Wildfire Hazard Assessment

Nanaimo Forest Products Properties – 950, 1260 Phoenix Way

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EXECUTIVE SUMMARY

In accordance with the City of Nanaimo's Development Permit Guidelines for Wildfire (DPA5), Nanaimo Forest Products Inc. retained Strathcona Forestry Consulting to prepare a Wildfire Hazard Assessment of two properties at Phoenix Way proposed for industrial lots and buildings to be developed under industrial (I4) zoning.

Results of the assessments determined that the wildfire threat at the subject site is presently High. Factors contributing to the current, elevated rating include: continuity and extent of fuel (forest vegetation) loading in the local area, HeadFire Intensity; intermix (> 1 structure/ha), lack of currently developed infrastructure (fireflow and access), and the possibility of delayed response. Under the provincial Wildfire Threat Rating system, ratings must be moderate or less to be considered acceptable.

This report contains Wildfire Risk Reduction (WRR) recommendations based on the FireSmart Program (FireSmartBC.ca), a recognized framework for wildfire prevention in the interface zone.

In my professional opinion, if the recommendations contained in this report are followed during development of the subject sites, the risk of wildfire can be reduced to ensure the safety of the intended development.

Introduction

In accordance with the City of Nanaimo's Development Permit Guidelines for wildfire (DPA5: Wildfire Hazard Guidelines), Nanaimo Forest Products (NFP) retained Strathcona Forestry Consulting to prepare a Wildfire Hazard Assessment of properties at 950 and 1260 Phoenix Way. In 2009, Strathcona Forestry Consulting inspected the area at the request of the previous owner when a resort and housing estate was proposed for these properties and adjoining lands to the east. When NFP purchased the property at 1260 Phoenix Way, a boundary adjustment (subdivision) was initiated, separating the portion of 1260 Phoenix Way east of the Cable Bay Trail, resulting in NFP owning the two properties west of the Cable Bay Trail. This report provides current conditions and ratings pertaining specifically to 950 and 1260 Phoenix Way, where industrial lots and buildings are planned under industrial (I4) zoning. At the present time, the concept subdivision plan is not yet finalized; building structures are yet to be determined.

The WUI (wildland urban interface) is defined as the area where structures and other human development meets or are inter-mixed with wildland fire fuels (Canadian Interagency Forest Fire Centre = CIFFC). The WUI Fuel complex consists of two main categories of fuel components: wildland fuels (all vegetation – natural and cultivated), and built fuels (man-made structures = human development). Together, these components comprise the WUI Fuel Complex – the fuel structure that results as a combination of built fuels and wildland fuels.

Under Section 919.1(1) (a) of the Local Government Act, development permits may be designated where protection of Natural Hazard Lands is justified. Natural hazards, including wildfires, may put life and property, and local biodiversity, at risk if development is inappropriately situated and not well planned. The objective is to properly manage the risks associated with the hazard (interface wildfires).

Assessment

This assessment reflects site conditions prior to the proposed disturbance, including any previous site disturbance, and the anticipated site conditions post-development. The assessment considers existing off-site developments and the impact these developments may have on the subject property. The assessment report describes the vegetation, terrain, and infrastructure on and around the subject property.

Assessment criteria are based on Rating Interface Wildfire Threats in British Columbia (https://www2.gov.bc.ca/), FireSmart (FireSmart, Protecting Your Community From Wildfire (Second Edition. Partners in Protection, 2003 (https://www.firesmartcanada.ca/), and the Home Owners FireSmart Manual (BC Edition (https://www2.gov.bc.ca/assets/gov/public-safety-and.../homeowner-firesmart.pdf). Fire behavior modeling is standardized after the Canadian Forest Fire Danger Rating System (CFFDRS).

The assessment utilizes supported assessment methodology of the BC Ministry of Forests, Lands and Natural Resource Operations. Wildfire threat assessment was conducted through an analysis of fuel threats in and adjacent to the proposed development, as described in the 2020 Wildfire Threat Assessment Guide and Worksheets (MFLNRO, 2020). This process, used by qualified environmental professionals, employs physical and biophysical factors, combined with fuel hazards, to determine the wildfire threat (low, moderate, high, or extreme). Fire risk is based on four classes: low, moderate, high, and extreme. Fuel Types listed in this assessment are customized from the CFFDRS Fuel Type list for applicability on BC's south coast. Recommendations in this report conform to BC Building Code standards and fire hazard planning authorized by Section 3(2) of the BC Fire Services Act.

The assessment includes consideration of a range of factors including but not limited to: fuel hazards, history of wildfire occurrence, and existing and proposed structures. The assessment evaluates the subject property for wildfire susceptibility as it pertains to the proposed land use and not just the current land use. The assessment includes evaluation of conditions both on and off-site including neighbouring lands that may present a wildfire hazard to the subject property. The assessment specifies how the proposal incorporates defensible space and building materials to form an appropriate buffer zone or protection buffer. The assessment includes fire hazard mitigation recommendations regarding site modification requirements and any other requirements for subdivision or new construction that may reduce the susceptibility of the subject property to wildfire. Where there are green remainders, this wildfire hazard assessment includes methods for reducing wildfire hazard along the property line to a level of "moderate" or less, and also addresses management of the interface.

Recommendations in this report conform to BC Building Code standards and fire hazard planning authorized by Section 3(2) of the BC Fire Services Act.

Field Inspection

Fieldwork took place in the summer and fall of 2022. Field investigation entailed an analysis of the interface fire hazard that the site is exposed to, from the perspective of the general area, local site, and proposed and existing structures in the general vicinity, up to 100+ m (to 2+ km) from property boundaries, where feasible.

Hazard Assessment

Methods used in this assessment are repeatable and based on scientific standards appropriate to the scope of the proposed development and the landscape being assessed. Methods contributing to the results, interpretations and recommendations contained in this assessment are identified in the assessment, mapping, and/or included in appendices.

Wildfire threat assessment employed collection of detailed data on key forest stand attributes. Priority setting scoring examined topography, site level and previous mitigation activities within the area of interest. Site level fuel assessment examined the ground fuel, surface fuel, ladder fuel, and crown or aerial fuel. The wildfire threat assessment process is consistent with wildfire behavior principles from the Canadian Forest Fire Danger Rating System (CFFDRS).

The focus of assessment is stand attribute data in order to document the ability of a unique area of forestland to support a wildfire. Analysis of forest structure and fuel types contributes to determination of the threat rating. Methodology involved a detailed walk through and ocular approaches consistent with stated survey objectives. A combination of coarse and fine filters was employed for fuel typing, and included a combination of aerial imagery and field work. Site level assessment identified areas of the subject property in need of hazard mitigation.

Location and Description of Proposal

The subject property is located in south Nanaimo, approximately 15 km southeast of the city centre (see Site Plan, map next pgs.). Bordered on the west by private industrial lands (including the Harmac mill), and to the south by rural (predominately residential) lands stemming north from Cedar Heights Crescent, on the east it borders lands on Dodds Narrows and Stuart Channel owned by Oceanview and proposed for residential development. The City of Nanaimo's Cable Bay Trail follows the eastern perimeter of the subject proposal. The subject proposal lies wholly within the City of Nanaimo limits.

Site Plan. Cable Bay Estates. Insert map shows Cable Bay Trail location (red).

GoogleEarth map showing generalized location of NFP lands at Phoenix Way. The subject proposal is located west of the Cable Bay Trail.

Left: accesses from the Cable Bay Trail to the subject lands are designated with private property signs. Right: The subject lands support multi-aged forest stands as a result of multiple logging entries.

Wildfire Hazard and Risk

Wildfire hazard is a process, a phenomenon or a human activity that may cause loss of life, injury, or other health impacts, property damage, social and economic disruption or environmental degradation. Wildfire hazard can be described qualitatively as a fire environment—fuel, weather, topography, and ignitions.

Risk assessment for wildfire and its impacts to communities considers both the likelihood of a wildfire and the potential consequence associated with that likelihood. For example, if the fuel (i.e. the hazard) ignites and the fire spreads towards the community (probability), the wildfire can become a threat to life and property (consequence) with an associated risk of loss.

As outlined in the Methodology section, determination of the wildfire hazard and risk involves a detailed assessment of potential fire behaviour, field reviewed fuel characteristics, proximity of fuel to the community, local fire spread patterns, topographical considerations and local factors.

Fire Behaviour. Fire behaviour has three components: weather, topography, and fuel. Fire behavior predicts how forest and wildland vegetation (fuel) will burn under different conditions. Weather and topography cannot be changed; alteration of fuels across the landscape is the only way to lower fire intensity and change fire behaviour. Various factors influence fuel, weather, and topography (see chart below).

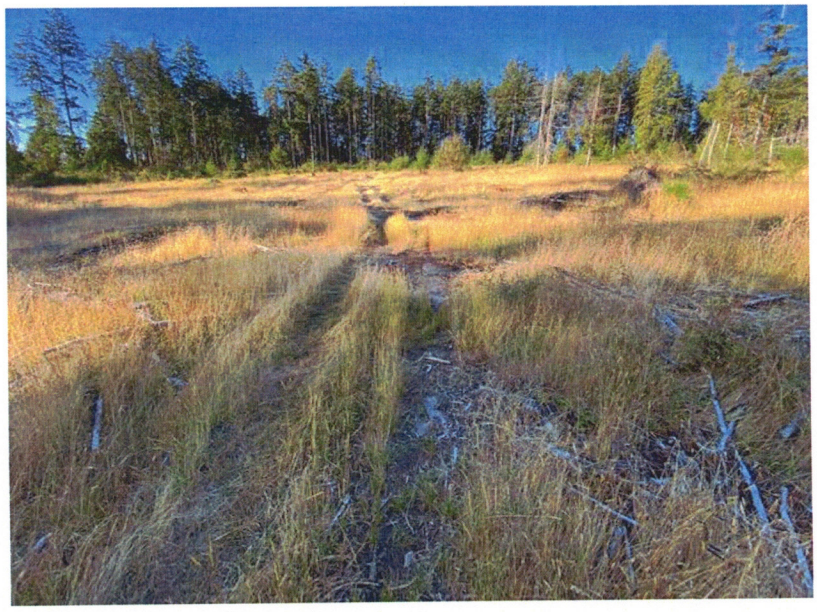
FIRE BEHAVIOUR

Fire Behaviour Components / Influencing Factors	**FUEL**	**WEATHER**	**TOPOGRAPHY**
	*Moisture*	*Wind*	*Slope*
	Size	*Precipitation*	*Aspect*
	Spacing	*Relative Humidity*	*Terrain*
	Continuity	*Temperature*	*Elevation*
	Fuel Loading		

Biogeoclimatic Classification. The subject proposal is located in the moist maritime Coastal Douglas-fir (CDFmm) biogeoclimatic subzone. The CDFmm represents the mildest climate in Canada. Summers are warm and dry, while winters are moist and mild. Growing seasons are long, and often feature pronounced water deficits on zonal (average) and drier sites. Prevailing summer winds are northwesterly. Net radiation

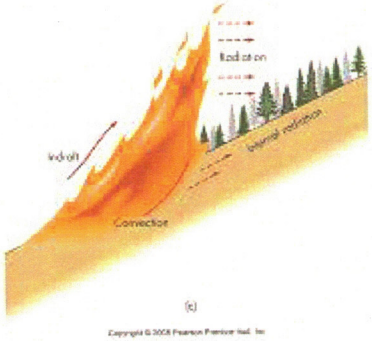
values are generally high. Fire Danger Ratings (i.e., the risk of a fire starting) often reach High and Extreme in summer.

Due to the historical human activities over the last century (e.g., forestry, agriculture, and housing), expanding population density and relatively benign topography, urban development has become widespread in the CDFmm.



Human disturbance activities at the subject proposal include logging, land clearing, and 4WD access.

Topography. Physical site characteristics impact fire behavior by affecting ignition potential and the rate of fire spread. The subject site encompasses a mid to lower slope. Overall gradient is generally gentle to moderate. Aspect is north to northeast. Cooler northeast aspects are generally less susceptible to fire behaviour. During extended periods of warm, dry, windy summer weather, however, any interface area can be vulnerable to wildfire.



Wildfires typically burn uphill. Warmer aspects tend to burn "hotter."

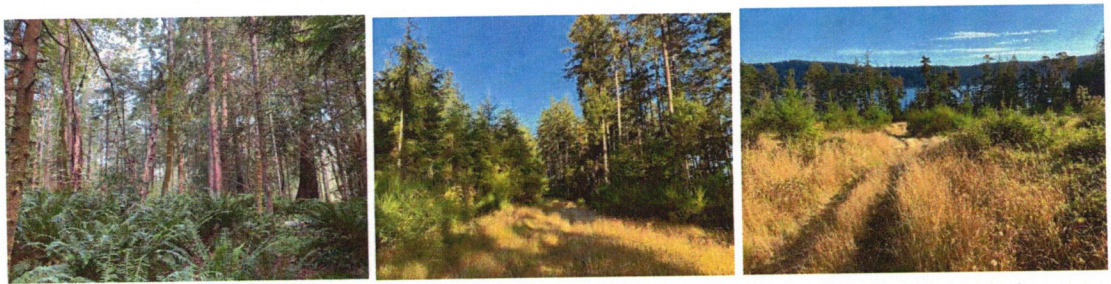
Vegetation. Fire behavior predicts how forest and wildland fuels (vegetation) will burn under different conditions. Fuel hazard means the potential fire behaviour, without regard to the state of weather or topography, based on the physical fuel characteristics,

including fuel arrangement, fuel load, condition of herbaceous vegetation and the presence of ladder fuels.

Benchmark vegetative fuel types developed by the Canadian Forest Fire Danger Rating System Fire Behavior System (CFFDRS) are used to forecast how a wildfire will react (cwfis.cfs.nrcan.gc.ca ›) (refer to Appendix 2). A Fuel Type is defined as "an identifiable association of fuel elements of distinctive species, form, size, arrangement, and continuity that will exhibit characteristic fire behavior under defined burning conditions" (Canadian Interagency Forest Fire Centre, 2003).

Main Fuel Types at NFP lands:

Fuel Types	Description/ Location	Forest Floor & Surface Fuels	Ladder Fuels	Wildfire Behaviour (why and how a fire spreads)
C-2 /0-1 (Grass; Modified) Brush	Invasive grasses; mix of native (e.g., salal, bracken fern) and invasive shrubs (e.g., broom, Himalayan blackberry)	Localized moderate to high surface fuel loading, Cured, dry grass contributes to surface fuel loading during summer fire season.	Moderate (to High). Higher incidence of ladder fuels associated with taller brush surrounding trees with low branches	Higher temperatures and windy conditions could promote faster ignition, faster rate of spread.
C-5 Coniferous stands	Second- (and third-) growth coniferous stands dominated by Douglas-fir; lesser component of western redcedar, grand fir. Localized arbutus	Discontinuous to somewhat continuous needle litter; scattered accumulations of dead and downed woody material. Scattered debris piles	Moderate to localize Moderate (to High) Fuel Loading.	Ignition start during warm dry windy weather will increase Rate of Spread–brisk winds could facilitate spread of fire
M-2 Mixedwood stands	Mixed wood stands of deciduous and coniferous trees: broadleaf maple, red alder, Douglas-fir, western redcedar	Typically less combustible surface fuels than coniferous stands (moister, shadier microsites)	Moderate. Understorey and lower branches tend to have higher MC.	Moderate – unless extended warm, dry conditions, which could expedite fire rate of spread



Vegetative cover at the NFP lands includes second-growth coniferous forests and degraded, grass-covered sandstone outcroppings. Encroachment from invasive species includes broom and thistle.

Second-growth coniferous and mixed wood stands occupy much of the subject proposal. There are also a number of terrestrial herbaceous ecosystems (moss-covered sandstone outcroppings) that are vegetated with grasses, broom, and thistles.

During land-clearing and development it will be important to promptly re-vegetate any areas of recent soil disturbance in order to minimize infestation of weed plants (e.g., broom, Himalayan blackberry, daphne, English ivy). Broom is particularly combustible.

Risk of Ignition. Risk of ignition represents the potential for fire starts. Risk of ignition could result from construction activities associated with the subject proposal, and adjacent landowners and users in the locale. Observations during the field assessment indicated trails and old roads in the area experience regular usage by hikers and off-road wheeled vehicles. Signage at the Cable Bay trail head cautions about industrial/construction activity at the subject lands. Private property signage is installed at the 15 m outside perimeter of the Cable Bay Trail. Based on current usage, risk of ignition is rated MODERATE.

Signage at the Cable Bay trailhead cautions of construction activities at subject lands.

Fire Spread and Intensity. Head fire intensity is a numerical ranking of difficulty of control for specific fuel types. Flame length is a main visual manifestation. Head fire intensity is a major determinant of certain fire effects and difficulty of control. Numerically, it is equal to the product of the net heat of combustion, quantity of fuel consumed in the flaming front, and the linear rate of spread. Under warm, dry conditions, there is currently sufficient continuity of surface and ladder fuels to enable a

fire to spread quickly at the subject proposal. Dry, windy conditions would increase the rate of spread.

HeadFire Intensity is currently rated Moderate to High. The goal of Wildfire Risk Reduction (WRR) is to reduce/ and or maintain HeadFire Intensity at less than 2000 kW/m (< 3, HFI column Moderate).

Fire Weather Indices

Hazard Rating	FFMC Fine Fuel Moisture Code	DMC Duff Moisture Code	DC Drought Code	ISI Initial Spread Index	BUI Build Up Index	FWI Fire Weather Index	HFI Head Fire Intensity
Low	0-76	0-21	0-79	0-1.5	0-24	0-4.5	1-2
Moderate	77-84	22-27	80-189	2-4	25-40	4.5-10.5	3 (GOAL: Moderate or Less)
High	85-88	28-40	190-299	5-8	41-60	10.5-18.5	4
Very High	89-91	41-60	300-424	9-15	61-89	18.5-29.5	5
Extreme	92+	61+	425+	16+	90+	29.5+	6

Spotting Potential. Spotting is a fire behavior characteristic in which sparks or embers are carried up by the wind and/or convective column and fall into other downwind fuels to ignite additional fires beyond the zone of direct ignition by the main fire (Firewise.org). Fire spotting is one of the major ways that fires spread and homes are ignited and destroyed in wildland/urban interface fires. Firebrands can come down on and ignite combustible roofs, combustible items stored adjacent to homes, and other nearby combustible fuels. The resulting spot fires may go unnoticed and thus unsuppressed when an area has been evacuated of residents, when firefighters are spread too thin, or when spot fires are too numerous.

The maximum spotting distance in a particular fire varies according to several factors, including overall fire intensity, wind speed, fuel type, initial size of the ember when lofted up, and how rapidly it is burning (Firewise.org).

If a fire start occurred during very warm/hot dry weather (High/Extreme Fire Danger Ratings) at or adjacent to the vicinity of the subject proposal, there is a high possibility of spotting in the area. Wind-borne embers can travel several kilometres.

Fire Protection. According to NFP, the subject lands are within the primary response area of Nanaimo Fire Rescue. Nanaimo Fire Rescue aims for a response time of less than 6 minutes to calls within its response area.

Fire department response time is the elapsed time, in minutes, from when the first firefighting unit is dispatched to when the first fire fighting unit arrives at the emergency scene. Fire department intervention time is crucial in determining the consequences of a fire in terms of deaths, injuries, and loss of property and damage to the environment. An early aggressive and offensive primary interior attack on a working fire is usually the most effective strategy to reduce the loss of lives and property damage.

The British Columbia Building Code addresses situations where the firefighter response time 'exceeds 10 minutes in 10% or more of all calls' by requiring higher levels of non-combustible construction and reductions on allowable areas of unprotected openings.

Mutual Aid Fire Departments within the Regional District of Nanaimo operate under a mutual aid agreement with other fire departments within (and outside) the region. In the case of a serious fire, mutual aid from adjoining fire departments can benefit fire suppression by pooling manpower and resources (water supply, water tenders, etc.,). Mutual aid, however, may not always available.

Wildfires Nanaimo Fire Rescue automatically responds to structure fires and small, easily accessible bush fires inside the fire service protection area (FPA). The Wildfire Management Branch generally responds to forested areas outside a FPA.

Water Supply An adequate and reliable water supply for firefighting is an essential part of a community's fire protection system. The Fire Underwriters Survey (FUS) Guidelines outline water specifications for fire protection. The BC Building Code governs the minimum water requirements for buildings.

In fire protection areas served by a community water system, water supply for fire protection generally consists of a piped system in common with domestic potable water. According to NFP, the subject proposal will be fully serviced with City of Nanaimo water.

Access FireSmart infrastructure and access increase the resident and firefighter safety, and facilitate quick response by firefighters. Developments should have sufficient access for emergency vehicles, including 2-way road access in and out of any site, and safe driveway accesses. FireSmart infrastructure and access increase the resident and firefighter safety, and facilitate quick response by firefighters. Local government

standards for public roads generally follow the BC Building Code and Geometric Design Guide for Canadian Roads (www.tac-atc).

Phoenix Way is the main access. NFP is working to establish a second access point to the properties elsewhere on the Harmac property.

Wildfire Hazard Assessment Results

Scoring from the wildfire hazard assessment and fire behavior analyses determined the subject proposal currently has a Moderate to High Fuel Assessment rating (see chart next page) and a High Local Wildfire Threat Rating (below). Factors currently contributing to the elevated threat score include: extent and continuity of fuel loading; lack of fully developed infrastructure; elevated HeadFire Intensity; the possibility of delayed response; and intermix >1 structure/ha. Ratings must be low/moderate to ensure an area and/or structure(s) are safe.

LOCAL WILDFIRE THREAT SUMMARY: NFP properties at Phoenix Way			
System:	**Subcomponents**	**CURRENT ratings**	**Projected Ratings post-development***
MFLNRO Wildfire Threat Assessment	Fire Behaviour: Fuel, Weather, Topography	Fuel Assessment Class: **Mod-(High)** (see chart next pg.)	Moderate
	Structural (incl vicinity)	Mod to High	Moderate
Overall Rating:		**High**	Moderate
HIRV Model	Hazard Impact Risk Vulnerability	Mod - High High - High Mod - High Mod - High	Moderate Moderate Moderate Moderate
Wildfire Risk	Likelihood Intensity Susceptibility	**High**	Moderate

*Projected ratings conditional upon compliance with recommendations contained in this report.

Wildfire risk triangle. (Scott et al. 2013).

Risk rating is currently **Moderate** (considers several factors, including varied usage of the area).

Generalized Descriptions of the "Fuel Assessment Rating" classes:

Low	Fires may start and spread slowly. There will be minimal involvement of deeper fuel layers or larger fuels.
Moderate	Forest fuels are drier and there is an increased risk of surface fires starting. There will be involvement of the organic layer but larger dead material will not readily combust.
High	Forest fuels are very dry, new fires may start easily, burn vigorously; aerial fuel will be engaged in the flaming front. Most fuel in the organic layer will be consumed and larger dead fuel will be consumed in the smoldering combustion.
Extreme	Extremely dry forest fuel, new fires will start easily, burn vigorously; all aerial fuel will be engaged in the flaming front. Most fuel in the organic layer will be consumed and larger dead fuel will be consumed in the smoldering combustion.

FMC (Fuel Moisture Content) 95% value based on 90th percentile drought conditions.

Fuel reduction targets should be sufficient to be effective to meet treatment objectives of reduced fire behaviour under 90th Percentile Fire Weather Index (FWI) Conditions (FFMC, ISI, BUI) from the BCWS weather network.

FireSmart Recommendations

Wildfire risk reduction recommendations outlined in this report are based on FireSmart principles and best practices (wildfire prevention, mitigation, and preparedness) to manage wildfire risk and impact (FireSmartCanada.ca; FireSmartBC.ca). FireSmart principles for wildfire prevention and preparedness have proven effective at reducing risk related losses to wildfire. Development standards can play a significant role in reducing the potential impact of wildfire on a specific area. Wildfire risk reduction involves taking the necessary steps to protect development from wildfire.

The risk of wildfire during and post-development can be reduced through application of the following recommendations:

Vegetation Management

General Precautions During Land Clearing and Construction

Ensure any land clearing activities are conducted in compliance with BC's Wildfire Act local bylaws.

- As per the BC Wildfire Act, if a high risk activity (i.e., land clearing) is taking place between 1 April and 31 October, the operator must keep at the activity site fire fighting hand tools, in a combination and type to properly equip each person who works at the site with a minimum of one fire fighting hand tool, and an adequate fire suppression system (onsite portable water tanker and fire fighting tools – shovels, pulaskis, portable water backpacks). In addition, efforts must be made to maintain an adequate fire break between any high risk activity and areas of continuous forest to ensure a fire originating at the site does not escape the site.
- During landclearing, develop an Emergency Plan of Action, listing key contact information in case of fire and/or other emergency at the site.
- Hazard abatement (removal of slash/disposal of debris piles) must take place in compliance with local government bylaws.
- Ensure construction workers are made aware of the risk of fire in the interface zone, especially during dry summer weather.
- Restrict construction during times of extreme fire hazard.

Hazard Tree Management

- *As per WorkSafe regulations, prior to commencement of work at the site, potentially hazardous trees require assessment from a certified Danger Tree Assessor. Trees identified as Danger Trees will require treatment (removal / possible modification) from a certified tree service.*
  Where safely practical, modified treatment can provide useful wildlife habitat.

FireSmart Zones – (see Appendix 1)

- **Priority Zone 1a: 0-1.5 m**

A noncombustible surface should extend for 1.5 m around structures and accessory structures, and any attachments. Avoid storing flammable outdoor items, such as garbage cans without lids and fuel tanks, which are all places where embers can land and start a fire, in this critical area adjacent to structures.

- Landscape with noncombustible landscaping materials, such as gravel, brick, or concrete
- Avoid woody shrubs, trees, or tree branches in this zone
- Create a noncombustible zone underneath and for 1.5 m around any vehicles
- Mitigate any auxiliary structures to same standards as those of main structures

- **FireSmart Priority Zone 1: 0-10 m**

Establish and maintain an environment around structures that will not support fire. Focus on fuel removal, conversion, and reduction.

- Plan on landscaping with a low density of fire resistant plants and shrubs. Avoid the use of cedar hedging.
- Maintain landscapes with regular irrigation, mowing, pruning, raking, weeding and dead plant removal.
- Create non-flammable hardscapes, such as rock, gravel, and water features, which, function as firebreaks by breaking up areas of fuel. Rock can provide a natural looking, low-maintenance and water-efficient mulch and as well as a fire-resistant buffer zone.
- Group fire resistant plant materials in islands. Group plants in islands surrounded by nonflammable materials, such as rock; employ landscape elements together to create breaks between fuels.
- Limb (prune) trees 1.5 to 2m from the ground. Create space between trees and shrubs – a general rule is twice the height of what the plant will be at maturity. Remove tree limbs closer than 15-feet from power lines and any touching structures.
- Avoid using woody debris, including bark mulch, as it provides potential places for fires to start
- Store items such as construction materials and tools at least 10 m from any structures

- **FireSmart Priority Zone 2: 10-30 m**

When and where feasible, extend the fuel modified area 10-30 m around structures. Conduct FireSmart thinning, pruning, and fuel reduction strategies in this zone to reduce fuel loading.

- Thin and prune evergreen trees to reduce hazard in this area
- Within 30 m of structures, selectively remove evergreen trees to create at least 3 m of horizontal space between the single or grouped tree crowns, and remove all branches to a height of at least 2.5 m from the ground on the remaining evergreen trees. (For smaller evergreen trees; general rule of thumb is prune branches up to a third the height of the tree)
- Regularly clean up accumulations of fallen branches, dry grass, dried arbutus leaves, and conifer needles from the ground to eliminate potential surface fires

- **FireSmart Priority Zone 3: 30-100 m**

Where fuel modification in PZ1 and PZ2 is insufficient to protect structures and/or

property, and where property boundaries permit, thin and prune trees in order to create an environment that will not support high-intensity crown fires.

- Look for opportunities to create a fire break by creating spaces between trees and other potentially flammable vegetation
- If possible, prune the trees located up to 100 m from structures
- Thin and prune overgrown trees to reduce hazard
- Regularly clean up accumulations of fallen branches, dry grass, and needles from the ground to eliminate potential surface fires

FireSmart Landscaping

- Incorporate FireSmart landscaping by using fire-resistive, widely spaced trees, native shrubs and groundcover in combination with stone and/or water features and/or maintained lawn areas. See FireSmart Guide to Landscaping. *https://www.firesmartcanada.ca/resources-library/firesmart-guide-to-landscaping*
- Promptly re-vegetate any areas of soil disturbed during clearing and construction with approved landscaping materials and/or native plant species to prevent encroachment from invasive plant species (i.e., broom, gorse, daphne, Himalayan blackberry). A moderate infestation of broom is currently encroaching on the site.
- Powerlines should be clear of branches and other vegetation.

ESA, Riparian, and Trail Buffers

- Maintain native forest cover and understorey in setback areas. Avoid disturbance within dripzone of retained trees.

Construction – Building design and construction shall generally be consistent with FireSmart.BC and the standards of NFPA 299.

The roof is the most vulnerable component of a structure. Sparks and burning embers from a wildfire can travel long distances and quickly ignite flammable roofing material.
Siding material is also vulnerable to wildfire. Combustible debris can accumulate at the vents and openings on your home and be ignited by embers during a wildfire.

- Use fire-retardant roof covering assemblies rated Class A, B, or C (i.e., metal, tile, ULC-rated asphalt) and feature non-combustible siding materials (i.e., stucco, metal siding, brick, cement shingles or cementitious materials, poured concrete, or ULC-rated wood siding) on new structures. Metal, clay tile, and rated asphalt shingles are the most fire resistant roofing materials. Siding materials such as stucco, metal, brick and concrete offer superior fire resistance to wildfire. Logs and heavy timbers are less effective, while wood and vinyl siding offer very little protection.
- Follow FireSmart guidelines for design, construction, and maintenance of window and door glazing, eaves and vents, and decking. Install noncombustible material for all vents (should be 3 mm screening or ASTM fire rated vents). Metal products are recommended for vents and vent flashing. https://www.firesmartcanada.ca/
- Ensure structures are equipped with working smoke alarm(s).
- Sheath in the structures with fire-resistant material to reduce the risk of sparks and embers igniting the structure.

- If a wood fence is installed, ensure at least a 1.5 m noncombustible break between the fence and a structure (i.e., a metal gate with a stone wall to break up combustible fence).

Maintenance

- Regularly inspect siding for locations where embers could accumulate and lodge.
- Maintain and remove combustible debris near exterior walls to reduce a building's vulnerability to ignition during a wildfire.
- Regularly remove debris from gutters – sparks and easily ignite these dry materials.
- Inspect vents and openings regularly to ensure vents are in good repair, and remove any accumulated combustible debris.

Water Supply / Fire Protection

- Ensure water main, fire hydrant capabilities and servicing meet local Engineering specifications.

Access

- Ensure roads and driveways meet BC Building Code and local Engineering requirements.
- Ensure address signage is clearly evident during the construction phase and at build-out. Letters, numbers, and symbols should be at least 10 cm high, with a 12 mm stroke, contrast with the background colour of the sign, and be reflective.
- Ensure new structures are mapped on fire department "pre-org" (fire planning) maps.

Regulatory Provisions

- Prior to subdivision registration, the applicant shall register a Section 219 covenant specifying:
  i) no outdoor burning shall occur on the subject property
  ii) a fuel reduced buffer shall be maintained at all times from the perimeter of every building to a distance equal to 10 m from the perimeter of every building, or to the property boundary, whichever is less, and that this area shall be landscaped and maintained with the intent of eliminating the accumulation of combustible debris;
  iii) if the fuel reduced buffers are not maintained, that the owner shall be required to pay a rent charge to local government of $1000 per year; and
  iv) non-combustible siding and fire-resistive rated roofing.

  (Registration of a Section 219 covenant is to ensure the protection, preservation, conservation, maintenance and or restoration of land and/or other specified features within the jurisdiction.
  A Section 219 Covenant is a charge secured against the title to a property in favour of the jusisdiction to impose a positive or negative obligation on the property owner, as per the provisions of Section 219 of the Land Title Act.)

Appendix 1. FireSmart Interface Priority Zones

In interface areas, FireSmart advocates the establishment and maintenance of Fuel Management Zones* extending outward from structures and along access routes:

Zone 1 a (0-1.5m)
Zone 1 (0-10 m).
Zone 2 (10-30 m).
Zone 3 (30-100 m).
(FireSmart, 2003; updated 2018)

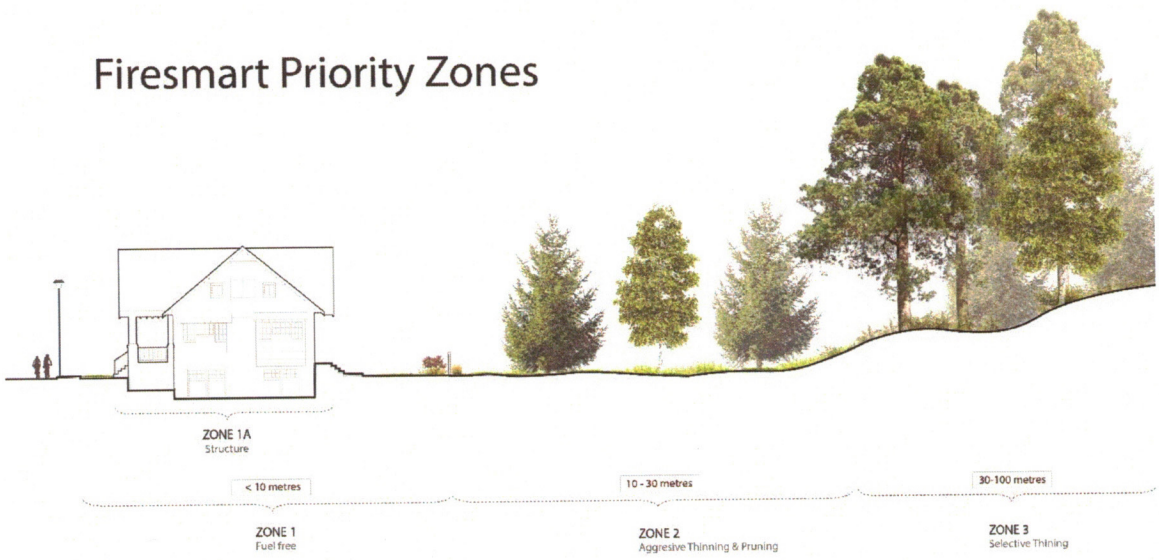
Zone 1a (0-1.5 m): This is the noncombustible zone, where it is very important not to have any combustibles next to buildings.

Zone 1 (0-10 m): The main objective of vegetation management is to create an environment that will not support fire. Vegetation management focuses on fuel removal, conversion, and reduction.

Zone 2 (10-30 m): Where treatment in PZ 1 is not sufficient to significantly reduce the fire hazard due to fuel loading, extend the fuel modified area with a variety of thinning and pruning actions.

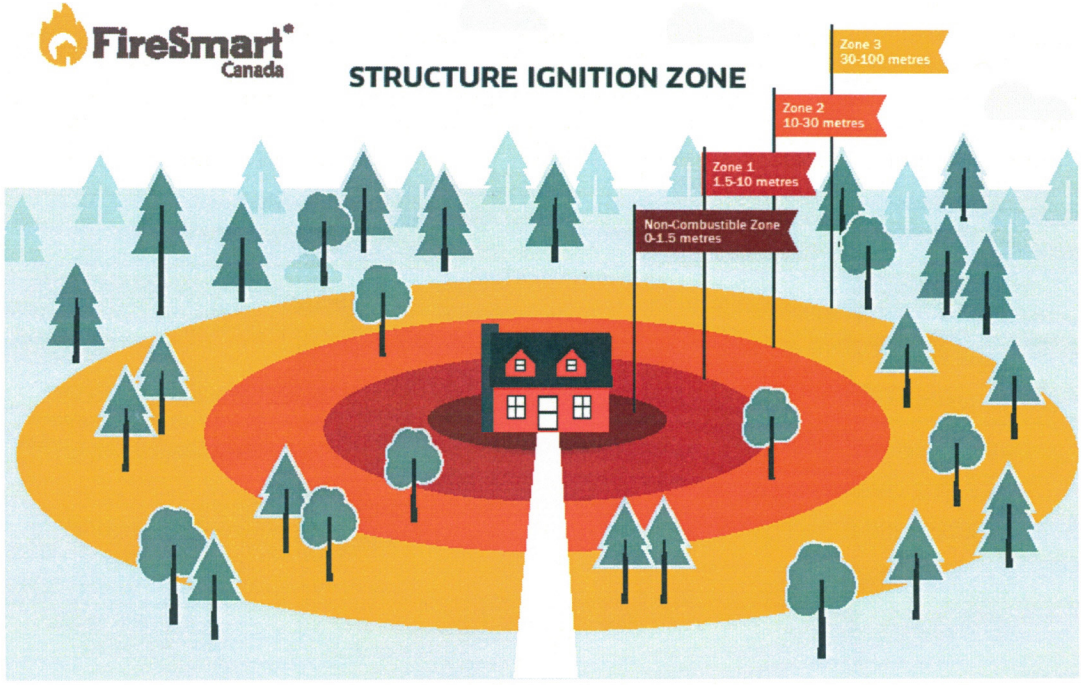
Zone 3 (30-100 m): Where fuel modification in PZ1 and PZ2 is insufficient to protect structures and/or property, FireSmart advocates treatment in Priority Zone 3 with a variety of thinning and pruning actions in order to create an environment that will not support high-intensity crown fires.

*Setback Zone distances may be extended depending on aspect, slope, fuel loading, etc.



FireSmart Canada

STRUCTURE IGNITION ZONE



Work with your neighbours in any overlapping priority zones!

Non-combustible Zone (0-1.5 metres)	Reduce the chance of wind-blown embers igniting materials near your home. A non-combustible surface should extend around the entire home and any attachments, such as decks. Creating a non-combustible surface can be as easy clearing vegetation and combustible material down to mineral soil. To add to your landscape design, use non-combustible materials such as gravel, brick, or concrete in this critical area adjacent to your home. Woody shrubs, trees or tree branches should be avoided in this zone, any that are present should be properly mitigated.
Zone 1 (1.5-10 metres)	Create a landscape that will not easily transmit fire to the home. A FireSmart yard includes making smart choices for your plants, shrubs, grass and mulch. Selecting fire-resistant plants and materials can increase the likelihood of your home surviving a wildfire. Plant a low density of fire-resistant plants and shrubs. Avoid having any woody debris, including mulch, as it provides potential places for fires to start. Storing items such as firewood piles, construction materials, patio furniture, tools and decorative pieces against or near a house is a major fire hazard. Move firewood piles, trailers/ recreational vehicles, storage sheds and other combustible structures out of this zone and into Zone 2. If unable to move, store firewood inside your mitigated garage, shed or other ember resistant structures, create a non-combustible zone underneath and for 1.5 metres around trailers/ vehicles and mitigate sheds and other structures to the same standards as those of your home.
Zone 2 (10-30 metres)	If your property extends out to this zone, thin and prune evergreen trees to reduce hazard in this area. Within 30 metres of your home, selectively remove evergreen trees to create at least 3 metres of horizontal space between the single or grouped tree crowns and remove all branches to a height of 2 metres from the ground on the remaining evergreen trees. If possible, pruning trees up to 100 metres from your home (Zone 3) is recommended. Regularly clean up accumulations of fallen branches, dry grass and needles from on the ground to eliminate potential surface fuels. Consider seeking the guidance of a forest professional with wildland fire knowledge on appropriate management options for this zone.
Zone 3 (30-100 metres)	Taking FireSmart actions in Zone 3 on your property will influence how a wildfire approaches your home. You can change the dynamics of wildfire behaviour by managing vegetation within this zone. Look for opportunities to create a fire break by creating space between trees and other potentially flammable vegetation. Thinning and pruning is effective here as well. These actions will help reduce the intensity of a wildfire. Consider seeking the guidance of a forest professional with wildland fire knowledge on appropriate management options for this zone.

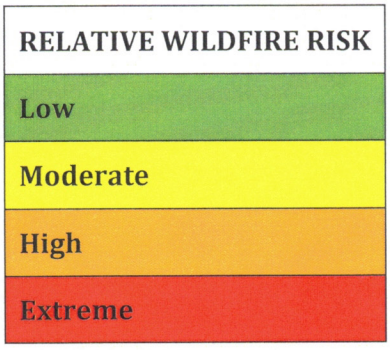
BRITISH COLUMBIA FireSmart

Begins at Home

Appendix 2. Generic Fuel Types (adopted from CFFDRS).

Fuel Type	Description	Wildfire Behaviour Under High Wildfire Danger
Coniferous:		
C1	Terrestrial herbaceous ecosystem: mossy rock outcroppings	High potential for surface fire, especially if high moss/lichen
C2	Dense regeneration to pole-sapling (immature) forest with crowns almost to ground	High potential for crown fires; low to very high fire intensity and rate of spread
C3	Fully stocked, mature forest, crowns separated from ground; sparse understorey	Surface and crown fire, low to very high fire intensity and rate of spread
C4	Dense, pole-sapling (immature) forest, heavy standing dead and down, dead woody fuel; continuous needle litter; continuous vertical crown fuel continuity	High potential for crown fires, high to very high fire intensity and rate of spread
C5	Moderately well-stocked, mature forest, moderate dense understorey crowns well separated from ground; continuous needle litter	Low to moderately fast-spreading, low to moderate intensity surface fire
C6	Fully stocked conifer plantation; absent understorey; tree crowns separated from ground; continuous needle litter	Surface fire may spread rapidly to become high intensity fire with high rate of spread
C7	Open, mature coniferous stand; uneven-aged; discontinuous understorey; tree crowns mostly separated from ground	Surface, torching, rarely crowning (except on steeper slopes), moderate to high intensity and rate of spread
D (Deciduous)	Moderately well-stocked deciduous stands; moderate medium to tall shrubs and herb layers D-1 Leafless D-2 In leaf	Typically a surface fire; low to moderate rate of spread and fire intensity
M (Mixed Forest)	Moderately well-stocked mixed stand of conifers and deciduous tree species; moderate shrub understorey; conifer crowns extend nearly to ground M-1 Leafless M-2 in Leaf	Surface, torching and crowning; moderate to very high intensity and spread rate (varies with slope and % vegetation cover) Fine fuel % and cedar foliage retention will result in faster ignition and spread
S (Slash)	Slash from logging and land clearing	Rapid spreading, moderate to high intensity surface fire
01-Long	Continuous standing grass – fuel loading is 0.3 kg/m2; scattered trees 01-a Matted 01-b Tall	The taller, and more cured the grass, the more rapid spread; low to moderate intensity surface fire
01-Short	Continuous human modified short grass	Typically low rate and spread and low fire intensity.

Appendix 3. Fire Risk Classes.



Fire Risk Classes

Low (Green): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it a lower potential for threatening a community. These stands will support surface fires, single tree or small groups of conifer trees could torch/ candle in extreme fire weather conditions. Fuel type spot potential is very low, low risk to any values at risk.

Moderate (Yellow): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns and known local wildfire threat factors make it possible that a wildfire in this area would threaten the community. Areas of matted grass, slash, conifer plantations, mature conifer stands with very high crown base height, and deciduous stands with 26 to 49% conifers. These stands will support surface fires, single tree or small groups of conifer trees could torch/ candle. Rates of spread would average between 2-5 meters/ minute. Forest stands would have potential to impact values in extreme weather conditions. Fuel type spot potential is unlikely to impact values at a long distance (<400m).

High (Orange): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it likely that a wildfire in this area would threaten the community. This includes stands with continuous surface/ crown fuel that will support regular torching/ candling, intermittent crown and/or continuous crown fires. Rates of spread would average 6 -10 meters/ minute. Fuel type spot potential is likely to impact values at a long distance (400 -1 000m).

Extreme (Red): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it very likely that a wildfire in this area would threaten the community. Stands with continuous surface/ crown fuel and fuel characteristics that tend to support the development of intermittent or continuous crown fires. Rates of spread would average >10 meters/ minute. Fuel type spot potential is probable to impact values at a long distance (400 -1 000m or greater).These forest stands have the greater potential to produce extreme fire behaviour (long range spotting, fire whirls and other fire behaviour phenomena.

Limitations

This report provides an assessment of site conditions. Evaluation is based on professional judgment. The investigation involved field observation. Recommended treatment pertains only to the particular site as disclosed at the time of inspection. The report was prepared considering site-specific circumstances and conditions. It is intended only for use by the client for the purpose for which it was commissioned and for use by local government regulating the activities to which it pertains.