



# Heffley Lake

---

## FIRESMART COMMUNITY ASSESSMENT REPORT

Prepared for  
Thompson Nicola Regional District

October 2019

Brittany Seibert, LFR

Frontline Operations Group, Ltd. | 11510 UPPER SUMMIT DRIVE, COLDSTREAM BC V1B 2B4

## Summary of Recommendations – Abbreviated

The FireSmart program provides detailed guidelines and recommendations to reduce home ignition potential during a wildfire. The recommendations made in this report must be considered *in addition* to those contained in the FireSmart *Protecting Your Community from Wildfire* manual. The following summary of recommendations is taken from Section 7 of this report, where additional detail and rationale is provided. These recommendations are specific for the community of Heffley Lake but could be applied to communities with similar characteristics.

### Recommendations for Heffley Lake

1. Remove conifers from Zone 1 (<10m from home) if possible. If conifers are retained in Zone 1, consider the following:
  - a. Remove all ladder fuels (i.e. low-lying branches) within 2m reach of the ground
  - b. Remove all branches in contact with the home
  - c. Increase spacing between conifers – preferably to 3m
2. Removal of ladder fuels and increase spacing within Zone 2 (10-30m) and Zone 3 (30-100m). Zones that fall onto crown land should be assessed by a qualified professional to determine course of action
3. Remove or store appropriately all combustibles in Zone 1 – including personal items such as trailers, recreational vehicles, tools, building materials, etc.
4. Apply FireSmart principles to any outbuilding within 15m of a structure
5. Remove firewood stacks from Zone 1 during times of wildfire threat
6. When away for lengths of time during high wildfire threat, consider items such as rattan door mats, flammable patio furniture, children’s toys, trash cans, BBQs, etc. as combustibles and store away
7. Create a local FireSmart Board and Community Plan to maintain awareness and community participation

Table of Contents

**Summary of Recommendations – Abbreviated ..... ii**

**List of Figures ..... iv**

**1.0 Introduction ..... 1**

**2.0 Definition of Ignition Zone ..... 2**

**3.0 Description of the Fire Environment..... 3**

**3.1 Fuels ..... 3**

        3.1.1 Fuel Layers ..... 3

        3.1.2 Fuel Size ..... 4

**3.2 Weather ..... 5**

        3.2.1 Wind ..... 5

        3.2.2 Temperature and Relative Humidity ..... 5

        3.2.3 Precipitation ..... 6

**3.3 Topography ..... 6**

**4.0 Site Description ..... 7**

**4.1 Fuel Type ..... 7**

        4.1.1 C3 Fuel Type ..... 7

        4.1.2 C5 Fuel Type ..... 8

        4.1.3 M2 Fuel Type ..... 8

**4.2 Fire Weather ..... 9**

**4.3 Topography ..... 9**

**4.4 Human Ignition Potential ..... 10**

**5.0 Assessment Process..... 10**

**6.0 Observations and Issues ..... 11**

    6.1 Roof Assemblies ..... 11

    6.2 Building Exteriors..... 11

    6.3 Nearby Combustibles..... 12

    6.4 Vegetation..... 13

**7.0 Recommendations ..... 14**

**8.0 Successful FireSmart Mitigations ..... 15**

    8.1 Fire-Resistant Roofing..... 16

    8.2 Landscaping..... 16

**9.0 Next Steps..... 17**

**10.0 Signature of Local FireSmart Representative ..... 18**

**APPENDIX 1: Resources..... 19**

**APPENDIX 2: Community Wildfire Hazard Assessment Form .....1**

**List of Figures**

Figure 1 Heffley Lake Community.....1

Figure 2 FireSmart Canada utilizes the concept of priority zones surrounding a home to help residents prioritize their hazard reduction efforts. A home’s immediate surroundings (Zones 1 and 1a) are of immediate concern to the homeowner and should be targeted aggressively to reduce ignition hazards to the home.....3

Figure 3 Wildland fuels can be described within three broad fuel layers: Ground fuels, surface fuels (to a height of 2m above the duff layer), and canopy fuels. Canopy fuels are also referred to as aerial fuels ....4

Figure 4 shows the relationship between temperature and relative humidity, as temperatures increase and the overall water content in the air does not change, relative humidity decreases. This affects fire behavior through the increased drying of fuels .....6

Figure 5 C3 fuel types are characterized by the available ladder fuels and ease of fire transference both vertically and horizontally.....8

Figure 6 C5 fuels types canopies are well established above surface fuels. Vertical fire growth is difficult in this fuel type .....8

Figure 7 Satellite image of Heffley Lake community .....9

Figure 8 Contour map of the Heffley Lake community. Structures are mainly located along the northern and eastern shoreline. ....10

Figure 9 Debris accumulation on roof tops is a potential ignition source that can challenge the roof’s resiliency .....11

Figure 10 Combustible materials stacked along a structure pose a threat to home ignition .....12

Figure 11 Most homes within the Heffley Lake community are located within the timber stand. However, due to the lack of ladder fuels, it unlikely for crown fires to be established within zone 1. ....13

Figure 12 Fuel densities of Heffley Lake .....14

Figure 13 Fire-rated roofing material is proven to be highly resilient against home ignition during a wildfire event. Roof design can also contribute to mitigation of debris accumulation by minimizing valleys and pinch point where debris can be captured .....16

Figure 14 This home demonstrates several FireSmart landscaping attributes. The gravel provides a non-combustible surface creating a break from direct flame contact to the home. Conifers have been removed up to 10m away and ladder fuels have been cleared. Leafy, deciduous plants are the preferred vegetation to be found in zone 1.....17

## 1.0 Introduction

The FireSmart approach is designed to provide an effective management approach for preserving wildland living aesthetics while reducing community ignition potential during a wildland urban interface (WUI) fire. The program can be tailored for the adoption by any community and/or neighborhood association that is committed to ensuring its citizens maximum preparation for wildland fire. The following Community Assessment Report (CAR) is intended to be a resource for residents of Heffley Lake for carrying out the recommendations and actions.

The CAR was developed by a trained Local FireSmart Representative (LFR). This assessment addresses the wildfire-related characteristics of Heffley Lake. It examines the area's exposure to wildfire as it relates to ignition potential. The assessment does not focus on the specific homes, but examines the community as a whole.

Funding for the Thompson Nicola Regional District – Heffley Lake – FireSmart project was provided through the Community Resiliency Investment program and was provided by the Union of BC Municipalities. The grant enabled the regional district to retain the services of Frontline Operations Group to conduct the project.

Community assessment was carried out on July 23, 2019 by Brittany Seibert, LFR.



Figure 1 Heffley Lake Community

## 2.0 Definition of Ignition Zone

Heffley Lake is located in a wildfire environment. The wildland areas surrounding the community are typical ecosystems that have developed, historically, from frequent low intensity fires. With the introduction of modern forest protection policies, the typical fire cycle has been interrupted thus contributing to a host of cascading ecological effects including the buildup of forest fuels.

Wildfires will happen in the Thompson Nicola region – exclusion from wildfire is not a choice. In 2017 the province of British Columbia was subjected to one of the worst fire seasons in its history. Over 1.2 million hectares were burnt and roughly 65,000 residents were evacuated. The Thompson Nicola region alone saw one of the most devastating fires of that year, Elephant Hill. The fire discovered on July 6, 2017 continued to burn for another 76 days and consumed over 190,000 hectares. Over the course of the fire, over 120 homes were destroyed.

A house burns because of its relationship with everything in its surrounding home ignition. To avoid a home ignition, a homeowner must eliminate the wildfire's potential relationship with their house. This can be accomplished by interrupting the natural path a fire takes by clearing fuel from the home ignition. To accomplish this, flammable items such as excessive vegetation and flammable debris must be removed from the areas surrounding the structure. This will prevent ignition of fuel sources in proximity of the structure and prevent direct contact of flames with the home. Reducing the volume of fuels and reducing its ability to move vertically will affect the intensity of the wildfire as it nears the home.

Included in this assessment are observations made while visiting Heffley Lake. The assessment addresses the ease with which home ignitions can occur under severe wildfire conditions and how these ignitions might be avoided within the home ignition zones of affected residents. Heffley Lake residents can reduce the risk of structure loss during a wildfire by taking actions within their home ignition zones – which includes a house and its immediate surroundings within 100 metres (figure 2). Given the extent of these zones, the ignition zones of several homes sometimes overlap, and often spill over onto adjacent public or community land.

The results of the assessment indicate 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 community vulnerabilities. Relatively small investments of time and effort will reap great rewards in wildfire safety.



Figure 2 FireSmart Canada utilizes the concept of priority zones surrounding a home to help residents prioritize their hazard reduction efforts. A home's immediate surroundings (Zones 1 and 1a) are of immediate concern to the homeowner and should be targeted aggressively to reduce ignition hazards to the home.

### 3.0 Description of the Fire Environment

Wildland fire behavior is influenced by the interaction of three broad environmental factors: fuel, weather and topography. Collectively these factors describe the fire environment and determine the intensity and rate of spread of a wildland fire. A working knowledge of the factors that characterize the fire environment is helpful for building an awareness of hazard mitigation at the site level.

#### 3.1 Fuels

In the context of wildland fire, fuel refers to the organic matter involved in combustion. In Canada, wildland fuels are classified into 16 fuel types within the Canadian Forest Fire Behavior Prediction (FBP) System. The FBP system is informed by the Canadian Forest Fire Danger Rating System (CFFDRS), which is the primary tool to obtain predictive wildfire management intelligence used by agencies across Canada.

When dealing with the wildland-interface environment fuel can extend beyond the surrounding vegetation. Fuels can include a structure's composition, neighboring buildings, vehicles and other combustible materials found around the home – see section 6.3

##### 3.1.1 Fuel Layers

The structure and arrangement of fuels are described in terms of their horizontal and vertical continuity within three broad layers of the fuel complex – ground fuels, surface fuels and canopy (or aerial) fuels (Figure 3). Ground fuels occupy the *duff layer* and the uppermost portions of the soil mineral horizon. In general terms, the duff layer is comprised of decomposing organic material and is found beneath the

litter layer and above the uppermost soil mineral horizon (A-horizon). The components of the duff layer lack identifiable form due to decomposition (as opposed to the *litter layer*, which is composed of identifiable material).

The surface fuel layer begins above the duff layer and extends 2m vertically. Surface fuels are characterized by the litter layer (leaves, needles, twigs, cones, etc.) as well as plants and dead woody material up to a height of 2m. In some cases, surface fuels may act as *ladder fuels* that can carry fire from the surface fuel layer into the canopy layer.

Canopy fuels are the portions of shrubs and trees that extend from 2m above the duff layer, upwards to the top of the fuel complex. Certain tree species, such as several spruce species (*Picea* sp.) are characterized by branches extending down to the forest floor, whereby these lower branches act as ladder fuels. Other species, particularly those found in drier, fire-maintained ecosystems, such as Ponderosa pine, lack these ladder fuels and form a distinct separation between the surface fuel layer and canopy fuel layer.

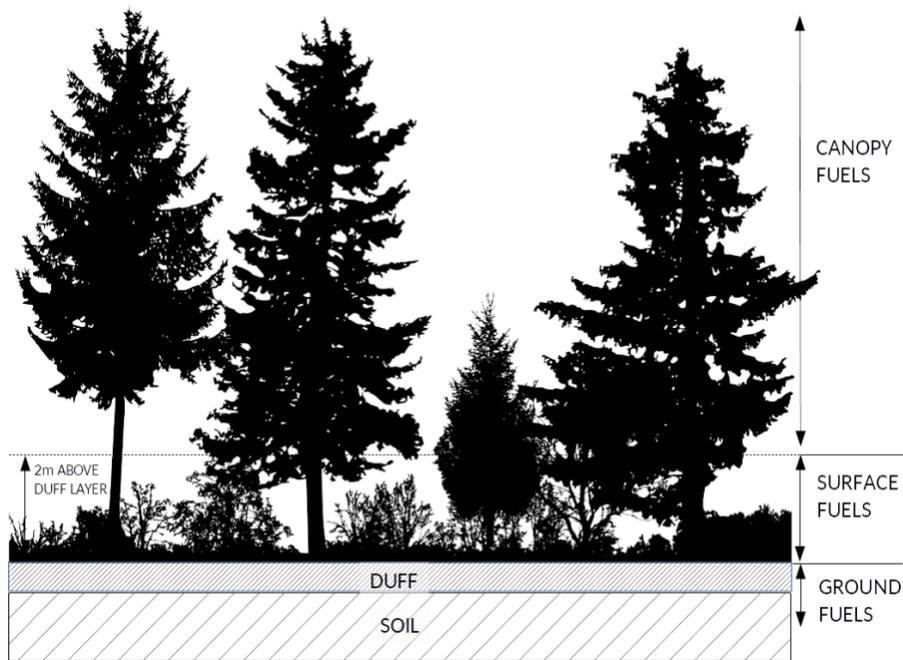


Figure 3 Wildland fuels can be described within three broad fuel layers: Ground fuels, surface fuels (to a height of 2m above the duff layer), and canopy fuels. Canopy fuels are also referred to as aerial fuels

### 3.1.2 Fuel Size

Wildland fuel can be further described in terms of relative size – so called *fine fuels* and *coarse* or heavy fuels. Fine fuels include leaves and conifer needles, grasses, herbs, bark flakes, lichen, twigs etc. Large branches, downed logs and other large woody material are considered coarse or heavy fuels. Fine fuels have a higher surface area to volume ratio than coarse fuels, and this characteristic influences the rate of drying and ease of ignition.

With a higher surface area to volume ratio than coarse fuels, fine fuels are more readily influenced by changes in environmental conditions (e.g. relative humidity, wind, precipitation etc.). As well, dead fine

fuels react to changes in environmental conditions at a relatively faster rate than green (i.e. live) fine fuels.

When available to burn, fine fuels ignite more easily and spread fire faster than coarser fuels. This characteristic makes fine fuels particularly susceptible to ignition from firebrands (or embers). Additionally, fine fuels are more susceptible to becoming firebrands – mobile ignition sources – as they are lighter and more easily made airborne. Finally, fine fuels take a shorter time to burn out than coarser fuels.

For any given fuel, the more there is and the more continuous it is, the higher the intensity of the fire will be and the faster the fire will spread.

## 3.2 Weather

Weather condition affect the moisture content of wildland fuels and influence the rate of spread and intensity of a wildland fire. Weather is the most dynamic element of the fire environment and the most challenging to assess and forecast. There are four main components of weather to consider when discussing wildland fire behavior: wind, temperature, relative humidity and precipitation.

### 3.2.1 Wind

Wind speed and direction influences the rate and direction of spread of a wildland fire. The application of wind on open flame has the effect of tilting the flame away from the wind, and, in the case of wildland fire, placing the flame into closer proximity (or contact) with downwind fuels thus contributing to fire spread.

Wind can also contribute to a preheating effect on fuel immediately downwind from open flame. Wind hastens the drying process of exposed fuel, with the rate of drying being a function of the surface to volume ratio. Having a relatively higher surface area to volume ratio, fine fuel moisture content is affected to a greater degree by wind when compared to coarse fuel.

Lastly, wind can also influence the ignition of a new wildland fire through its contribution to spotting. Ignited fine fuels – that have become airborne through rising thermal air – can be carried by wind over the course of large distances. These firebrands result in the ignition of new fuels cultivating in new fires.

### 3.2.2 Temperature and Relative Humidity

Temperature and relative humidity have a close and inverse relationship – as temperature increases, relative humidity decreases. This is because relative humidity is the percent of water vapor in the air compared to what would be present if it were saturated. As air is heated through increasing temperatures, its ability to hold more moisture also increases. However, without the introduction of more moisture the percentage decreases.

$$rH = \frac{\text{Amount of moisture currently in the air}}{\text{Amount of moisture air can hold}} \times 100$$

The moisture content of wildland fuel is constantly seeking to equalize with moisture content of the

surrounding air. This effect is most pronounced in dead fuel. When the relative humidity is high, dead fine fuels will readily absorb moisture from the air and conversely, when the relative humidity is low, dead fine fuels will readily give up moisture to the air.

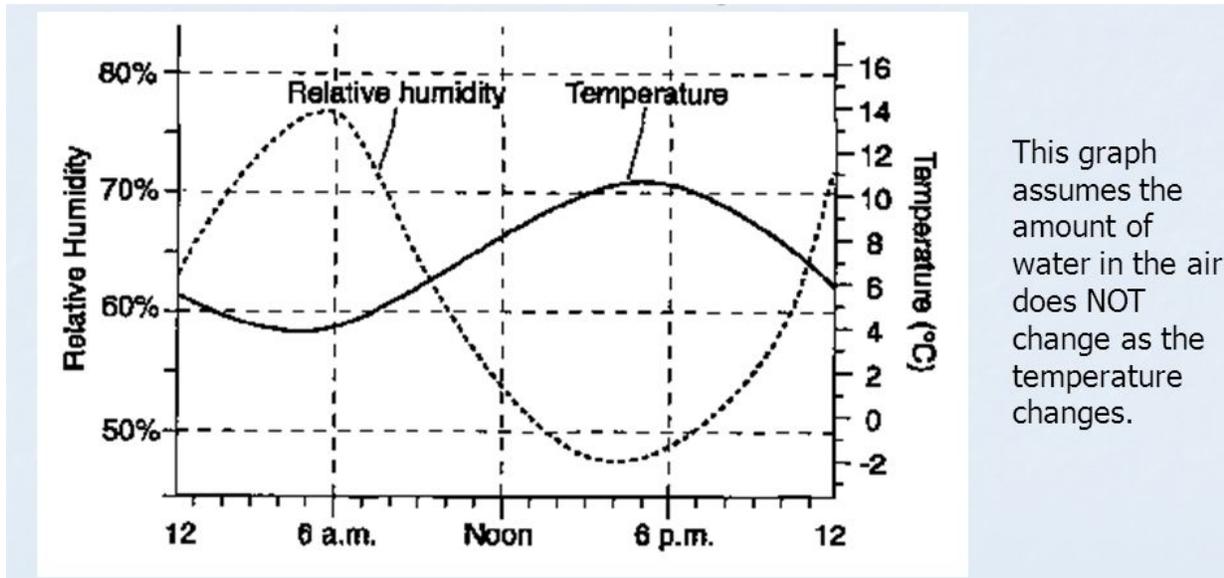


Figure 4 shows the relationship between temperature and relative humidity, as temperatures increase and the overall water content in the air does not change, relative humidity decreases. This affects fire behavior through the increased drying of fuels

### 3.2.3 Precipitation

The effect of moisture on wildland fuel is dependent on the size and state of the fuel. The moisture content of dead fine fuel is highly reactive to changes in relative humidity, precipitation and wind. Fine fuels require less precipitation to reach saturation than coarse fuels, and in turn, dry out at a faster rate.

Precipitation's arrival in the form of thunderstorms can inadvertently increase fire behavior, even if for short time. Thunderstorms can generate large influxes in wind through in and out flows, and downdrafts which have adverse effects on fire behavior.

## 3.3 Topography

In the context of the fire environment, topography refers to the shape and features of the landscape. Of all the topography factors in fire behavior, the primary importance for an understanding of fire behavior is slope. When all other factors are equal, a fire will spread faster up a slope than it would across flat ground. When a fire burns on a slope, the upslope fuel particles are closer to the flame compared to the downslope fuels. This pre-heating effect on upslope fuels contributes to fast upslope fire spread. As well, hot air rising along the slope tilts the flame uphill which further increasing the ease of ignition of upslope fuels.

Topography influences fire behavior principally by the steepness of the slope. However, the configuration of the terrain such as narrow draws, saddles and so forth can also influence fire spread and intensity. Slope aspect (i.e. the cardinal direction that a slope faces) determines the amount and

quality of solar radiation that a slope will receive, which in turn influences plant growing conditions and drying rates.

## 4.0 Site Description

Heffley Lake is located approximately 44km northeast of Kamloops, BC along the Heffley Louis Creek Rd and is situated between Heffley Creek to the west (17km) and Sun Peaks to the east (16km).

It includes ~100 homes, many with outbuildings located on the property. The properties themselves are a mixture of year-round residents and seasonal vacationers. Road access to the community exists only along the Heffley Louis Creek Rd. The Yellowhead HWY (HWY 5) is located to the west of the community. As well, the turn off for Knouff Lake Rd. which would lead traffic towards Barriere is also located to the west. The road to Sun Peaks (east) would not allow for access/egress but could potentially be used to divert public to safety zones if a wildfire event deemed the need. There are also two campsites located on the lake: a private campground, Hitch N Rail resort, is located on the northern shoreline and features both cabins and campgrounds, and a public campground located on the northeast shoreline of the lake. Both campgrounds allow campfires.

All structures feature a variety of ember accumulator features such as complex roof shapes, deck configurations and open (unsheathed) deck constructions and open carports. Lots are of varying sizes but mostly similar size and configuration with homes are separated from each other by 20-40m. Most of the natural vegetation (mainly the tree species – Douglas fir) on the properties has been retained with additions of planted trees, hedges and ornamental plants.

### 4.1 Fuel Type

Classifying fuel complexes in BC according the FBP fuel types is an imperfect process, given the diversity of ecosystems in the province in comparison to the rest of Canada. When considering FBP fuel types for a particular fuel complex, the actual species composition is of less importance than the overall stand structure characteristics. The FBP fuel types referenced below specify. Certain species not found in BC (e.g. red pine and eastern white pine, etc.), however the overall structural characteristics of the fuel types share similarities with the Heffley Lake site conditions. Herein lies the challenge of classifying certain BC forest types into a handful of FBP fuels types. In the Heffley Lake area, the most appropriate FBP fuel type(s) are:

#### 4.1.1 C3 Fuel Type\*

This fuel type is characterized by pure, fully stocked (1000–2000 stems/ha) jack pine (*Pinus banksiana* Lamb.) or lodgepole pine (*Pinus contorta* Dougl. ex Loud.) stands that have matured at least to the stage of complete crown closure. The base of live crown is well above the ground. Dead surface fuels are light and scattered. Ground cover is feather moss (*Pleurozium schreberi*) over a moderately deep (approximately 10 cm), compacted organic layer. A sparse conifer understory may be present.



Figure 5 C3 fuel types are characterized by the available ladder fuels and ease of fire transference both vertically and horizontally

#### 4.1.2 C5 Fuel Type\*

By definition, the C5 fuel type is characterized by mature stands of red pine (*Pinus resinosa* Ait.) and eastern white pine (*Pinus strobus* L.) in various proportions, sometimes with small components of white spruce (*Picea glauca* (Moench) Voss) and old white birch (*Betula papyrifera* Marsh.) or aspen (*Populus* spp.). The understory is of moderate density, usually red maple (*Acer rubrum* L.) or balsam fir (*Abies balsamea* (L.) Mill.). A shrub layer, usually beaked hazel (*Corylus cornuta* Marsh.), may be present in moderate proportions. The ground surface cover is a combination of herbs and pine litter. The organic layer is usually 5–10 cm deep.



Figure 6 C5 fuels types canopies are well established above surface fuels. Vertical fire growth is difficult in this fuel type

#### 4.1.3 M2 Fuel Type\*

This fuel type (and its "leafless" counterpart, M1) is characterized by stand mixtures consisting of the following coniferous and deciduous tree species in varying proportions: black spruce (*Picea*

## HEFFLEY LAKE FIRESMART COMMUNITY ASSESSMENT REPORT

*mariana* (Mill.) B.S.P.), white spruce (*Picea glauca* (Moench) Voss), balsam fir (*Abies balsamea* (L.) Mill.), subalpine fir (*Abies lasiocarpa*(Hook.) Nutt.), trembling aspen (*Populus tremuloides* Michx.), and white birch (*Betula papyrifera* Marsh.). On any specific site, individual species can be present or absent from the mixture. In addition to the diversity in species composition, stands exhibit wide variability in structure and development, but are generally confined to moderately well-drained upland sites. M2, the second phase of seasonal variation in flammability, occurs during the summer. The rate of spread is weighted according to the proportion (expressed as a percentage) of conifer and deciduous components. In the summer, when the deciduous overstory and understory are in leaf, fire spread is greatly reduced, with maximum spread rates only one-fifth that of spring or fall fires under similar burning conditions.

\* Excerpts from the CFFDRS FBP

### 4.2 Fire Weather

The climatic conditions of the southern and central region of the Thompson-Nicola can be broadly characterized by warm, dry summers and cool winters. Heffley Creek (located 17km to the west) is characterized as a semi-arid climate. Heffley Lake is located at ~960m (3150ft) elevation, about 600m (1970ft) above its neighbor. This increase in elevation creates a decrease in average temperatures (approximately 2°C per 1000ft) and an increase in fuel densities.

### 4.3 Topography

Heffley Lake is located along valley bottom between Heffley Creek, to the west, and Sun Peaks, to the east. Local topography is likely to influence wind speed and direction. As well, valley slopes are likely to influence fire growth and direction. Valley slopes were assessed at 15 to < 30%. There is potential, due to slope, that fire will grow away from community. It should be noted, however, that upslope fire growth and resulting increased fire behavior can lead to an increased risk of firebrands. These firebrands may travel cross or downslope affecting structures along the valley bottom.



Figure 7 Satellite image of Heffley Lake community

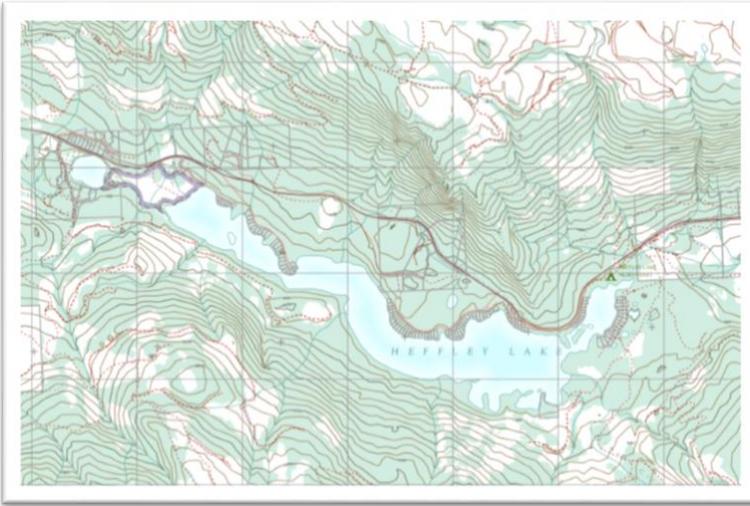


Figure 8 Contour map of the Heffley Lake community. Structures are mainly located along the northern and eastern shoreline.

#### 4.4 Human Ignition Potential

There are opportunities for human caused wildfire ignitions in the Heffley Lake area that could lead to a wildfire event. The primary example of a wildfire resulting from a human ignition source – within this community – would likely be due to poorly managed campfires on both private and public (campsite) lands. There is also potential from the increased tourism and local traffic of a higher frequency of motor vehicle accidents that may result in a wildfire.

As well, due to the proximity of structures to the canopy, should a structure fire occur it may result in a wildfire as flames spread from the building to the forest stand.

#### 5.0 Assessment Process

The Heffley Lake community was assessed by Local FireSmart Representative, Brittany Seibert, during her visit on July 23, 2019. The community and adjacent vegetation within a least a 100m radius were assessed and observations were recorded using the *FCCRP Community Hazard Assessment Form* (see Appendix 2). The assessment process noted a number of attributes that contribute both negatively and positively towards the risk of property damage/loss due to a wildfire event.

The assessment was done in conjunction with Heffley Creek, however due to the distance between the communities and vast difference in fuel type and topography a separate *FCCRP Community Hazard Assessment and Community Assessment Report* was completed.

As part of the FireSmart project – funded by the TNRD – a FireSmart public talk was given on the same day at a local resident’s house in the Heffley Lake community. The objective of the talk was to educate home owners on the use of the *FireSmart Site and Structure Hazard Assessment Form* to help identify and prioritize hazards as they relate to wildland fire and their homes. The invitation was open to members of both Heffley Lake and Heffley Creek. It was advertised through the TRND’s Facebook page and as well through the Heffley Holler. There were 5 residents in attendance.

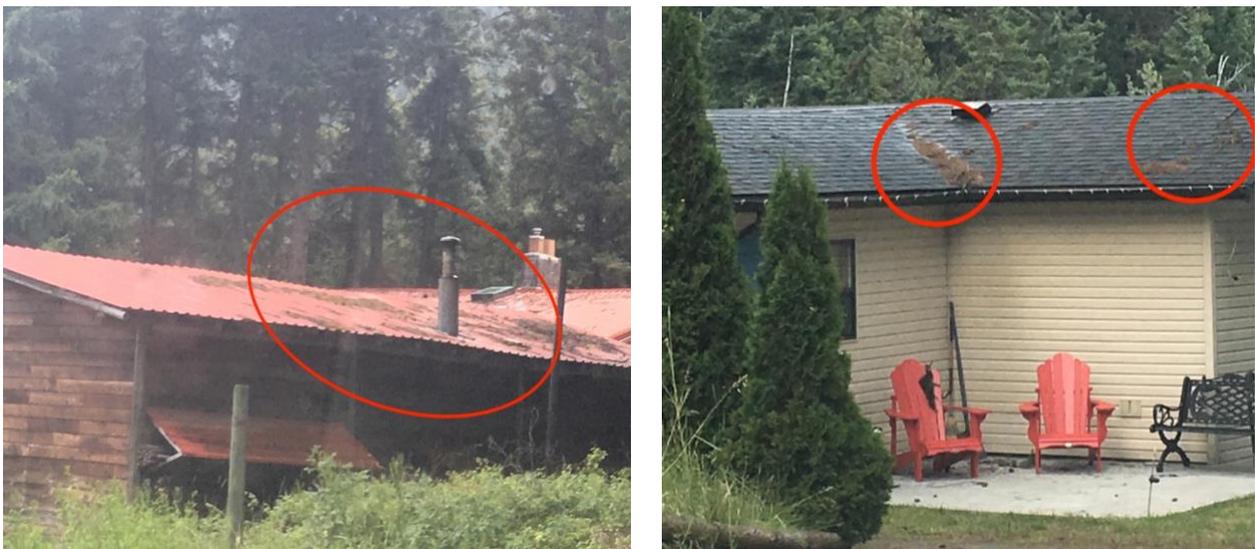
## 6.0 Observations and Issues

The following observations were noted during the community wildfire hazard assessment. See Appendix 2 to view the entire community wildfire hazard assessment form and notations.

### 6.1 Roof Assemblies

A home's roof is the largest surface that is the most exposed to embers during a wildfire. Homes with a flammable wood shake roof have a much higher probability of igniting during a wildfire compared to a non-wood roofing system. Most of the structures within the Heffley Lake community were seen to have fire-rated roofing materials – a mixture between metal and asphalt shingles. Roofs appeared overall to be in good condition however several roofs were seen with accumulation of combustible debris. This accumulation is likely due to the high prevalence of conifer overstory within the community. While rated roofing material has proven to be resilient against combustion, it is recommended that roofs be free and clear of combustible debris. There is potential that burning debris may challenge a roof's fire resistance or may become airborne or roll from the roofs, igniting other fuel sources around the home.

Some structures around the community were seen to have wood roofs, particularly on outbuildings such as sheds. Outside of the potential for loss of the structure, there is cause of concern that the outlying structure will become a fuel source that can create embers or sustain enough radiant heat for home ignition. See section 6.3 for further detail



*Figure 9 Debris accumulation on roofs is a potential ignition source that can decrease the fire resistance*

### 6.2 Building Exteriors

The Heffley Lake community contained an array of building exterior materials from fire-rated siding, such as log, to non-fire rated including vinyl and wood. However, risk factors associated with the exterior surface of a structure are less dependent on the characteristics of the exterior cladding system

(e.g. stucco vs. cement board vs. vinyl siding etc.) and more dependent on the likelihood of direct flame contact and/or ember accumulation on the structure. Accumulated fuel along an exterior wall can negate the fire-resistant advantages that any particular exterior cladding system provides, should the fuel ignite (figure 10). The removal of fuel accumulations along any exterior wall should be of much greater concern than the actual composition of the wall itself.

### 6.3 Nearby Combustibles

In the context of the structure and site hazard assessment, *nearby combustibles* refer to non-vegetative fuel – firewood, wood fences, sheds, vehicles etc. Outbuildings are of particular concern if they are located within 15m (45ft) of the home. Outbuildings pose a threat to the ignition of a home because they are able to sustain extreme radiant heat for over long periods of time. There is an additional risk of firebrand production which poses a risk to any nearby structures or fuel sources. Any outbuilding that is located within 15m (45ft) should have FireSmart principles applied to mitigate potential ignition.



*Figure 10 Combustible materials stacked along a structure pose a threat to home ignition*

Firewood was a common characteristic within the Heffley Lake community. While several properties demonstrated proper FireSmart mitigations by placing firewood stack away from structures, many properties were seen with firewood stacks within close proximity and often abutting the structure. Firewood has a high risk of ignition and, like outbuildings, maintains extreme radiant heat while burning. This burning fuel source can also provide direct flame contact and contribute to firebrand creation. It is recommended that firewood to be stack at least 10m away from the structure until the threat of wildfire season has passed. Other combustible materials were also seen stored along structure exteriors.

Direct flame contact is often thought of as the primary factor in home ignition and subsequent loss. However, recently it has become more apparent that ignition from firebrands is the most likely scenario. Because of this, innocuous items commonly found around the outside of a home may act as a combustible that could ignite the home. Flammable patio furniture (particularly seat cushions), sisal

doormats and rats, or even a corn broom leaning against the house are all potential fuels that could ignite from ember accumulation.

## 6.4 Vegetation

Vegetation is assessed in three concentric zones around a home (Figure 2), with Priority Zone 1 (PZ-1) being the area occupying the first 10m (30ft) around the structure. More recently Zone 1a – known as the non-combustible zone – has been added to distinguish the importance of the first 1.5m (4.5ft) from a structure. The quantity and condition of canopy, ladder and surface fuels are the key factors assessed in regards to vegetation.

In Heffley lake Douglas fir the predominant tree species. Several other species were seen within the 100m radius of the community including various deciduous species and Ponderosa pine. The forest stand itself can be described as continuous crown with pockets of deciduous intermixed. Deciduous species are the recommended vegetation when it comes to FireSmart mitigations. This is because deciduous are naturally resistive to intense wildland fire behavior; there is a lack of ladder fuels and a smooth, tight bark which deters vertical fire growth, and a higher moisture content found within the leaves.



*Figure 11 Most homes within the Heffley Lake community are located within the timber stand. However, due to the lack of ladder fuels, it unlikely for crown fires to be established within zone 1.*

## HEFFLEY LAKE FIRESMART COMMUNITY ASSESSMENT REPORT

Almost all structures within the community were found below conifer canopy. This can pose a significant risk to structures however, due to the lack of natural ladder fuel (e.g. low-lying branches) the overall risk is decreased. It is unlikely within the PZ-1(a) to see vertical fire growth or sustained crown fire. Home owners should still be cognizant of needle litter accumulation on roof tops, decks, and lawns and associated risk of conifer presence. Ladder fuels within the continuous conifer stand were more present along the main road (Heffley Louis Creek Rd.).

Most homes in the Heffley Lake community have overlapping zones. In many cases, one home's Zone 1 is the adjacent home's Zone 1. This is a common characteristic of higher-density WUI areas and it reinforces the view that many individual FireSmart efforts can increase the overall wildfire resilience of the entire neighborhood. Unfortunately, the same holds true when one (or more) homes aren't FireSmart and pose a threat to adjacent homes that are.



*Figure 12 Fuel densities of Heffley Lake*

## 7.0 Recommendations

FireSmart seeks to create a sustainable balance that will allow communities to live safely while maintaining environmental harmony in a wildland urban interface (WUI) setting. Homeowners already balance their decisions about fire protection measures against their desire for certain flammable components on the properties. It is important for them to understand the implications of the choices they're making. These traces directly relate to the ignitability of their home ignition zones during a wildfire.

A home owner/community must focus attention on the home and surrounding area and eliminate the fires potential relationship with the house. This can be accomplished by disconnecting the house from high and/or low-intensity fire that could occur around it, and by being conscious of the devastating effects of wind driven embers.

## HEFFLEY LAKE FIRESMART COMMUNITY ASSESSMENT REPORT

The following section of this report provides recommendations for consideration by the Heffley Lake community concerning wildfire safety issues that were identified as priorities during the assessment:

- Removal of conifers and combustible plants within Zone 1a (0-1.5m) and Zone 1 (1.5-10m) will significantly reduce the fire hazard rating for structures and properties within the community. Homeowners may reference the *FireSmart Guide to Landscaping* for recommended vegetation for PZ-1(a)
  - Should there be reluctance on the complete removal of these species – particularly with standing conifers – removal of ladder fuels and any branches in contact with the home will be required. It is also highly recommended to increase the horizontal spacing to 3m.
- Removal of ladder fuels within Zone 2 (10-30m) and Zone 3 (30-100m) will help to decrease intensities in approaching flame fronts by reducing the fire from continuous crown fire to a more manageable surface fire. Increasing horizontal continuity to 3m separation is also recommended.
  - Should any of the priority zones fall onto crown land it is recommended to seek a qualified professional for assessment and plan of action
- Personal items such as trailers/RVs, recreational vehicles, tools, building materials, etc. are all considered combustible and should be stored appropriately or removed from PZ-1 (>10m from home).
- Neighboring buildings – such as sheds or detached garages – located within 15m of the home should be considered as a fuel source. It is recommended that they have FireSmart mitigations completed to prevent ignition.
- Homes with firewood should have stacks a min. of 10m away from structures during the wildfire season. Firewood may be moved closer during times when wildfire threat is low (i.e. winter). Homeowners should remain vigilant on weather changes during shoulder seasons, as wildfire seasons have demonstrated earlier and later burning periods in the calendar year.
- When fire weather is severe and the home is unoccupied, homeowners should remember not to leave flammable items outside. This includes rattan doormats, flammable patio furniture, children's toys and trash cans.

It is recommended that the community come together to create FireSmart Community Plan regardless of the community's intention to seek FireSmart Community Recognition status. A FireSmart Community Plan is generally a simple action plan, comprised of at least three agreed-upon, doable action items that will improve a community's wildfire readiness. The Community Plan can be modified with the passage of time and renewed with each new wildfire season.

### 8.0 Successful FireSmart Mitigations

When adequately prepared, a house can likely withstand a wildfire without the intervention of the fire service. Further, a house and its surrounding community can be both FireSmart and compatible with the

area's ecosystem. The FireSmart Communities program is designed to enable communities to achieve a high level of protection against wildfire loss even as a sustainable ecosystem balance is maintained.

Other than the replacement of an unrated wood roof or replacing a flammable deck, most FireSmart hazard mitigations around the home are inexpensive and straightforward. In many ways, hazard mitigation and spring yardwork go together and can be scheduled as such. Most often it is the small things that a homeowner attends to that can make a big difference in whether their home will survive during a WUI fire. The following are good examples of small steps that homeowners within the Thompson Nicola Regional District have put in place that make their homes – and subsequently their community – more resilient to wildfire:

### 8.1 Fire-Resistant Roofing

Replacing a roof is one of the single-most expensive FireSmart improvements. The combination of a rated roof that is free of fuel accumulations is a big step to improving the survivability of a home during wildfire event.



*Figure 13 Fire-rated roofing material is proven to be highly resilient against home ignition during a wildfire event. Roof design can also contribute to mitigation of debris accumulation by minimizing valleys and pinch point where debris can be captured*

### 8.2 Landscaping

Simple landscaping changes to one's respective Zone 1 can make all the difference in preventing home ignition. Replacing bark mulch with rock, replacing conifers with deciduous, and utilizing low flammable plants within gardens are all great steps one can make towards increasing their home's resiliency. Maintaining a green lawn is the best standard however, a mowed lawn is still a fire-resistant lawn – grasses shorter than 10cm are less likely to burn intensely. Removal of dead leaves and pine needle litter will also help to reduce fuel sources within the yard.



*Figure 14 This home demonstrates several FireSmart landscaping attributes. The gravel provides a non-combustible surface creating a break from direct flame contact to the home. Conifers have been removed up to 10m away and ladder fuels have been cleared. Leafy, deciduous plants are the preferred vegetation to be found in zone 1.*

## 9.0 Next Steps

After reviewing the contents of this assessment and its recommendations, it is up to the Heffley Lake community to determine whether or not they will implement the recommendations. The recommendations and FireSmart guidelines noted above are proven and time-tested to be effective in reducing the risk of wildfire losses. It is believed that there is great potential for the community and its residents to work together to reduce the wildfire threat quickly and substantially by acting to mitigate priority issues.

Should the Heffley Lake community wish to seek FireSmart Community recognition status it is encouraged for them to contact the Local FireSmart Representative and to also create a FireSmart Board. A FireSmart Board is a multi-disciplinary group of volunteer representatives of the neighborhood or community who are responsible for driving the FireSmart initiative in their community and ensuring the recognition criteria are met.

If the report and the recommendations are accepted and recognition will be sought, the Heffley Lake FireSmart Board will create agreed-upon, area-specific solutions to the FireSmart Community Assessment Report recommendations to prepare a FireSmart Community Plan in cooperation with their Local FireSmart representative and local fire agency personnel who may be acting as advisers.

If Heffley Lake seeks to achieve the national recognition as a FireSmart Community, the following standards should be incorporated into its FireSmart Community Plan:

## HEFFLEY LAKE FIRESMART COMMUNITY ASSESSMENT REPORT

- Sponsor a local FireSmart Board that maintains the FireSmart Community program and recognition status
- Continue to work with the Local FireSmart Representative or enlist the assistance of a WUI specialist to complete a FireSmart Community Plan which identifies agree-upon, achievable local solutions
- Invest a minimum of \$2.00 annually per capita in its local FireSmart Events and activities and activities (work done by municipal employees or volunteers\*, using municipal or other equipment, can be included, as can provincial/territorial grants dedicate to that purpose).
- Hold a FireSmart Event (e.g. FireSmart Day) each year that is dedicated to a local FireSmart project.
- Submit an application form or annual renewal application form with supporting information to FireSmart Canada. This application or renewal process documents continuing participation in the FireSmart Communities Program with respect to the above criteria.

\* Volunteer hours are calculated at a rate of \$21 per hour or at the rate of service being voluntarily given

### 10.0 Signature of Local FireSmart Representative

| Signed:   | Date signed:     |   |
|---|------------------|---|
|  | October 25, 2019 | Brittany Seibert, LFR<br>Frontline Operations Group, Ltd.<br>Brittany@frontlineops.ca |
|   |                  |   |

## APPENDIX 1: Resources

- FireSmart Canada

<https://www.firesmartcanada.ca>

- FireSmart British Columbia

<https://firesmartbc.ca>

- FireSmart Begins at Home Assessment

<https://firesmartbc.ca/wp-content/uploads/2019/07/FireSmart-Home-Assessment.pdf>

- FireSmart Canada Community Recognition Program (FCCRP)

<https://firesmartbc.ca/resource/how-to-apply-for-the-firesmart-canada-community-recognition-program-fccrp/>

<https://firesmartbc.ca/wp-content/uploads/2019/01/FCCRP-Application-Form-1.pdf>

- FireSmart Guide to Landscaping

<https://www.firesmartcanada.ca/mdocs-posts/firesmart-guide-to-landscaping/>

## APPENDIX 2: Community Wildfire Hazard Assessment Form



This Community Wildfire Hazard Assessment form provides a written evaluation of the overall community wildfire hazard – the prevailing condition of structures, adjacent vegetation and other factors affecting the FireSmart status of a small community or neighbourhood. This hazard is based on the **hazard factors** and **FireSmart recommended guidelines** found in **FireSmart: Protecting Your Community from Wildfire** (Partners in Protection, 2003) and will assist the Local FireSmart Representative in preparing the FireSmart Community Assessment Report. **NOTE: Mitigation comments refer to the degree to which the overall community complies or fails to comply with FireSmart recommended guidelines with respect to each hazard factor**

| <b>Community Name:</b> Heffley Lake  |                   | <b>Date: (mm/dd/yyyy)</b> July 23, 2019   |
|--|-------------------|---|
| <b>Assessor Name:</b> Brittany Seibert   |                   | <b>Accompanying Community Member(s):</b>  |
| Hazard Factor  | Ref               | Mitigation Comments   |
| <b>1. Roof Assemblies</b>  |                   |   |
| a. Type of roofs<br>ULC rated (metal, tile, asphalt, rated wood shakes) unrated (unrated wood shakes)  | 2-5<br>3-21       | Mix of roofing materials. Newer/updated homes have rated roofs; cabins have varying roofing materials                         |
| b. Roof cleanliness and condition<br><i>* Debris accumulation on roofs/in gutters; curled damaged or missing roofing material; or any gaps that will allow ember entry or fire impingement beneath the roof covering</i> | 2-6               | Most observable roofs have some amount of combustible accumulations presented. Heavy conifer overstory plays into this factor |
| <b>2. Building Exteriors</b>   |                   |   |
| <b>2.1 Materials</b>   |                   |   |
| a. Siding, deck and eaves  | 2-7<br>2-8<br>2-9 | Variety of siding materials. Most homes along the lake have a deck (wood). Newer/updated homes have closed eaves              |
| b. Window and door glazings<br>(single pane, sealed double pane)   | 2-10              | Highly variable, dependant on age of structures.  |

|   |             |   |
|---|-------------|---|
| <p>c. Ember Accumulator Features<br/>(scarce to abundant)</p> <p><i>* Structural features such as open eaves, gutters, unscreened soffits and vents, roof valleys and unsheathed crawlspaces and under-deck areas</i></p> |             | <p>All structures have a variety of ember accumulator features including roof shapes, deck configurations, open and unsheathed deck construction and gutters</p>  |
| <p>d. Nearby Combustibles – firewood, fences, outbuildings</p>  | <p>2-11</p> | <p>Firewood and outbuildings are most common feature. Store firewood away from the house during firer season (&lt;10m). Fire wood can be moved onto porches/under eaves once threat of WUI firer has passed for the season. Other combustible materials seen propped against structures</p> |

| Hazard Factor   | Ref  | Mitigation Comments   |
|---|------|---|
| <b>3. Vegetation</b>  |      |   |
| <b>3.1 PZ-1: Vegetation - 0 - 10m from structure Page Reference 3-5</b>   |      |   |
| a. Overstory forest vegetation<br>(treated vs. untreated)   | 2-14 | Most homes along the lake are tucked into the trees. Area has had bark beetle issues; some P2-1 areas have been affected. In some cases, affected trees have been removed. Mature Douglas fir is the most prevalent conifer species in the area with a mixture of deciduous aspen and birch. While there is a heavy presence of conifer within the 10m zone, it should be noted there is very little for ladder fuels and is unlikely that fire would be carried through the canopy/overstory |
| b. Ladder fuels<br>(treated vs untreated)   | 2-17 | Immature douglas fir would be the primary ladder fuel within the stand  |
| c. Surface fuels-includes landscaping mulches and flammable plants<br>(treated vs untreated)  | 2-16 | Most surface fuels around homes are removed. Grasses are the prominent vegetation surrounding property's main structure   |
| <b>3.2 PZ-2: Vegetation - 10 - 30m from structures Page Reference 3-9</b>   |      |   |
| a. Forest vegetation (overstory)<br>treated vs untreated  | 2-14 | Similar to zone 1 as there is little definition of change between zones 1&2   |
| b. Ladder fuels<br>treated vs untreated   | 2-17 | See comments above  |
| c. Surface fuels<br>treated vs untreated  | 2-16 | Duff layer containing twigs, sparse grass and other organic material would likely create a ground fire that is slower in movement but would require more effort for suppression and mop up (fire would be more like to be sustained)  |
| <b>3.3 PZ-3: Vegetation - 30 - 100m from structures Page Reference 3-13 Provide mitigation comments on the prevailing PZ3 fuel type</b> |      |   |
| a. Light fuel- deciduous – grass, shrubs  | 2-16 | Some grasses, mainly leafy deciduous plants   |

| Hazard Factor  | Ref  | Mitigation Comments   |
|--|------|---|
| b. Moderate fuel - mixed wood – light to moderate surface and ladder fuels, shrubs   | 2-17 | Immature douglas fir contributes mainly to ladder fuels   |
| c. Heavy fuel - coniferous - moderate to heavy surface and ladder fuels, shrubs  | 2-14 | Mixture of C3, C5 and M2 (75% conifer, 25% deciduous) throughout community. C5 and M2 fuel types demonstrate lower levels of ladder fuels and higher concentrations of horizontal continuity while C3 also includes ladder fuels  |
| d. Logging slash, dead/down fuel accumulations   | 2-16 | N/A   |
| e. Diseased forest – without foliage vs with foliage   |      | Some areas demonstrate bark beetle issues. In some cases these trees have been removed  |
| f. Fuel islands within community - treated vs untreated  |      | N/A   |
| <b>4. Topography</b>   |      |   |
| <b>4.1 Slope (within 100m of structures)</b>   |      |   |
| a. Slope - Flat or < 10 %, 10 – 30% or >30%  | 2-19 | Valley slopes 30%. Community structures located along lake and bottom of slope  |
| <b>4.2 Buildings setback on slopes &gt;30 %, position on slope Provide mitigation comments on items a – c as applicable</b>                                    |      |   |
| a. Setback from top of slope > 10m, or bottom of slope – valley bottom.<br>b. Buildings located mid-slope<br>c. Setback from top of slope <10m, or upper slope | 2-12 | Most homes are located along the shoreline and would unlikely be affected by the valley slope. It is more likely that a fire started on the hillside would burn away from properties due to fire's tendency to burn up hill. However, downhill and cross slope winds may still create hazard of embers that may result from aggressive fire behaviour |

| Hazard Factor   | Ref  | Mitigation Comments  |
|---|------|--|
| <b>5. Infrastructure - Access / Egress, Roads, Driveways and Signage</b>          |      |  |
| 5.1 Access Routes – Road Layout To FireSmart Recommended Guideline?               |      |  |
| a. Single Road or Looped Road   | 3-28 | Single road access.  |
| 5.2 Roads- width, grade, curves, bridges and turnarounds                          |      |  |
| a. To FireSmart Recommended Guideline?  | 3-30 | N/A  |
| 5.4 Fire Service Access / Driveways - Grade, Width/Length, Turnarounds            |      |  |
| a. To FireSmart Recommended Guideline?  | 3-30 | N/A  |
| 5.5 Street Signs / House Numbers  |      |  |
| a. To FireSmart Recommended Guideline?  | 3-30 | N/A  |
| <b>6. Fire Suppression - Water Supply, Fire Service, Homeowner Capability</b>     |      |  |
| 6.1 Water Supply  |      |  |
| a. Fire Service water supply – hydrants, static source, tender or no water supply | 3-32 | Lake would be the main water source  |
| 6.2 Fire Service  |      |  |
| a. Fire Service < 10 minutes or > 10 minutes, no fire service                     | 2-25 | No coverage within community; there is a FD in Sun Peaks and BCWS crews located in Kamloops (IA and Unit Crew) |
| 6.3 Homeowners Suppression Equipment  |      |  |
| a. Shovel, grubbing tool, water supply, sprinklers, roof-top access ladder        | 3-28 | Likely that property owners would have basic suppression tools (ie: hand or power saw, shovels)                |

| Hazard Factor   | Ref  | Mitigation Comments  |
|---|------|--|
| <b>7. Fire Ignition and Prevention - Utilities, Chimneys, Burn Barrel / Fire Pit, Ignition Potential</b>  |      |  |
| 7.1 Utilities   |      |  |
| a. ToFireSmartRecommended<br>Guideline?   | 2-24 | N/A  |
| 7.2 Chimneys, Burn Barrel / Fire Pit  |      |  |
| a. ToFireSmartRecommended<br>Guideline?   | 2-22 | N/A  |
| 7.3 Ignition Potential Provide mitigation comments on items a – d as applicable   |      |  |
| a. Topographic features adversely affect fire behaviour<br>b. Elevated probability of human or natural ignitions<br>c. Periodic exposure to extreme fire weather or winds<br>d. Other | 2-21 | Some local year-round residents, higher population of seasonal visitors. Campgrounds permitting campfires would be most likely source of human ignition<br>Valley winds and fuel loads would be main topographic feature to affect fire behaviour and spread |
| <b>General Comments</b>   |      |  |