Village of Harrison Hot Springs
Community Wildfire Protection Plan 2017

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HARRISON HOT SPRINGS
Naturally Refreshed

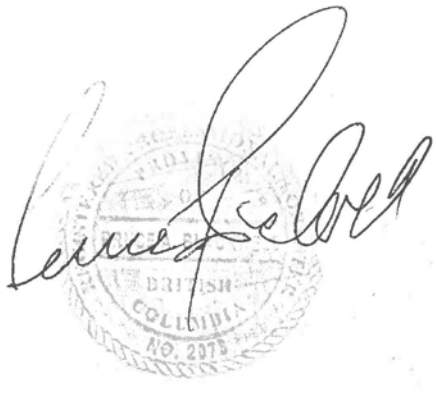
ACKNOWLEDGEMENTS

The authors would like to thank the following Village of Harrison Hot Springs and District of Kent staff: Gerald Basten (Emergency Program Coordinator); Derek Dubiellak (Deputy Emergency Program Coordinator); Madeline McDonald (Chief Administrative Officer); Troy Davis (Infrastructure Manager); Nicole Sethe (Clerk). The authors would also like to express their appreciation to David Whittaker (Fire Chief – Village of Harrison Hot Springs Fire Department). These individuals invested substantial time in meetings, answering questions, reviewing and commenting on the contents of this document.

In addition, the authors would like to thank staff from the BC Wildfire Service, including: Tony Botica (Fuel Management Specialist, Coastal Fire Centre); Orin Caddy (Forest Protection Technician, Fraser Fire Zone - Cultus/Haig Fire Base); as well as Reg Dyck (Manager of Electoral Area Emergency Services, Fraser Valley Regional District); Stacey Barker (Deputy Director of Regional Programs, Fraser Valley Regional District); and Sam Stickney (Area Supervisor – North Fraser, BC Parks).

This report would not be possible without the Strategic Wildfire Prevention Initiative (SWPI) Program and funding from the Union of British Columbia Municipalities (UBCM).

REGISTERED PROFESSIONAL SIGN AND SEAL



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March 1, 2019

EXECUTIVE SUMMARY/ SUMMARY OF CWPP RECOMMENDATIONS

The Community Wildfire Protection Plan (CWPP) process was created in British Columbia (BC) as a response to the devastating 2003 wildfire in Kelowna. As an integral part of the Strategic Wildfire Prevention Initiative (SWPI), managed and funded through the Strategic Wildfire Prevention Working Group, CWPPs aim to develop strategic recommendations to assist in improving safety and to reduce the risk of damage to property from wildfires.

This CWPP will provide the Village of Harrison Hot Springs (the Village) with a framework that can be used to review and assess areas of identified high fire risk within the Village. Additionally, the information contained in this report should help to guide the improvement and/or development of emergency plans, emergency response, evacuation plans, communication and education programs (including FireSmart), bylaw development in areas of fire risk, and the management of potentially hazardous forest lands adjacent to the community.

Wildfire management requires a multi-faceted approach for greatest efficacy and risk reduction outcomes. A total of 23 strategic recommendations are summarized in Table 1 below. In addition, these recommendations are more thoroughly discussed in their appropriate sections within the document. As emergency services are currently managed jointly between the District of Kent and the Village of Harrison Hot Springs, efficiencies may be gained by both parties if some of the recommendations contained in this CWPP are implemented cooperatively. As such, it is suggested that the Village partner with the District wherever appropriate and feasible, as determined by Village and District staff. Furthermore, because the area of interest extends onto private land and therefore outside the Village jurisdiction, the Village's role may be limited to the role of an influencer in some instances, while other recommendations can be directly implemented by the Village. Ultimately, the recommendations within this strategy should be considered a toolbox of options to help reduce the wildfire threat to the community. There is not one combination or course of action which is the answer; the Village will have to further prioritize based on resources, strengths, constraints, and availability of funding and regularly update the prioritization and course of action as variables change through time.

Table 1. Summary of CWPP recommendations by document section.

Document Section 2: Local Area Description (2.5.3: Local Government/First Nations Policies and Recommendations)				
Item	**Page No.**	**Priority**	**Recommendation / Next Steps**	**Estimated Cost ($) or Person hours**
Objective: Review and amend the current Village regulatory framework to incorporate wildfire mitigation and preparedness considerations				
1	10	High	Consider reviewing Section 3.5 of the OCP and incorporating a Wildfire Development Permit Area where wildfire interface guidelines based on FireSmart principles apply. (See Section 5.2.2 for further details and recommendations regarding a new development permit).	UBCM CRI Funding/ ~25-50 in-house hours (local government funding)
2	11	Moderate	Consider applying to the Community Resiliency Investment (CRI) Program[1] for funding to conduct FireSmart home and property assessments within the Village, to develop a FireSmart rebate program for residents, and for the removal of debris accumulated from FireSmart activities conducted on private land.[2]	~25-30 in-house hours (local government funding)
3	12	Moderate	Review the OCP and consider parks acquisition and maintenance through a wildfire risk lens, including consideration for long-term maintenance costs and access. Consider amendments where needed, including the following: 1) require the use of a Qualified Professional (QP) in review, assessment, and siting of parks and park access prior to acceptance; and 2) ensure that bylaws provide the Village authority to request modification (either fuels, access, or siting) based upon QP recommendation and prior to acceptance to ensure that the park is received in, and able to be maintained in, an acceptable range of risk. (See Section 6.1.3 for related recommendations specific to access).	UBCM CRI Funding/ ~15-20 in-house hours (local government funding)

[1] Note that the UBCM SWPI funding stream has very recently transitioned into a new Community Resiliency Investment (CRI) Program. Refer to Section 5.1 and the Union of BC Municipality's website (https://www.ubcm.ca/EN/main/funding/lgps/community-resiliency-investment.html) for further information.

[2] 2019 Community Resiliency Investment Program FireSmart Community Funding & Supports Program & Application Guide, 2018.

Document Section 2: Local Area Description (2.5.3: Local Government/First Nations Policies and Recommendations)				
Item	**Page No.**	**Priority**	**Recommendation / Next Steps**	**Estimated Cost ($) or Person hours**
4	12	High	Develop a Parks and Trails Master Plan and include consideration for the placement, type, width, and objective of trails. Consideration should also be given to trail building and maintenance as these activities can either increase wildfire risk (through fuels accumulations and unsafe work practices) or decrease wildfire risk (though proper placement, clean-up of combustible fuels trailside and work practices which adhere to Wildfire Act and Regulations). The Master Plan could also include an emergency response plan to deal with the risks of fire within parks.	Approximately $50,000-$100,000
5	13	Moderate	Review Village Tree Management and Preservation Bylaw No. 1015, 2012 and revise to allow for homeowners to address wildfire hazards on their property associated with trees immediately adjacent to homes, as determined by a QP.	UBCM CRI Funding/ ~20-50 in-house hours (local government funding)

Document Section 3: Values at Risk				
Item	**Page No.**	**Priority**	**Recommendation / Next Steps**	**Estimated Cost ($) or Person hours**
Objective: Protect human life and safety				
6	20	Moderate	Consider lobbying the Provincial government or local Medical Health Officer(s) to develop a strategy for communities to draw upon when they are exposed to smoke from wildfire for extended periods of time. This strategy may include smoke exposure risk assessments, exposure reduction measures, and a decision-key for when to evacuate the community due to wildfire smoke.	~10-15 in-house hours (local government funding)
Objective: Protect critical infrastructure and mitigate post-wildfire impacts				
7	20	Moderate	The use of fire resistant construction materials, building design and landscaping should be considered for all CI when completing upgrades or establishing new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart guidelines. Secondary power sources are important to reduce critical infrastructure vulnerability in the event of an emergency which cuts power for days, or even weeks.	Negligible in-house cost

Document Section 5: Risk Management and Mitigation Factors Recommendations				
Item	**Page No.**	**Priority**	**Recommendation / Next Steps**	**Estimated Cost ($) or Person hours**
Objective: Reduce Wildfire Threat through Fuel Management				
8	59	High	Proceed with detailed assessment, prescription development and treatment of hazardous fuel units identified and prioritized in this CWPP.	UBCM CRI Funding/ local government funding
9	63	Moderate	If and when operational fuel treatments are conducted within the Village AOI, treatment monitoring should be completed by a Qualified Professional in order to schedule the next set of maintenance activities (5 – 10 years out). This can be completed with a CWPP update or as a stand-alone exercise.	UBCM CRI Funding/ local government funding
Objective: Reduce Wildfire Hazard on Private Land				
10	70	High	10.1 - Review the Official Community Plan (OCP); consider including wildfire as a natural hazard development permit area. A recommended development permit area (DPA) for the Village would include all areas within the municipality that are located within 200 m of moderate, high or extreme wildfire behaviour threat class areas. It is also recommended that the Village consider incorporating QP reports and sign-off as part of the wildfire interface guidelines and that DP applications are provided to the Village of Harrison Hot Springs Fire Department (VHHSFD) for opportunity for input prior to approval. As more wildfire DP applications are received, the importance of communication and integration between the VHHSFD and the Village will increase. The Village should also consider engaging the development/ building community (may include developers, builders, landscapers, and architects) in DPA development process. It is recommended that this be done in partnership with the District of Kent, if appropriate. 10.2 - To complement the DPA, it is recommended that the Village develop a landscaping standard which lists flammable non-compliant vegetation and landscaping materials, non-flammable drought and pest resistant alternatives, and tips on landscape design to reduce maintenance, watering requirements, avoid wildlife attractants, and reduce wildfire hazard. See *Section 5.2.2 Planning and Development* for more information on DPA recommendations.	UBCM CRI Funding/ local government funding

Document Section 5: Risk Management and Mitigation Factors Recommendations				
Item	**Page No.**	**Priority**	**Recommendation / Next Steps**	**Estimated Cost ($) or Person hours**
Objective: Increase Public Wildfire Awareness				
11	74	High	Make this report and associated maps publicly available through webpage, social media, and public FireSmart meetings. In addition, this CWPP should be shared with local industry partners; in particular industrial forest companies who may be interested in collaborating on direct fuel management treatments or with other sections of this CWPP document.	3-6 in-house hours depending on method of distribution
12	74	Moderate	Complete or schedule periodic updates of the CWPP to gauge progress and update the threat assessment (hazard mapping) for changes in fuels, forest health, land planning, stand structure or changes to infrastructure in the interface. The frequency of updates is highly dependent upon major changes which would impact the Village's wildfire threat assessment or the rate at which wildfire risk reduction efforts are implemented. An evaluation of major changes (including funding program changes that may lead to new opportunities) and the potential need for a CWPP update should be initiated every 5 - 7 years.	UBCM CRI funding/ local government funding
13	75	High	Consider promoting FireSmart approaches for wildfire risk reduction to Village residents through Town Hall meetings, workshops and/or presentations. Aim to conduct the engagement/promotion campaign prior to and during the fire season. Consider supplying FireSmart materials to homeowners in the interface during these engagement campaigns and making this information available to tourists and visitors to the Village to increase awareness of wildfire risk.	~10 hours. May be eligible for UBCM CRI grant
14	75	Moderate	Work towards FireSmart community recognition, at the neighbourhood level and facilitate uptake into the FireSmart Canada Community Recognition Program (FSCCRP). This will help reduce fire risk and aid in further funding applications.	FireSmart grant (when funding is available)

Document Section 5: Risk Management and Mitigation Factors Recommendations				
Item	**Page No.**	**Priority**	**Recommendation / Next Steps**	**Estimated Cost ($) or Person hours**
15	75	Moderate	Facilitate the FSCCRP uptake within the Village and enhance its applications by including the following: 1) inviting BCWS crews to participate in and support the annual FireSmart events set up by participating neighbourhoods 2) Encourage individual homeowner participants to complete the self-administered FireSmart home assessment tool 3) Include within the FireSmart Canada Community Assessment Report the standard recommendation that participating neighbourhoods hold a home hazard assessment workshop as one of their FireSmart events.	$5,000/ neighbourhood and an additional 40 hours / initiative UBCM CRI grant(s) available
16	75	Moderate	Promote the use of the FireSmart Home Partners Program offered by the Partners in Protection Association, which facilitates voluntary FireSmart assessments on private property. Use the opportunity to educate the home or business owner about the hazards which exist on their property and provide easy improvements to reduce their risk.	~1.5 hours/ assessment

Document Section 6: Wildfire Response Resources Recommendations				
Item	**Page No.**	**Priority**	**Recommendation / Next Steps**	**Estimated Cost ($) or Person hours**
Objective: Improve Access/Egress to Enhance Emergency Preparedness				
17	79	High	In cooperation with the District of Kent, continue to work with relevant Provincial ministries and stakeholders including BC Parks, Emergency Management BC, Ministry of Transportation and Infrastructure, MFLNRORD, Seabird Island Indian Band (holders of a woodlot license adjacent to Sasquatch Provincial Park), BC Hydro, Fraser Valley Regional District, Enbridge (operating a line station at Ruby Creek) and Canadian Pacific Railway, to complete a secondary egress route through Sasquatch Park and provide an alternate evacuation route for residents and visitors along Rockwell Drive.	~40-50 in-house hours, dependent on task sharing with the District of Kent
18	79	Moderate	When the evacuation plan is finalized, complete and participate in regular testing of, and updates to, the evacuation plan.	~30-40 hours to plan and stage; 8 hours to complete testing
19	79	Moderate	Consider developing a community wildfire pre-planning brochure that addresses the following: 1) locations of staging areas; 2) identifies water reservoirs, communications requirements (*e.g.*, radio frequencies), minimum resource requirements for structure protection in the event of an interface fire, and values at risk; and 3) maps of the area of interest.	~10,000- $15,000 to complete (contractor estimate)
Objective: Include Wildfire Considerations when Trail Planning				
20	79	Moderate	Develop a Total Access Plan for the Village to create, map and inventory trail and road network in natural areas for suppression planning, identification of areas with insufficient access and to aid in strategic planning. Georeferenced maps with ground-truthed locations of potential optimal firebreaks should be developed as part of the Total Access Plan and shared with fire suppression personnel and BCWS to support emergency response in the event of a wildfire. The plan should be updated every five years, or more regularly, as needed to incorporate additions and / or changes.	~8,000-$10,000 to build plan, map, populate attributes and update (contractor estimate)
Objective: Enhance Wildfire Equipment and Training				
21	80	Moderate	Fire Departments should engage in regular cadence of communication with the BCWS Fraser Fire Zone, Cultus/Haig Fire Base to foster a strong relationship and identify potential cooperative wildfire risk reduction opportunities.	~4 hours/ year

Document Section 6: Wildfire Response Resources Recommendations				
Item	**Page No.**	**Priority**	**Recommendation / Next Steps**	**Estimated Cost ($) or Person hours**
22	80	High	Ensure all VHHSFD continue to have SPP-WFF 1 at a minimum. Consider expanding the training program to maintain a high level of member education and training specific to interface and wildland fires. The Office of the Fire Commissioner (OFC) offers SPP-115 (formerly S-115) to train structural firefighters on the use of wildfire pumps and hose, and fire service hose and hydrants in the application of structural protection units (SPUs). The OFC is currently developing additional wildfire-specific Officer-level training courses (*e.g.*, Engine Operations in the Wildland Urban Interface); the fire department should continue the practice of staying up to date on wildfire training opportunities, and to train members in this capacity, as training resources / budgets allow.	Current training budget plus additional 8 hour training session/firefighter for SPP-115
Objective: Enhance Protection of Municipal Infrastructure from Wildfire				
23	82	High	Complete a vulnerability assessment of all critical infrastructure, secondary power sources, and fuel availability. Review current capability of secondary power sources, identify vulnerabilities, and prioritize needs, in the case of prolonged or extensive power outages. Upgrade or realign resources, as prioritized.	~20 hours to complete vulnerability assessment and upgrading dependent on project(s) chosen

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COMMONLY USED ACRONYMS

BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic Ecosystem Classification
CDC	Conservation Data Centre
CFFDRS	Canadian Forest Fire Danger Rating System
CRI	Community Resiliency Investment Program
CWPP	Community Wildfire Protection Plan
DP	Development Permit
EOC	Emergency Operations Centre
FBP	Fire Behaviour Prediction System
FDU	Forest Development Unit
FESBC	Forest Enhancement Society of British Columbia
FMP	Fire Management Plan
FRS	Fire Rescue Services
FSCCRP	FireSmart Canada Community Recognition Program
FSP	Forest Stewardship Plan
GAR	Government Actions Regulation
HIZ	Home Ignition Zone
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations, and Rural Development
NFPA	National Fire Protection Agency
OCP	Official Community Plan
OFC	Office of the Fire Commissioner
PSTA	Provincial Strategic Threat Analysis
PTU	Proposed Treatment Unit
QP	Qualified Professional
SPU	Structural Protection Unit
SWPI	Strategic Wildfire Prevention Initiative
TSA	Timber Supply Area
UBCM	Union of British Columbian Municipalities
VHHSFD	Village of Harrison Hot Springs Fire Department
WUI	Wildland Urban Interface

SECTION 1: INTRODUCTION

In 2017, B.A. Blackwell and Associates Ltd. was retained to assist the Village of Harrison Hot Spring (the Village) in developing a Community Wildfire Protection Plan (CWPP); hereinafter referred to as the CWPP. This CWPP document will focus on integrating the updated Provincial Strategic Threat Analysis (PSTA), updated BC Wildfire Service (BCWS) fuel type mapping, and the updated and improved wildfire threat analysis methodology. Furthermore, Village staff have recognized that wildfire mitigation and planning is an important component of emergency planning and preparedness for the community.

Although forest fires are both inevitable and essential to the health of forested ecosystems, the 2003, 2004, 2009, 2010, 2015 and 2017 wildfire seasons resulted in significant economic, social and environmental losses in BC. The 2018 fire season was the most extensive in terms of area burned, surpassing the 2017 fire season. While final suppression costs for the 2018 season are yet to be calculated, the 2017 fire season costs were estimated at over $568 million. Recent wildfire disasters like those experienced in Slave Lake, Alberta (2011), Washington State (2014 and 2015), Fort McMurray, Alberta (2016) and BC and California (2017 and 2018) all display the vulnerability of communities and the potential toll of wildfires on families, neighbourhoods and the economy of entire regions. These events, along with critical lessons learned and important advances in knowledge and loss prevention programs have spurred the need for greater consideration and due diligence with respect to fire risk in the wildland urban interface[3] (WUI).

1.1 PURPOSE

The purpose of this CWPP is to identify the wildfire risks within and surrounding the Village of Harrison Hot Springs, to describe the potential consequences if a wildfire was to impact the community, and to examine options and strategies to reduce the wildfire risks. Each community has a unique risk profile. This CWPP provides an assessment of the level of risk with respect to changes in the area that have occurred recently and gives the Village a current and accurate understanding of the threats to human life, property, and critical infrastructure faced by their communities from wildfires. The goal of this CWPP, in addition to defining the threats, is to identify measures necessary to mitigate these threats, and outline a plan of action for implementing these measures. Specifically, this CWPP is intended to serve as a framework to inform the implementation of specific actions and strategies that will serve to: 1) reduce the likelihood of wildfire entering the community, 2) reduce the impacts and losses to property and critical infrastructure if wildfire were to occur, and 3) reduce the negative economic and social impacts of wildfire to the community.

[3] Wildland/urban interface is defined as the presence of structures in locations in which conditions result in the potential for their ignition from flames and firebrands/embers of a wildland fire (National Fire Protection Association). See Appendix D for a more detailed discussion.

1.2 CWPP PLANNING PROCESS

This CWPP is a review and synthesis of the background information and current data related to the Area of Interest (AOI) which represents the municipal boundary of the Village of Harrison Hot Springs. The CWPP consists of four general phases:

1) **Consultation involving key local government representatives, structural and wildfire specialists, First Nations, and stakeholders**. Consultation and information sharing at various stages of the CWPP development and ensuring linkages with relevant existing land use plans, legislation, and policy currently in place.
2) **Identification of the values at risk and assessment of the local wildfire threat**. Wildfire threat assessment takes into consideration natural fire regime and ecology, Provincial Strategic Threat Analysis (2017), and field work, fuel type verification, completion of Wildland Urban Interface (WUI) Threat Forms and Geographic Information Systems (GIS) wildfire threat analyses.
3) **Developing a risk mitigation strategy**. A guide for the Village to implement mitigation and risk reduction activities. The risk mitigation strategy accounts for prioritization of fuel treatments, FireSmart activities, and wildfire response recommendations that will reduce wildfire threat locally.
4) **Building a community engagement and education strategy**. This phase includes presentation of the CWPP to the Board or Council, the formation of a Wildfire Working Group as well as comprehensive outside consultation with First Nations, government and non-governmental agencies. This CWPP provides recommendations for ongoing community education and engagement to support successful implementation of the CWPP.

1.2.1 Consultation

Broad engagement with local government, Provincial government landowner representatives, stakeholders and First Nations played a key role in developing this CWPP.

The first step in the consultation process was to assemble the key players in the 'Wildfire Working Group'. This group was composed of key internal Village staff, which included: Chief Administrative Officer, Infrastructure Manager, Chief Financial Officer, and Emergency Program Manager and Deputy Emergency Program Coordinator. The only non-Village staff included in the Working Group was the Fire Chief for the Village of Harrison Hot Springs Fire Department. At the initial meeting of the Wildfire Working Group, the objective was to obtain information on wildfire risk mitigation initiatives currently in place or completed, existing plans and policies, current resources, areas of concern, and Village vulnerabilities; and to determine priorities and potential mitigation strategies. Members of the Working Group were consulted on an ongoing basis throughout CWPP development and were integral in providing plan review and approval. The Wildfire Working Group was integral in the review of the draft of this CWPP and provided ongoing support throughout the CWPP process.

BCWS representatives (Wildfire Threat Specialist and Forest Protection Technician) were consulted as follows: 1) at the onset of the project planning phase and 2) throughout the CWPP development process,

both via the submission of Fuel Type Change Rationales and a questionnaire regarding the concerns and priorities of BCWS with respect to wildfire and emergency planning in the Village; and 3) revision of the draft document upon Plan completion.

Information sharing took place with the Seabird Island Band, the Sts'ailes First Nation, the Stó:lō Tribal Council (Stó:lō Nation, Soowahlie First Nation, Shxw'ow'hamel First Nation, Skawahlook First Nation, Leq'a:mel First Nation, Scowlitz First Nation, Kwaw-kwaw-apilt First Nation, Skwah First Nation, Chawathil First Nation), Siska Indian Band, Cook's Ferry Indian Band, Coldwater Indian Band, Nlaka'pamux Nation Tribal Council (Oregon Jack Creek Indian Band, Lytton First Nation, Boothroyd Indian Band, Spuzzum First Nation, Skuppah Indian Band), and Lower Nicola Indian Band, as identified through the Consultative Areas Database and in consultation with Ministry of Forests, Lands, Natural Resources, and Rural Development (MFLNRORD) and the Village of Harrison Hot Springs, regarding the CWPP and locations of potential cultural values at risk requiring protection consideration. Information sharing consisted of an initial phone call, and subsequent distribution of a referral letter and information package (maps, explanation of CWPP, and CWPP draft).

Additional stakeholders were consulted to identify synergies, opportunities for collaboration, and ensure linkages with adjacent and overlapping planning. Combined, these various consultation and engagement opportunities have generated a shared understanding of the CWPP objectives and expected outcomes among local government, stakeholders, residents, and land managers.

1.2.2 Identification of Values at Risk and Local Wildfire Threat Assessment

The risks associated with wildfire must be clearly identified and understood before a CWPP can define strategies or actions to mitigate risks. The identified values at risk are described in Section 3. The wildfire threat in the Village of Harrison Hot Springs AOI was assessed through a combination of the following approaches:

- Natural fire regime and ecology (Section 4.1);
- Provincial Strategic Threat Analysis (Section 4.2); and
- Local wildfire threat analysis (Section 4.3).

The relationship between wildfire hazard, threat and risk can be demonstrated in the following example. If a fire (the hazard) ignites and spreads towards a community, the wildfire can become a threat to life and property, with an associated risk of loss, where:

$$\textit{Wildfire risk} = \textit{Probability x Consequence}$$

And where:

- Wildfire risk is defined as the potential losses incurred to human life, property and critical infrastructure within a community in the event of a wildfire;
- Probability is the likelihood of fire occurring in an area and is related to the susceptibility of an area to fire (fuel type, climate, probability of ignition etc.); and

- Consequences refer to the repercussions associated with fire occurrence in a given area (higher consequences are associated with densely populated areas, or areas of high biodiversity etc.).

1.2.3 Development of a Risk Management Strategy

An effective risk management strategy was developed considering a full range of activities relating to the following:

- Fuel management;
- FireSmart planning and activities;
- Community outreach through communication and education;
- Other prevention measures;
- Structure protection and planning;
- Emergency response and preparedness;
- Evacuation and access; and
- Planning and development.

1.2.4 Building Community Engagement and Education Strategy

Engaging the entire community, from local government staff and officials, to key stakeholders and residents, in wildfire protection planning activities is key to ensuring successful implementation of the plan recommendations. A community engagement and education strategy is described in Section 5.3.

A presentation to the Village Council will aim to ensure high level approval and support for this CWPP.

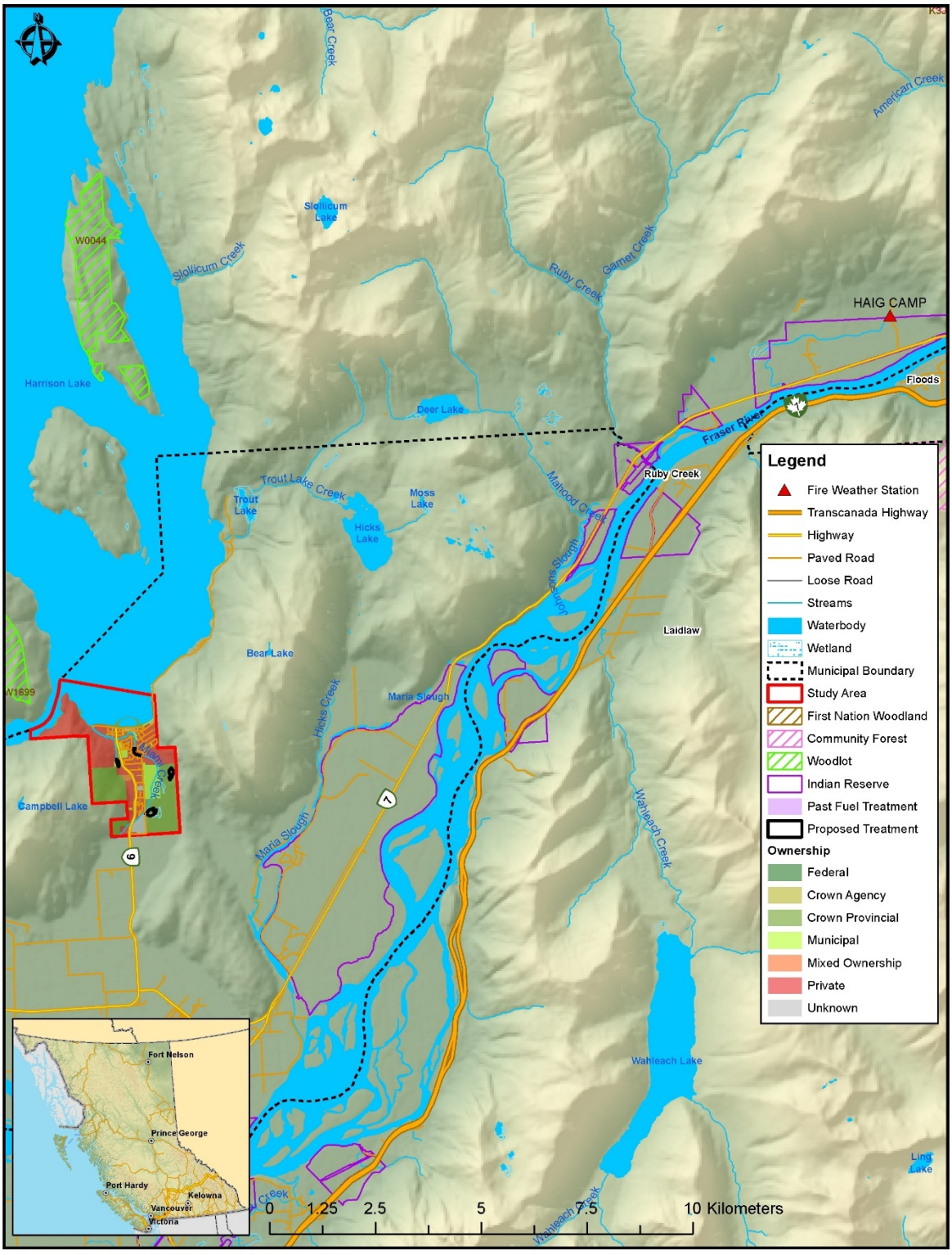
SECTION 2: LOCAL AREA DESCRIPTION

This section describes the extent of the Village of Harrison AOI, summarizes the current community engagement initiatives in wildfire prevention and mitigation, and identifies linkages to other plans and policies with relevance to wildfire planning.

2.1 AREA OF INTEREST

The Village of Harrison Hot Springs is located in the South Coast region of BC, approximately 100 km east of Vancouver in the Fraser Valley. The Village is bordered by the District of Kent on its south, east and west sides, and Harrison Lake on its north side.

The AOI for the CWPP is illustrated below in Map 1. It represents the municipal boundary of the Village of Harrison Hot Springs. The AOI encompasses 709 ha of land in total. A breakdown of the AOI's land ownership is provided in Table 2.



Map 1. Area of Interest (AOI).

Table 2. Summary of AOI by land ownership.

Land Ownership	Hectares
Private	410
Municipal	0
Provincial Crown	3
Crown Agency	43
Federal Crown	234
Unknown	19
Total	709

2.2 COMMUNITY DESCRIPTION

The Village of Harrison Hot Springs is a small resort community located at the southern tip of Harrison Lake in the Fraser Valley. The Village has a population of approximately 1,500 residents and is a popular tourist destination.[4] Services to residents of the Village are provided both at the municipal and regional level through the Village of Harrison and the Fraser Valley Regional District. The regional government provides environmental services, building services, strategic planning, emergency management services, and regional parks planning. At the municipal level, services provided include the enforcement of select bylaws, fire protection services, license and permitting services, public works and utilities, and planning and development.[5]

The South Coast region has been inhabited by the Coast Salish Aboriginal Peoples since before recorded time. The Sts'ailes First Nation, the Seabird Island Band, and the Stó:lō Nation Bands are among the Coast Salish nations that historically occupied land (a complete list of First Nations with interest in the area is provided in Section 1.2.1 and 3.3.2). What is now the Village of Harrison Hot Springs became known to miners for its hot springs in the 1850s and a hotel was built in 1886 to draw visitors to the area. Harrison Lake was and continues to be actively logged for timber and many logging camps have existed in the area throughout the past century. The townsite plan was first registered in 1889 but the Village was not officially incorporated until 1949.

Despite its small size, the Village AOI is topographically diverse, with low lying ecologically productive lands and mountainous terrain. The elevation varies from less than 200 m to over 500 m. Harrison Lake is the largest freshwater body within and adjacent to the AOI, with an area of over 20,000 ha. Several streams are present within the Village, including Hotsprings Slough and Miami Creek.

[4] Harrison Hot Springs, 2017. Our Community. Retrieved online from: https://www.harrisonhotsprings.ca/our-community/

[5] Harrison Hot Springs, 2017. Departments. Retrieved online from: https://www.harrisonhotsprings.ca/village-office/#

The Village of Harrison Hot Springs economy was historically driven by forestry and mining.[6] Although these industries remain important to the community and surrounding areas, the economic focus has shifted in recent decades to tourism.

Fire protection within the AOI is the responsibility of the Village of Harrison Hot Springs Fire Department (FD). Mutual aid agreements exist between this department and the Agassiz Fire Department. BCWS is responsible for responding to fires that are beyond the boundaries of the department Fire Service Areas. In the event of a wildfire, the Village of Harrison Hot Springs has limited emergency egress routes. Hot Springs Road (Highway 9) is the arterial route connecting the Village with Lougheed Highway (Highway 7), which runs north and south from the AOI. It is the only reliable, paved access route. Additionally, the Rockwell Drive corridor is an area of particular concern with respect to limited emergency egress and lack of an alternate evacuation route (see Section 6.1.3 for further discussion). This limits the ability of fire crews to respond to fires and safely evacuate residents.

2.3 PAST WILDFIRES, EVACUATIONS AND IMPACTS

BCWS Fraser Fire Zone staff communicated that the majority of past wildfire activity within the AOI was human-caused ignitions due to abandoned campfires and poor recreation practices. BCWS staff reported that slash accumulations following industrial logging can be an issue, particularly next to forest service roads.

Based on the BCWS historical wildfire dataset, the largest fires to burn within and adjacent to the Village AOI occurred in 1938, with an estimated area of over 1,700 ha. No significant fires have occurred in the AOI in recent years. In 2018, a 427-ha fire burned less than 6 km east of the AOI on Mt. Hicks in the District of Kent. This fire burned for several weeks and resulted in the closure of the Lougheed Highway, which connects many Fraser Valley communities. The Mt. Hicks wildfire, in combination with the 2016 Fort McMurray and 2017 and 2018 BC province-wide wildfires, have alerted BCWS to the potential for large, catastrophic wildfires occurring within and surrounding the present AOI.

The BC Wildfire Service historical ignition dataset demonstrates that the proportion of human-caused fires within the Village AOI is substantially greater than that of the province as a whole.[7] This ignition data shows that within the Village AOI, approximately 92% of ignitions since 1972 have been human-caused (a conservative estimate not including miscellaneous/undetermined causes), versus 40% in the province of BC.[8] This statistic may be explained by the lower proportion and occurrence of lightning strikes in the Fraser Valley relative to other areas in the province. Additionally, high recreational use and the prevalence of forestry activities within the AOI may also contribute to this statistic.

[6] Harrison Hot Springs, 2017. Our History. Retrieved online from: https://www.harrisonhotsprings.ca/our-community/our-history/

[7] BC Wildfire Service: Fire Incident Locations - Historical

[8] BCWS, 2018

2.4 CURRENT COMMUNITY ENGAGEMENT

There is recognition and awareness, from both Village staff and the community, of the threat posed to the community by wildfire. There has been some community engagement in FireSmart initiatives in the Village to this point. FireSmart presentations and workshops are provided by the fire department during Fire Prevention Week and FireSmart materials have been distributed door to door prior to the fire season in previous years. Furthermore, the fire department is consulted during community development planning. However, there is currently no established wildfire development permit area within the Village of Harrison Hot Springs, which can set standards based upon FireSmart principles for building material use, landscaping and appropriate setbacks from forested areas. Future initiatives should focus efforts during times of high public uptake (post wildfire season) in order to maximize the resources available for community engagement.

2.5 LINKAGES TO OTHER PLANS AND POLICIES

Following is a summary of Village policies and provincial policies and guidelines that relate to strategic wildfire management, wildfire threat reduction, operational fuel treatments and emergency planning.

2.5.1 Local Authority Emergency Plan

Emergency preparedness and response is managed jointly by the District of Kent and the Village of Harrison Hot Springs, and they have created a comprehensive Emergency Management Plan to serve the two communities.[9] The plan was developed to optimize the response, resources and planning for major emergencies that may occur within the Village and District. The plan outlines the Emergency Operations Centre (EOC) functions and activation, Incident Command Post (ICP) functions, guidelines for emergency response (communications, personnel identification, documentation, etc.), and hazard-specific roles and procedures. The hazard-specific roles and procedures for wildland interface fires lists the possible major effects of such an event, the potential actions that may be required to address these effects, the associated actions of the EOC, and any resources that could aid in response. Emergency response is coordinated using the BC Emergency Management System (BCEMS) Site and Site Support Standard, with designated EOC locations and Incident Command (IC) for site level response. A Provincial Emergency Operations Centre (PREOC) and a Provincial Emergency Coordination Centre (PECC) may also be established if the emergency is large in scale.

2.5.2 Affiliated CWPPs

CWPPs have been developed for the City of Abbotsford (2009), the District of Mission (2005), and the District of Maple Ridge (2005). A CWPP for Seabird Island is currently being developed by Firefly Integrated Resources Enterprises Inc. These documents, when available, were reviewed for relevance (i.e., synergistic project opportunities, as well as to confirm that there are no contradicting recommendations). Furthermore, a CWPP Update for the District of Kent is being developed

[9] Emergency Response and Recovery Plan - Kent/Harrison Joint Emergency Program, 2015.

concurrently with this CWPP by the same consultant, ensuring consistency in recommendations and synergies within proposed future fuel treatment works.

2.5.3 Local Government/First Nation Policies and Recommendations

The intent of this section is to review all relevant local government plans, policies and bylaws and identify sections within that are relevant to the CWPP. Fraser Valley Regional District (FVRD) plans and policies were reviewed and incorporated where applicable. However, recommendations to revise or update these bylaws were not included as this is considered outside of the scope of this plan. The following municipal bylaws, strategies and policies are relevant to wildfire planning in the AOI.

Bylaw No. 864, 2007: Village of Harrison Hot Springs Official Community Plan

OCP Section 3.2: Growth Management Strategy

Section 3.2 of the OCP acknowledges the small land base of the Village of Harrison Hot Springs, provides estimates of projected growth, options for accommodating growth within the municipality, and outlines the financial implications of development. The specific growth management policies include increasing density in the Village Centre, developing Pine Avenue for low density residential housing, and expanding medium density housing in the Lakeshore Residential Area. Subsection 3.2.4, which outlines the development of the Lakeshore Residential Area, recognizes the need for setbacks due to geotechnical hazards.

OCP Section 3.5: Development Permit Areas

Section 3.5 outlines the Village policy surrounding development permit areas (DPAs), the purpose of DPAs within the Village, and the situations under which DPAs are not required. DPAs within the Village include DPA 1 - Lakeshore (Section 4.4 of the OCP), DPA 2 - Tourist Commercial (Section 5.4), DPA 3 - Multi-family residential (Section 6.4), DPA 4 – Geotechnical Hazard (Section 9.4), and DPA 5 – Miami River (Section 14.4). These DPAs are together intended to reduce specific hazards, protect the environment, and guide development in the Village of Harrison Hot Springs. Refer to Section 5.2.2 *Planning and Development* for detailed discussion and recommendations regarding a Wildfire Development Permit Area.

RECOMMENDATION #1: Consider reviewing Section 3.5 of the OCP and incorporating a Wildfire Development Permit Area where wildfire interface guidelines based on FireSmart principles apply. See *Section 5.2.2 Planning and Development* for further details regarding a new development permit.

OCP Section 6: Residential Development

Section 6 of the OCP describes the current development trends in the Village, specifically the locations of multi-family versus single-family residential areas. Along with promoting high quality and sufficient supply of housing, one of the objectives included in this section is to allow for appropriate setbacks to protect environmentally sensitive areas, including riparian ecosystems.

OCP Section 7: East Sector Special Planning Area

The East Sector Special Planning Area is approximately 160 ha of land east of McCombs Drive, which encompasses multiple ownership types, including provincial, municipal, private, and Agricultural Land Reserve (ALR) land. Section 7 of the OCP outlines the importance of this area for the community due to the presence of species at risk, rare ecosystems, natural water drainage systems, and recreation trails. The issues that need to be resolved prior to any development occurring within the East Sector Special Planning Area include the completion of drainage studies, environmentally sensitive areas assessments, and a Parks and Trails Master Plan. Due to the importance of this area, a concerted effort should be made to protect the above values should the Village choose to conduct operational fuel treatments within the East Sector Special Planning Area.

OCP Section 8: Resource Lands

Section 8 of the OCP outlines the Village's commitment to maintaining the lands designated as Resource Lands in a natural state, thereby directing development to other parts of the municipality. It also emphasizes that ALR land within the Village is the jurisdiction of the Agricultural Land Commission, and despite this, the needs of private landowners still require consideration.

OCP Section 9.3.3: Areas Subject to Interface Fire Potential

This section of the OCP states that Council will encourage FireSmart activities on properties within the Village that are adjacent to forested land, including thinning trees and removing surface fuels, and will make upgrades to the Village water system in order to increase water availability for fire protection. These upgrades to the water system were completed in 2018 (see Section 6.1.2 for more details).

RECOMMENDATION #2: Consider applying to the Community Resiliency Investment (CRI) Program for funding to conduct FireSmart home and property assessments within the Village, to develop a FireSmart rebate program for residents, and for the removal of debris accumulated from FireSmart activities conducted on private land.[10]

OCP Section 10.3.4: Water Systems

Section 10.3.4 of the OCP outlines the community's goals for maintaining and upgrading the Village's water systems. These relate to storage capacity, expansion based on planned development, protection of well sites, and withdrawals from Harrison Lake.

OCP Section 10.3.5: Drainage

This section of the OCP proposes that the Village develop a Drainage Plan to address several aspects of the drainage system within the community, including reducing system deficiencies, utilizing groundwater infiltration and detention to control peak flows, and an assessment of the current drainage infrastructure in the Village. The section goes on to describe the environmental considerations that

[10] 2019 Community Resiliency Investment Program FireSmart Community Funding & Supports Program & Application Guide, 2018.

should be included in the development of the Drainage Plan and the potential financing for the plan and associated upgrades to the system.

OCP Section 13: Parks and Open Space

Section 13 of the OCP discusses the importance of parks, greenspace, and trees within the Village and outlines several objectives and policies to maintain and improve these areas. Policy 13.3.1 describes the plan to acquire Crown land for parks within the Village and Policy 13.3.2 outlines the intent to prepare a "Parks and Trails Master Plan", which will guide future acquisitions, development and restoration and maintenance projects.

RECOMMENDATION #3: Review the OCP and consider parks acquisition and maintenance through a wildfire risk lens, including consideration for long-term maintenance costs and access. Consider amendments where needed, including the following: 1) require the use of a Qualified Professional (QP) in review, assessment, and siting of parks and park access prior to acceptance; and 2) ensure that bylaws provide the Village authority to request modification (either fuels, access, or siting) based upon QP recommendation and prior to acceptance to ensure that the park is received in, and able to be maintained in, an acceptable range of risk. (See Section 6.1.3 for related recommendations specific to access).

RECOMMENDATION #4: Develop a Parks and Trails Master Plan and include consideration for the placement, type, width, and objective of trails. Consideration should also be given to trail building and maintenance as these activities can either increase wildfire risk (through fuels accumulations and unsafe work practices) or decrease wildfire risk (though proper placement, clean-up of combustible fuels trailside and work practices which adhere to Wildfire Act and Regulations). The Master Plan could also include an emergency response plan to deal with the risks of fire within parks.

Subdivision and Development Servicing Bylaw No. 578, 1993

The Subdivision and Development Servicing Bylaw dictates that all developments to occur within the Village must be connected to both the community water and sewage systems and defines other levels of service required for Village subdivisions and developments. Furthermore, the standards and specifications set out for this infrastructure are outlined in Schedule B of the bylaw.

Development Procedures Bylaw No. 1090, 2016

This bylaw describes the conditions under which development permits may be issued within the Village of Harrison Hot Springs, including the application process, fees, the potential requirement for public meetings, reporting requirements, security, approvals, and situations in which issued permits may be revoked.

Fire Department Regulation Bylaw No. 1031, 2013

This bylaw regulates aspects of the Village of Harrison Hot Springs Fire Department (VHHSFD), including the establishment of the VHHSFD and positions within the department, the appointment or election of officers, membership requirements, renumeration, the Fire Chief's authority, jurisdiction, mutual aid

agreements, offence and penalty, and repeal. Section 8.1 (e) of bylaw 1031, which addresses the Fire Chief's authority, includes a clause which allows for the Chief to order a land owner to remove or reduce objects or conditions on their property that present a fire hazard.

Open Burning and Outdoor Fire Regulation Bylaw No. 1110, 2017

Bylaw No. 1110, 2017 outlines the conditions under which open burning and campfires are permitted within the Village, enforcement, penalties for non-compliance, and severability. Open burning is limited to very specific conditions and locations within the Village and all communal campfires require a permit from the Fire Department. The bylaw also allows for the Fire Chief to prohibit the use of campfires for a period of time if conditions are such that there will be higher risk of escape or significant smoke concerns.

Fireworks Regulation Bylaw No. 871

This bylaw regulates the use of fireworks within the Village of Harrison Hot Springs, as well as enforcement and severability should a person violate the bylaw. Permits for firework use are issued by the Fire Chief, who has the authority to not issue permits, revoke permits, and to impose restrictions on the permits issued.

Tree Management and Preservation Bylaw No. 1015, 2012

Bylaw No. 1015 is in place to ensure that trees are preserved within the Village by restricting the conditions under which trees can be cut, including the cutting of "Distinct Trees" of large diameters.

RECOMMENDATION #5: Review Village Tree Management and Preservation Bylaw No. 1015, 2012 and revise to allow for homeowners to address wildfire hazards on their property associated with trees immediately adjacent to homes, as determined by a QP.

Water Regulation and Fee Bylaw No. 967, 2011

The Water Regulation and Fee Bylaw outlines general provisions such as liability and restrictions, as well as the fees that apply to water service, water system connections, prohibited acts, inspection requirements and water metering.

Solid Fuel Burning Appliance Regulation No. 1124, 2018

Bylaw No. 1124, 2018 regulates the use of solid fuel burning appliances within the Village of Harrison Hot Springs by setting emissions standards for existing appliances and prohibiting the installation of new appliances. Exceptions include the use of barbeques and hibachis on private property.

Riparian Area Protection Bylaw No. 852

The Riparian Area Protection Bylaw dictates when and how riparian assessments are to be conducted prior to development and specifies that these assessments must be completed by a Qualified Environmental Professional (QEP).

Park Regulation Bylaw No. 915, 2009

The Park Regulation Bylaw regulates the use of public spaces such as parks, beaches, and boulevards in the Village. Restricted activities within these areas include campfires, and the use of barbeques, hibachis, and other wood, charcoal or briquette burning cooking devices. Furthermore, smoking of any kind is also restricted within all public spaces in the Village.

Property Maintenance Bylaw No. 1072, 2015

The Property Maintenance Bylaw prohibits the owner or occupant of any property within the Village from allowing rubbish, furniture, vehicle parts, wood (with some exceptions), construction materials when no construction activities are occurring, or standing water to accumulate on the property.

Regional Growth Strategy for the Fraser Valley Regional District[11]

Eight growth management goals are outlined relating to transportation, the agricultural sector, responsible management of urban land, sustainable communities, protection of the natural environment, protection and management of rural and recreational lands, sustainable economic growth and managing water, energy and waste responsibly. As a member municipality of the FVRD, the Village OCP is consistent with these goals. With respect to the goal of managing urban land responsibly, the Strategy supports contained development and OCPs that encourage compact development patterns. It also supports settlement patterns that minimize risk associated with hazards including wildfire. Rural and intermix areas are generally more vulnerable (at higher risk) for interface fires than contained development areas as there is often the potential to have inadequate or unreliable water supply for suppression, as well as longer emergency response times.

Fraser Valley Regional District Parks Regulation Bylaw No. 1273, 2014

This bylaw applies to the Harrison Boat Launch and East Sector Lands, which are the only FVRD managed parks within the Village AOI.[12] This bylaw contains several subsections that relate to fire prevention in Regional parks. It controls the use of fire and flame-producing cooking devices in Regional parks, unless in a designated place or facility and/or accompanied by a permit and sets the maximum allowable fire size. Additionally, authorized personnel may prohibit or extinguish any of the above for public safety. This bylaw also prohibits smoking when signs or notices are posted. Under section 13, the discharge of fireworks is prohibited without a valid permit, as outlined above in Bylaw No. 871.

With respect to potential fuel treatments in Regional parks, section 7 also addresses the preservation of natural features and lists prohibited activities (except as authorized by a permit) that may alter or damage trails, disturb wildlife, damage natural park features, introduce plant material or introduce contaminants. Section 8 outlines restoration requirements for park permit holders or contractors. As outlined in Section 10, any Regional park or park road or trail may be closed to public use for public safety. This has implications for park closures during periods of high wildfire danger.

[11] "Choices for our Future", Fraser Valley Regional District, 2004.

[12] Regional Parks Strategic Plan 2014-2024, Fraser Valley Regional District. Retrieved from https://www.fvrd.ca/assets/Parks~and~Recreation/Documents/2014%20-%202024%20Strategic%20Parks%20Plan.pdf

2.5.4 Higher Level Plans and Relevant Legislation

Sustainable Resource Management Plan (SRMP) Biodiversity Chapter for East Harrison Landscape Unit[13]

The SRMP is the higher-level planning document for the East Harrison Landscape Unit (LU), which encompasses the Village of Harrison Hot Springs AOI. The plan describes the resource tenure holders in the LU, the resource values present, existing higher-level plans, First Nations, an analysis of the Old Growth Management Areas (OGMAs) and Wildlife Tree Retention within the LU, and a discussion regarding LU objectives.

Spotted Owl Management Plan[14]

The Spotted Owl Management Plan is a guidance document for spotted owl (*Strix occidentalis caurina*) management within the Chilliwack and Squamish Forest Districts. The goal of this plan is to stabilize, and ideally increase, spotted owl populations in the two districts over time while avoiding substantial impacts to forestry employment and timber supply. It includes a strategic management plan with objectives, policies, and operational guidelines for forest practices and creating operational plans in spotted owl management areas. Best management practices to manage forests within spotted owl habitat were subsequently updated as a component of the Spotted Owl Management Plan[15]. This document should be reviewed and used as a guidance during any fuel management activities that are proposed within areas of suitable spotted owl habitat such as late seral stage forests.

Relevant Legislation

Spatially explicit ministerial orders pertaining to Old Growth Management Areas (OGMA) were identified within the Village of Harrison AOI. These orders must be reviewed, considered, and addressed during the fuel management prescription-level phase. Fuel management within these areas should aim to enhance these values within the AOI, whenever possible, and the land manager and/or stewardship forester (Chilliwack Natural Resource District) must be consulted regarding any overlapping values at risk, spatially explicit ministerial orders, or other notable values on the land base, during prescription development.

2.5.5 Ministry or Industry Plans

Reviewing and incorporating other important forest management planning initiatives into the CWPP planning process is a critical step in ensuring a proactive and effective wildfire mitigation approach in the AOI.

[13] The Province of BC, Ministry of Sustainable Resource Management, 2005.
[14] The Province of BC, 1997.
[15] Spotted Owl Best Management Practices Working Group, 2009. https://www.for.gov.bc.ca/ftp/DCK/external/!publish/LOCAL_DATA/Spotted_Owl_Management_Plan/DOCUMENTS/SPOWBestManagementPractiesJul2009.pdf

The South Coast Response Fire Management Plan (FMP)[16] was developed for the Sea to Sky Natural Resource District (NRD), the Sunshine Coast NRD, and the Chilliwack NRD. The FMP was reviewed to identify any regional fire management planning objectives and their interpretation in the context of management considerations for the Village AOI. The 2018 South Coast FMP identifies values at risk and prioritizes broad categories of values as 'themes' for response planning through the Resource Strategic Wildfire Allocation Protocol (RSWAP). The South Coast FMP briefly speaks to the concept of wildfire prevention engineering within the region, which includes fuel management such as locally identified fuel breaks, proposed treatment areas, or demonstration and operational treatment areas. In order to reduce local fire threat and to build defensible space around critical infrastructure and/or residential neighbourhoods, this CWPP identifies various fuel treatment opportunities (Section 5.1.1).

Due to the fact that the Village of Harrison Hot Springs has limited access and egress options, improving access and increasing public safety in the event of an emergency evacuation should be a priority. There may be funding opportunities for fuel breaks on Crown land along the Agassiz-Rosedale Highway (Highway 9/Hot Springs Road) and Rockwell Drive through the Forest Enhancement Society of British Columbia (FESBC). Communication with the Natural Resource District and Ministry of Transportation and Infrastructure can be initiated to explore potential fuel treatments.

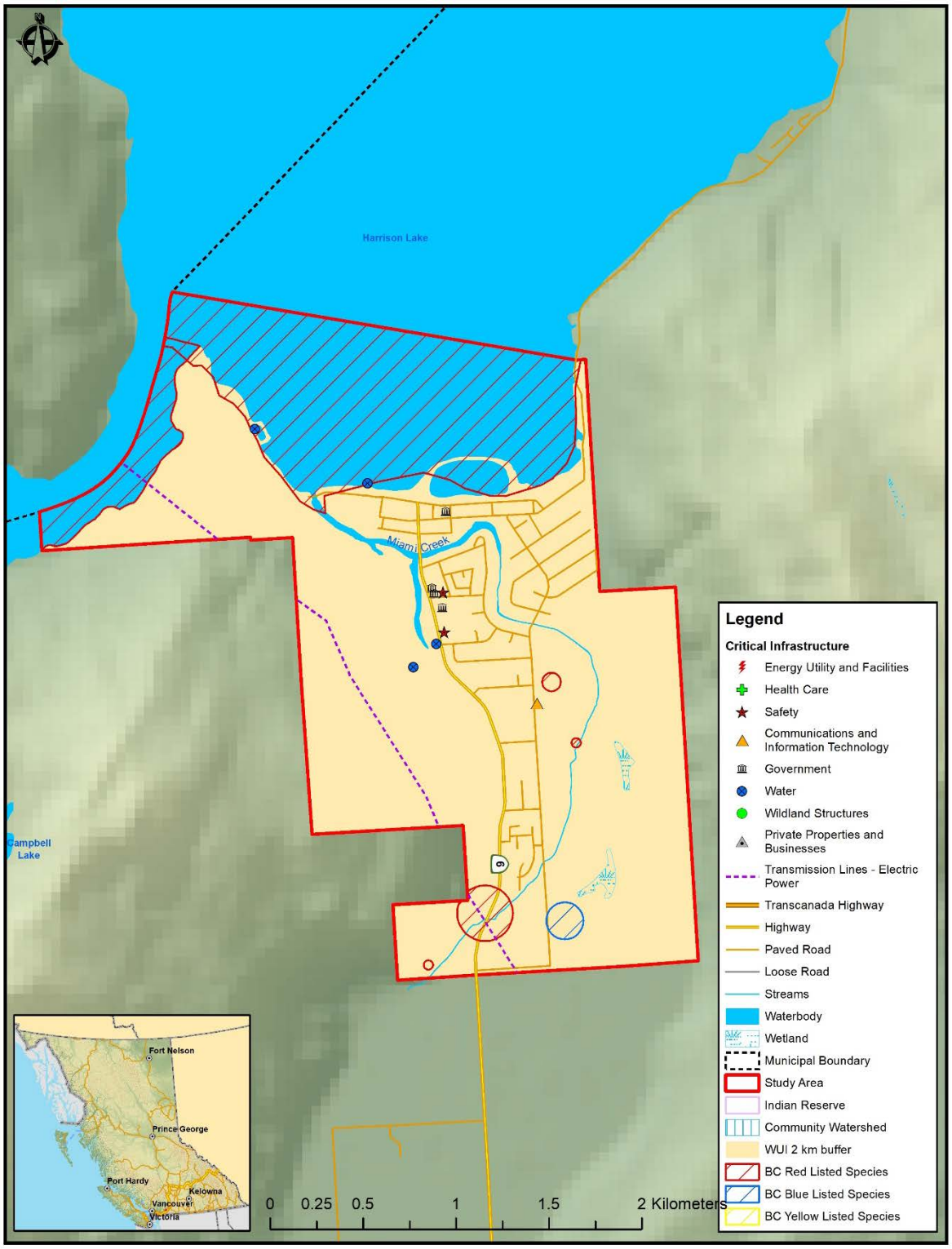
Six approved Forest Development Units (FDUs) are located within and adjacent to the AOI with associated Forest Stewardship Plans which set specific forest practices obligations applicable to specific forest licensees.

Forest health management and associated initiatives within the Fraser TSA are guided by the Coast Area 2015-17 Coastal Timber Supply Areas Forest Health Overview[17]. This plan must be reviewed, considered, and addressed during the prescription-level phase. Fuel management and prescriptions aimed at reducing wildfire hazard within the AOI should aim to incorporate the guiding principles and best management practices (BMPs) presented within this aforementioned plan.

SECTION 3: VALUES AT RISK

Following is a description of the extent to which wildfire has the potential to impact the values at risk (VAR) within the Village of Harrison Hot Springs AOI. VAR, or the human and natural resources that may be impacted by wildfire, include human life and property, critical infrastructure, high environmental and cultural values, and other resource values. VAR also include hazardous values that pose a safety hazard. Key identified VAR are illustrated below in Map 2.

[16] South Coast Fire Management Plan. 2018.
[17] Ministry of Forests, Lands and Natural Resource Operations. 2015



Map 2. Values at risk within the AOI.

3.1 HUMAN LIFE AND SAFETY

One of the primary goals of the BCWS is to support emergency response and provide efficient wildfire management on behalf of the BC government. BCWS aims to protect life and values at risk, while ensuring the maintenance and enhancing the sustainability, health and resilience of BC ecosystems.[18]

Human life and safety is the first priority in the event of a wildfire. A key consideration is the evacuation of at-risk areas and safe egress. Evacuation can be complicated by the unpredictable and dynamic nature of wildfire, which can move quickly. Evacuation takes time and safe egress routes can be compromised by wildfire, limited visibility, or by traffic congestion and/or accidents.

The population distribution (both people and structures) within the AOI is important in determining the wildfire risk and identifying mitigation activities. The population of the Village of Harrison Hot Springs remained stable in recent years. It was last measured at approximately 1,468 persons in 2011 and 2016, the last two census years.[19] This compares to 6.6% growth in the Fraser Valley Regional District as a whole during the same years. According to the 2016 Census, there are 928 private dwellings in the Village AOI, approximately 209 of which are occupied on a part-time basis. The future population growth in the Village is expected to be determined by the availability of development opportunities and was estimated to reach 2,545 residents by 2021 in the 2007 OCP.[20] The Village of Harrison Hot Springs also attracts visitors for camping, hiking, canoeing, summer camps, and other recreational endeavors, particularly during the fire season (May – October). Several parks throughout the AOI are highly used during the summer months, including Rendall Park, Spring Park, East Sector, and Greenspace. Furthermore, Hot Springs Road (Highway 9) is frequently used as an access corridor for Sasquatch Provincial Park, which increases the number of people to evacuate in the event of a wildfire.

Knowledge of and access to updated structure locations within an area is a critical step in efficient and successful emergency response planning and the development of mitigation strategies and recommendations. Field visits to the Village AOI and access to recent orthophotography and spatial data from the Village has enabled the development of a spatial layer with structure locations that accounts for the most recent development.

Smoke exposure is another important consideration when assessing the risks of wildfire to human life and safety. Wildfire smoke contains many substances that can be harmful to human health, including particulate matter, carbon monoxide, volatile organic compounds, and toxic gases.[21] Those with pre-existing health conditions and firefighters are particularly at risk.

[18] BC Provincial Coordination Plan for Wildland Urban Interface Fires. 2016. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/provincial-emergency-planning/bc-provincial-coord-plan-for-wuifire_revised_july_2016.pdf

[19] Statistics Canada. 2016 Census.

[20] Village of Harrison Hot Springs Official Community Plan Bylaw No. 864.

[21] Wildfire Smoke and Your Health. US Forest Service. Retrieved from https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5318238.pdf

RECOMMENDATION #6: Consider lobbying the Provincial government or local Medical Health Officer(s) to develop a strategy for communities to draw upon when they are exposed to smoke from wildfire for extended periods of time. This strategy may include smoke exposure risk assessments, exposure reduction measures, and a decision-key for when to evacuate a community due to wildfire smoke.

3.2 CRITICAL INFRASTRUCTURE

Protection of critical infrastructure (CI) during a wildfire event is an important consideration for emergency response effectiveness, ensuring that coordinated evacuation can occur if necessary, and that essential services in the study area can be maintained and/or restored quickly in the case of an emergency. Critical infrastructure includes emergency and medical services, electrical and gas services, transportation, water, social services, and communications infrastructure. Table 3 details an inventory of critical infrastructure identified by the Village staff and during field visits and Map 2 provides a visual depiction of this critical infrastructure within the AOI.

Protection of critical infrastructure has shown itself to be an essential wildfire preparedness function. Survival and continued functionality of these facilities not only support the community during an emergency but also determine the extent and cost of wildfire recovery and economic and public disruption during post wildfire reconstruction. Critical infrastructure provides important services that may be required during a wildfire event or may require additional considerations or protection. As outlined in Section 5.2, FireSmart principles are important when reducing wildfire risk to both classes of structure and are reflected in the outlined recommendations. During field visits, it was observed that the Village's critical infrastructure (*e.g.*, fire halls, water infrastructure, etc.) is in various levels of compliance with FireSmart principles.

RECOMMENDATION #7: The use of fire resistant construction materials, building design and landscaping should be considered for all CI when completing upgrades or establishing new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart guidelines. Secondary power sources are important to reduce critical infrastructure vulnerability in the event of an emergency which cuts power for days, or even weeks.

3.2.1 Electrical Power

Electrical service for most of the Village is received through a network of wood pole transmission and underground distribution infrastructure supplied by BC Hydro. Neighbourhoods with small, street-side wooden poles to connect homes are particularly vulnerable to fire. It is recommended that utility right-of-way BMPs such as regular brushing and clearing of woody debris and shrubs be employed to help reduce fire risk, utility pole damage, and subsequent outages.

One major transmission line bisects the Village AOI, connecting the Bridge River substation to the Rosedale substation. This system is well-mapped and BC Hydro states that staff will work with local fire departments and BCWS to mitigate impacts to this infrastructure in the event of a wildfire.[22]

A large fire has the potential to impact electrical service by causing disruption in network distribution through direct or indirect means. For example, heat from flames or fallen trees associated with a fire event may cause power outages. Consideration must be given to protecting this critical service and providing power back up at key facilities to ensure that the emergency response functions are reliable.

Secondary power sources are important to reduce critical infrastructure vulnerability in the event of an emergency which could cut power for days, or even weeks. Secondary power is available for some critical infrastructure such as the fire hall, emergency operations centre, and most water pumping stations via backup generators. Vulnerabilities for secondary power sources include mechanical failure, potentially insufficient power sources should a wide-scale outage occur, and fuel shortage in the event of very long outages. Refer to Section 6.1.2 for discussion and recommendations related to backup power and water availability for fire suppression.

3.2.2 Communications, Pipelines and Municipal Buildings

The Village of Harrison Hot Springs does not contain any hospitals or airports, as residents are serviced by Chilliwack General Hospital, Abbotsford International Airport, and Vancouver International Airport. There is a FortisBC gas line that supplies the Village. A map of the FortisBC natural gas distribution system is not available to external companies. As such, it is not possible to identify specific areas that may be vulnerable to wildfire. A publicly available service area map[23] indicates that a Spectra Energy (now Enbridge Inc.) natural gas pipeline transects the Zone. A full inventory of critical infrastructure for communications, pipelines and Village buildings with updated locations is presented in Table 3, below.

Table 3. Critical Infrastructure Identified in CWPP field visits.

Critical Infrastructure Type	Location
Canadian Broadcasting Corporation Telecommunication Tower	McCombs Drive between Pine Avenue and Alder Avenue
Village of Harrison Hot Springs Municipal Administration Office	495 Hot Springs Road
Village of Harrison Hot Springs Fire Department	555 Hot Springs Road
Alternative* Emergency Operations Centre (EOC) 1 – the Village of Harrison Hot Springs Office	495 Hot Springs Road
Harrison Hot Springs Elementary	501 Hot Springs Road
Water Treatment Plant	East of Hot Springs Road (Highway 9) at Balsam Avenue

[22] https://www.bchydro.com/safety-outages/emergency-preparation/natural-disasters.html

[23] https://www.fortisbc.com/About/ServiceAreas/Pages/default.aspx

Critical Infrastructure Type	Location
Water Reservoir	East of Hot Springs Road (Highway 9) at Balsam Avenue

**Primary EOC is the Agassiz Fire Hall, located outside of the AOI*

3.2.3 Water and Sewage

The Village of Harrison Hot Spring's water is supplied through surface water sources from Harrison Lake. It is a duel system which relies on both pump and gravity fed mechanisms. The system includes a water treatment plant, a water reservoir, three pumps along Harrison Lake, and gravity fed distribution pipes which provide water to all residences within the Village. The province of BC tracks the water levels in Harrison Lake and levels are closely monitored during high water events. The Village operates and maintains a sewer system and has both a water treatment plant and a wastewater treatment plan within the AOI. In 2015, the Village commissioned a Water Master Plan Report to assess the water infrastructure and develop a planning strategy for the municipality. The report found multiple deficiencies in the system, and according to the Wildfire Working Ground, many of these have been resolved since the report was submitted.

In 2017, the Village was awarded $2.29 million for its Water Infrastructure Renewal Program. This work is now complete and involved upgrading water lines and water mains, and extending the system to incorporate 102 additional properties. These updates to the system within the Village, specifically the water main upgrade along Hot Springs Road, have increased the water capacity for fire suppression efforts. A detailed account of water availability for wildfire suppression is provided in Section 6.1.2.

Locations for water and sewage infrastructure (current as of 2018) within the Village AOI are detailed below in Table 4.

Table 4. Critical Water and Sewer Infrastructure Identified in CWPP field visits.

Critical Infrastructure Type	Location
Water supply	• The water treatment plant is located east of Hot Springs Road at Balsam Avenue. • The water reservoir is located uphill of the water treatment plant. • The water intake for the water system is located west of Harrison Beach.
Sanitary sewer system	• The wastewater treatment plant is located on Whippoorwill Point.

3.3 HIGH ENVIRONMENTAL AND CULTURAL VALUES

The following section identifies high environmental and cultural values and where they are located. Environmental, cultural and recreational values are high throughout the AOI. A more detailed account of environmental and biodiversity aspects of this region is presented in Section 3.3.3.

3.3.1 Drinking Water Supply Area and Community Watersheds

The Village of Harrison Hot Springs draws its domestic water from Harrison Lake. There are no Community Watersheds which intersect Village AOI, however, effects from wildfire still have the potential to impact the community's primary water supply. It should also be noted that the potential impacts of wildfire extend past the time a fire is extinguished. Depending on fire size and severity, there is the potential for significant hydrological impacts, extending for years post-burn.[24] Some areas may have a lower threshold for precipitation triggered events and would be particularly vulnerable to post-wildfire debris flows, mass wasting, landslides, or flooding. This may directly impact the community through structure loss or risk to public safety, or indirectly, through loss or damage of critical infrastructure, roads, or impacts on the watershed affecting water quality.

3.3.2 Cultural Values

The Coast Salish are the main First Nations group whose territory falls within the Fraser Valley. Within this group, a total of 37 First Nations with aboriginal interests in the AOI were identified in the BC Consultative Areas Database. These include the following mainland-based First Nations: Stó:lō Nation and Stó:lō Tribal Council, Soowahlie First Nation, Shxw'ow'hamel First Nation, Skawahlook First Nation, Leq'a:mel First Nation, Scowlitz First Nation, Kwaw-kwaw-apilt First Nation, Skwah First Nation, Chawathil First Nation, Seabird Island Band, Sts'ailes, Peters First Nation, Siska Indian Band, Cook's Ferry Indian Band, Coldwater Indian Band, Oregon Jack Creek Indian Band, Nlaka'pamux Nation Tribal Council, Nicola Tribal Association, Lower Nicola Indian Band, Lytton First Nation, Boothroyd Indian Band, Ashcroft Indian Band, Shackan Indian Band, Spuzzum First Nation, Skuppah Indian Band, Popkum First Nation, Cheam First Nation, Union Bar First Nations, Yale First Nation, Nooaitch Indian Band, and the following Vancouver Island based First Nations: Halalt First Nation, Stz'uminus First Nation, Cowichan Tribes, Lake Cowichan First Nation, Lyackson First Nation, and Penelakut Tribe.

Archaeological sites in BC that pre-date 1846 are protected by the *Heritage Conservation Act* (HCA), which applies on both private and public lands. Archaeological remains in BC are protected from disturbance, intentional and inadvertent, by the HCA. Sites that are of an unknown age that have a likely probability of dating prior to 1846 (*e.g.*, lithic scatters) as well as Aboriginal pictographs, petroglyphs, and burials (which are likely not as old but are still considered to have historical or archaeological value) are also protected. Under the HCA, protected sites may not be damaged, altered or moved in any way without a permit. It is a best practice that cultural heritage resources such as culturally modified tree (CMT) sites be inventoried and considered in both operational and strategic planning.

Due to site sensitivity, the locations of archaeological sites may not be made publicly available, however, data provided by the MFLNRORD Archaeology Branch confirms that multiple sites do exist. The Village should ensure that they have direct access to Remote Access to Archaeological Data (RAAD), which

[24] Jordan, P., K. Turner, D. Nicol, D. Boyer. 2006. Developing a Risk Analysis Procedure for Post-Wildfire Mass Movement and Flooding in British Columbia. Part of the 1st Specialty Conference on Disaster Mitigation. Calgary, AB May 23 -26, 2006.

allows users to look up or track any archeological sites in the area.[25] Prior to stand modification for fire hazard reduction, and depending on treatment location, preliminary reconnaissance surveys may be undertaken to ensure that cultural heritage features are not inadvertently damaged or destroyed. Pile burning and the use of machinery have the potential to damage artifacts that may be buried in the upper soil horizons. Above ground archaeological resources may include features such as CMTs, which could be damaged or accidentally harvested during fire hazard reduction activities. Fuel treatment activities should include consultation with all identified First Nations at the site level and should ensure sufficient time for review and input regarding their rights and interests prior to prescription finalization or implementation.

3.3.3 High Environmental Values

The AOI overlaps with multiple legal Old Growth Management Areas (OGMAs). Any proposed fuel treatment that may overlap these areas requires MFLNRORD oversight at the prescription development phase, and works can only occur following MFLNRORD consultation and approval.

The Conservation Data Centre (CDC), which is part of the Environmental Stewardship Division of the Ministry of Environment and Climate Change Strategy, is the repository for information related to plants, animals and ecosystems at risk in BC. To identify species and ecosystems at risk within the study area, the CDC database was referenced. Two classes of data are kept by the CDC: non-sensitive occurrences for which all information is available (species or ecosystems at risk and location); and masked, or sensitive, occurrences where only generalized location information is available.

There are four occurrences of Red-listed species, one occurrence of Blue-listed species within the AOI (Table 5), and one overlap with a masked occurrence. Through consultation with the CDC and a biologist or QP, all site level operational plans must determine if these occurrences will be impacted by fuel management or other wildfire mitigation activities. All future fuel treatment activities or those associated with recommendations made in this plan should consider the presence of, and impact upon, potentially affected species. Additionally, all site level operational plans should consult the most recent data available to ensure that any new occurrences or relevant masked occurrences are known and considered in the operational plan to mitigate any potential impacts on species at risk. The BC Species & Ecosystems Explorer, which allows combined searches for species and ecological communities, should also be consulted at the prescription phase. Due to potential limitations of existing databases, consultation with a QP with local knowledge may also be recommended at the prescription phase.

[25] https://www.for.gov.bc.ca/archaeology/accessing_archaeological_data/obtaining_access.htm

Table 5. Publicly available occurrences of Red and Blue-listed species recorded within the AOI.

Common Name	Scientific Name	Category	BC List	Habitat Type
Salish Sucker	*Catostomus sp. 4*	Vertebrate Animal	Red	Riverine: Creek
Pacific Water Shrew	*Sorex bendirii*	Vertebrate Animal	Red	Terrestrial: Forest Mixed, Swamp
Pygmy Longfin Smelt	*Spirinchus sp. 1*	Vertebrate Animal	Red	Lacustrine; Deep Water
White Sturgeon (Lower Fraser River population)	*Acipenser transmontanus pop. 4*	Vertebrate Animal	Red	Riverine: Big River; High Gradient; Low Gradient; Moderate Gradient; Estuarine: River Mouth; Tidal Flat
Northern Red-legged Frog	*Rana aurora*	Vertebrate Animal	Blue	Lacustrine: Shallow Water; Palustrine: Pond; Terrestrial: Marsh, Forest Needleleaf, Forest Mixed

3.4 OTHER RESOURCE VALUES

There are multiple resources values associated with the land base, including recreation and tourism, wildlife habitat, drinking water supplies, timber supply and many others.

The AOI is located in the Fraser Timber Supply Area (TSA), which encompasses approximately 1.4 million hectares of land and is administered by the Chilliwack Natural Resource District.[26] The last Timber Supply Review (TSR) was completed in 2015 and the Allowable Annual Cut (AAC) determination was completed in February of 2016. [27,28] However; effective August, 2016 the current AAC is 1,241,602 cubic metres (as a result of the surrender of a Tree Farm License).[26] The AAC is not applicable to private managed forest land. The effective timber harvesting land base in the TSA, based on the last TSR, is 250,405 ha or approximately 17.6% of the total land area.[27]

Fuel reduction treatments on Crown land within the AOI are not anticipated to have a measurable effect on the timber harvesting land base. Typically, forest stands identified for fuels treatments are highly constrained for conventional logging and are often in undesirable or uneconomic stand types. No forest tenures currently exist on crown land within the AOI, however, the opportunity still exists to work with

[26] Government of BC, Fraser Timber Supply Area. Accessed at: https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/timber-supply-review-and-allowable-annual-cut/allowable-annual-cut-timber-supply-areas/fraser-tsa

[27] Ministry of Forests, Lands and Natural Resource Operations, Fraser TSA Timber Supply Analysis Discussion Paper. Accessed at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/tsr-annual-allowable-cut/fraser_tsa_discussion_paper.pdf

[28] Fraser Timber Supply Area Rationale for AAC Determination. Accessed at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/tsr-annual-allowable-cut/fraser_tsa_rationale.pdf

local licensees on commercial thinning projects that meet fuel management objectives on forested tenure lands immediately adjacent to the AOI.

3.5 HAZARDOUS VALUES

Hazardous values are defined as values that pose a safety hazard to emergency responders. The Village of Harrison Hot Springs wastewater treatment plant is the only industrial site or facility that can be considered a hazardous value. The management and treatment of fuels in proximity to hazardous infrastructure is critical in order to reduce the risks associated with both structural fire and wildfire. Specifically, best management practices recommended for management of hazardous values include: 1) incorporating FireSmart planning and setback requirements for all infrastructure in this category; and 2) maintaining emergency fuel/propane emergency shut off procedures to be enacted immediately and efficiently in the event of an approaching wildfire or ember shower.

Table 6. Hazardous Infrastructure Identified in CWPP field visits.

Critical/Hazardous Infrastructure Name	2018 Location
Wastewater treatment plant	Whippoorwill Point

SECTION 4: WILDFIRE THREAT AND RISK

This section summarizes the factors that contribute to and were assessed in the determination of wildfire threat around the community. These factors include the natural fire regime and ecology, the Provincial Strategic Threat Analysis, and the local wildfire risk analysis completed for the AOI.

4.1 FIRE REGIME, FIRE DANGER DAYS AND CLIMATE CHANGE

The ecological context of wildfire and the role of fire in the local ecosystem under historical conditions is an important basis for understanding the current conditions and the potential implications of future conditions on wildfire threat to the community. Historical conditions may be altered by the interruption of the natural fire cycle (*e.g.*, due to fire exclusion, forest health issues, human development) and/or climate change.

4.1.1 Fire Regime

Ecological Context and Forest Structure

The Biogeoclimatic Ecosystem Classification (BEC) system describes zones by vegetation, soils, and climate. Map 3 outlines the BEC zones found within the AOI. Regional subzones are derived from relative precipitation and temperature. Subzones may be further divided into variants based upon climatic variation and the resulting changes in the vegetative communities; variants are generally slightly drier, wetter, snowier, warmer, or colder than the climate of the regional subzone.[29] The following section is synthesized from information found on MFLRNORD's Research Branch BECWeb.[29]

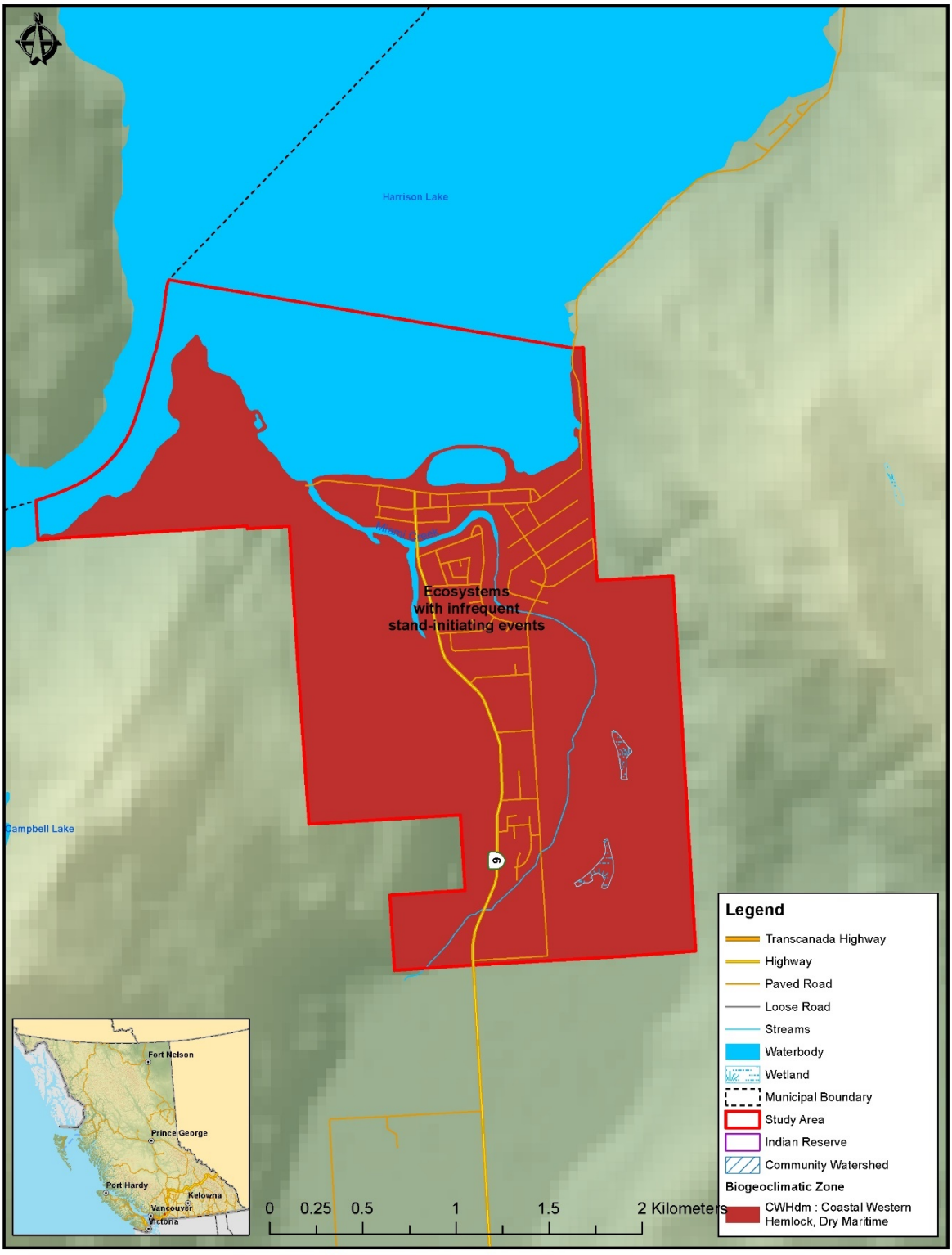
[29] https://www.for.gov.bc.ca/HRE/becweb/resources/classificationreports/subzones/index.html

BEC zones have been used to classify the Province into five Natural Disturbance Types (NDTs). NDTs have influenced the vegetation dynamics and ecological functions and pathways that determine many of the characteristics of our natural systems. The physical and temporal patterns, structural complexity, vegetation communities, and other resultant attributes should be used to help design fuel treatments, and where possible, to help ensure that treatments are ecologically and socially acceptable.[30]

The Village of Harrison Hot Springs' AOI is characterized by Coastal Western Hemlock, Dry Maritime (CWHdm) BEC subzone. The CWHdm makes up 100% of the Village AOI. The CWHdm supports forests on zonal sites that are dominated by Douglas-fir (*Pseudotsuga menziesii*), accompanied by western redcedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*). It is normally found at elevations between sea level and 650m.[31] The CWHdm is characterized by warm, dry summers and moist, mild winters where snowfall is uncommon. The CWHdm is classified as a Natural Disturbance Type 2 – forest ecosystems with infrequent stand initiating events where fires are often of moderate size (20 to 1000 ha) with a mean return interval of fire of approximately 200 years.[30] Many of these fires occur after periods of extended drought and produce a forested landscape characterized by extensive areas of mature forest with intermixed patches of younger forests.[30] Although the fire frequency is not high and fires are generally not large, pre-planning and preparation are essential to reduce the negative impacts of a wildfire.

[30] Province of British Columbia, 1995. Biodiversity Guidebook, s.l.: s.n.

[31] Green & Klinka, 1994



Map 3. Biogeoclimatic Zones within the AOI.

Forest Health Issues

The Coast Forest Health Overview outlines forest health issues present within the Fraser TSA.[32] This overview and forest health strategy (2015-2017) outlines several forest health issues that are most prevalent within the Fraser Timber Supply Area. Of particular concern, due to the severity or extent of outbreaks, are the Douglas-fir beetle, Swiss needle cast, Douglas-fir needle cast, mountain pine beetle, root diseases (primarily laminated root disease and armillaria spp.), drought, and windthrow. Outbreaks of western hemlock looper and western spruce budworm were a concern in the past, however, occurrences of these pests have declined in recent years. Spatial data available through DataBC[33] indicates no historic outbreaks of forest pests within the Village AOI. However, these forest health factors may still be present within the AOI and have implications for the level of surface fuel accumulation in affected stands, as well as access and working conditions for firefighters in the event of wildfire. Both laminated and armillaria root rot can result in high levels of windthrow due to the destabilization of infected trees' root systems.

Human Development and Natural Events

Most land cover change in the AOI can be described as residential and commercial development. This process entails land clearing and road building. Forest harvesting is also common on provincial Crown land as well as on private land within the AOI. Abiotic and biotic natural events occur at small geographic scales. The overall implication of human development is an increase in human ignition potential with a decrease in hazardous fuels cover as land clearing for human development generally increases the non-fuel and O1-a/b fuel types (see Section 4.3.1 for a description of fuel types).

Since the establishment of communities within the Village of Harrison Hot Springs, there have been numerous anthropogenic and natural changes that have occurred on the landscape. The following is a list of notable changes observed within the AOI and a description of associated implications regarding wildfire behaviour.

- Residential land development has occurred across the AOI since the mid-19th century following wide-spread settlement by early pioneers engaging in resource-based activities. This has generally resulted in an increased wildland-urban interface in particular areas (Section 5.2.3) and an increase in fire suppression in an ecosystem that had a historic fire interval of 200 years. Population growth is expected to continue and the Village's proximity to larger Fraser Valley communities, favourable climate and high recreational and landscape values make it a desirable place to live and work or retire.
- Forest industry activities – forest harvesting occurs on provincial crown land within the AOI. Poor slash hazard abatement practices have been attributed to some operations which can lead to high fuel loading along roadsides.

[32] 2015-17 Coastal Timber Supply Areas Forest Health Overview. 2015.

[33] https://catalogue.data.gov.bc.ca/pt_BR/dataset/pest-infestation-polygons (current as of September, 2017)

4.1.2 Fire Weather Rating

The Canadian Forestry Service developed the Canadian Forest Fire Danger Rating System (CFFDRS) to assess fire danger and potential fire behaviour. 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 is used to determine fire danger, represented by Fire Danger Classes, on forestlands within a community. The information can be obtained from the BCWS and is most commonly utilized by municipalities and regional districts to monitor fire weather, restrict high risk activities when appropriate, and to determine hazard ratings associated with bans and closures.

The BC *Wildfire Act* [BC 2004] and *Wildfire Regulation* [BC Reg. 38/2005], which specify responsibilities and obligations with respect to fire use, prevention, control and rehabilitation, and restrict high risk activities based on these classes. Fire Danger Classes are defined as follows:

- **Class 1 (Very Low)**: Fires are likely to be self-extinguishing and new ignitions are unlikely. Any existing fires are limited to smoldering in deep, drier layers.
- **Class 2 (Low)**: Creeping or gentle surface fires. Ground crews easily contain fires with pumps and hand tools.
- **Class 3 (Moderate)**: Moderate to vigorous surface fires with intermittent crown involvement. They are challenging for ground crews to handle; heavy equipment (bulldozers, tanker trucks, and aircraft) are often required to contain these fires.
- **Class 4 (High)**: High-intensity fires with partial to full crown involvement. Head fire conditions are beyond the ability of ground crews; air attack with retardant is required to effectively attack the fire's head.
- **Class 5 (Extreme)**: Fires with fast spreading, high-intensity crown fire. These fires are very difficult to control. Suppression actions are limited to flanks, with only indirect actions possible against the fire's head.

It is important for the development of appropriate prevention programs that the average exposure to periods of high fire danger is determined. 'High fire danger' encompasses Danger Class ratings of 4 (High) and 5 (Extreme). Danger class days were summarized to provide an indication of the fire weather in the AOI. Considering that fire danger varies from year to year, historical weather data can provide information on the number and distribution of days when the AOI is typically subject to high fire danger conditions, which is useful information in assessing fire risk.

Figure 1 displays the average frequency of Fire Danger Class days between the months of April and October. The data summarized comes from the Haig Camp weather station (daily data for the years 2002 – 2018). According to Figure 1, the months with the highest average number of 'high' and 'extreme' fire danger class days are July and August. Historically, 'high' fire danger days also occur in June and even extend into May and October. 'Extreme' fire danger class days extend only into June and September. August historically has the highest number of days in the 'extreme' and 'high' classes when compared to June, July, and September.

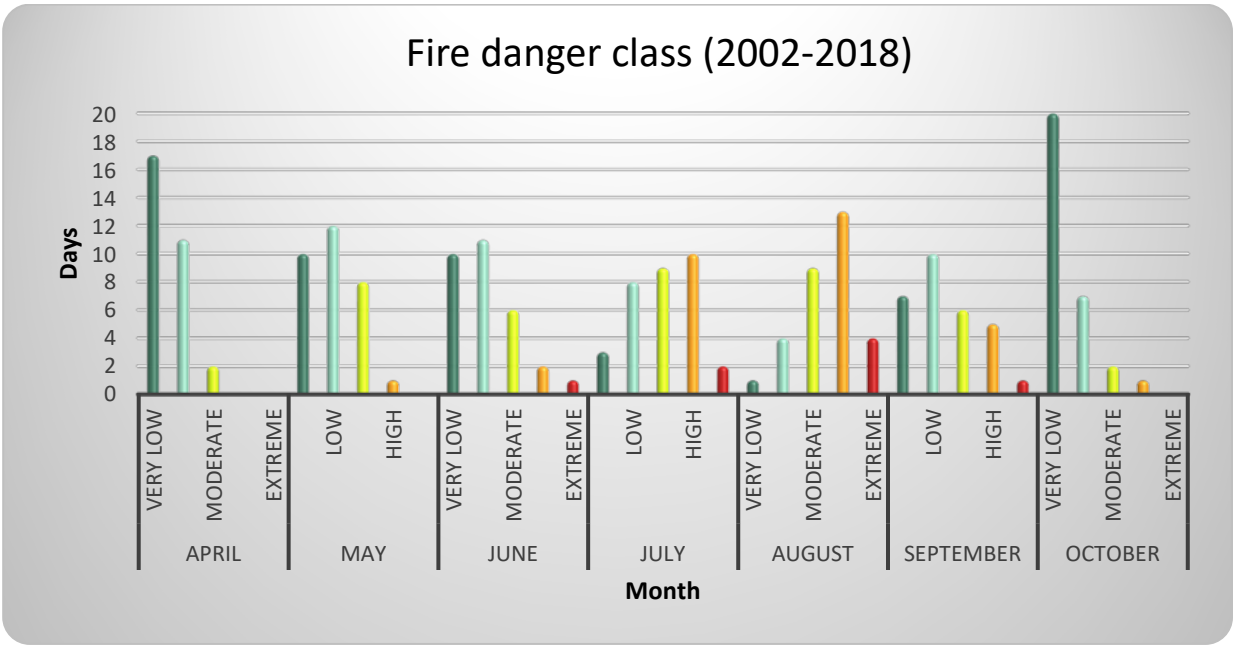


Figure 1. Average number of danger class days for the Haig Camp weather station. Summary of fire weather data for the years 2002 - 2018.

4.1.3 Climate Change

Climate change is a serious and complex consideration for wildfire management planning. Warming of the climate system is unequivocal, and since the 1950s, each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. The period from 1983 to 2012 was likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere.[34]

Numerous studies outline the nature of these impacts on wildland fire across Canada, and globally. Although there are uncertainties regarding the extent of the impacts of climate change on wildfire, it is clear that the frequency, intensity, severity, duration and timing of wildfire and other natural disturbances is expected to be altered significantly with the changing climate.[35] Despite the uncertainties, trends within the data are visible. As outlined in the *BC Agriculture Climate Change Adaptation Risk & Opportunity Assessment Series Fraser Valley and Metro Vancouver Snapshot Report*[36], the following climate projections for the Fraser Valley are made:

- Increases in average annual temperature consistent with temperature increases for the province of BC (approximately 1.8°C increase from 1961-1990 baseline by 2050);

[34] International Panel on Climate Change. (2014) Climate change 2014: Synthesis report, summary for policymakers. 32p.
[35] Dale, V., L. Joyce. S. McNulty, R. Neilson, M. Ayres, M. Flannigan, P. Hanson, L. Irland, A. Lugo. C. Peterson, D. Simberloff, F. Swanson, B. Stocks, B. Wotton. *Climate Change and Forest Disturbances*. BioScience 2001 51 (9), 723-734.
[36] British Columbia Agriculture & Food Climate Action Initiative, 2012. https://pics.uvic.ca/sites/default/files/uploads/publications/Adapt-FraserMetroVan%20Crawford.pdf

- Decline in summer precipitation (up to 14% decrease by 2050) leading to drier fuels and soils, thereby increasing fire behaviour potential;
- Increase in winter precipitation (6% by 2050) in the form of rain and significant decreases in snowfall (-25% in the winter and -56% in the spring);
- Annual runoff from the Fraser River is expected to increase by approximately 14%, with increasing spring flow and decreasing summer flow; and
- In the province as a whole, as average winter temperatures increase, more intense winter precipitation is expected to fall as rain during extreme events, and less falling as snow, potentially influencing watershed and groundwater storage ability, timing and amount of run-off, and soil and fuel moisture during early fire season.

An increased frequency of natural disturbance events is expected to occur as a result of climate change with coincident impacts to ecosystems. These include:

- Storm events, including catastrophic blowdown and damage to trees from snow and ice;
- Wildfire events and drought;
- Increased winter precipitation may result in slope instability, mass wasting, increased peak flows (loss of forest cover from fire or other disturbance may increase the chance of mass wasting); and
- Insects and disease occurrence of spruce beetle and Swiss needle cast may increase; outbreaks of western hemlock looper may increase.[37]

Other research regarding the intricacies of climate change and potential impacts on wildfire threats to Canadian forests has found that:

- Fuel moisture is highly sensitive to temperature change and projected precipitation increases will be insufficient to counteract the impacts of the projected increase in temperature. Results conclude that future conditions will include drier fuels and a higher frequency of extreme fire weather days.[38]
- The future daily fire severity rating (a seasonally cumulative value) is expected to have higher peak levels and head fire intensity is expected to increase significantly in western Canada. A bi-modal (spring-late summer) pattern of peak values may evolve to replace the historical late summer peak which is the current norm.[39] The length of fire seasons is expected to increase and the increase will be most pronounced in the northern hemisphere, specifically at higher latitude northern regions. Fire season severity seems to be sensitive to increasing global

[37] MFLNRO, 2016. BC Provincial Government extension note '*Adapting natural resource management to climate change in the West and South Coast Regions*'. Accessed online at: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nrs-climate-change/regional-extension-notes/coasten160222.pdf

[38] Flannigan, M.D., B.M. Wotton, G.A. Marshall, W.J. deGroot, J. Johnston, N. Jurko, A.S. Cantin. 2016. *Fuel moisture sensitivity to temperature and precipitation: climate change implications*. Climatic Change (2016) 134: 59 -71. Accessed online at https://link.springer.com/content/pdf/10.1007%2Fs10584-015-1521-0.pdf.

[39] deGroot, W. J., M. D. Flannigan, A.S. Cantin. 2013. *Climate change impacts on future boreal fire regimes*. Forest Ecology and Management. 294: 35 -44.

temperatures; larger and more intense fires are expected and fire management will become more challenging.[40, 41]

- More extreme precipitation events (increased intensity and magnitude of extreme rainfall) are expected, particularly in April, May and June, along with dry periods between major events (increased summer drought periods). Annual runoff is also expected to increase and the timing of peak flows are anticipated to occur earlier in the spring. [42]
- Future climatic conditions may be more suitable for, or give competitive advantage to, new species of plants, including invasive species.[43]

In summary, climate scientists expect that the warming global climate will trend towards wildfires that are increasingly larger, more intense and difficult to control. Furthermore, it is likely that these fires will be more threatening to WUI communities due to increased potential fire behaviour, fire season length, and fire severity. This trend is expected to be disproportionately felt in northern latitudes.[44]

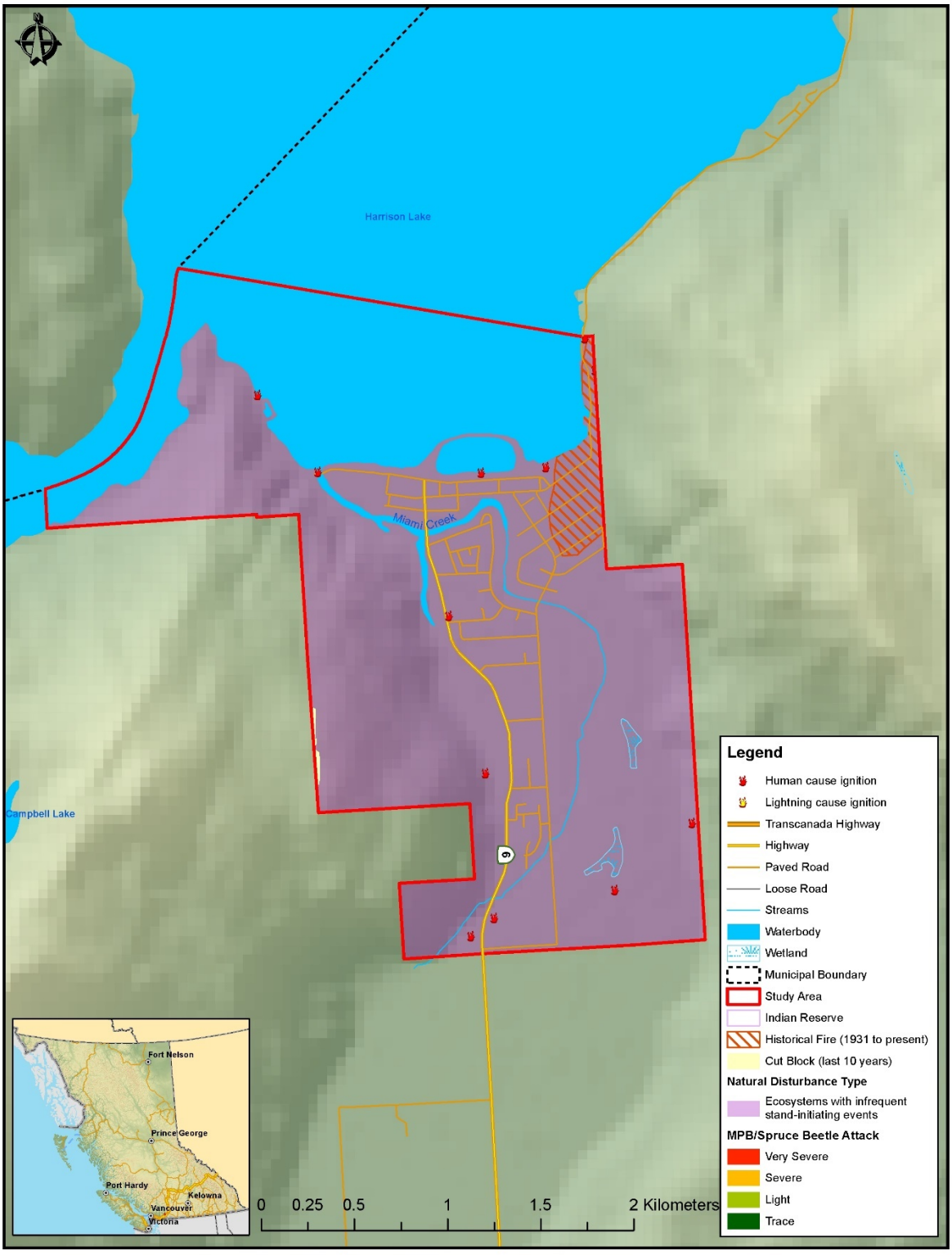
[40] Flannigan, M.D., A.S. Cantin, W.J. de Groot, M. Wotton, A. Newbery, L.M. Gowman. 2013. *Global wildland fire season severity in the 21st century*. Forest Ecology and Management (2013) 294: 54 - 61.

[41] Jandt, R. 2013. Alaska Fire Science Consortium Research Brief 2013-3.

[42] British Columbia Agriculture & Food Climate Action Initiative, 2012. https://pics.uvic.ca/sites/default/files/uploads/publications/Adapt-FraserMetroVan%20Crawford.pdf

[43] British Columbia Agriculture & Food Climate Action Initiative, 2012. https://pics.uvic.ca/sites/default/files/uploads/publications/Adapt-FraserMetroVan%20Crawford.pdf

[44] All research noted was completed for Canada or globally, not for the study area. Direct application of trends may not be appropriate, although general expectations for Canada were noted to be consistent across multiple studies.



Map 4. Fire Regime, Ecology and Climate Change.

4.2 PROVINCIAL STRATEGIC THREAT ANALYSIS

The Provincial Strategic Threat Analysis (PSTA) evaluates multiple data sets to provide a coarse (high-level) spatial representation of wildfire threats across BC. The information in this section is a synthesis of the BCWS' Provincial Strategic Threat Analysis 2017 Wildfire Threat Analysis Component.[45] Three inputs are combined to create the PSTA Wildfire Threat Analysis (WTA) Component:

1) **Historic fire density**: represents the ignition and fire spread potential based upon historic patterns and fire density weighted by fire size (larger fire perimeters were given a higher weight in order to reflect the greater cost and damage usually associated with larger fires) (see Map 5 below).
2) **Spotting impact**: represents the ability of embers or firebrands from a burning fire to be sent aloft and start new fires in advance of the firefront, or outside of the fire perimeter. Spotting is most associated with high intensity crown fires in coniferous fuels and structure losses. For the WTA, the spotting analysis is based on estimating the threat to a given point on the landscape from the fuels surrounding it, up to a distance of 2 km. Spotting distances greater than 2 km are rare and unpredictable.
3) **Head fire intensity (HFI)**: represents the intensity (kW/m) of the fire front, a measure of the energy output of the flaming front. HFI is directly related to flame length, fire spread rate and fuel consumption and a fire's leading edge. There is a strong correlation between HFI, suppression effort required, and danger posed to suppression personnel. The HFI used in the WTA was developed using the 90th percentile fire weather index value.

The final wildfire threat analysis value was developed through an average weighting process of the aforementioned three layers: fire density 30%; HFI 60%; and spotting impact 10%. Water bodies were automatically given a value of 'no threat' (-1). The values were then separated into 10 classes (1 – 10) which represent increasing levels of overall fire threat (the higher the number, the greater the fire threat); threat class 7 is considered the threshold. Threat classes of 7 and higher are locations where the threat is severe enough to potentially cause catastrophic losses in any given fire season, when overlapping with values at risk. Classes were grouped into the following general threat class descriptions: low (1 – 3); moderate (4 – 6); high (7 – 8); and, extreme (9 – 10).

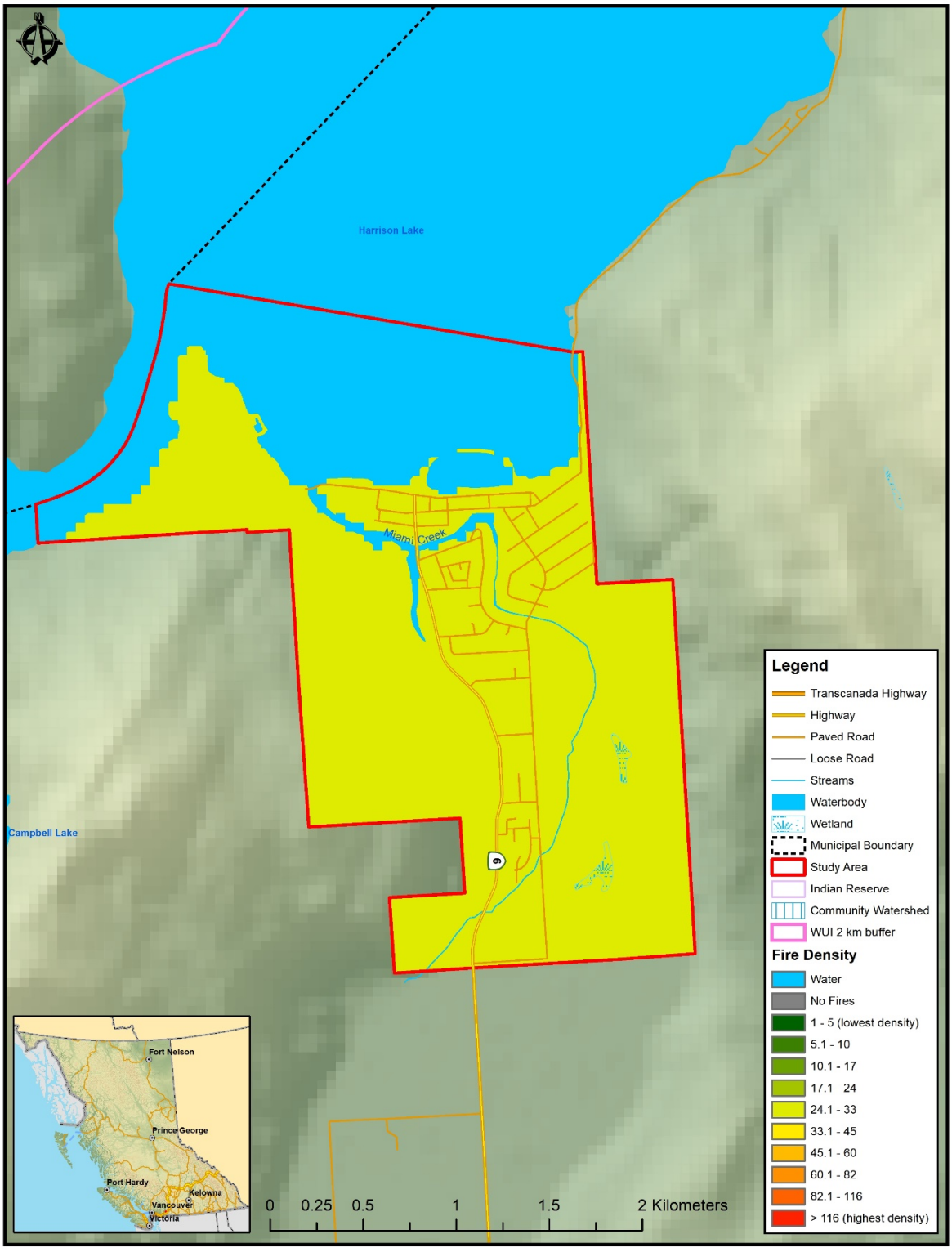
There are considerable limitations associated with the WTA component based upon the accuracy of the source data and the modeling tools, the most notable being:

- Limited accuracy and variability of the fire history point data;
- Sensitivity to fuel type and the associated limitations of using fuel type approximations for fire behaviour modelling; and

[45] BC Wildfire Service. 2015. *Provincial Strategic Threat Analysis 2015 Wildfire Threat Analysis Component*. Retrieved from: https://www.for.gov.bc.ca/ftp/!Project/WildfireNews/PSTA/Provincial_Strategic_Threat_Analysis_PSTA_2015_REPORT.pdf. Accessed January 9, 2018.

- 90th percentile rating for HFI, which represents a near worst-case scenario which may be artificial in some circumstances.

The WTA serves to provide a provincial-level threat assessment for resource and land managers and local governments in order to complete landscape fire management planning and strategically plan efficient and effective wildfire risk reduction initiatives (*e.g*. placement or prioritization of fuel treatment areas, identification of values at risk, FireSmart planning, etc.). The WTA is then validated at the stand level in order to produce a finer, more accurate assessment of local threat.



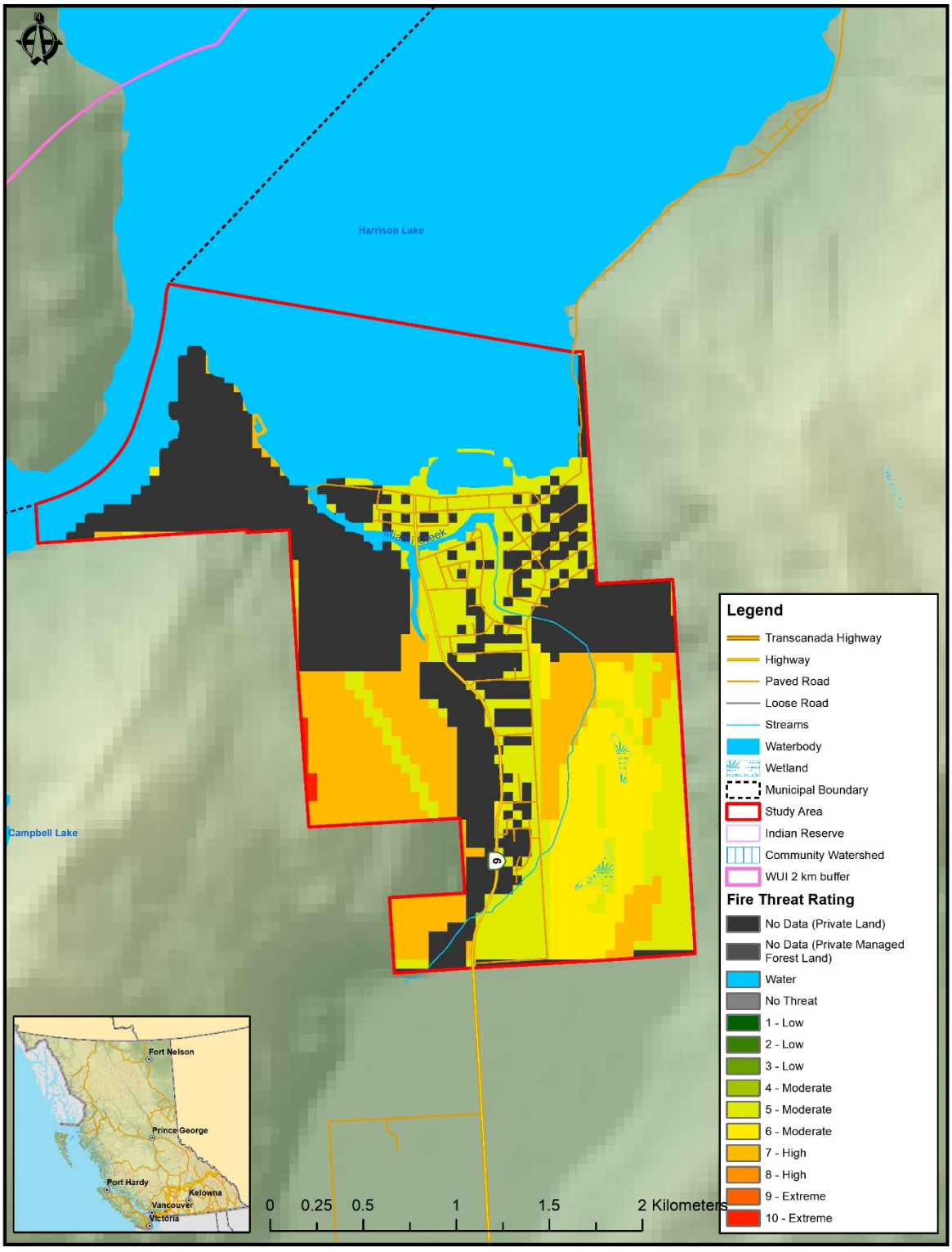
Map 5. Historical Fire Density.

4.2.1 PSTA Final Wildfire Threat Rating

Approximately 28% of the AOI is categorized as having a moderate wildfire threat rating in the provincial Wildfire Threat Analysis (Table 7). High threat ratings cover less than 15% of the study area, with the most notable high-threat areas being concentrated on the western side of the AOI on Mount Woodside, and portions of the East Sector Lands (Map 6). 31% of the AOI is categorized as private land and has no data for wildfire threat in the Provincial Wildfire Threat Analysis dataset (PSTA), and water covers 27%. There are no low or extreme threat areas within the Village AOI.

Table 7. Overall PSTA Wildfire Threat Analysis for the study area (rounded to the nearest hectare).

Threat Class	Area (ha)	Threat Class Description	Percent of AOI
-3	217	No Data (Private Land)	31
-2	0	No Data (Private Managed Forest Land)	0
-1	192	Water	27
0	0	No Threat	0
1	0	Low	0
2	0		
3	0		
4	0	Moderate	28
5	133		
6	62		
7	102	High	14
8	0		
9	0	Extreme	0
10	2		
Total	708	-	**100**



Map 6. Provincial Strategic Threat Rating.

4.2.2 Spotting Impact

Spotting impact is modeled by fuel type and distance class from a given fuel type. The layer estimates the threat of embers impacting a given point on the landscape from the fuel types surrounding it.

It has been found that, during extreme wildfire events, most home destruction has been a result of low-intensity surface fire flame exposures, usually ignited by embers in advance of the fire front. Firebrands can be transported long distances ahead of the wildfire, across fire guards and fuel breaks, and accumulate in densities that can exceed 600 embers per square meter. Combustible materials found adjacent or near to values at risk can provide fire pathways allowing spot surface fires ignited by embers to spread and carry flames or smoldering fire into contact with structures.

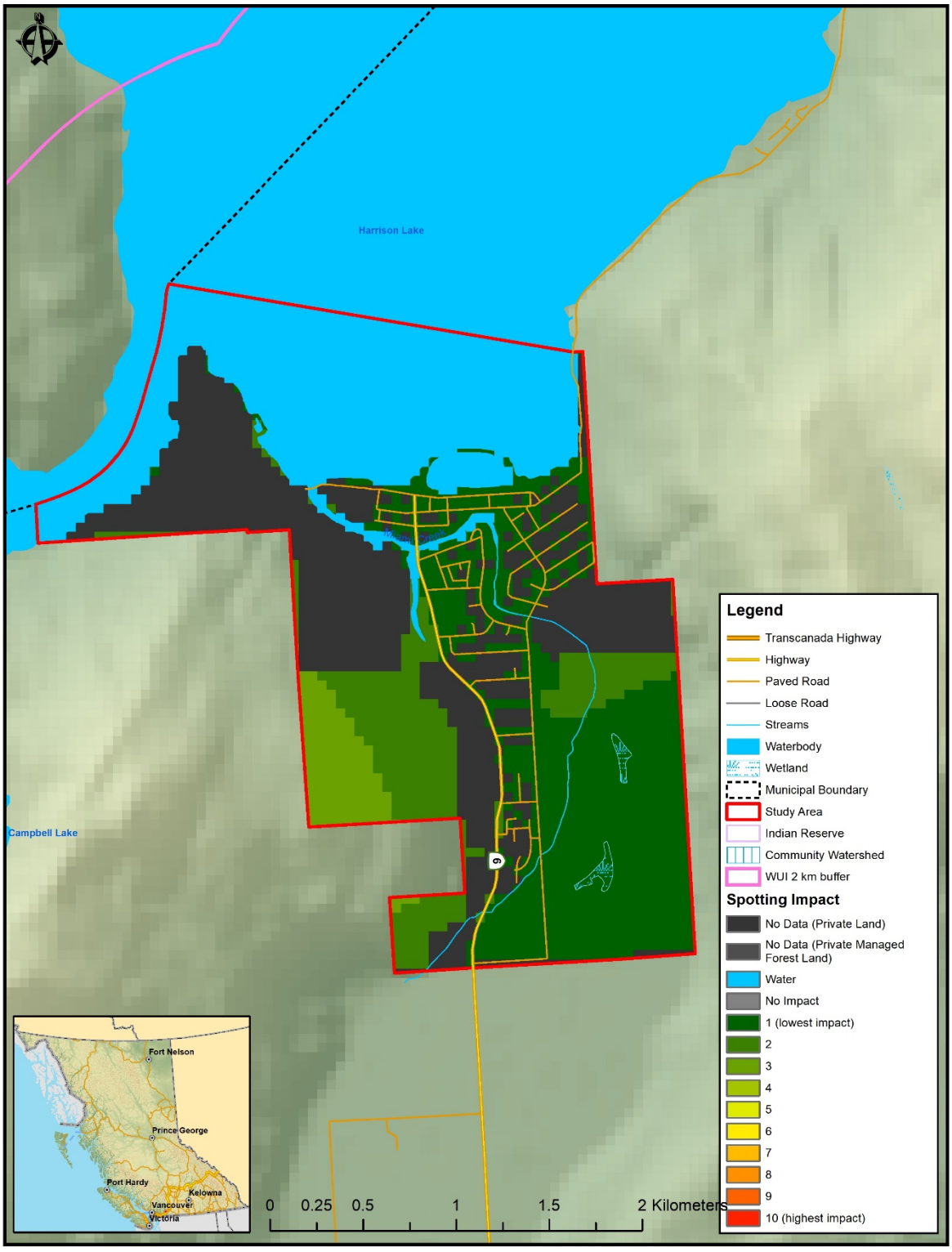
For example, an investigation of home destruction from the 2016 Fort McMurray, Alberta fire found that the vast majority of home ignitions in the interface (outer edges of urban neighbourhoods) were attributable to embers alighting on combustible material (home or adjacent areas).[46] Similarly, reports from the 2010 Fourmile Canyon fire outside Boulder, Colorado, found that only 17% of the 162 homes destroyed were attributed to crown fire.[47,48] Instead of high intensity flames or radiant heat, the majority of homes ignited as a result of firebrands (or embers), which ignited lower-intensity surface fires adjacent to structures or the home directly.[48] Post-fire studies have shown that it is uncommon for homes to be partially damaged by wildfire; survivability is based upon whether or not the structure, or area adjacent to the structure, ignites.

The AOI appears to generally be low in terms of spotting impact with the highest impact areas being in the western part of the AOI on Mount Woodside (Map 7).

[46] Westhaver, A. 2017. *Why some homes survived. Learning from the Fort McMurray wildland/urban interface fire disaster*. A report published by the Institute for Catastrophic Loss Reduction – ICLR research paper series – number 56. https://www.iclr.org/images/Westhaver_Fort_McMurray_Final_2017.pdf

[47] Calkin, D., J. Cohen, M. Finney, M. Thompson. 2014. *How risk management can prevent future wildfire disasters in the wildland-urban interface*. Proc Natl Acad Sci U.S.A. Jan 14; 111(2): 746-751. Accessed online 1 June, 2016 at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3896199/.

[48] Graham, R., M. Finney, C. McHugh, J. Cohen. D. Calkin, R. Stratton, L. Bradshaw, N. Nikolov. 2012. Fourmile Canyon Fire Findings. Gen. Tech. Rep. RMRS-GTR-289. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 110 p.



Map 7. Spotting Impact within the AOI.

4.2.3 Head Fire Intensity

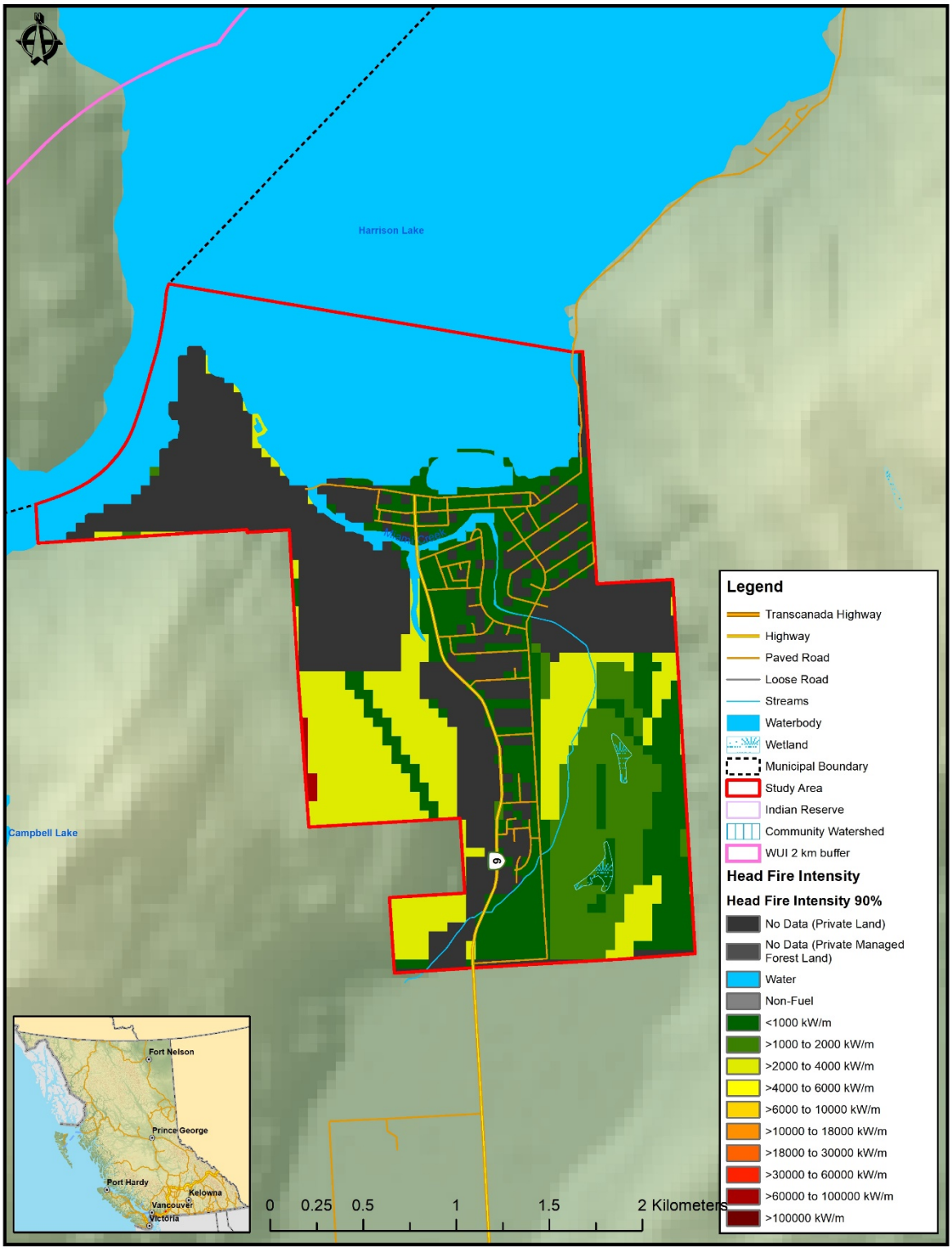
HFI is correlated with flame length and fire behaviour. The greater the fire intensity (or HFI), as measured in kW/m, and fire intensity class, the more extreme the fire behaviour is likely to be and the more difficult the fire will likely be to suppress (Table 8 and Map 8).

Generally speaking, classes 1 and 3 are the most common in the AOI (approximately 19 and 14% of the area, respectively), and class 2 makes up the third most area (Table 8, Map 8). Class 3 is described as vigorous surface fire and classes 2 and 1 are described as moderate vigour surface fire and smoldering surface fire, respectively. The highest fire intensity class within the AOI is 9, which represents extreme and aggressive fire behaviour with blowups and conflagration. This small area of intensity class 9 is limited to the western edge of the AOI on Mount Woodside.

Table 8. Head Fire Intensity classes and associated fire behaviour.

PSTA - HFI Class	Fire Intensity kW/m	Fire Intensity Class[49]	Percent of AOI	Flame Length (meters)[50]	Likely Fire Behaviour[51]
1	0.01 – 1,000	2	19	< 1.8	Smouldering surface fire
2	1,000.01 – 2,000	3	9	1.8 to 2.5	Moderate vigour surface fire
3	2,000.01 – 4.000	4	14	2.5-3.5	Vigorous surface fire
4	4,000.01 – 6,000	5	0	3.5 to 4.2	Vigorous surface fire with occasional torching
5	6,000.01 – 10,000	5	0	4.2 to 5.3	Vigorous surface fire with intermittent crowning
6	10,000.01 – 18,000	6	0	12.3 to 18.2	Highly vigorous surface fire with torching and/or continuous crown fire
7	18,000.01 – 30,000	6	0	18.2 to 25.6	Extremely vigorous surface fire and continuous crown fire
8	30,000.01 – 60,000	6	0	>25.6[52]	Extremely vigorous surface fire and continuous crown fire, and aggressive fire behaviour
9	60,000.01 – 100,000	6	<1	>25.6	Blowup or conflagration, extreme and aggressive fire behaviour
10	≥ 100,000	6	0	>25.6	Blowup or conflagration, extreme and aggressive fire behaviour

[49] Head fire intensity should be classified by intensity class not fire rank. Fire rank is a visual description of conifer fires for air operations.
[50] For calculating Flame Length, Bryam (1959) was used for surface fire (<10 000 kW/m) and Thomas (1963) was used for crown fire situations (>10 000 kW/m).
[51] These characteristics will be different in open and closed forest fuel.
[52] With HFI over 30 000 kW/m the function of the equation is stretched beyond the expectation of the equation, fire is under the influence too many other factors.



Map 8. Head Fire Intensity within the AOI.

4.2.4 Fire History

Fire ignition and perimeter data are depicted in Map 4. It was reported from BCWS (personal communication) that most fire activity in the Village AOI has occurred due to recreationalists leaving abandoned campfires, and using cut blocks for target practice. Locally, BCWS prevention activity is focused on patrolling popular areas to enforce fire bans during the fire season.

As shown in Map 4; one recorded historical wildfire has burned within the AOI. Fire ignition data for the area is available for 1950-2017 and fire perimeter data from 1928-2016. Based on the fire ignition data, from the year 1950 to 2016, there have been 8 fire incidents within the AOI; 7 of these ignitions were human-caused and one was of miscellaneous/undetermined cause. Based on the fire perimeter data from 1928-2017, the fire that burned within the AOI was estimated to be over 1,700 ha, and burned along the east side of Harrison Lake. It was also defined as human-caused.

4.3 LOCAL WILDFIRE THREAT ASSESSMENT

WUI Threat Assessments were completed over three field days in June and August of 2018, in conjunction with verification of fuel types. WUI Threat Assessments were completed in interface (i.e., abrupt change from forest to urban development) and intermix (i.e., where forest and structures are intermingled) areas of the study area. This process was used to support the development of priority treatment areas, and in order to confidently ascribe threat to polygons which may not have been visited or plotted, but which have similar fuel, topographic, and proximity to structure characteristics, to those that were.

Field assessment locations were prioritized based upon:

- PSTA WTA class - Field assessments were clustered in those areas with WTA classes of 5 or higher.
- Proximity to values at risk – Field assessments were clustered in the intermix and interface, as well as around critical infrastructure.
- Prevailing fire season winds – More field time was spent assessing areas upwind of values at risk.
- Slope position in relation to value – More field time was spent assessing areas downslope of values at risk. Similarly, values at top of slope or upper third of the slope were identified as particularly vulnerable.
- Land ownership – Crown and municipal land was the main focus of field assessments.
- Local knowledge – Areas identified as hazardous, potentially hazardous, with limited access / egress, or otherwise of particular concern as vulnerable to wildfire, as communicated by local fire officials and BCWS zone staff.
- Observations – Additional areas potentially not recognized prior to field work were visually identified as hazardous and assessed during the week.

A total of 13 WUI threat plots were completed and over 40 other field stops (i.e., qualitative notes, fuel type verification, and/or photograph documentation) were made across the AOI (see Appendix E for WUI threat plot locations).

4.3.1 Fuel Type Verification

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.[53] The most appropriate fuel type was assigned based on research, experience, and practical knowledge; this system has been used within BC, with continual improvement and refinement, for 20 years.[54] It should be noted that there are significant limitations with the fuel typing system which should be recognized. Major limitations include: a fuel typing system designed to describe fuels which do not occur within the study area, fuel types which cannot accurately capture the natural variability within a polygon, and limitations in the data used to create initial fuel types.[54] Details regarding fuel typing methodology and limitations are found in Appendix F. There are several implications of the aforementioned limitations, which include: fuel typing further from the developed areas of the study has a lower confidence, generally; and, fuel typing should be used as a starting point for more detailed assessments and as an indicator of overall wildfire threat, not as an operational, or site-level, assessment.

Table 9 summarizes the fuel types by general fire behaviour (crown fire and spotting potential). In general, the fuel types considered hazardous in terms of fire behaviour and spotting potential are C-3 and C-4. C-5 and C-7 can sometimes represent hazardous fuels, particularly if there are large amounts of woody fuel accumulations or denser understory ingrowth. C-5 fuel types have a moderate potential for active crown fire when wind-driven.[54] An M-1/2 fuel type, a mix of deciduous and coniferous trees, can sometimes be considered hazardous, depending on the proportion of conifers within the forest stand; conifer fuels include those in the overstory as well as those in the understory. An O-1b fuel type often can support a rapidly spreading grass or surface fire capable of damage or destruction of property, and jeopardizing human life, although it is recognized as a highly variable fuel type dependent upon level of curing.[55] These fuel types were used to guide the threat assessment.

Forested ecosystems are dynamic and change over time: fuels accumulate, stands fill in with regeneration, and forest health outbreaks occur. Regular monitoring of fuel types and wildfire threat assessment should occur every 5 – 10 years to determine the need for threat assessment updates and the timing for their implementation.

[53] Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3.

[54] Perrakis, D. and G. Eade. 2015. BC Wildfire Service. Ministry of Forests, Lands, and Natural Resource Operations. *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description* 2015 Version.

[55] Ibid.

Table 9. Fuel Type Categories and Crown Fire Spot Potential. *

Fuel Type	FBP / CFDDRS Description	Study Area Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type – Crown Fire / Spotting Potential
C-3	Mature jack or lodgepole pine	Fully stocked, late young forest (western redcedar, hemlock, and/or Douglas-fir), with crowns separated from the ground	Surface and crown fire, low to very high fire intensity and rate of spread	High**
C-5	Red and white pine	Well-stocked mature forest, crowns separated from ground. Moderate understory herbs and shrubs. Often accompanied by dead woody fuel accumulations.	Moderate potential for active crown fire in wind-driven conditions. Under drought conditions, fuel consumption and fire intensity can be higher due to dead woody fuels	Low
M-1/2	Boreal mixedwood (leafless and green)	Moderately well-stocked mixed stand of conifers and deciduous species, low to moderate dead, down woody fuels.	Surface fire spread, torching of individual trees and intermittent crowning, (depending on slope and percent conifer)	<26% conifer (Very Low); 26-49% Conifer (Low); >50% Conifer (Moderate)
D-1/2	Aspen (leafless and green)	Deciduous stands	Always a surface fire, low to moderate rate of spread and fire intensity	Low
W	N/A	Water	N/A	N/A
N	N/A	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.	N/A	N/A

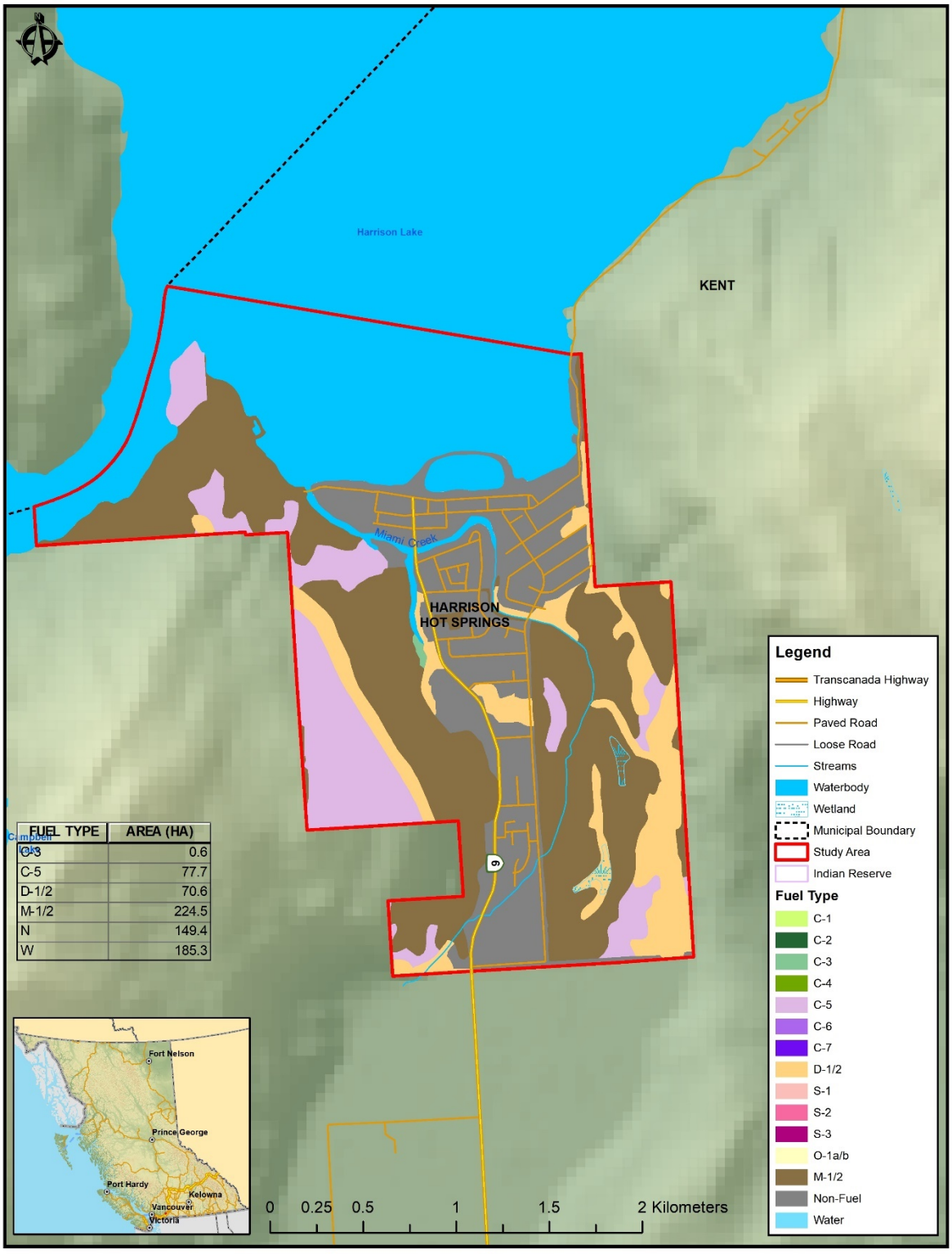
** Only summaries of fuel types encountered within the AOI are provided (as such, other fuel types, C-1, C-2, C-4, C-6 C-7, O-1a/b, S-1, S-2, and S-3 are not summarized below).*

***C-3 fuel type is considered to have a high crown fire and spotting potential within the study area due to the presence of moderate to high fuel loading (dead standing and partially or fully down woody material), and continuous conifer ladder fuels (i.e., western redcedar, Cw, and/or Douglas-fir, Fd).*

During field visits, two recurring patterns of fuel type errors were found in the provincial dataset. They were:

- M-1/2 fuel types being incorrectly identified by the PSTA as C-5, and
- M-1/2 fuel types identified as D-1/2.

All fuel type updates were approved by BCWS, using stand and fuel descriptions and photo documentation for the review process (see Appendix A for submitted fuel type change rationales).



Map 9. Updated fuel types.

4.3.2 Proximity of Fuel to the Community

Fire hazard classification in the WUI is partly dictated by the proximity of the fuel to developed areas within a community. More specifically, fuels closest to the community are considered to pose a higher hazard in comparison to fuels that are located at greater distances from values at risk. As a result, it is recommended that the implementation of fuel treatments prioritizes fuels closest to structures and / or developed areas, in order to reduce hazard level adjacent to the community. Continuity of fuel treatment is an important consideration, which can be ensured by reducing fuels from the edge of the community outward. Special consideration must be allocated to treatment locations to ensure continuity, as discontinuous fuel treatments in the WUI can allow wildfire to intensify, resulting in a heightened risk to values. In order to classify fuel threat levels and prioritize fuel treatments, fuels immediately adjacent to the community are rated higher than those located further from developed areas. Table 10 describes the classes associated with proximity of fuels to the interface.

Table 10. Proximity to the Interface.

Proximity to the Interface	Descriptor*	Explanation
WUI 100	(0-100 m)	This zone is always located adjacent to the value at risk. Treatment would modify the wildfire behaviour near or adjacent to the value. Treatment effectiveness would be increased when the value uses FireSmart practices.
WUI 500	(101-500 m)	Treatment would affect wildfire behaviour approaching a value, as well as the wildfire's ability to impact the value with short- to medium- range spotting; should also provide suppression opportunities near a value.
WUI 2000	(501-2000 m)	Treatment would be effective in limiting long - range spotting but short- range spotting may fall short of the value and cause a new ignition that could affect a value.
	>2 000 m	This should form part of a landscape assessment and is generally not part of the zoning process. Treatment is relatively ineffective for threat mitigation to a value, unless used to form a part of a larger fuel break / treatment.

**Distances are based on spotting distances of high and moderate fuel type spotting potential and threshold to break crown fire potential (100 m). These distances can be varied with appropriate rationale, to address areas with low or extreme fuel hazards.*

4.3.3 Fire Spread Patterns

Wind speed, wind direction, and fine fuel moisture condition influence wildfire trajectory and rate of spread. Wind plays a predominant role in fire behaviour and direction of fire spread and is summarized in the Initial Spread Index (ISI) rose(s) from the local representative BCWS weather station – Haig Camp.[56] The ISI 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) winds from the northwest dominate in the afternoon (12-6pm) with the highest ISI values (related to wind speed) in the 18-24 range occurring in April and the highest

[56] MFLNRORD, 2018. Retrieved online: https://www.for.gov.bc.ca/ftp/HPR/external/!publish/Website/ISI%20Roses/

frequency of high ISI values (12-18) occurring in July and August (based on hourly data for date ranges as indicated in Figure 2). Winds predominantly blow from the northwest and east overnight (between 6pm and 6am) and continue from these directions between 6 am and noon. Figure 3 illustrates a windrose showing average daily wind readings during the fire season. The highest ISI values and frequency of winds generally occur from the northwest throughout the fire season (Figure 3). This has implications for potential fire spread patterns within the AOI, thereby allowing for strategic planning of fuel reduction treatments within the Village and providing important information to responders in the event of a wildfire. Potential treatment areas were identified and prioritized with the predominant wind direction in mind; wildfire that occurs upwind of a value poses a more significant threat to that value than one which occurs downwind.

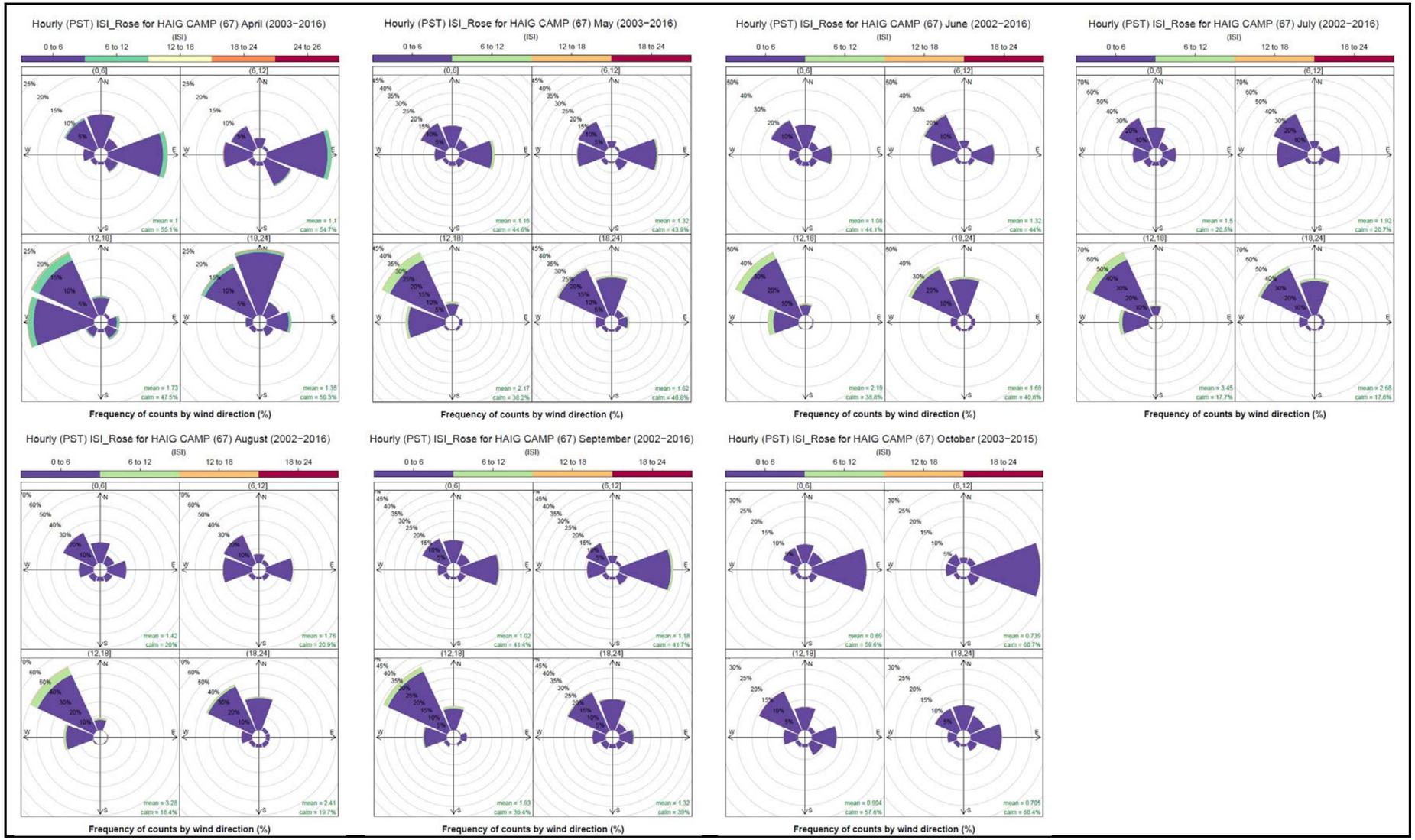


Figure 2. ISI roses depicting average hourly Initial Spread Index values (indicative of windspeed) for the fire season April – October. Data was sourced from the BCWS Haig Camp weather station for date ranges as indicated in each graphic. The ISI roses in each month are depicted for four daily time periods: (000 – 600 hrs (0, 6), 600 -1200 hrs (6, 12), 1200 -1800 hrs (12, 18) and 1800 -2400 hrs (18, 24). The length of each bar represents the frequency of readings in % and bar colour indicates the ISI value range from lowest (purple) to highest (red). The mean ISI value and the percent frequency of 'no wind events' (calm) are provided in each graphic.[57]

[57] Source BCWS, 2018. Tools for Fuel Management. Initial Spread Index Roses. Retrieved online: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/fire-fuel-management/fuel-management.

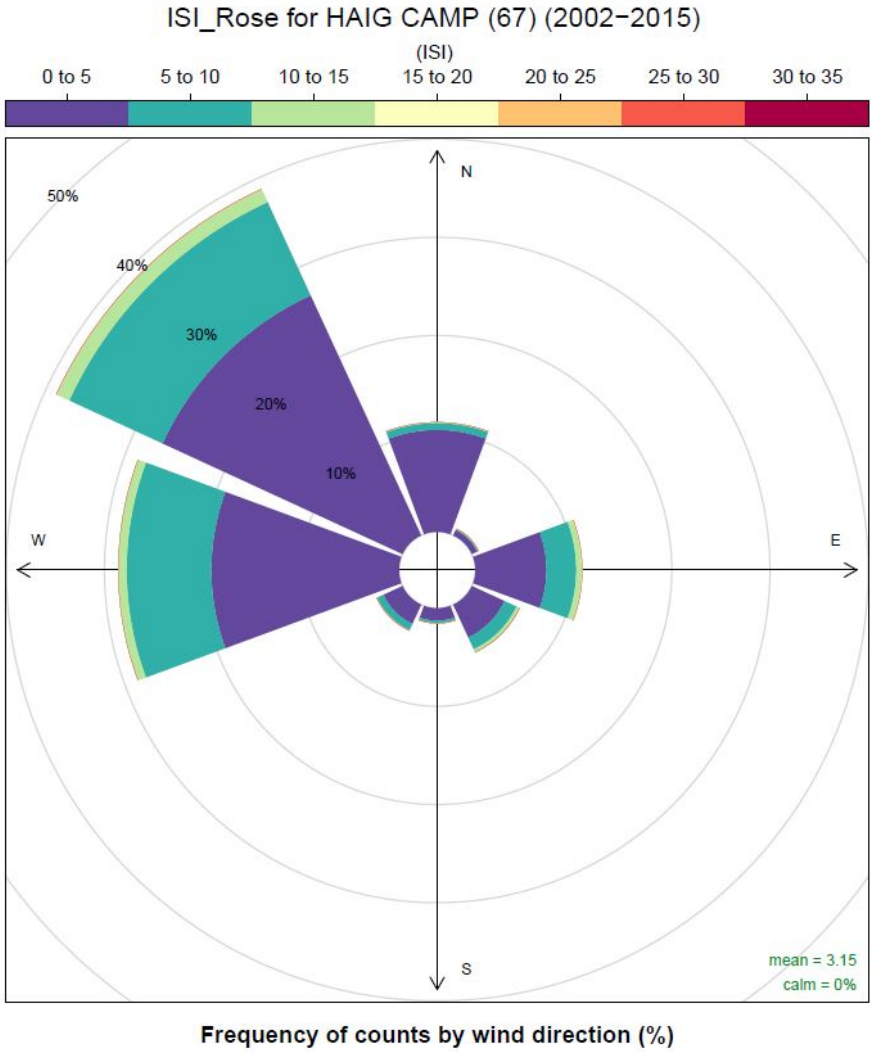


Figure 3. Windrose showing average daily wind readings during the fire season (April 1 – October 31) 2002 – 2015. Data taken from the Haig Camp weather station. The length of each bar represents the frequency of readings in % and bar colour indicates the ISI value range from lowest (purple) to highest (red). The mean ISI value and the percent frequency of 'no wind events' (calm) is provided in bottom right hand corner of the graphic.

4.3.4 Topography

Topography is an important environmental component that influences fire behaviour. Considerations include slope percentage (steepness) and slope position. Slope steepness influences the fire's trajectory and rate of spread and slope position relates to the ability of a fire to gain momentum uphill. Other factors of topography that influence fire behaviour include aspect, elevation and land configuration.

Slope Class and Position

Slope steepness affects solar radiation intensity, fuel moisture (influenced by radiation intensity) and influences flame length and rate of spread of surface fires. Table 11 summarizes the fire behaviour implications for slope percentage (the steeper the slope the faster the spread). In addition, slope position affects temperature and relative humidity as summarized in Table 12. A value placed at the bottom of the slope is equivalent to a value on flat ground (see Table 11). A value on the upper 1/3 of the slope would be impacted by preheating and faster rates of spread (Table 12). The majority of the AOI (69%) is on less than 20% slope and will likely not experience accelerated rates of spread due to slope class. Approximately 31% percent of the study area is likely to experience an increased or high rate of spread. On the larger topographic scale, the Village of Harrison Hot Springs and its commercial, recreational and residential developments would be considered bottom of the slope or valley bottom.

Table 11. Slope Percentage and Fire Behaviour Implications.

Slope	Percent of AOI	Fire Behaviour Implications
<20%	69	Very little flame and fuel interaction caused by slope, normal rate of spread.
21-30%	3	Flame tilt begins to preheat fuel, increase rate of spread.
31-45%	5	Flame tilt preheats fuel and begins to bathe flames into fuel, high rate of spread.
46-60%	9	Flame tilt preheats fuel and bathes flames into fuel, very high rate of spread.
>60%	14	Flame tilt preheats fuel and bathes flames into fuel well upslope, extreme rate of spread.

Table 12. Slope Position of Value and Fire Behaviour Implications.

Slope Position of Value	Fire Behaviour Implications
Bottom of Slope/ Valley Bottom	Impacted by normal rates of spread.
Mid Slope - Bench	Impacted by increased rates of spread. Position on a bench may reduce the preheating near the value. (Value is offset from the slope).
Mid slope – continuous	Impacted by fast rates of spread. No break in terrain features affected by preheating and flames bathing into the fuel ahead of the fire.
Upper 1/3 of slope	Impacted by extreme rates of spread. At risk to large continuous fire run, preheating and flames bathing into the fuel.

4.3.5 Local Wildfire Threat Classification

Using the verified and updated fuel types combined with field wildfire threat assessments, local wildfire threat for the study area was updated. Using the 2016 methodology, there are two main components of the threat rating system: the wildfire behaviour threat class (fuels, weather and topography sub-components) and the WUI threat class (structural sub-component).

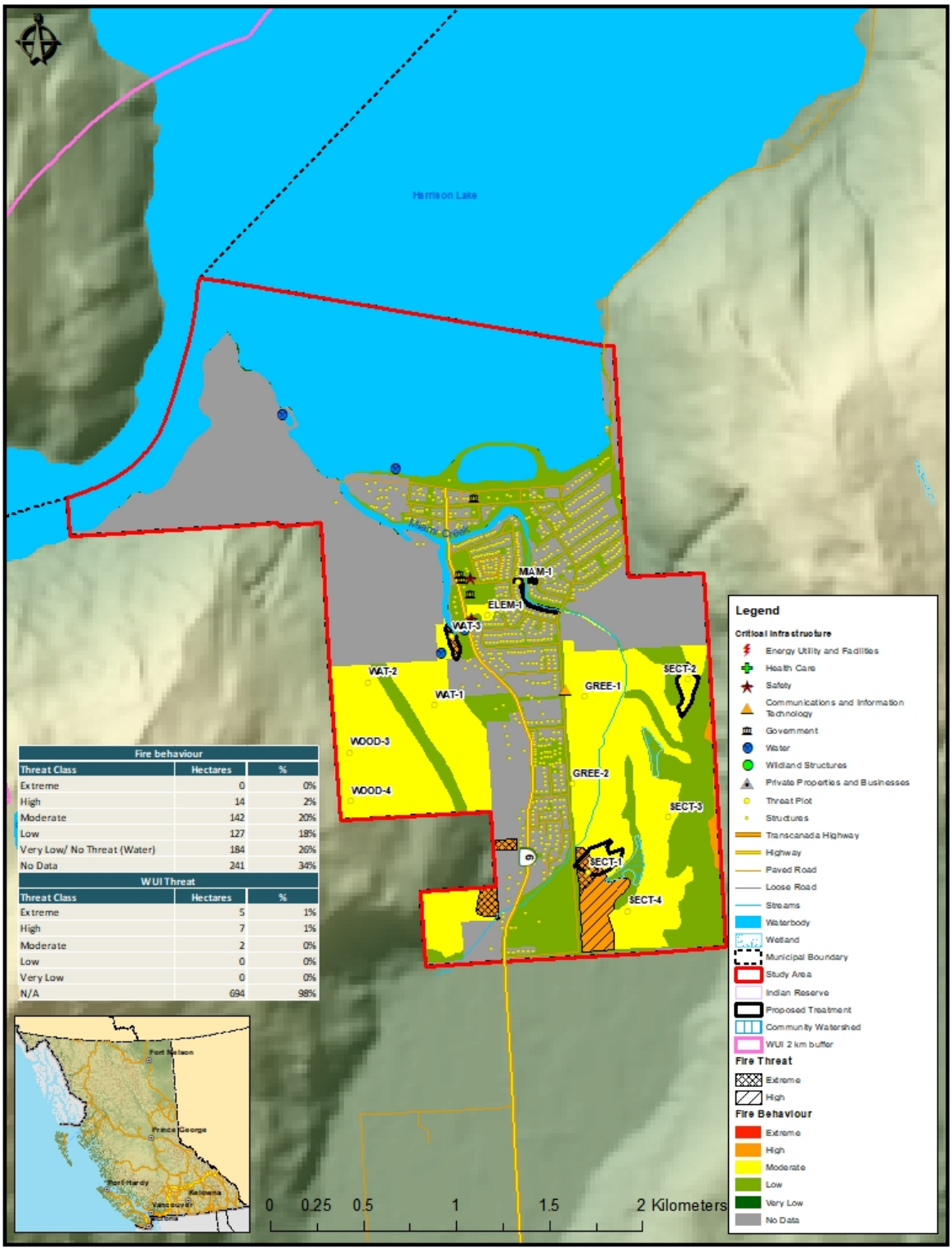
The result of the analysis shows that the study area is composed of a mosaic of low, moderate and high threat class stands; the variability in wildfire threat is dictated primarily by the stand types that occur within the Village of Harrison Hot Springs and the level of the development within the municipal boundary. A comparison of the wildfire behaviour threat class data from the original 2017 PSTA Data and this CWPP's corrected data can be found below (Table 13). 34% of the AOI is classified as private land and as such has not been allocated fire threat data. Assessment of fire threat on private land is not funded by SWPI and is therefore outside the scope of this CWPP.

The areas that represent the highest wildfire behavior potential and greatest risk to values within the Village AOI are areas of high threat class in the southwestern portion of the East Sector Lands and across Highway 9, east of the BC Hydro transmission line.

For detailed methodology on the local threat assessment and classification, please see Appendix G – WUI Threat Assessment Methodology.

Table 13. Fire behaviour threat summary for the study area.

Wildfire Behaviour Threat Class	2017 PSTA Data	2017 CWPP
	Percent of AOI	Percent of AOI
Extreme	0	0
High	14	2
Moderate	28	20
Low	0	18
Very Low/ No Threat (Water)	27	26
No Data	31	34



Map 10. Local Fire Behaviour Threat Rating and WUI Threat Rating.

SECTION 5: RISK MANAGEMENT AND MITIGATION FACTORS

This section outlines a wildfire risk management and mitigation strategy that accounts for fuel types present within the community, local ecology, hazard, terrain factors, land ownership, and capacity of local government and First Nations. Wildfire risk mitigation is a complex approach that requires cooperation from applicable land managers/owners, which includes all level of governments (local, provincial, federal and First nations), and private landowners. The cooperative effort of the aforementioned parties is crucial in order to develop and proactively implement a wildfire risk mitigation program. Development of a successful wildfire risk mitigation strategy is dependent on hazard identification within the community, which accounts for forest fuels, high risk activities, frequency and type of human use, and other important environmental factors. The resulting wildfire risk management and mitigation strategy aims to build more resilient communities and produces strategic recommendations or actionable items that can be categorized as follows:

1. Fuel management opportunities to reduce fire behaviour potential in the WUI;
2. Applications of FireSmart approaches to reduce fire risk and impacts within the community; and
3. Implementation of communication and education programs to inform and remind the public of the important role it plays in reducing fire occurrence and impacts within its community.

5.1 FUEL MANAGEMENT

Fuel management, also referred to as vegetation management or fuel treatment, is a key element of wildfire risk reduction. For the purpose of this discussion, fuel management generally refers to native vegetation/fuel modifications in forested areas greater than 30 m from homes and structures (priority Zone 3 and beyond, see Section 5.2 for details on FireSmart priority zones). The principles of fuel management are outlined in detail in Appendix H. No fuel treatments have been completed within the Village AOI to date. Proposed treatments will begin the process of reducing the wildfire risk in the AOI, where the objectives for fuel management are to:

- Reduce wildfire threat on private and public lands nearest to values at risk; and
- Reduce fire intensity, rate of spread, and ember/spot fire activity such that the probability of fire containment increases and the impacts on the forested landscape and the watershed are reduced (create more fire resilient landscapes).

Ideally, these objectives will enhance protection to homes and critical infrastructure. Caveats associated with the statement include: 1) wildfire behaviour will only be reduced if the fire burns in the same location as treatments occurred, and 2) protection of homes and critical infrastructure is highly dependent upon the vulnerability to ignition by embers (ignition potential) directly around the value at risk. In summary, fuel treatments alone should not be expected to protect a community from the effects of wildfire, namely structure loss.

Fuel treatments are designed to reduce the possibility of uncontrollable crown fire through the reduction of surface fuels, ladder fuels and crown fuels. However, the degree of fire behaviour reduction

achieved by fuel management varies by ecosystem type, current fuel type, fire weather, slope and other variables and it is important to note that it does not stop wildfire.

Historically, funds from public sources, such as the Forest Enhancement Society of BC (FESBC) and the Union of British Columbia Municipalities (UBCM), were only eligible to be used on Crown lands and could not be used to treat private land. While this is still the case for the FESBC program, the new Community Resiliency Investment (CRI) Program (formerly SWPI) provides funding for selected FireSmart activities and planning on private land (subject to program requirements and limits).[58] It is important to recognize that the majority of the AOI (58%) is located on private land, which increases some of the challenges encountered in mitigation of fuels on private lands. Some of the best approaches to mitigate fuels on private land are to establish wildfire development permit areas to increase the resiliency of homes and to urge private landowners to comply with FireSmart guidelines (as described below in Section 5.2) and to conduct appropriate fuel modifications using their own resources (CRI program funding may be available). In general, when considering fuel management to reduce fire risk, the following steps should be followed:

- Carefully anticipate the likely wildfire scenarios to properly locate fuel modification areas;
- Acquire an understanding of local ecological, archaeological, and societal values of the site;
- Prescriptions should be developed by a Registered Professional Forester working within their field of competence;
- Public consultation should be conducted during the process to ensure community support;
- Potential treatment areas and draft prescriptions should be referred to First Nations with sufficient time for meaningful review and input;
- Treatment implementation should weigh the most financially and ecologically beneficial methods of fulfilling the prescriptions goals;
- Pre- and post-treatment plots should be established to monitor treatment effectiveness; and
- A long-term maintenance program should be in place or developed to ensure that the fuel treatment is maintained in a functional state.

The fuel treatment opportunities identified in this document include the use of interface fuel breaks and primary fuel breaks as defined in Section 5.1.1, to reduce the wildfire potential around the AOI. Potential treatment activities include fuel removal, thinning, stand conversion, pruning, and chipping, or a combination of two or more of these activities. Stand conversion has been shown to be effective at reducing wildfire potential in mixed-wood or conifer dominated stands and is recommended as a BMP to encourage a higher deciduous component. This approach generally involves a thin-from-below to reduce ladder fuels and crown fuels continuity, targeting the removal of conifer species and the retention of broadleaf species. Stand conversion fuel treatments are intricately linked to the establishment and enactment of fire management stocking standards within the WUI 2 km buffer. The

[58] 2019 CRI FireSmart Community Funding & Supports – Program & Application Guide. Retrieved online on Sept 20, 2018. https://www.ubcm.ca/assets/Funding~Programs/LGPS/CRI/cri-2019-program-guide.pdf

implementation of modified stocking standards plays a pivotal role in ensuring the success and effectiveness of stand conversion fuel treatments and associated reduction of fire hazard.[59]

5.1.1 Proposed Treatment Units

Funding opportunities from UBCM under the SWPI Program have historically been limited to Crown Provincial, Regional District, or Municipal land. The UBCM SWPI funding stream (in place at the time this CWPP was developed) has transitioned, as of September 2018, into a new provincial program, the Community Resiliency Investment (CRI) Program, that will consider fire prevention activities on provincial Crown land and private land, in addition to local government and reserve land.[60] Fire prevention activities on private land that may be funded under this program are related to FireSmart activities (including FireSmart planning and assessments, local rebate programs for completion of eligible FireSmart activities, and provision of off-site disposal of vegetation management debris), subject to program requirements. This does not preclude other current and future funding opportunities or potential industrial partnerships and changes to existing programs.

The potential treatment areas represent moderate or high fire hazard areas which are close to values at risk (structures or infrastructure) and are located on Crown Provincial or municipal land. Recommendation for treatment in areas of moderate fire hazard areas were limited to areas which would increase efficacy of, and / or create continuity between areas of low threat / no fuel areas). All polygons identified for potential treatment have been prioritized based on fire hazard, operational feasibility, estimated project cost, type and number of values at risk, common fire weather (wind direction), and expected efficacy of treatment. Although potential treatment areas have been ground-truthed during field work, additional refinement of the polygons will be required at the time of prescription development. Polygons will require detailed site-level assessment to stratify treatment areas (and areas of no treatment), identify values and constraints, and identify and engage all appropriate Provincial agencies, First Nations, and stakeholders.

Recommended potential treatment areas within the AOI are outlined in Table 14 and displayed in Map 11. These fuel treatment opportunities include the use of interface fuel treatments (the treatment of both patches of fuels and linear interface fuel breaks) and trailside treatments as defined below.

Fuel Treatment Types

The intent of establishing a fuel break (and associated treated patches) is to modify fire behaviour and create a fire suppression option that is part of a multi-barrier approach to reduce the risk to values (*e.g.*,

[59]Forest Practices Board. (2006). Managing Forest Fuels. Special Report. Available online at: https://www.bcfpb.ca/wp-content/uploads/2016/04/SR29-Managing-Forest-Fuels.pdf

[60] This new funding program (up to $50 million over three years) was initiated as per recommendations from the 2017 BC Flood and Wildfire Review Report by Abbott and Chapman (https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/bc-flood-and-wildfire-review-addressing-the-new-normal-21st-century-disaster-management-in-bc-web.pdf). Program details are available on the UBCM's website: https://www.ubcm.ca/EN/main/funding/lgps/community-resiliency-investment.html

structures). A fuel break, in and of itself, is unlikely to stop a fire under most conditions. The application of appropriate suppression tactics in a timely manner with sufficient resources, is essential for a fuel break to be effective. Lofting of embers (*i.e.*, "spotting") over and across a fuel break is a possibility (increasing with more volatile fuel types and fire weather) and has the potential to create spot fires beyond the fuel break that can expand in size and threaten values at risk, or land directly on or near structures and ignite them. To address spotting, fuels between the fuel break and the values at risk should be evaluated and treated to create conditions where extinguishment of spot fires is possible and FireSmart Standards should be applied to structures and associated vegetation and other fuel to reduce the risk of structures igniting. A multi-barrier approach that reduces the risk to values can include: establishing multiple fuel breaks (Interface Fuel Break), addressing fuels between the fuel break and structures (Interface Fuel Treatments), and applying FireSmart Standards to structures and the surrounding vegetation. Fuel breaks require periodic maintenance to retain their effectiveness.

Interface Fuel Breaks

Fuel breaks on Crown Land immediately adjacent to private land and in close proximity to the wildland urban interface and/or intermix areas, are termed 'interface fuel breaks'. These are designed to modify fire behaviour, create fire suppression options, and improve suppression outcomes. Interface fuel treatments are relatively small (approximately 100 meters wide) and when treated with appropriate fuel reduction measures, can break the crown fire threshold and reduce the risk of a crown fire reaching values at risk. Treatment widths can be varied to allow for alignment and to take advantage of natural and man-made fire resilient features that enhance effectiveness. Surface fire spread across the fuel treatment and spotting across the fuel treatment are both concerns and rely on suppression actions to be effective. In order to reduce potential fire intensity and spotting, fuel on private land between the interface fuel treatment and structures should be treated according to FireSmart vegetation management standards. Structures in interface areas should be constructed or retrofitted to FireSmart design standards.

Trailside Treatments

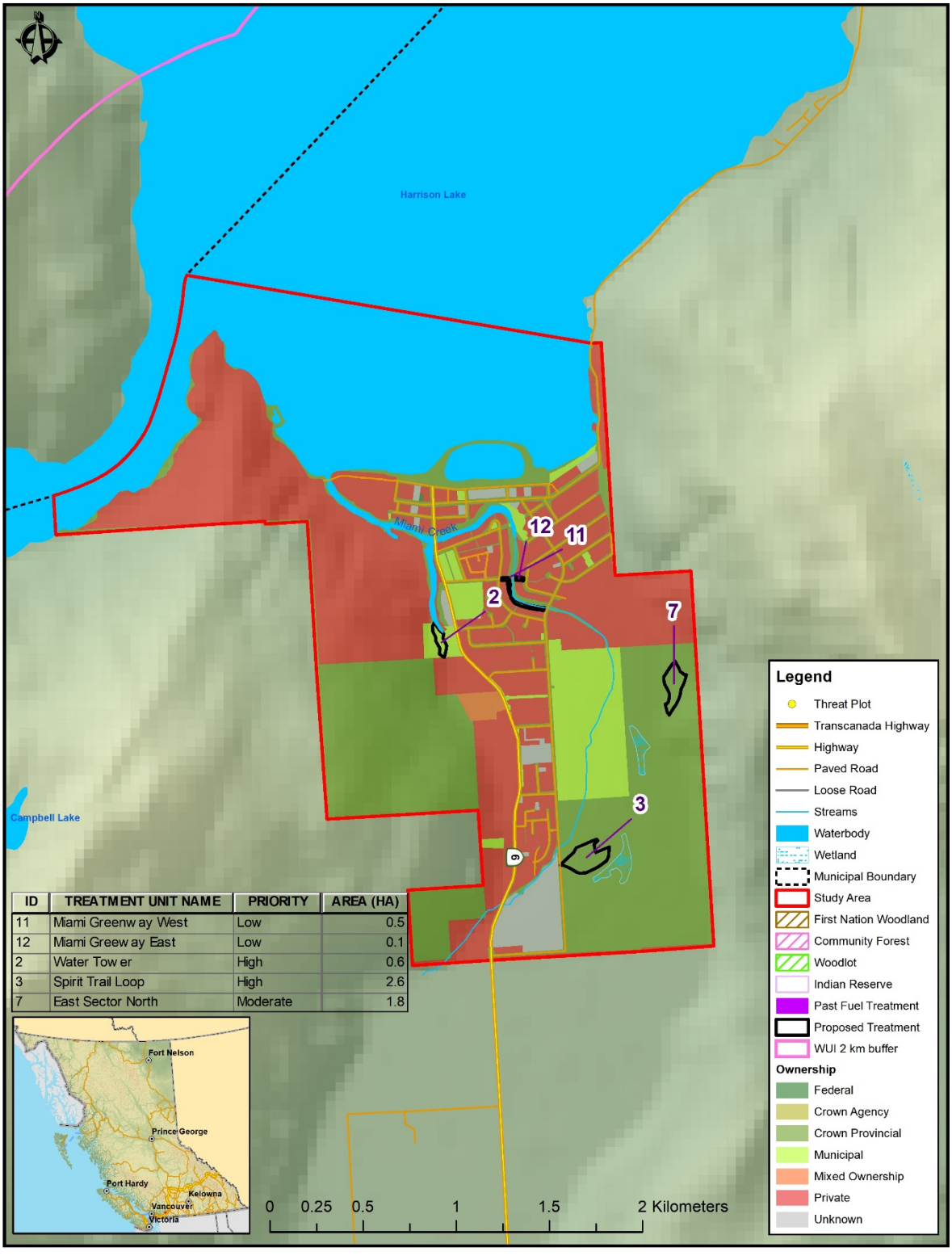
Trailside treatments are implemented to address hazardous fuels adjacent to publicly used trails, where ignition potential may be higher due to increased recreational use by hikers and both motorized and non-motorized off-road vehicles. The primary objective of these treatments is to reduce potential fire intensity and the probability of ignition, which is achieved through the creation of a defensible space surrounding these features. Potential strategies include reducing ladder and surface fuels, increasing crown base height of trees, and retaining fire-resistant tree species. Trailside treatments vary in size and are typically in the form of linear features which follow trail systems.

RECOMMENDATION #8: Proceed with detailed assessment, prescription development and treatment of hazardous fuel units identified and prioritized in this CWPP.

Table 14. Proposed Treatment Area Summary Table.

FTU # and Stratum	Geographic Area	Priority	Total Area (ha)	Treatment Unit Type/ Objective	Local Fire Threat (ha)			Overlapping Values / Treatment Constraints*	Treatment Rationale
					Extreme/ High	Mod	Low		
2	Water Tower	High	0.6	Interface Fuel Break	0.6	0.0	0.0	This proposed treatment unit (PTU) is located adjacent to one arm of the Miami River. Multiple Forest Development Units (FDUs) overlap the Water Tower PTU: TFLP, Northwest Hardwoods Fraser, BCTS TCH Chilliwack District, Sta'ailes, Teal Cedar Products Ltd., the Dorman Group (Seabird Island First Nation), and Chawathil First Nation. Consultation with the licensees must occur during the prescription development phase and prior to implementation to ensure all concerns are addressed.	This PTU is located immediately adjacent (<200 m) to private residences and the Village's water reservoir. This area has been recommended for treatment due to its high recreational use and the presence of hazardous fuels. The stands characteristic of this PTU are primarily typed as C-3 fuel types with moderate to high stand densities, moderate to high fine and medium woody fuel loading, low crown base heights, and interlocking crowns. The combination of these factors results in an increased potential for crown fire behavior. Recommended treatments include removal of understorey conifers and pruning to increase crown base heights, thereby reducing laddering potential and potential surface fire intensity.
3	Spirit Trail Loop	High	2.6	Interface Fuel Break	0.9	1.7	0.0	This PTU lies entirely within East Sector Lands, a Regional nature park with high ecological and cultural value. Presence of Conservation Data Centre (CDC) red-listed Salish Sucker (*Catostomus sp. 4*) has been recorded within East Sector riparian areas. As such, consultation with a biologist and the Fraser Valley Regional District must occur during the prescription development phase and prior to implementation to ensure all concerns are addressed. Multiple Forest Development Units (FDUs) overlap this PTU: TFLP, Northwest Hardwoods Fraser, BCTS TCH Chilliwack District, Sta'ailes, Teal Cedar Products Ltd., the Dorman Group (Seabird Island First Nation), and Chawathil First Nation. Consultation with the licensees must occur during the prescription development phase and prior to implementation to ensure all concerns are addressed.	The Spirit Trail Loop PTU is located in the southwestern part of the East Sector Lands, adjacent to residences along McCombs Drive. The stands characteristic of this area are mixed conifer and deciduous stands typed as M-1/2, with high understorey conifer densities and low crown base heights. This type of stand is likely to exhibit potential for crown fire behavior during periods of high or extreme fire danger. Recommended treatments include removal of understorey conifers and pruning to increase crown base heights, thereby reducing laddering potential and potential surface fire intensity.

FTU # and Stratum	Geographic Area	Priority	Total Area (ha)	Treatment Unit Type/ Objective	Local Fire Threat (ha)			Overlapping Values / Treatment Constraints*	Treatment Rationale
					Extreme/ High	Mod	Low		
7	East Sector North	Moderate	1.8	Interface Fuel Break	0.0	1.8	0.0	This PTU lies entirely within East Sector Lands, a Regional nature park with high ecological and cultural value. Presence of Conservation Data Centre (CDC) red-listed Salish Sucker (*Catostomus sp. 4*) has been recorded within East Sector riparian areas. As such, consultation with a biologist and the Fraser Valley Regional District must occur during the prescription development phase and prior to implementation to ensure all concerns are addressed. Multiple Forest Development Units (FDUs) overlap the East Sector North PTU: TFLP, Northwest Hardwoods Fraser, BCTS TCH Chilliwack District, Sta'ailes, Teal Cedar Products Ltd., the Dorman Group (Seabird Island First Nation), and Chawathil First Nation. Consultation with the licensees must occur during the prescription development phase and prior to implementation to ensure all concerns are addressed.	This PTU is located in the northeastern part of the East Sector Lands, approximately 650 m from private residences on McCombs Drive. The stands characteristic of this area are classified as a C-5 fuel type with a minor component of deciduous (<10%). High fine and medium fuel levels are present throughout, and ladder fuels are sparse. Recommended treatments include surface fuel removal, pruning trees to increase crown base heights, and removing understorey conifers.
11	Miami Greenway West	Low	0.5	Trailside Treatment	0.0	0.5	0.0	Multiple Forest Development Units (FDUs) overlap this PTU: TFLP, Northwest Hardwoods Fraser, BCTS TCH Chilliwack District, Sta'ailes, Teal Cedar Products Ltd., the Dorman Group (Seabird Island First Nation), and Chawathil First Nation. Consultation with the licensees must occur during the prescription development phase and prior to implementation to ensure all concerns are addressed.	The Miami Greenway West PTU is a proposed trailside treatment located along the Miami River bridges public trail. The stands characteristic of this area are classified as an M-1/2 fuel type with a moderate deciduous component (approximately 30%). A light treatment which involves removing surface fuels, pruning trees to increase crown base heights, and removing understorey conifers is recommended.
12	Miami Greenway East	Low	0.1	Trailside Treatment	0.0	0.0	0.1	Multiple Forest Development Units (FDUs) overlap this PTU: TFLP, Northwest Hardwoods Fraser, BCTS TCH Chilliwack District, Sta'ailes, Teal Cedar Products Ltd., the Dorman Group (Seabird Island First Nation), and Chawathil First Nation. Consultation with the licensees must occur during the prescription development phase and prior to implementation to ensure all concerns are addressed.	The Miami Greenway East PTU is a proposed trailside treatment located along the Miami River bridges public trail. The stands characteristic of this area are classified as an M-1/2 fuel type with a moderate deciduous component (approximately 30%). A light treatment which involves removing surface fuels, pruning trees to increase crown base heights, and removing understorey conifers is recommended.



ID	TREATMENT UNIT NAME	PRIORITY	AREA (HA)
11	Miami Greenway West	Low	0.5
12	Miami Greeway East	Low	0.1
2	Water Tower	High	0.6
3	Spirit Trail Loop	High	2.6
7	East Sector North	Moderate	1.8

Map 11. Proposed and Past Fuel Treatments.

5.1.2 Maintenance of Previously Treated Areas

As no fuel treatments have occurred within the Village AOI, maintenance activities of previously treated areas are not applicable. However, if fuel treatments are to occur in the Village in the future, maintenance activities such as removing standing dead, reducing surface fuels, or additional thinning (overstorey reduction and thinning suppressed conifers or conifer regeneration) should occur as needed to maintain the effectiveness of these treatments. The return interval for maintenance activities depends upon site productivity and the type and intensity of treatment. Less productive areas can likely withstand a longer frequency between maintenance activities, while more productive areas would require treatments more often.

RECOMMENDATION #9: If and when operational fuel treatments are conducted within the Village AOI, treatment monitoring should be completed by a Qualified Professional in order to schedule the next set of maintenance activities (5 – 10 years out). This can be completed with a CWPP update or as a stand-alone exercise.

5.2 FIRESMART PLANNING AND ACTIVITIES

This section provides detail on: 1) the current level of FireSmart implementation and uptake within the community; 2) identified FireSmart subdivisions and/or acceptance into the FireSmart Canada Community Recognition Program (FSCCRP); and 3) recommended potential FireSmart activities that can be applied within the AOI at a future date.

5.2.1 FireSmart Goals and Objectives

FireSmart® is the comprehensive nationally accepted set of principles, practices and programs for reducing losses from wildfire.[61] FireSmart spans the disciplines of hazard/threat assessment; regional planning and collaboration; policy and regulations; public communication and education; vegetation/fuel management; training and equipment; and, emergency preparedness and response. FireSmart concepts provide a sound framework for advancing the goal of wildfire loss reduction, as it is a common goal shared with CWPPs.

The FireSmart approach and concepts, including recommended FireSmart guidelines[62], have been formally adopted by almost all Canadian provinces and territories, including British Columbia in 2000; FireSmart has become the de facto Canadian standard. FireSmart is founded in standards published by the National Fire Protection Association (NFPA). The objective of FireSmart is to help homeowners, neighbourhoods, whole communities and agencies with fire protection and public safety mandates to work together to prepare for the threat of wildfire in the WUI. Coordinated efforts between all levels of planning and action are integral to effectively and efficiently reducing the risk to communities.

[61] FireSmart is the registered trademark held by the Partners in Protection Association.

[62] FireSmart guidelines first published in the 1999 manual "*FireSmart: Protecting Your Community from Wildfire*", with a second edition published in 2003.

The following are key principles of FireSmart:

- Wildland fires are a natural process and critical to the health of Canadian ecosystems.
- Mitigation and response efforts must be carefully coordinated through all stages of planning and implementation.
- Threats and losses due to wildfires can be reduced by working together. Responsibility for effectively mitigating hazards must be shared between many entities including homeowners, industry, businesses and governments.[63]
- There are seven broad disciplines to help address the threat of wildfire: education, vegetation management, legislation and planning, development considerations, interagency cooperation, emergency planning, and cross training.[63]
- Solutions are required at all scales from individual backyards, to communities and the wider landscape. In order to succeed, these efforts must be integrated across the mosaic of land ownership (Figure 4).
- The ultimate root of the WUI interface problem is the vulnerability of structures and homes to ignition during wildfire events, in particular vulnerability to embers. This leads to an emphasis on risk mitigations on private properties.

The highest level of planning within the FireSmart program is strategic direction, such as that provided in CWPPs.

[63] https://www.firesmartcanada.ca

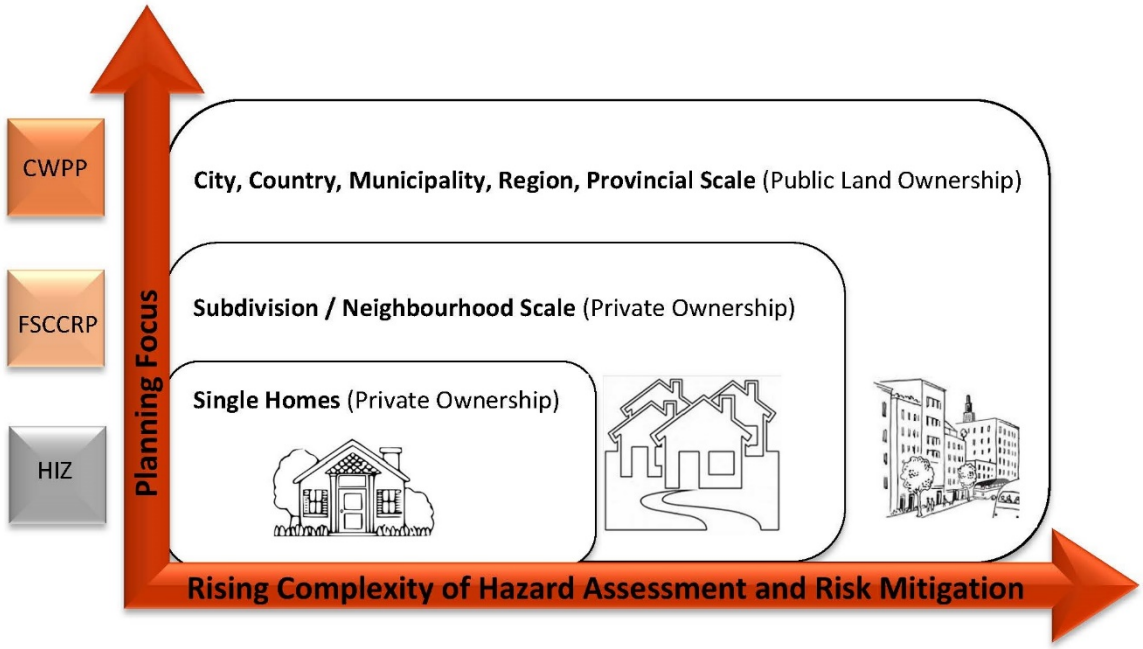


Figure 4. Diagram of the various, coordinated levels of the FireSmart program.[64] CWPP: Community Wildfire Protection Plan, FSCCRP: FireSmart Canada Community Recognition Program, HIZ: Home Ignition Zone.

Home Ignition Zone

Multiple studies have shown that the principal factors regarding home loss to wildfire are the structure's characteristics and immediate surroundings; the area that determines the ignition potential is referred to as the Home Ignition Zone (HIZ).[65,66] The HIZ includes the structure itself and three concentric, progressively wider Priority Zones. HIZ Priority Zones are based upon distance from structure: 0 – 10 m (Priority Zone 1), 10 – 30 m (Priority Zone 2), and 30 – 100 m (Priority Zone 3). These zones help to guide risk reduction activities, with recommended FireSmart guidelines being most stringent closest to the structure. The likelihood of home ignition is mostly determined by the area within 30 m of the structure (Priority Zones 1 and 2). Recommended FireSmart guidelines address a multitude of hazard factors within the HIZ: building materials and design; vegetation (native or landscaped materials); and the presence of flammable objects, debris, and vulnerable ignition sites. More detail on the FireSmart Priority Zones can be found in Appendix J.

It has been found that, during extreme wildfire events, most home destruction has been a result of low-intensity surface fire flame exposures, usually ignited by embers. Firebrands, also known as embers, can be transported long distances ahead of the wildfire, across fire guards and fuel breaks, and accumulate

[64] Figure and content developed by A. Westhaver. Adapted by A. Duszynska, 2017.

[65] Reinhardt, E., R. Keane, D. Calkin, J. Cohen. 2008. Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States. Forest Ecology and Management 256:1997 - 2006.

[66] Cohen, J. Preventing Disaster Home Ignitability in the Wildland-urban Interface. Journal of Forestry. p 15 - 21.

within the HIZ in densities that can exceed 600 embers per square meter. Combustible materials found within the HIZ combine to provide fire pathways allowing spot surface fires ignited by embers to spread and carry flames or smoldering fire into contact with structures.

Because ignitability of the HIZ is the main factor driving structure loss, the intensity and rate of spread of wildland fires beyond the community has not been found to necessarily correspond to loss potential. For example, FireSmart homes with low ignitability may survive high-intensity fires, whereas highly ignitable homes may be destroyed during lower intensity surface fire events.[66, 67] It is for this reason that the key to reducing WUI fire structure loss is to reduce home ignitability; mitigation responsibility must be centered on homeowners. Risk communication, education on the range of available activities, and prioritization of activities should help homeowners to feel empowered to complete simple risk reduction activities on their property.

FireSmart Canada Community Recognition Program

In the case of adjacent homes with overlapping HIZs, a neighbourhood (or subdivision) approach can be an effective method of reducing ignition potential for all homes within the neighbourhood. The FireSmart Canada Community Recognition Program (FSCCR Program) is an 8-step resident-led program facilitated by trained Local FireSmart Representatives designed for this purpose. It provides groups of residents with critical information and a means of organizing themselves to progressively alter hazardous conditions within their neighbourhood. The program also facilitates FireSmart knowledge and practices to quickly filter downwards onto the property of individual residents to further mitigate wildfire hazards at the single-home scale within the HIZ.

WUI Disaster Sequence

Calkin et al (2014) coined the 'WUI disaster sequence', a six-step sequence which has been used to describe the situation in which the firefighting capacity of a community is overwhelmed by wildland / interface fires in highly ignitable communities: 1) extreme wildfire behaviour weather combined with, 2) a fire start, which 3) exposes numerous homes with high ignition potential, and results in numerous structures burning, 4) overwhelms suppression efforts and capabilities, and 5) leads to unprotected homes, and therefore 6) considerable structure loss (Figure 5).

Once multiple homes are ignited in an urban area, there is increasing potential for fire to spread from structure to structure, independently of the wildland vegetation. This is known as an urban conflagration. Effective fire protection depends on ignition resistant homes and properties during extreme wildfire events.[68] More than two simultaneous structure fires could overwhelm the resources and capacity of a fire department.

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[67] Calkin, D., J. Cohen, M. Finney, M. Thompson. 2014. *How risk management can prevent future wildfire disasters in the wildland-urban interface*. Proc Natl Acad Sci U.S.A. Jan 14; 111(2): 746-751. Accessed online 1 June, 2016 at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3896199/.

[68] Calkin, D., J. Cohen, M. Finney, M. Thompson. "*How risk management can prevent future wildfire"*

Overall, FireSmart leads to communities that are better adapted to wildfire, more resilient and able to recover following wildfires by sustaining fewer losses and disruption, and safer places to live and recreate. Action by homeowners is the number one priority for reducing structure loss in the event of a WUI fire, but the overall adaptation of the community to wildfire is multi-pronged and the landscape should not be ignored.[68]

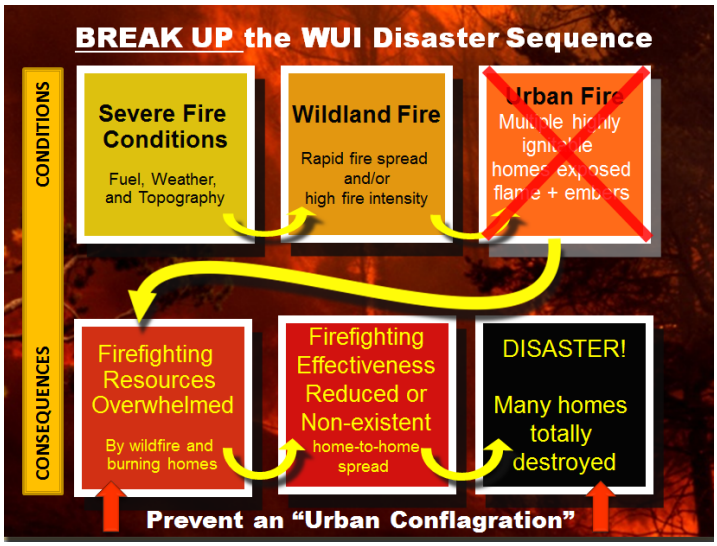

Figure 5. Wildland/urban interface disaster sequence.[69] It is possible to break up the disaster sequence by decreasing the number of highly ignitable homes exposed to embers, therefore reducing the number of homes ignited and removing the consequences of multiple structures lost.

5.2.2 Key Aspects of FireSmart for Local Governments

Reducing the fire risk profile of a community through FireSmart implementation requires coordinated action from elected officials, local government planners, developers, private land owners and industrial managers. This section presents various options of FireSmart practices, which when enacted, provide avenues for reducing fire risk within the community. An evaluation of the current level of FireSmart implementation within the Village is also presented in this section.

Communication, Education and Partnerships

Communicating effectively is a key aspect of any education strategy. Communication materials must be audience specific and delivered in a format and through mediums that reach the target audience. Audiences should include home and landowners, students, local businesses, elected officials, Village staff, and local utilities providers. Education and communication messages should be simple yet comprehensive. A basic level of background information is required to enable a solid understanding of fire risk issues and the level of complexity and detail of the message should be specific to the target audience.

FireSmart information material is readily available and simple for municipalities to disseminate. It provides concise and easy-to-use guidance that allows homeowners to evaluate their homes and take

[69] Graphic adapted from Calkin et. al, by A. Westhaver.

measures to reduce fire risk. However, the information needs to be supported by locally relevant information that illustrates the vulnerability of individual houses to wildfire.

The Village of Harrison Hot Springs has undertaken some public education outreach in the community to date, including FireSmart concepts being included in the local newsletter, community vegetation management days, delivery of FireSmart materials, and FireSmart presentations during the VHHSFD open house. This can be expanded upon and/or adapted to further enhance wildfire preparedness and education. Programming could include volunteer/advocacy work from professional foresters, wildland firefighters or prevention officers, and Village staff. The Village should consider holding a wildland specific Fire Prevention Day, or similarly formatted event, in the spring prior to the wildfire season. Timely educational materials to increase preparedness would be most effective immediately prior to the fire season.

A full list of recommendations pertaining to the Communication, Education and Partnerships strategy is presented in Section 5.3.

FireSmart Vegetation Management

Some examples of actionable items for the Village with regards to vegetation or fuel management and the FireSmart approach include: 1) policy development and implementation of FireSmart maintenance for community parks and open spaces; 2) implementing fire resistive landscaping requirements as part of the development permitting process; and 3) provision of collection services for private landowners with a focus on pruning, yard and thinning debris.

The Village does not currently enforce FireSmart landscaping requirements within development permits. More detailed recommendations regarding municipal policies and bylaws are provided below in Planning and Development.

Planning and Development

Municipal policies and bylaws are tools available to mitigate wildfire risk to a community. It is recognized that, to be successful, all levels of government (municipal, provincial, and federal) and individual landowners need to work together to successfully reduce their risk. To that end, local government can use a range of policy tools to help the community to incrementally increase FireSmart compliance over the mid-term (5 – 20 years) and therefore play a role in reducing the chance of structure loss from wildfire.

The planning and development objectives for the Village of Harrison Hot Springs are:

- To include wildfire considerations in the planning and acquisition strategy for parks and recreational areas; and
- To utilize regulatory and administrative tools to reduce wildfire hazard on private land and increase number of homes compliant with FireSmart guidelines (with low ignition potential).

The OCP does not explicitly consider the establishment of a development permit (DP) area to address wildfire risk mitigation. It is recommended that the Village review the OCP, with consideration towards establishing a wildfire development permit area that addresses new constructions, exterior renovations,

and changes in building footprints. Other jurisdictions' wildfire development permit areas can serve as models for various components. [70] The first step should be to establish DP area objectives (for example, minimize risk to property and people from wildland fires; minimize risk to forested area surrounding communities and development in the AOI; conserve the visual and ecological assets of the forest surrounding these areas; reduce the risk of post-fire landslides, debris flows and erosion, etc.). The following components should be considered during the OCP review and DP area development process in order to help meet the established objectives:

- Use of fire resistant exterior construction materials within the established development permit area, based on recognized standards such as NFPA 1144 or FireSmart;
- Inclusion of minimum setbacks from forested edge and top of slope based on FireSmart principles;
- Use of FireSmart landscaping (low flammability plants, appropriate spacing and low flammability surface materials / ground cover based on FireSmart principles);
- Underground servicing;
- Mitigation of fire hazard through fuel management activities based upon Qualified Professional recommendations (prescriptions and oversight). This is generally most applicable in the subdivision phase;
- Prompt removal of combustible construction materials, thinning/ fuel management debris, or clearing debris during the fire season;
- Coordinating QPs to ensure that requirements for overlapping, and potentially conflicting hazards are met;
- Review and approval process for submitted applications;
- Post-development inspections and sign-offs;
- Outline of responsibilities for staff and applicants; and
- Enforcement and regulation (consequences of non-compliance).

It is advised to engage the development community in the DP process to educate, inform, and allow for input. This can be accomplished in a variety of formats, including, but not limited to, workshops, informational sessions, or open-houses.

In 2015, the province passed the *Building Act* as the new legislation to guide building and construction in the province (Spring 2015). This Act establishes the province as the sole authority to set building requirements and limits local government authority to set building requirements in their bylaws. Section 5 of the *Building Act* provides an exception to the above limitation to local governments by giving them the authority to set local building bylaws for unrestricted and temporarily unrestricted matters, such as exterior design and finish of buildings in relation to wildfire hazard and within a development permit area. The British Columbia Building Code does not have any wildfire-specific fire-resistant design components. Until revisions of the Building Code to include requirements specific to prevention of wildfire spread are

[70] The District of North Vancouver and the District of Maple Ridge have robust and well-documented Wildfire Hazard Development Permit processes.

completed, local governments can set exterior requirements within an established development permit area for wildfire risk mitigation.[71]

RECOMMENDATION #10:
10.1 - Review the Official Community Plan (OCP); consider including wildfire as a natural hazard development permit area. A recommended development permit area for the Village would include all areas within the municipality that are located within 200 m of moderate, high or extreme wildfire behaviour threat class areas. This is a suggested distance which should be validated and defined through a more comprehensive GIS analysis of hazardous fuels and their proximity to the interface.

It is suggested that the Village review similar DPAs established in other jurisdictions and use as models for various aspects of the DPA process. The following aspects should be considered in the OCP review and wildfire DP development:

- Establish DP objectives (*e.g.* minimize risk to property and people from wildland fires; minimize risk to forested area surrounding the AOI; and conserve the visual and ecological assets of the forests surrounding communities); and
- Where possible, it is recommended to mandate FireSmart construction materials, some of which may be beyond the BC Building Code within the established wildfire hazard development permit area.

In order to meet objectives, consider including the following elements:

1) Minimum setbacks from forested edge based on FireSmart guidelines,
2) Fuel management based upon Qualified Professional (QP) recommendations,
3) Landscaping to FireSmart guidelines,
4) Building materials and design based on NFPA 1144 or FireSmart standards,
5) Underground servicing, and
6) Prompt removal of combustible construction materials or thinning/ fuel management waste.

It is also recommended that the Village consider incorporating QP reports and sign-off as part of the wildfire interface guidelines and that DP applications are provided to the VHHSFD for opportunity for input prior to approval. As more wildfire DP applications are received, the importance of communication and integration between the VHHSFD and the Village will increase.

The Village should also consider engaging the development/ building community (may include developers, builders, landscapers, and architects) in DP development process. This can be accomplished through a series of workshops/ informational sessions to: 1) increase awareness of wildfire risk, 2) demonstrate that there are a variety of actions which can be undertaken to immediately and measurably reduce the risk to the homeowner and community, 3) discuss various strategies and actions which could be implemented to meet DP objectives, 4) educate and inform regarding the DP process and expectations. It is recommended that this be done in partnership with the District of Kent, if appropriate.

10.2 - To complement the DPA, it is recommended that the Village develop a landscaping standard which lists flammable non-compliant vegetation and landscaping materials, non-flammable drought

[71] Building and Safety Standards Branch. 2016. Bulletin No. BA 16-01 Building Act Information Bulletin: Update for Local Governments.

and pest resistant alternatives, and tips on landscape design to reduce maintenance, watering requirements, avoid wildlife attractants, and reduce wildfire hazard. Consider including the landscaping standard as a requirement of the development permit within the applicable area, as well as making it publicly available for residents and homeowners outside of the DPA (can be provided at issue of building permit and made available at Municipal Office or other strategic locations). It is recommended that this be done in partnership with the District of Kent, if appropriate.

Additional recommendations for amendments to policies and bylaws were discussed in Section 2.5.3.

Subdivision Design

Subdivision design should include consideration to decrease the overall threat of wildfire. Aspects of subdivision design that influence wildfire risk are access, water pressure and hydrant locations. The number of access points and the width of streets and cul-de-sacs determine the safety and efficiency of evacuation and emergency response. In the communities and/or developed areas within the Village, on-street parking can contribute hazards on narrow or dead-end roads, which are already unlikely to have a high capacity under heavy smoke conditions.[72] When the time for evacuation is limited, poor access has contributed to deaths associated with entrapments and vehicle collisions during wildfires.[73] Methodologies for access design at the subdivision level can provide tools that help manage the volume of cars that need to egress an area within a given period of time.[72]

For new development in rural settings where hydrants are limited or unavailable (or it is otherwise determined by the Village that adequate or reliable water supply systems may not exist), the NFPA 1142 can be used to help determine minimum requirements for alternative water supply (natural or artificial). Alternative water sources, such as dry hydrant systems, water usage agreements for accessing water on private land, cisterns or other underground storage, etc., should be reviewed by the Village and the VHHSFD prior to development approval.

Increasing Local Capacity

Local capacity for emergency management and efficient response to wildland urban interface fires can be enhanced by addressing the following steps:

- Provision of sprinkler kits to community residents (at a cost); and
- Engagement in annual cross-training exercises with adjacent fire departments and/or BCWS in order to increase both local and regional emergency preparedness with regards to structural fire and wildfire training.

A detailed account of current local capacity for Village and recommendations to address gaps is provided in SECTION 6:.

[72] Cova, T. J. 2005. Public safety in the wildland-urban interface: Should fire-prone communities have a maximum occupancy? Natural Hazards Review. 6:99-109.

[73] De Ronde, C. 2002. Wildland fire-related fatalities in South Africa – A 1994 case study and looking back at the year 2001. Forest Fire Research & Wildland Fire Safety, Viegas (ed.), http://www.fire.uni-freiburg.de/GlobalNetworks/Africa/Wildland.cdr.pdf

FireSmart Compliance within the Area of Interest

There is a wide range of FireSmart compliance on private properties in the Village AOI. There are large differences in the degree to which FireSmart best practices are visible within individual HIZs, and in neighbourhoods throughout Village. Generally speaking, many homes in areas such as the Rockwell Corridor, McCombs Drive, and homes backing onto forested land on the eastern and western edges of the Village do not maintain 10 m defensible space. The main concern in the aforementioned areas is the ubiquity of flammable landscaping options (*e.g.*, cedar hedging or trees overhanging homes) in proximity to residences, as well as the lack of defensible space between property footprints and adjacent forested areas. Accumulations of conifer foliage in roof corners and gutters was not uncommon. Storage of combustible items under decks, carports, and other horizontal surfaces was also noted. On the other hand, many residences are surrounded by lawn, 10 m defensible space, and/or hardscaping (rocks), all of which are FireSmart compliant. The Lakeshore area generally displays the highest FireSmart compliance rate.

Aside from differing levels of awareness, understanding and acceptance of recommended FireSmart guidelines by residential and commercial property owners, there are a number of other factors that add variability to the level of FireSmart compliance within the AOI. Ultimately, these also impact the vulnerability of structures and the amount of effort required to achieve a FireSmart rating for individual homes, neighbourhoods or the community as a whole. These factors include but are not limited to: the age of homes or subdivision; prevailing design features and favored building materials of the era; proximity to forested area (both on private land and adjacent Crown or Village-owned land); density, lot size and lay-out of the subdivision; positioning of the home or neighbourhood in relation to slope, aspect and prevailing winds; and the stage and maturity of landscaping.

Neighbourhoods in the Village AOI were unofficially surveyed during field work. The following observations were made:

- Wildfire hazard levels range from low to high across neighbourhoods within the AOI;
- The bulk of hazards are associated with conditions of natural and landscaped vegetation immediately surrounding residential properties;
- For new development, where landscaping is not yet completed, educational approaches may aid in promoting fire resistant landscaping options and achieving defensible space in the HIZ; and
- All neighbourhoods have good opportunities to mitigate risk through individual and collective action.

5.2.3 Priority Areas within the AOI for FireSmart

This section identifies priority areas within the AOI that would benefit from FireSmart planning and activities.

These priorities are based on general field observations and input from the Village and are not based on a scientific sample or formal data collection. Recommended FireSmart activities are essentially the same for each neighbourhood or area; however, it is recommended that the Village prioritize the

neighbourhoods in Table 15. In addition, every neighbourhood within the AOI should continue and improve upon existing FireSmart activities and equally participate in the Village's FireSmart program.

Table 15. Summary of FireSmart Priority Areas.

Area	FireSmart Y/N	FireSmart Canada Recognition Received Y/N	Recommended FireSmart Activities
Rockwell Drive	N	N	The following is a non-extensive list of FireSmart activities for which the Village can engage suggested neighbourhood residents: 1) Provide guidance to ensure landscaping is to an established FireSmart standard; 2) Incentivise private landowners to engage in retrofitting homes with building materials and design based on NFPA 1144 or FireSmart standards; 3) Encourage prompt removal of combustible construction materials or yard waste from private properties; and 4) Coordinate monthly or bi-monthly yard waste removal days prior to and during the fire season to reduce WUI fire hazard.
Echo Avenue	N	N	
Naismith Avenue	N	N	
Residences west of Hot Springs Road (Highway 9)	N	N	
McCombs Drive	N	N	
Critical infrastructure	Y (partially)	N/A	Based on field observations, most critical infrastructure has had some level of FireSmart setback from forested areas. Consider conducting frequent (2-3 years) maintenance treatments to ensure the wildfire risk remains moderate. It is recommended that fuel treatments be considered for areas adjacent to critical infrastructure in order to bolster the effect of previous FireSmart treatments. FireSmart treatments may include thinning from below to reduce ladder fuels and crown fire potential, pruning of retained trees to 3 m, and reducing surface fuels. Additionally, consider adding regular brushing activities to the maintenance treatment schedule to control weeds and grasses around critical infrastructure.

5.3 COMMUNICATION AND EDUCATION

Establishing effective communications and actively engaging key stakeholders in risk reduction activities are keystones to building a FireSmart community. Without the support and involvement of residents, businesses, public officials, industry, and other forest tenure holders, the efforts of public officials, fire departments, and others to reduce wildfire losses will be hindered. In many communities, there is a general lack of understanding about interface fire, the relationship between ignition potential and loss of homes, and the simple steps that can be taken to minimize risk on private land. In addition, public

perceptions regarding responsibility for risk reduction and the ability of firefighters to safely intervene to protect homes during a wildfire are often limited or inaccurate.

Based on the consultation completed during the development of this Plan, it is evident that Village staff and some residents have a good level of awareness of interface fire risk and a strong level of commitment to continue to improve their awareness and understanding. However, field observations highlighted the need to further educate the community at large on what private land owners can do to build a FireSmart community and take personal responsibility for the ignition potential of their homes, businesses, lands, and neighbourhoods. Often, the risk of wildfire is at the forefront of public awareness during or after major wildfire events, whether close to home or further afield. The challenge is to retain this level of awareness outside these times. The Communication and Education objectives for the AOI are:

- To improve public understanding of fire risk and personal responsibility by increasing resident and property owner awareness of the wildfire threat in their community, to establish a sense of responsibility for risk mitigation among property owners, and to empower them to act;
- To enhance the awareness of, and participation by, elected officials and all WUI stakeholders regarding proactive WUI risk mitigation activities; and
- To reduce or avoid ignitions from industrial sources.

Bringing organizations together to address wildfire issues that overlap physical, jurisdictional or organizational boundaries is a good way to help develop interagency structures and mechanisms to reduce wildfire risk. Engagement of various stakeholders can help with identifying valuable information about the landscape and help provide unique and local solutions to reducing wildfire risk. The Village should use the existing Emergency Planning Committee with the District of Kent to coordinate wildfire risk reduction efforts. Meetings relating to wildfire risk reduction could include key stakeholders such as Village and District staff, BCWS, BC Parks, recreational groups/representatives, industrial operators, and forest tenure license holders.

Moving from the CWPP to implementation of specific activities requires that the community is well informed of the reasons for, and the benefits of specific mitigation activities. In order to have successful implementation, the following communication and public education recommendations are made:

RECOMMENDATION #11: Make this report and associated maps publicly available through webpage, social media, and public FireSmart meetings. In addition, this CWPP should be shared with local industry partners; in particular industrial forest companies who may be interested in collaborating on direct fuel management treatments or with other sections of this CWPP document.

RECOMMENDATION #12: Complete or schedule periodic updates of the CWPP to gauge progress and update the threat assessment (hazard mapping) for changes in fuels, forest health, land planning, stand structure or changes to infrastructure in the interface. The frequency of updates is highly dependent upon major changes which would impact the Village's wildfire threat assessment or the rate at which wildfire risk reduction efforts are implemented. An evaluation of major changes (including funding

program changes that may lead to new opportunities) and the potential need for a CWPP update should be initiated every 5 - 7 years.

RECOMMENDATION #13: Consider promoting FireSmart approaches for wildfire risk reduction to Village residents through Town Hall meetings, workshops and/or presentations. Aim to conduct the engagement/promotion campaign prior to and during the fire season. Consider supplying FireSmart materials to homeowners in the interface during these engagement campaigns and making this information available to tourists and visitors to the Village to increase awareness of wildfire risk.

RECOMMENDATION #14: Work towards FireSmart community recognition at the neighbourhood level and facilitate uptake into the FireSmart Canada Community Recognition Program (FSCCRP). This will help reduce fire risk and aid in further funding applications.

RECOMMENDATION #15: Facilitate the FSCCRP uptake within the Village and enhance its applications by including the following: 1) inviting BCWS crews to participate in and support the annual FireSmart events set up by participating neighbourhoods. 2) Encourage individual homeowner participants to complete the self-administered FireSmart home assessment tool. 3) Include within the FireSmart Canada Community Assessment Report the standard recommendation that participating neighbourhoods hold a home hazard assessment workshop as one of their FireSmart events.

RECOMMENDATION #16: Promote the use of the FireSmart Home Partners Program offered by the Partners in Protection Association, which facilitates voluntary FireSmart assessments on private property. Use the opportunity to educate the home or business owner about the hazards which exist on their property and provide easy improvements to reduce their risk.

5.4 OTHER PREVENTION MEASURES

In addition to fuel treatment and community communication and education, fire prevention in the AOI is also addressed via the following avenues: 1) public display of danger class rating signs throughout the AOI; 2) fire ban alignment with provincial fire bans; 3) potential enforcement of restricted access to back country areas similar to provincial requirements; and 4) enforcement of local bylaws such as Property Maintenance Bylaw No. 1072, 2015; Fire Department Regulation Bylaw No. 1031, 2013; Fireworks Regulation Bylaw No. 871; and the Park Regulation Bylaw No. 915, 2009. The aforementioned activities are either currently being applied or have potential to be applied in order to reduce the potential and / or threat of wildfire ignitions within the AOI.

Risk of human-caused ignition within the study area is not limited to private property owners and individual residents. Powerlines and industrial activities pose a risk of ignition, particularly in areas where cured fuels or fuel accumulations exist. Tree failures adjacent to power lines (transmission and distribution) are common occurrences and represent significant risks to ignition within the study area. A cooperative approach for addressing the industrial area concerns must be undertaken by the Village and pertinent industrial partners.

SECTION 6: WILDFIRE RESPONSE RESOURCES

This section provides a high-level overview of the local government resources accessible for emergency response and preparedness use. Accordingly, in emergency situations when multiple fires are burning in different areas of the Province, resource availability may be scarce. Therefore, local government preparedness and resource availability are critical components of efficient wildfire prevention and planning. Deployment of provincial resources occurs as per the process detailed in the *Provincial Coordination Plan for Wildland Urban Interface Fires* document[74]. The aforementioned document establishes a protocol for collaborative and integrated emergency management in the event of WUI fires within British Columbia.

6.1 LOCAL GOVERNMENT AND FIRST NATION FIREFIGHTING RESOURCES

Firefighting efforts and effectiveness can be affected by access to secondary power sources, water pressure and supply, and existing local government contingency plans. In the event of a wildfire emergency situation and loss of power, the Village has access to mobile diesel generators to power critical infrastructure such as the Fire Halls and the Emergency Operation Centre (EOC). In consultation with the Wildfire Working Group, it was also noted that water infrastructure, such as pumps and water treatment, have dedicated backup power. However, should a wide-scale outage occur, known vulnerabilities to secondary power sources include mechanical failure and potential fuel shortages. The local government has not identified any issues with water pressure within areas that have fire hydrant service. Specific limitations of the Village water system with regards to wildfire suppression are detailed in Section 6.1.2.

Formal mutual aid agreements are in effect between the Village of Harrison Hot Springs Fire Department (VHHSFD) and the District of Kent (more detail is provided in Section 6.1.1). In the event of a WUI fire emergency, mutual aid in the Village is activated, as required, and may also lead to aid requests from BCWS.

6.1.1 Fire Department and Equipment

Fire protection with the AOI is the responsibility of the VHHSFD.

Table 16 provides an overview of the fire services capacity in the AOI, including fire department personnel and equipment.

The greatest personnel deficiency reported by the VHHSFD is attrition. In consultation with the VHHSFD, it was determined that there are no structural or wildland firefighting equipment deficiencies.

[74] Provincial Coordination Plan for Wildland Urban Interface Fires. 2016. Available online at: https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/provincial-emergency-planning/bc-provincial-coord-plan-for-wuifire_revised_july_2016.pdf

Table 16. Fire department capacity and equipment within the AOI.

Fire Department	Number of Stations	Number of Members	Apparatus type and number
Village of Harrison Hot Springs FD	1	17 (paid, on-call)	2 engines, 1 rescue, 1 utility truck

The VHHSFD has a formal mutual aid agreement with the District of Kent and can provide mutual aid within relatively short response times. These mutual aid agreements may be utilized several times a year for structure or vehicle fires. In consultation with the Wildfire Working Group, it was noted that the VHHSFD relies on mutual aid from the District of Kent for some daytime responses and for large or complex fires that require more resources. Members of the VHHSFD undergo significant training focused on structural firefighting and some training related to wildfire, including Structure Protection Program Wildland Firefighter Level 1 (SPP-WFF1). The VHHSFD has two in-house SPP-WFF1 train-the-trainers. The VHHSFD has had no exposure to practical cross-training with MFLNRORD's BCWS. Cross-training with the BCWS would enable the local fire department to prepare its responders with the technical and practical firefighting experience in order to action both structural and wildland fires. It is recommended that all VHHSFD members have at a minimum S100 and/or SPP-WFF1 (or equivalent), and that the fire department members engage in yearly practical wildland fire training with BCWS that covers at a minimum: pump, hose, hydrant, air tanker awareness, and employment of SPUs. The aforementioned cross-training opportunity could include, for example, a joint wildfire simulation exercise. This level of training would improve the local fire departments' commitment to wildfire preparedness.

Over the previous 7 years (2011-2017), the VHHSFD responded to two significant wildland fire calls, in 2013 and 2015.

6.1.2 Water Availability for Wildfire Suppression

Water is the single most important suppression resource. In an emergency response scenario, it is critical that a sufficient water supply be available. The Fire Underwriters Survey summarizes their recommendations regarding water works systems fire protection requirements, in *Water Supply for Public Fire Protection* (1999).[75] Some key points from this document include the need for:

- Duplication of system parts in case of breakdowns during an emergency;
- Adequate water storage facilities;
- Distributed hydrants, including hydrants at the ends of dead-end streets; and

[75] http://www.scm-rms.ca/docs/Fire%20Underwriters%20Survey%20-%201999%20Water%20Supply%20for%20Public%20Fire%20Protection.pdf

- Piping that is correctly installed and in good condition.

Water works planning should always take worst-case-scenarios into consideration. The water system should be able to serve more than one major fire simultaneously, especially in larger urban centers.

Water service within the Village is an important component of emergency response for a wildland urban interface fire in the event of a large-scale emergency, and in particular for structural fires. As previously noted in Sections 3.2.3 and 3.3.1, water service is provided by a Village-operated system which relies on surface water from Harrison Lake. For suppression within the AOI, hydrant service is provided in all areas within the municipal boundary. In consultation with the VHHSFD, it was noted that water availability for fire suppression is most challenging in interface areas with steep slopes. In 2017, the Village was awarded provincial funding to upgrade and expand the water system to increase fire protection capacity. This project was completed in 2018.

The Village fire department can draft from natural water sources such as Harrison Lake, and as a last resort, streams such as Miami Creek. These natural water sources are known and mapped. Harrison Lake in particular provides a large capacity freshwater reservoir that is not assumed to be immediately vulnerable to drought conditions or climate change.

6.1.3 Access and Evacuation

Road networks in a community serve several purposes including providing access for emergency vehicles, providing escape/evacuation routes for residents, and creating fuel breaks. Access and evacuation during a wildfire emergency often must happen simultaneously and road networks should have the capacity to handle both. In the event of a wildfire emergency, the Hot Springs Road (Highway 9) is the only access route to and from the AOI. Evacuation would be conducted by First Responders, RCMP, and the Search and Rescue team (tactical). If a wildfire were to block Hot Springs Road, evacuation from the AOI would be difficult. Smoke and poor visibility, car accidents, wildlife, and other unforeseen circumstances can further complicate evacuations and hinder safe passage.

Many developments within the Village are located on single access roads which branch off of the Hot Springs Road, which also limits the ability of fire crews to respond to fires and safely evacuate residents. The Rockwell Drive corridor was identified by the Wildfire Working Group as the development of greatest concern for access and egress within the Village AOI. Within the AOI, some of the critical infrastructure is reached via narrow and/or private, forested roads, which may impede suppression efforts and response times.

Emergency access and evacuation planning is of particular importance in the event of a wildfire event or other large-scale emergency. The District of Kent and Village of Harrison have developed a Kent-Harrison Joint Emergency Response and Recovery Plan (2018) which includes basic contingencies in the event of a wildland / interface fire (i.e., contacts and roles of local government personnel). However, the plan does not specify evacuation routes to be used during an emergency situation. In the event of a wildfire emergency within the AOI, the Agassiz Fire Hall (outside of the AOI) can be designated as the EOC and the

Village municipal administration office can be designated as the back-up EOC. It is recommended that the Village develop a detailed evacuation plan that includes the following provisions:

- Mapping and identification of safe zones, marshaling points and aerial evacuation locations;
- Planning of traffic control and accident management;
- Identification of volunteers that can assist during and/or after evacuation; and
- Development of an education/communication strategy to deliver emergency evacuation procedures to residents.

Recreation trails built to support ATVs can provide access for ground crews and act as fuel breaks for ground fires, particularly in natural areas. Strategic recreational trail development to a standard that supports ATVs, and further to install gates or other barriers to minimize access by unauthorized users, can be used as tools that increase the ability of local fire departments to access interface areas.

The creation of a map book or spatial file that displays the trail network available for fire departments to access during an emergency or for fire suppression planning must accompany any fire access trail building activities. In order to effectively use the trails as crew access or as fuel breaks during suppression efforts, it is recommended that a Parks Access Plan, or Total Access Plan, is developed. This plan should be made available to the VHHSFD and the BCWS in the event that they are aiding suppression efforts on an interface fire in the AOI. The plan should include georeferenced maps with associated spatial data and ground-truthed locations of potential optimal firebreaks, identify the type of access available for each access route, identify those trails that are gated or have barriers, and provide information as to how to unlock / remove barriers. The plan should also identify those natural areas where access is insufficient. Access assessment should consider land ownership, proximity of values at risk, wildfire threat, opportunities for use as fuel break / control lines, trail / road network linkages where fuel-free areas or burn off locations can be created or used as potential sprinkler locations, and requirements for future maintenance activities such as operational access for fuel treatments and other hazard reduction activities.

In addition to providing the safest, quickest, and easiest access routes for emergency crews, a Total Access Plan would minimize the need for using machinery or motorized access in an otherwise undisturbed area. This would reduce the risk of soil disturbance and other environmental damage, and would therefore decrease rehabilitation costs.

RECOMMENDATION #17: In cooperation with the District of Kent, continue to work with relevant Provincial ministries and stakeholders including BC Parks, Emergency Management BC, Ministry of Transportation and Infrastructure, MFLNRORD, Seabird Island Indian Band (holders of a woodlot license adjacent to Sasquatch Provincial Park), BC Hydro, Fraser Valley Regional District, Enbridge (operating a line station at Ruby Creek) and Canadian Pacific Railway, to complete a second-means egress route through Sasquatch Park and provide an alternate evacuation route for residents and visitors along Rockwell Drive.

RECOMMENDATION #18: When the evacuation plan is finalized, complete and participate in regular testing of, and updates to, the evacuation plan.

RECOMMENDATION #19: Consider developing a community wildfire pre-planning brochure that addresses the following: 1) locations of staging areas; 2) identifies water reservoirs, communications requirements (i.e., radio frequencies), minimum resource requirements for structure protection in the event of an interface fire, and values at risk; and 3) maps of the area of interest.

RECOMMENDATION #20: Develop a Total Access Plan for the Village to create, map and inventory trail and road network in natural areas for suppression planning, identification of areas with insufficient access and to aid in strategic planning. Georeferenced maps with ground-truthed locations of potential optimal firebreaks should be developed as part of the Total Access Plan and shared with fire suppression personnel and BCWS to support emergency response in the event of a wildfire. The plan should be updated every five years, or more regularly, as needed to incorporate additions and / or changes.

6.1.4 Training

The VHHSFD maintains a current level of structural protection training as described in Section 6.1.1. Additionally, all members have yearly refreshers and / or certification in SPP-WFF1. According to the Office of Fire Commissioner, a new course on Engine Operations in the Wildland Urban Interface is currently being developed and expected to be released in 2018, which is a 1-day course that combines the SPP-WWF-1, the S115 and S215 (personal communication with Tom Boechler, Structure Protection Specialist). It is recommended that the VHHSFD considers providing members with this course upon release, to ensure currency with techniques, applications and procedures for wildland urban interface fire suppression. Provision of training opportunities for structural firefighters in the realm of wildland firefighting is critical to building capacity for suppression and emergency management at the local level. Until these course developments are complete, it is recommended that all fire department members at minimum have S100 and/or SPP-WFF1 (or equivalent), and that the fire departments engage in yearly practical wildland fire training with BCWS.

The current level of communication between the VHHSFD and BCWS occurs as required by the fire season demands. It is recommended that the VHHSFD work cooperatively with the BCWS (Fraser Fire Zone, Cultus/Haig Fire Base) to conduct yearly mock exercises, where information and technical/practical knowledge are shared, such as: fireline construction, Mark 3 pump operations, sprinkler protection, skid pack operations, portable water tank deployment, and wildland hose operations. These practices could also provide training to wildland crews on hydrant hookup methods, as well as provide an avenue to discuss working together on inter-agency fires. Additional training options could include engaging adjacent Fire Departments outside the AOI (i.e., Agassiz Fire Department) to conduct joint training so as to further strengthen regional emergency response and firefighting training.

RECOMMENDATION #21: Fire Departments should engage in regular cadence of communication with the BCWS Fraser Fire Zone, Cultus/Haig Fire Base to foster a strong relationship and identify potential cooperative wildfire risk reduction opportunities.

RECOMMENDATION #22: Ensure that the VHHSFD maintains the capability to effectively suppress wildland fires, through wildfire-specific training sessions. Ensure all VHHSFD continue to have SPP-WFF 1 at a minimum. Consider expanding the training program to maintain a high level of member education and training specific to interface and wildland fires. The Office of the Fire Commissioner (OFC) offers SPP 115 (formerly S-115) to train structural firefighters on the use of wildfire pumps and hose, and fire service hose and hydrants in the application of structural protection units (SPUs). The OFC is currently developing additional wildfire-specific Officer-level training courses (i.e., Engine Operations in the Wildland Urban Interface); the fire department should continue the practice of staying up to date on wildfire training opportunities, and to train members in this capacity, as training resources / budgets allow.

6.2 STRUCTURE PROTECTION

The VHHSFD is relatively well-resourced in both structural and wildland fire suppression equipment. The fire departments maintain a current level of training in both wildfire and structural firefighting (see Section 6.1.1 for additional detail). The VHHSFD is not equipped with a Structural Protection Unit (SPU) The UBCM owns four complete SPUs, each equipped to protect 30 – 35 structures. The kits are deployed by the MFLNRORD / BCWS incident command structure and are placed strategically across the province during the fire season based on fire weather conditions and fire potential. When the kits are not in use, they may be utilized by fire departments for training exercises. SPUs can be useful tools in the protection of rural/ interface homes in the event of a wildfire. An important consideration in protecting the WUI zone from fire is ensuring that homes can withstand an interface fire event. Structure protection is focused on ensuring that building materials and construction standards are appropriate to protect individual homes from interface fire. Materials and construction standards used in roofing, exterior siding, window and door glazing, eaves, vents, openings, balconies, decks, and porches are primary considerations in developing FireSmart neighbourhoods. Housing built using appropriate construction techniques and materials in combination with fire resistant landscaping are less likely to be impacted by interface fires.

While many BC communities established to date were built without significant consideration with regard to interface fire, there are still ways to reduce home vulnerability. Changes to roofing materials, siding, and decking can be achieved over the long-term through voluntary upgrades, as well as changes in bylaws and building codes. The FireSmart approach has been adopted by a wide range of governments and is a recognized process for reducing and managing fire risk in the wildland urban interface. More details on FireSmart construction can be found in Appendix J.

It is recommended that homeowners take a building envelope-out approach, that is, starting with the home and working their way out. Addressing little projects first can allow for quick, easy, and cost-effective risk reduction efforts to be completed sooner, while larger, more costly projects can be completed as resources and planning allow. For example, prior to the fire season, clearing roofs and gutters of combustible materials (leaves and needles), cleaning out any combustible accumulations or stored materials from under decks, moving large potential heat sources such as firewood, spare building materials or vehicles as far from the structure as possible, maintaining a mowed and watered lawn, removing dead vegetation, and pruning trees are actionable steps that residents can start working on immediately. The following link accesses an excellent four-minute video demonstrating the importance of FireSmart building practices during a simulated ember shower: http://www.youtube.com/watch?v=_Vh4cQdH26g.

The structure protection objectives for the Village are to:

- Encourage private homeowners to voluntarily adopt FireSmart principles on their properties and to reduce existing barriers to action;
- Enhance protection of critical infrastructure from wildfire (and post-wildfire impacts); and
- Enhance protection of residential / commercial structures from wildfire.

RECOMMENTATION #23: Complete a vulnerability assessment of all critical infrastructure, secondary power sources, and fuel availability. Review current capability of secondary power sources, identify vulnerabilities, and prioritize needs, in the case of prolonged or extensive power outages. Upgrade or realign resources, as prioritized.

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APPENDIX A – WILDFIRE THREAT ASSESSMENT – FBP FUEL TYPE CHANGE RATIONALE

Provided separately as PDF package.

APPENDIX B – WILDFIRE THREAT ASSESSMENT WORKSHEETS AND PHOTOS

Provided separately as PDF package.

APPENDIX C – MAPS

Provided separately as PDF package.

APPENDIX D – WILDLAND URBAN INTERFACE DEFINED

The traditional and most simple definition for the wildland/urban interface (WUI) is "the place where the forest meets the community". However, this definition can be misleading. Incorrectly, it implies that neighbourhoods and structures well within the perimeter of a larger community are not at risk from wildfire. As well, it fails to recognize that developments adjacent to grassland and bush are also vulnerable.

A more accurate and helpful definition of the WUI is based on a set of conditions, rather than a geographical location: "the presence of structures in locations in which conditions result in the potential for ignition of structures from the flames, radiant heat or embers of a wildland fire." This definition was developed by the National Fire Protection Association and is used by the US Firewise program.[76] It recognizes that all types of wildland fuel/fire can lead to structural ignition (i.e. forest, grassland, brush) and also identifies the three potential sources of structural ignition.

Two situations are differentiated. Locations where there is a clean/abrupt transition from urban development to forest lands are usually specified as the "interface" whereas locations where structures are embedded or mingled within a matrix of dense wildland vegetation are known as the "intermix". An example of interface and intermixed areas is illustrated in Figure 6.

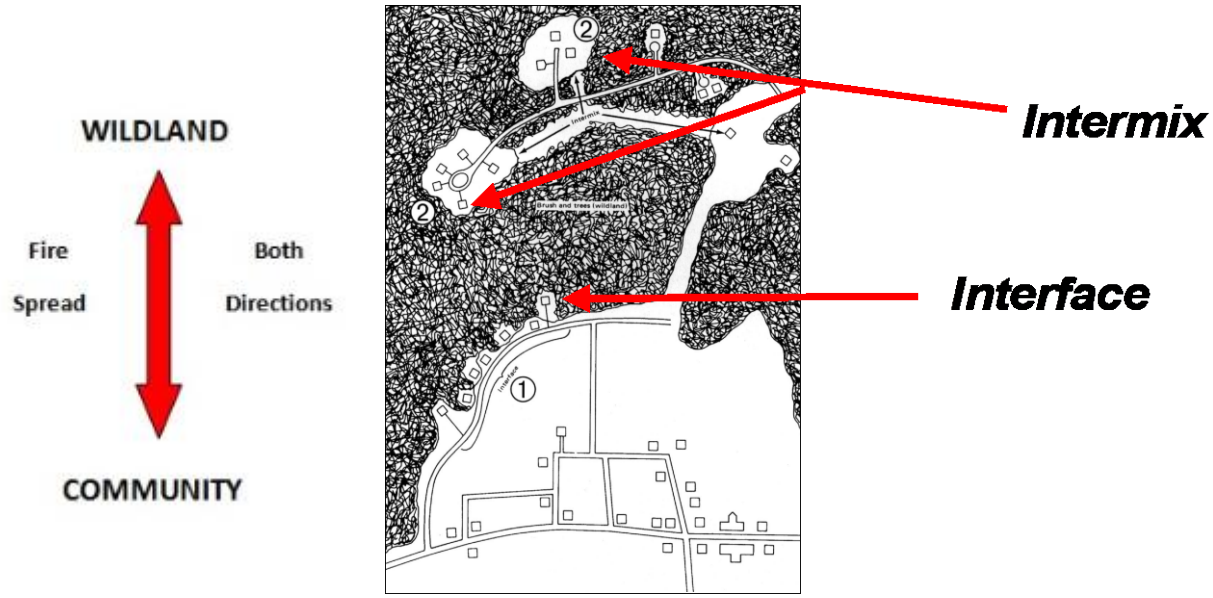

Figure 6. Illustration of intermix and interface situations.

Within the WUI, 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. 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 itself for interface fires.

[76] https://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA

Fires spreading into the WUI from the forest can impact homes in two distinct ways:

1. From sparks or burning embers carried by the wind, or convection that starts new fires beyond the zone of direct ignition (main advancing fire front), that alight on vulnerable construction materials or adjacent flammable landscaping (roofing, siding, decks, cedar hedges, bark mulch, etc.) (Figure 7).

2. From direct flame contact, convective heating, conductive heating or radiant heating along the edge of a burning fire front (burning forest), or through structure-to-structure contact. Fire can ignite a vulnerable structure when the structure is in close proximity (within 10 meters of the flame) to either the forest edge or a burning house (Figure 8).

Figure 7. Firebrand caused ignitions: burning embers are carried ahead of the fire front and alight on vulnerable building surfaces.

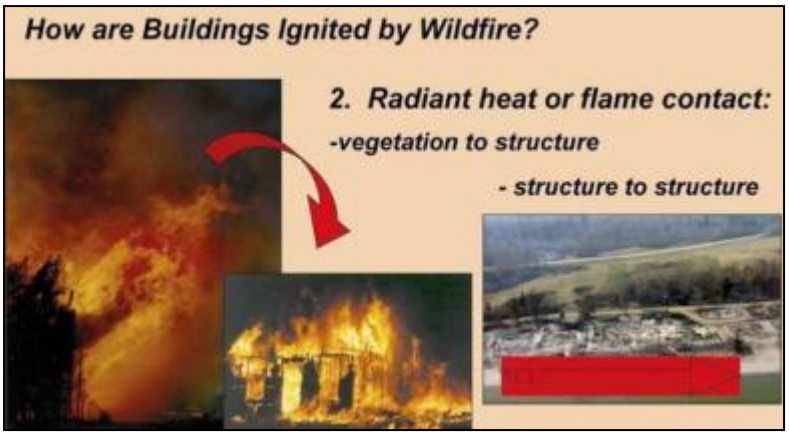

Figure 8. Radiant heat and flame contact allows fire to spread from vegetation to structure or from structure to structure.

Current research confirms that the majority of homes ignited during major WUI events trace back to embers as their cause (*e.g.* 50% – 80⁺ %). Firebrands can be transported long distances ahead of the wildfire, across any practicable fire guards, and accumulate on horizontal surfaces within the home ignition zone in densities that can reach 600⁺ /m^2. Combustible materials found within the home ignition zone combine to provide fire pathways allowing spot fires ignited by embers to spread and carry flames or smoldering fire into contact with structures.

APPENDIX E – WUI THREAT PLOT LOCATIONS

Table 17 displays a summary of all WUI threat plots completed during CWPP field work. The original WUI threat plot forms and photos will be submitted as a separate document. The following ratings are applied to applicable point ranges:

- Wildfire Behaviour Threat Score – Low (0-40); Moderate (41 – 95); High (96 – 149); Extreme (>149); and,
- WUI Threat Score – Low (0 – 13); Moderate (14 – 26); High (27 – 39); Extreme (>39).

Table 17. Summary of WUI Threat Assessment Worksheets.

WUI Plot #	Geographic Location	Wildfire Behaviour Threat Class	WUI Threat Class*
ELEM-1	Park adjacent to Harrison Elementary	Moderate	N/A
GREE-1	Greenspace	Moderate	N/A
GREE-2	Greenspace	Moderate	N/A
MIAM-1	Miami River Greenway	Moderate	N/A
SECT-1	East Sector Lands	High	High
SECT-2	East Sector Lands	Moderate	N/A
SECT-3	East Sector Lands	Moderate	N/A
SECT-4	East Sector Lands	Moderate	N/A
WAT-1	Campbell Lake Trail	Moderate	N/A
WAT-2	Campbell Lake Trail	Moderate	N/A
WAT-3	Adjacent to water reservoir	High	Extreme
WOOD-3	Mount Woodside	Moderate	N/A
WOOD-4	Mount Woodside	Moderate	N/A

*Note that WUI threat scores are only collected for untreated polygons that rate high or extreme for Wildfire Behaviour Threat score.

APPENDIX F – FUEL TYPING METHODOLOGY AND LIMITATIONS

The initial starting point for fuel typing for the study area was the 2015 provincial fuel typing layer provided by BCWS as part of the *2015 Provincial Strategic Threat Analysis* (PSTA) data package. This fuel type layer is based on the FBP fuel typing system. PSTA data is limited by the accuracy and availability of information within the Vegetation Resource Inventory (VRI) provincial data; confidence in provincial fuel type data is very low on private land. The PSTA threat class for all private land within the AOI was not available. Fuel types within the study area have been updated using ortho-imagery of the study area with representative fuel type calls confirmed by field fuel type verification. Polygons not field-verified were assigned fuel types based upon similarities visible in orthophotography to areas field verified. Where polygons were available from the provincial fuel typing layer, they were utilized and updated as necessary for recent harvesting, development, etc.

It should be noted that fuel typing is intended to represent a fire behaviour pattern; a locally observed fuel type may have no exact analog within the FBP system. The FBP system was almost entirely developed for boreal and sub-boreal forest types, which do not occur within the study area. As a result, the AOI fuel typing is a best approximation of the Canadian Forest Fire Danger Rating System (CFFDRS) classification, based on the fire behaviour potential of the fuel type during periods of high and extreme fire danger within the South Coast region. Additionally, provincial fuel typing depends heavily on Vegetation Resource Inventory (VRI) data, which is gathered and maintained in order to inform timber management objectives, not fire behaviour prediction. For this reason, VRI data often does not include important attributes which impact fuel type and hazard, but which are not integral to timber management objectives. Examples include: surface fuels and understory vegetation.

In some cases, fuel type polygons may not adequately describe the variation in the fuels present within a given polygon due to errors within the PSTA and VRI data, necessitating adjustments required to the PSTA data. In some areas, aerial imagery is not of sufficiently high resolution to make a fuel type call. Where fuel types could not be updated from imagery with a high level of confidence, the original PSTA fuel type polygon and call were retained.

For information on the provincial fuel typing process used for PSTA data as well as aiding in fuel type updates made in this document, please refer to Perrakis and Eade, 2015.[77]

[77] Ibid.

APPENDIX G – WUI THREAT ASSESSMENT METHODOLOGY

As part of the CWPP process, spatial data submissions are required to meet the defined standards in the Program and Application Guide. As part of the program, proponents completing a CWPP or CWPP update are provided with the Provincial Strategic Threat Analysis (PSTA) dataset. This dataset includes:

- Current Fire Points
- Current Fire Polygons
- Fuel Type
- Historical Fire Points
- Historical Fire Polygons
- Mountain pine beetle polygons (sometimes not included)
- PSTA Head Fire Intensity
- PSTA Historical Fire Density
- PSTA Spotting Impact
- PSTA Threat Rating
- Structure Density
- Structures (sometimes not included)
- Wildland Urban Interface Buffer Area

The required components for the spatial data submission are detailed in the Program and Application Guide Spatial Appendix – these include:

- AOI
- Fire Threat
- Fuel Type
- Photo Location
- Proposed Treatment
- Structures
- Threat Plot
- Wildland Urban Interface

The provided PSTA data does not necessarily transfer directly into the geodatabase for submission, and several PSTA feature classes require extensive updating or correction. In addition, the Fire Threat determined in the PSTA is fundamentally different than the Fire Threat feature class that must be submitted in the spatial data package. The Fire Threat in the PSTA is based on provincial scale inputs - fire density; spotting impact; and head fire intensity, while the spatial submission Fire Threat is based on the components of the Wildland Urban Interface Threat Assessment Worksheet. For the scope of this project, completion of WUI Threat Assessment plots on the entire AOI is not possible, and therefore an analytical model has been built to assume Fire Threat based on spatially explicit variables that correspond to the WUI Threat Assessment worksheet.

Field Data Collection

The primary goals of field data collection are to confirm or correct the provincial fuel type, complete WUI Threat Assessment Plots, and assess other features of interest to the development of the CWPP. This is accomplished by traversing as much of the study area as possible (within time, budget and access constraints). Threat Assessment plots are completed on the 2012 version form, and as per the Wildland Urban Interface Threat Assessment Guide.

For clarity, the final threat ratings for the study area were determined through the completion of the following methodological steps:

1. Update fuel-typing using orthophotography provided by the client and field verification.
2. Update structural data using critical infrastructure information provided by the client, field visits to confirm structure additions or deletions, and orthophotography
3. Complete field work to ground-truth fuel typing and threat ratings (completed 13 WUI threat plots on a variety of fuel types, aspects, and slopes and an additional 40+ field stops with qualitative notes, fuel type verification, and/or photographs)
4. Threat assessment analysis using field data collected and rating results of WUI threat plots – see next section.

Spatial Analysis

Not all attributes on the WUI Threat Assessment form can be determined using a GIS analysis on a landscape/polygon level. To emulate as closely as possible the threat categorization that would be determined using the Threat Assessment form, the variables in Table 18 were used as the basis for building the analytical model. The features chosen are those that are spatially explicit, available from existing and reliable spatial data or field data, and able to be confidently extrapolated to large polygons.

Table 18. Description of variables used in spatial analysis for WUI wildfire threat assessment.

WUI Threat Sheet Attribute	Used in Analysis?	Comment
FUEL SUBCOMPONENT		
Duff depth and Moisture Regime	No	Many of these attributes assumed by using 'fuel type' as a component of the Fire Threat analysis. Most of these components are not easily extrapolated to a landscape or polygon scale, or the data available to estimate over large areas (VRI) is unreliable.
Surface Fuel continuity	No	
Vegetation Fuel Composition	No	
Fine Woody Debris Continuity	No	
Large Woody Debris Continuity	No	
Live and Dead Coniferous Crown Closure	No	
Live and Dead Conifer Crown Base height	No	
Live and Dead suppressed and Understory Conifers	No	
Forest health	No	
Continuous forest/slash cover within 2 km	No	
WEATHER SUBCOMPONENT		
BEC zone	Yes	
Historical weather fire occurrence	Yes	
TOPOGRAPHY SUBCOMPONENT		
Aspect	Yes	

WUI Threat Sheet Attribute	Used in Analysis?	Comment
Slope	Yes	Elevation model was used to determine slope.
Terrain	No	
Landscape/ topographic limitations to wildfire spread	No	
STRUCTURAL SUBCOMPONENT		
Position of structure/ community on slope	No	
Type of development	No	
Position of assessment area relative to values	Yes	Distance to structure is used in analysis; position on slope relative to values at risk is too difficult to analyze spatially.

The field data is used to correct the fuel type polygon attributes provided in the PSTA. The corrected fuel type layer is then used as part of the initial spatial analysis process. The other components are developed using spatial data (BEC zone, fire history zone) or spatial analysis (aspect, slope). A scoring system was developed to categorize resultant polygons as having relatively low, moderate, high or extreme Fire Threat, or Low, Moderate, High or Extreme WUI Threat.

These attributes are combined to produce polygons with a final Fire Behaviour Threat Score. To determine the Wildland Urban Interface Score, only the distance to structures is used. Buffer distances are established as per the WUI Threat Assessment worksheet (<200, 200-500 and >500) for polygons that have a 'high' or 'extreme' Fire Behaviour Threat score. Polygons with structures within 200m are rated as 'extreme', within 500 m are rated as 'high', within 2 km are 'moderate', and distances over that are rated 'low'.

There are obvious limitations in this method, most notably that not all components of the threat assessment worksheet are scalable to a GIS model, generalizing the Fire Behaviour Threat score. The WUI Threat Score is greatly simplified, as determining the position of structures on a slope, the type of development and the relative position are difficult in an automated GIS process. This method uses the best available information to produce the initial threat assessment across the study area in a format which is required by the UBCM SWPI program.

Upon completion of the initial spatial threat assessment, individual polygon refinement was completed. In this process, the WUI threat plots completed on the ground were used in the following ways:

- fuel scores were reviewed and applied to the fuel type in which the threat plot was completed;
- conservative fuel scores were then applied to the polygons by fuel type to check the initial assessment;
- high Wildfire Behaviour Threat Class polygons were reviewed in google earth to confirm their position on slope relative to values at risk.

In this way, we were able to consider fuel attributes outside the fuel typing layer, as well as assessment area position on slope relative to structures, which are included in the WUI threat plot worksheet.

Limitations

The threat class ratings are based initially upon (geographic information systems) GIS analysis that best represents the WUI wildfire threat assessment worksheet and are updated with ground-truthing WUI threat plots. WUI threat plots were completed in a variety of fuel types, slopes, and aspects in order to be able to confidently refine the GIS analysis. It should be noted that there are subcomponents in the worksheet which are not able to be analyzed using spatial analysis; these are factors that do not exist in the GIS environment.

The threat assessment is based largely on fuel typing, therefore the limitations with fuel typing accuracy (as detailed in Section 4.3.1) impacts the threat assessment as well.

APPENDIX H – PRINCIPLES OF FUEL MANAGEMENT

Fuel or vegetation management is a key element of the FireSmart approach. Given public concerns, fuel management is often difficult to implement and must be carefully rationalized in an open and transparent process. Vegetation management should be strategically focused on minimizing impact while maximizing value to the community. The decision whether or not to implement vegetation management must be evaluated against other elements of wildfire risk reduction to determine the best avenue for risk reduction. The effectiveness of fuel treatments is dependent on the extent to which hazardous fuels are modified or removed and the treatment area size and location (strategic placement considers the proximity to values at risk, topographic features, existing fuel types, etc.) in addition to other site-specific considerations. The longevity of fuels treatments varies by the methods used and site productivity.

What is Fuel Management?

Fuel management is the planned manipulation and/or reduction of living and dead forest fuels for land management objectives (*e.g.*, hazard reduction). Fuels can be effectively manipulated to reduce fire hazard by mechanical means, such as tree removal or modification, or abiotic means, such as prescribed fire. The goal of fuel management is to lessen potential fire behavior proactively, thereby increasing the probability of successful containment and minimizing adverse impacts to values at risk. More specifically, the goal is to decrease the rate of fire spread, and in turn reduce fire size and intensity, as well as crowning and spotting potential (Alexander, 2003).

Fire Triangle:

Fire is a chemical reaction that requires fuel (carbon), oxygen and heat. These three components make up the fire triangle and if one is not present, a fire will not burn. Fuel is generally available in adequate quantities in the forest. Fuel comes from living or dead plant materials (organic matter). Trees and branches lying on the ground are a major source of fuel in a forest. Such fuel can accumulate gradually as trees in the stand die. Fuel can also build up in large amounts after catastrophic events such as insect infestations. Oxygen is present in the air. As oxygen is used up by fire it is replenished quickly by wind. Heat is needed to start and maintain a fire. Heat can be supplied by nature through lightning or people can be a source through misuse of matches, campfires, trash fires and cigarettes. Once a fire has started, it provides its own heat source as it spreads through a fuel bed capable of supporting it.

Forest Fuels:

The amount of fuel available to burn on any site is a function of biomass production and decomposition. Many of the forest ecosystems within BC have the potential to produce large amounts of vegetation biomass. Variation in the amount of biomass produced is typically a function of site productivity and climate. The disposition or removal of vegetation biomass is a function of decomposition. Decomposition is regulated by temperature and moisture. In wet maritime coastal climates, the rates of decomposition are relatively high when compared with drier cooler continental climates of the interior. Rates of decomposition can be accelerated naturally by fire and/or anthropogenic means.

A hazardous fuel type can be defined by high surface fuel loadings, high proportions of fine fuels (<1 cm) relative to larger size classes, high fuel continuity between the ground surface and overstory tree canopies, and high stand densities. A fuel complex is defined by any combination of these attributes at the stand level and may include groupings of stands.

Surface Fuels:

Surface fuels consist of forest floor, understory vegetation (grasses, herbs and shrubs, and small trees), and coarse woody debris that are in contact with the forest floor. Forest fuel loading is a function of natural disturbance, tree mortality and/or human related disturbance. Surface fuels typically include all combustible material lying on or immediately above the ground. Often roots and organic soils have the potential to be consumed by fire and are included in the surface fuel category.

Surface fuels that are less than 7 cm in diameter contribute to surface fire spread; these fuels often dry quickly and are ignited more easily than larger diameter fuels. Therefore, this category of fuel is the most important when considering a fuel reduction treatment. Larger surface fuels greater than 7 cm are important in the contribution to sustained burning conditions, but, when compared with smaller size classes, are often not as contiguous and are less flammable because of delayed drying and high moisture content. In some cases, where these larger size classes form a contiguous surface layer, such as following a windthrow event or wildfire, they can contribute an enormous amount of fuel, which will increase fire severity and the potential for fire damage.

Aerial Fuels:

Aerial fuels include all dead and living material that is not in direct contact with the forest floor surface. The fire potential of these fuels is dependent on type, size, moisture content, and overall vertical continuity. Dead branches and bark on trees and snags (dead standing trees) are important aerial fuels. Concentrations of dead branches and foliage increase the aerial fuel bulk density and enable fire to move from tree to tree. The exception is for deciduous trees where the live leaves will not normally carry fire. Numerous species of moss, lichens, and plants hanging on trees are light and easily ignited aerial fuels. All of the fuels above the ground surface and below the upper forest canopy are described as ladder fuels.

Two measures that describe crown fire potential of aerial fuels are the height to live crown and crown closure (Figure 9 and Figure 10). The height to live crown describes fuel continuity between the ground surface and the lower limit of the upper tree canopy. Crown closure describes the inter-tree crown continuity and reflects how easily fire can be propagated from tree to tree. In addition to crown closure, tree density is an important measure of the distribution of aerial fuels and has significant influence on the overall crown and surface fire conditions (Figure 11). Higher stand density is associated with lower inter tree spacing, which increases overall crown continuity. While high density stands may increase the potential for fire spread in the upper canopy, a combination of high crown closure and high stand density usually results in a reduction in light levels associated with these stand types. Reduced light levels accelerate self-tree pruning, inhibit the growth of lower branches, and decrease the cover and biomass of understory vegetation.

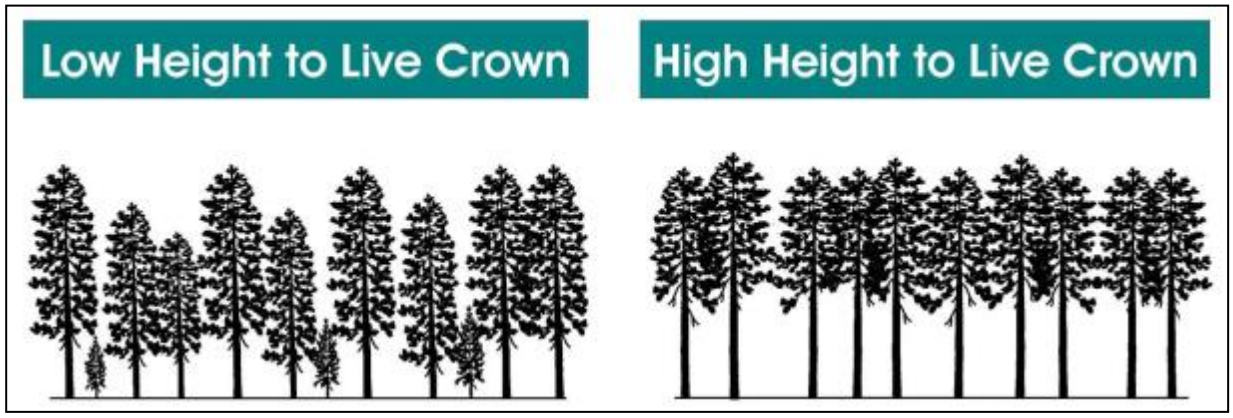

Figure 9. Comparison of stand level differences in height-to-live crown in an interior forest, where low height to live crown is more hazardous than high height to live crown.

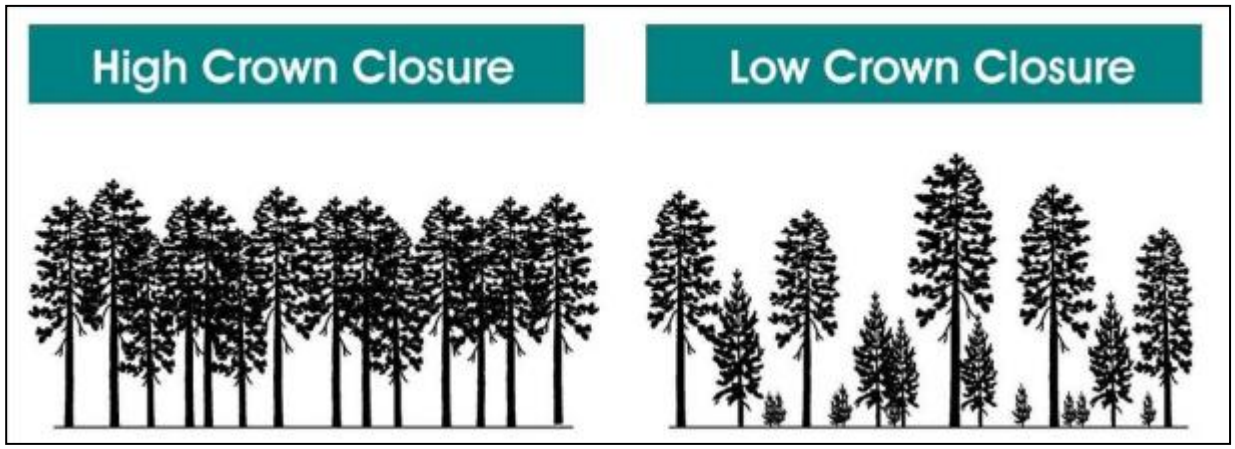

Figure 10. Comparison of stand level differences in crown closure, where high crown closure/continuity contributes to crown fire spread, while low crown closure reduces crown fire potential.

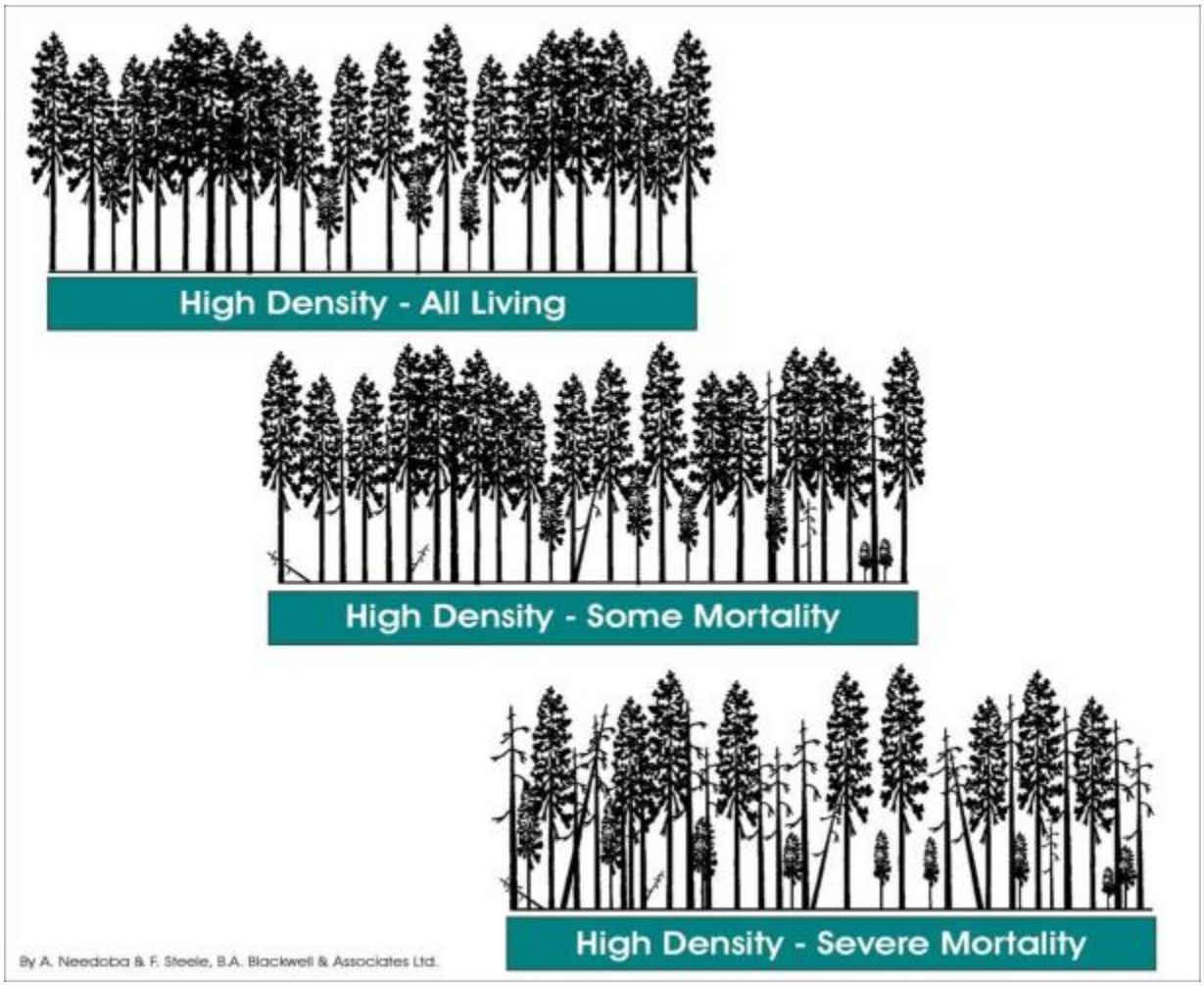

Figure 11. Comparison of stand level differences in density and mortality, and the distribution of live and dead fuels in these types of stands.

Thinning is a preferred approach to fuel treatment (Figure 12.) and offers several advantages compared to other methods:

- Thinning provides the most control over stand level attributes such as species composition, vertical structure, tree density, and spatial pattern, as well as the retention of snags and coarse woody debris for maintenance of wildlife habitat and biodiversity.
- Unlike prescribed fire treatments, thinning is comparatively low risk, and is less constrained by fire weather windows.
- Thinning may provide marketable materials that can be utilized by the local economy.
- Thinning can be carried out using sensitive methods that limit soil disturbance, minimize damage to leave trees, and provide benefits to other values such as wildlife.

The main wildfire objective of thinning is to shift stands from having a high crown fire potential to having a low surface fire potential. In general, the goals of thinning are to:

- Reduce stem density below a critical threshold to minimize the potential for crown fire spread;
- Prune to increase the height to live crown to reduce the potential of surface fire spreading into tree crowns; and
- Remove slash created by spacing and pruning to minimize surface fuel loadings while still maintaining adequate woody debris to maintain ecosystem function.

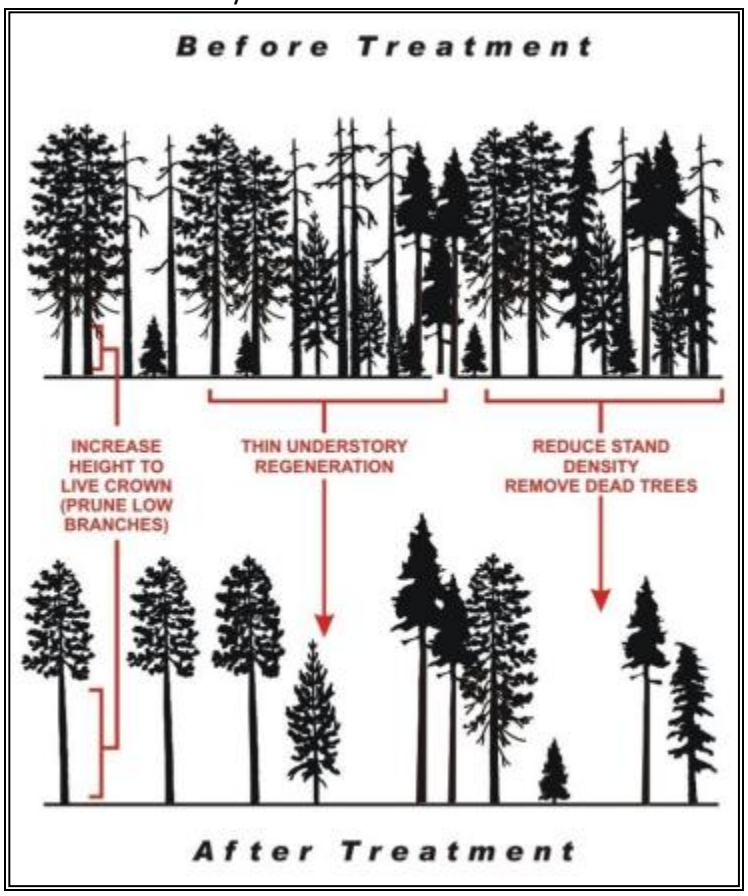

Figure 12. Illustration of the principles of thinning to reduce the stand level wildfire hazard.

Fuel type, weather and topography are all primary factors that influence the spread of fires. The three most important components of weather include wind, temperature and humidity. Fuel type and slope are primary concerns related to fire spread along the forested areas on the slopes surrounding the Village. The steepness of a slope can affect the rate and direction a fire spreads and generally fires move faster uphill than downhill, and fire will move faster on steeper slopes. This is attributed to (MFLNRO, 2014):

- *On the uphill side, the flames are closer to the fuel;*
- *The fuels become drier and ignite more quickly than if on level ground;*
- *Wind currents are normally uphill and this tends to push heat flames into new fuels;*
- *Convected heat rises along the slope causing a draft which further increases the rate of spread; and*
- *Burning embers and chunks of fuel may roll downhill into unburned fuels, increasing spread and starting new fires.*

APPENDIX I – FIRESMART FUEL TREATMENTS

The following information regarding fuel treatments is based on the FireSmart Manual (Partners in Protection 2002).

Priority Zone 1 is a 10 m fuel free zone around structures. This ensures that direct flame contact with the building cannot occur and reduces the potential for radiative or conductive heat to ignite the building. While creating this zone is not always possible, landscaping choices should reflect the use of less flammable vegetation such as deciduous shrubs, herbs and other species with low flammability. Coniferous vegetation such as juniper or cedar shrubs and hedges should be avoided, as these are highly flammable.

Priority Zone 2 extends from 10 to 30 m from the structure. In this zone, trees should be widely spaced 5 to 10 m apart, depending on size and species. Tree crowns should not touch or overlap. Deciduous trees have much lower volatility than coniferous trees, so where possible deciduous trees should be preferred for retention or planting. Trees in this area should be pruned as high as possible (without compromising tree health), especially where long limbs extend towards buildings. This helps to prevent a fire on the ground from moving up into the crown of the tree or spreading to a structure. Any downed wood or other flammable material should also be cleaned up in this zone to reduce fire moving along the ground.

Priority Zone 3 extends from 30 to 100 m from the home. The main threat posed by trees in this zone is spotting, the transmission of fire through embers carried aloft and deposited on the building or adjacent flammable vegetation. To reduce this threat, cleanup of surface fuels as well as pruning and spacing of trees should be completed in this zone (Partners in Protection 2002).

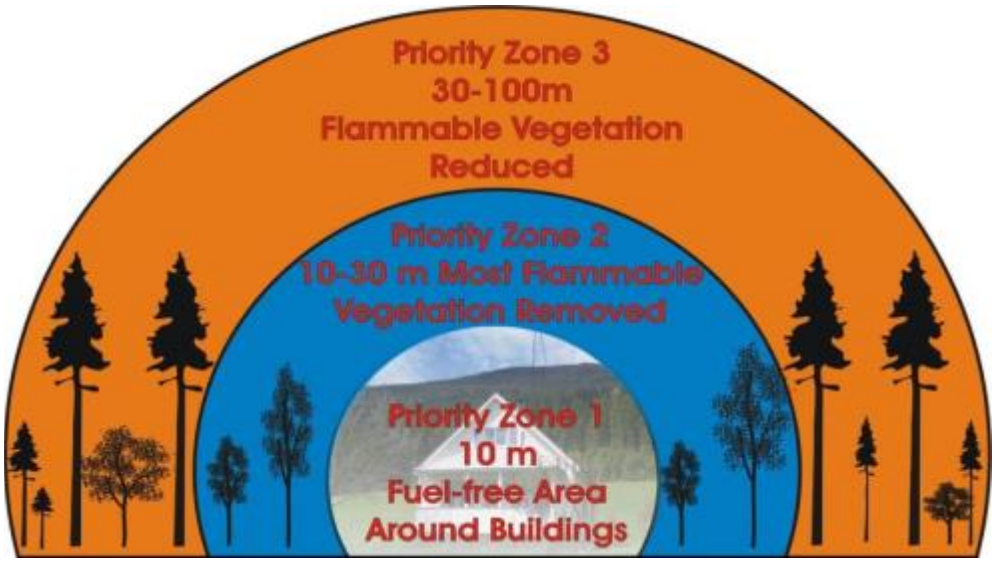

Figure 13. Illustration of FireSmart zones. (Figure adapted from FireSmart)

APPENDIX J – FIRESMART CONSTRUCTION AND LANDSCAPING

Two recent studies by Westhaver (2015, 2017) found that certain "fatal flaws", such as high-flammability landscaping like bulky ornamental junipers and large, easily ignited fuel sources (*e.g.* motorized vehicles, firewood, construction materials, *etc*.) were sufficiently influential to result in structure ignition of homes otherwise assessed as "Low" hazard by overwhelming the advantages provided by highly fire resistant structures[78].

In the 2017 Fort McMurray investigations (Westhaver) it was found that the most notable observed attributes of the surviving interface homes were: vegetation and fuels within the HIZ which were compliant with FireSmart practices, HIZs with relatively few combustible objects and ignition sites (examples of ignition sites include: combustible accumulations on roofs, gutters, *etc*.) , and Low to Moderate structural hazard ratings.[79,80] This investigation, and other similar investigations, indicate that the FireSmart principles can be effective at reducing structure loss, particularly in the urban perimeter where fire initially spreads from the forest to structures. .

The following link accesses an excellent four-minute video demonstrating the importance of FireSmart building practices during a simulated ember shower: https://www.youtube.com/watch?v=IvbNOPSYyss.

FireSmart Construction

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.

Soffits and Eaves

Open soffits or eaves provide locations for embers to accumulate, igniting a structure. Soffits and eaves should be closed. Vents which open into insulated attic space are of particular concern, as they provide a clear path for embers to a highly flammable material inside the structure. Any exhaust or intake vents that open into attic spaces should resist ember intrusion with non-combustible wire mesh no larger than 3 mm.

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. Brick, stucco, or heavy timber materials offer much better resistance to

[78] Westhaver, A. 2017. *Why some homes survived. Learning from the Fort McMurray wildland/urban interface fire disaster*. A report published by the Institute for Catastrophic Loss Reduction – ICLR research paper series – number 56. https://www.iclr.org/images/Westhaver_Fort_McMurray_Final_2017.pdf

[79] Ibid.

[80] Using the FireSmart hazard assessment system.

fire. While wood may not be the best choice for use in the WUI, other values from economic and environmental perspectives must also be considered. It is significantly less expensive than many other materials, supplies a great deal of employment in BC, and is a renewable resource. New treatments and paints are now available for wood that increase its resistance to fire and they should be considered for use.

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. Horizontal surfaces, such as decks, of flammable materials are vulnerable to ignition from embers. Fire resistant decking/ patio materials will reduce the ignitability of the home.

Combustible Materials:

Combustible materials stored within 10 m of residences are also considered a significant issue. Woodpiles, propane tanks, recreational motorized vehicles, 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 homes.

FireSmart Landscaping

Future landscaping choices should be limited to plant species with low flammability within 10 m of the building. Coniferous vegetation such as Juniper, Cypress, Yew or Cedar hedging or shrubs of any height should not be planted within this 10 m zone as these species are considered highly flammable under extreme fire hazard conditions.

Decorative bark mulch, often used in home landscapes is easily ignitable from wildfire embers or errant cigarettes and can convey fire to the home. Alternatives to bark mulch include gravel, decorative rock, or a combination of wood bark and decorative rock.[81]

Landscaping Alternatives

The landscaping challenges faced by many homeowners pertain to limited space, privacy and the desire to create visually explicit edge treatments to demarcate property ownership from adjacent lots with evergreen vegetation screens. Ornamental plant characteristics fulfilling these criteria have an upright branching habit, compact form, dense foliage, as well as a moderate growth rate. Dwarf and ornamental conifers such as Arborvitae hedging are popular choices, yet conifers such as these which have needle or scale-like foliage are highly flammable and not compliant with FireSmart principles and should be omitted from the 10 m Fire Priority Zone of the planned home footprint.

There are a number of broadleaved deciduous and evergreen plants with low flammability which can be used for landscaping within FireSmart PZ 1 (within 10 m of structures). Landscaping should be selected for the appropriate Canadian Plant Hardiness Zone (see www.planthardiness.gc.ca for the Hardiness Zone specific to the various study area). The majority of the areas would be within Zone 3b.

[81] *Fire Resistant Plants for Home Landscapes: Selecting plants that may reduce your risk from wildfire*. 2006. A Pacific Northwest Extension Publication (PNW 590).

Plants that are fire resistant/ have low flammability generally have the following characteristics:

- Foliage with high moisture content (moist and supple),
- Little dead wood and do not tend to accumulate dry and dead foliage or woody materials, and
- Sap that is water-like and without a strong odour.[3]

It is important to note that even fire resistant plants can burn if not maintained. Grass, shrubs, and herbs must be maintained in a state that reduces fire hazard by maintaining foliar moisture content. This can be accomplished by:

- Choosing plant species that are well-adapted to the site (microclimate and soil conditions of the parcel);
- Incorporating a landscape design where shrubs, herbs, and grasses are planted in discrete units manageable by hand watering;
- Removal of dead and dying foliage; and/or,
- Installing irrigation.

Depending solely on irrigation to maintain landscaping in a low flammability state can be limiting and may actually increase the fire hazard on the parcel, particularly in times of drought and watering restrictions. Lack of irrigation in times of watering restrictions may create a landscape which is unhealthy, unsightly, as well as dead, dry, and highly flammable.

There are a number of resources available to aid in development of FireSmart compliant landscaping curriculum or educational material; links can be found below.

The Canadian and U.S. systems for determining Plant Hardiness Zones differ.

- The USDA bases hardiness zones on minimum winter temperatures only: http://planthardiness.ars.usda.gov/PHZMWeb/Default.aspx,
- The Canadian system bases them on seven climatic factors including frost free days, and minimum and maximum temperature: http://www.planthardiness.gc.ca/

APPENDIX K – COMMUNICATION AND EDUCATION

Communicating effectively is the key aspect of education. Communication materials must be audience specific and delivered in a format and through a medium that will reach the target audience. Audiences should include home and landowners and occupiers, school students, local businesses, municipal officials and staff, community members, and other community groups. Education and communication messages should be engaging, empowering, simple yet comprehensive. A basic level of background information is required to enable a solid understanding of fire risk issues and the level of complexity and detail of the message should be specific to the target audience.

Websites and social media are some of the most cost-effective methods of communication available. Pew Research Center recently found that approximately 60% of Americans get their news from social media; 44% get their news from Facebook.[82] Twitter, LinkedIn, and Instagram are other social media platforms which can be used to provide real-time information to a large audience and are used, albeit to a lesser extent, by users as their primary news source.[83]

The challenge of all social media is to ensure that your message reaches the intended audience, accomplished by having users 'like' the page, engage with the posts, or re-share information to an even larger audience. There are communication experts who specialize in social media who can evaluate an organization's goals and offer tips to increase engagement and create compelling content to communicate the message. Likewise, it is important to be aware of the demographic of the community; a younger, more digitally connected community is more likely to use social media to get updates on 'newsworthy items'.[84]

[82] Pew Research Center Journalism and Media. Social media news use: Facebook leads the pack. May 25, 2016. Accessed December 17, 2017 from http://www.journalism.org/2016/05/26/news-use-across-social-media-platforms-2016/pj_2016-05-26_social-media-and-news_0-03/.

[83] Although the research cited in this document is of American social media users, it can be cautiously assumed that, while data and numbers are not likely exact to the Canadian demographic, similar trends in Canada likely occur.

[84] The Pew Research Center finds that 69% of Facebook users are 49 and younger. Only 8% of Facebook users are older than 65.

PROJECT: Village of Harrison Hot Springs CWPP

Wildfire Threat Assessment – FBP Fuel Type Change Rationale

Location: Village of Harrison H	Date: 8/29/18	Assessor/ Professional Designation: Leslie Brown, FIT	
Coordinates: 49°17.322' N, 121°46.630'		Coordinate system used and format: DD.MM.SS	
PSTA Threat: 7.00		FBP fuel type: C-5	
Assessor's FBP Fuel type: M-1/2		Ownership: Crown	

Assessor's Fuel Type Rationale:

The area is characterized by a mixed stand dominated by Cw, Hw, and Dr in the overstorey. The understorey is composed of Hw, Cw, vine maple. The fuel type polygon has a higher proportion of deciduous than at plot location, which is approximately 25% deciduous.The overall stand density is moderate and ladder fuels are relatively uncommon. There are large gaps in the canopy due to dying trees (potentially root rot) that have fallen to create surface fuel accumulations. Where gaps have formed, deciduous shrubs and sword fern dominates. This area is located in Green Space, a park within the Village of Harrison Hot Springs.

Attach at least 6 representative photos that support the fuel type rationale change. There should be at least 2 photos of each part of the forest stratum: surface fuel, ladder fuel (present or absent) and the crown fuel

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

Photo Direction: Comment:

Forest Floor	Other (specif	

. · Photo Direction: · Comment:

Forest Floor	Other (specif	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Village of Harrison Hot Springs CWPP 2017

Wildfire Threat Assessment – FBP Fuel Type Change Rationale

Location: Village of Harrison H	Date: 8/30/18	Assessor/ Professional Designation: Leslie Brown, FIT	
Coordinates: 49°17.825' N, 121°46.960' W		Coordinate system used and format: DD.MM.SS	
PSTA Threat: 5.00		FBP fuel type: D-1/2	
Assessor's FBP Fuel type: M-1/2		Ownership: Crown	

Assessor's Fuel Type Rationale:

This stand is comprised of both deciduous and coniferous species (Cw70Mb20Hw10), some of which are very mature. Mature deciduous trees are going through senescence and others have died and fallen to create high coarse fuel loading. Fine and medium fuel loading is also fairly high and continuous. Throughout the stand are patches of relatively dense, less mature Cw and Hw with low crown base heights and 80-100% live crown. Crown closure varies significantly throughout the stand due to the combination of dense patches and openings.

Attach at least 6 representative photos that support the fuel type rationale change. There should be at least 2 photos of each part of the forest stratum: surface fuel, ladder fuel (present or absent) and the crown fuel

	Photo Direction	Comment:
Ladder Fuels	West	

	Photo Direction	Comment:
Ladder Fuels	North	

Photo Direction: Comment:

Forest Floor	Other (specif	

Photo Direction: Comment:

Forest Floor	Other (specif	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: ELEM-1	Community: Village of Harrison Hot Springs
Assessor: L. Brown	Geographic Location/Street Name: Harrison Elementary (park adjcacent)
Date: 8/30/18	GPS/UTM: 49°17.825' N, 121°46.960' W
Photos: Y[✓] N[ ] #: 5	Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

Est. Fuel Type
M-1/2

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [ ] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [ ]	41–60 3 [X]	61–80 4 [ ]	>80 5 [ ]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [ ]	Herbs, Deciduous Shrubs 2 [X]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [ ]	10-25 coverage 7 [X]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 2 [ ]	10-25 coverage 5 [X]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [ ]	41–60 10 [X]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [ ]	<20 5 [X]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [ ]	2–<3 7 [X]	1–<2 10 [ ]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [X]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [X]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [X]	61-80 7 [ ]	>80 10 [ ]
					Sub Total	49 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [X]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [ ]	<16% slope all aspects 10 [X]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [X]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [X]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [ ]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [X]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	17 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	77 /240**
	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]
					WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE	0 /55
					TOTAL WILDFIRE THREAT SCORE	77 /295

% Hardwood (M-1/2)
20

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[X]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Last Updated: January 24, 2013

Comments:

Prune, surface fuel removal and danger tree assessment if funding allows - deciduous are overmature and

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

	Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: GREE-1 | Community: Harrison Hot Springs

Assessor: S. Dranga | Geographic Location/Street Name: Greenspace

Est. Fuel Type: C-5

Date: 6/27/18 | GPS/UTM: 49°17'34.6", -121°46'35.1"

Photos: Y [✓] N [ ] #: 5 | Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

% Hardwood (M-1/2):

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [ ] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [ ]	41–60 3 [X]	61–80 4 [ ]	>80 5 [ ]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [X]	Herbs, Deciduous Shrubs 2 [ ]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [ ]	10-25 coverage 7 [ ]	>25 coverage, < 10 cm deep 10 [X]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [X]	Scattered, <10 coverage 2 [ ]	10-25 coverage 5 [ ]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [ ]	41–60 10 [ ]	61–80 15 [X]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [ ]	<20 5 [X]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [X]	2–<3 7 [ ]	1–<2 10 [ ]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [X]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [ ]	Standing Dead and Partly Down 5-25 5 [X]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [X]	61-80 7 [ ]	>80 10 [ ]
					Sub Total	55 /155*
	Weather					
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [X]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography					
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [ ]	<16% slope all aspects 10 [X]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [X]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [X]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [ ]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [X]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	17 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	83 /240**
	Structural					
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [X]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [X]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [X]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE 0 /55

TOTAL WILDFIRE THREAT SCORE 83 /295

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[X]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[X]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Last Updated: January 24, 2013

Comments:

Ignore structural subcomponent entries as wildfire behaviour threat score is <95 points.

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: GREE-2 | Community: Village of Harrison Hot Springs

Assessor: L. Brown | Geographic Location/Street Name: Greenspace

Date: 8/29/18 | GPS/UTM: 49°17.322' N, 121°46.630' W

Photos: Y [✓] N [ ] #: 5 | Land Ownership: [✓] Crown [ ] Private [ ] I.R. [ ] Other (specify)

Est. Fuel Type: M-1/2

% Hardwood (M-1/2): 25

	COMPONENT /Subcomponent	LEVELS				
	Fuel	**A**	**B**	**C**	**D**	**E**
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [ ] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [x] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [ ]	41–60 3 [ ]	61–80 4 [ ]	>80 5 [x]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [x]	Herbs, Deciduous Shrubs 2 [ ]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [ ]	10-25 coverage 7 [x]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 2 [ ]	10-25 coverage 5 [x]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [x]	41–60 10 [ ]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [ ]	<20 5 [x]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [x]	2–<3 7 [ ]	1–<2 10 [ ]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [x]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [x]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [x]	61-80 7 [ ]	>80 10 [ ]

Sub Total 46 /155*

	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [x] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [x]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]

Sub Total 11 /30

	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [ ]	<16% slope all aspects 10 [x]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [x]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [x]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [ ]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [x]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]

Sub Total 17 /55

FUEL, WEATHER AND TOPOGRAPHY **WILDFIRE BEHAVIOUR THREAT SCORE** 74 /240**

	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/* Community on Slope	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area* Relative to Values	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE 0 /55

TOTAL WILDFIRE THREAT SCORE 74 /295

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[x]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Comments:

Last Updated: January 24, 2013

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

	Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: MIAM-1 | Community: Harrison Hot Springs

Assessor: S. Dranga | Geographic Location/Street Name: Miami River Greenway

Est. Fuel Type: M-1/2

Date: 6/28/18 | GPS/UTM: 49°17'54.8", -121°46'48.3"

Photos: Y [✓] N [ ] #: 5 | Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

% Hardwood (M-1/2): 30

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [X]	2–<5 Dry Zonal Wet 5 [ ] 3 [ ] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [ ] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [X]	41–60 3 [ ]	61–80 4 [ ]	>80 5 [ ]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [ ]	Herbs, Deciduous Shrubs 2 [X]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [ ]	10-25 coverage 7 [X]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [X]	Scattered, <10 coverage 2 [ ]	10-25 coverage 5 [ ]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [ ]	41–60 10 [X]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [X]	<20 5 [ ]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [ ]	2–<3 7 [ ]	1–<2 10 [X]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [ ]	501-1000 5 [X]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [X]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [X]	41-60 5 [ ]	61-80 7 [ ]	>80 10 [ ]
					Sub Total	47 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [X] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [X]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [ ]	<16% slope all aspects 10 [X]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [X]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [X]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [ ]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [X]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [ ]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	13 /55

FUEL, WEATHER AND TOPOGRAPHY — **WILDFIRE BEHAVIOUR THREAT SCORE** 71 /240**

	Structural	A	B	C	D	E
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [X]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE 0 /55

TOTAL WILDFIRE THREAT SCORE 71 /295

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[X]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Comments:

Last Updated: January 24, 2013

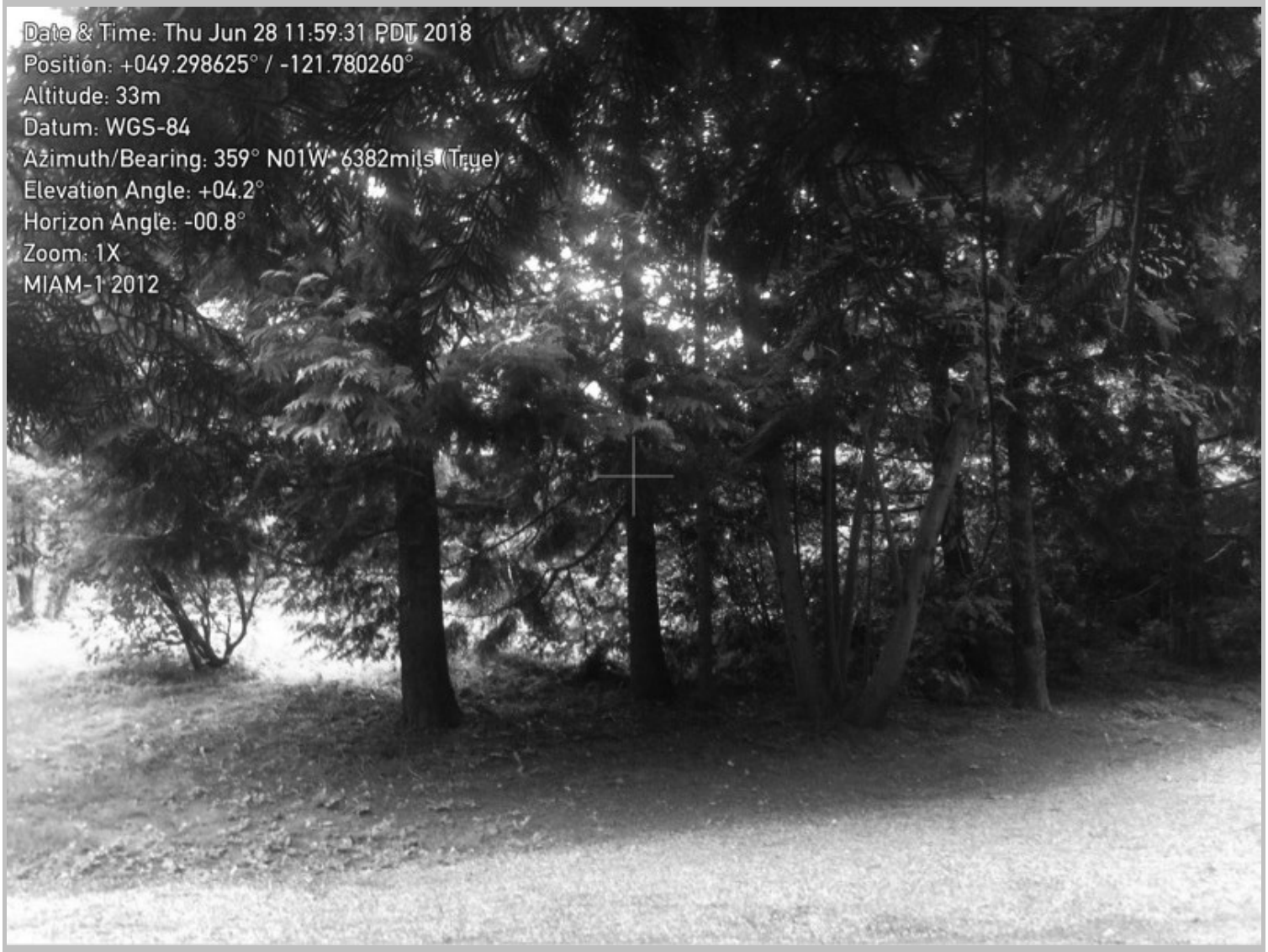

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

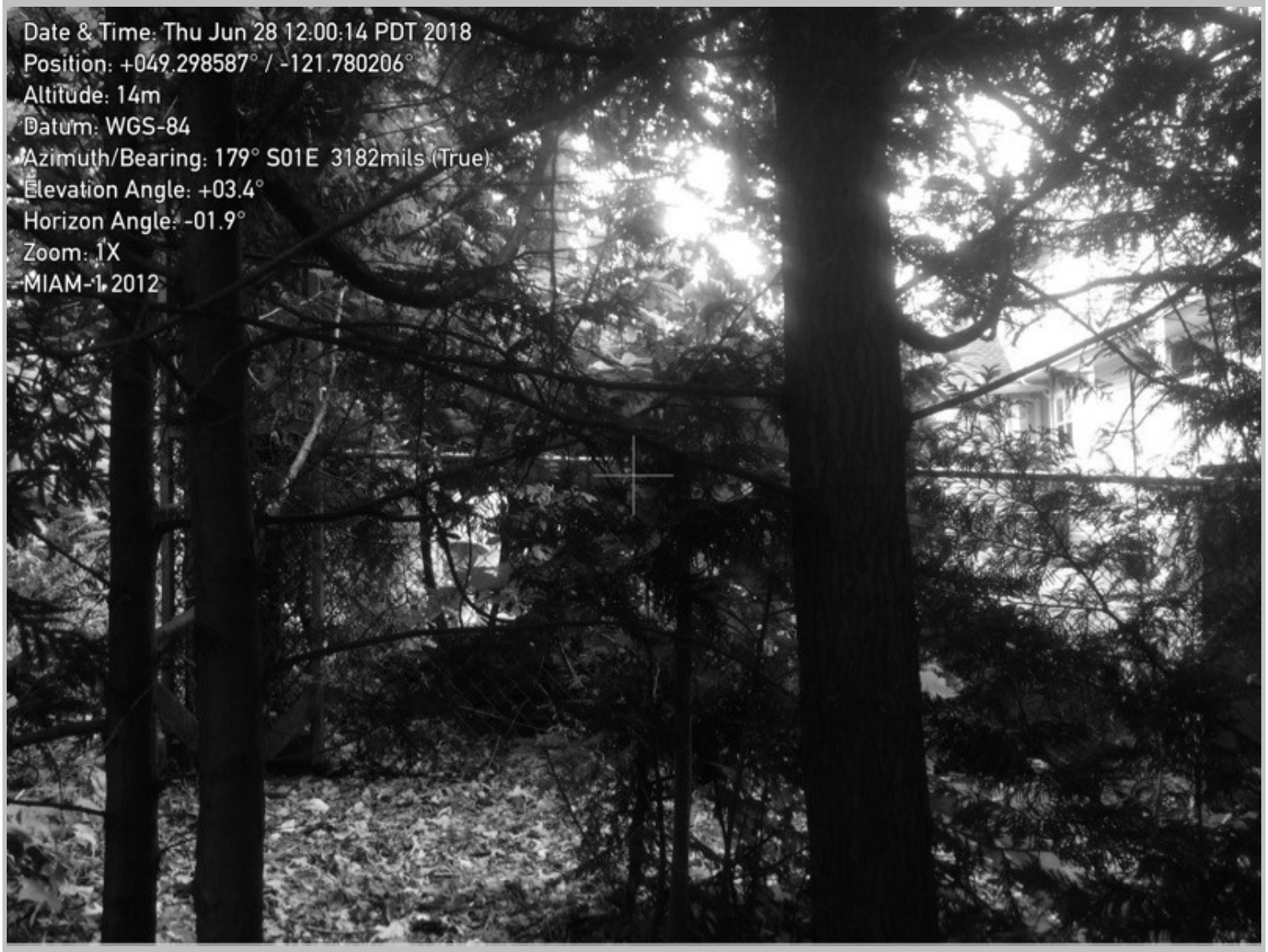

	Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: SECT-1	Community: Harrison Hot Springs
Assessor: S. Dranga	Geographic Location/Street Name: East Sector Lands
Date: 6/27/18	GPS/UTM: 49°17'03.8", -121°46'35.0"
Photos: Y [✓] N [ ] #: 5	Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

Est. Fuel Type: M-1/2

% Hardwood (M-1/2): 50

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel	**LEVELS**				
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [ ] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [x] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [ ]	41–60 3 [ ]	61–80 4 [x]	>80 5 [ ]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [ ]	Herbs, Deciduous Shrubs 2 [x]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [x]	10-25 coverage 7 [ ]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 2 [x]	10-25 coverage 5 [ ]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [x]	41–60 10 [ ]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [x]	<20 5 [ ]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [ ]	2–<3 7 [ ]	1–<2 10 [x]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [ ]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [x]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [x]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [x]	61-80 7 [ ]	>80 10 [ ]
					Sub Total	63 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [x] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [x]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [ ]	<16% slope all aspects 10 [x]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [x]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [x]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [ ]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [ ]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [x]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	22 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	96 /240**
	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [x]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [x]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [x]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE 38 /55

TOTAL WILDFIRE THREAT SCORE 134 /295

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[ ]
High	96-149	[x]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[x]
Extreme	>39	[ ]

Comments:

Last Updated: January 24, 2013

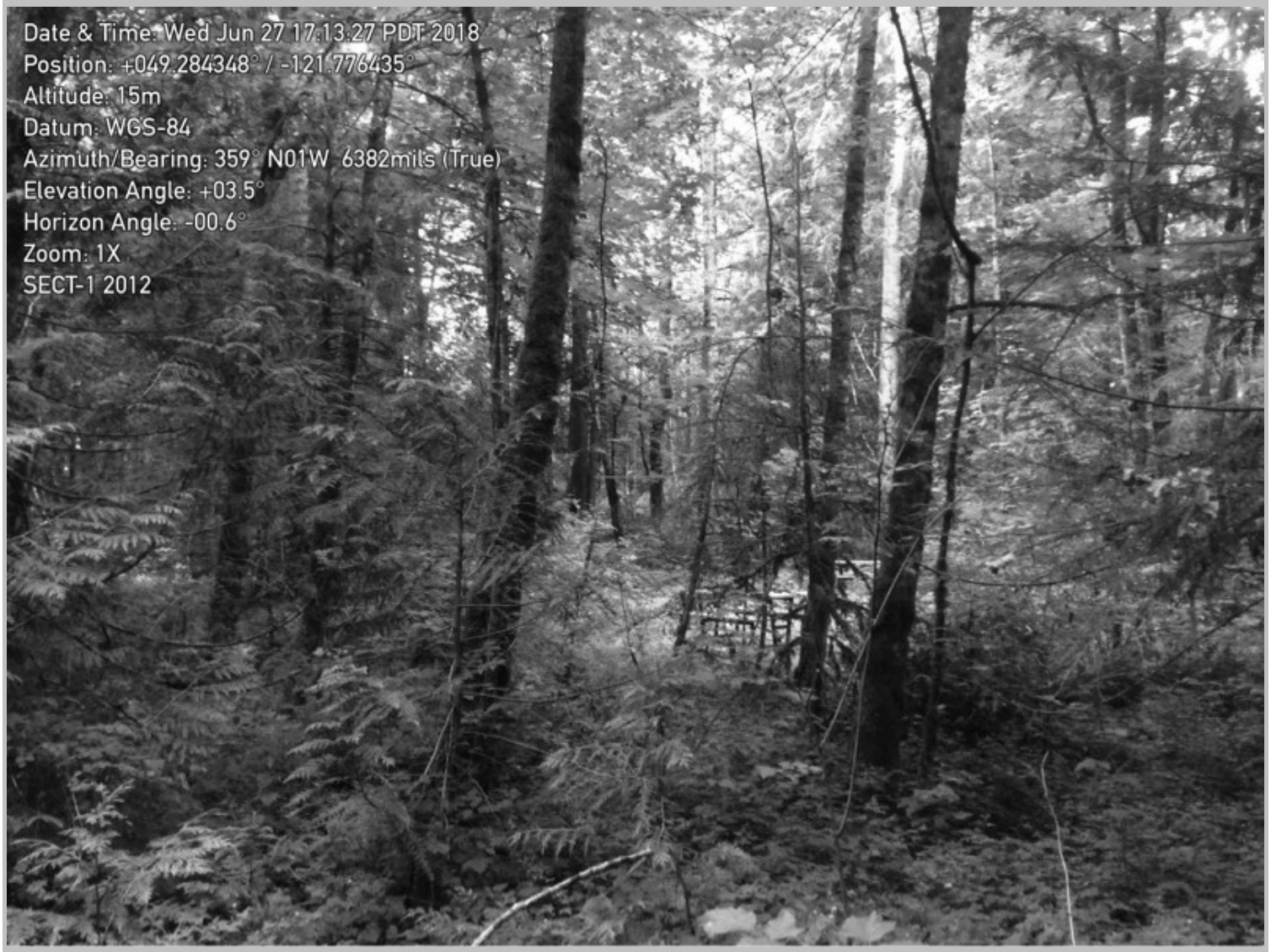

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

	Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

☑ Pre-treatment ☐ Post-treatment

Plot #: SECT-2 | Community: Harrison Hot Springs

Assessor: S. Dranga | Geographic Location/Street Name: East Sector Lands

Est. Fuel Type: C-5

Date: 8/27/18 | GPS/UTM: 49°17'36.4", -121°46'05.6"

Photos: Y ☑ N ☐ #: 5 | Land Ownership: ☑ Crown ☐ Private ☐ I.R. Other (specify)

% Hardwood (M-1/2):

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 ☐	2–<5 Dry Zonal Wet 5 ☐ 3 ☐ 1 ☐	5–<10 Dry Zonal Wet 10 ☐ 6 ☐ 2 ☐	10–20 Dry Zonal Wet 12 ☐ 8 ☐ 4 ☐	>20 Dry Zonal Wet 15 ☐ 10 ☐ 5 ☐
2	*Surface Fuels Continuity (% cover)*	<20 0 ☐	20–40 2 ☐	41–60 3 ☐	61–80 4 ☐	>80 5 ☒
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 ☐	Herbs, Deciduous Shrubs 2 ☒	Lichen, Conifer Shrubs 3 ☐	Pinegrass, Juniper 4 ☐	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 ☐
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 ☐	Scattered, <10 coverage 5 ☐	10-25 coverage 7 ☐	>25 coverage, < 10 cm deep 10 ☒	>25 coverage, > 10 cm deep 15 ☐
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 ☒	Scattered, <10 coverage 2 ☐	10-25 coverage 5 ☐	> 25 coverage, not elevated 7 ☐	>25 coverage, partially elevated 10 ☐
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 ☐	20–40 5 ☐	41–60 10 ☒	61–80 15 ☐	>80 10 ☐
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 ☐	61-80 2 ☐	41–60 3 ☐	20–40 4 ☐	<20 5 ☒
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 ☐	3–5 5 ☒	2–<3 7 ☐	1–<2 10 ☐	< 1 15 ☐
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 ☒	501-1000 5 ☐	1001-2000 10 ☐	2001-4000 20 ☐	>4000 30 ☐
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 ☒	Standing Dead and Partly Down 5-25 5 ☐	Standing Dead and Partly Down >25-50 10 ☐	Standing Dead and Partly Down >50 - 75 20 ☐	Standing Dead and Partly Down >75 30 ☐
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 ☐	21-40 3 ☐	41-60 5 ☒	61-80 7 ☐	>80 10 ☐
					Sub Total	48 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 ☐	CWH, CDF, MH Dry Zonal Wet 5 ☐ 3 ☐ 1 ☐	ICH, SBS, ESSF Dry Zonal Wet 10 ☐ 7 ☐ 3 ☐	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 ☐ 10 ☐ 5 ☐	PP, BG 15 ☐
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 ☐	G3, G8, R3, R4, V6, G1, G9, V8 5 ☐	G7, C5, G4, C4, V1, C1, N6 8 ☒	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 ☐	N7, K4, K2, N1 15 ☐
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 ☐	East 5 ☐	<16% slope all aspects 10 ☒	West 12 ☐	South 15 ☐
15	*Slope (%)*	<16 1 ☒	16–29 and max score for North slopes 5 ☐	30–44 10 ☐	45-54 12 ☐	>55 15 ☐
16	*Terrain*	Flat 1 ☒	Rolling 3 ☐	Sloped terrain, minor low relief draws 5 ☐	Consistent slope, deep draws or shallow gullies 7 ☐	Consistent slope, deep gullies 10 ☐
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 ☐	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 ☐	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 ☒	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 ☐	Continuous, consistent topography No restriction to wildfire spread 15 ☐
					Sub Total	17 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	76 /240**
	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 ☐	Bottom of slope, valley bottom 5 ☐	Mid-slope benchland, elevated valley, <16% slope 10 ☐	Mid-slope continuous, >15% slope 12 ☐	Upper 1/3 of Slope 15 ☐
19	*Type of Development*	No Structures Values within 2 km 0 ☐	Perimeter Interface, no inclusions 3 ☐	Perimeter Interface, with inclusions 5 ☐	Intermix > 1 structure/ha 8 ☐	Intermix <1 structure/ha Infrastructure 10 ☐
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 ☐	Above >500 200-500 <200 m 1 ☐ 10 ☐ 20 ☐	Sidehill >500 200-500 <200 m 1 ☐ 12 ☐ 25 ☐	Flat/Rolling >500 200-500 <200 m 1 ☐ 12 ☐ 25 ☐	Below >500 200-500 <200 m 1 ☐ 15 ☐ 30 ☐

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE 0 /55

TOTAL WILDFIRE THREAT SCORE 76 /295

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	☐
Moderate	41-95	☒
High	96-149	☐
Extreme	>149	☐

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	☐
Moderate	14-26	☐
High	27-39	☐
Extreme	>39	☐

Comments:

Commercial thin potential. Would bolster effectiveness of existing natural feature (rock bluff to the east) as a fuel

Last Updated: January 24, 2013

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

	Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: SECT-3	Community: Harrison Hot Springs
Assessor: S. Dranga	Geographic Location/Street Name: EAST SECTOR LANDS
Date: 8/27/18	GPS/UTM: 49°17'12.6", -121°46'12.7"
Photos: Y[✓] N[ ] #: 5	Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

Est. Fuel Type: M-1/2

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [ ] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [ ]	41–60 3 [ ]	61–80 4 [ ]	>80 5 [X]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [ ]	Herbs, Deciduous Shrubs 2 [X]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [X]	10-25 coverage 7 [ ]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 2 [X]	10-25 coverage 5 [ ]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [X]	41–60 10 [ ]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [X]	<20 5 [ ]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [X]	2–<3 7 [ ]	1–<2 10 [ ]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [X]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [X]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [X]	61-80 7 [ ]	>80 10 [ ]
					Sub Total	38 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [X]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [ ]	<16% slope all aspects 10 [X]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [X]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [X]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [ ]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [X]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	17 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	66 /240**
	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]
					WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE	0 /55
					TOTAL WILDFIRE THREAT SCORE	66 /295

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

% Hardwood (M-1/2): 30

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[X]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Comments:

Last Updated: January 24, 2013

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: SECT-4 | Community: Village of Harrison Hot Springs

Assessor: S. Dranga | Geographic Location/Street Name: EAST SECTOR LANDS

Date: 8/27/18 | GPS/UTM: 49°16'56.6", -121°46'25.0"

Photos: Y [✓] N [ ] #: | Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

Est. Fuel Type: M-1/2

% Hardwood (M-1/2): 50

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [ ] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [ ]	41–60 3 [ ]	61–80 4 [ ]	>80 5 [X]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [ ]	Herbs, Deciduous Shrubs 2 [X]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [ ]	10-25 coverage 7 [X]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [X]	Scattered, <10 coverage 2 [ ]	10-25 coverage 5 [ ]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [X]	41–60 10 [ ]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [X]	<20 5 [ ]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [X]	2–<3 7 [ ]	1–<2 10 [ ]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [X]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [X]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [X]	61-80 7 [ ]	>80 10 [ ]
					Sub Total	39 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [X]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [ ]	<16% slope all aspects 10 [X]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [X]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [X]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [ ]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [X]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	17 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	67 /240**
	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]
					WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE	0 /55
					TOTAL WILDFIRE THREAT SCORE	67 /295

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[X]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Comments:

Last Updated: January 24, 2013

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

	Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: WAT-1 | Community: Village of Harrison

Assessor: L. Brown | Geographic Location/Street Name: Harrison Grind

Date: 8/29/18 | GPS/UTM: 49°16.272' N, 121°51.540' W

Photos: Y [✓] N [ ] #: 5 | Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

Est. Fuel Type: M-1/2

% Hardwood (M-1/2): 30

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [ ] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [x] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [ ]	41–60 3 [ ]	61–80 4 [x]	>80 5 [ ]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [x]	Herbs, Deciduous Shrubs 2 [ ]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [ ]	10-25 coverage 7 [x]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 2 [x]	10-25 coverage 5 [ ]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [x]	41–60 10 [ ]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [x]	<20 5 [ ]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [x]	3–5 5 [ ]	2–<3 7 [ ]	1–<2 10 [ ]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [x]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [x]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [x]	61-80 7 [ ]	>80 10 [ ]
					Sub Total	36 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [x] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [x]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [x]	<16% slope all aspects 10 [ ]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [ ]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [x]
16	*Terrain*	Flat 1 [ ]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [x]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [x]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	35 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	82 /240**
	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE 0 /55

TOTAL WILDFIRE THREAT SCORE 82 /295

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[x]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Last Updated: January 24, 2013

Comments:

Potential trailside treatment - surface fuel removal, prune and thin-from-below for 10m alongside trail, where

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: WAT-2 | Community: Village of Harrison

Assessor: L. Brown | Geographic Location/Street Name: Harrison Grind

Date: 8/29/18 | GPS/UTM: 49°17.658' N, 121°47.502' W

Photos: Y [✓] N [ ] #: 5 | Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

Est. Fuel Type: C-5

% Hardwood (M-1/2):

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel	**LEVELS**				
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [X]	2–<5 Dry Zonal Wet 5 [ ] 3 [ ] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [ ] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [ ]	41–60 3 [ ]	61–80 4 [X]	>80 5 [ ]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [X]	Herbs, Deciduous Shrubs 2 [ ]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [X]	10-25 coverage 7 [ ]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 2 [X]	10-25 coverage 5 [ ]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [ ]	41–60 10 [X]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [ ]	<20 5 [X]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [X]	3–5 5 [ ]	2–<3 7 [ ]	1–<2 10 [ ]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [X]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [X]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [X]	61-80 7 [ ]	>80 10 [ ]
					Sub Total	37 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [X]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [X]	<16% slope all aspects 10 [ ]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [ ]	16–29 and max score for North slopes 5 [ ]	30–44 10 [X]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [ ]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [X]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [X]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	30 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	78 /240**
	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]
					WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE	0 /55
					TOTAL WILDFIRE THREAT SCORE	78 /295

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[X]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Comments:

Last Updated: January 24, 2013

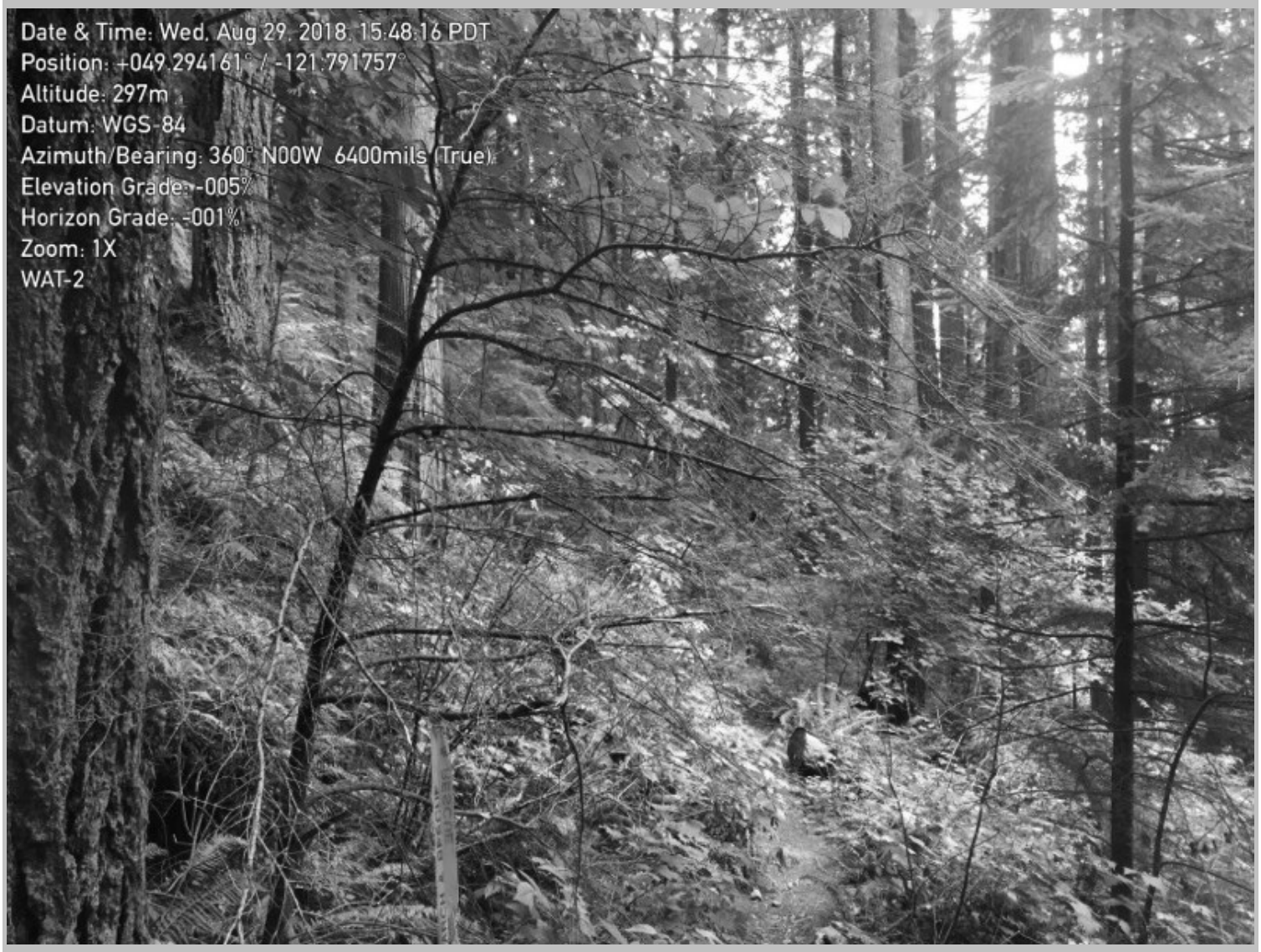

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

	Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: WAT-3 | Community: Village of Harrison Hot Springs

Assessor: L. Brown | Geographic Location/Street Name: Water Tower

Date: 8/29/18 | GPS/UTM: 49°17.773' N, 121°47.132' W

Photos: Y [✓] N [ ] #: 5 | Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

Est. Fuel Type: C-3

% Hardwood (M-1/2):

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [ ] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [X]	20–40 2 [ ]	41–60 3 [ ]	61–80 4 [ ]	>80 5 [ ]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [X]	Herbs, Deciduous Shrubs 2 [ ]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [ ]	10-25 coverage 7 [X]	>25 coverage, < 10 cm deep 10 [ ]	>25 coverage, > 10 cm deep 15 [ ]
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 [X]	Scattered, <10 coverage 2 [ ]	10-25 coverage 5 [ ]	> 25 coverage, not elevated 7 [ ]	>25 coverage, partially elevated 10 [ ]
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [ ]	41–60 10 [ ]	61–80 15 [X]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [ ]	<20 5 [X]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [ ]	2–<3 7 [ ]	1–<2 10 [ ]	< 1 15 [X]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [ ]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [X]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [X]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [ ]	61-80 7 [X]	>80 10 [ ]
					Sub Total	74 /155*
	Weather					
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [•] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [X]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography					
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [X]	<16% slope all aspects 10 [ ]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [ ]	16–29 and max score for North slopes 5 [ ]	30–44 10 [ ]	45-54 12 [ ]	>55 15 [X]
16	*Terrain*	Flat 1 [ ]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [X]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [X]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]
					Sub Total	35 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	120 /240**
	Structural					
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [X]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [X]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [•]

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE 47 /55

TOTAL WILDFIRE THREAT SCORE 167 /295

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[ ]
High	96-149	[X]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[X]

Last Updated: January 24, 2013

Comments:

Structure for WUI assessment refers to water tower, however residences are within 50m northeast of the

	Photo Direction	Comment:
Ladder Fuels	North	

Photo Direction	Comment:
Ladder Fuels	East

Photo Direction: Comment:

Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

☑ Pre-treatment ☐ Post-treatment

Plot #: WOOD-3	Community: Harrison Hot Springs
Assessor: S. Dranga	Geographic Location/Street Name: End of Mount Woodside FSR
Date: 8/28/18	GPS/UTM: 49°17'27.1", -121°47'36.5"
Photos: Y ☑ N ☐ #: 5	Land Ownership: ☑ Crown ☐ Private ☐ I.R. Other (specify)

Est. Fuel Type: C-5

% Hardwood (M-1/2):

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 ☐	2–<5 Dry Zonal Wet 5 ☐ 3 ☐ 1 ☐	5–<10 Dry Zonal Wet 10 ☐ 6 ☒ 2 ☐	10–20 Dry Zonal Wet 12 ☐ 8 ☐ 4 ☐	>20 Dry Zonal Wet 15 ☐ 10 ☐ 5 ☐
2	*Surface Fuels Continuity (% cover)*	<20 0 ☐	20–40 2 ☒	41–60 3 ☐	61–80 4 ☐	>80 5 ☐
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 ☒	Herbs, Deciduous Shrubs 2 ☐	Lichen, Conifer Shrubs 3 ☐	Pinegrass, Juniper 4 ☐	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 ☐
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 ☐	Scattered, <10 coverage 5 ☐	10-25 coverage 7 ☐	>25 coverage, < 10 cm deep 10 ☒	>25 coverage, > 10 cm deep 15 ☐
5	*Large Woody Debris Continuity (>7cm) (% cover)*	<1 coverage 1 ☐	Scattered, <10 coverage 2 ☒	10-25 coverage 5 ☐	> 25 coverage, not elevated 7 ☐	>25 coverage, partially elevated 10 ☐
6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 ☐	20–40 5 ☐	41–60 10 ☒	61–80 15 ☐	>80 10 ☐
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 ☐	61-80 2 ☐	41–60 3 ☐	20–40 4 ☐	<20 5 ☒
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 ☒	3–5 5 ☐	2–<3 7 ☐	1–<2 10 ☐	< 1 15 ☐
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 ☒	501-1000 5 ☐	1001-2000 10 ☐	2001-4000 20 ☐	>4000 30 ☐
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 ☒	Standing Dead and Partly Down 5-25 5 ☐	Standing Dead and Partly Down >25-50 10 ☐	Standing Dead and Partly Down >50 - 75 20 ☐	Standing Dead and Partly Down >75 30 ☐
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 ☐	21-40 3 ☐	41-60 5 ☐	61-80 7 ☐	>80 10 ☒
					Sub Total	48 /155*
	Weather	**A**	**B**	**C**	**D**	**E**
12	*Biogeoclimatic Zone*	AT, Irrigated 1 ☐	CWH, CDF, MH Dry Zonal Wet 5 ☐ 3 ☒ 1 ☐	ICH, SBS, ESSF Dry Zonal Wet 10 ☐ 7 ☐ 3 ☐	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 ☐ 10 ☐ 5 ☐	PP, BG 15 ☐
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 ☐	G3, G8, R3, R4, V6, G1, G9, V8 5 ☐	G7, C5, G4, C4, V1, C1, N6 8 ☒	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 ☐	N7, K4, K2, N1 15 ☐
					Sub Total	11 /30
	Topography	**A**	**B**	**C**	**D**	**E**
14	*Aspects (>15% slope)*	North 0 ☐	East 5 ☒	<16% slope all aspects 10 ☐	West 12 ☐	South 15 ☐
15	*Slope (%)*	<16 1 ☐	16–29 and max score for North slopes 5 ☐	30–44 10 ☐	45-54 12 ☒	>55 15 ☐
16	*Terrain*	Flat 1 ☐	Rolling 3 ☐	Sloped terrain, minor low relief draws 5 ☐	Consistent slope, deep draws or shallow gullies 7 ☐	Consistent slope, deep gullies 10 ☒
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 ☐	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 ☐	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 ☒	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 ☐	Continuous, consistent topography No restriction to wildfire spread 15 ☐
					Sub Total	32 /55
	FUEL, WEATHER AND TOPOGRAPHY				**WILDFIRE BEHAVIOUR THREAT SCORE**	91 /240**
	Structural	**A**	**B**	**C**	**D**	**E**
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 ☐	Bottom of slope, valley bottom 5 ☐	Mid-slope benchland, elevated valley, <16% slope 10 ☐	Mid-slope continuous, >15% slope 12 ☐	Upper 1/3 of Slope 15 ☐
19	*Type of Development*	No Structures Values within 2 km 0 ☐	Perimeter Interface, no inclusions 3 ☐	Perimeter Interface, with inclusions 5 ☐	Intermix > 1 structure/ha 8 ☐	Intermix <1 structure/ha Infrastructure 10 ☐
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 ☐	Above >500 200-500 <200 m 1 ☐ 10 ☐ 20 ☐	Sidehill >500 200-500 <200 m 1 ☐ 12 ☐ 25 ☐	Flat/Rolling >500 200-500 <200 m 1 ☐ 12 ☐ 25 ☐	Below >500 200-500 <200 m 1 ☐ 15 ☐ 30 ☐
					WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE	0 /55
					TOTAL WILDFIRE THREAT SCORE	91 /295

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	☐
Moderate	41-95	☒
High	96-149	☐
Extreme	>149	☐

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	☐
Moderate	14-26	☐
High	27-39	☐
Extreme	>39	☐

Last Updated: January 24, 2013

Comments:

Treatment could be commercial thin, likely cable due to mountainous terrain. Dead standing removal and pruning

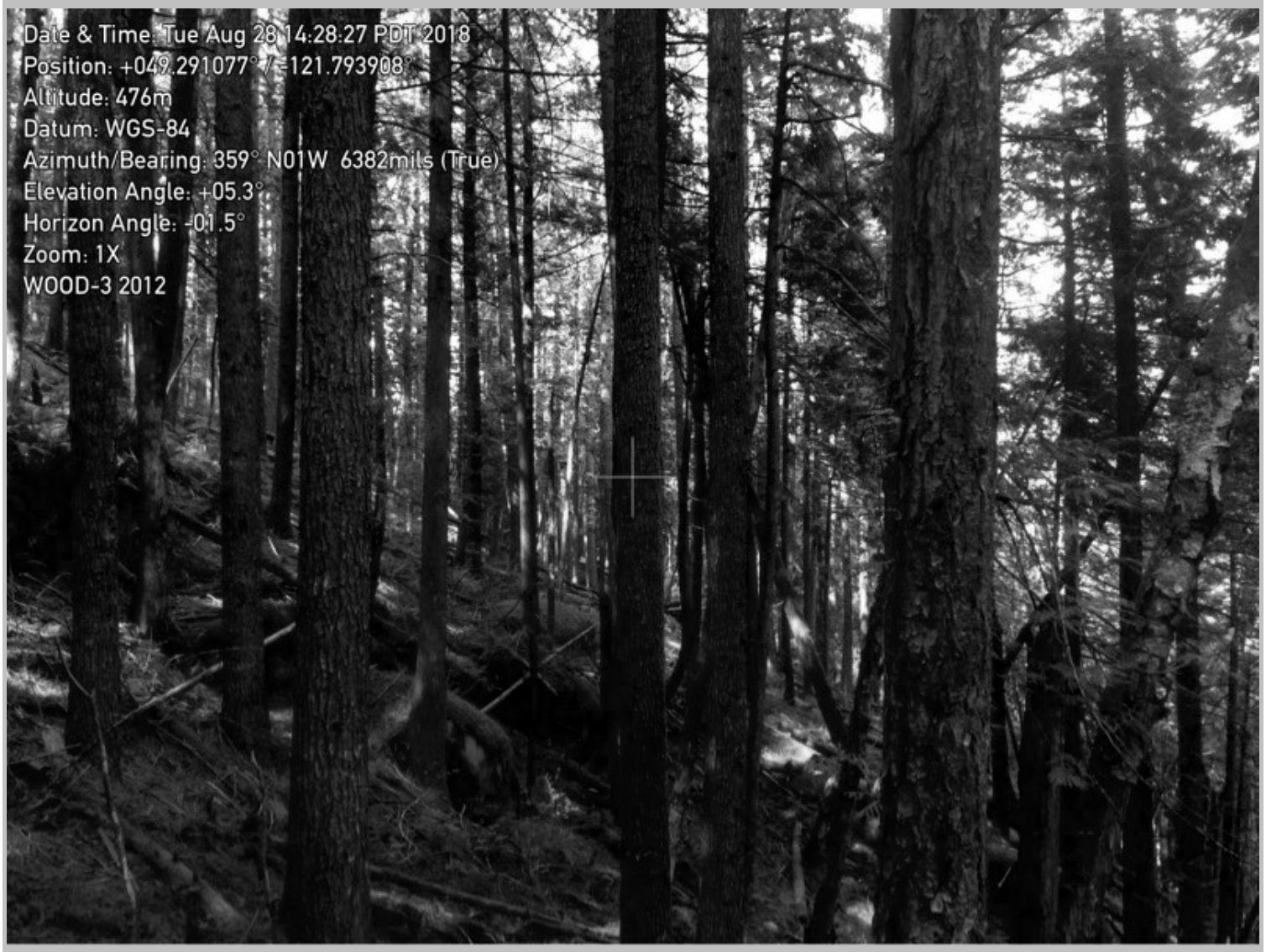

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

PROJECT: Harrison Hot Springs

WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET

[✓] Pre-treatment [ ] Post-treatment

Plot #: WOOD-4 | Community: Harrison Hot Springs

Assessor: S. Dranga | Geographic Location/Street Name: End of Mount Woodside FSR

Est. Fuel Type: C-5

Date: 8/28/18 | GPS/UTM: 49°17'18.6", -121°47'36.9"

Photos: Y[✓] N[ ] #: 5 | Land Ownership: [✓] Crown [ ] Private [ ] I.R. Other (specify)

% Hardwood (M-1/2):

	COMPONENT /Subcomponent	A	B	C	D	E
	Fuel					
1	*Duff Depth and Moisture Regime (cm)*	1–<2 3 [ ]	2–<5 Dry Zonal Wet 5 [ ] 3 [ ] 1 [ ]	5–<10 Dry Zonal Wet 10 [ ] 6 [x] 2 [ ]	10–20 Dry Zonal Wet 12 [ ] 8 [ ] 4 [ ]	>20 Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]
2	*Surface Fuels Continuity (% cover)*	<20 0 [ ]	20–40 2 [x]	41–60 3 [ ]	61–80 4 [ ]	>80 5 [ ]
3	*Vegetation Fuel Composition*	Moss, Herbs, Irrigated Crops, Low Flammability Weeds 1 [x]	Herbs, Deciduous Shrubs 2 [ ]	Lichen, Conifer Shrubs 3 [ ]	Pinegrass, Juniper 4 [ ]	Sagebrush, Bunchgrass, Antelope Brush, Scotch Broom 5 [ ]
4	*Fine Woody Debris Continuity (<=7cm) (% cover)*	<1 coverage 1 [ ]	Scattered, <10 coverage 5 [ ]	10-25 coverage 7 [ ]	>25 coverage, < 10 cm deep 10 [x]	>25 coverage, > 10 cm deep 15 [ ]
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6	*Live and Dead Coniferous Crown Closure (%)*	<20 2 [ ]	20–40 5 [x]	41–60 10 [ ]	61–80 15 [ ]	>80 10 [ ]
7	*Live Deciduous Crown Closure (%)*	>80 or <40% coniferous crown closure 0 [ ]	61-80 2 [ ]	41–60 3 [ ]	20–40 4 [ ]	<20 5 [x]
8	*Live and Dead Conifer Crown Base Height (m)*	5+ or <20% conifer crown closure 0 [ ]	3–5 5 [x]	2–<3 7 [ ]	1–<2 10 [ ]	< 1 15 [ ]
9	*Live and Dead Suppressed and Understorey Conifers (stems/ha)*	0-500 2 [x]	501-1000 5 [ ]	1001-2000 10 [ ]	2001-4000 20 [ ]	>4000 30 [ ]
10	*Forest Health (% of dominant and co-dominant stems)*	Standing Dead and Partly Down < 5 or <20 stems/ha 0 [x]	Standing Dead and Partly Down 5-25 5 [ ]	Standing Dead and Partly Down >25-50 10 [ ]	Standing Dead and Partly Down >50 - 75 20 [ ]	Standing Dead and Partly Down >75 30 [ ]
11	*Continuous Forest/Slash Cover within 2km (%)*	0-20 0 [ ]	21-40 3 [ ]	41-60 5 [ ]	61-80 7 [ ]	>80 10 [x]
					Sub Total	48 /155*
	Weather					
12	*Biogeoclimatic Zone*	AT, Irrigated 1 [ ]	CWH, CDF, MH Dry Zonal Wet 5 [ ] 3 [x] 1 [ ]	ICH, SBS, ESSF Dry Zonal Wet 10 [ ] 7 [ ] 3 [ ]	IDF, MS, SBPS, CWH ds1 & ds2, BWBS, SWB – Dry Zonal Wet 15 [ ] 10 [ ] 5 [ ]	PP, BG 15 [ ]
13	*Historical Wildfire Occurrence (by WMB Fire Zone)*	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7 1 [ ]	G3, G8, R3, R4, V6, G1, G9, V8 5 [ ]	G7, C5, G4, C4, V1, C1, N6 8 [x]	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2 10 [ ]	N7, K4, K2, N1 15 [ ]
					Sub Total	11 /30
	Topography					
14	*Aspects (>15% slope)*	North 0 [ ]	East 5 [x]	<16% slope all aspects 10 [ ]	West 12 [ ]	South 15 [ ]
15	*Slope (%)*	<16 1 [ ]	16–29 and max score for North slopes 5 [ ]	30–44 10 [x]	45-54 12 [ ]	>55 15 [ ]
16	*Terrain*	Flat 1 [ ]	Rolling 3 [ ]	Sloped terrain, minor low relief draws 5 [ ]	Consistent slope, deep draws or shallow gullies 7 [ ]	Consistent slope, deep gullies 10 [x]
17	*Landscape/ Topographic Limitations to Wildfire Spread*	< 5 ha isolated forest land 1 [ ]	North and/or east aspects dominate, wildfire spread restricted from South and/or West 2 [ ]	Mountainous terrain, broken topography, regular aspect and slope changes, multiple restrictions to wildfire spread large water bodies 5 [x]	Rolling terrain, minor water bodies, minimal aspect and slope changes, minor restrictions to wildfire spread 10 [ ]	Continuous, consistent topography No restriction to wildfire spread 15 [ ]

FUEL, WEATHER AND TOPOGRAPHY — **Sub Total** 30 /55; **WILDFIRE BEHAVIOUR THREAT SCORE** 89 /240**

	Structural	A	B	C	D	E
18	*Position of Structure/ Community on Slope*	No Structures Values within 2 km 0 [ ]	Bottom of slope, valley bottom 5 [ ]	Mid-slope benchland, elevated valley, <16% slope 10 [ ]	Mid-slope continuous, >15% slope 12 [ ]	Upper 1/3 of Slope 15 [ ]
19	*Type of Development*	No Structures Values within 2 km 0 [ ]	Perimeter Interface, no inclusions 3 [ ]	Perimeter Interface, with inclusions 5 [ ]	Intermix > 1 structure/ha 8 [ ]	Intermix <1 structure/ha Infrastructure 10 [ ]
20	*Position of Assessment Area Relative to Values*	No Structures Values within 2 km 0 [ ]	Above >500 200-500 <200 m 1 [ ] 10 [ ] 20 [ ]	Sidehill >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Flat/Rolling >500 200-500 <200 m 1 [ ] 12 [ ] 25 [ ]	Below >500 200-500 <200 m 1 [ ] 15 [ ] 30 [ ]

*Proceed only if Fuel sub total is>29.

** Proceed to Structural component only if Wildfire Threat Behaviour Score is >95 for untreated polygons.

WILDLAND URBAN INTERFACE WILDFIRE THREAT SCORE 0 /55

TOTAL WILDFIRE THREAT SCORE 89 /295

Wildfire Behaviour Threat Class (check applicable class)

Low	0-40	[ ]
Moderate	41-95	[x]
High	96-149	[ ]
Extreme	>149	[ ]

Wildland Urban Interface Threat Class (check applicable class)

Low	0-13	[ ]
Moderate	14-26	[ ]
High	27-39	[ ]
Extreme	>39	[ ]

Last Updated: January 24, 2013

Comments:

Topographically challenging terrain.

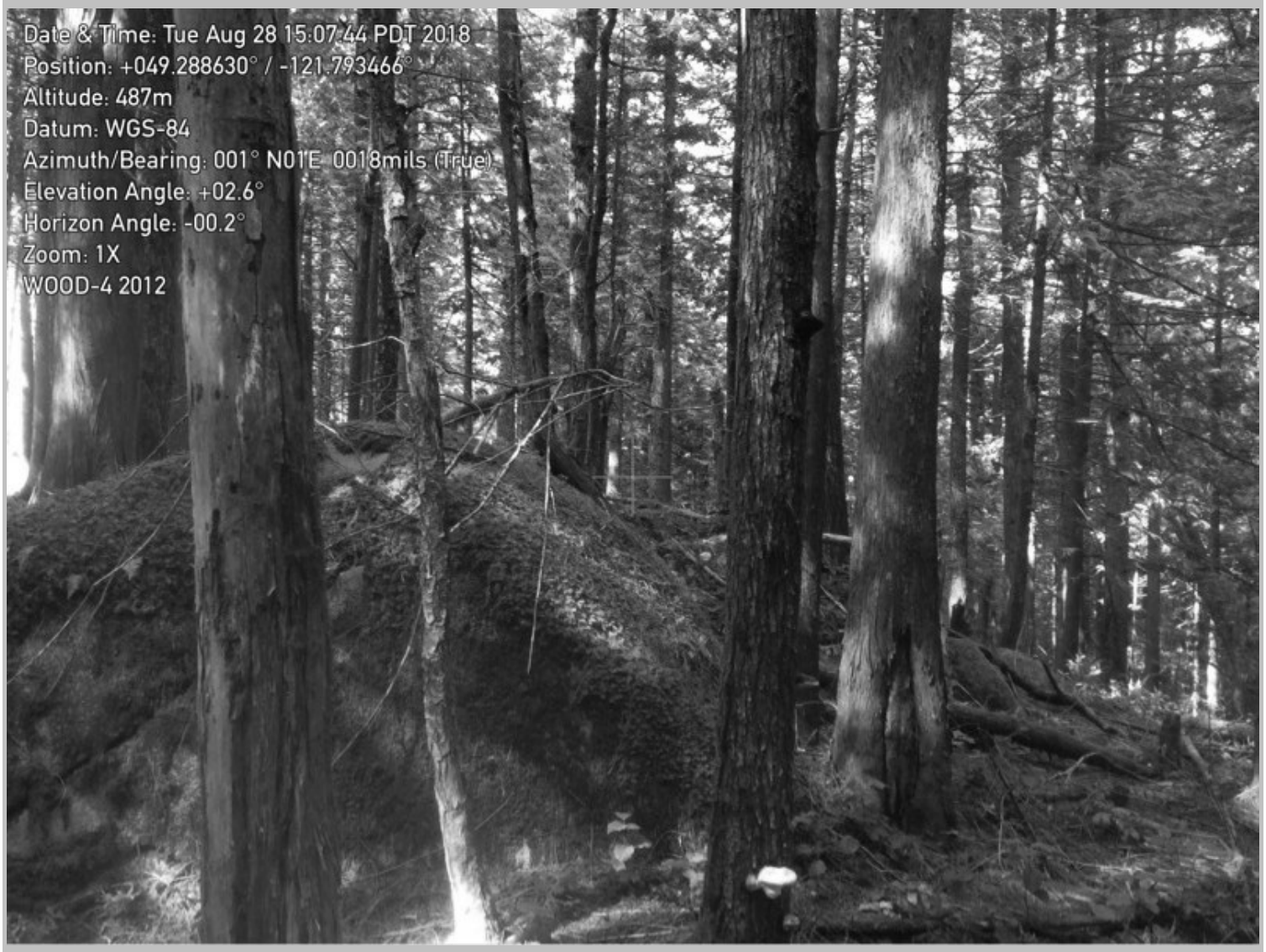

	Photo Direction	Comment:
Ladder Fuels	North	

	Photo Direction	Comment:
Ladder Fuels	East	

	Photo Direction:	Comment:
Ladder Fuels	South	

	Photo Direction:	Comment:
Ladder Fuels	West	

Photo Direction: Comment:

Canopy Fuels	Other (specif	

Area of Interest

W1698

Harrison Lake

Miami Creek

Campbell Lake

12
11
2
7
9
3

Legend

- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Woodlot
- Proposed Treatment

Ownership

- Federal
- Crown Agency
- Crown Provincial
- Municipal
- Mixed Ownership
- Private
- Unknown

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Values at Risk

Harrison Lake

Miami Creek

Campbell Lake

Legend

- Structure

Critical Infrastructure

- Energy Utility and Facilities
- Health Care
- Safety
- Communications and Information Technology
- Government
- Water
- Wildland Structures
- Private Properties and Businesses
- Transmission Lines - Electric Power
- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- WUI 2 km buffer
- Community Watershed

Species and Ecosystems at Risk

- BC Red Listed Species
- BC Blue Listed Species
- BC Yellow Listed Species

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Fire Regime, Ecology and Climate Change

Harrison Lake
Lillooet River
Miami Creek
Campbell Lake

Legend

- Human cause ignition
- Lightning cause ignition
- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Community Watershed
- Cut Block (last 10 years)
- Historical Fire (1931 to present)

MPB/Spruce Beetle Attack

- Very Severe
- Severe
- Light
- Trace

Natural Disturbance Type

- Ecosystems with infrequent stand-initiating events

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Provincial Strategic Threat Analysis

Fire Density

Harrison Lake

Harrison River

Miami Creek

Campbell Lake

Legend

- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of
- Community
- WUI 2 km buffer

Fire Density

- Water
- No Fires
- 1 - 5 (lowest
- 5.1 - 10
- 10.1 - 17
- 17.1 - 24
- 24.1 - 33
- 33.1 - 45
- 45.1 - 60
- 60.1 - 82
- 82.1 - 116
- > 116 (highest

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Fire History

Harrison Lake

Miami Creek

Campbell Lake

Legend

- Structure

Critical Infrastructure

- Energy Utility and Facilities
- Health Care
- Safety
- Communications and Information Technology
- Government
- Water
- Wildland Structures
- Private Properties and Businesses
- Human cause ignition
- Lightning cause ignition
- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Indian Reserve
- Community Watershed
- WUI 2 km buffer
- Historical Fire (1931 to present)
- Cut Block (last 10 years)

Natural Disturbance Type

- Ecosystems with infrequent stand-initiating events

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Updated Fuel Type

Harrison Lake

Miami Creek

Campbell Lake

Legend

- Fuel Type Verification Plot
- Fuel Type Change Rationale
- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Community Watershed
- WUI 2 km buffer

Fuel Type

- C-1
- C-2
- C-3
- C-4
- C-5
- C-6
- C-7
- D-1/2
- S-1
- S-2
- S-3
- O-1a/b
- M-1/2
- Non-Fuel
- Water

FUEL TYPE	AREA (HA)
C-3	1
C-5	78
D-1/2	71
M-1/2	224
N	149
W	185

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Local Fire Risk

Harrison Lake

Harrison River

Miami Creek

Campbell Lake

MIAM-1
12
11
ELEM-1
WAT-3
2
WAT-2
WAT-1
WOOD-3
WOOD-4
GREE-1
GREE-2
SECT-2
7
9
SECT-3
3
SECT-1
SECT-4

Fire behaviour		
Threat Class	Hectares	%
Extreme	0	0%
High	14	2%
Moderate	142	20%
Low	127	18%
Very Low/ No Threat (Water)	184	26%
No Data	241	34%

WUI Threat		
Threat Class	Hectares	%
Extreme	5	1%
High	7	1%
Moderate	2	0%
Low	0	0%
Very Low	0	0%
N/A	694	98%

Legend

- Structure
- Threat Plot

Critical Infrastructure

- Energy Utility and Facilities
- Health Care
- Safety
- Communications and Information Technology
- Government
- Water
- Wildland Structures
- Private Properties and Businesses
- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Community Watershed
- WUI 2 km buffer
- Proposed Treatment

Fire Threat

- Extreme
- High

Fire Behaviour

- Extreme
- High
- Moderate
- Low
- Very Low
- No Data

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-11-12

Fuel Treatment

Harrison Lake

Miami Creek

Nahatlatch River

Campbell Lake

FTU ID	FTU Name	Total Area (ha)
2	Water Tower	0.6
3	Spirit Trail Loop	2.6
7	East Sector North	1.8
11	Miami Greenway West	0.5
12	Miami Greeway East	0.1

Legend

- Structure
- Threat Plot
- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Community Watershed
- WUI 2 km buffer

Ownership

- Federal
- Crown Agency
- Crown Provincial
- Municipal
- Mixed Ownership
- Private
- Unknown

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-03-01

Provincial Strategic Threat Analysis

Fire Density

Harrison Lake

Harrison River

Miami Creek

Campbell Lake

Legend

- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of
- Community
- WUI 2 km buffer

Fire Density

- Water
- No Fires
- 1 - 5 (lowest
- 5.1 - 10
- 10.1 - 17
- 17.1 - 24
- 24.1 - 33
- 33.1 - 45
- 45.1 - 60
- 60.1 - 82
- 82.1 - 116
- > 116 (highest

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Provincial Strategic Threat Analysis

Fire Threat Rating

Harrison Lake

Campbell Lake

Legend

- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Community Watershed
- WUI 2 km buffer

Fire Threat

- No Data (Private Land)
- No Data (Private Managed Forest Land)
- Water
- No Threat
- 1 - Low
- 2 - Low
- 3 - Low
- 4 - Moderate
- 5 - Moderate
- 6 - Moderate
- 7 - High
- 8 - High
- 9 - Extreme
- 10 - Extreme

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Provincial Strategic Threat Analysis

Head Fire Intensity

Harrison Lake

Fraser River

Campbell Lake

Legend

- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Community Watershed
- WUI 2 km buffer

Head Fire Intensity

- No Data (Private Land)
- No Data (Private Managed Forest Land)
- Water
- Non-Fuel
- <1000 kW/m
- >1000 to 2000 kW/m
- >2000 to 4000 kW/m
- >4000 to 6000 kW/m
- >6000 to 10000 kW/m
- >10000 to 18000 kW/m
- >18000 to 30000 kW/m
- >30000 to 60000 kW/m
- >60000 to 100000 kW/m
- >100000 kW/m

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28

Provincial Strategic Threat Analysis

Spotting Impact

Harrison Lake

Campbell Lake

Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983

0 0.2 0.4 0.8 1.2 1.6 2 Kilometers

Legend

- Highway
- Paved Road
- Loose Road
- Streams
- Lakes
- Wetland
- Municipal Boundary
- Area of Interest
- Community Watershed
- WUI 2 km buffer

Spotting Impact

- No Data (Private Land)
- No Data (Private Managed Forest Land)
- Water
- No Impact
- 1 (lowest impact)
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 (highest impact)

Local Government Name: **Harrison Hot Springs**
CWPP Consultant:**B.A. Blackwell & Associates Ltd.**
GIS Consultant:**B.A. Blackwell & Associates Ltd.**
Date:2019-02-28