



Building FireSmart Communities through Post-Fire Learnings

*A Wildland-Urban Post-Fire Case Study: Grouse Complex, BC 2023
[McDougall Creek, Walroy Lake, Clarke Creek]*

Agenda



- Background and Context
- Acknowledgements and Contributors
- Objectives
- Fire Behaviour and Spread Analysis
- Structure Ignition/Survival Analysis
- Land Use Planning – Literature Review
- Discussion and Adjournment

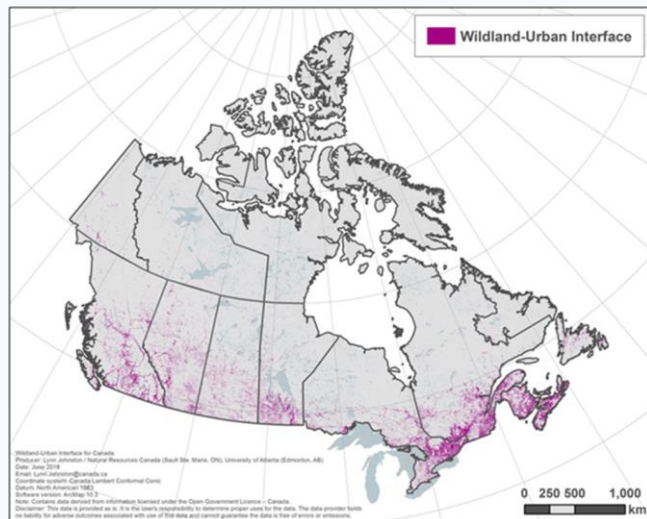


Wildland-Urban Interface and FireSmart



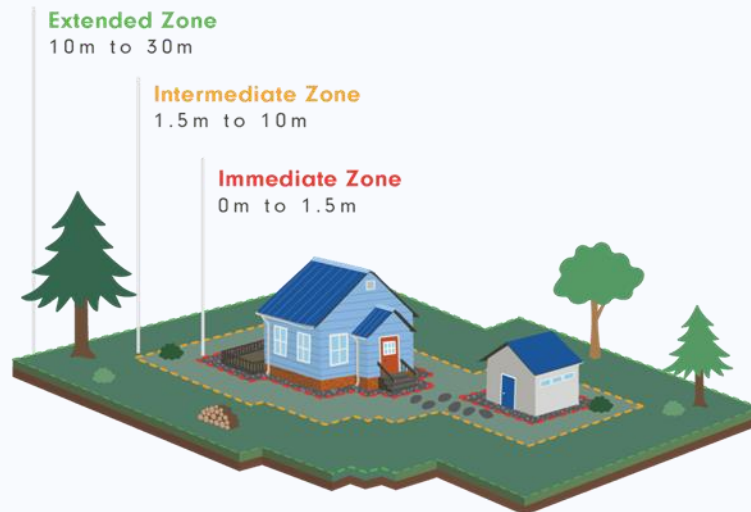
Wildland-Urban Interface:

- *The area where human development meets or intermingles with the natural environment*
- *An estimated 11 million Canadians currently live in areas of significant wildfire hazard*



FireSmart Principles:

- *Set of proactive measures that have been proven to mitigate risk to structural damage during WUI fires*



Wildland-Urban Interface and FireSmart

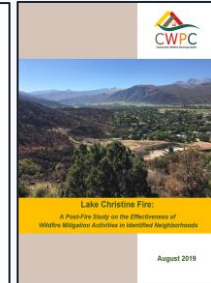
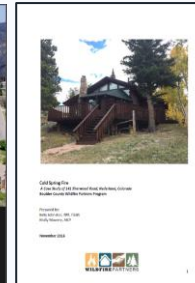
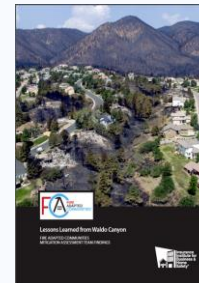


Wildland-Urban Interface Disaster Sequence



Post-fire examinations aim to:

- Provide quantitative information from actual incidents,
- Inform fire mitigation strategies,
- Improve FireSmart guidelines and principles,
- Empower communities to effectively create long-term behavioural changes
- Aid in the development and adoption of local FireSmart policies and bylaw



Project Initiation



- August 2023: Opportunity identified by the **BC FireSmart Committee**
- Support obtained from **Institute for Catastrophic Loss Reduction (ICLR)**
- Research team initiated and field research conducted by **FPIinnovations**



ICLR



FPIinnovations
Wildfire Operations



Fire Chiefs' Association of
British Columbia

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First Nations' Emergency
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Acknowledgements



- **Communities**

- Skwlāx te Secwepemcúłecw, Westbank First Nation, City of West Kelowna, Regional District of Central Okanagan, City of Kelowna, Lake Country, Thompson-Nicola Regional District, Columbia-Shuswap Regional District, Hamlet of Enterprise

- **Research Team**

- FPInnovations – Greg Baxter, Brandon MacKinnon, Steve Hvenegaard, Andrew Stack
- Advanced Investigative Solutions (AIS) – Mike Richards
- Whitebark and Sage Wildfire Science and Management – Cordy Tymstra

- **Advisory Group**

- Office of the Fire Commissioner, BC Wildfire Service, BC FireSmart Committee, First Nations' Emergency Services Society, Institute for Catastrophic Loss Reduction

In-Scope:

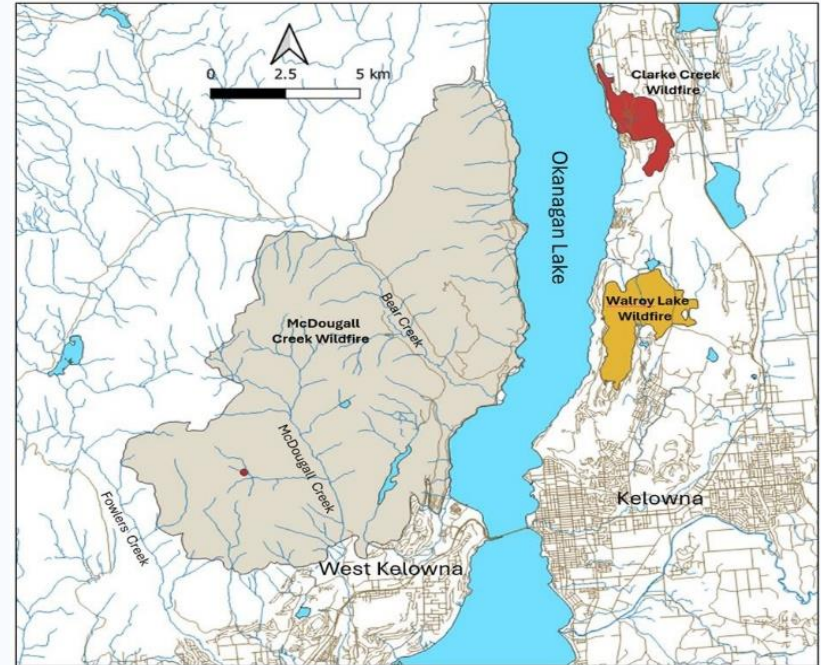
1. How the fire moved into the community
2. How the fire spread once it had entered the community
3. Factors contributing to structure ignition
4. Fuel treatment modification on fire behaviour
5. Impacts of land use planning, urban layout, critical infrastructure positioning, etc.
6. Impacts that structure protection efforts had within the community and on individual structures

Out of Scope:

- Fire origin and fire cause
- Suppression strategies and tactics not linked to key questions about fuel treatment, structure losses, etc.
- All other operational considerations, observations, and data

Grouse Complex – August 2023

- Began mid-August 2023 during the worst wildfire season on record in B.C.
- McDougall Creek wildfire (West Kelowna, Westbank First Nation, RDCO)
- Walroy Lake wildfire (Kelowna)
- Clarke Creek wildfire (Lake Country)
- \$480 million in insured losses



Methods

- Fire Behaviour
 - Fuels
 - Topography
 - Weather
- Used to answer project objectives 1 and 2
 - How the fire moved into the community
 - How the fire spread once it had entered the community
- Photos and videos from staff (agencies and fire departments) and public
- Recorded observations and notes from staff
- Interviews
- Remote sensing imagery including drone imagery
- Fire growth simulation modelling
- Weather data, and
- Physical field evidence (type, amount, and location) for fire movement.



Key Findings

1. Fire spread – extreme fire behaviour due to long term drought and an ‘unusual’ cold-front.
2. Homes ignited by ember showers originated long distances away.
3. Once burned – structures acted like ember sources and continued to spread the fire.

Embers ignited structure fires – not the head of the fire



Methods

- Random selection of damaged structures – then closest undamaged (if exists and not too far)
- Structure Fire Investigation
 - Court approved methods
 - Focused on burn and collapse patterns
 - Identified ignition location and fire spread
- Home Partners Program Assessment App
 - Purpose of app
 - How it was used
 - Data produced

- Used to answer objectives 3
 - Factors contributing to structure ignition



Structure - Damaged



Main factors contributing to ignition:

- Flammable materials within 1.5 m of structures - common examples
 - Cedars and soffits
 - Trees and soffits
 - Vehicles, ATV's, wood piles



Flammable materials within 1.5 metres of structure:



Main factors contributing to ignition:

- Inadequate deck management
 - Position on slope
 - Material
 - Condition and items



Main features of undamaged structures:

- Fuel Management
 - Green or low grass
 - Trees
 - Live/Dead vegetation
 - Reduced fuels
 - Sprinklers

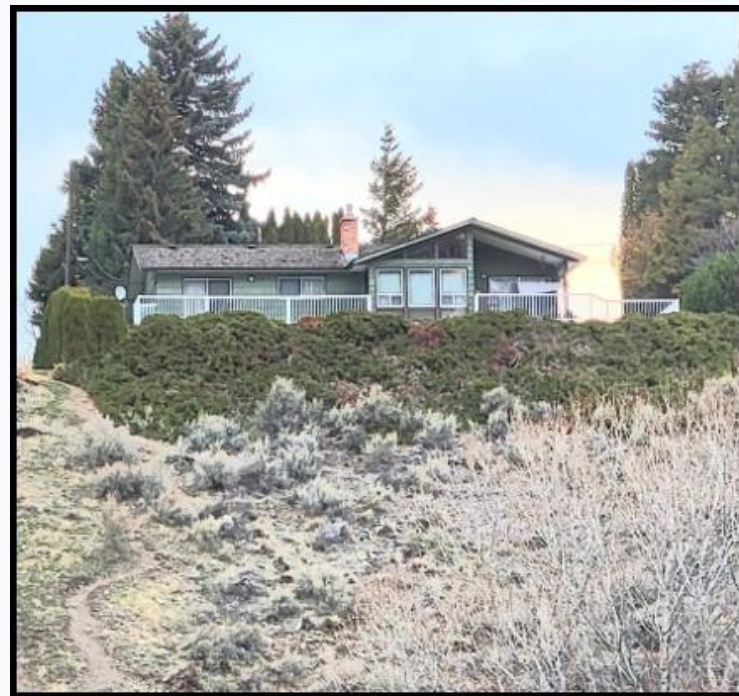


Structure Ignition/Survival Recommendations



1. Vegetation Management

- **No** combustible fuels within 1.5 metres of structure
- Vegetation management from 1.5 metres to 10 metres from structure
 - Plant maintenance (pruning, thinning, litter)
 - Vegetative debris clean-up
 - FireSmart plant selection
- Increase fuel management on slopes below and adjacent to structure

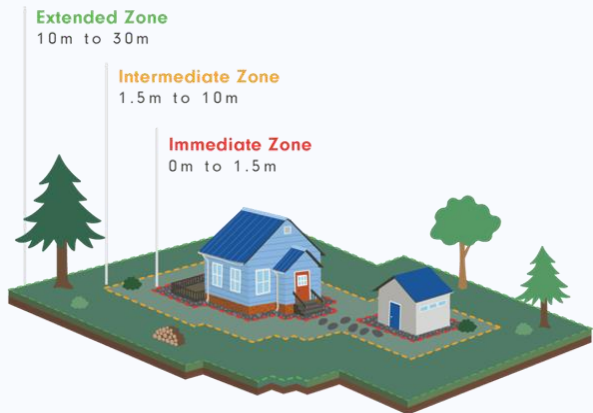


Structure Ignition/Survival Recommendations



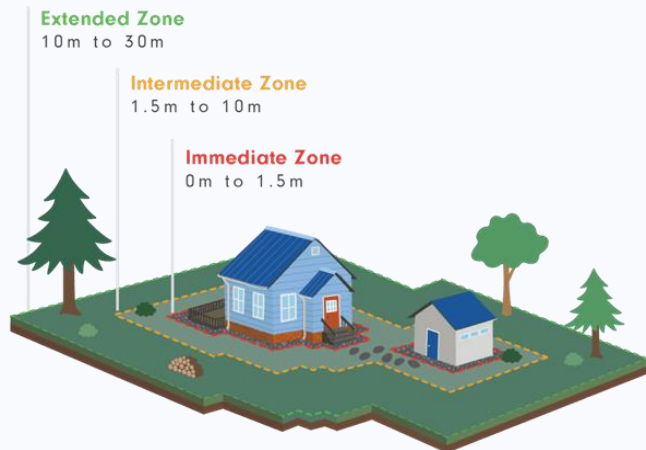
2. Structural Preparedness

- Deck management: slotted & solid surface
- Skirting: complete and in good condition
- Investigate new soffit technology or material
- Address exposures to the internal structure:
 - Incomplete, damaged or poorly fit walls, soffits, windows, doors, sheathing



3. Lifestyle Considerations

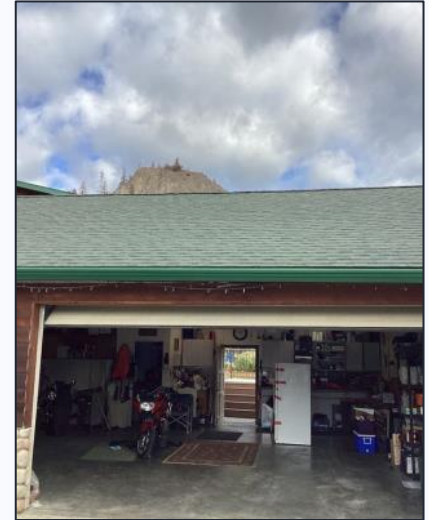
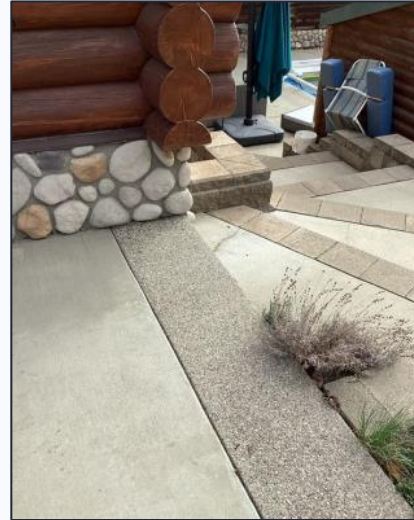
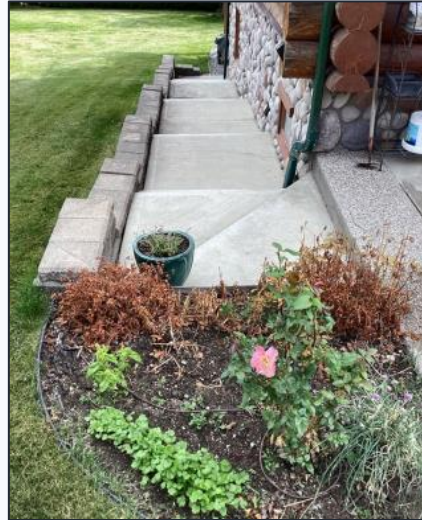
- Manage combustible yard items
- Storage away from structures or fully enclosed
- Limit summer firewood storage
- Park vehicles on non-combustible surface



Structure Survival - Traders Cove



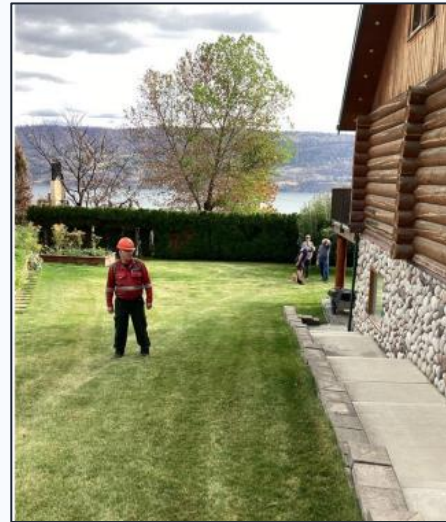
- Assessment completed October 2023 (~1.5 months following fire passage)
- Large amounts of ash and firebrand lodged in crevices of home
- Successfully survived the fire passage:
 - NO combustible fuels within 1.5 metres of structure
 - Vegetation management from 1.5 metres to 10 metres from structure



Structure Survival - Traders Cove



- Cedar hedge impacted outside of intermediate zone (> 10 m)
 - 50 metres of cedar hedge burnt within 12 metres of home
- Impacted in both 2016 and 2023
 - Homeowner will be removing and replacing the cedar hedge with fence or deciduous option



Structure Survival - Rose Valley



- Large amounts of ash and firebrand lodged in crevices of home
- Successfully survived the fire passage



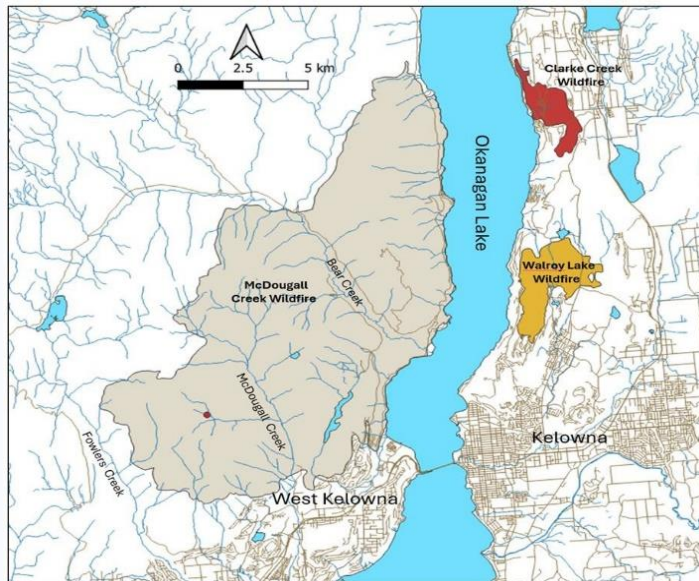
Land Use Planning – Literature Review



Recommendations were made based on gaps identified in current policies.

- Regional District of Central Okanagan
- City of West Kelowna
- City of Kelowna
- District of Lake Country

- Used to answer objective 5
 - **Impacts of land use planning**, urban layout, critical infrastructure positioning, etc.





BC Building Code & National Code Development

Federal

- Model National Codes
- Harmonization

Provincial

- Authority to adopt
- Codes, Standards, and other regulations

Local

- Zoning, Land use bylaws
- Permits and enforcement





Building Act & Unrestricted Matters

Province has sole responsibility for establishing building regulations but can unrestrict matters

For a building in a development permit area for a wildfire hazard*, the following matters as they relate to wildfire hazard are unrestricted:

- Form

- Exterior design and

- Finish

* Section 488 (1) (b) Local Government Act



Local Government Authorities

In relation to wildfire hazard, local governments can:

- Specify areas that may be subject to wildfire remain free of development, except in accordance with any conditions contained in the permit;
- Include requirements respecting the character of the development, including landscaping, form, exterior design and finish of buildings;
- Establish restrictions on the type and placement of trees and other vegetation in proximity to the development



Comparing Building Codes with DPAs

- *Building codes cannot address vegetation - DPAs can*
- *Building code applies to all new construction in BC - DPAs are community based*
- *Limited flexibility of prescriptive requirements in codes - DPAs use guidelines*
- *Local government bylaws can address fencing <1.8 metres - codes do not*

Recommendations

- Expand the geographical area of Wildfire Development Permit Areas
- Enhance enforcement of Wildfire Development Permit Areas
- FireSmart BC – Wildfire Development Permit Areas (A non-technical guide for FireSmart Coordinators in British Columbia)
- Align Wildfire Development Permit Area Exemptions Across Jurisdictions



Wildfire Development Permit Areas



Building Materials

Guideline	Justification	Example guideline text
Roof Material	Roofs catching fire are the number one cause of building losses during a wildfire event. The roof presents a large, flat area that fire embers can land on. Roofing material has several classifications with Class A being the most fire resistant. Some materials that either fall within the rating system or can be obtained that meet the requirements, include composite (asphalt and fiberglass) shingles, concrete or clay tile, metal roofing, and factory treated wood shake roofing.	Roof coverings should conform to Class A or B fire resistance as defined in the BCBC or materials meeting CAN/ULC-S114, "test for determination of non-combustibility in building materials"
Gutter Material	Installation of non-combustible gutters will limit the risk of ember produced fires spreading from debris in the gutters, to the gutters and roof.	Gutters should be constructed out of non-combustible material.
Vents	Unscreened vents can allow embers to enter a building. With the exception of dryer vents, install non-combustible vents with 3 mm metal screening in order to limit embers from accessing the home. Ensure dryer vents are clean and operational.	All vents should be screened with corrosion resistant, minimum 3-millimetre non-combustible wire mesh (excluding dryer vents).
Eaves	Open eaves create vulnerabilities to embers and radiant heat. Consider enclosing eaves with properly fitted soffits and fascia to reduce the risk of embers and heat from reaching the wooden rafters of the home.	All eaves should be enclosed with properly fitted soffits and fascia. Soffits should be non-combustible.

Vegetation - Immediate Zone (0-1.5 metres)

Guideline	Justification	Example guideline text
Vegetation	Reduce the chance of wind-blown embers igniting materials near the home. A non-combustible surface should extend around the structure and any attachments such as decks. Flammable materials and vegetation such as grass or plants (deciduous or coniferous) should not be present in this zone.	A 1.5 metre non combustible surface should extend around the structure and any attachments such as decks. Vegetation and other flammable materials should not be present in this zone.

Vegetation Intermediate Zone (1.5-10 metres)

Guideline	Justification	Example guideline text
Coniferous Trees	Coniferous trees provide a pathway for fire to spread vertically and horizontally. Individual conifer trees may be present in the Intermediate Zone provided: <ul style="list-style-type: none"> The tree is limbed up to 2 metres The tree is standing alone, and not within 6 meters (measured trunk to trunk) of other conifer species or the home. 	Coniferous trees can be present in this zone provided they are limbed up to two metres from branch to ground, there are no shrubs or heavy accumulation of vegetation below the drip line, and the siding of the home is non-combustible. If this cannot be accomplished, coniferous trees should not be present in this zone.

Recommendation

- Improve landscape management by reducing fuel loads and enhancing the defensibility of properties against wildfires
- Address vegetation management, the use of fire-resistant plant species and maintaining clear zones around structures

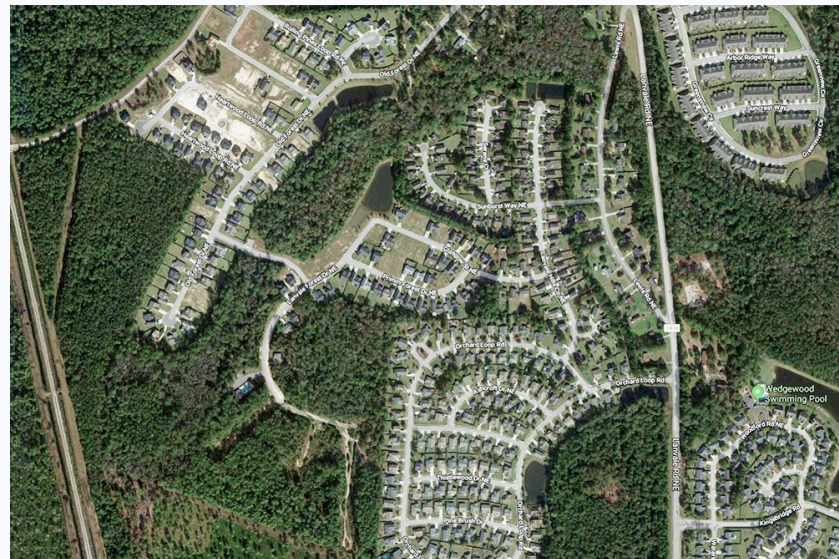


Recommendation

- Focus on fireproofing to minimize the risk of fence materials contributing to fire spread
- Use non-combustible materials and specific design standards to limit exposure of fences to fire
 - E.g. Fence continuity to structures within 1.8 metres of the structure and affixed to the structure

Recommendation

- Limit Development in Rural Areas
- Reduce urban sprawl
- Direct new residential development towards existing urban centres and community hubs
- Minimize the creation of isolated, vulnerable developments in rural areas
- Allow for more efficient and effective fire response



Additional Land Planning Considerations



Recommendation

- Increase Zoning Bylaw Setbacks
 - Consider revising zoning bylaws to enforce larger setbacks
 - Up to 10 meters between properties in heavily forested and residential zones is recommended
 - Increased buffer space can help prevent fire spread between properties, especially in high-risk areas
- Long-Term Behavioural Changes
- Insurance Incentives





CRI - FireSmart Community Funding & Supports

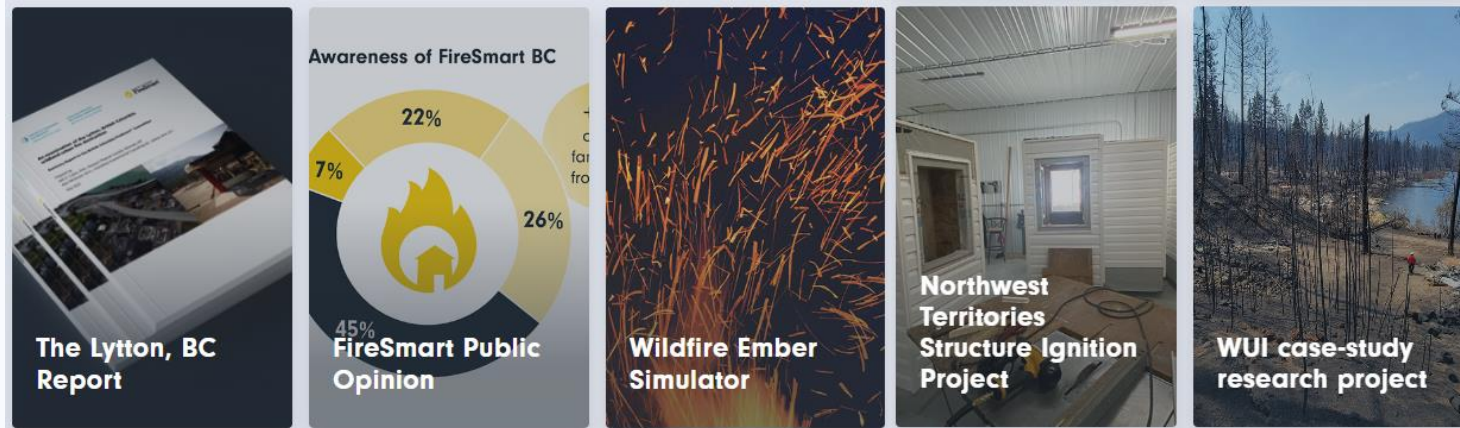
4. DEVELOPMENT CONSIDERATIONS

Community land use and development in wildfire-prone areas affects the susceptibility of the community at different scales and in terms of where and how a community is, or will be, developed.

Refer to the [Wildfire-Resilience Best Practice Checklist for Home Construction, Renovation and Landscaping](#) or [FireSmart BC Landscaping Hub](#).

Eligible Activities	Cost Maximums and Guidance
A. Amend Official Community Plans, Comprehensive Community Plans and/or land use, engineering and public works bylaws to incorporate FireSmart principles.	Up to \$11,600
B. Revise landscaping requirements in zoning and development permit documents to incorporate FireSmart principles.	Up to \$11,600
C. Establish or revise Development Permit Areas for Wildfire Hazard to incorporate FireSmart principles.	Up to \$11,600
D. Amend referral processes for new developments to ensure multiple departments, including the fire department and/or emergency management personnel, are included.	Up to \$11,600

Publication of Final Report: A wildland-urban post-fire case study: Grouse Complex Wildfire, BC 2023





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Questions?





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Greg Baxter - *Senior Researcher, FPInnovations*

Greg.Baxter@FPInnovations.ca

Chief Jason Brolund - *Fire Chief, City of West Kelowna*

Jason.Brolund@westkelownacity.ca

Hannah Swift - *A/Program Lead, FireSmart BC Committee Chair*

Chair@FireSmartBC.ca

Joel Hamilton - *Wildfire Interface Specialist, FireSmart BC*

HomePartners@FireSmartBC.ca