Fraser Valley Regional District
Neighbourhood Wildfire Hazard Assessment
Hemlock Valley

June 10, 2022

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Fraser Valley Regional District

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Commonly Used Acronyms

BCWS	British Columbia Wildfire Service
FBP	Fire Behaviour Prediction System
FSCNRP	FireSmart Canada Neighbourhood Recognition Program
FVRD	Fraser Valley Regional District
HIZ	Home Ignition Zone
LFR	Local FireSmart Representative
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations, and Rural Development
WUI	Wildland Urban Interface

Commonly Used Definitions

Class A UL/ASTM: materials that have the lowest fire spread rate and minimal smoke production in standard testing (ASTM E-84) of surface burning characteristics of building products.

Combustible: describes a material that must usually be heated before it catches on fire at temperatures above normal (~38° C to ~93° C)

Fire resistant: refers to structures and materials that prevent or retard the passage of excessive heat, flames or gases under conditions of use

Fire resistive: means construction materials designed to provide reasonable protection against fire.

Ignition: refers to the process initiating combustion or catching fire

Ignition resistant: refers to structures and materials that prevent combustion ignition

Flammable: describes a material that will catch on fire at a lower flash point closer to normal temperatures (less than ~38°)

Flaming combustion: is the chemical process in which fuel oxidizes to produce visible flames and plume

Risk: the term used to describe the exposure to the chance of injury or loss; hazard or dangerous chance

Threat: describes a situation or activity that could result in harm or danger

1.0 INTRODUCTION

The FireSmart Canada Neighbourhood Recognition Program (FSCNRP) is designed to provide an effective management approach for preserving wildland living aesthetics while reducing community ignition potential and subsequent spread of fire through the community during a wildland urban interface fire. Whether or not the community is wanting to work towards attaining FSCNRP status, the program can be tailored for adoption by any community, neighbourhood association, or government that is committed to ensuring its citizens maximum protection from wildland fire. The first step on the path towards gaining FSCNRP is the preparation of a neighbourhood wildfire hazard assessment report prepared by a Local Fire Smart Representative (LFR) to assess the overall wildfire risk conditions within and adjacent to the community.

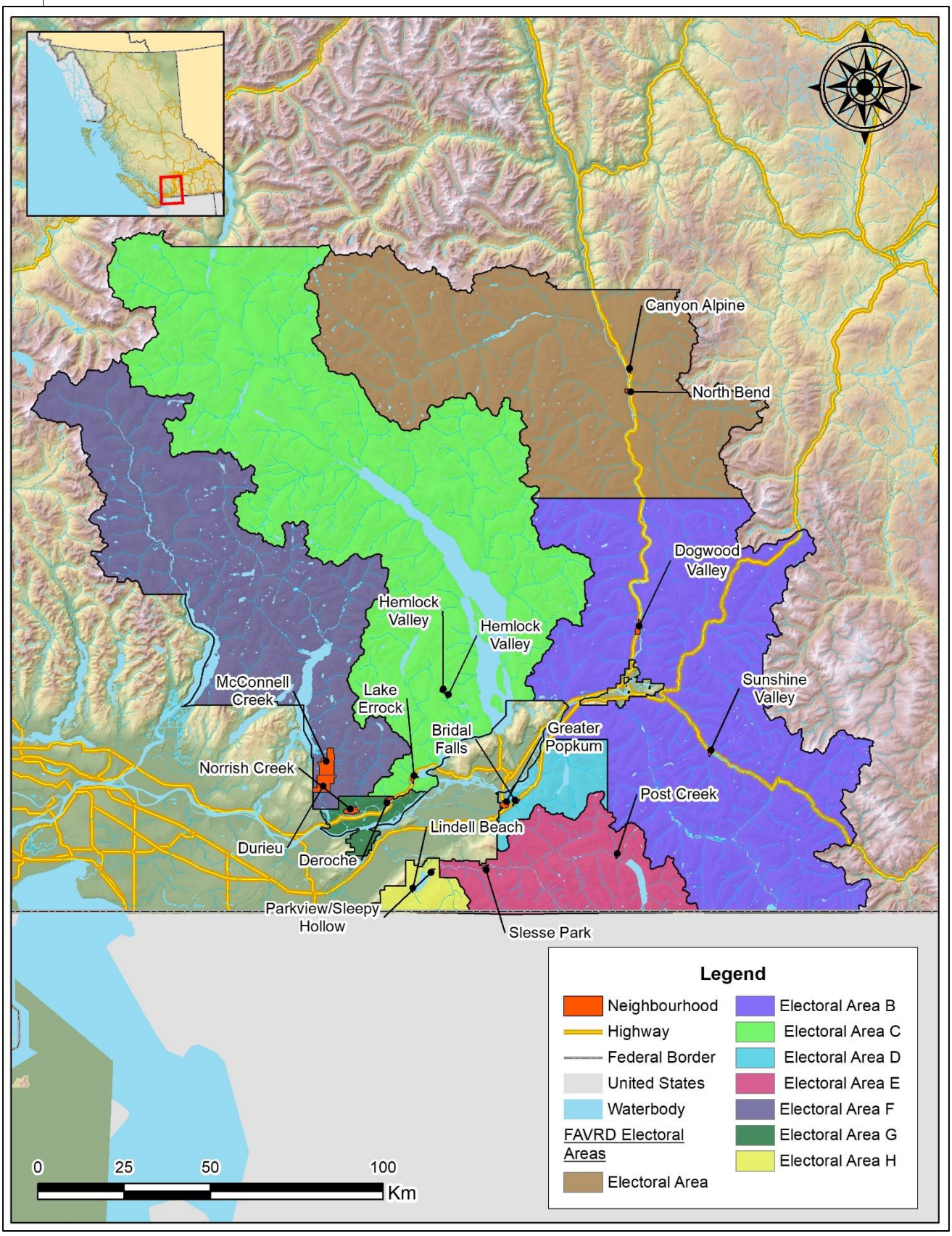
The purpose of a neighbourhood wildfire hazard assessment is to assess a study area's wildfire hazard and identify the components which contribute to the neighbourhood's wildfire risk profile. The study area is composed of 16 neighbourhoods in the Fraser Valley Regional District (Table 1, Map 1). Once hazards and risks were defined, a set of recommendations was developed that both the Fraser Valley Regional District and neighbourhood residents can implement over time. The process included GIS analyses of fuel type and fire risk data followed by field visits and assessments of each neighbourhood (with general assessments of homes within them). The recommendations that stem from these reports are listed in Table 3 in Section 6.0 - FireSmart Recommendations.

Utilizing and then building upon on the FireSmart Canada Wildfire Hazard Assessment Form (Section 7.0 - Neighbourhood Wildfire Hazard Assessment), a series of neighbourhood assessments have been developed by B.A. Blackwell and Associates Ltd., who hold qualified Local FireSmart Representative (LFR) status, in consultation with the Fraser Valley Regional District. This report contains additional elements including a description and spatial analysis of the fire environment for each neighbourhood. The associated maps illustrate fuel type, land ownership, surrounding topography, and ignition and fire perimeter history, as these are important elements in defining risk to the study area from wildfire. To engage with residents effectively, a description of the fire environment and subsequent rationale for recommendations are both meaningful and practical measures to mitigate interface fire risks, with greater success.

Table 1. FireSmart assessment neighbourhoods and their respective FVRD Electoral Area

Electoral Area	Neighbourhood
Electoral Area A	North Bend
	Canyon Alpine
Electoral Area B	Dogwood Valley
	Sunshine Valley
Electoral Area C	Hemlock Valley

Electoral Area	Neighbourhood
	Lake Errock
Electoral Area D	Greater Popkum
	Bridal Falls
Electoral Area E	Post Creek
	Slesse Park
Electoral Area F	Durieu
	McConnell Creek
Electoral Area G	Norrish Creek
	Deroche
Electoral Area H	Parkview / Sleepy Hollow
	Lindell Beach



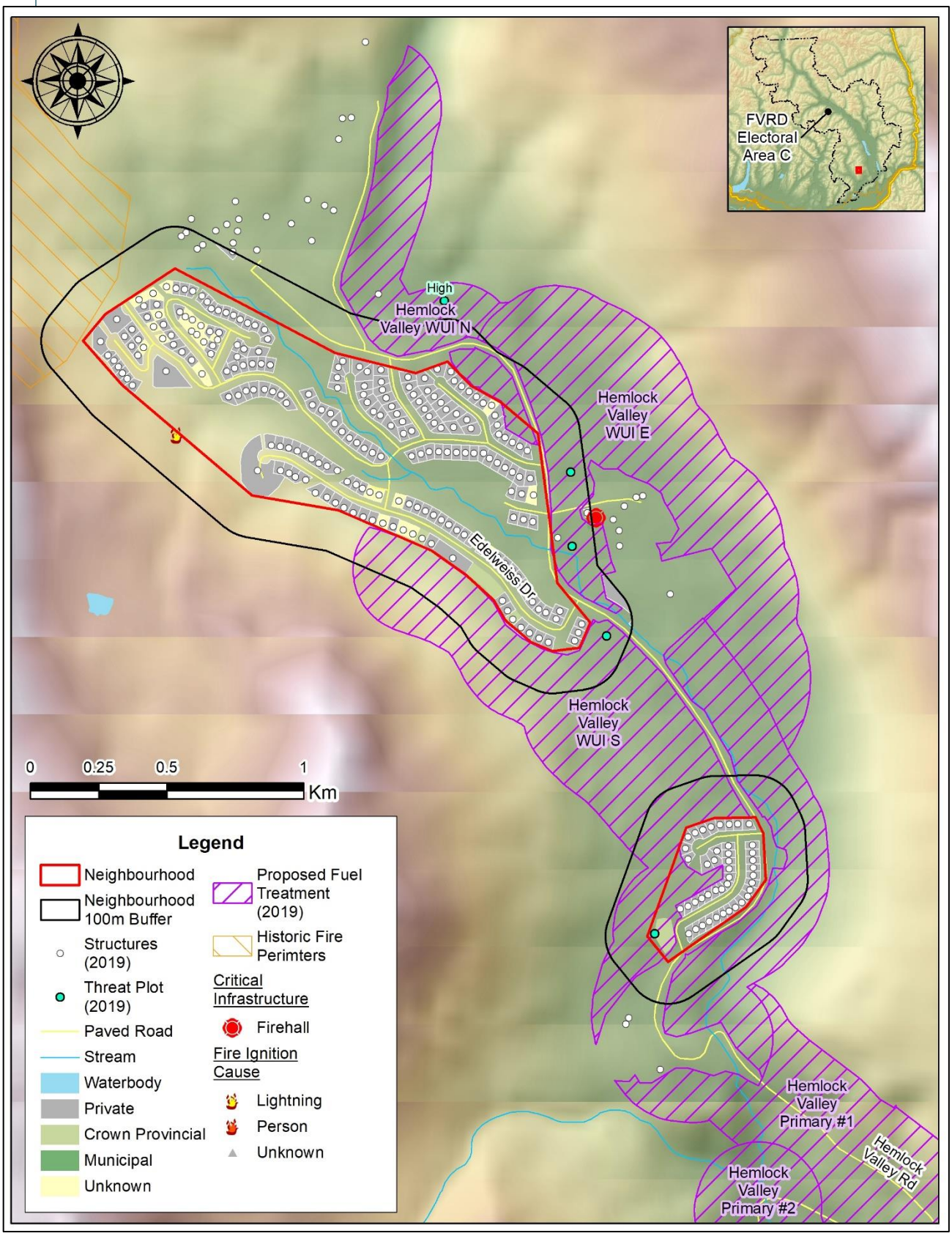
Map 1. Fraser Valley Regional District FireSmart assessment neighbourhoods

2.0 BACKGROUND

SITE DESCRIPTION AND PROJECT AREA

Hemlock Valley (Study Area) is a neighbourhood with two parts: a northern neighbourhood (approximately 43.8 hectares) and a southern neighbourhood (approximately 5.9 hectares). Both neighbourhoods are located within the Fraser Valley Regional District Electoral Area C, located north of Highway 9 up Morris Valley Road and then Hemlock Valley Road. The Study Area encompasses approximately 49.7 hectares and is shown below in Map 2. The pattern of development is composed of single family and duplex residences, mostly occupied by seasonal or part-time residents. There are many users of short-term rental accommodations, as well. Both neighbourhoods are surrounded by steep, mountainous, forested terrain on all sides. Fire protection for Hemlock Valley is primarily the responsibility of the Hemlock Valley Volunteer Fire Department and a fire hall is located with 100 metres of the northern neighbourhood and within 1200 metres of the southern neighbourhood.

Adjacent to the neighbourhood is Sasquatch Mountain Resort, which is located just beyond the Study Area. The Hemlock Valley neighborhood, with structures and services initially developed to support snow sport recreationalists and traffic to Sasquatch Mountain Resort is a popular tourist destination, during both summer and winter months. There is continuous traffic in the area during peak times of the fire season as recreational users come to dirt bike, ATV, hike, camp and explore the backcountry. Activity during times of high fire danger increases the potential of human caused ignitions and the risk of wildfire.



Map 2. Overview map of the project area

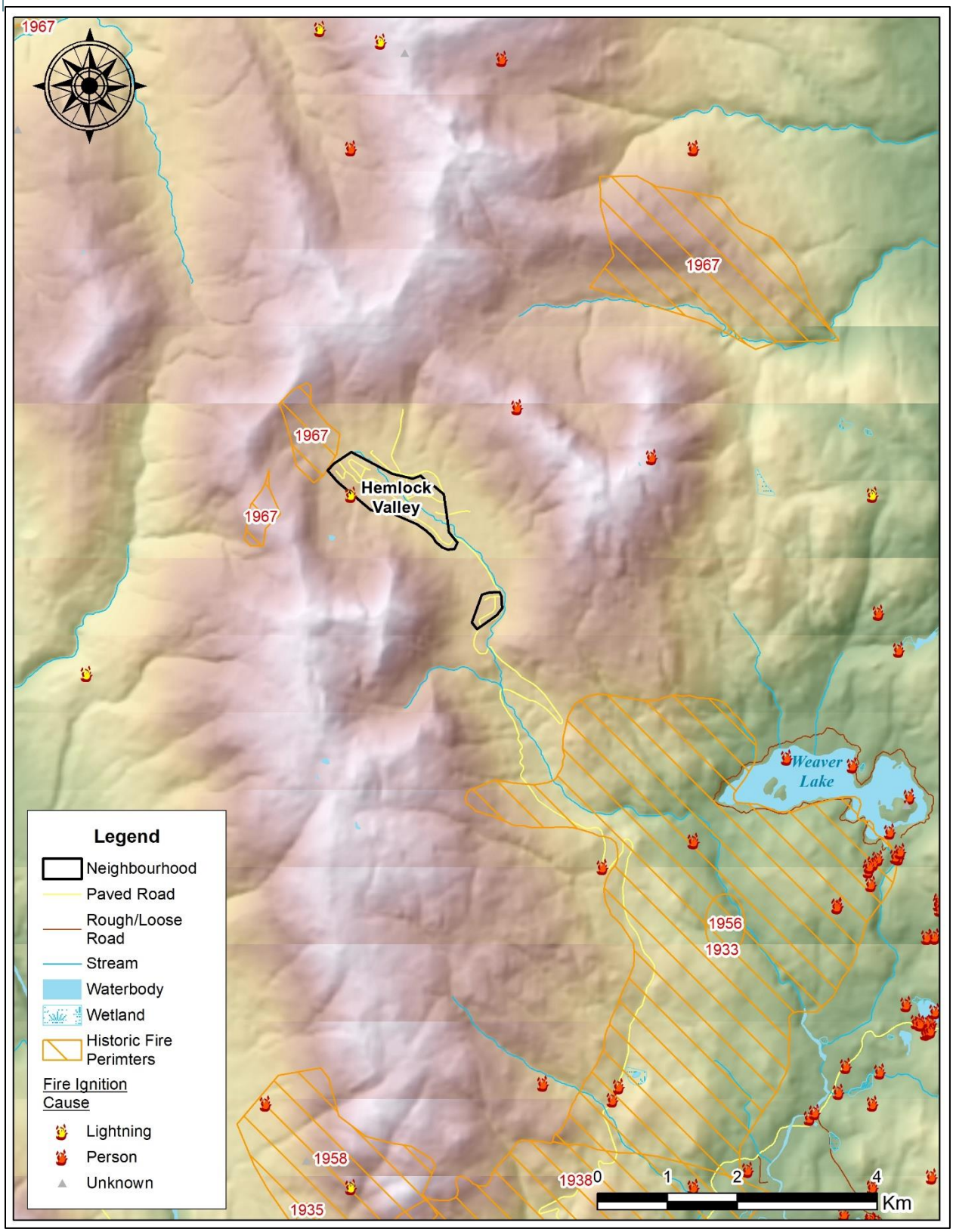
3.0 FIRE REGIME

FIRE HISTORY

Map 3 shows the spatial distribution of historic ignitions (both human and lightning caused) and wildfire perimeters (from the BCWS historical wildfire dataset) within and surrounding Hemlock Valley. Fire ignition data is available from 1950-2020 and fire perimeter data is available from 1919-2020. Approximately 12 wildfires have occurred over the last century within a 5 kilometres buffer of the Study Area.

Multiple fires of various sizes have burned in areas with similar landscape characteristics near the Study Area. The most notable fire footprint burned near the Study Area was an 899.2 hectares human-ignited fire that occurred southwest of Weaver Lake, less than 2 kilometres southeast of the study area, in 1933. One other fire of a similar size also burned near the Study Area in 1967, and various smaller fires occurred in similar landscapes in the 1950s and 1960s. These fires occurred in similar fuels and are within the same regional climate, suggesting that in the absence of active fire suppression, the WUI is capable of supporting similar fires during prolonged periods of high to extreme fire danger.

Humans are the most common cause of ignitions in the general area, though one of two fire ignitions recorded within the Study Area was lightning-caused. Map 3 highlights the concentration of ignitions (predominantly human) within the area and includes recreation and backcountry areas, and along the highway and road networks. One fire was ignited by humans in the Study Area in 1967, though it did not occur on private land. There has also been a steady rate of human ignitions into the backcountry between 1950 and 2020, with a particular concentration of human-caused ignitions south of Hemlock Valley near Weaver Creek Road. The density of lightning ignitions also increases somewhat along adjacent mountainsides; this illustrates the vulnerability of Hemlock Valley to wildfire risk at a landscape level beyond the boundaries of the Study Area.



Map 3. Historic ignitions (human and lightning) and historic wildfire perimeters.

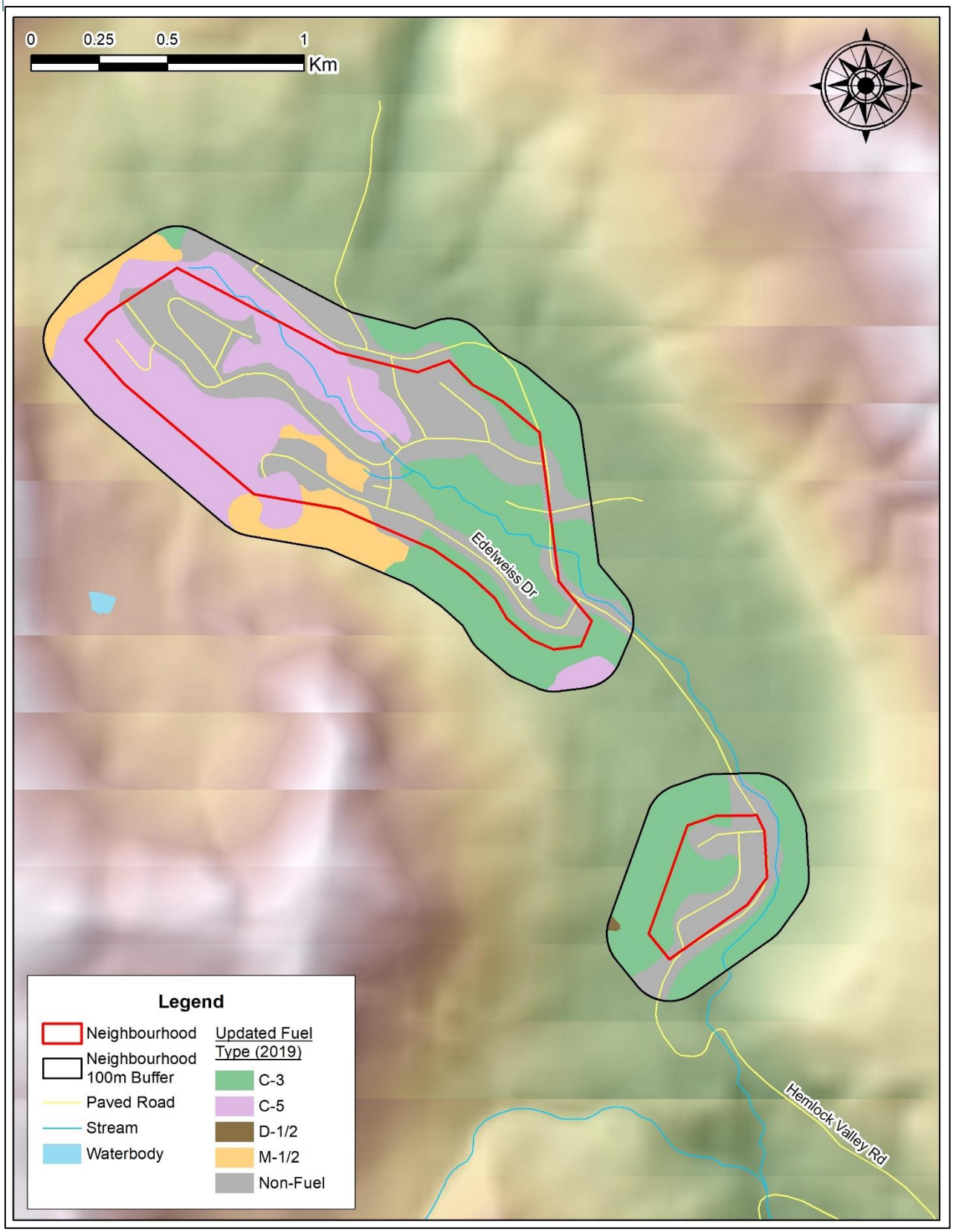
FUEL TYPES

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines five major fuel groups and sixteen fuel types based on characteristic fire behaviour under defined conditions. In the Hemlock Valley community, the fuel types observed in the area during site assessment are C-3, C-5, D-1/2, M-1/2, and Non-fuel as summarized by general fire behaviour in Table 2 and shown in Map 4. In general, the fuel types that may be considered hazardous (in terms of fire behaviour and spotting potential) in the Study Area are the M-1/2 fuel types that are composed of 75% or higher conifers (particularly if there are large amounts of woody fuel accumulations or denser understory ingrowth) and the C-3 and C-5 fuel types.

The northern neighbourhood is surrounded primarily by mature, live conifer trees with an understory of smaller trees, and some deciduous shrubs. There are pockets of mature, dense conifer trees with abundant understory conifers which create continuous fuel loading from forest floor to tree crowns. Stands are mostly conifer dominated with little deciduous shrub or tree growth. The southern neighbourhood is surrounded by mature, dense conifer trees with lots of understory conifers. Forest fuel types surrounding the neighborhood pose a risk for intense fire behaviour in the event of a wildfire.

Table 2. A summary of fuel types, associated hazard and areas within the Study Area.

Fuel Type	Description	Wildfire Behaviour Under High Wildfire Danger Level
C-3	Mature jack pine or lodgepole pine, fully-stocked late young forest (coastal lodgepole pine, western red cedar, hemlock, and/or Douglas-fir), with crowns generally separated from the ground.	Surface and crown fire, low to very high fire intensity and rate of spread
C-5	Red and white pine, well-stocked mature forest, crowns separated from ground.	Surface and crown fire, low to very high fire intensity and rate of spread
D-1/2	Aspen (leafless and green), deciduous stands.	Always a surface fire, low to moderate rate of spread and fire intensity
M-1/2	Boreal mixedwood (leafless and green).	Surface fire spread, torching of individual trees and intermittent crowning, (depending on slope and percent conifer)
Non-fuel	Non-fuel: irrigated agricultural fields, golf courses, alpine areas void or nearly void of vegetation, urban or developed areas void or nearly void of forested vegetation.	Surface fire spread, torching of individual trees and intermittent crowning, (depending on slope and percent conifer)



Map 4. Fuel types for the Study Area

Figure 1. Flammable C-3 vegetation fuel types.

TOPOGRAPHY

Topography is an important environmental component that influences fire behaviour. Slope influences flame length and rate of spread of surface fires (the steeper the slope, the faster the spread). Other factors of topography that influence fire behaviour include aspect, elevation, and configuration of features on the landscape that can restrict (e.g., water bodies, rock outcrops) or drive (e.g., valleys, exposed ridges) the movement of a wildfire.

The Study Area is located in scenic Hemlock Valley, a ski resort and destination for outdoor recreation. The northern neighbourhood is situated on a flat bench of the valley, extending into rolling hills on the eastern end. The southern neighbourhood is located on rolling to steep slopes. Both neighbourhoods are surrounded by steep, mountainous terrain on all sides. Properties and structures in the neighbourhood occupy a bench on the mountain, but on a landscape level the community is located at the top of a slope intermixed with the continuous forested landscape across the mountainside.

Due to the steepness of these slopes, in conjunction with the continuous vegetation occurring along the slopes, a potential fire ignited in the community would have the ability to gain momentum and quickly spread upslope across the forested landscape. The community is surrounded on all sides by steep slopes,

presenting additional risk from wildfire. Northern slopes lend themselves to more vegetative growth and heavier fuel loads, while fuel on southern slopes dries more quickly. Hemlock Valley is a montane ecosystem with some rocky slopes where tree growth is inhibited and forest cover is discontinuous. Ski slopes are also kept clear, which impacts the continuity of the forest surrounding Hemlock Valley. Additionally, since residential development is located at the top of a landscape level slope, the community is at a higher risk for wildfire travelling up the mountain.

Figure 2. Google Earth Imagery of Hemlock Valley community (facing south).

WEATHER

'Fire Weather' refers to weather conditions that are conducive to fire; these conditions determine the fire season. Fire Danger Classes provide a relative index of the ease of ignition and the difficulty of suppression. A network of fire weather stations is maintained during the fire season by MFLNRORD and the recorded data are used to determine fire danger, represented by Fire Danger Classes, on forestlands within a community. Figure 3 displays the average frequency of Fire Danger Class days between the months of April and October in the Study Area. The data is summarized from the Ford Mountain fire weather station (years 2012 – 2019), located south of Bridal Veil Falls Provincial Park at the north side of Chilliwack Lake Road and 36 kilometre southeast of the community. According to Figure 3, the months with the highest average number of 'high' and 'extreme' fire danger class days are June, July, August, and September. Historically, the month of August has the highest overall average number of 'high' and 'extreme' fire danger class days, followed by July and September. Although highest fire danger is within these four months, it should be noted that there are 'high' and 'extreme' danger class days which extend into May and October (Figure 3).

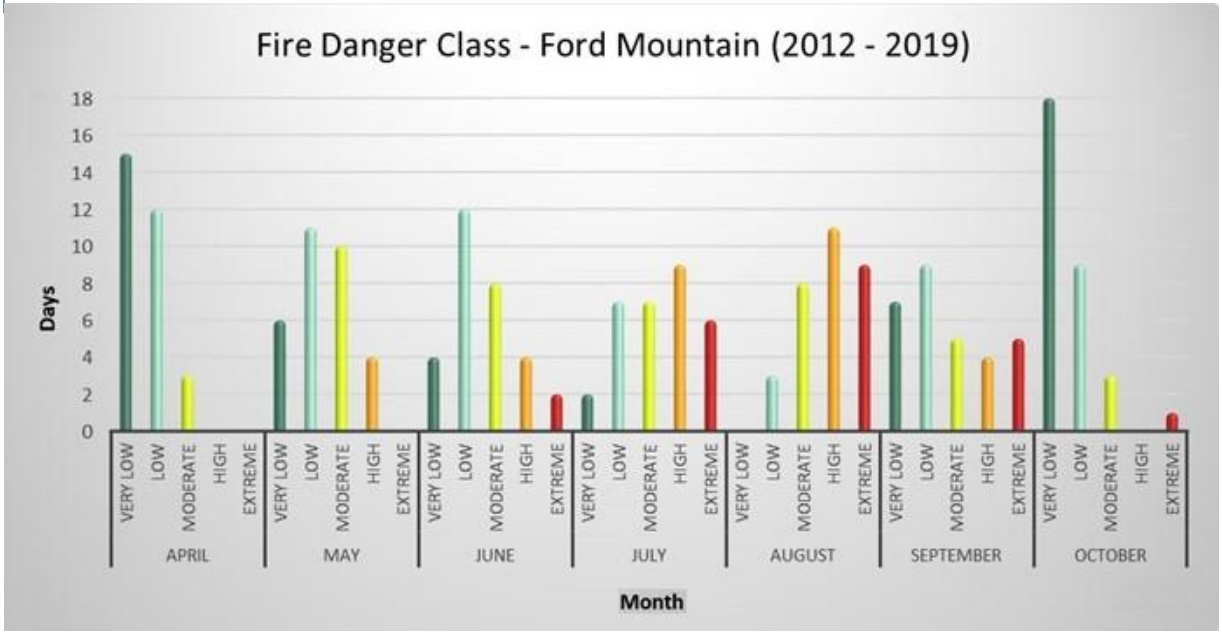


Figure 3. Average number of danger class days for the Ford Mountain weather station. Summary of fire weather data for the years 2012 - 2019.

Wind speed and wind direction heavily influence wildfire trajectory and rate of spread. Wind plays a significant role in fire behaviour and direction of fire spread and is summarized in the Initial Spread Index (ISI) Rose(s) from the Ford Mountain BCWS weather station. The wind rose data is compiled hourly and provides an estimate of prevailing wind directions and wind speed in the area of the weather station. During the fire season (April-October) predominant winds originate from the southwest, north, and northeast. Winds also occur to a lesser degree from the south and northeast in most months. Wind speeds over an ISI value of 12 occur more frequently from the southwest between the months of April to September and between 6 am and 6 pm. Throughout the fire season, morning (12 am to 6 am) and evening (6 pm to 12 am) winds are primarily from the north, northwest, and northeast and generally have lower wind speeds (ISI value less than 12), with the exception of the month of May, where windspeeds can reach upward of an ISI value of 18. When considering potential treatment areas, it should be noted that wildfires occurring upwind of a value pose a more significant threat to that value than one which occurs downwind.

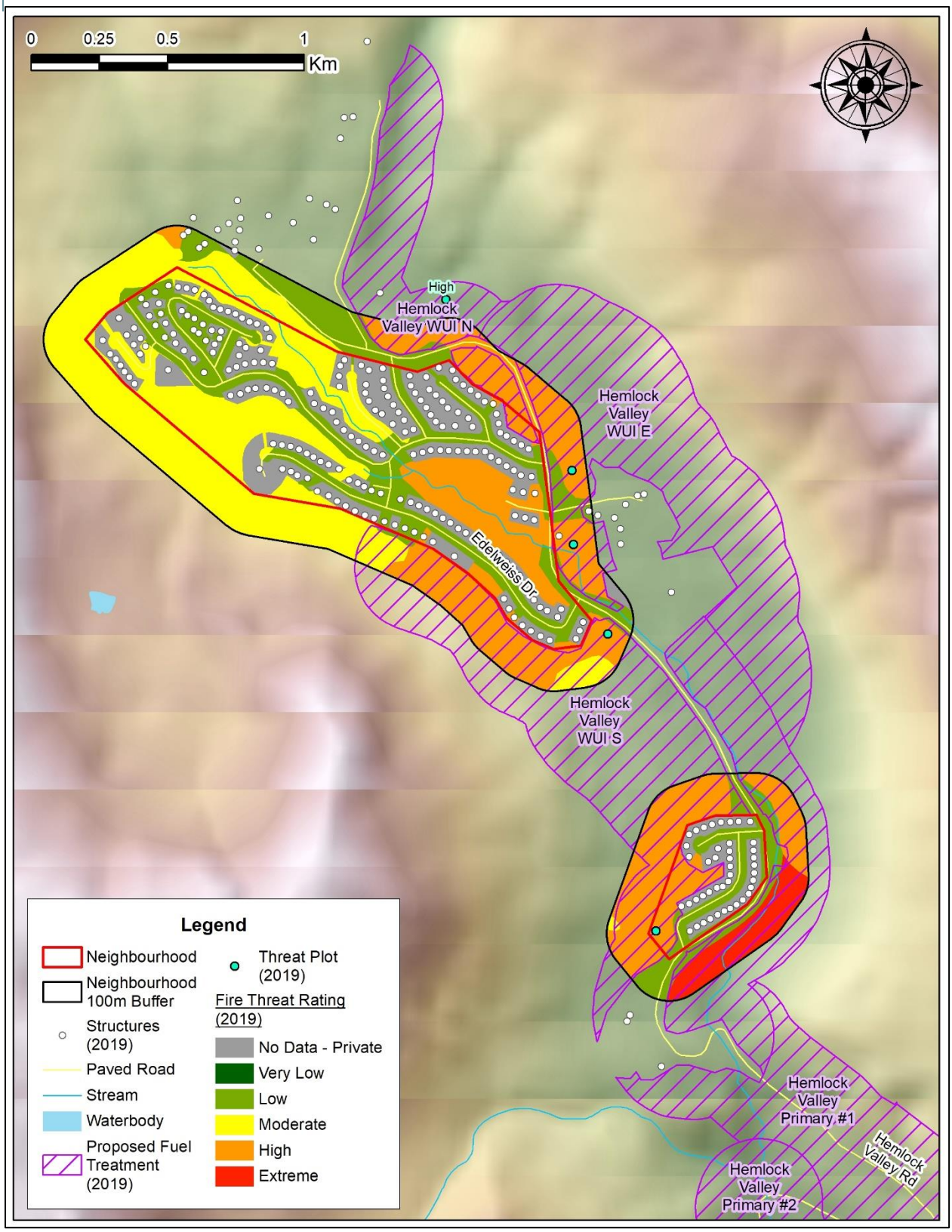
FIRE THREAT

Fire behavior potential is a combination of fuel, topography, and climate. Fire behavior potential around communities in the Fraser Valley Regional District was mapped as part of the 2019 Community Wildfire Protection Plan(s). Areas of high and extreme threat illustrate where there is greater potential for fire related damage to buildings and structures within the Study Area.

Map 5 shows that houses and structures adjacent to the steep-sided slopes along the west boundary of Hemlock Valley have a moderate wildfire threat rating; this corresponds to the potential to support surface fires that are less threatening to homes and structures. Conversely, structures near the eastern boundary of the community have a high rating, indicating that candling or intermittent and continuous crown fires can occur, which carries the potential to directly impact development. At the southernmost

edge of the neighbourhood, the fire threat rating is extreme, meaning there is continuous forested land that will support intermittent or continuous crown fires that can directly impact development. Since the wildfire threat analysis only uses data for lands with public ownership, the 'No Data' class (coloured grey) covers the Study Area, meaning that no data was available.

The only way residents can directly affect the fire behaviour potential under their control is through the application of FireSmart principles, which creates a separation – or defensible space – where radiant heat produced by wildfires is dissipated.



Map 5. Wildfire threat rating for the Study Area.

4.0 THE WILDLAND URBAN INTERFACE (WUI)

The wildland urban interface (WUI) is defined by FireSmart Canada as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. There are different WUI conditions, which are variations on 'perimeter interface' and 'intermix'. A perimeter interface condition is generally where there is a clean transition from urban development to forest lands. Smaller, more isolated developments that are embedded within the forest are referred to as intermixed areas. An example of interface and intermixed areas is illustrated in Figure 4.

Figure 4. Illustration of intermix and interface areas in the WUI taken from Google Earth imagery.

In interface and intermixed communities, fire has the ability to spread from the forest into the community or from the community out into the forest. Although these two scenarios are quite different, they are of equal importance when considering interface fire risk.

Hemlock Valley primarily has intermixed residences where connected strips of remnant forest stands occur along and between residential streets. Along the westernmost and easternmost edges of the built community, interface zones exist where structures back onto continuous forested areas near the base of the surrounding forested slopes. Regardless of which scenario occurs, there will be consequences for the community and this will have an impact on the way in which the community plans and prepares for interface fires.

SPOTTING

Spotting is the ability of embers or firebrands from a burning fire to be sent aloft and start new fires in advance of the fire front, or outside of the fire perimeter. It has been found that, during extreme wildfire events, a significant proportion of home destruction has been a result of low-intensity surface fire flame exposures, usually ignited by embers in advance of the fire front. For example, findings from an investigation of how homes survived or ignited during the Fort McMurray 2016 Horse River wildfire indicate that the vast majority of initial home ignitions in the WUI were caused by embers rather than direct contact by flames or radiant heat.[1] Surviving homes in both urban and rural areas in that wildfire event exhibited many attributes of FireSmart principles, regardless of the broader wildfire risk surrounding them.

The risk of spotting is influenced by the type of forest fuels that are burning. Some forest fuel types produce abundant embers and firebrands which can be lofted up over the wildfire and travel farther distances. Other forest fuel types, when burning, result spotting activity that is lower, and spotting distances that are shorter. The risk of embers lofting into the Hemlock Valley neighborhood is low, with some areas of moderate risk to the northeast of the neighborhood.[2] Stands of dense young conifer forests to the northeast of the neighborhood increase the risk of spotting, as this forest type is more likely to produce larger quantities of embers, that may travel further distances. Taking action based on FireSmart principles and the recommendations of this report is an effective way to mitigate this risk.

[1] Westhaver, A. 2017. *Why some homes survived: Learning from the Fort McMurray wildland/urban interface fire disaster.* Institute for Catastrophic Loss Reduction (ICLR) research paper series – number 56.
[2] BC Wildfire Service. (2022). Provincial Strategic Threat Analysis - Spotting Impact [Data set]. https://catalogue.data.gov.bc.ca/dataset/bc-wildfire-psta-spotting-impact

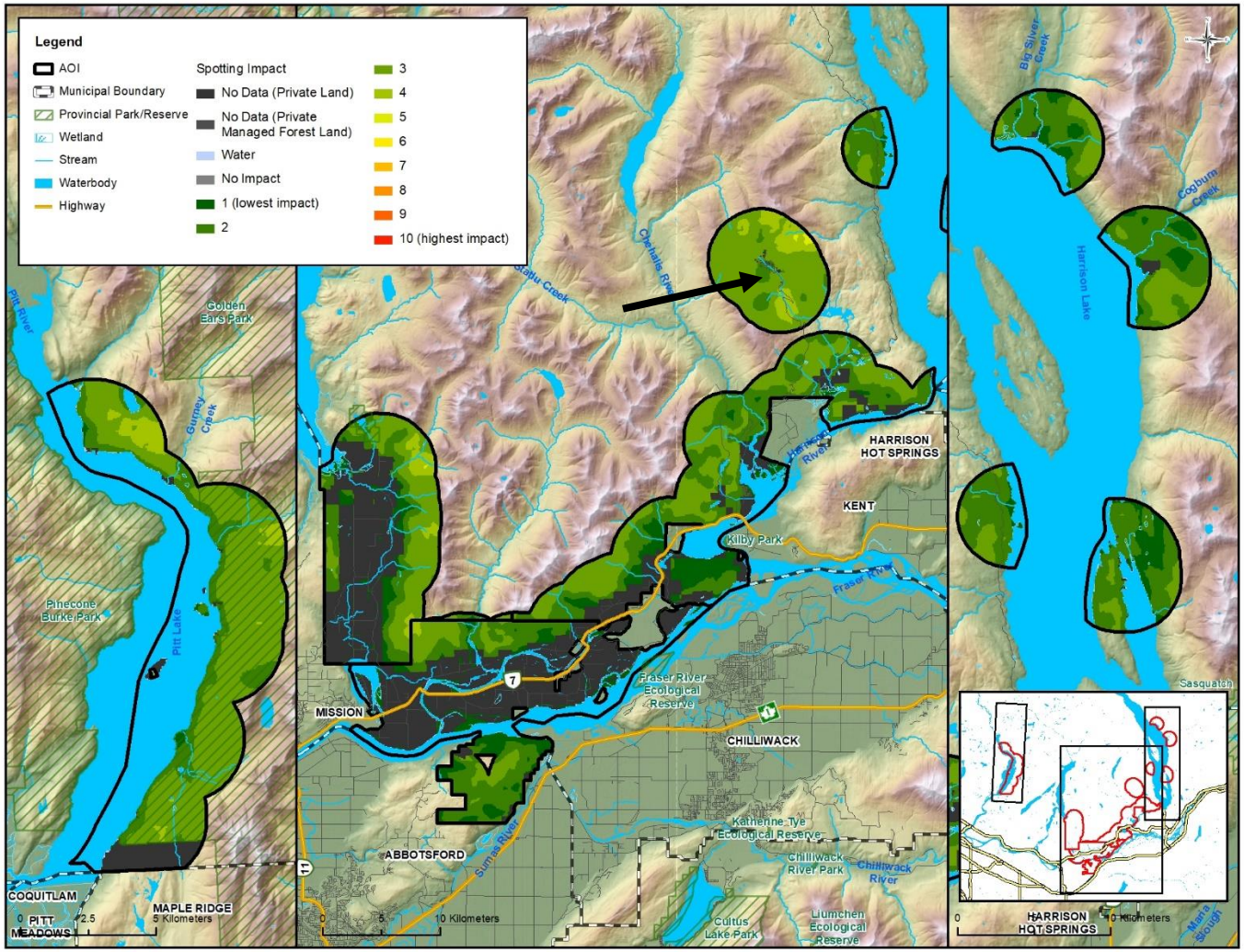


Figure 5. Map from the 2019 FVRD 'Zone B' Community Wildfire Protection Plan displaying the Spotting Risk classes from the Provincial Strategic Threat Analysis. The Study Area is indicated with an arrow.

HOME IGNITION ZONE

Multiple studies have shown that the principal factors regarding home and structure loss to wildfire are the structure's characteristics and immediate surroundings. The area that determines the ignition potential of a structure to wildfire is referred to as (for residences) the Home Ignition Zone (HIZ). The HIZ includes the structure itself and four concentric, progressively wider Priority Zones out to 100 metres from the structure (Map 6 and Figure 6 below). More details on priority zones can be found in the FireSmart Manual.[3]

Included in this assessment are observations made while Blackwell visited the Study Area. The assessment addresses the ease with which home ignitions can occur under severe wildfire conditions and how these ignitions might be avoided within the ignition zones of affected residents. Residents can reduce the risk of structure loss during a wildfire by taking action within their ignition zones. This zone principally determines the potential for home ignitions during a wildland fire; it includes a house and its immediate surroundings within 100 metres. Given the extent of this zone, the ignition zones of several homes sometimes overlap, and often spill over onto adjacent public or community land where the homeowner has no control or authority; it then becomes important to consult and collaborate with public agencies or other private land owners to mitigate ignition potential.

The results of the assessment show (under current conditions) that wildfire behavior and subsequent losses will be dominated by the residential characteristics of this area. The good news is that residents will be able to substantially reduce their exposure to loss by addressing neighbourhood vulnerabilities. This relatively small investments of time and effort will improve wildfire safety.

[3] Available for download here: FireSmartBC_HomeownersManual_Printable.pdf

Map 6. Fire Priority Zones 1a, 1, 2, and 3 for a typical residential property.

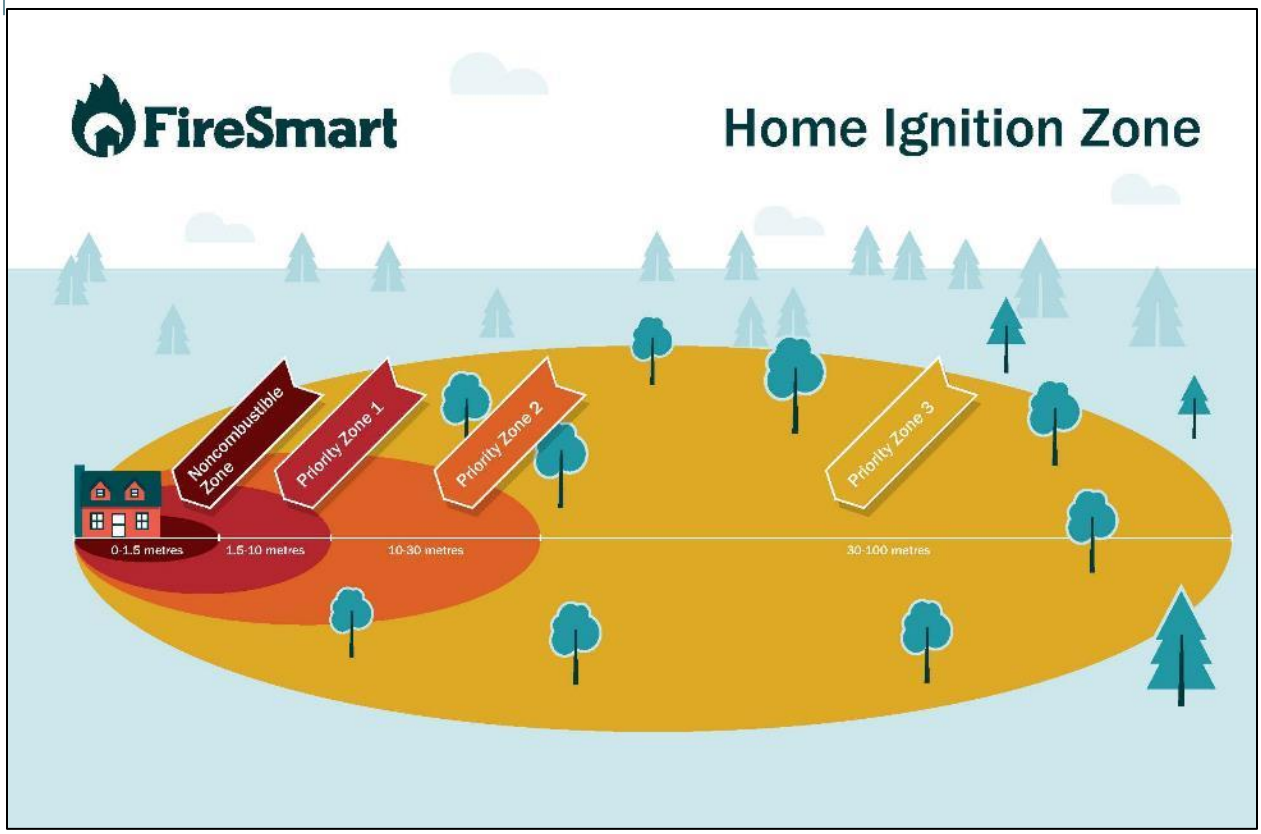


Figure 6. Fire Priority Zones 1a, 1, 2, and 3 collectively comprise the 100m home ignition zone (HIZ).

5.0 OBSERVATIONS FROM THE FIELD ASSESSMENT

A field review of Hemlock Valley was conducted by Monica Nederend, FIT on May, 26 2022. The intent of the field assessment was to assess the level of wildfire risk to the neighbourhood and to furthermore identify specific vulnerabilities which they and the FVRD could address to assist in bolstering Hemlock Valley's resilience to future interface fire events.

To this end, complete coverage of the entire neighbourhood was needed during the field assessment and focused especially on subdivisions or homes occurring immediately adjacent to forested vegetation, as well as building construction typologies and materials, remnant forest patches and green corridors embedded within the neighbourhood, landscaping around homes, one-way access routes and dead-end roads, and the location of water delivery (fire hydrants) and electrical power supply.

The following data was collected as part of the field review:

- The location of access points into the neighbourhood;
- Evacuation routes;
- Exterior building materials commonly used on homes;
- Forest vegetation in the WUI;
- Ornamental landscaping around homes and along roads;

- Critical infrastructure including water systems and power supply;
- The pattern of existing and new development within the WUI; and
- Topographical factors influencing the spread of, or barrier to wildfire.

Photographs and notes of the neighbourhood were taken for documentation.

BUILDING CONSTRUCTION

Throughout the neighborhood, homes have been designed to accommodate the amount of snow that falls in the area each year. As a result, most residences have metal roofs without gutters, few outbuildings, and gravel scattered in a 1-5 metre radius around the building envelope. These are all features that increase the fire safety of the structure (Figure 7).

In the main village, there is less intermixed vegetation around structures, and while most structures still have conifers in Zone 1, or a non-compliant Zone 1, there is more defensible space around structures in this area of Hemlock Valley. However, throughout both the southern and northern neighborhoods, high-hazard conifer vegetation is abundant and landscaping around homes mostly does not comply with FireSmart principles (Figure 9).

Many structures have lean-tos, enclosures built below patio balconies, or built onto the sides of homes (Figure 9). These structures are used to store building materials, firewood or outdoor gear. Additionally, due to the hilly terrain, many structures are built onto slopes. This results in poor access on the side of homes facing away from the road, and increased exposure of the bottoms of unsheathed decks, and balconies.

Most residences are single-detached homes, but there are some multi-unit dwellings, mostly located within the northern neighborhood. Many of the multi-unit dwellings are older buildings, with gaps, cracks, and openings on combustible siding, as well as combustible materials and belongings stored within the NCZ (1.5 metres of the home). As a result, these structures are at a higher risk of ignition in an embers shower. The montane climate likely weathers building materials at a faster rate, contributing to more wear and tear on structures.

Since many property owners do not live at these residences full-time, or rent them out to short-term users, some properties have fewer accumulations of building materials, patio furniture, and other belongings that are more common in other neighborhoods with full-time residents.

There are several key vulnerabilities of structures as seen during the field assessment. First, the use of combustible siding, decking, and sheathing of eaves increases the ignitability of the structure. Second, conifer vegetation in the NCZ, Zone 1, Zone 2, and Zone 3 puts buildings at higher risk. Unmaintained NCZs also elevate fire risk. Finally, gaps, cracks, and openings in lean-tos, decking, siding, doors, and windows give access for embers into the building. All of these vulnerabilities in building structures create an elevated risk of wildfire impact for the Hemlock Valley neighbourhood.

Figure 7. Home with defensible space, but combustible open deck and wooden sidings.

Figure 8. New homes with metal roofing and mature conifers within 10 metres.

Figure 9. Older home with non-compliant lean-to, wood siding, and conifer vegetation within 10 metres of the home.

Roofing Material:

Roofing material is one of the most important characteristics influencing a home's vulnerability to fire. Roofing materials that can be ignited by burning embers increases the probability of fire related damage to a home during an interface fire event.

In many communities, there is no fire vulnerability standard for roofing material. Homes are often constructed with unrated materials that are considered a major hazard during a large fire event. In addition to the vulnerability of roofing materials, adjacent vegetation may be in contact with roofs, or roof surfaces may be covered with litter fall from adjacent trees. This increases the hazard by increasing the ignitable surfaces and potentially enabling direct flame contact between vegetation and structures.

Building Exterior - Siding Material:

Building exteriors constructed of vinyl or wood are considered the second highest contributor to structural hazard after roofing material. These materials are vulnerable to direct flame or may ignite when sufficiently heated by nearby burning fuels. The smoke column will transport burning embers, which may lodge against siding materials.

Balconies and Decking:

Open balconies and decks increase fire vulnerability through their ability to trap rising heat, by permitting the entry of sparks and embers, and by enabling fire access to these areas. Closing these structures off limits ember access to these areas and reduces fire vulnerability.

Combustible Materials:

Combustible materials stored within 10 metres of residences are also considered a significant issue. Woodpiles, propane tanks and other flammable materials adjacent to the home provide fuel and ignitable surfaces. Locating these fuels away from structures helps to reduce structural fire hazards and makes it easier and safer for suppression crews to implement suppression activities adjacent to a house or multiple houses.

Other Factors:

In addition to the vulnerability of roofing materials, adjacent vegetation may be in contact with roofs, or roof surfaces may be covered with litter fall from adjacent trees. This increases the hazard by increasing the ignitable surfaces and potentially enabling direct flame contact between vegetation and structures.

Although non-combustible exterior materials are often chosen for new developments and structures and are therefore generally compatible with FireSmart principles, a 2016 investigation by Westhaver[4] after the Fort McMurray wildfire revealed that the leading contributor to hazard and hence home survivability were vegetation and fuel conditions surrounding the home. This highlights that these factors need to be addressed in tandem in order for a structure to be in FireSmart compliance.

PROPERTY AND VEGETATION

Landscaping on private property within the study area is generally not compliant with FireSmart standards and represents a considerable hazard to individual properties and the entire neighbourhood. The Fraser Valley Regional District is located in a coastal environment with a lower landscape level threat of wildfire – however, landscaping around property is critical in order to limit fire pathways to buildings. Most properties are largely landscaped with a mix of natural vegetation: western and mountain hemlock, western redcedar, and amabilis fir. Natural vegetation around homes transitions into continuous coniferous forests on surrounding Crown land and the ski resort. These forests are typical of montane environments and contain abundant understorey growth to act as ladder fuel. Juniper, cedar, and other coniferous hedging are highly flammable. Mature coniferous trees, such as cedar and fir, deposit dry and flammable needles onto roofing and can accumulate on roof corners and in gutters. Vegetation around homes, as well as homes being built into the forest landscape, is one of the major vulnerabilities of the community.

New builds are more common than renovations of older structures, and these developments, while generally complying with FireSmart building standards, are not FireSmart compliant in regards to landscaping. Trees are in place less than 2 metres from homes around many builds, especially around Snowmist Drive and Snowmist Place in the southern neighbourhood. Coarse woody debris from landclearing is often left on site due to the cost of removal (Figure 10); the accumulations of bucked logs, whole logs, and fine woody debris (limbs or branches with foliage) create high fuel loads within the middle of neighbourhoods. These areas of high fuel loading present a significant hazard for Hemlock Valley.

[4]Westhaver, A. 2017. Why some homes survived: Learning from the Fort McMurray wildland/urban interface fire disaster. Retrieved from: https://issuu.com/iclr/docs/westhaver_fort_mcmurray_final_2017

Figure 10. Land clearing debris from new development.

PARKS AND NATURAL AREAS

The area around Hemlock Valley is surrounded by steep, forested slopes on all sides. The community is a popular tourist area for outdoor recreation, including the nearby ski resort on Crown land. The surrounding non-tenured Crown land is also a destination for recreationalists who enjoy dirtbiking, ATV riding, and hiking. Tourist activities create a higher risk of human-caused fire ignitions due to off-road recreating, smoking, or abandoned campfires. Forestry activity around Hemlock Valley is minimal: some lots are cut in town for development purposes and there is also active and ongoing forestry management around the resort area. Actively harvested areas contain hazardous accumulations of post-harvest slash or young regenerating conifer stands. Other than development in town and the active management around the resort area, very little of the forestland around Hemlock Valley has been recently modified.

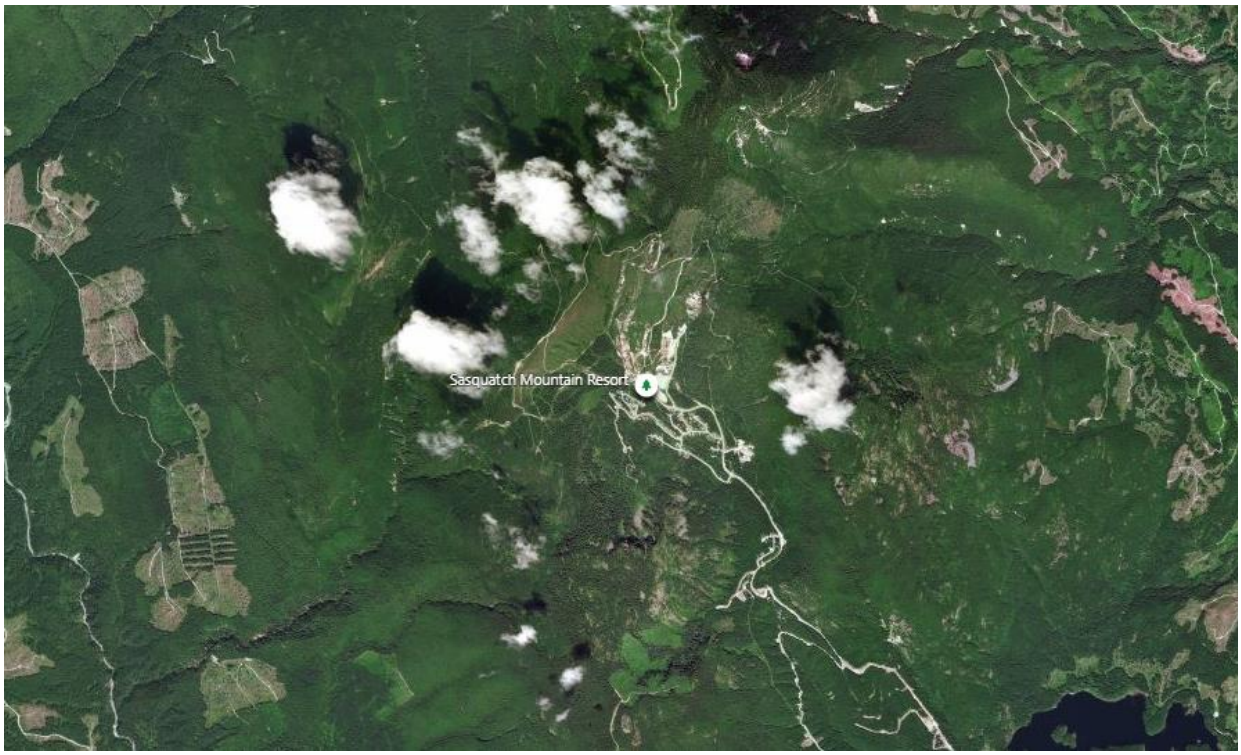


Figure 11. Bing Maps imagery showing the mostly continuous forest cover in the area surrounding Hemlock Valley (centred in the screenshot).

CRITICAL INFRASTRUCTURE

Protection of infrastructure during a wildfire event is important to ensure that emergency response is as effective as possible, coordinated evacuation can occur if necessary, and essential services in the study area can be maintained and/or restored quickly. Critical infrastructure includes emergency and medical services, water, electrical service, transportation, major water infrastructure, and communications infrastructure. The volunteer fire department hall is located just outside the Study Area, approximately 100 metres from the northern neighbourhood and approximately 1200 metres from the southern neighbourhood. There is hydrant coverage throughout both neighbourhoods, with sufficient water supply and pressure for firefighting purposes. Hemlock Valley has its own private water system (Hemlock Utility Services Ltd.), which also provides sewer services via a tertiary treatment plant and pumphouses. Sasquatch Mountain Resort has separate private water utility operations. The neighbourhoods are also serviced by BC Hydro electricity, in agreement with Sasquatch Mountain Resort. Most homes are serviced by propane and/or woodstove heating. A cell tower is located beside the volunteer fire hall and a cell tower repeater is located outside the neighbourhood assessment areas. Without the repeater, the cell tower cannot function. While the volunteer fire hall does have a landline, communication is severely limited without both the cell tower and the cell tower repeater. Other important utility structures include a water pump, water reservoir (located outside the neighbourhood assessment areas), and a transfer station. The transfer station is very small and has limited service.

EMERGENCY RESPONSE

Fire protection is provided by the Hemlock Valley Volunteer Fire Department, with good response time across the neighbourhoods due to the small community size and central location. Hydrant coverage and water supply throughout the neighbourhoods are good. A major vulnerability for the neighbourhoods is the single evacuation route on Hemlock Valley Road. This road is long and winding with several dead spots of cell reception; the road also traverses complex topography where washouts and avalanches can occur. In 2020, a washout resulted in total road closure and stranded many residents and visitors. Vehicle fires have also been recorded on the road and are a possible source of wildfire ignitions.

6.0 FIRESMART RECOMMENDATIONS

FireSmart principles are important when reducing wildfire risk to structures in Hemlock Valley and are reflected in the outlined recommendations. FireSmart mitigation activities should be approached as a multi-year (>10-year) project with incremental build-out as new development or re-development land use changes occur. It has two levels of modification: the site (individual lot or parcel) and community or neighbourhood.

The Hemlock Valley neighbourhood should aim to:

- Enhance protection of critical infrastructure from wildfire; and
- Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.

The two main avenues for implementing FireSmart include:

- Change the vegetation type, density and setback from the structure; and
- Change the structure (where feasible) to reduce vulnerability to fire and reduce the potential for fire to spread to or from a structure.

Table 3. Hemlock Valley FireSmart Neighbourhood Wildfire Hazard Assessment FireSmart Recommendations

Item #	Priority	Recommendation	Metric for Success	Responsibility
1	High	**Identify hazardous parts of the home and convert them over time to fire-resistive materials.** • Create short- and long-term strategies to replace or upgrade different components of the home. • Roof replacements should be the first priority if roof materials are not FireSmart. • Replacing exterior siding and decking with fire resistant materials should be second priority.	Percentage of homes with FireSmart building construction	Residents
2	High	**Remove flammable plants and materials from the Non-Combustible Zone.** • Coniferous shrubs (e.g., cedar, juniper, or yew) are especially hazardous. • Remove wood building materials, firewood, pallets, or ground cover materials such as bark mulch and wood chips from this zone. • Remove combustible materials or objects from beneath decks. • Remove ATVs, vehicles, and machinery from this zone. • Consider replacing this area with an ignition-resistant surface such as paving stones, gravel, or brick.	Percentage of homes with fully cleared Non-Combustible Zone	Residents
3	Moderate	**Complete a spring clean-up before the fire season.** • Remove accumulated woody debris and yard waste. • Clean off roofs and gutters and prune away any branches touching the home (space 5 meters above the home). • Remove firewood stacked against home that will not be burned during summer and store 10 meters away from the home. • Remove flammable materials and items stored below decks and around Non-Combustible Zone (building materials, ATV vehicles, woodpiles, etc.) • If feasible, this should be promoted by neighborhood associations or resident groups.	Action taken by residents annually	Residents
4	High	**Modify outbuildings to comply with FireSmart principles.** • Outbuildings and sheds within 10 m of the home should follow FireSmart principles for building construction and have a cleared Non-Combustible Zone. • Alternatively relocate outbuildings outside of Zone 1	Percentage of outbuildings FireSmart compliant.	Residents

Item #	Priority	Recommendation	Metric for Success	Responsibility

5	Low	**Residents and the FVRD should co-operate to encourage FireSmart landscaping throughout the neighborhood.**
		• The FVRD should encourage individual homeowner participation in removing excess and flammable vegetation from their property. Consider hosting the following activities:
		  ○ Neighbourhood chipping program.
		  ○ Free yard waste drop-off.
		  ○ Scheduled garden debris burning weekend with neighbourhood representatives.
		• Distribute educational materials, such as FireSmart plant selection & landscaping design information.
		• Investigate the possibility of discounted rates for arborist work that may be available for multiple properties in order to increase FireSmart compliance for property owners that do not live in Hemlock Valley full-time.
			Occurrences of engagement between residents and FVRD	FVRD / Residents

7.0 NEIGHBOURHOOD WILDFIRE HAZARD ASSESSMENT

PDF Assessment forms appended.

8.0 REFERENCES

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9.0 APPENDIX A SIGNATURES OF LOCAL FIRESMART REPRESENTATIVES

Local FireSmart Representative

SIGNATURE

Monica Nederend, Forest Technician

B.A. Blackwell & Associates Ltd.

June 10, 2022