FIREHARD CANADA

CLOSE NEIGHBOUR EXPOSURE LEVEL (CNEL) GUIDE

Structure-to-Structure Fire Protection

A separation-distance-based framework for hardening building faces exposed to neighbouring structures

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Site-specific conditions: The specifications and recommendations in this guide are general in nature. Actual wildfire resistance depends on site-specific conditions including but not limited to: topography, prevailing wind patterns, vegetation type and density, proximity to wildland fuels, local climate, neighbouring structures, and access to fire suppression services.

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1. Why This Matters

Most Canadian subdivision homes are built 1.5 to 6 metres apart. At these distances, a fully involved neighbouring structure produces radiant heat fluxes of 20 to 80 kW/m² on the exposed face of adjacent buildings. This exceeds the piloted ignition threshold for most combustible cladding materials (approximately 12.5 kW/m² for wood products). The duration of exposure from a structural fire (30 to 90 minutes) far exceeds the brief pulse of a passing wildland fire front (typically 5 to 15 minutes).

Structure-to-structure fire spread is the leading cause of loss in wildland-urban interface events. In Lytton (2021), Paradise (2018), and the Marshall Fire (2020), the majority of structures were lost to fire spreading between buildings, not to direct wildland fire contact.

TWO SEPARATE RISKS

Your home faces two independent fire risks: wildland exposure (embers and radiant heat from burning vegetation) and close neighbour exposure (radiant heat and brands from a burning neighbouring structure). The WER system addresses wildland exposure. The CNEL system addresses close neighbour exposure. You may need both.

2. In Plain English

If your neighbour's house catches fire, the wall of your home facing that fire gets hit with intense, sustained heat — far more intense and far longer than a wildland fire front passing through. The closer your homes are, the worse the exposure. The CNEL system tells you exactly what to do to that facing wall, based on how far apart your homes are and whether your neighbour has done any hardening.

The good news: you only need to harden the face that's exposed. This is not a whole-house rebuild. CNEL-1 and CNEL-2 measures on a single wall are affordable and achievable for most homeowners. And every home that hardens its neighbour-facing wall makes the adjacent home safer too.

SHARE THIS WITH YOUR NEIGHBOUR

The CNEL system works best when both sides participate. If your neighbour hardens to WER-2 or higher, your CNEL level drops (because a hardened neighbour is far less likely to become fully involved). Share this guide. Coordinate improvements. A neighbourhood that hardens together is exponentially safer than individual homes hardening alone.

3. Does This Apply to You?

Measure the distance from your house wall to the nearest neighbouring structure on each side. Include detached garages, carports, workshops, and any roofed structure. If any neighbouring structure is within 10 metres of any face of your home, the CNEL system applies to that face.

For new construction, measure from your planned building face to the property line, then add the minimum setback from the neighbouring lot's zoning bylaw. If the total is less than 10 metres, design to the appropriate CNEL level. Assume worst case: the neighbouring lot will eventually have a standard wood-frame home at minimum setback.

4. How to Determine Your CNEL Level

The CNEL level for each building face is determined by two factors: separation distance and your neighbour's condition (WER level). A neighbour that has hardened their home presents a lower risk because it is less likely to become fully involved.

Step 1: Measure Separation Distance

Measure from your building face to the nearest neighbouring structure on that side. Measure to the closest point of the neighbouring structure, including eaves, decks, carports, and attached structures.

Step 2: Determine Neighbour Condition

If your neighbour has completed a FireHard assessment or has visibly hardened their home (non-combustible cladding, enclosed soffits, tempered glazing), they are likely WER-2 or higher. If you don't know, assume unrated (worst case).

Step 3: Apply CNEL Level

Component	Specification
Separation >10m	No CNEL measures required. Your wildland WER level governs.
Separation 6–10m (any neighbour condition)	CNEL-1: Moderate Exposure. Also applies at 3–10m if neighbour is WER-2+.
Separation 3–6m, neighbour WER-1 or unrated	CNEL-2: High Exposure. The most common Canadian suburban scenario.
Separation <3m, OR neighbour is known high-risk	CNEL-3: Severe Exposure. Known high-risk includes derelict structures, combustible storage within 1.5m, or unrated combustible accessory structures.

Step 4: Compare with Wildland WER

If your property also has a wildland WER level, compare the CNEL specification with the WER specification for each building element on each face. Apply whichever is more stringent. A property may have different levels on different faces: for example, WER-2 on the wildland-facing north side and CNEL-2 on the close-neighbour east side.

5. CNEL-1: Moderate Exposure

Applies when: separation 6–10 metres, OR separation 3–10 metres and neighbour is WER-2+.

At 6–10 metres from a fully involved single-storey wood-frame structure, incident radiant heat flux is approximately 8–15 kW/m² (at or below the piloted ignition threshold). The primary risk is brand transport and ember exposure from the burning structure, not sustained radiant heat ignition.

Component	Specification
Roof	Class A fire-rated roof covering (ASTM E108 / CAN/ULC-S107).
Cladding — facing wall	Non-combustible cladding on facing wall to 400mm minimum above grade. Fibre cement, metal panel, stucco, or masonry veneer.
Glazing — facing windows	Tempered glass in both panes on all windows facing the neighbouring structure.
Soffits — facing eave	Enclosed non-combustible soffits on the facing eave. Fibre cement or metal.
Fencing between structures	Non-combustible or fire-rated fencing between structures. Metal, masonry, or stone.
Ground cover in gap	Non-combustible ground cover within 1.5m of either structure. Gravel, stone, or concrete.
Combustible materials	Clear all combustible materials from the separation zone: firewood, lumber, recycling bins, patio furniture, mulch.
Non-facing sides	Non-facing sides remain at the property's wildland WER level.

COST: CNEL-1

Typical cost for a single facing elevation: $1,000–$5,000 retrofit; $500–$2,000 incremental in new construction. CNEL-1 is achievable for most homeowners in a weekend with basic trades support.

6. CNEL-2: High Exposure

Applies when: separation 3–6 metres AND neighbour is WER-1 or unrated. This is the workhorse level of the CNEL system — it addresses the most common Canadian suburban condition: homes on standard residential lots with 3–5 metre side-yard setbacks.

At 3–6 metres from a fully involved structure, incident radiant heat flux is approximately 15–40 kW/m² (NIST TN 1796, AS 3959 Clause 3.5). This exceeds the piloted ignition threshold and approaches the spontaneous ignition threshold for wood products (~25 kW/m²). The facing wall must resist sustained radiant heat exposure for 30–60 minutes.

Component	Specification
Roof	Class A roof covering. Non-combustible preferred: metal standing seam or concrete tile.
Cladding — facing wall	Full non-combustible cladding on the entire facing elevation. Fibre cement, metal panel, stucco, or masonry.
Sheathing — facing wall	Type X glass-mat faced gypsum sheathing (15.9mm) behind cladding on the facing wall. Gold Bond eXP Fire-Shield, Georgia-Pacific DensGlass, or equivalent.
Insulation — facing wall	Mineral wool cavity insulation on facing wall (Rockwool ComfortBatt or SafenSound). Non-combustible.
Glazing — facing windows	Tempered or fire-rated glazing on all facing windows. 5mm tempered glass minimum in both panes.
Soffits — facing eave	Enclosed non-combustible soffits with ASTM E2886 ember-resistant vents on the facing side.
Fencing between structures	Non-combustible fencing or barrier between properties. Metal panel, masonry, or concrete.
Ground cover in gap	Non-combustible ground cover throughout the full separation zone. Gravel, stone, or concrete.
Attachments — facing side	Non-combustible decks, pergolas, and attachments on the facing elevation. No combustible lattice, screens, or trellises.
Combustible materials	No combustible materials in the separation zone. No firewood, lumber, recycling bins, propane tanks, patio furniture, or mulch.
Non-facing sides	Non-facing sides remain at the property's wildland WER level.

COST: CNEL-2

Typical cost for a single facing elevation: $5,000–$15,000 retrofit; $2,000–$8,000 incremental in new construction. This is the level that addresses the most common real-world scenario and provides the highest return on investment.

7. CNEL-3: Severe Exposure

Applies when: separation less than 3 metres, OR neighbouring structure is a known high-risk condition (derelict, combustible storage within 1.5m, combustible accessory structure).

At less than 3 metres from a fully involved structure, incident radiant heat flux exceeds 40 kW/m² and can reach 80 kW/m² or more (NIST TN 1796, AS 3959). This exceeds the spontaneous ignition threshold for all combustible materials. The facing wall must function as a fire-rated assembly.

Component	Specification
Roof	Class A non-combustible. Metal standing seam or concrete tile.
Wall assembly — facing elevation	Fire-rated wall assembly: non-combustible cladding + Type X gypsum sheathing + mineral wool cavity insulation. See TB-01 Section 4 for preferred wall assembly.
Glazing — facing wall	Fire-rated or no glazing on facing wall. Minimise window area. Where windows are required, specify fire-rated assemblies.
Shutters — facing windows	Wildfire shutters on all facing windows and doors. Manual roller or hinged NC shutters.
Soffits — facing eave	Non-combustible soffit with no vents on the facing eave. Sealed. Compensating ventilation provided on non-facing sides or by unvented roof assembly.
Radiant heat barrier	Radiant heat barrier between properties: masonry wall, concrete block fence, or non-combustible panel fence with fire-rated core.
Ground cover	Non-combustible throughout entire gap. Concrete or stone preferred.
Attachments	No combustible attachments on the facing elevation. No decks, pergolas, screens, trellises, or storage.
Non-facing sides	Non-facing sides remain at the property's wildland WER level.

COST: CNEL-3

Typical cost for a single facing elevation: $15,000–$35,000 retrofit; $5,000–$15,000 incremental in new construction. CNEL-3 is a significant intervention but is still less than full WER-4 because it is single-elevation focused.

8. High-Risk Features in the Separation Zone

The space between closely spaced homes is the fire pathway during a WUI event. Certain common residential features dramatically increase the risk of fire transfer between structures. Removing or replacing these features is often the single most impactful action a homeowner can take.

8.1 Combustible Fencing as Fire Highways

NIST Technical Note 2228 documented through 187 fire experiments that combustible fences carry fire efficiently between structures. A wood privacy fence connecting your property to a neighbour's provides a direct, continuous combustible path. Fire can travel the full length of a fence in minutes. Double-sided lattice fencing was the worst performer: the chimney effect between the two panels caused explosive fire growth. Even parallel fences at property lines with less than 0.9m separation created oven-like conditions.

Action: Replace the first 2.4m (8 feet) of combustible fence nearest each building with non-combustible material (metal gate, steel panel, masonry). This breaks the fire pathway for $200–$500.

8.2 Decorative Timber Screens and Slatted Features

Vertical timber slat screens, privacy screens, and decorative louvred panels are increasingly popular in contemporary residential design. These are among the most dangerous features on a home in fire-prone areas. They combine thin timber members (high surface-area-to-volume ratio for rapid ignition), air gaps between slats (promoting convective airflow and flame spread), direct attachment to the building envelope, and frequent placement below eaves or over windows (the most vulnerable parts of the building).

A decorative timber screen attached to a building face in the separation zone between homes is a fire accelerator. It ignites from radiant heat at lower thresholds than solid cladding, burns rapidly, and delivers flame directly to the building envelope behind it.

Action: At CNEL-1+, remove or replace all combustible decorative screens on the facing elevation. Non-combustible alternatives include aluminium slat screens, powder-coated steel louvres, and perforated metal panels. These provide the same aesthetic with zero fire risk.

8.3 Combustible Features Below Eaves

Any combustible material mounted or stored below the eave line creates a fire bridge from ground level to the most vulnerable part of the building envelope. 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.

The eave-soffit-fascia junction is the primary entry point for fire into the roof structure. Anything that delivers flame or radiant heat to this junction dramatically increases the probability of roof ignition.

Action: Clear all combustible materials from within 1.5m of the eave line on the facing elevation. Remove combustible trellises and climbing plants. Replace combustible pergola attachments with non-combustible materials.

8.4 Under-Deck and Under-Structure Storage

NIST and IBHS research consistently identifies under-deck combustible storage as a primary ignition pathway. Firewood stacked under a deck is the equivalent of building a campfire against your house.

In the separation zone between homes, under-deck storage creates a fire bridge that can ignite the deck, which ignites the eave, which ignites the roof structure.

Action: Remove ALL combustible storage from under decks and raised structures. This is free and immediately effective. No firewood, lumber, cardboard, propane tanks, or furniture.

8.5 Firewood, Propane, and Fuel Storage

Firewood stacked against a building wall or in the separation zone between homes is a large, readily ignitable fuel load. A cord of firewood produces sustained radiant heat output comparable to a small structure fire. Propane tanks, gasoline containers, and other fuel sources in the separation zone add explosive potential.

Action: Store firewood minimum 10m from any building (FireSmart Canada Zone 1A/1B recommendation). Propane tanks per fire code minimum separation. Gasoline and fuel containers in enclosed non-combustible storage only, never in the separation zone.

8.6 Combustible Mulch and Ground Cover

NIST testing found that pine straw mulch was the worst-performing ground cover for fire spread. Wood chip mulch, bark mulch, and rubber mulch also ignite readily from embers and spread fire to adjacent structures. In the separation zone between homes, combustible mulch provides a continuous ground-level fire pathway.

Action: Replace all combustible mulch in the separation zone with gravel (minimum 75mm depth), stone, or concrete. Cost: $50–$80 per cubic yard, covering approximately 8 m^2.

9. Outbuildings in the Separation Zone

Sheds, detached garages, carports, workshops, and accessory structures in the separation zone between homes represent a neighbouring-structure fire risk identical to a neighbour's home. A shed with a combustible roof is a large fuel load that, once ignited, exposes both adjacent buildings to sustained radiant heat and flame contact.

IBHS testing showed that outbuildings within 10m of a home are significant ignition sources. For the CNEL assessment, measure the separation distance from your building face to the nearest outbuilding as well as to the neighbouring home. Apply the more stringent CNEL level. An outbuilding at 2m triggers CNEL-3 on the facing wall regardless of the distance to the neighbouring home.

Component	Specification
Outbuilding within 10m	Class A roof covering. Clear combustible storage from around exterior. No firewood stacked against shed. 1.5m non-combustible zone around outbuilding.
Outbuilding within 6m	Class A roof. Non-combustible siding. Meet building WER level or apply Close Neighbour measures to the face of your home facing the outbuilding.
Outbuilding within 3m	Outbuilding should meet same WER level as the main building, or be relocated beyond 6m. If neither is feasible, apply CNEL-3 to the facing wall of your home.
Non-combustible outbuilding	Steel-framed, metal-clad outbuildings do not contribute fuel. These are the preferred construction for outbuildings in the separation zone.

10. Relationship Between CNEL and WER

CNEL and WER are complementary systems addressing different hazards. A property may have both a wildland WER level (based on vegetation, slope, and separation from wildland fuels) and one or more CNEL levels (based on proximity to neighbouring structures). The two systems are applied independently, and the more stringent specification governs for each building element on each face.

Example: A home rated WER-2 for wildland exposure with a 4-metre separation to an unrated neighbour on the east side. The east face requires CNEL-2 measures (which are more stringent than WER-2 on cladding and sheathing). The north, south, and west faces require WER-2 measures only. The roof requires the higher of WER-2 or CNEL-2 specifications.

For properties with no wildland exposure but close neighbour risk (a dense urban infill lot), the CNEL system provides standalone guidance. No wildland WER assessment is required.

11. The Community Effect

The CNEL system creates a positive feedback loop. As more homes in a neighbourhood harden their close-neighbour faces, the CNEL levels for remaining homes effectively decrease. A neighbour rated WER-2 or higher shifts your CNEL from level 2 to level 1 at the same separation distance, because a hardened neighbour is far less likely to become fully involved.

This is why FireHard Canada publishes all resources free. The goal is community-level adoption, which produces multiplicative rather than additive risk reduction. A single hardened home in a row of unhardened homes gains limited benefit. A row of hardened homes creates a firebreak.

EVERY HOME MATTERS

Share this guide with your neighbour. If both homes harden their facing walls, the probability of fire transfer drops dramatically — because there is no fully involved structure to generate the sustained radiant heat that drives the ignition cascade. Community hardening is the most effective wildfire protection strategy that exists.

12. References

12.1 Research

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.

Butler, K.M. et al. (2022). NIST Technical Note 2228. Wind-Driven Fire Spread to a Structure from Fences and Mulch.

IBHS (2019–2024). Research on Community-Scale Fire Spread and the Neighbourhood Effect.

12.2 Standards

AS 3959:2018 + Amd 2:2020. Construction of Buildings in Bushfire-Prone Areas. Clause 3.5.

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

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

IBHS (2025). Wildfire Prepared Home Standard. ibhs.org.

Verification Pathways

The WER system recognizes three pathways to meet each specification. This mirrors how building codes work — a prescriptive path for straightforward compliance, and alternative solution paths for flexibility.

Deemed-to-Satisfy

Materials and assemblies explicitly named in the FireHard specification. If the design guide lists it, it meets the standard. Example: fibre cement panel, metal cladding, stucco, or masonry all satisfy “noncombustible cladding (or engineered equivalent)” without further testing.

Tested Equivalent

Products tested to the referenced standard by a recognized testing laboratory. The manufacturer’s test report is the evidence of compliance.

Engineered Alternative

A P.Eng. assessment demonstrating equivalent performance through analysis. The engineer’s sealed report is the evidence.

Disclaimer

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About FireHard Canada

FireHard Canada (firehard.ca) is a trade name of Wildernest Systems Inc. The Wildfire Exposure Rating (WER) system and Close Neighbour Exposure Level (CNEL) system were developed by engineers at Wildernest Systems Inc. and Bulkley Valley Engineering Services Ltd., with landscape architecture expertise from Lazzarin Svisdahl Landscape Architects.

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

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