or ember density. The fire then attacked the underside of the deck, the ledger board connection, and the building wall simultaneously.

5.3 Action

Remove ALL combustible storage from under decks and raised structures. No firewood, lumber, cardboard, propane tanks, gasoline containers, recycling bins, or furniture. This is free and immediately effective. If the deck is more than 600mm above grade, enclose the under-deck space with non-combustible screening (metal mesh ≤3mm) or install non-combustible skirting. Non-combustible ground cover underneath.

6. Firewood, Propane, and Fuel Storage

6.1 The Problem

A cord of firewood (approximately 3.6 cubic metres) contains enough energy to sustain a structural fire. Firewood stacked against a building wall, under a deck, or in the separation zone between homes is a large, readily ignitable fuel load that produces sustained radiant heat output comparable to a small structure fire once ignited. Propane tanks and gasoline containers add explosive potential.

6.2 Research Basis

FireSmart Canada Zone 1A/1B recommendations specify firewood storage at minimum 10m from any building. NIST post-fire investigations consistently found that homes with firewood stacked against walls or under decks were significantly more likely to be lost. The NRC National Guide for WUI Fires (2021) identifies combustible storage within 1.5m of buildings as a primary ignition source.

6.3 Action

Store firewood minimum 10m from any building. Never stack against building walls, under decks, under eaves, or in the separation zone between homes. Propane tanks per fire code minimum separation (typically 3m for residential cylinders). Gasoline and fuel containers in enclosed non-combustible storage only, never against building walls or in separation zones.

7. Combustible Mulch and Ground Cover

7.1 The Problem

Combustible mulch within 1.5m of a building provides a ground-level fire pathway that carries ember-ignited fire to the wall base. Different mulch types have dramatically different fire performance. Pine straw (pine needle mulch) is the worst performer; wood chip, bark, and rubber mulch also ignite readily.

7.2 Research Basis

NIST Technical Note 2228 (Butler et al., 2022) tested multiple mulch types for ignition from embers under wind conditions. Pine straw mulch ignited in 100% of tests, even at low ember densities. Rubber mulch was the second worst performer, sustaining fire longer than organic mulch due to petroleum content. Shredded hardwood mulch was more resistant but still ignitable. Gravel (75mm depth) did not ignite in any test.

Quarles and Standohar-Alfano (2018, IBHS) found that fire spreading through combustible mulch against a building wall ignited vinyl siding in under 3 minutes and wood siding in under 5 minutes. The fire then spread vertically via the chimney effect in the wall-to-mulch re-entrant corner.

7.3 Action

Replace all combustible mulch within 1.5m of any building wall with gravel (minimum 75mm depth), stone, or concrete. No pine straw within 3m. Cost: $50–$80 per cubic yard of gravel, covering approximately 8 m^2 at 75mm depth. This is one of the most cost-effective wildfire measures available.

8. Quick Reference: High-Risk Features

Feature	Why It's Dangerous / What to Do
Timber slat screens	Remove or replace with aluminium/steel alternatives. Any CNEL level or WER-2+. Cost: $40–$80/m for NC alternatives.
Combustible fencing at building	Replace first 2.4m with metal gate or panel. Any WER level. Cost: $200–$500.
Double-sided lattice	Replace with solid metal or masonry panels. Worst performer in NIST testing. Any WER level.
Combustible pergolas below eaves	Replace with NC materials (steel posts, aluminium beams) or separate from building. WER-2+.
Climbing plants on walls	Remove from all building faces, especially below eaves. Any WER level.
Firewood against walls	Move to 10m minimum from any building. Never under decks. Free. Any WER level.
Under-deck combustible storage	Remove ALL combustible materials from under decks. Free. Any WER level. #1 priority.
Pine straw mulch	Remove within 3m of building. Replace with 75mm gravel. Cost: $50–$80/yd³. Any WER level.
Wood/bark/rubber mulch	Remove within 1.5m. Replace with gravel or stone. Cost: $50–$80/yd³. Any WER level.
Propane tanks against walls	Move to fire code minimum separation (typically 3m). Free. Any WER level.
Patio furniture under eaves	Store cushions inside during fire season. Move furniture 1.5m from walls. Free.
Vinyl lattice under eaves	Replace with NC metal mesh or solid panels. WER-1+. Cost: $100–$300.

9. References

Butler, K.M., Johnsson, E.L., & Maranghides, A. (2022). NIST Technical Note 2228. Wind-Driven Fire Spread to a Structure from Fences and Mulch. National Institute of Standards and Technology.

Maranghides, A. & Mell, W. (2009). NIST Technical Note 1600. Framework for Addressing the National Wildland Urban Interface Fire Problem.

Maranghides, A. et al. (2013). NIST Technical Note 1796. A Case Study of a Community Affected by the Witch and Guejito Wildland Fires.

Maranghides, A. et al. (2021). NIST Technical Note 2205. A Case Study of the 2018 Camp Fire — Notification, Evacuation, Traffic and Evacuation.

Manzello, S.L. et al. (2020). Role of firebrand combustion in large outdoor fire spread. Progress in Energy and Combustion Science, 76, 100801.

Quarles, S.L. & Standohar-Alfano, C. (2018). Ignition Potential of Decks Subjected to an Ember Exposure. IBHS Research Report.

IBHS (2019–2024). Research Reports on Community-Scale Fire Spread and the Neighbourhood Effect. Insurance Institute for Business & Home Safety.

AS 3959:2018 + Amd 2:2020. Construction of Buildings in Bushfire-Prone Areas. Standards Australia.

Bénichou, N. et al. (2021). National Guide for Wildland-Urban Interface Fires. National Research Council Canada.

FireSmart Canada (2018). FireSmart Begins at Home Manual. firesmartcanada.ca.

About FireHard Canada

FireHard Canada (firehard.ca) is a trade name of Wildernest Systems Inc. The WER system and CNEL system were developed by engineers at Wildernest Systems Inc. and Bulkley Valley Engineering Services Ltd.

FireHard Canada publishes free wildfire hardening resources for Canadian homes. All resources are available free at firehard.ca.

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

Get involved: firehard.ca/partners
Contact: info@firehard.ca | Web: firehard.ca