

Community Wildfire Resiliency Plan



Village of Pemberton

February 21, 2023

Submitted by:

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I certify that the work described herein fulfills the standards expected of a member of the Association of British Columbia Forest Professionals and that I did personally supervise the work.	
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- Sarah Toews (Village of Pemberton Emergency Program Coordinator)
- Paul Stoker (Pemberton FireSmart Coordinator)
- Cameron Adams (Pemberton Fire Rescue)
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EXECUTIVE SUMMARY

In March 2022, B.A. Blackwell and Associates Ltd. was retained to assist the Village of Pemberton in updating their Community Wildfire Resiliency Plan (CWRP). A CWRP is both a localized risk assessment and an action plan to improve wildfire resiliency within the municipality. This plan replaces the previous Community Wildfire Protection Plan completed for the Village in 2016, accounting for changes that have occurred in the last six years and taking advantage of the newest community wildfire planning framework in BC. The CWRP is founded on the application of the [seven FireSmart™ disciplines](#) (Education, Legislation and Planning, Development Considerations, Interagency Cooperation, Cross-training, Emergency Planning, and Vegetation Management).

Since the 2016 CWPP, Pemberton has made progress with fuel management programs, community emergency planning, and the delivery of FireSmart activities within the Village boundaries. Pemberton has become one of the fastest growing communities in BC, which provides an opportunity to proactively address wildfire risk as the community expands. As well, the creation of the Spelkúmtn Community Forest (SCF) in 2020 provides a consistent land manager for many forested areas adjacent to the Village, in which the forest can be actively managed to reduce wildfire risk. As the Village shares borders with the Squamish Lillooet Regional District (SLRD) and Lil'wat Nation, community wildfire resiliency is strongly tied to the actions of these neighbouring jurisdictions and the provincial government. Maintaining meetings of Pemberton's Community FireSmart Resiliency Committee will be essential to implementing this plan and achieving effective wildfire risk reduction throughout the Pemberton area.

Pemberton is located in a provincially defined Wildland Urban Interface polygon that has a Risk Class of "1", which reflects the highest wildfire risk rating. The Provincial Strategic Threat Analysis assigns a "High" or "Extreme" threat rating to much of the surrounding area. Fieldwork for this CWRP allowed for verified and updated fuel types and wildfire threat assessments to be combined with an office-based analysis to provide a local wildfire risk assessment for the Village. The local analysis determined that the forested area surrounding Pemberton has a moderate to extreme threat rating. The analysis cannot be performed on private land and wildfire risk is difficult to accurately quantify on private land due to the wide range of potential hazards. Private land covers approximately 52% of the area assessed for this CWRP, which highlights the need to implement risk mitigation programs on private land if community resilience is to be achieved. Conditions on private land can often result in the fire hazard being much higher than in the forest adjacent if there is low compliance with FireSmart principles – which is an issue that was frequently observed through field work.

Pemberton is an interface community – the homes and structures are largely situated adjacent to vegetated/forested landscapes. Wildfire poses a threat to the community from either a human or lightning ignition in the adjacent forest, or from a residential fire that then spreads into surrounding vegetation and landscaping. With a considerable amount of development activity throughout the Village and the popularity of the valley for recreation, the chance for human ignition is heightened. A total of 42 recommendation and action items are presented in Table 1 within this Executive Summary and are more thoroughly discussed in their appropriate sections within the plan. Ultimately, the recommendation and action items within this plan should be considered as a toolbox of options to help reduce the wildfire risk

and consequence to the Village of Pemberton. Pemberton will have to further prioritize implementation based on resources, strengths, constraints, and availability of funding, and regularly update the prioritization and course of actions as variables change through time.

Table 1: Village of Pemberton's Community Wildfire Resiliency Plan

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
<i>Education - Section 5.2</i>							
<i>Visitors</i>							
1	Low	Purchase and install reflective signage at Mackenzie Forest Service Road (FSR) and One Mile Lake parking lots that communicates information on campfire bans and associated fines.	The Village of Pemberton (VoP) Community FireSmart Resiliency Committee (CFRC) identified One Mile Lake and Mackenzie FSR as good locations for fire danger rating signs. Both sites are highly used by visitors and residents who may also be camping around Pemberton. Other locations could be considered.	VoP (RSTBC)	2 years (signs installed)	Reduction in nuisance fires.	Sign cost ~\$300-400 and 2 hour per sign to coordinate and install
<i>Residents</i>							
2	High	Continue to promote FireSmart to Pemberton residents at community events and public spaces using FireSmart branded material and printed manuals (Home and Landscaping).	Most neighbourhoods in Pemberton, especially the older streets, are not FireSmart. Landscaping (conifer hedges) and firewood storage are the biggest issues. FireSmart BC resources help present a unified message. Print resources are popular and easy to distribute. FireSmart branded tents, banners, and t-shirts can be purchased with Community Resiliency Investment FireSmart Community Funding and Supports (CRI FCFS).	VoP (PFR)	Annually	Quantity of resources distributed/number of times used at events	CRI FCFS up to cost maximums
3	High	Continue to promote FireSmart in Pemberton schools using the FireSmart Education Kit and other resources.	Pemberton Fire Rescue has had great success with outreach in schools. Engaging with the community's younger population may increase uptake with all residents.	VoP (PFR)	Annually	Number of school visits	CRI FCFS; e.g. FireSmart Magnetic Board for \$1,710
4	Moderate	Continue to offer FireSmart workshops in-person or virtually to interested members of the public.	Workshops provide detailed information on a variety of topics related to FireSmart community resiliency and can help generate community leaders.	VoP (PFR)	Annually	Number of workshops held, and workshop attendees	CRI FCFS up to \$5,350 per event

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5	Moderate	Increase public awareness of recently developed Village of Pemberton evacuation plans, and of this Community Wildfire Resiliency Plan.	Increasing awareness of wildfire risk also increases community resiliency through household emergency planning, and support for FireSmart.	VoP Emergency Program	1 year	Awareness by residents - consider survey	Staff time to update website, and media posts. Newspaper ads ~\$500 each
Legislation, Planning and Development - Section 5.3							
Vegetation Policies							
6	High	Enact a Wildfire Landscaping Bylaw to restrict flammable landscaping. Example: prohibit conifer vegetation in the Non-Combustible Zone of a residence or structure (1.5 m) and prohibit the planting of new conifer vegetation in Priority Zone 1 (10 m). The bylaw should apply throughout the Village.	Community FireSmart Resiliency Committee (CFRC) Priority. Cedar hedges and ornamentals are popular in the Village of Pemberton and have been planted around new builds. As new developments are built, the Village has a great opportunity to prevent flammable vegetation from being established.	VoP Development Services	Approved within 2 years	All new development complies with the policy	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost
7	High	If not covered under a new Wildfire Development Permit Area (DPA), consider amending the Subdivision and Development Bylaw (677, 2011) to require natural forested areas that are retained as parkland/pockets in and around developments (e.g. 100 m buffer) receive a wildfire threat assessment and subsequent risk reduction plan by a qualified forest professional, and b) fuel modification treatments before or during the building phase.	The Nkwúkwma (Upper Benchlands), Ridge, and Sunstone developments are on dry forested slopes of the Village and abut or contain forested areas that are moderate to high hazard wildfire risk. The developer should bear the cost of mitigation. Mitigated forest areas greatly increase the defensibility of these neighbourhoods.	VoP Development Services	As soon as possible	Developments are required to mitigate forest fuel hazards	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost
Fire Prevention and Response Policies							
8	High	Ensure that road requirements in the Subdivision and Development Bylaw (677, 2011) are adequate for emergency response. Undertake a thorough review process with PFR of all applications for variances to ensure that requirements for fire truck access are met.	Bylaw 677 is being updated this year. Access to some townhome complexes was identified as an issue by PFR. Several applications for road width narrowing in developments (Sunstone) and subdivisions (Fernwood Drive) were observed in the field.	VoP Development Services & PFR	As soon as possible	All new developments have adequate fire truck access.	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost

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9	Moderate	Review the Village of Pemberton Fire Prevention Bylaw No. 744, 2013 to ensure that yard waste burning and campfire permitting is adequately stringent.	The CFRC identified yard waste burning and abandoned campfires as a significant cause of ignitions in and around Pemberton. It is possible that education and/or a joint fire ban enforcement policy with the SLRD will be preferred routes to success.	VoP Development Services & PFR	2 years	Reduction in human-caused ignitions and calls to nuisance fires.	Staff time
10	High	Meet with the Squamish Lillooet Regional District (SLRD) and Lil'wat Nation to develop a joint fire ban enforcement policy. The goal is to make local burning regulations or provincial fire bans enforceable by Pemberton Fire Rescue throughout the Pemberton Fire Service Area, which includes Mount Currie, Pemberton Meadows, and Pemberton Fringe/Heights.	The SLRD CFRC identified misalignment of burning bylaws in the VoP, Mount Currie, and Pemberton Fringe as a challenge and a risk. Pemberton Fire Rescue needs the authority to enforce fire bans in Pemberton Meadows and Pemberton Fringe/Heights. Also recommended in the 2021 SLRD Area C CWRP.	VoP, SLRD, Lil'wat	As soon as possible	Pemberton Fire Rescue has the authority to enforce fire bans throughout their Service area, including Pemberton Meadows and Pemberton Fringe/Heights.	Staff time: 40-80 hours
11	High	Develop and enforce trail standards for trails that are built within new developments to ensure that they function as access points and/or anchor points for first responders, and/or fuel breaks. Basic recommendation would be Type 2 main trails (1.25 m width) with Type 3 arterial trails (0.75 m width), and minimum vegetation management requirements for trailside areas.	The Benchlands Nkwúkwma development has pre-identified a number of new, active trails that will be located within the neighbourhood. These travel through forested areas and provide opportunities for surface fire breaks and/or first responder access.	VoP, PVTA, Developers	2 years	Trail standards are applied to all new trail in the Benchlands Nkwukwma development, and future phases of Sunstone.	Staff time
FireSmart Policies							
12	High	Consider amending the Natural Hazard Development Permit Area guidelines in Section 7.2 of the Official Community Plan (OCP) to include more specific wildfire guidelines, or developing a separate Wildfire Hazard DPA. DPA guidelines should require adherence to specific FireSmart principles in building construction and landscaping. This DPA should apply, at a minimum, to any areas recommended in the 2016 CWPP, subject to further refinement. Involve the development community and PFR in guideline development.	CFRC Priority & recommended in the 2016 CWRP. There has generally been good usage of FireSmart building materials in new developments in Pemberton, but the existing Wildfire guidelines in the Natural Hazard DPA do not adequately incorporate FireSmart principles. DPA guidelines are the only way for local governments to establish technical building regulations outside of the BC Building Code.	VoP Development Services	As soon as possible	Establishment and enforcement of a Wildfire DPA for all new developments and substantial renovations.	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost

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				(Involved)			
13	High	Continue to conduct FireSmart Critical Infrastructure Assessments for public works and community/government buildings. Conduct FireSmart mitigation as soon as possible (vegetation management, material upgrades). Prioritize assessing the E-comm tower above the Benchlands, subject to land ownership constraints.	Protecting water and wastewater systems and community infrastructure is critical to wildfire response and recovery. The E-comm tower site is not FireSmart (intermix, and wooden critical buildings). PFR has already conducted mitigation around some sites (i.e. the fire hall).	VoP (PFR)	Ongoing	Number of assessments completed and mitigation hours/investment	CRI FCFS: up to \$800 per assessment and up to \$50,000 for mitigation per structure (publicly owned only)
14	Moderate	Include a policy in the VoP OCP to require VoP critical infrastructure to adhere to FireSmart principles, including the prohibition of cedar shakes.	Cedar shake roofs on some water lift stations and mailbox shelters were noted. Using non-FireSmart construction materials sets a bad example to residents and can leave adjacent vegetation and/or residences exposed to a risk.	VoP Development Services	As soon as possible	All VoP infrastructure has metal or asphalt roof covering.	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost
Interagency Cooperation - Section 5.4							
15	High	Continue to engage with Lil'wat Nation, Spelkúmtn Community Forest, BC Wildfire Service, Ministry of Forests, and the SLRD on FireSmart initiatives through a regional Community FireSmart Resiliency Committee.	Even once-annual meetings are valuable and provide a platform for information sharing. All parties have indicated a willingness for collaboration.	VoP / SLRD	Ongoing	Inter-agency FireSmart meeting takes place at least once annually	At least 8 hours per meeting to prepare, participate and debrief. CRI FCFS up to \$2,000 per meeting.
16	High	Consider working with the SLRD to provide contracted HIZ assessments, and potentially other FireSmart services to residents in Pemberton Meadows and Pemberton Fringe/Heights.	Pemberton FireSmart receives many requests for FireSmart assessments initiatives from these SLRD areas. PFR may be well-suited to assist the SLRD with assessments given the proximity to Pemberton.	VoP / SLRD	As soon as possible	More residents outside of VoP boundaries receive FireSmart assessments	SLRD CRI FCFS funding, and staff time for discussion
17	Moderate	Consider allocating some community forest revenue to FireSmart initiatives in Pemberton and Mount Currie.	The community forest may provide a stable source of revenue for community FireSmart activities that is independent of provincial funding programs.	VoP, Lil'wat (SCF)	1 year (discussion started)	Meeting(s) are held to discuss.	Staff time (free online courses)

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<i>Cross Training & Fire Department Resources - Section 5.5</i>							
<i>Training</i>							
18	Moderate	Consider training Pemberton Emergency Management staff/Emergency Operations Centre (EOC) members in Incident Command System courses (ICS).	ICS-100 is an online course that provides an introduction to effective control of an emergency site; other levels of ICS provide more detailed training. BCWS uses the ICS system.	VoP (Emergency Program)	1 year	Number of VoP Emergency Management staff that receive some level of ICS training.	CRI FCFS: staff time and course cost (ICS-100 \$25 online)
19	High	Continue to provide SPP-WFF1 training in-house to PFR members and consider having some members take 'train-the-trainer' courses so that more courses (e.g. S-231, WSPP-115) can be delivered in-house to members.	PFR identified this as an opportunity to expand wildland specific training, and potentially train adjacent fire departments.	PFR	2 years	Number of PFR members with wildland training beyond SPP-WFF1 increases	Staff time; CRI FCFS Training
20	High	PFR should continue to perform wildfire response/structure protection drills - using hydrants and/or natural water sources. Cross-train with BCWS if possible.	Fast and effective deployment of the PFRs SPU and any additional equipment operated by the BCWS will be crucial in any interface fire scenario. Equipment compatibilities and/or differences between PFR & BCWS should be identified and addressed ahead of time. Cross training was identified as a priority for the Pemberton Fire Zone.	PFR (BCWS)	Annually	Drills performed at least once annually in different neighbourhoods, in different fuel types and topography, and with different water sources.	Staff time
21	High	Continue to assist BCWS, Spelkúmtn Community Forest, and/or Lil'wat Nation with prescribed/cultural burning projects.	Continuously exposing PFR members to live-fire scenarios in different fuel types under controlled conditions will increase their capacity and ability to lead and/or assist in wildfire scenarios.	PFR (BCWS) (Lil'wat) (SCF)	Annually	PFR remains involved in local burns, ideally in different fuel types (grassland hazard-reduction burning, slash burning, pile and/or fuel modification burning)	Staff time
<i>Water</i>							

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
22	High	Continue to identify natural and artificial water sources useable for fire suppression. Document and share this information and update over time. This can double as a pre-plan of emergency community water delivery systems to connect major natural water sources with interface neighbourhoods, to facilitate deployment of a structural protection system.	Outside of VOP boundaries, but within the PFR response area, there are no hydrants and PFR does not have sufficient equipment for water shuttling. Response to these areas impacts VOP's wildfire resilience. Shuttling or pumping water from lakes and rivers to fill bladders may be planned in advance, including tender access points, traffic control, permanent large-volume pumps and piping.	PFR (BCWS)	1 year and ongoing	A fire suppression water source plan and map is produced and shared.	CRI FCFS Community Water Delivery Assessment - Up to \$10,700 for incremental staff hours or contract cost
23	High	Conduct a water supply analysis, to determine how long the municipal water supply would last [in the absence of electricity] without restricting residents' usage.	CFRC Priority. Will provide valuable information to VoP Public Works and to PFR on potentials gaps in the water system (storage and/or delivery), and will inform the pre-plan of emergency community water delivery.	Consultant (VoP)	2 years (complete)	A water supply analysis is conducted.	CRI FCFS Community Water Delivery Assessment - Up to \$10,700 for incremental staff hours or contract cost
24	Moderate	Continue to work with the Squamish Lillooet Regional District (SLRD) on additional protection of the PFR response areas that are non-hydranted (SLRD areas outside of municipal boundaries). Procurement of a water tender may be considered to facilitate water shuttling.	Response to these areas impacts VOP's wildfire resilience. This recommendation was also made in the 2016 CWRP.	SLRD, PFR (VoP)	Ongoing	A plan to purchase a suitable water tender is made.	Staff time and SLRD budget
Equipment & Staff							
25	Moderate	Continue to develop and implement plans to replace PFR apparatus as it ages out.	PFR has an aging fleet of engines. Suitable apparatus are critical for response to interface wildfires.	PFR (VoP)	1 year (plan)	The PFR fleet and fire hall are adequate to meet demands.	Staff time and VoP budget
26	Moderate	Continue to develop and implement plans to replace the PFR fire hall and Emergency Operations Centre.	PFR has outgrown their fire hall, and further municipal growth is anticipated.	PFR (VoP)	1 year (plan)	The PFR fleet and fire hall are adequate to meet demands.	Staff time and VoP budget

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				(Involved)			
Emergency Planning - Section 5.6							
27	High	Create community evacuation pre-plans for each VoP neighbourhood noting muster points, key contacts, primary and secondary access/egress routes, first responder contact information, water sources, etc.	Noted as a priority by PFR. Guidance can help facilitate evacuation as residents understand the process. Consider the NEPP framework, and use community leaders.	VoP (PFR & Emergency Program)	1 year (first plan initiated)	A plan is developed and available to a) PFR and the VoP EOC b) BCWS c) residents (online and in print)	Possibly CRI CEMF. CRI FCFS Emergency Planning.
28	High	Invest in back-up generators for any critical infrastructure that does not have one. Encourage private businesses that provide critical services, like gas stations and grocery stores, to follow suit.	Back-up generators for pumphouses, treatment plants, and community buildings would facilitate both emergency response (water supply for suppression) and rapid community return and recovery following a fire. Generators were noted for the E-comm tower.	VoP (Emergency Program)	ASAP	A budget and purchase plan for back-up generators is implemented, starting with the most critical infrastructure.	Cost varies - ~\$10,000
29	High	Schedule regular updates of this Community Wildfire Resiliency Plan: target every 5 years.	A current and acceptable CWRP is required for funding under the CRI FCFS program. Pemberton has several new developments underway that should be accounted for in the next plan(s).	VoP (Emergency Program)	5 years – 2028 update	VoP always has a current and acceptable CWRP	~\$30,000; CRI FCFS funding
Vegetation Management - Section 5.7							
Fuel Management Treatments							
30	Moderate	Work with Ministry of Forests to implement One Mile Lake FMP.	The area is already prescribed and portions of the One Mile Lake FMP are on municipal land. The prescription encompasses high hazard forest land within 350m of residences, and within 1 km of downtown Pemberton. It is adjacent to a high-use recreational area and is also Lil'wat Spirited Ground.	VoP (MoF)	2 years	One Mile Lake FMP is implemented.	Cost per ha varies; ~\$15,000/ha
31	Moderate	Develop fuel management prescriptions for fuel management areas identified in this plan. Prioritize a prescription for Nkwúkwma considering development timeline and treatment of forested private parkland.	Nkwúkwma is strategically located in the forested interface of Pemberton Benchlands neighbourhood, which is poised to more than double after the proposed 400+ unit Nkwúkwma Development. The unit is moderate-high hazard, has good road access, and surrounds critical infrastructure (E-comm tower).	VoP (consultant)	1 year (first prescription underway)	Approved FMP(s) and eventual implementation	~\$425/hectare for a ~20 ha prescription

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32	Moderate	Engage BCWS and Lil'wat about prescription and future burn plan of Mack and surrounding area. Consider harvest opportunities for Spelkúmtn Community Forest.	This unit is well positioned for a pilot stand maintenance burn - it is anchored between low fuel areas on a consistent, moderate south facing slope (rail/river below, Mackenzie FSR prescription area above) and is intersected with trails for logical burn areas. The stand has accumulating surface fuel in consistent patches and burning would reduce fire hazard, provide positive outcomes associated with the return of lower severity fire (fire scars on veteran Douglas fir observed), and provide training opportunities.	VoP, SCF, BCWS	2 years (discussion underway)	Approved FMP(s), Burn Plan, and eventual implementation	Staff time
33	Low	Work with the Spelkumntn Community Forest and neighbouring jurisdictions (SLRD, RMOW, Lil'wat) to explore alternative disposal methods for debris from fuel treatments or other forest harvesting activities (e.g., combined heat and power, biochar, secondary forest products, etc.).	The Village's Community Climate Action Plan identifies the need to close the loop on compostable waste, explore renewable energy options, and identify industrial wood waste producers in the area and explore opportunities from there. The Regional Economic Development Strategy also identifies the need to pursue regional business opportunities such as biofuel and value-added products. Policies on slash burning are expected to become more restrictive in recent years, and pile burning can also prove to be logistically difficult and often be viewed negatively from the community.	VoP, SCF (SLRD / Lil'wat / RMOW)	3 years (discussion underway)	Alternatives considered and documented	Staff time
34	High	Work with the SLRD, Spelkumntn Community Forest, and Sunstone Ridge Developments to ensure that the secondary egress road/multiuse trail east of Sunstone is completed to fuel break standards. This includes managing debris from trail clearing. Consider extra thinning to a specified distance off the trail.	This trail is outside of Village of Pemberton boundaries but within the WUI. It is key secondary egress for Sunstone and Ridge developments. It is important that the trail also functions as a safe anchor point for firefighting crews. It is strategically located to protect against a fire moving along Mackenzie Ridge from the north/east. Fuel loading of adjacent areas is moisture dependant: low to moderate.	Spelkumntn Community Forest, Sunstone Ridge Developments (VoP/SLRD)	3 years	Trail is vehicle accessible and is adjacent to low fuel-loaded areas.	15 m buffer on each side of ~3 km trail = 9 ha of fuel management @ \$15,000/ha = \$135,000
Residential FireSmart							
35	High	Retain capacity to deliver FireSmart programs by continuing to hire full- or part-time FireSmart staff as needed. The VoP FireSmart staff should work with BCWS, LFN and others through any regional FireSmart committee that is developed.	FireSmart staff can efficiently deliver municipal FireSmart programs, including conducting FireSmart Assessments, providing support for the FireSmart Canada Neighbourhood Recognition Program, and coordinating fuel management programs.	VoP (PFR)	Annual	Capacity for FireSmart is maintained or enhanced	CRI FCFS funding: FireSmart Positions

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36	Moderate	Continue supporting neighbourhoods through the FireSmart Canada Neighbourhood Recognition Program	The FireSmart Canada Neighbourhood Recognition Program motivates individuals and groups to take action through community hype. Pemberton has several distinct neighbourhoods that would be good candidates for the program and already has 2 recognized neighbourhoods.	VoP (PFR)	Ongoing	Number of neighbourhoods recognized	CRI FCFS funding: up to \$430 per assessment, \$1,070 per plan; up to \$5,350 per education event
37	Moderate	Continue to waive tipping fees for residents conducting yard cleanup, through partnership with Sea to Sky Soils or similar.	Yard waste burning restrictions limit options for debris disposal. Free debris disposal may be used as an incentive to participate in other FireSmart activities, like assessments or workshops.	VoP	Annual	Number of properties who elect to have debris disposed	CRI FCFS funding; ~\$100-150 per chipper crew hour.
38	Moderate	Continue making Home Ignition Zone (HIZ) assessments available for residents through VOP's trained Wildfire Mitigation Specialists. Leverage incentives to increase uptake including insurance discounts.	HIZ assessments encourage action in the Priority Zones of a community, through education or through incentives for mitigation (e.g., rebate program, insurance discount)	VoP (PFR)	Annually - spring - fall	Number of assessments completed annually	CRI FCFS: up to \$265 per property
39	Low	Continue to engage with local garden centers to implement the FireSmart BC Plant [Tagging] Program.	FireSmart BC introduced a plant tagging program in 2021 that has been implemented with great success by 34 nurseries and garden centres to date. The Plant Program is an easy way to provide information at the point of purchase for homeowners and landscapers. https://firesmartbc.ca/landscaping-hub/plant-program/	Local nurseries (PFR)	Aim for Spring 2023	At least one local garden center participates in the Plant Program.	Staff time for engagement (2-4 hours)
40	High	Consider offering a FireSmart rebate program available for residents who have a pre- and post-work FireSmart assessment conducted. Focus on removal of conifer hedges, firewood storage (subsize FireSmart sheds?)/relocation.	FireSmart rebate programs are an incentive to complete FireSmart work and/or participate in a Neighbourhood Recognition Program.	VoP (PFR)	Annually - spring - fall	Number of properties participating annually	50% of costs per property up to \$1,000, plus 2 hours administration time per property (CRI FCFS)

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41	Moderate	Consider obtaining a Village of Pemberton chipper and trailer to facilitate residential FireSmarting.	VoP does not currently have a chipper and relies on BCWS equipment. Could be shared with Public Works. Driveway chipping programs have been very successful in other municipalities.	PFR (VoP Public Works)	1 year	A suitable chipper and trailer are obtained	Internal
42	High	Consider releasing an annual Pemberton FireSmart report to the public that tracks community-specific uptake in various FireSmart initiatives, as well as tracks fuel management at all scales.	As the program grows, reporting allows the Pemberton FireSmart program to track challenges and successes, further promote the program, and tailor outreach methods to achieve the most uptake.	VoP	Annual	An annual report is published	Eligible for CRI funding – FireSmart staff time. Estimate 40-80 hours.

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FREQUENTLY USED ACRONYMS

AOI	Area of Interest
BC	British Columbia
BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic Ecosystem Classification
CFFDRS	Canadian Forest Fire Danger Rating System
CRI	Community Resiliency Investment
CWPP	Community Wildfire Protection Plan
CWRP	Community Wildfire Resiliency Plan
DPA	Development Permit Area
FBP	Fire Behavior Prediction System
FCFS	FireSmart Community Funding and Supports: Stream 1 of the UBCM CRI Program
FSR	Forest Service Road
HIZ	Home Ignition Zone
MOF	Ministry of Forests
MOTI	Ministry of Transportation and Infrastructure
NDT	Natural Disturbance Type
PFR	Pemberton Fire Rescue
PSTA	Provincial Strategic Threat Assessment
SCF	Spelkúmtn Community Forest
SLRD	Squamish-Lillooet Regional District
UBCM	Union of British Columbia Municipalities
VoP	Village of Pemberton
WRR	Wildfire Risk Reduction: Stream 2 of the UBCM Community Resiliency Investment Program, administered by the Ministry of Forests
WTA	Wildfire Threat Assessment
WUI	Wildland Urban Interface

SECTION 1: INTRODUCTION

In March 2022, B.A. Blackwell and Associates Ltd. was retained to assist the Village of Pemberton (VoP) in updating their Community Wildfire Resiliency Plan (CWRP). A CWRP has its roots in the Community Wildfire Protection Plan (CWPP) framework, which was originally established in BC in response to the series of devastating wildfires in 2003. This plan replaces the previous CWPP completed for the Village of Pemberton in 2016. Recent wildfire disasters like those experienced in Washington State (2014, 2015), Fort McMurray (2016), British Columbia (2017, 2018, 2021), and California (2017, 2018, 2020) continue to display the vulnerability of communities and the potential toll of wildfires on families, neighbourhoods, public health, and the economy of entire regions. These events, along with important advances in loss prevention programs, have spurred the need for greater consideration and due diligence concerning fire risk in the wildland-urban interface (WUI).¹ CWRPs are an invaluable opportunity to proactively manage wildfire risk and increase community resilience to wildfire.

CWRPs are currently being developed at many jurisdictional and geographic scales, and are individually tailored to address the needs of different communities in response to their size, their capacity, and the unique threats that they face. Despite these differences, the goals of a CWRP remain the same and are founded in the seven FireSmart disciplines: Education, Legislation & Planning, Development Considerations, Interagency Cooperation, Cross-Training, Emergency Planning and Vegetation Management.

1.1 PLAN PURPOSE AND GOALS

This plan accounts for changes that have occurred since the Village's last CWPP and takes advantage of the most recent community wildfire planning framework in BC. This CWRP identifies the interface wildfire risk within the municipality, and gives the Village a current and accurate understanding of the threats to human life, infrastructure, and values at risk from wildfire. This CWRP is intended to serve as a framework to guide the implementation of specific actions and strategies to:

- 1) Increase the efficacy and of fire suppression and safety of emergency responders,
- 2) Reduce potential impacts and losses to property and critical infrastructure from wildfire, and
- 3) Reduce potential wildfire behavior and threat within the community.

To help guide and accomplish the above strategies, this CWRP will provide the Village of Pemberton with:

- 1) An assessment of wildfire risk to the community,
- 2) An assessment of values at risk and potential consequences from wildfire,
- 3) Maps of fuel types and recommended areas for fuel treatments,
- 4) An assessment of emergency response capacity, and
- 5) Options and strategies to reduce wildfire risk through the seven FireSmart disciplines.

¹ 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).

1.2 PLAN DEVELOPMENT SUMMARY

The CWRP development process consisted of five general phases:

- 1) Formation of the Community FireSmart Resiliency Committee (CFRC – see Appendix H) Consultation with the CFRC and information sharing with stakeholders and First Nations occurred throughout.
- 2) Review of relevant plans and legislation regarding emergency response and wildfire (Section 2)
- 3) Description of the community and identification of values at risk (Section 3)
- 4) Assessment of the local wildfire risk (Section 4)
- 5) Analysis and action plan for each of the seven FireSmart disciplines (Section 5)

CWRPs are funded in BC by the Union of BC Municipalities (UBCM) under the Community Resiliency Investment (CRI) FireSmart Community Funding and Supports (FCFS) Program. As per funding requirements, this CWRP is completed according to the 2022 CRI template.

SECTION 2: RELATIONSHIP TO OTHER PLANS AND LEGISLATION

Wildfires can affect all aspects of a community. As a result, there are many plans from both the Village of Pemberton and neighbouring jurisdictions that relate to this CWRP. This section reviews all relevant plans, policies, bylaws, guidelines and provincial legislation to identify sections within that are relevant to community wildfire planning and response.

2.1 LINKAGES TO CWPPS/CWRPS

2016 Village of Pemberton CWPP

B.A. Blackwell & Associates Ltd. completed a Community Wildfire Protection Plan (CWPP) for the Village of Pemberton in 2016. The scope of this plan was a two-kilometer buffer around the municipal boundaries. This CWPP was an update to an original CWPP that was completed in 2005 by Davies Wildfire Management Inc. and Diamond Head Consulting Ltd. Recommendations of the two plans were reviewed and incorporated as appropriate into this plan. A generalized review of the 2016 recommendations and their implementation status is presented in Appendix A.

2021 Squamish-Lillooet Regional District Electoral Area C CWRP

B.A. Blackwell & Associates Ltd. completed a CWRP for Electoral Area C of the SLRD in 2021. Opportunities for collaboration and joint-funding initiatives between Pemberton and the SLRD will be discussed in this plan. Representatives from Pemberton Fire Rescue (PFR) / FireSmart were active members of the CFRC for the SLRD as this plan was developed.

Table 2 on the following page lists jurisdictions adjacent to the Village of Pemberton that have been involved in community wildfire planning. Potential synergies often exist between jurisdictions.

Table 2: Local Community Wildfire Plans and their relationship to this CWRP

Community	Wildfire Plan	Recommendations Relevant to this CWRP/Partnership
SLRD Electoral Area C	2021 Community Wildfire Resiliency Plan Wildfire Protection Development Permit Area (DPA)	<ul style="list-style-type: none"> Working with PFR to establish joint fire ban enforcement Formalizing mutual aid agreements between PFR and Birken Volunteer Fire Departments Considering funding extra equipment for PFR to effectively respond outside of VoP boundaries Pursuing joint hazard assessment and vegetation management programs with the VoP. Enacted a DPA to enforce FireSmart building decisions on all new developments (see Section 5.3)
Lil'wat Nation	2017 Community Wildfire Protection Plan Update	<ul style="list-style-type: none"> Considering bylaws to regulate the use of fire Prioritize fuel management treatments along important egress and access corridors Through mutual agreements with the SLRD, VoP or the Resort Municipality of Whistler, procure the use of a Structural Protection Unit (SPU) Proposed fuel treatment units near Pemberton Portage Road substation and Owl Ridge south
Resort Municipality of Whistler	2021 Community Wildfire Resiliency Plan	<ul style="list-style-type: none"> Continue to participate in the SLRD Community FireSmart Resiliency Committee to improve interagency efforts and Sea-to-Sky community connections Explore local markets and solutions to biomass utilization (e.g., combined heat and power) in order to make local fuel management projects more affordable and appealing Analyze the return-on-investment in fuel reduction thinning vs. the FireSmart program, and develop a strategic plan identifying where to spend funds

2.2 LOCAL PLANS AND BYLAWS

The local plans and bylaws listed in Table 3 are directly relevant to proactive wildfire resilience in the Village of Pemberton. These plans were reviewed as part of the CWRP to address any gaps or limitations that inadequately address fire hazards or risk mitigation. It is important to note that at the time of writing the Village is currently in the process of updating their Official Community Plan (OCP) – with an expected completion date of 2024 – and a number of bylaws. It is the desire of the authors and multiple municipal staff that the updated OCP reflect many of the ideas and recommendations contained in this CWRP.

Table 3: Local Plans and Bylaws and relationship to the CWRP

Plan	Description and <i>Relation to CWRP</i>	Gaps / Limitations
<p>Village of Pemberton Official Community Plan (OCP) 2011, with updates to 2015</p>	<p>The governing plan / document that outlines Pemberton’s values and growth strategy. A new OCP is currently being developed, aimed for release in 2024.</p> <ul style="list-style-type: none"> - <i>Sets the urban growth boundary for the Village, which is not expected to change through the life of this document.</i> - <i>Presented ideas for fire management: using parks and trails as fire breaks and for suppression access, having infrastructure policies to decrease risk and protect firefighters, established a Wildland Fire Interface Hazard Area and a Development Permit Area (DPA) for land constraints – which required the need for a pre-development fire risk assessment and fuel management strategy by a wildfire management specialist.</i> - <i>Described various construction-specific requirements of homes (discouraged vinyl siding, not permitting wood roofing, and required a defensible space) as per the Building Bylaw.</i> 	<ul style="list-style-type: none"> -Current Land Constraints DPA area only covers the ‘Hillside’ area -No specific guidelines for construction and/or landscaping materials -No standards or guidelines for the fire risk assessment or fuel management strategy -Advent of the Building Act in 2015 resulted in the inability of the Village to force technical building requirements
<p>Comprehensive Emergency Management Plan (2020)</p>	<p>Builds on the joint Hazard Risk and Vulnerability Assessment which identifies urban fires, rural fires, and WUI fires as high-rated hazards, and discusses risk mitigation.</p> <ul style="list-style-type: none"> - <i>Outlines emergency response plans for the Village, from the response phase to local recovery, and community restoration and rehabilitation.</i> - <i>Discusses emergency communication plans for the Village, including but not limited to PembertonAlert, websites and social media outlets.</i> 	<p>None noted.</p>
<p>Community Disaster Resilience Plan (2022)</p>	<p>The intent of the Community Disaster Resilience Plan is to strengthen the capacity of the community to cope with, and recover from, the possible impact of disaster risks that cannot realistically be mitigated.</p> <ul style="list-style-type: none"> - <i>Many hazards that can lead to the establishment and spread of an interface fire cannot be changed and/or completely eliminated (i.e., mountainous topography, forests and grasslands, extreme weather events). This CWRP provides many fire-specific resilience strategies to proactively reduce the likelihood of an interface fire disaster.</i> 	<p>None noted.</p>
<p>VoP Evacuation Route Plan (2020) & Sea to Sky Evacuation Plan (2019)</p>	<p>Outlines evacuation routes and potential evacuation difficulties for the Village and surrounding area.</p> <ul style="list-style-type: none"> - <i>Public should be informed of evacuation difficulties and the importance of having their selves and their property prepared ahead of time.</i> 	<p>None noted.</p>
<p>Parks and Open Spaces Master Plan (2011)</p>	<p>Outlines the importance of these spaces for the Village’s character and residential needs, ecological protection, and economic development.</p> <ul style="list-style-type: none"> - <i>Provides standards for different classifications of parks. Explored through Recommendation 7 (Section 5.3).</i> 	<p>No mention of natural hazards or fire risk mitigation in these parks / open spaces.</p>

Plan	Description and <i>Relation to CWRP</i>	Gaps / Limitations
Recreation Trails Master Plan (2020)	<p>Collaboration between VoP, Lil'wat, SLRD, Rec Sites and Trails BC and the Pemberton Valley Trails Association that provides a framework for the management and maintenance of trails.</p> <ul style="list-style-type: none"> - <i>Outlines trail classifications and standards for any pre-existing official trails or new trails to be developed. Explored through Recommendation 11 (Section 5.3).</i> 	<p>Natural hazards focused on terrain stability – no mention of fire hazards or using trails as fuel breaks or for emergency access.</p>
Community Climate Action Plan (2022)	<p>A community plan to reduce GHG emissions and mitigate emissions – resulting in a low-carbon future where climate change challenges are proactively addressed.</p> <ul style="list-style-type: none"> - <i>Recognizes the impacts of smoke to respiratory and cardiovascular health, specifically as the VoP has limited health services and an aging population.</i> - <i>Ensuring that buildings and housing are prepared for climate change.</i> - <i>A push for healthy ecosystems (e.g., reintroducing natural disturbances, ecosystem restoration).</i> - <i>Diverting all yard waste to useable compost or another regional processing facility – collaboration with the SLRD.</i> 	<p>None noted.</p>
Regional Economic Development Strategy (2021)	<p>Collaboration between local government, non-profit organizations and Indigenous communities to address economic development from a regional perspective.</p> <ul style="list-style-type: none"> - <i>Recognizes forest fires as a challenge, but also an opportunity for academic partnerships to assess, plan, and mitigate climate change effects through cross-governmental and/or academic partnerships</i> - <i>Presents a desire to pursue regional business opportunities (e.g., biofuels, value-added forest products) alongside industrial partners and the Spelkúmtn Community Forest. Explored through Recommendation 33 (Section 5.7).</i> 	<p>None noted.</p>
Building Bylaw (2021)	<p>Applies to the design, construction, and occupancy of new buildings and structures and the alteration, reconstruction, demolition, removal, relocation, and occupancy of existing buildings and structures.</p> <ul style="list-style-type: none"> - <i>Pemberton's rapid growth and continual reconstruction of older original homes presents a major need to ensure that resultant building is done proactively with fire hazards in mind.</i> 	<p>-No current mention of FireSmart construction materials or defensible zones. -Building Act largely restricts these measures outside of a DPA.</p>
Subdivision Development & Control Bylaw (2011)	<p>Sets various rules for strata / subdivision development (e.g., road widths, cul-de-sac lengths, turnaround requirements, emergency access road specifications.</p> <ul style="list-style-type: none"> - <i>Recommendation 8 addresses the need for a formal requirement to have subdivisions designed with adequate mitigation measures for wildfire risks.</i> 	<p>Does not explicitly contain design elements to address natural hazards (i.e., wildfires)</p>

Plan	Description and <i>Relation to CWRP</i>	Gaps / Limitations
<p>Fire Prevention Bylaw (2013)</p>	<ul style="list-style-type: none"> - <i>Outlines multiple powers that the Fire Chief has (e.g., identifying dangerous/hazardous fire conditions on a property and forcing the removal/mitigation.</i> - <i>Provides requirements to maintain a property in conformance with the FireSmart Manual. Owner/occupier is liable to be fined or charged for the work to be completed if contravened.</i> - <i>Governs the accumulation of combustible materials on a property and the need to remove these.</i> - <i>Governs Open Air Fire Permits and residential campfire permits, including for Hazard Abatement/Fuel Modification – in which the Fire Chief can issue a permit on such additional modified terms and conditions as the Fire Chief considers necessary and appropriate in the circumstances.</i> 	<p>Powers or enforcement measures have not been exercised from a fuel management standpoint.</p> <p>Open burning for Pemberton’s fuel modification projects has still been subject to the Open Burning Smoke Control Regulations (OBSCR).</p>
<p>Zoning Bylaw (2018)</p>	<p>Resulted in the Zoning map for the Village (Schedule A in the current OCP).</p> <ul style="list-style-type: none"> - <i>Defines building setbacks (front, back, exterior sides) for different development zones, which have the potential to expose homes on sloped terrain to fire.</i> - <i>Permits forestry activities in the community watershed, which can allow for ecosystem restoration and/or hazard abatement treatments.</i> 	<p>None noted.</p>
<p>Site Alteration Bylaw (2013)</p>	<p>Regulates the cutting of trees (not on Village-owned lands or for work undertaken by the Village) within the municipality.</p> <ul style="list-style-type: none"> - <i>Requires a tree management plan and a rationale for the removal of trees from a property (as prepared by a registered professional arborist) – trees defined as anything with a DBH greater than 10cm.</i> 	<p>None noted.</p>

The major gap that was identified in the Village of Pemberton’s Emergency Management program as it relates to wildfire is the lack of an effective Wildfire Development Permit Area. Recommendations will be made in Section 5.3 that explore potential new bylaws, as well as amendments to a number of pre-existing bylaws and plans that can help facilitate proactive wildfire risk reduction in the Village.

2.3 HIGHER-LEVEL PLANS AND LEGISLATION

Table 4 lists higher-level plans and legislation that are relevant to wildfire planning and risk mitigation within Pemberton and the surrounding area. These plans help guide where and how activities like resource extraction occur on the landscape, which can affect both wildfire threat and consequence. Depending on the location of any proposed fuel management treatments, fuel management prescriptions and prescribed / cultural burn plans may need to address these plans as they relate to on-the-ground restrictions and policies for forest modification.

Table 4: Description of higher-level plans and legislation and their relationship to the CWRP.

Plan	Description and <i>Relationship to CWRP</i>
<p>Spelkúmtn Community Forest (SCF) Management Plan (2019)</p>	<p>Prepared through the Community Forest Agreement application process, in order to link the partner communities (Lil'wat Nation and the Village of Pemberton) and their values to the management of the Community Forest. This Forest Management Plan also establishes the annual allowable cut (AAC) for the SCF.</p> <p><i>While not explicitly addressing fire or risk reduction in the Values or Specific Resource Management Objectives, the SCF describes the following methods to manage for fire as a forest health issue:</i></p> <ul style="list-style-type: none"> - <i>Striving to maximize fibre utilization and minimize waste through all operations; Piling and disposing of excessive fine slash; Removing slash from the roadside to keep the road as an effective fuel break and safe access point; Distributing slash throughout a block so that it is spread out.</i> - <i>Cooperating with the VoP & SLRD to implement CWPP recommendations.</i>
<p>Spelkúmtn Community Forest Stewardship Plan (FSP) (2020)</p>	<p>Outlines government objectives for forest management on Crown land, and how these objectives will be managed for in the Community Forest through specific results and strategies.</p> <p><i>The SCF FSP defines post-harvest stocking standards that are specific to wildfire management activities that reduce the likelihood of crown fire and allow for broadleaf species to establish. It also provides for a minor amount of harvesting to be allowed within Old Growth Management Areas (OGMA) that are in fire-dominated ecosystems.</i></p>
<p>Sea to Sky Natural Resource District Fire Management Plan (2016)</p>	<p>Maps values at risk and other data relevant to suppression response (managed wildfire areas, treated areas etc.). Sets protection priorities: (1) Human life and safety, (2) property and critical infrastructure, (3) high environmental and cultural values, (4) natural resource values.</p> <ul style="list-style-type: none"> - <i>Community watersheds and water intakes are mapped; BC Wildfire Service (BCWS) will consider restricting fire-retardant use and mineral soil exposure in these areas;</i> - <i>BCWS will contact District Ecosystems Biologists for management clarification on wildlife areas, and Land & Resource Specialists for OGMAs;</i> - <i>BCWS will avoid heavy equipment use near cultural sites.</i>
<p>Sea-to-Sky Land and Resource Management Plan (2008)</p>	<p>Applies to the entire Village of Pemberton. Many of the objectives are reinforced through the SCF Management Plan. Sets goals for fire management:</p> <ul style="list-style-type: none"> - <i>Enhanced ability to manage or suppress wildfire to improve public safety and protect values</i> - <i>Maintain/restore ecosystem health through reintroduction of health sustaining disturbance processes</i> <p><u><i>Legal Land Use Objectives:</i></u> <i>Cultural Places - Skelulátkwa / Owl Creek, Signal Hill spirited ground area, Pemberton Airport spirited ground area</i> <i>Ungulate Winter Range & Wildlife Habitat Areas – Minor overlaps with u-2-005 (Black-tailed deer & Moose) and 2-525 (Spotted Owl)</i></p>

SECTION 3: COMMUNITY DESCRIPTION

This section defines the planning area for this CWRP and provides general demographic information about the Village of Pemberton. An understanding of population trends, land use patterns, and values at risk can help effectively direct FireSmart outreach and risk mitigation activities.

3.1 WILDLAND-URBAN INTERFACE

The Wildland-Urban Interface (WUI) is defined by FireSmart Canada as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. For the purpose of the FireSmart Community Funding and Supports (FCFS) program, the ‘eligible WUI’ is considered as the area one kilometer from a structure density class greater than six structures per square kilometer. BC Wildfire Service generates WUI Risk Class maps and associated spatial data to assist with initiatives related to wildfire risk reduction, including the FCFS program.²

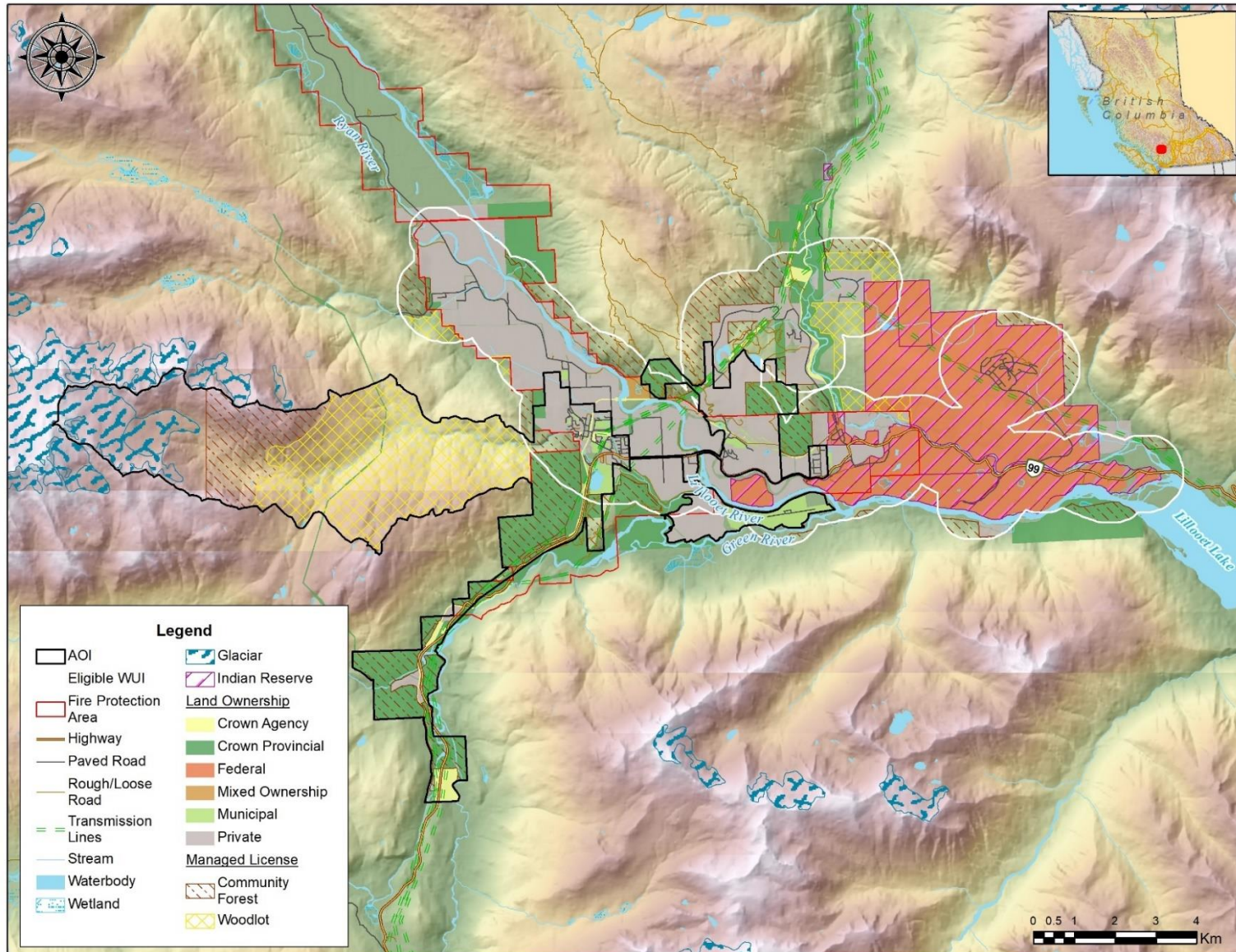
Field work, GIS analysis, and the recommendations for this CWRP cover only this one kilometer ‘eligible WUI’ and were restricted to within the municipal boundary of Pemberton. This area covers a total of 1,159 hectares. The municipality includes residential, industrial, agricultural and forested areas. Land use is guided by the Official Community Plan as discussed in Section 2.2. As development occurs, it is possible that both the municipal boundary and the WUI will change.

Map 1 shows an overview of the wildland urban interface surrounding Pemberton, with an approximate breakdown of land ownership type by area listed in Table 5. The map displays how large portions of the municipality are outside of the ‘eligible WUI’, and also how continuous the WUI is onto SLRD or Mount Currie (Lil’wat Nation) lands. Successful wildfire resilience efforts will need to cross these jurisdictional boundaries. The majority of the forested Crown land in and outside of Pemberton is managed through the Spelkúmtn Community Forest and/or local Woodlot licensees.

Table 5: Land Ownership within the eligible WUI of Pemberton.

Land Ownership	Area (Ha)	Percent of WUI (%)
Private	603	52
Crown Provincial	324	28
Crown Agency (right-of-ways)	22	2
Municipal	168	15
Federal	< 1	0
Mixed Ownership	27	2
Unclassified (often strata)	15	1
TOTAL	1889	-

²[Wildland Urban Interface Risk Class Maps - Province of British Columbia \(gov.bc.ca\)](https://www2.gov.bc.ca/gov/content/safety/wildfire/wildfire-risk-class-maps)



Map 1. Wildland Urban Interface for the Village of Pemberton. The 'eligible WUI' area is the white bubble within the Area of Interest (AOI), which spans the municipal boundaries of Pemberton.

3.2 COMMUNITY DESCRIPTION

The population of the Village of Pemberton has increased an impressive 32.4% over the last five years, which is the fastest growth rate of any community in the Sea to Sky Corridor.³ The municipality shares boundaries with other relatively populous communities; Electoral Area C is the most populous in the SLRD, having experienced a 20.3% growth in population between 2016 and 2021, while the majority of the Lil'wat Nation lives within Mount Currie.⁴ Relevant socio-economic statistics on population, employment, housing and education for the Village of Pemberton are summarized in Table 6.

Table 6: Socio-economic statistics for the Village of Pemberton, as per the 2021 census. Bolded values will be discussed below as they have special relevance to the CWRP.

Metric	Value
Population	
Total Population	3407
Population Density (people/km ²)	55.5
Population percentage change between 2016 and 2021	+32.4%
Number of people <14 years old	665 (20%)
Number of people 15-64 years old	2520 (74%)
Number of people >65 years old	225 (6%)
Median Age (years)	36.4 ⁵
Housing	
Total private dwellings (2016/2021)	756 / 1430
Private dwellings permanently occupied	1357 ⁶
Average household size	2.5
Income and Employment	
Median Total Income of Households ⁷	\$100,000

As shown in Table 6, the growth rate in both population and in the total number of private dwellings has been considerable. This provides an opportunity for the Village to proactively provide FireSmart education to residents that are new to the area, and work to ensure that new infrastructure and neighbourhoods are built with wildfire resilience in mind. When compared with the rest of the province, Pemberton has a young population which again provides an opportunity for proactive FireSmart education, and potentially a more long-term and able-bodied population to perform FireSmart mitigation work.

The Village was originally built at valley bottom on the floodplains of the Lillooet and Green Rivers, but has begun to expand further into the forested hillsides that surround the valley. Since 2016 there have been major residential development in the Benchlands area above downtown, which contains steep complex topography and conifer-dominated forests to the south and west. The proposed [Nkwúkwma development](#) will further extend into the hillside in this area, with initial plans for an additional 270 homes

³ Data in this section has all been obtained from the 2021 Canadian Census, unless noted otherwise.

⁴ 2021 census data for Indigenous communities was not available at the time of writing, but the Lil'wat webpage lists that 1450 of the 2200 community members live within Mount Currie.

⁵ The median age for BC is 43.0 as per the 2016 census.

⁶ 17% single-detached house; 58% row house or apartment/flat in a duplex; 18% apartment < 5 stories

⁷ In 2020, pre-tax.

(and 450 homes once complete). On the other side of the valley the [Ridge](#) and [Sunstone](#) developments continue to develop lots further up the steep, south-facing slopes.



Figure 1: Aerial view of the Ridge subdivision. Photo from Creus Engineering, accessed from <https://creus.ca/portfolio-posts/ridge-at-pemberton/>

The areas in and around the Village see considerable increases in daily populations during the peak of fire season due to expanding recreational networks and tourism opportunities in the summer months. Many of these tourists hail from the Greater Vancouver / Lower Mainland area, where the average individual's awareness of fire hazards and/or fire bans may be lower. An increase in summer visitation to the area results in:

- A) Increased likelihood of a human-caused wildfire;
- B) Increased consequences of a wildfire – more people to evacuate.

Both the Village of Pemberton and the SLRD's Community Wildfire Resiliency Committees identified 'slackcountry campers' as one of the biggest wildfire concerns in the region, especially as compliance with provincial and local fire bans was identified as an issue.

Immediately outside the municipal boundaries there are a number of more semi-rural communities, namely Pemberton Meadows and Pemberton Fringe in the SLRD, as well as Mount Currie. These areas share a close and mutually supportive relationship with the Village of Pemberton. The majority of residences in Pemberton Meadows are located on large agricultural properties on flat land at the bottom of the Lillooet River valley. Properties in Pemberton Fringe (off of Owl Ridge Road, Reid Road, and Walkerville Estates Road) are much more intermixed with the surrounding forest and are often located on parcels abutting steep slopes and unmanaged forests. Structure fire response for these areas is provided by Pemberton Fire Rescue via a five-year renewing Fire Services Agreement.

3.3 VALUES AT RISK

Values at risk are the human, natural, or cultural resources that could be negatively impacted by a wildfire. Protection of these values during a wildfire event is an important consideration for effective emergency response. Pre-identifying critical infrastructure and values at risk before an emergency event can ensure that essential services can be protected and/or restored quickly. As well, many activities that proactively assess and mitigate fire hazards around critical infrastructure and “Community Assets” are currently eligible for funding under the 2023 CRI FCFS Program Guide, which is addressed through Recommendation 13 (FireSmart Policies). Critical infrastructure includes buildings and structures that are essential to the health, safety, security, or economic wellbeing of the community and the effective functioning of government.

Table 7 lists critical infrastructure in Pemberton as identified by the Village’s emergency management staff. The SLRD also maintains a comprehensive database of critical infrastructure that also includes cell phone towers, gas stations, quarries, and grocery stores. Water and electric systems are discussed in more detail in Sections 3.3.1 and 3.3.2. There is some private water infrastructure (e.g., reservoirs in the Ridge development) that is not included in Table 7. At the time of writing, Pemberton FireSmart staff have performed FireSmart Critical Infrastructure Assessments on 11 pieces of Village infrastructure. Mitigation work focused on simple fuel management practices is being actively completed around these assets by Village FireSmart staff. These assessments and the follow-up work has been funded through the CRI FCFS program. Map 2 presents a visual display of values at risk throughout the eligible WUI.

Table 7: Critical Infrastructure within the Village of Pemberton.

Classification	Name	Agency	Address	Risk & Resilience Factors ⁸
Government				
Government	Pemberton Municipal Hall (Primary EOC)	VoP	7400 Prospect Street Pemberton, BC	Intermix with a manicured park. Mostly non-fuel surrounding.
Government	Pemberton & District Community Centre	VoP	7390 Cottonwood Street, Pemberton, BC	Surrounded by non-fuel (built-up)
Government	Pemberton Public Works Yard	VoP	1350 Aster Street Pemberton, BC	Continuous conifer forest to the SW, much of which has had fuel management
Health	Pemberton Health Centre	VCH	1403 Portage Road Pemberton, BC	Surrounded by non-fuel / planted vegetation
School	Signal Hill Elementary School	SD #48	1410 Pemberton Portage Road Pemberton, BC	Surrounded by non-fuel / maintained fields
School	Pemberton Secondary School	SD #48	1400 Oak Street Pemberton, BC	Surrounded by planted conifers and low-hazard deciduous stands.

⁸ Critical infrastructure FireSmart Assessments were outside of the scope of this plan; factors are based on general location or community function

Classification	Name	Agency	Address	Risk & Resilience Factors ⁸
Utilities				
Water	Pemberton Waste Water Treatment	VoP	1890 Airport Road Pemberton, BC	Surrounded by irrigated agricultural land, non-fuel, and deciduous riparian stands.
Water	Water Lift Stations (7) & Water Wells (3) & Reservoirs (2)	VoP	Multiple locations – not individually assessed	Majority are non-combustible pieces of infrastructure.
Hydro	Field Office & Works Yard	BC Hydro	1368 Aster Street Pemberton, BC	In the intermix, conifer forest to the west, north and east.
Hydro (SLRD)	Creekside Series Capacitor Station	BC Hydro	Pemberton Portage Road – Owl Creek Rec Site	Fuel management proposed and underway around this area.
Transportation				
Airport	Pemberton Regional Airport	VoP	1870 Airport Road Pemberton, BC	FireSmart structures, largely surrounded by non-fuel. Potential for dense cured grass if left unmaintained.
Emergency Response				
Fire	Pemberton Fire Rescue Hall	VoP	1350 Aster Street Pemberton, BC	Continuous conifer forest to the SW, much of which has had fuel management
Fire	BC Wildfire Service Base	BCWS	Airport Road Pemberton BC	Surrounded by irrigated agricultural land, non-fuel, and deciduous riparian stands
Ambulance	Pemberton BC Ambulance Service – Station 219	BC Ambulance Service	7413 Flint St, Pemberton, BC	Mostly surrounded by non-forest fuel (built up), with maintained mature conifers in the park to the west
Police	Pemberton RCMP Detachment	RCMP	7413 Prospect St, Pemberton, BC	Well separated from the forest – small number of planted conifers surrounding
Communications	Communications Towers	CBC, SAR, VoP	N 50° 19.644' W 122° 49.343'	Surrounded by dense conifer stands – much of which is now private property.

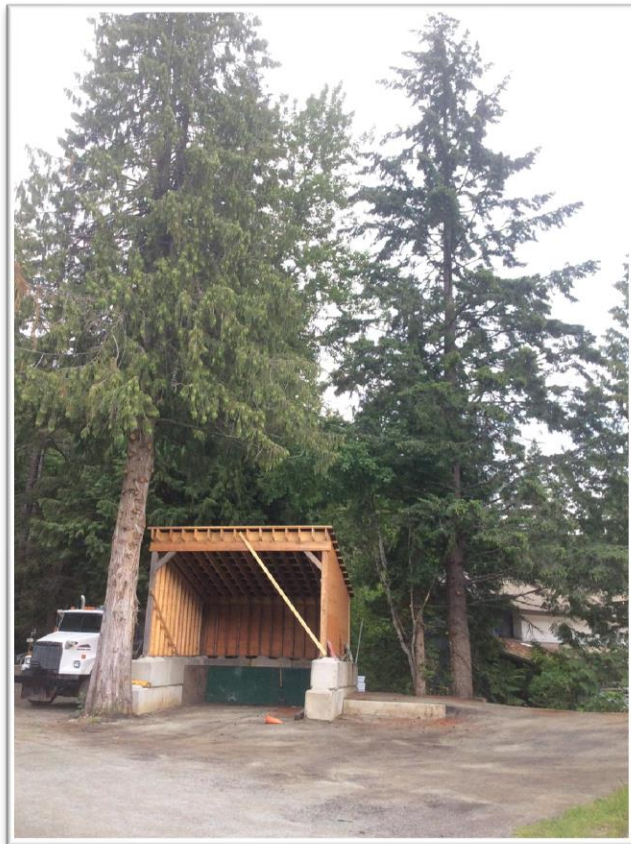


Figure 2: Examples of recent fuel mitigation work (thinning small conifers, pruning retained trees) around Village infrastructure, planned and completed by Pemberton FireSmart.

3.3.1 ELECTRICAL POWER

A large fire has the potential to impact electrical service by causing disruption in network distribution through direct or indirect processes. Direct heat from flames or damage from fallen trees associated with a fire event may cause power outages. There are three major transmission line right-of-ways bisecting the municipality, which can provide excellent fuel breaks and access for first responders in the event of a wildfire – if the vegetation on them is regularly managed and kept in a low-hazard state. BC Hydro clears right-of-ways in the region every few years, and no fuel hazard concerns were noted in these areas during field work for this plan, or by local BCWS / PFR staff.

Residential and commercial power throughout the Village is provided by a network of wood-pole BC Hydro distribution lines with underground servicing to many neighbourhoods. The distribution line that runs above Benchlands to the communications towers is a clear example of a line that could easily be compromised during a fire event in the area. Figure 3 shows how there are dense, high-hazard conifer stands on either side of this right-of-way, with accumulations of surface fuel and conifer regeneration underneath the line and adjacent to the combustible wooden poles. This same potential problem is present where landowners have highly flammable vegetation and/or unmaintained conifer trees growing in close proximity to power poles or distribution lines.



Figure 3: Looking east toward the Village along the distribution line right-of-way, downslope of the communications towers. Dense continuous conifer stands are found on either side.

Having secondary power sources for critical infrastructure is important to reduce community vulnerability in the event of an emergency that cuts power for days, or even weeks. The Village should invest in back-up generators for all Village-owned critical infrastructure (see Recommendation #28 in Section 5.6).

3.3.2 WATER AND SEWAGE

The Village utilizes a groundwater source for potable drinking water from the Pemberton Creek Fan Aquifer, pumped via two active wells (with a third well currently inactive).⁹ Well #2 performs as a backup well only to be used in emergency events (i.e., increased demand for fire flow during an urban or interface fire). This groundwater system also supplies water to residents of the Pemberton North Improvement District which is within the SLRD.

Pemberton Fire Rescue (PFR) has noted that all locations in the Village have an adequate supply of water available for fire response via fire hydrants. At the time of writing, PFR is working on an analysis to determine the maximum availability of water to their hydrant systems under different scenarios of structure protection. As the PFR's Fire Protection Area extends outside of Village boundaries to the Pemberton Meadows and Pemberton Fringe area, there are concerns of an inadequate water supply outside the municipal boundaries. PFR has noted that they do not have adequate equipment to provide reliable water shuttling to many of these areas. PFR is currently in the process of identifying and establishing water use agreements for additional water sources (natural and/or man-made for drafting and/or pump and hose setups) in rural areas outside the Village. See Section 5.5 for recommendations related to fire department resources.

No concerns or vulnerabilities from fire hazards were noted with the sewage system for the Village – which utilizes a state-of-the-art facility adjacent to the Lillooet River.

3.3.3 HAZARDOUS VALUES

Hazardous values are defined as values that pose a safety hazard to emergency responders and include large fuel / propane facilities, landfills, rail yards, storage facilities containing explosives, pipelines, etc. Anywhere combustible materials, explosive chemicals, or gas/oil is stored can be considered a hazardous value. Protecting hazardous values from fires is important to preventing interface fire disasters.

Hazardous values in the WUI are concentrated around the industrial park, east of downtown. It is also very likely that farms in the valley store gas, oil, and/or fertilizer. As well, a fire at the tire store near the Village's wells could constitute a significant contaminant risk to Pemberton's aquifer.¹⁰ It was also noted in the 2021 SLRD Community Risk Assessment that hazardous materials are transported by truck and train through the municipality (Highway 99 and CN rail corridor). Train car derailments near Gates Lake in 2017 and 2018 illustrate the risk of a material spill and potential fire or contamination event.

Accidental ignitions from train tracks and equipment are also a fire risk. In the summer of 2021 when rail traffic was increased along the Sea to Sky corridor in response to wildfires in the Fraser Canyon, CN increased track patrols.¹¹ Vegetation management practices along the rail lines has the ability to exacerbate a fire hazard if deciduous and/or coniferous vegetation and cured grasses are being brushed and left in accumulations beside the tracks. This presents more of a concern where the vegetation on

⁹ Water source information from the Village of Pemberton's Water Conservation Plan (2022), produced by Kerr Wood Leidal consulting engineers.

¹⁰ Enterprise Geoscience Services Ltd. (2012). Village of Pemberton Hydrogeological Assessment For Groundwater Protection Plan

¹¹ CBC News. July 11, 2021. Pemberton mayor raises fears about trains diverted from Lytton sparking fires.

<https://www.cbc.ca/news/canada/british-columbia/pemberton-trains-cn-wildfires-1.6098005>

private properties adjacent to the tracks has a coniferous component or cured grass, especially where developments such as The Ridge and Sunstone have built upslope of these rail lines.

3.3.4 CULTURAL VALUES

There are many documented historic and archeological sites within the WUI and a high potential for additional sites to be found given the long history of use by Lil'wat Nation.¹² Known archeological sites are protected under the Heritage Conservation Act, which applies on both private and public lands.

The Village of Pemberton and/or the Ministry of Forests should continue to consult with applicable First Nations well before development and implementation of any proposed fuel prescriptions to allow for meaningful review and input. As the SCF is jointly managed by Pemberton and the Lil'wat Nation, there is little concern that forest management within the Community Forest will not adequately address cultural values. Archeological assessments may be required to ensure that known or unknown cultural resources are not inadvertently damaged or destroyed, and that First Nations strategies for land management in their traditional territory are complied with (see Land Use Plans in Table 4).

3.3.5 HIGH ENVIRONMENTAL VALUES

The Sea to Sky Land and Resource Management Plan and Spelkúmtn Community Forest (SCF) Management Plan identify many important environmental areas throughout the AOI. There are minor overlaps with provincially-protected Old-Growth Management Areas (OGMA), Ungulate Winter Range, and Wildlife Habitat Areas, as well as significant overlaps with species and ecosystems at risk identified through the B.C. Conservation Data Center and by the federal government (Table 8). All fuel management prescriptions must identify and mitigate potential impacts to ecosystems or species at risk and may require rationales and/or mitigation measures for tree removal in some areas. As mentioned in Table 4, the approved SCF Forest Stewardship Plan identifies that minor forest harvesting may occur in OGMAs that are located in fire-dominated ecosystems. This idea is well supported by current research that indicates the importance of managing for dynamic reserves as opposed to static reserves in seasonally dry forests.¹³

¹² MFLNRORD Archeology Branch; Lil'wat Land Use Plan 2006

¹³ Gaines, W.L., et al., 2022. Climate Change and Forest Management on Federal Lands in the Pacific Northwest, USA: Managing for Dynamic Landscapes. DOI: <https://doi.org/10.1016/j.foreco.2021.119794>

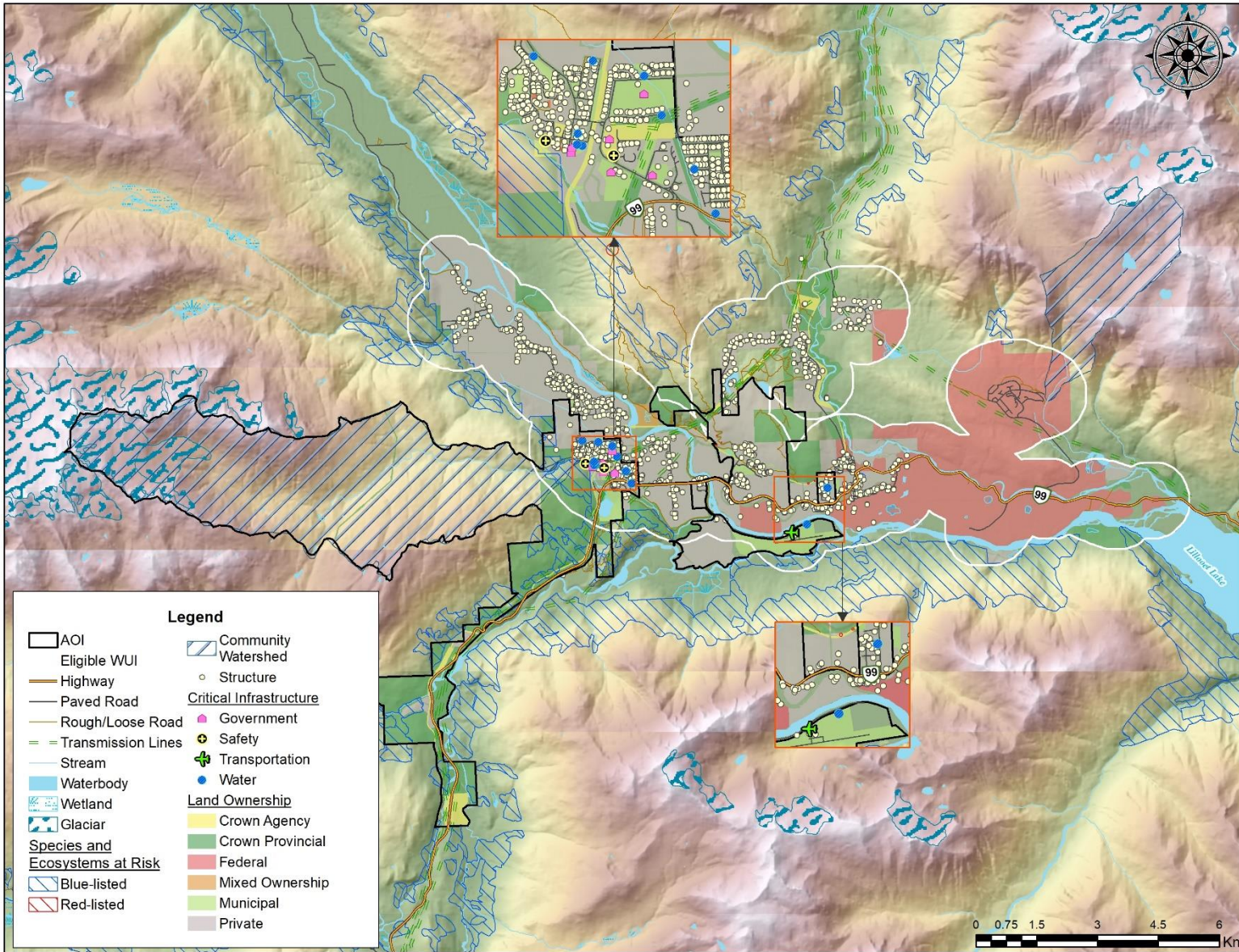
Table 8. Species and Ecosystems at Risk in the WUI – BC Conservation Data Center. *Denotes Critical Habitat for Federally Listed Species at Risk

Common Name	Scientific Name	Category	BC List	Habitat Type
Dun Skipper	<i>Euphyes vestris</i>	Invertebrate Animal	Blue*	Terrestrial: Roadside
Sharp-tailed Snake	<i>Contia tenuis</i>	Vertebrate Animal	Red *	Terrestrial: Coarse Woody Debris, Shrubland, Forest Mixed
Bank Swallow	<i>Riparia riparia</i>	Vertebrate Animal	Yellow*	Terrestrial: Agricultural, Anthropogenic, Forest, Grassland
Western Hemlock - Douglas-fir / Electrified Cat's-tail Moss Dry Submaritime 1	<i>Tsuga heterophylla</i> – <i>Pseudotsuga menziesii</i> / <i>Rhytidiadelphus triquetrus</i> Dry Submaritime 1	Ecological Community	Blue	N/A

The Lil'wat Nation Land Use Plan identifies the following plant habitats as rare or endangered: low to mid-elevation floodplains and alluvial forests, low-elevation warm-aspect rock outcrops, dry closed forests, and high-elevation avalanche tracks and meadows. The most threatened Biogeoclimatic units are the Interior Douglas Fir wet warm zone (IDFww) and Coastal Western Hemlock dry sub maritime zone (CWHds1) plant communities. It should be noted that all forestry related development plans in the AOI should be directed to the Lil'wat Land Use Referral Committee.

3.3.6 OTHER RESOURCE VALUES

There are multiple other important resource values associated with the land base, including forestry, agriculture, recreation, and tourism. Any fuel management within the Village of Pemberton should consider the impact on any of these additional values, and consult with appropriate land managers in the area.



Map 2: Values at Risk map for the Village of Pemberton and surrounding area.

SECTION 4: WILDFIRE RISK ASSESSMENT

This section summarizes the factors that contribute to local wildfire risk in the Village of Pemberton. Section 4.1 discusses the wildfire environment in the WUI: focusing on topography, fuel, and weather. Section 4.2 and 4.2.3 discuss wildfire history in the area and wildfire response data from local fire crews. Section 4.3 uses updated fuel types combined with wildfire threat assessments and an office-based analysis to update the local wildfire risk for the eligible WUI.

The local wildfire risk assessment helps to identify the parts of the eligible WUI that are most vulnerable to wildfire. The CWRP risk assessment complements the broader scale Comprehensive Emergency Management Plan.

The relationship between wildfire risk and wildfire threat is defined as follows:

$$\text{Wildfire Risk} = \text{Probability} \times \text{Consequence}$$

Where:

Wildfire risk is defined as the potential losses incurred to human life and values at risk within a community in the event of a wildfire.

Probability is the threat of wildfire occurring in an area and is expressed by the ability of a wildfire to ignite and then consume fuel on the landscape. An area's *wildfire threat* is controlled primarily by:

- Topography: Slope and terrain features can influence rate of spread; aspect can affect pre-heating and other fuel properties
- Fuel: Amount, vertical and horizontal arrangement, type, and dryness
- Weather: Temperature, relative humidity, wind speed and direction, precipitation

Consequences refer to the repercussions associated with fire occurrence in a given area. Higher consequences are associated with densely populated areas, presence of values at risk, etc.

4.1 WILDFIRE ENVIRONMENT

There are three environmental components that influence wildfire behavior: topography, weather, and fuel. These components are generally referred to as the 'fire behaviour triangle' (Figure 4); the ways in which they individually influence the wildfire environment of the area will be detailed below. Fuel is the only component of the fire triangle that can be reasonably managed through human intervention.



Figure 4: Graphic display of the fire behaviour triangle, and a subset of characteristics within each component.¹⁴

4.1.1 TOPOGRAPHY

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 configuration of features on the landscape that can restrict (i.e., water bodies, rock outcrops) or drive (i.e., valleys, exposed ridges) the movement of a wildfire. As Pemberton occupies a steep-sided river valley, topography presents a natural risk factor as this valley can funnel winds to drive a fire both up and down the valley. Smaller rivers, tributaries, and creek draws (often running up/down the valley slopes of the major drainages) provide additional convective features that can drive the fast upslope spread of fire.

¹⁴ Graphic adopted from the Province of Alberta.



Figure 5: View of the slope-driven Miller Creek fire in the Pemberton Valley in 2020. Photo from [CBC](#).

The oldest parts of the Village and the majority of Village infrastructure is located on the valley bottom, which is naturally advantageous from a fire spread standpoint. As new developments have moved out of the floodplain and into the surrounding hills (e.g., Benchlands, Ridge, Sunstone, Plateau), more structures and infrastructure are being put at a topographical risk to fire. The complex topography around these developments can also make water delivery more difficult as natural water sources are scarce and pumping against gravity requires additional pressure. Both Ridge and Sunstone are located on exposed south / southwest facing slopes, which receive nearly constant insolation throughout the summer. While this aspect provides the most challenging weather conditions in fire season, vegetation growth is more limited here due to more pronounced growing season water deficits.

Table 9 shows the percent of the WUI by slope steepness class, with corresponding fire behavior implications. One-third of the WUI (31%) is on >30% slope and would experience accelerated rates of spread due to slope class.

Table 9. Slope Percentage and Fire Behaviour Implications.

Slope	Percent of Eligible WUI	Fire Behaviour Implications
<20%	56%	Very little flame and fuel interaction caused by slope, normal rate of spread.
21-30%	13%	Flame tilt begins to preheat fuel, increase rate of spread.
31-45%	12%	Flame tilt preheats fuel and begins to bathe flames into fuel, high rate of spread.
46-60%	14%	Flame tilt preheats fuel and bathes flames into fuel, very high rate of spread.
>60%	6%	Flame tilt preheats fuel and bathes flames into fuel well upslope, extreme rate of spread.

Table 10 shows the fire behavior implications of slope position of a value. Values located mid-slope are threatened by faster rates of fire spread due to the pre-heating of fuels and longer flame lengths. As discussed above, the majority of the Village is situated at valley bottom at an elevation of approximately 200 meters, so would not fire rates of spread influenced by topography alone. However, newer developments and community infrastructure are located up to 160 meters further upslope in elevation, with transmission lines often located mid-slope. These values are more at risk from fires spreading quickly uphill and are often damaged or temporarily disabled by wildfires. High levels of particulate matter from wildfire smoke can also impact transmission lines. In the summer of 2021, two cell towers were damaged by the Lytton wildfire.¹⁵

Table 10. 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 increase 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.

4.1.2 FUEL

The ecological context of wildfire and the role of fire in the local ecosystem under both current and historical conditions is an important basis for understanding the current and future wildfire threat to a community. As well, the type and amount of fuel available for a wildfire is a major driver of the potential fire behaviour in an area. Fuel is the only component of the fire triangle that can be realistically managed through human intervention.

Land clearing for agriculture and/or development has removed native forest stands from the majority of the valley bottom. These swaths of cleared, irrigated farm land at the bottom of the valley reduce wildfire threat. Extending into the hillsides above the Village, extensive logging has combined with historically suppressed wildfires throughout the 1900s to result in a continuous distribution of dense even-aged conifer stands. The forest stands adjacent to developed areas are generally continuous, with few natural or human-created fuel breaks other than rocky areas with sparse or absent tree cover, transmission line right-of-ways, and water bodies. As many of these second-growth stands have regenerated in high densities and had fire excluded as an agent of natural disturbance, their fuel structure has become problematic. Opportunities have now been challenged and/or lost to re-introduce low-severity fires to

¹⁵Roden, B. July 1, 2021. TELUS working to restore communication in Lytton after fire damages infrastructure. Ashcroft Cache Creek Journal. <https://www.ashcroftcachecreekjournal.com/news/telus-working-to-restore-communication-in-lytton-after-fire-damages-infrastructure/>

many of these dense areas without managing the fuel ahead of time. As these stands continue to age, forest health issues (both biotic and abiotic) can affect stand structure and fuel loading.

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines sixteen fuel types based on characteristic fire behaviour under defined conditions.¹⁶ BC Wildfire Service maintains a provincial fuel type layer that was confirmed and updated for this CWRP. It should be noted that a locally observed fuel type may have no exact analog within the FBP system. In these cases, the most appropriate fuel type to predict fire behaviour was assigned; the FBP system was almost entirely developed for boreal and sub-boreal forest types, which do not occur within the study areas. Furthermore, fuel types depend heavily on Vegetation Resource Inventory (VRI) data, which is gathered and maintained in order to inform timber management objectives, not fire behaviour prediction. Although a subjective process, the most appropriate fuel type was assigned based on research, experience, and practical knowledge; this system has been successfully used within BC, with continual improvement and refinement, for 20 years.¹⁷ In some areas, aerial imagery is of low spatial resolution and/or ground access was impossible, making fuel type assessment difficult.

Table 11 lists the percentage of fuel types in Pemberton's eligible WUI. The fuel type present that is considered most hazardous in terms of fire behaviour is C-3. These stands can readily support crown fire as a result of fuel moisture, fuel loading, and weather conditions. Extensive areas of O-1a/b or C-7 can support a rapidly spreading surface fire capable of damage or destruction of property and jeopardizing human life. The fire behaviour potential in O-1a/b and C-7 fuel types is recognized as highly variable dependent on the percentage of grass that is cured and the wind speed. An M-1/2 fuel type can be considered hazardous depending on the proportion of conifers within the forest stand, and/or the amount of dead and downed material. D-1/2 stands are dominated by deciduous species, and are generally considered the least hazardous forest type as a result of their higher moisture content and lack of flammable ladder fuels. The hazard of a D-1/2 stand can greatly increase if there is an accumulation of surface fuels, cured grasses, or flammable shrubs. Recent spring cross-over conditions¹⁸ on the coast have allowed for destructive forest fires in deciduous-dominated stands. The Squamish valley has experienced a number of these human-caused fires since 2018 which have destroyed multiple homes in the valley. Detailed fuel type descriptions and their associated wildfire risk can be found in Appendix B-1: Fuel Typing Methodology.

¹⁶Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3.

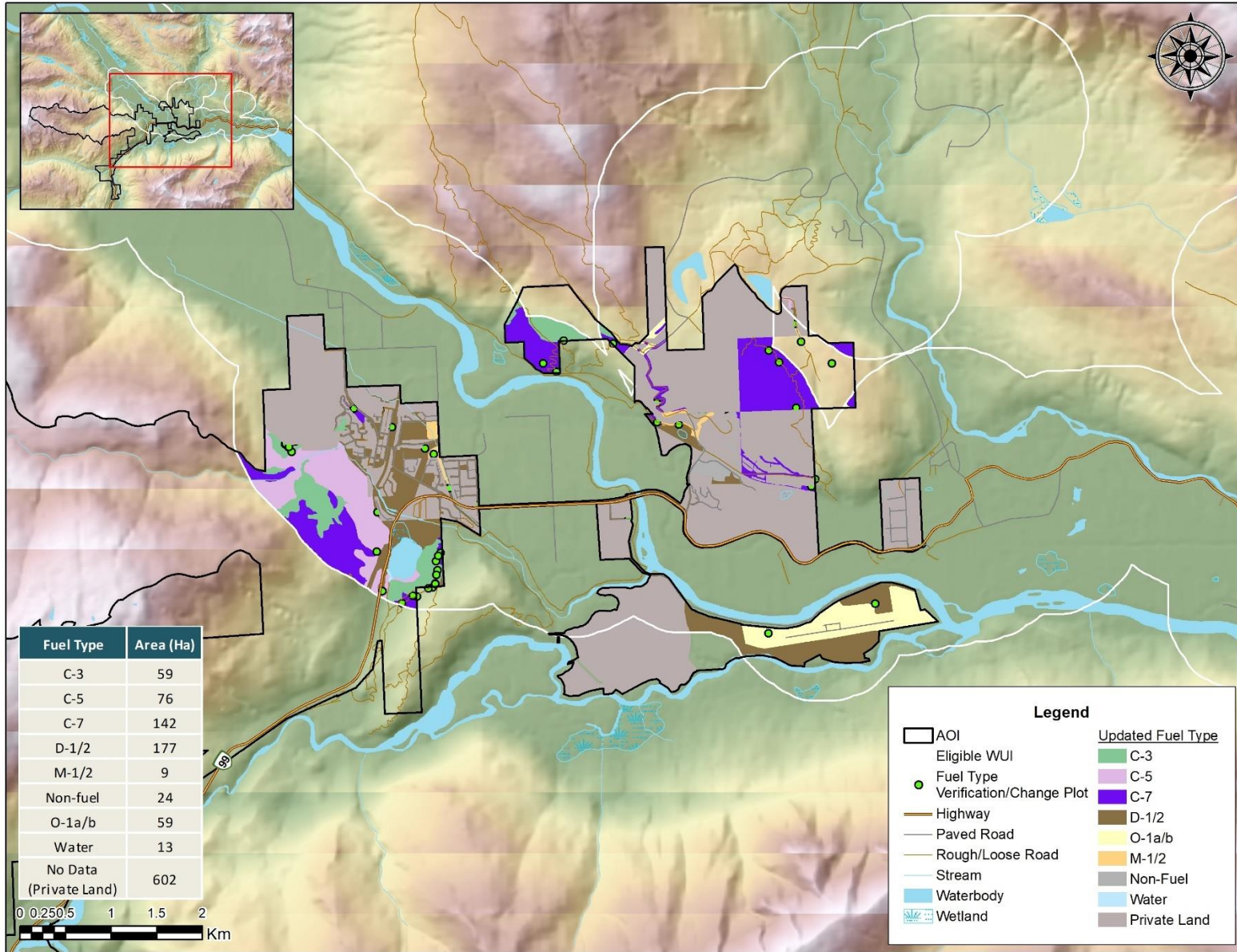
¹⁷ Perrakis, D, G. Eade and D. Hicks. 2018. Canadian Forest Service Pacific Forestry Centre. British Columbia Wildfire Fuel Typing and Fuel Type Layer Description

¹⁸ Cross-over conditions refer to a point where air temperature drops below the relative humidity (e.g., 20°C/15% humidity), providing conditions for potentially severe fire behaviour.

Table 11. Fuel types in the Wildland Urban Interface

Fuel Type	Fuel Type Description within the WUI	Area (ha) of WUI	Percent (%) of WUI
C-3	Well-stocked immature / mature conifers stands, often with a canopy closure > 60 %. Often have a considerable dead component (standing and downed fuel) through stem exclusion, and/or a flammable understory layer.	59	5%
C-5	Lower hazard mature conifer stands (often dominated by cedar and hemlock) with structural complexity. Often contain a low-flammability shrub layer, more open canopies than a C-3, and high crown base heights.	76	7%
C-7	Mature and open forest stands with a mix of flashy grass fuels and lower flammability shrubs. Often located on south-facing slopes and throughout the IDFww.	142	12%
D-1/2	Deciduous stands/forest. Hazard increases with the amount of deadfall and/or establishment of a flammable shrub layer.	177	15%
M-1/2	Moderately well-stocked mixed stands of conifer and deciduous, low to moderate dead stems and down woody fuels. Often transition to become more conifer dominated as pioneer deciduous species die out if disturbance is excluded.	9	1%
O-1a/b	Grassland fuels ('a' refers to matted grasses, 'b' refers to standing). The volatility of this fuel type depends on the percentage of grass that is cured.	59	5%
Non-fuel	Areas with no available forest or grass fuels (e.g., roadways, gravel clearings, irrigated fields). These areas may (and often do) contain combustible materials, infrastructure, flammable landscaping, and homes.	24	2%
Water	-	13	1%
Private Land	-	602	52%

Map 3 below displays the updated fuel types for the eligible WUI surrounding Pemberton.



Map 3. Updated fuel types in the eligible WUI of the Village of Pemberton

4.1.3 WEATHER

The Village of Pemberton has a low elevation valley-bottom location, surrounded by large mountains in all directions. Weather patterns in the area are highly unpredictable and variable due to the complex topography. Fire season conditions are generally extremely hot and dry in the valley, with climate change projections trending toward even hotter summers and more pronounced droughts. Local BC Wildfire Service (BCWS) staff commented that in this area, weather (i.e., relative humidity and wind) and drought are far more important factors in fire growth than fuel types.

Historical weather data can provide information on the number and distribution of days when the Pemberton area experiences high fire danger conditions. ‘High fire danger’ is considered with a Canadian Forest Fire Danger Rating System (CFFDRS) Danger Class rating of 4 (High) or 5 (Extreme). Average danger class data as reported by the Pemberton Base BCWS weather station for the past 10 years is presented in Figure 6 below. Pemberton Base is located at 204 meters in elevation in the CWHds1 (this classification is covered in Section 4.2). The data from this station may underestimate fire danger due to the moderating effect of the nearby Lillooet and Green Rivers, and by the way in which the Wildfire Regulation delineates the province into Danger Index Regions. The nearby Cheakamus station is in a different Danger Index Region and reports much more extreme fire weather data, despite being located at a higher elevation and in a wetter BEC zone (Figure 7). This is problematic for Pemberton and the surrounding area, as residents and industrial operators reference the Pemberton Base weather station for the daily fire danger rating.

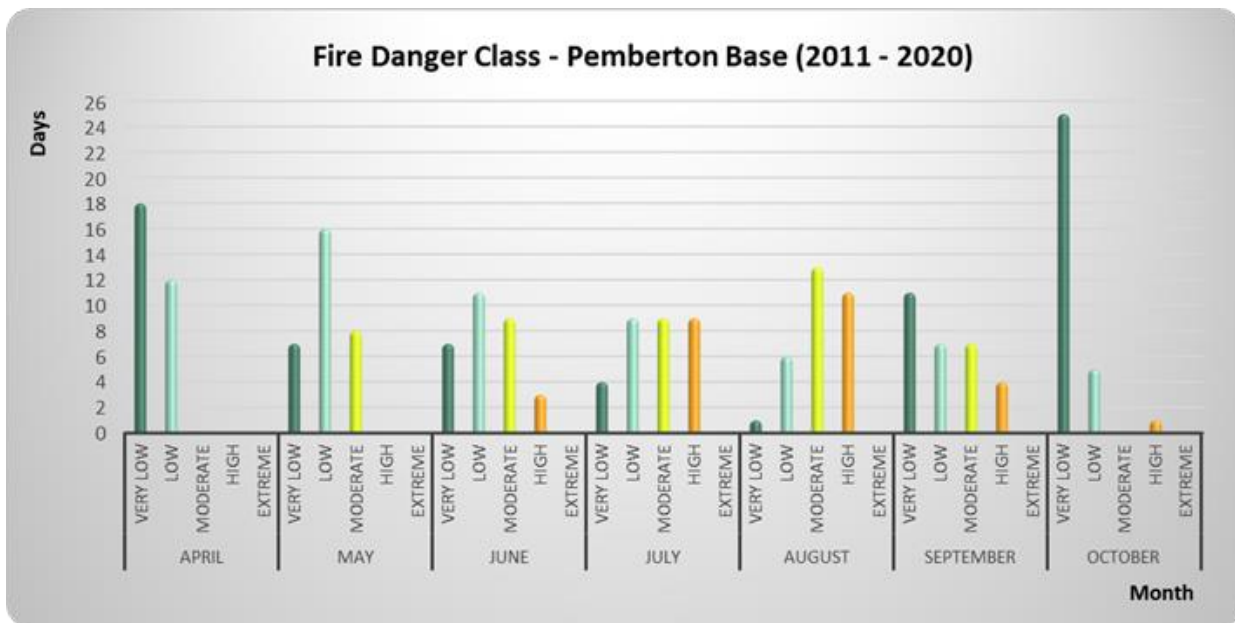


Figure 6: Average number of fire danger rating days by month for the Pemberton Base weather station – located in Danger Index Region 3.

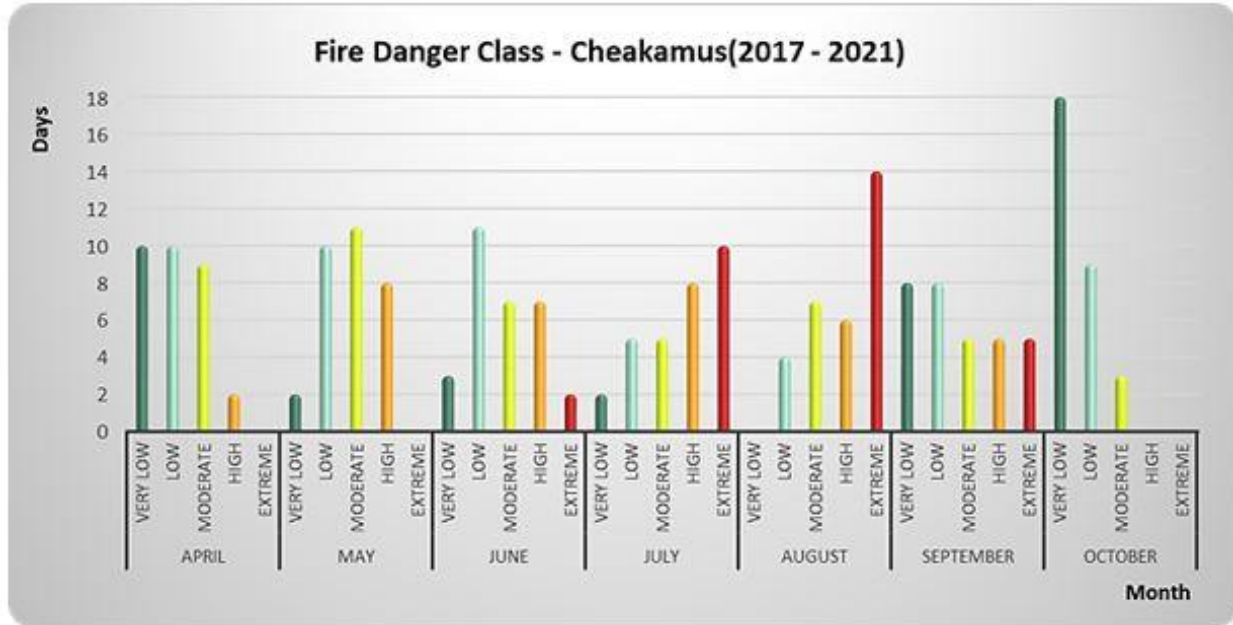


Figure 7: Average number of fire danger rating days by month for the Cheakamus weather station – located in Danger Index Region 1.

Hourly wind speed and direction is also recorded at BCWS weather stations. Data is publicly available in the form of average Initial Spread Index (ISI) roses.¹⁹ The ISI is a numeric rating of the expected rate of fire spread that combines the effects of wind speed and fine fuel moisture (which is controlled by temperature and relative humidity). ISI roses can be used to help plan the location of fuel treatments on the landscape to protect values at risk based on the predominant wind direction and frequency of higher ISI values. Wildfire that occurs upwind of a value poses a more significant threat to that value than one which occurs downwind.

During the fire season, Pemberton can experience strong winds from multiple directions, influenced by diurnal wind patterns and/or weather systems that originate either off the coast or from the arctic / interior. As per the ISI rose, the highest ISI wind directions can mostly likely originate from any cardinal direction other than true north and south. The predominant wind direction at the Pemberton Base during the fire season is from the east (Figure 8). Hourly data (not displayed) shows that wind speeds peak from around noon to 6 pm, remaining strong into the evening and tapering off after midnight.

¹⁹<https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management>

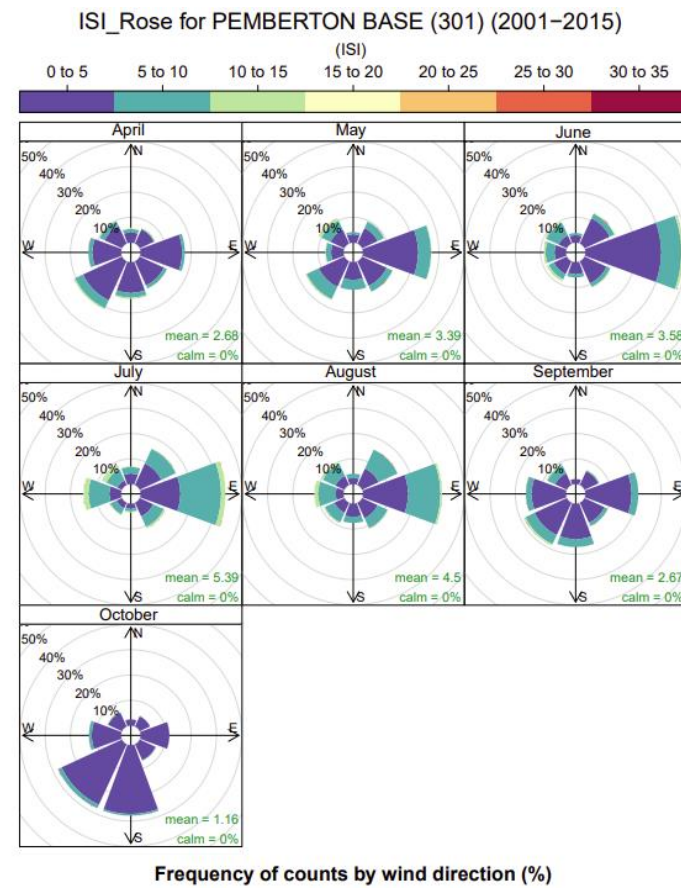
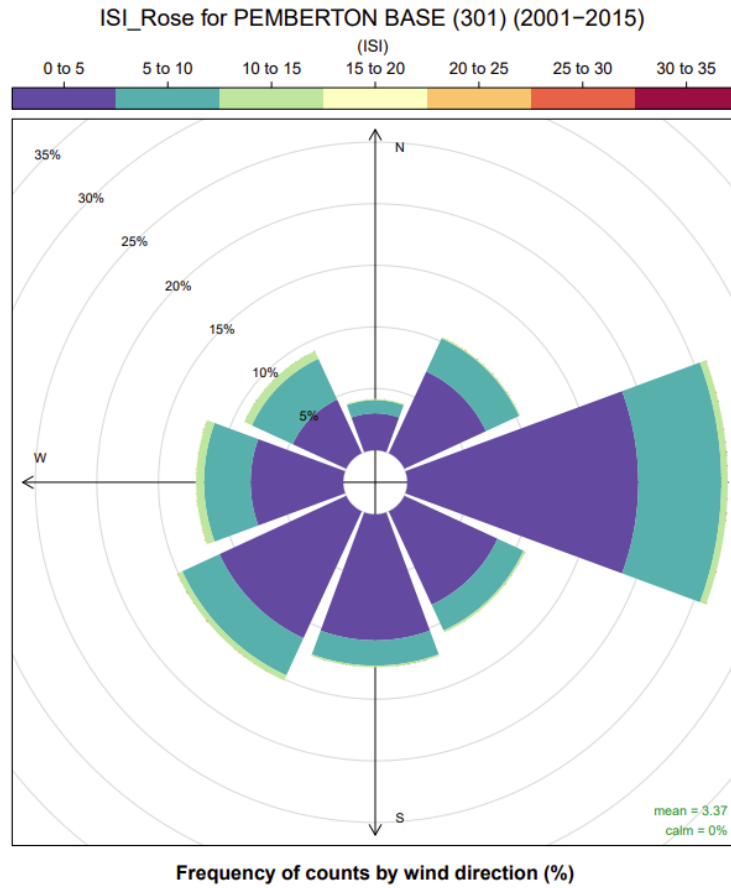


Figure 8. Daily and monthly average initial spread index rose for Pemberton Base weather station for the fire season (April – October)

4.2 WILDFIRE HISTORY

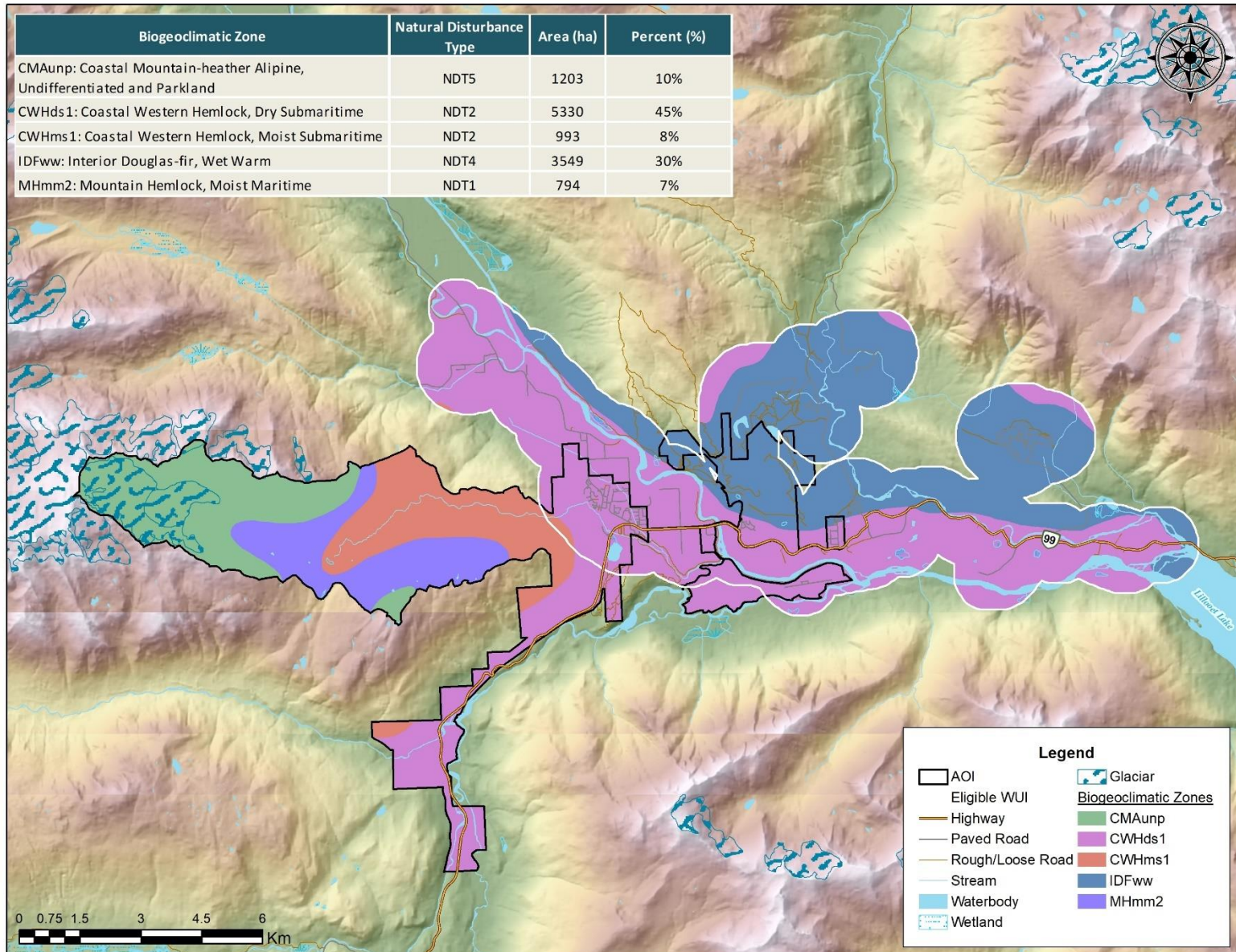
4.2.1 HISTORIC FIRE REGIME

The Pemberton WUI can be categorized using the Biogeoclimatic Ecosystem Classification (BEC) system, which classifies the province into zones by vegetation, soils, and climate. Regional subzones are derived from relative precipitation and temperature. The majority of the WUI surrounding Pemberton falls into the Coastal Western Hemlock dry-submaritime (CWHds1), which is the driest “coastal” forest type before transitioning into the Interior Douglas Fir (IDF). The south facing slopes at the north end of the municipality are within the IDF wet-warm (ww). Forests in the IDFww are characterized by a disturbance regime of frequent low-intensity surface fires (referred to as a Natural Disturbance Type [NDT] 4), which would normally regulate the amount of fuel built-up. CWHds1 forests are thought to have a NDT2 – defined by return intervals between 200 and 450 years for stand replacing disturbances. Fire regimes in the CWHds1 were likely a mix between low-severity (killing small saplings), moderate-severity (patchy mortality) and high-severity (killing many large trees).²⁰ Map 4 below shows the distribution of Biogeoclimatic zones and associated NDTs in the wildland-urban interface and throughout Pemberton’s municipal boundary. It is important to consider that BEC distributions will likely change along with climate change.

Forests in the IDFww would normally experience frequent, low-intensity fires that remove understory vegetation and maintain larger, fire-resistant trees. This regime was likely exemplified through pre-settlement cultural burning practices by the Liíwat7úl. A higher frequency and a variable intensity of these types of fires across the landscape would create mosaics of uneven-aged forests and grassy or shrubby openings which naturally restrict the spread of large severe fires. In the NDT2 – there were two large stand-replacing fires in the CWHms1 in 2015 alone: the ~12,000-hectare Elaho fire and the ~3,000-hectare Nahatlatch fire. Both of these fires were found to have been ignited by lightning during a period of low rain after a winter with low snow pack, and were influenced by strong, dry outflow winds from the interior.²¹

²⁰ Dorner, B. & Wong, C. (2003). *Natural Disturbance Dynamics in Coastal British Columbia*. Accessed from: <https://www.for.gov.bc.ca/tasb/slrp/citbc/b-NatDist-DornerWong-May03.pdf>

²¹ MFLNRORD. 2016. Sea to Sky Natural Resource District Fire Management Plan.



Map 4: Overview of Biogeoclimatic Zones and their respective natural disturbance type throughout the municipality and in the surrounding WUI.

4.2.2 HISTORICAL WILDFIRE OCCURENCES

Wildfires in the Pemberton area occur frequently and have the potential to be large. Although humans are the most common cause of ignitions in the wildland-urban interface, all areas are also subject to lightning ignitions at higher elevations and slope positions, and most large fires in the area have been lightning-caused. Local BCWS staff have expressed concerns regarding the potential difficulty of managing multi-start fire events as a result of lightning storms. Figure 9 displays trends with fire ignitions since the 1950's within the Village boundaries. 70% of these ignitions have been human-caused.

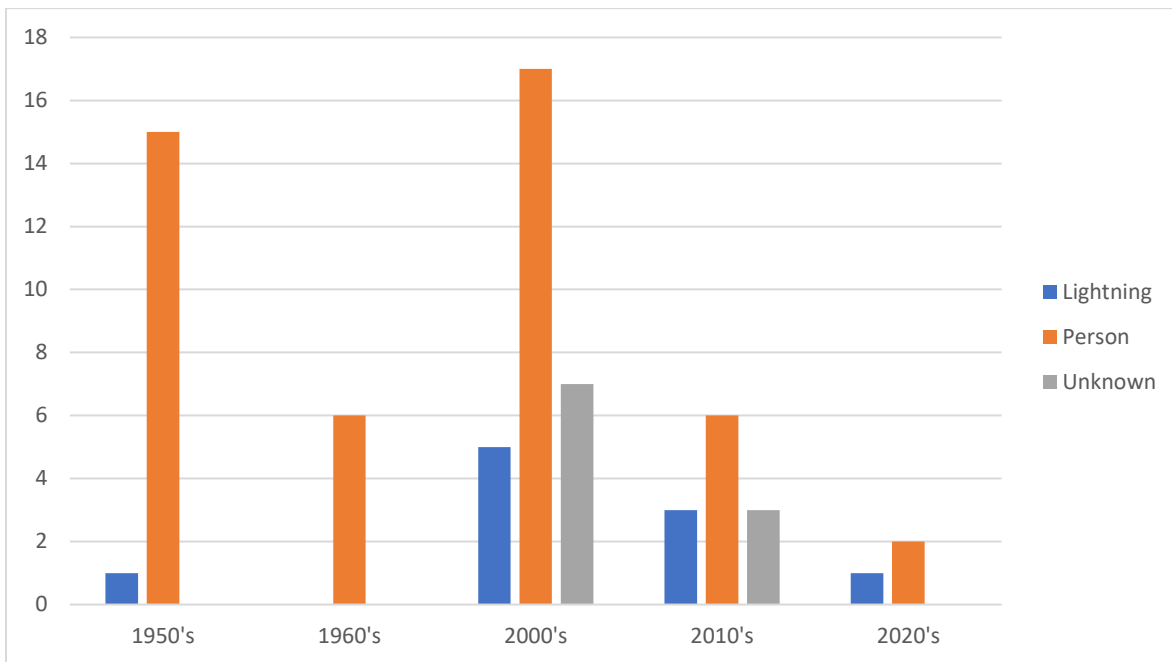


Figure 9: Summary of fire ignition data by cause within the municipal boundaries of Pemberton (Data from the BC Wildfire Service).

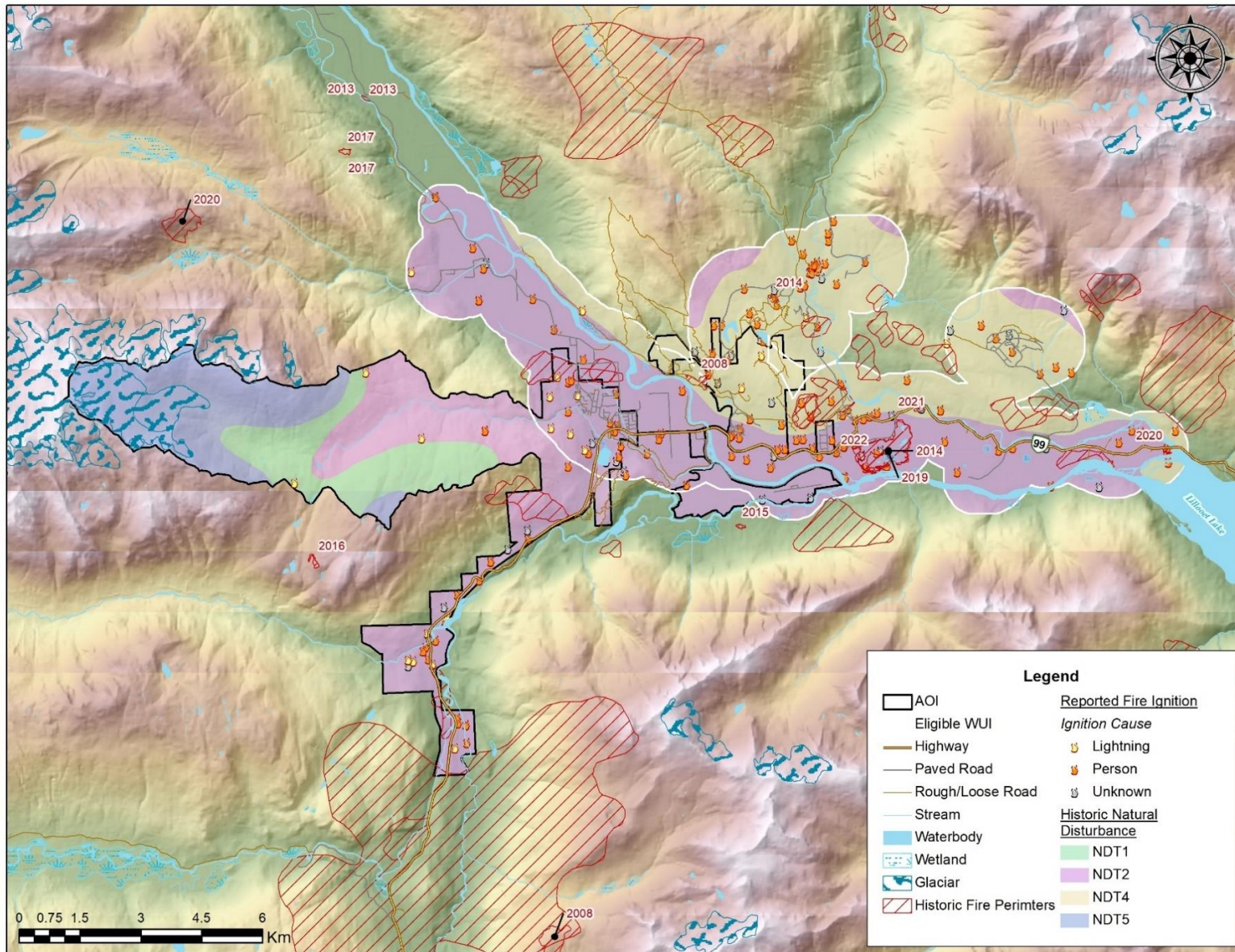
There have been a number of significant fires in adjacent valleys, the distribution and frequency of which demonstrates the natural potential of wildfire in the ecosystem. In 2009, a pair of lightning-ignited fires burned more than 650 and 850 hectares respectively on either side of Pemberton Meadows. In 2015, the lightning-ignited Boulder fire burned more than 6,600 ha, spreading down the Boulder Creek drainage and up the Meager Creek and Lillooet River drainages. There were two fires on the western shore of Anderson Lake in 2018, one ~500 ha and one over 800 ha (one person-caused, one lightning-caused) and a ~370-ha lightning-caused fire on the western shore of Lillooet Lake in 2020. It is concerning that there is no considerable area burned since the mid-1900's in the IDFww surrounding Pemberton.

Table 12. Fire History, Cause, and Spread Patterns within VoP boundaries, and near adjacent communities.

Community	Natural Disturbance Type	Fire History in the WUI
Pemberton Municipal Boundary	NDT2 (80%) NDT4 (20%)	66 ignitions since 1950s; 70% human-caused. Multiple nuisance / public carelessness starts attended by Pemberton Fire Rescue. Multiple roadside fires.
Pemberton Fringe	NDT4 90% NDT2 10% (higher up)	45 ignitions since 1950s; 96% person-caused. Almost all recent ignitions were nuisance fires (smoke chase) often at Owl Creek Rec Site. There was a 2-ha fire started from welding/grinding on Reid Road in 2014.
Pemberton Meadows	NDT2 (70%) NDT4 (30%, east of Lillooet River)	70 ignitions since 1950s; 87% person-caused. Most recent fires on private property around Clover Road and beginning of Meadows Road have been nuisance fires/smoke chases. Three 20-60 ha person-caused fires in 1920s - 30s at valley bottom near town Large historical fires on the valley slopes including two lightning-caused 700-900 ha fires in 2009. Spread upslope and to the southeast.

4.2.3 WILDFIRE RESPONSE

Pemberton Fire Rescue has responded to an average of 45 fire calls per year since 2016. ~33% are wildfires and ~38% are burn complaints. The ignition cause of most wildfires that Pemberton Fire Rescue responds to was identified as 1) accidental ignition by the public walking in the forest, 2) lightning strikes 3) open burning contrary to restrictions, during windy conditions, or unattended. Response data from Pemberton Fire Rescue demonstrates the importance of wildfire specific training and equipment and public fire education. See Section 5 for related recommendations.



Map 5: Natural disturbance regimes and historical fire ignitions and occurrences (fires greater than 1 hectare in size) in the area surrounding Pemberton.

4.3 LOCAL WILDFIRE RISK ASSESSMENT

There are two main components of this local risk assessment: the *wildfire behaviour threat class* (fuels, weather, and topography sub-components) and the *WUI risk class* (structural sub-component). The local wildfire threat assessment process includes several key steps as outlined in Appendix B: Local Wildfire Risk Process and summarized as follows:

- *Fuel type attribute assessment* – ground truthing/verification and updating as required to develop a local fuel type map (Appendix B-1: Fuel Typing Methodology).
- *Consideration of the proximity of fuel to the community* – recognizing that fuel closest to the community usually represents the highest hazard (Appendix B-4: Proximity of Fuel to the Community).
- *Analysis of predominant summer fire spread patterns* – using wind speed and wind direction during the peak burning period using ISI Rose(s) from BCWS weather station(s). Wind speed, wind direction, and fine fuel moisture condition influence wildfire trajectory and rate of spread.
- *Consideration of topography in relation to values* (Table 9 and Table 10) – slope percentage and slope position of the value are considered, where slope percentage influences the fire’s trajectory and rate of spread and slope position relates to the ability of a fire to gain momentum uphill.
- *Stratification of the WUI* – according to relative wildfire threat based on the above considerations, other local factors, and field assessment of priority wildfire risk areas.

Wildfire Threat Assessment (WTA) plots were completed over a number of field days in July of 2022 in conjunction with verification of fuel types (see Appendix C: Wildfire Risk Assessment – Worksheets and Photos). WTA plots were completed in interface (i.e., abrupt change from forest to residential development) and intermix (i.e., where forest and structures are intermingled) areas of the WUI to support development of priority treatment areas. A total of 8 WTA plots were completed and over 250 other field stops (e.g., qualitative notes, fuel type verification, and/or photograph documentation) were made across the WUI (see Appendix B-2: and Map 6).

It is important to note that the local WTA analysis does not apply to private land parcels or any areas outside of the AOI for this CWRP. As well, the threat assessments quantify threat as it relates to forest fuels, and does not include the ignition potential of residential landscaping, structures or other infrastructure. Structure fires and structure-to-structure spread in a wildfire scenario are largely attributable to hazardous conditions in the Home Ignition Zone of a structure (i.e., the area within 1.5 m of the principal building and/or its attachments).

4.3.1 WILDFIRE THREAT CLASS ANALYSIS

Classes of the wildfire threat class analysis are as follows:

- Very Low: Waterbodies with no forest or grassland fuels, posing no wildfire threat;
- Low: Developed and undeveloped land that will not support significant wildfire spread;

- **Moderate:** Developed and undeveloped land that will support surface fires that can be unthreatening to homes and structures;
- **High:** Landscapes or stands with continuous forested or grassland fuels that will support candling, intermittent crown fires, or continuous crown fires. These landscapes often contain steeper slopes, rough or broken terrain and/or south or west aspects. High polygons may include high indices of dead and downed conifers; and
- **Extreme:** Continuous forested land that will support intermittent or continuous crown fires.

The results of the wildfire threat class analysis are shown on Map 6 and in Table 13 below. The local threat analysis shows that 14% of the assessable (i.e., not private land) eligible WUI within Pemberton is classified as high or extreme fire behavior threat. 33% is classified as moderate threat. 52% of the area is private land and as such has not been allocated fire threat data. Conditions on private land can often result in the fire hazard being much higher than in the forest adjacent if there is low compliance with FireSmart principles – which is an issue that was frequently observed through field work.

High threat areas are scattered throughout the WUI, and abut private land in many instances. Extreme threat areas are isolated and further away from developed areas. The spatial distribution of risk is driven by the factors listed above, including fuel type, slope, and weather.

Table 13: Fire threat summary for the eligible WUI within the Village of Pemberton.

Fire Threat			
Threat Class	Hectares	% of WUI	% of Assessable Public Land
Extreme	35	3%	6%
High	45	4%	8%
Moderate	184	16%	33%
Low	257	22%	46%
Very Low/No Threat (Water)	36	3%	3%
No Data (Private Land)	602	52%	-

4.3.2 WUI RISK CLASS ANALYSIS

WUI risk classes are quantified when the Wildfire Threat (the above) is assessed as high or extreme, causing potential of unacceptable wildfire risk when near communities and developments. WUI risk classes are described below:

- **Low:** The high or extreme threat is sufficiently distant from developments, having no direct impact of the community and is located over 2 km from structures;
- **Moderate:** The high or extreme threat is sufficiently distant from developments, having no direct impact of the community and is located 500m to 2 km distance from structures;

- **High:** The high or extreme threat has potential to directly impact a community or development and is located 200m to 500m from structures; and
- **Extreme:** The high or extreme threat has potential to directly impact a community or development and is located within 200m from structures.

Table 14 below (and also displayed on Map 6) summarizes the risk class ratings within the WUI. Of the 80 hectares assigned a High or Extreme threat class, only five hectares (less than 1% of the eligible WUI) have an extreme risk while an additional 23 hectares have a high risk.

It is important to note that reducing the risk (i.e., performing fuel management) in any of these moderate to extreme risk areas is unlikely to be a silver bullet in protecting neighbourhoods. Large private land holdings (e.g., for the Nkwúkwa development or upslope of the Ridge or Sunstone developments) may result in a large patch of untreated forest fuels between these managed forest stands and any structures / infrastructure. In combination with fuel management, increasing the resilience of these neighbourhoods can only be efficiently achieved by performing residential-scale FireSmart treatments on private land. The proposed fuel treatment units identified in Section 5.7 were selected for as the highest priority areas that are feasible to implement and that also present the highest risk to the community.

Table 14: WUI risk class ratings within the eligible WUI of the Village of Pemberton

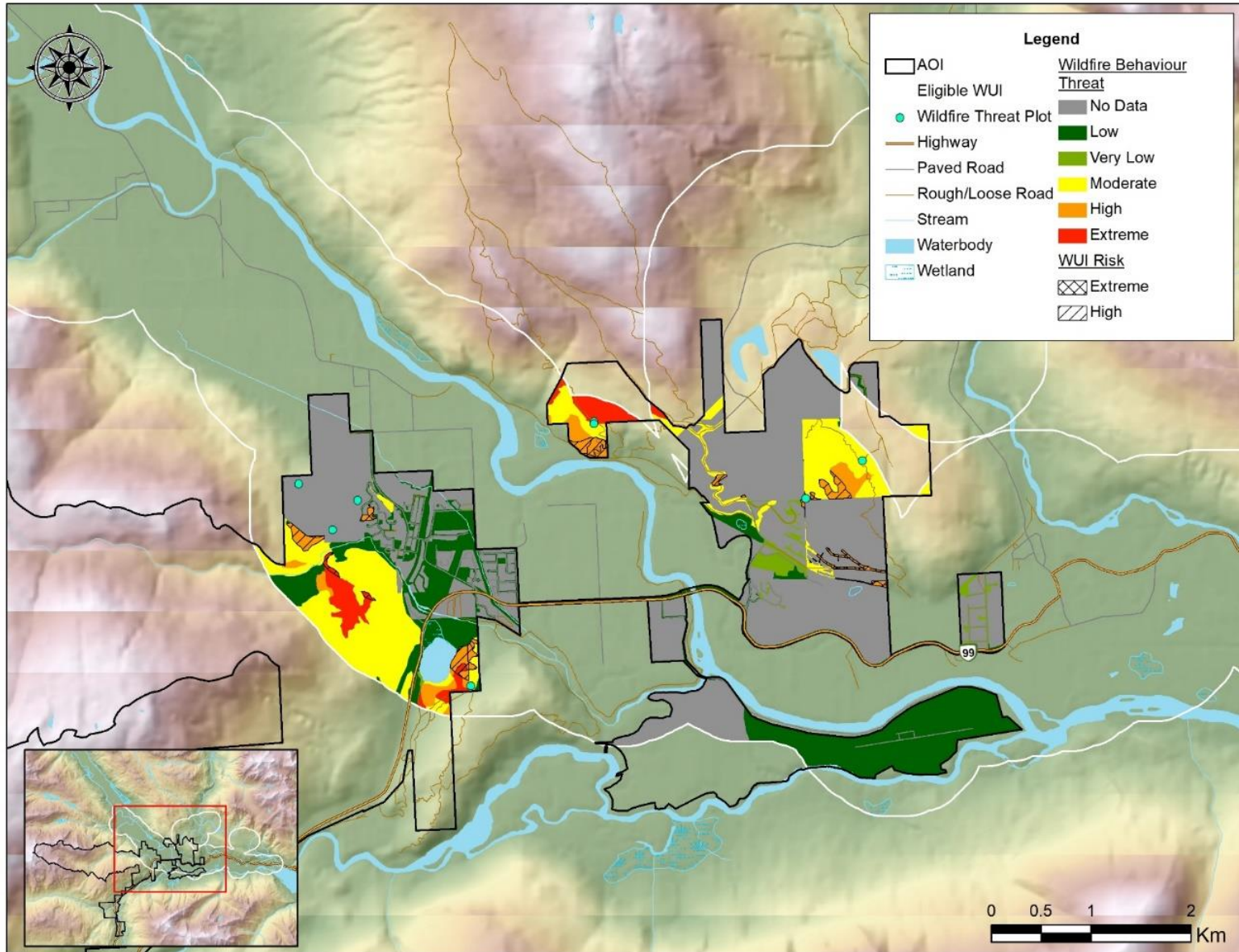
WUI Risk			
Risk Class	Hectares	%	% Assessable Public Land
Extreme	5	0%	1%
High	23	2%	4%
Moderate	52	5%	10%
Low	0	0%	0%
N/A (Moderate, Low or Very Low fire threat)	478	41%	85%
No Data (Private Land)	602	52%	-

For detailed field data collection and spatial analysis methodology for the local threat assessment and classification, see Section 6.2.

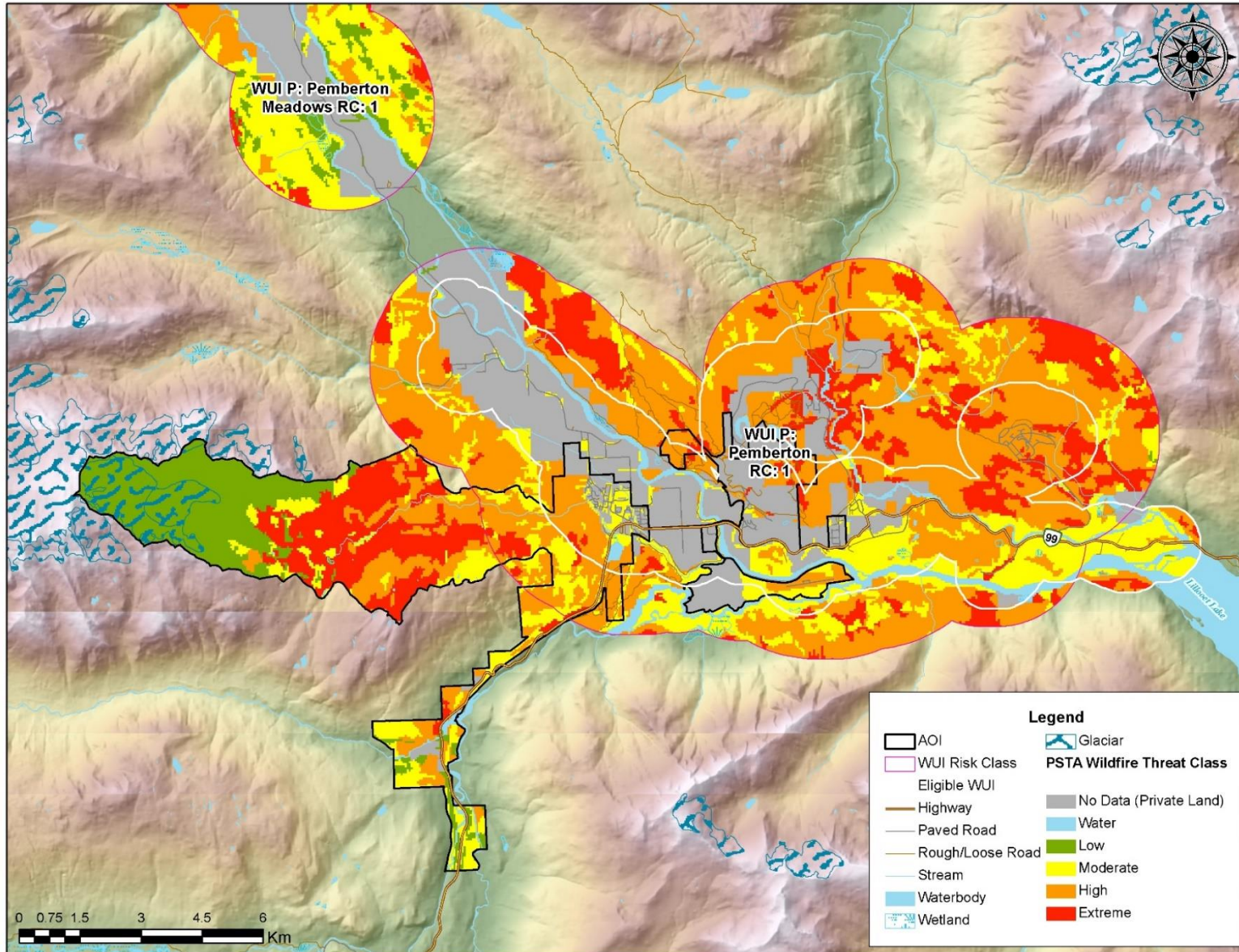
The Province of BC produces a Provincial Strategic Threat Analysis (PSTA, updated in 2021) for all non-private land parcels in BC. This high-level assessment of relative wildfire threat throughout the province is largely based on data from the Vegetation Resource Inventory (VRI) that has not been ground truthed, fire occurrence patterns, potential fire intensity, and spotting potential.²² The PSTA ranks threat on a scale of 1 (lowest) through 10 (extreme). The PSTA is a high-level, geographic information system (GIS) raster analysis that is suitable for wildfire threat information across the land base, while appropriate land management activities need to be determined at the local level using site-specific stand-level information.

²² MFLNRORD. (2017). Provincial Strategic Threat Analysis. Accessed from: https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/provincial_strategic_threat_analysis_2017_update.pdf

It complements the local wildfire risk assessment. Additionally, the Province has developed a WUI Risk Class Framework to prioritize risk reduction initiatives, categorizing WUI polygons by a risk class of 1 (highest) through 5 (lowest). The Pemberton WUI is in a Risk Class of 1. Map 7 displays the PSTA ranking throughout the Pemberton WUI Risk Class polygon and municipal boundary.



Map 6: Local wildfire threat assessment within the Village of Pemberton's eligible WUI



Map 7: Provincial Strategic Threat Analysis map throughout the Pemberton WUI Risk Class and Pemberton's municipal boundary.

4.4 HAZARD, RISK, AND VULNERABILITY ASSESSMENT

The purpose of a Hazard, Risk and Vulnerability Assessment (HRVA) is to help a community make risk-based choices to address vulnerabilities, mitigate hazards, and prepare for responding to and recovering from hazard events. The HRVA process assesses sources of potential harm, their likelihood of occurring, the severity of their possible impacts, and who or what is particularly exposed or vulnerable to these impacts.²³ The Village of Pemberton has a risk rating chart through a joint HRVA completed with the SLRD and Lil'wat Nation which identifies both urban/rural fires and WUI fires as high-risk, when considering likelihood and potential consequence.

²³Government of BC. HRVA Example Report. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/local-government/hrva/hrva_forms-step_8-anytown_bc-sample_hrva_report.pdf

SECTION 5: FIRESMART PRINCIPLES

FireSmart™ is the leading program in Canada aimed at empowering the public and increasing neighbourhood resilience through wildfire mitigation measures. It has been formally adopted by almost all Canadian provinces and territories, including British Columbia in 2000. The FireSmart program covers a wide breadth of preventative measures, which are founded in the seven FireSmart disciplines: Education, Legislation and Planning, Development Considerations, Interagency Cooperation, Cross-Training, and Vegetation Management. These seven disciplines and the guiding principles behind FireSmart can be applied at a number of spatial scales, and are not restricted to any type of land ownership, forest type or property type. The Village of Pemberton has had an active FireSmart program in place since the 2016 CWPP – efforts of which will be detailed throughout this section.

5.1 COMMUNITY OVERVIEW

During CWRP development, FireSmart risk and resiliency factors for different areas throughout the municipality were noted (Table 15). This incorporates field observations, the local risk assessment, information from the Community FireSmart Resiliency Committee (CFRC), and Community Emergency Plans.

Table 15: FireSmart vulnerability and resilience by neighbourhood.²⁴

Community	Vulnerability	Resilience
Benchlands	<ul style="list-style-type: none"> - Direct interface with the forest and mature conifers / flammable landscaping throughout. - Lower/mid-slope 	<ul style="list-style-type: none"> - Newer builds often utilize FireSmart construction materials - One FireSmart recognized neighbourhood
Village Center	<ul style="list-style-type: none"> - High density, a number of older buildings and commercial lots 	<ul style="list-style-type: none"> - Valley bottom, largely cleared of vegetation
Tiyata / Creekside	<ul style="list-style-type: none"> - High-flammability plants adjacent to homes is common - Firewood frequently stored beside homes or under overhangs - Interface forest and train tracks to the west 	<ul style="list-style-type: none"> - Multiple new builds in Tiyata are constructed with FireSmart materials - Tiyata is a FireSmart recognized neighbourhood - PEMB-4 fuel treatment has reduced the fire risk in forest stands to the west
The Glen	<ul style="list-style-type: none"> - Wood and vinyl siding are common. Exposed wooden decks, firewood frequently stored underneath. - Tight roads, tough turnarounds, small yards and homes close together 	<ul style="list-style-type: none"> - Metal roofs frequent - Well maintained yards and lawns, conifers are frequently pruned
Aspen Fields	<ul style="list-style-type: none"> - Cedar hedges are common - Wood and vinyl siding, tight packed homes 	<ul style="list-style-type: none"> - Majority of forests surrounding are deciduous - Valley bottom, flat topography

²⁴ Neighbourhood names correspond to the VoP's online Neighbourhood Map, accessed from: <https://www.pemberton.ca/public/download/files/171821>

Community	Vulnerability	Resilience
The Peaks / Pioneer Junction / Mobile Home Park / Portage	<ul style="list-style-type: none"> - Wooden townhomes, tightly packed, thick ornamental conifers on Vine Road - Arbutus townhomes have ornamental conifers, often single access with tight turnarounds - Short dead-end roads common - Construction and landscaping vulnerabilities in the mobile home park - Firewood storage adjacent to homes is common 	<ul style="list-style-type: none"> - Good yard/grass maintenance, minor bits of conifer pruning performed - Fiber-cement siding on many new townhouses
The Plateau	<ul style="list-style-type: none"> - Lower to upper slopes - Townhouse complex, natural and ornamental conifers downslope - Majority of homes have cedar shrubs / hedges 	<ul style="list-style-type: none"> - Asphalt roofs, larger lots - Well maintained yards - Landscape risk is low – rocky knoll surrounded by deciduous - ~20% of homes have fiber-cement siding
The Ridge & Sunstone	<ul style="list-style-type: none"> - Dry, steep, south-facing slopes - Conifers retained within, continuous grass and shrub between all developed areas - Undeveloped forestland (with a popular biking/hiking network) on all sides 	<ul style="list-style-type: none"> - Emergency access roads between the neighbourhoods - Constructing a quad-trail to the east of the development; provides access and a small fuel break - Potential quarry pond to be built for additional water for suppression - C-7 fuel type (moderate threat)
Industrial Park	<ul style="list-style-type: none"> - Industrial operations - Potential hazardous values 	<ul style="list-style-type: none"> - Largely cleared of vegetation

The sections to follow provide information on each FireSmart discipline as it relates to the Village of



Pemberton. An analysis of actions that have been implemented in Pemberton is listed, as well as any relevant gaps identified by the Community FireSmart Resiliency Committee. Each section contains a table of recommended actions for the Village. Most actions are fundable through the CRI FireSmart Community Funding and Supports program. Each recommendation includes a rationale, lead agency, timeline and estimated resources to complete.

5.2 EDUCATION

Public education and outreach play a critical role in helping a community prepare for and prevent a wildfire. Awareness of fire risk is one thing, but this needs to be paired with an awareness of potential mitigation actions and available FireSmart programs in the community. Participating in wildfire risk reduction and resiliency activities can also promote a sense of empowerment and shared responsibility at the home, street, neighbourhood, and village level. The education discipline often supports the successful implementation of many other FireSmart disciplines by building awareness and understanding within both residents and visitors.

The Village of Pemberton has been actively engaging the community through educational FireSmart programs in recent years, and they continue to expand this program as funding allows. Village staff noted that while the public's response and awareness of wildfire risk has increased, there has been a slow uptake of the FireSmart program to date. Education strategies that are currently used and are successful in the Village include pop-up informational tents at community events and local recreation areas, FireSmart education in elementary schools, and delivery of complimentary Home Ignition Zone assessments. The Village keeps an up-to-date FireSmart webpage that notifies residents of available programs. Since the 2016 CWPP, the Village has implemented some of the following 'Communication and Education' recommendations that were made:

- Make the CWPP and maps available online – VoP website
- Develop a school education strategy – Pemberton Fire Rescue has a FireSmart Education Kit and has presented it to a number of schools. They have built a prop forest to demonstrate the efficacy of fuel treatments.
- Work with adjacent jurisdictions (Squamish-Lillooet Regional District, Resort Municipality of Whistler, Lil'wat Nation) through a FireSmart committee.

FireSmart Education was the focus of Pemberton's second Community FireSmart Resiliency Committee (CFRC) meeting in June 2022. Participants reviewed the successes and challenges of the FireSmart program and identified opportunities for focused action. The CFRC noted difficulties with implementing an effective social media strategy for FireSmart and fire danger ratings, and shared concerns with a lack of fire danger rating signs throughout the Village. To continue furthering FireSmart education initiatives, Table 16 below details recommended actions that the Village can pursue.

Table 16: Education recommendation and action items

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
Education - Section 5.2							
Visitors							
1	Low	Purchase and install reflective signage at Mackenzie Forest Service Road (FSR) and One Mile Lake parking lots that communicates information on campfire bans and associated fines.	The Village of Pemberton (VoP) Community FireSmart Resiliency Committee (CFRC) identified One Mile Lake and Mackenzie FSR as good locations for fire danger rating signs. Both sites are highly used by visitors and residents who may also be camping around Pemberton. Other locations could be considered.	VoP (RSTBC)	2 years (signs installed)	Reduction in nuisance fires.	Sign cost ~\$300-400 and 2 hour per sign to coordinate and install
Residents							
2	High	Continue to promote FireSmart to Pemberton residents at community events and public spaces using FireSmart branded material and printed manuals (Home and Landscaping).	Most neighbourhoods in Pemberton, especially the older streets, are not FireSmart. Landscaping (conifer hedges) and firewood storage are the biggest issues. FireSmart BC resources help present a unified message. Print resources are popular and easy to distribute. FireSmart branded tents, banners, and t-shirts can be purchased with Community Resiliency Investment FireSmart Community Funding and Supports (CRI FCFS).	VoP (PFR)	Annually	Quantity of resources distributed/number of times used at events	CRI FCFS up to cost maximums
3	High	Continue to promote FireSmart in Pemberton schools using the FireSmart Education Kit and other resources.	Pemberton Fire Rescue has had great success with outreach in schools. Engaging with the community's younger population may increase uptake with all residents.	VoP (PFR)	Annually	Number of school visits	CRI FCFS; e.g. FireSmart Magnetic Board for \$1,710
4	Moderate	Continue to offer FireSmart workshops in-person or virtually to interested members of the public.	Workshops provide detailed information on a variety of topics related to FireSmart community resiliency and can help generate community leaders.	VoP (PFR)	Annually	Number of workshops held, and workshop attendees	CRI FCFS up to \$5,350 per event
5	Moderate	Increase public awareness of recently developed Village of Pemberton evacuation plans, and of this Community Wildfire Resiliency Plan.	Increasing awareness of wildfire risk also increases community resiliency through household emergency planning, and support for FireSmart.	VoP (Emergency Program)	1 year	Awareness by residents - consider survey	Staff time to update website, and media posts. Newspaper ads ~\$500 each

5.3 LEGISLATION, PLANNING AND DEVELOPMENT CONSIDERATIONS

Legislation and planning regulation are effective tools for proactively reducing wildfire risk, especially in communities like Pemberton with such a considerable growth rate. As mentioned in Section 3.2, the population growth and number of planned developments in Pemberton is unparalleled in the Sea to Sky corridor. Pemberton is also in an advantageous position to enact legislative changes that are more considerate of FireSmart principles as the Village is currently in the process of updating their Official Community Plan and development bylaws. Pemberton's CFRC showed a strong desire to more strictly enforce FireSmart compliance through planning avenues.



Figure 11: Alternate view of the forest adjacent to a newly developed home. The left photo looks out and shows good tree clearing within 10m of the home, while the right photo looks from the forest toward the home, where no mitigation and a hazardous forest type remains.

Section 2.2 provided a comprehensive look at local plans and bylaws that are currently in place and relevant to wildfire resilience in Pemberton. Since the 2016 CWPP, Pemberton has worked toward implementing a number of recommendations related to planning and development, but many of these changes will likely not be finalized until the Official Community Plan (OCP) is updated.

One of the priority recommendations in this plan is the expansion and refinement of Pemberton's Wildfire Hazard Development Permit Area (DPA). This was recommended in the Village's 2016 CWPP and remains a priority for the CFRC. DPAs can be one of the most powerful influences that planning departments can have on local wildfire risk.

While developing a Wildfire DPA, The Village of Pemberton may be able to use guidance from adjacent jurisdictions. This District of Squamish and the Resort Municipality of Whistler both established Wildfire DPAs within the last three years.^{25,26} In July 2022, the SLRD adopted a *Wildfire Protection DPA* that applies to all new developments throughout Electoral Area C, portions of which are within the Fire Protection Area of Pemberton Fire Rescue.²⁷ Highlights of the Wildfire Protection DPA guidelines in SLRD Electoral Area C include:

- Non-combustible materials (Class A/B rated roof shingles, slate, clay or metal) must be used for roofing (as defined by the current BC Building Code);
- Development Permit Applications must include plans that show how *two of the following three measures* are implemented (except in WedgeWoods Estates, where all 3 measures must be implemented). Additional information may also be requested including landscape plans prepared in consultation with a QEP (Qualified Environmental Professional) to mitigate interface fire hazard.
 - Within the Non-Combustible Zone (0 – 1.5 meters from face of building) implement all of the following: non-combustible siding (including but not limited to cement board, slate, metal, plaster, stucco, and other concrete products, excluding decorative trim, soffit, fascia, and similar features); fire resistant windows (exterior windows, windows within exterior doors, and skylights shall be tempered, multilayered glazed panels, or glass block), install spark arrestor on chimney (for fireplaces, wood stoves and furnaces), screen vents, eaves, attics and underfloor openings with three-millimeter non-combustible wire mesh
 - Within Zone 1 (1.5 – 10 meters) – implement fire resistant landscaping (plant low-growing, well-spaced, fire-resistant plants and shrubs – refer to BC Fire Smart Landscaping Guide) and maintain a 1.5-metre, non-combustible zone around the entire home and any attachments (rock, or stone surface with no plants, debris or combustible materials);
 - Within Zone 2 (10 – 30 meters) - implement coniferous tree spacing (spacing trees at least 3 meters apart) and remove combustible materials.

Although Pemberton does legislate some measure of wildfire risk mitigation through their existing Land Constraints DPA (see Table 3 in Section 2.2 for more details), the guidelines are inadequate to fully address wildfire risk. However, good efforts have been made to proactively reduce risk in some developments within the Village. For example, Sunstone’s building scheme and design guidelines and fire risk strategy have resulted in useful considerations regarding FireSmart building materials, landscaping, fuel mitigation, and emergency access / egress. Recommended changes to planning and development in the Village of Pemberton are detailed in Table 17.

²⁵ District of Squamish. Wildfire Hazard Regulations. Accessed from: <https://squamish.ca/yourgovernment/projects-and-initiatives/wildfire/>;

²⁶ Resort Municipality of Whistler. Wildfire Protection. Accessed from: <https://www.whistler.ca/ocp/wildfire-protection>

²⁷ SLRD Area C Wildfire Protection Development Permit Area, accessed from: <https://www.slrd.bc.ca/sites/default/files/pdfs/planning/staff-reports/Area%20C%20Wildfire%20DPA%20Adoption%20Report-FULL.pdf>

Table 17: Legislation, planning and development recommendation and action items

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
Legislation, Planning and Development - Section 5.3							
Vegetation Policies							
6	High	Enact a Wildfire Landscaping Bylaw to restrict flammable landscaping. Example: prohibit conifer vegetation in the Non-Combustible Zone of a residence or structure (1.5 m) and prohibit the planting of new conifer vegetation in Priority Zone 1 (10 m). The bylaw should apply throughout the Village.	Community FireSmart Resiliency Committee (CFRC) Priority. Cedar hedges and ornamentals are popular in the Village of Pemberton and have been planted around new builds. As new developments are built, the Village has a great opportunity to prevent flammable vegetation from being established.	VoP (Development Services)	Approved within 2 years	All new development complies with the policy	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost
7	High	If not covered under a new Wildfire Development Permit Area (DPA), consider amending the Subdivision and Development Bylaw (677, 2011) to require natural forested areas that are retained as parkland/pockets in and around developments (e.g. 100 m buffer) receive a) wildfire threat assessment and subsequent risk reduction plan by a qualified forest professional, and b) fuel modification treatments before or during the building phase.	The Nkwúkwma (Upper Benchlands), Ridge, and Sunstone developments are on dry forested slopes of the Village and abut or contain forested areas that are moderate to high hazard wildfire risk. The developer should bear the cost of mitigation. Mitigated forest areas greatly increase the defensibility of these neighbourhoods.	VoP (Development Services)	As soon as possible	Developments are required to mitigate forest fuel hazards	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost
Fire Prevention and Response Policies							
8	High	Ensure that road requirements in the Subdivision and Development Bylaw (677, 2011) are adequate for emergency response. Undertake a thorough review process with PFR of all applications for variances to ensure that requirements for fire truck access are met.	Bylaw 677 is being updated this year. Access to some townhome complexes was identified as an issue by PFR. Several applications for road width narrowing in developments (Sunstone) and subdivisions (Fernwood Drive) were observed in the field.	VoP (Development Services & PFR)	As soon as possible	All new developments have adequate fire truck access.	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost
9	Moderate	Review the Village of Pemberton Fire Prevention Bylaw No. 744, 2013 to ensure that yard waste burning and campfire permitting is adequately stringent.	The CFRC identified yard waste burning and abandoned campfires as a significant cause of ignitions in and around Pemberton. It is possible that education and/or a joint fire ban enforcement policy with the SLRD will be preferred routes to success.	VoP (Development Services & PFR)	2 years	Reduction in human-caused ignitions and calls to nuisance fires.	Staff time

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
10	High	Meet with the Squamish Lillooet Regional District (SLRD) and Lil'wat Nation to develop a joint fire ban enforcement policy. The goal is to make local burning regulations or provincial fire bans enforceable by Pemberton Fire Rescue throughout the Pemberton Fire Service Area, which includes Mount Currie, Pemberton Meadows, and Pemberton Fringe/Heights.	The SLRD CFRC identified misalignment of burning bylaws in the VoP, Mount Currie, and Pemberton Fringe as a challenge and a risk. Pemberton Fire Rescue needs the authority to enforce fire bans in Pemberton Meadows and Pemberton Fringe/Heights. Also recommended in the 2021 SLRD Area C CWRP.	VoP, SLRD, Lil'wat	As soon as possible	Pemberton Fire Rescue has the authority to enforce fire bans throughout their Service area, including Pemberton Meadows and Pemberton Fringe/Heights.	Staff time: 40-80 hours
11	High	Develop and enforce trail standards for trails that are built within new developments to ensure that they function as access points and/or anchor points for first responders, and/or fuel breaks. Basic recommendation would be Type 2 main trails (1.25 m width) with Type 3 arterial trails (0.75 m width), and minimum vegetation management requirements for trailside areas.	The Benchlands Nkwúkwma development has pre-identified a number of new, active trails that will be located within the neighbourhood. These travel through forested areas and provide opportunities for surface fire breaks and/or first responder access.	VoP, PVTA, Developers	2 years	Trail standards are applied to all new trail in the Benchlands Nkwúkwma development, and future phases of Sunstone.	Staff time
FireSmart Policies							
12	High	Consider amending the Natural Hazard Development Permit Area guidelines in Section 7.2 of the Official Community Plan (OCP) to include more specific wildfire guidelines, or developing a separate Wildfire Hazard DPA. DPA guidelines should require adherence to specific FireSmart principles in building construction and landscaping. This DPA should apply, at a minimum, to any areas recommended in the 2016 CWPP, subject to further refinement. Involve the development community and PFR in guideline development.	CFRC Priority & recommended in the 2016 CWRP. There has generally been good usage of FireSmart building materials in new developments in Pemberton, but the existing Wildfire guidelines in the Natural Hazard DPA do not adequately incorporate FireSmart principles. DPA guidelines are the only way for local governments to establish technical building regulations outside of the BC Building Code.	VoP (Development Services)	As soon as possible	Establishment and enforcement of a Wildfire DPA for all new developments and substantial renovations.	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost
13	High	Continue to conduct FireSmart Critical Infrastructure Assessments for public works and community/government buildings. Conduct FireSmart mitigation as soon as possible (vegetation management, material upgrades). Prioritize assessing the E-comm tower above the Benchlands, subject to land ownership constraints.	Protecting water and wastewater systems and community infrastructure is critical to wildfire response and recovery. The E-comm tower site is not FireSmart (intermix, and wooden critical buildings). PFR has already conducted mitigation around some sites (i.e. the fire hall).	VoP (PFR)	Ongoing	Number of assessments completed and mitigation hours/investment	CRI FCFS: up to \$800 per assessment and up to \$50,000 for mitigation per structure (publicly owned only)

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
14	Moderate	Include a policy in the VoP OCP to require VoP critical infrastructure to adhere to FireSmart principles, including the prohibition of cedar shakes.	Cedar shake roofs on some water lift stations and mailbox shelters were noted. Using non-FireSmart construction materials sets a bad example to residents and can leave adjacent vegetation and/or residences exposed to a risk.	VoP (Development Services)	As soon as possible	All VoP infrastructure has metal or asphalt roof covering.	CRI FCFS: up to \$10,700 with estimated incremental staff hours or contract cost

5.4 INTERAGENCY COOPERATION

The goal of interagency cooperation is to approach wildfire resilience through a collaborative, multi-agency approach. This increases the ability of local governments to plan and respond to emergencies effectively. Cooperation and communication is especially critical in the Pemberton Valley as there are multiple jurisdictions side-by-side (VoP, SLRD, Lil'wat Nation) and multiple land managers currently operating. Landscape-level fire resilience cannot effectively be achieved without planning for resilience across jurisdictional boundaries. Engagement can be formal or informal and can take place through existing communication channels or stand-alone committees. For the development of this CWRP, a Community FireSmart Resiliency Committee (CFRC) was formed with membership from the Village of Pemberton, Pemberton Fire Rescue, Lil'wat Nation, Spelkúmtn Community Forest, and provincial agencies (see Appendix E: Community FireSmart Resiliency Committee). Pemberton also has an internal FireSmart committee which meets throughout the year.

When planning and implementing forest harvesting and fuel management treatments in the community and in adjacent forest tenures, a high-level tracking and communication of fuel treatments needs to occur. It is imperative that all land managers know what adjacent or overlapping jurisdictions have identified as fuel breaks, so that time and money is not wasted re-assessing or re-prescribing an area. A fuel management planning table for Pemberton should at least include Pemberton FireSmart, the Spelkúmtn Community Forest, the Wildfire Risk Reduction group at the Ministry of Forests (MOF), Lil'wat Nation, and adjacent Woodlot License holders. It is recommended that the MOF take charge of an annual fuel management table to share this information with local governments and stakeholders. Although RESULTS²⁸ is a powerful spatial tool to keep track of forest activities, it does not include activities on municipal and First Nations land. A separate spatial layer should be maintained by MOF as a public service using inputs from municipalities, First Nations, and forest licensees. Fuel treatment units that are proposed, prescribed, or treated should be mapped.

A fuel management table is also recommended so that sharing information on proposed treatment units can occur with plenty of lead time for meaningful discussion and engagement. Inadequate consultation has already caused delays and other challenges for proposed fuel treatments in the Sea to Sky area. This would also help land managers learn from each other's mistakes and successes and share information on archeological and environmental assessments that have been completed. The 2016 Sea to Sky Natural Resource District Fire Management Plan touts the benefits of including 'CWPP communities' in larger discussions on landscape treatment planning.

Changes to the MOF Wildfire Risk Reduction program in the coming years may solve some of these problems. Table 18 details Interagency Cooperation recommendations for the Village of Pemberton.

²⁸ Government application that tracks silviculture information by managing the submission of openings, disturbances, silviculture activities and obligation declarations as required by the Forest and Range Practices Act.

Table 18: Interagency cooperation recommendation and action items

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
<i>Interagency Cooperation - Section 5.4</i>							
15	High	Continue to engage with Lil'wat Nation, Spelkúmtn Community Forest, BC Wildfire Service, Ministry of Forests, and the SLRD on FireSmart initiatives through a regional Community FireSmart Resiliency Committee.	Even once-annual meetings are valuable and provide a platform for information sharing. All parties have indicated a willingness for collaboration.	VoP / SLRD	Ongoing	Inter-agency FireSmart meeting takes place at least once annually	At least 8 hours per meeting to prepare, participate and debrief. CRI FCFS up to \$2,000 per meeting.
16	High	Consider working with the SLRD to provide contracted HIZ assessments, and potentially other FireSmart services to residents in Pemberton Meadows and Pemberton Fringe/Heights.	Pemberton FireSmart receives many requests for FireSmart assessments initiatives from these SLRD areas. PFR may be well-suited to assist the SLRD with assessments given the proximity to Pemberton.	VoP / SLRD	As soon as possible	More residents outside of VoP boundaries receive FireSmart assessments	SLRD CRI FCFS funding, and staff time for discussion
17	Moderate	Consider allocating some community forest revenue to FireSmart initiatives in Pemberton and Mount Currie.	The community forest may provide a stable source of revenue for community FireSmart activities that is independent of provincial funding programs.	VoP, Lil'wat (SCF)	1 year (discussion started)	Meeting(s) are held to discuss.	Staff time (free online courses)

5.5 CROSS-TRAINING AND FIRE DEPARTMENT RESOURCES

All staff and agency partners who are expected to participate in the development and implementation of this plan, or participate in a wildfire response and recovery, should be appropriately trained. This includes municipal Emergency Management staff, other municipal staff that could play a role in an Emergency Operations Center (EOC), and Pemberton Fire Rescue (PFR) / FireSmart. Training opportunities include:

- Basic Wildland Fire Suppression and Safety
- Incident Command System
- FireSmart 101
- FireSmart Local FireSmart Representative (LFR)
- FireSmart Community Champion
- FireSmart Home Partners Wildfire Mitigation Specialist (WMS)
- Post-wildfire reclamation and recovery
- Post-wildfire structure damage assessment
- BC Structure Protection Program (WSPP-115)

Despite being a relatively small department, PFR has a considerable amount of wildland fire training and experience. PFR has five paid staff (two of which are hired for FireSmart through grant funding) and an additional 33 paid-on-call. Members from PFR have been deployed on wildfire incidents across the province in 2017, 2018, and 2021. In recent years PFR has been involved with Lil'wat Nation and the BCWS to conduct prescribed burns in the Pemberton Valley, and they have future plans to host Structure Protection Unit (SPU) cross-training with the BCWS. Regular in-person cross-training between agencies is imperative to familiarize with each other's equipment and address any incompatibilities. The following list highlights wildland-specific training levels in the PFR:

- 30 individuals trained in WSPP-115;
- 2 individuals trained to instruct SPP-WFF1
- 4 individuals certified as WMS';
- 10 individuals trained as engine bosses (S-230);
- Fire Chief trained as a Task Force Leader (TFL);

PFR is in the early stages of developing an apparatus replacement plan and planning for a new fire hall, as much of their equipment is outdated and they have long outgrown their fire hall. The department currently has one wildland firetruck, one engine to use for wildfire, two pumps with forestry hose and attachments, portable backpacks, and collapsible bladder tanks. In 2022 PFR obtained a Type 2 SPU, with future plans to acquire additional SPU equipment.

Table 19 lists recommendations for the Village of Pemberton related to cross-training and fire department resources.

Table 19: Cross-training recommendation and action items

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
Cross Training & Fire Department Resources - Section 5.5							
Training							
18	Moderate	Consider training Pemberton Emergency Management staff/Emergency Operations Centre (EOC) members in Incident Command System courses (ICS).	ICS-100 is an online course that provides an introduction to effective control of an emergency site; other levels of ICS provide more detailed training. BCWS uses the ICS system.	VoP (Emergency Program)	1 year	Number of VoP Emergency Management staff that receive some level of ICS training.	CRI FCFS: staff time and course cost (ICS-100 \$25 online)
19	High	Continue to provide SPP-WFF1 training in-house to PFR members and consider having some members take 'train-the-trainer' courses so that more courses (e.g. S-231, WSPP-115) can be delivered in-house to members.	PFR identified this as an opportunity to expand wildland specific training, and potentially train adjacent fire departments.	PFR	2 years	Number of PFR members with wildland training beyond SPP-WFF1 increases	Staff time; CRI FCFS Training
20	High	PFR should continue to perform wildfire response/structure protection drills - using hydrants and/or natural water sources. Cross-train with BCWS if possible.	Fast and effective deployment of the PFRs SPU and any additional equipment operated by the BCWS will be crucial in any interface fire scenario. Equipment compatibilities and/or differences between PFR & BCWS should be identified and addressed ahead of time. Cross training was identified as a priority for the Pemberton Fire Zone.	PFR (BCWS)	Annually	Drills performed at least once annually in different neighbourhoods, in different fuel types and topography, and with different water sources.	Staff time
21	High	Continue to assist BCWS, Spelkúmtn Community Forest, and/or Lil'wat Nation with prescribed/cultural burning projects.	Continuously exposing PFR members to live-fire scenarios in different fuel types under controlled conditions will increase their capacity and ability to lead and/or assist in wildfire scenarios.	PFR (BCWS) (Lil'wat) (SCF)	Annually	PFR remains involved in local burns, ideally in different fuel types (grassland hazard-reduction burning, slash burning, pile and/or fuel modification burning)	Staff time
Water							
22	High	Continue to identify natural and artificial water sources useable for fire suppression. Document and share this information and update over time. This can double as a pre-plan of emergency community water delivery systems to connect major natural water sources with interface neighbourhoods, to facilitate deployment of a structural protection system.	Outside of VOP boundaries, but within the PFR response area, there are no hydrants and PFR does not have sufficient equipment for water shuttling. Response to these areas impacts VOP's wildfire resilience. Shuttling or pumping water from lakes and rivers to fill bladders may be planned in advance, including tender access points, traffic control, permanent large-volume pumps and piping.	PRF (BCWS)	1 year and ongoing	A fire suppression water source plan and map is produced and shared.	CRI FCFS Community Water Delivery Assessment - Up to \$10,700 for incremental staff hours or contract cost

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
23	High	Conduct a water supply analysis, to determine how long the municipal water supply would last [in the absence of electricity] without restricting residents' usage.	CFRC Priority. Will provide valuable information to VoP Public Works and to PFR on potentials gaps in the water system (storage and/or delivery), and will inform the pre-plan of emergency community water delivery.	Consultant (VoP)	2 years (complete)	A water supply analysis is conducted.	CRI FCFS Community Water Delivery Assessment - Up to \$10,700 for incremental staff hours or contract cost
24	Moderate	Continue to work with the Squamish Lillooet Regional District (SLRD) on additional protection of the PFR response areas that are non-hydranted (SLRD areas outside of municipal boundaries). Procurement of a water tender may be considered to facilitate water shuttling.	Response to these areas impacts VOP's wildfire resilience. This recommendation was also made in the 2016 CWRP.	SLRD, VoP (PFR)	Ongoing	A plan to purchase a suitable water tender is made.	Staff time and SLRD budget
Equipment and Staff							
25	Moderate	Continue to develop and implement plans to replace PFR apparatus as it ages out.	PFR has an aging fleet of engines. Suitable apparatus are critical for response to interface wildfires.	PFR (VoP)	1 year (plan)	The PFR fleet and fire hall are adequate to meet demands.	Staff time and VoP budget
26	Moderate	Continue to develop and implement plans to replace the PFR fire hall.	PFR has outgrown their fire hall, and further municipal growth is anticipated.	PFR (VoP)	1 year (plan)	The PFR fleet and fire hall are adequate to meet demands.	Staff time and VoP budget

5.6 EMERGENCY PLANNING

Local government and community preparations for a wildfire emergency are very important. Plans, mutual aid agreements, resources, training, and emergency communications systems make for effective wildfire response. The Village of Pemberton has an excellent Comprehensive Emergency Management Plan and Community Disaster Resilience Plan that addresses wildfire, as well as risk from flooding, landslide/mudslides, storms, and other hazards. Aspects of these plans are summarized in Section 2.2. The Sea to Sky Natural Resource District Fire Management Plan²⁹ contains additional information to guide BCWS' response based on known and mapped values. The plan is summarized in Table 4 in Section 0.

In a wildfire emergency that requires evacuation, a number of constraints were identified by ISL Engineering through Pemberton's 2020 Evacuation Route Plan, largely due to potential evacuation numbers that exceed the capabilities of the current road and traffic network. There are also concerns that evacuation could be slowed due to a lack of preparedness of residents and/or an unwillingness to leave. The Village now utilizes Pemberton Alert to communicate emergency notifications to residents that have signed up for the free service.

A pre-incident plan is a compilation of essential fire management information needed to save valuable time during fire suppression operations. During a busy wildfire season provincial resources are often stretched thin, and any information that local governments can provide to BCWS crews is helpful. A pre-incident plan should be developed and tested using tabletop simulations, and if necessary, revised prior to every fire season. BCWS should be involved in this process to ensure that any mapping done as part of the pre-incident plan or Fire Management Planning process is not unnecessarily duplicated.

Figure 12 contains a checklist of discussion points and considerations during pre-incident plan development.

²⁹ MFLNORD 2016. Applies to the Pemberton Fire Zone



Figure 12. A pre-incident planning checklist that can be used to help develop a pre-incident wildfire suppression plan and maps.

The Village of Pemberton could also consider developing local daily action guidelines based on expected wildfire conditions. Table 20 below provides a template that can be tailored specifically to the Village of Pemberton, outlining actions staff can take as fire danger levels change throughout the fire season.

Table 20: Example of a Wildfire Response Preparedness Condition Guide³⁰

FIRE DANGER LEVEL	ACTION GUIDELINES
LOW	<ul style="list-style-type: none"> All Community staff on normal shifts.
MODERATE	<ul style="list-style-type: none"> All Community staff on normal shifts Information gathering and dissemination through Pemberton’s CFRC
HIGH	<ul style="list-style-type: none"> All Community staff on normal shifts. Regional fire situation evaluated. Daily fire behavior advisory issued. Wildland fire-trained Municipal staff and EOC staff notified of Fire Danger Level. Establish weekly communications with CFRC
EXTREME	<ul style="list-style-type: none"> Daily fire behavior advisory issued. Regional fire situation evaluated. EOC staff considered for stand-by. Wildfire Incident Command Team members considered for stand-by/extended shifts. Designated Community staff: water tender and heavy machinery operators, arborists may be considered for stand-by/extended shifts. Consider initiating Natural Area closures to align with regional situation. Provide regular updates to media / Municipal staff on fire situation. Update public website as new information changes.
FIRE(S) ONGOING	<ul style="list-style-type: none"> All conditions apply as for ‘Extreme’ (regardless of actual fire danger rating). Mobilize EOC support if evacuation is possible, or fire event requires additional support. Mobilize Wildfire Incident Command Team under the direction of the Fire Chief. Implement Evacuation Alerts and Orders based on fire behavior prediction and under the direction of the Fire Chief.

Recommendations and action items that Pemberton can implement to continue productive and effective emergency planning are detailed below in Table 21.

³⁰ From FireSmart Community Funding and Supports 2022 CWRP Supplemental Instruction Guide

Table 21: Emergency preparedness recommendation and action items

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
Emergency Planning - Section 5.6							
27	High	Create community evacuation pre-plans for each VoP neighbourhood noting muster points, key contacts, primary and secondary access/egress routes, first responder contact information, water sources, etc.	Noted as a priority by PFR. Guidance can help facilitate evacuation as residents understand the process. Consider the NEPP framework, and use community leaders.	VoP (PFR & Emergency Program)	1 year (first plan initiated)	A plan is developed and available to a) PFR and the VoP EOC b) BCWS c) residents (online and in print)	Possibly CRI CEMF. CRI FCFS Emergency Planning.
28	High	Invest in back-up generators for any critical infrastructure that does not have one. Encourage private businesses that provide critical services, like gas stations and grocery stores, to follow suit.	Back-up generators for pumphouses, treatment plants, and community buildings would facilitate both emergency response (water supply for suppression) and rapid community return and recovery following a fire. Generators were noted for the E-comm tower.	VoP (Emergency Program)	ASAP	A budget and purchase plan for back-up generators is implemented, starting with the most critical infrastructure.	Cost varies - ~\$10,000
29	High	Schedule regular updates of this Community Wildfire Resiliency Plan: target every 5 years.	A current and acceptable CWRP is required for funding under the CRI FCFS program. Pemberton has several new developments underway that should be accounted for in the next plan(s).	VoP (Emergency Program)	5 years – 2028 update	VoP always has a current and acceptable CWRP	~\$30,000; CRI FCFS funding

5.7 VEGETATION MANAGEMENT AND OTHER FIRESMART ACTIVITIES

As discussed in Section 4.1, fuel is the only aspect of the fire behavior triangle that can be realistically modified to reduce wildfire threat. Fuel or vegetation management reduces potential wildfire intensity and ember exposure to people, structures, and other values through manipulation of both natural and cultivated vegetation within or adjacent to a community. A well-planned vegetation management strategy can greatly increase first responder safety, fire suppression effectiveness and reduce damage to property and to values.

Vegetation management can largely be accomplished through two different activities:

1. **Residential-scale FireSmart landscaping:** The removal, reduction, or conversion of flammable [landscaping] plants to create more fire-resistant areas in the FireSmart Noncombustible Zone and Priority Zones 1, 2 and 3.
2. **Fuel management treatments:** The manipulation or reduction of living or dead forest and grassland fuels to reduce the rate of spread and head fire intensity and enhance likelihood of successful suppression.

Fuel management treatments may function as fuel breaks (linear features, at least 1 km in length) or polygon treatments for discrete areas. The intent of establishing fuel treatments is to modify fire behaviour and should be designed to keep surface fires on the ground to avoid the establishment of more dangerous and uncontrollable crown fires. Fuel treatments can also provide anchor points to fire-fighting crews for suppression activities,³¹ yet the application of appropriate suppression tactics in a timely manner with sufficient resources is essential for fuel treatments to be effective. To increase the efficacy of fuel treatments, FireSmart standards should be applied to nearby structures and vegetation to reduce the risk of structures igniting. Fuel treatment units will also require periodic maintenance (e.g., brushing, prescribed burning, surface fuel cleanup) to retain their effectiveness.

Implementing fuel management treatments often takes the successful collaboration of various land managers, as these treatment areas can span across multiple types of land ownership. Often times this is required in order for the fuel treatment to effectively connect areas of low hazard. With the establishment of the Spelkúmtn Community Forest (SCF) in 2020 a significant amount of land within the municipal boundaries of Pemberton is now officially managed by one forest tenure holder, which may facilitate the implementation of fuel management treatments. Fuel management projects in community forests are currently funded and administered through the Forest Enhancement Society of BC (FESBC), through which the SCF received \$183,456 in November 2022 to implement prescribed fuel treatments around One Mile Lake.³²

³¹ BC Wildfire Service. (2022). [2022 Fuel Management Prescription Guidance](#).

³² The Pique News Magazine. (2022). [Whistler, Pemberton forests receive funding for wildfire mitigation](#).

The Village of Pemberton has worked to implement various Vegetation Management and FireSmart programs at both the residential-scale (on private land) and through fuel management treatments (on municipal land). These programs stemmed from recommendations in the 2016 CWPP:

- Continue to implement the 'PEMB-4' fuel treatment area, a 22-hectare area southwest of the Village;
- Have supported residential vegetation management through neighbourhood work days and offering a free chipper service for debris disposal;
- Have reached an agreement with Sea-to-Sky Soils to waive tipping fees for debris, if the debris was removed in connection with a Home Ignition Zone assessment;
- Have completed over 700 hours of work on Critical Infrastructure assessments for municipal infrastructure and follow-up mitigation work as of fall 2022;
- Have reached their goal of performing 150 Home Ignition Zone Assessments throughout the Village.



Figure 13: Post-treatment photo from PEMB-4 where a considerable amount of understory conifer have been removed.

The Village of Pemberton does not currently have publicly accessible information on their website regarding fuel treatment efforts. Associated vegetation management recommendations and action items are listed in Table 22. Newly identified Fuel Treatment Units are described in Table 23 and shown on Map 8 and Map 9. The SLRD is actively working with the Ministry of Forests (MOF) to develop fuel management prescriptions and implement fuel treatments in several priority locations near the Village in Electoral Area C. Reid Road, Walkerville Estates, and Owl Ridge all have fuel management prescriptions developed for portions of Crown Land through the MOF's Wildfire Risk Reduction program.³³

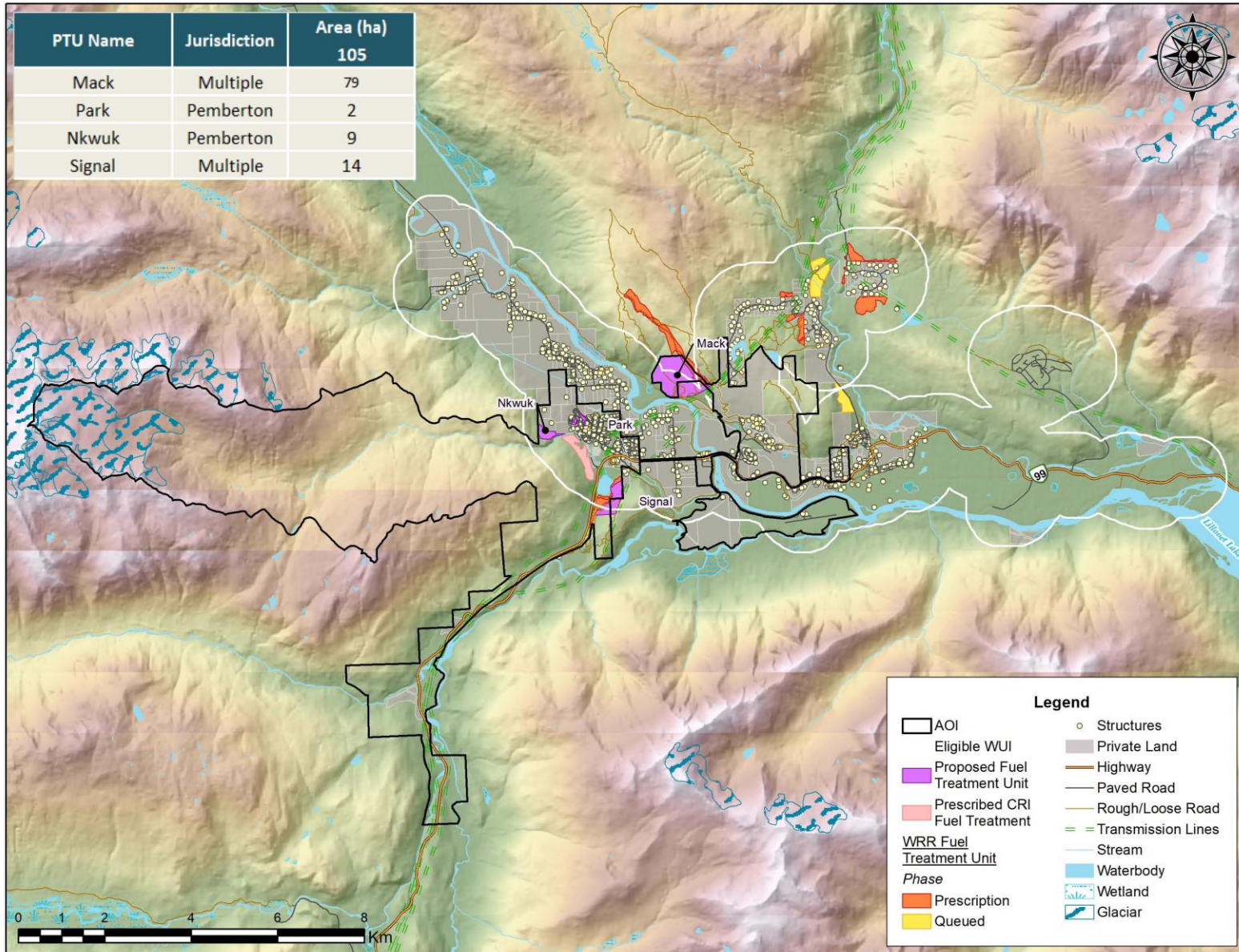
³³ SLRD. (2020). [Notice of Forest Fuels Management in the SLRD](#).

Table 22: Vegetation management action items

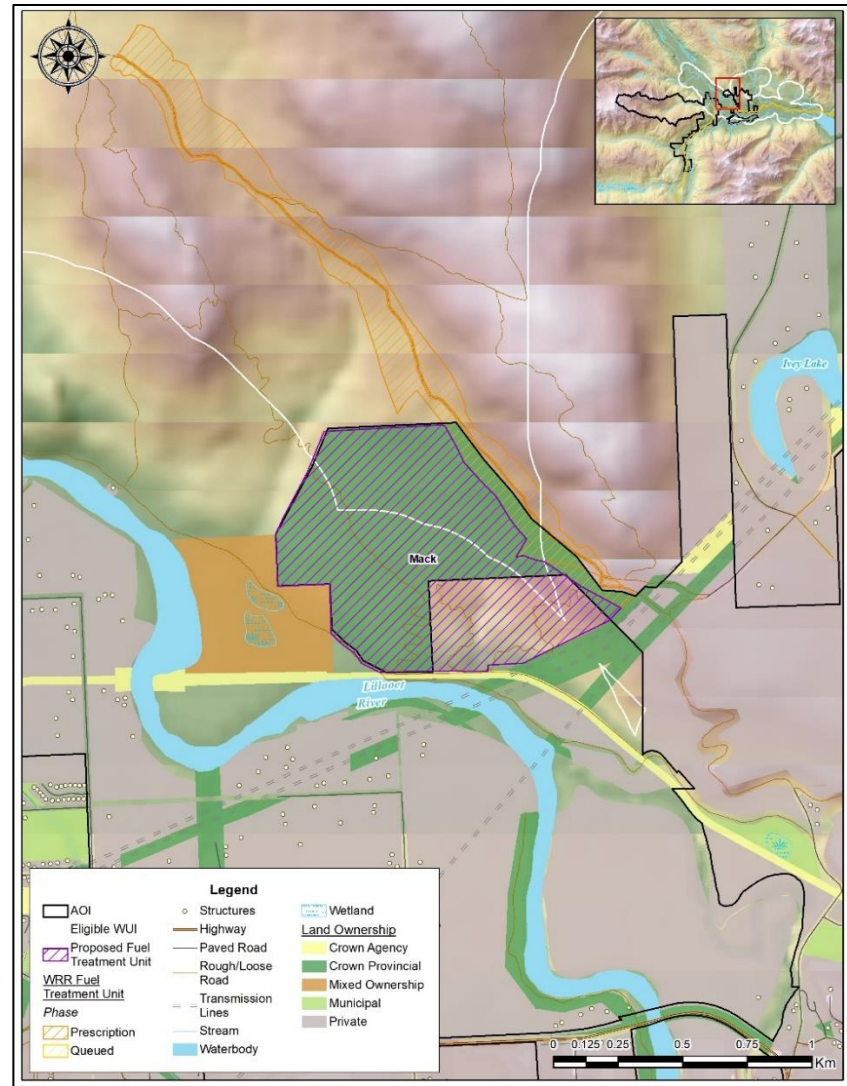
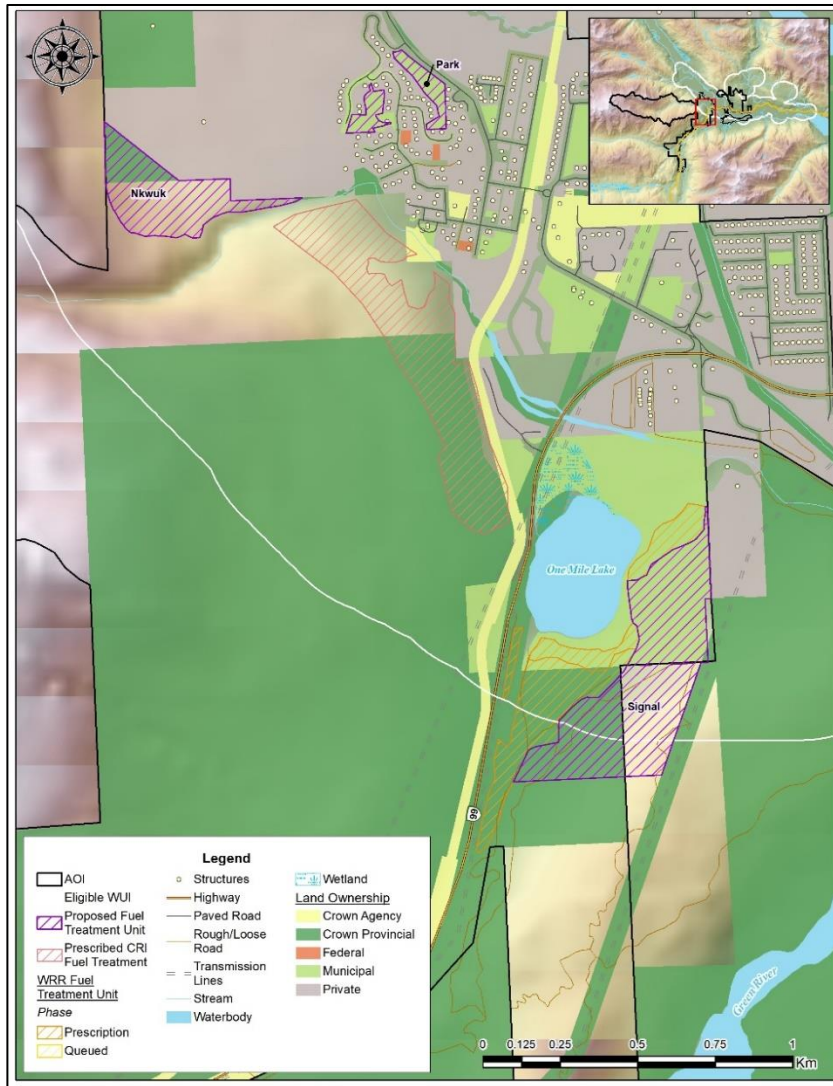
Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric Success for	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
Vegetation Management - Section 5.7							
Fuel Management Treatments							
30	Moderate	Work with Ministry of Forests to implement One Mile Lake FMP.	The area is already prescribed and portions of the One Mile Lake FMP are on municipal land. The prescription encompasses high hazard forest land within 350m of residences, and within 1 km of downtown Pemberton. It is adjacent to a high-use recreational area and is also Lil'wat Spirited Ground.	VoP (MoF)	2 years	One Mile Lake FMP is implemented.	Cost per ha varies; ~\$15,000/ha
31	Moderate	Develop fuel management prescriptions for fuel management areas identified in this plan. Prioritize a prescription for <i>Nkwuk</i> considering development timeline and treatment of forested private parkland.	<i>Nkwuk</i> is strategically located in the forested interface of Pemberton Benchlands neighbourhood, which is poised to more than double after the proposed 400+ unit Nkwúkwmá Development. The unit is moderate-high hazard, has good road access, and surrounds critical infrastructure (E-comm tower).	VoP (consultant)	1 year (first prescription underway)	Approved FMP(s) and eventual implementation	~\$425/hectare for a ~20 ha prescription
32	Moderate	Engage BCWS and Lil'wat about prescription and future burn plan of <i>Mack</i> and surrounding area. Consider harvest opportunities for Spelkúmtn Community Forest.	This unit is well positioned for a pilot stand maintenance burn - it is anchored between low fuel areas on a consistent, moderate south facing slope (rail/river below, Mackenzie FSR prescription area above) and is intersected with trails for logical burn areas. The stand has accumulating surface fuel in consistent patches and burning would reduce fire hazard, provide positive outcomes associated with the return of lower severity fire (fire scars on veteran Douglas fir observed), and provide training opportunities.	VoP, SCF, BCWS	2 years (discussion underway)	Approved FMP(s), Burn Plan, and eventual implementation	Staff time
33	Low	Work with the Spelkumntn Community Forest and neighbouring jurisdictions (SLRD, RMOW, Lil'wat) to explore alternative disposal methods for debris from fuel treatments or other forest harvesting activities (e.g., combined heat and power, biochar, secondary forest products, etc.).	The Village's Community Climate Action Plan identifies the need to close the loop on compostable waste, explore renewable energy options, and identify industrial wood waste producers in the area and explore opportunities from there. The Regional Economic Development Strategy also identifies the need to pursue regional business opportunities such as biofuel and value-added products. Policies on slash burning are expected to become more restrictive in recent years, and pile burning can also prove to be logistically difficult and often be viewed negatively from the community.	VoP, SCF (SLRD / Lil'wat / RMOW)	3 years (discussion underway)	Alternatives considered and documented	Staff time

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric Success for	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
34	High	Work with the SLRD, Spelkumntn Community Forest, and Sunstone Ridge Developments to ensure that the secondary egress road/multiuse trail east of Sunstone is completed to fuel break standards. This includes managing debris from trail clearing. Consider extra thinning to a specified distance off the trail.	This trail is outside of Village of Pemberton boundaries but within the WUI. It is key secondary egress for Sunstone and Ridge developments. It is important that the trail also functions as a safe anchor point for firefighting crews. It is strategically located to protect against a fire moving along Mackenzie Ridge from the north/east. Fuel loading of adjacent areas is moisture dependant: low to moderate.	Spelkumntn Community Forest, Sunstone Ridge Developments (VoP/SLRD)	3 years	Trail is vehicle accessible and is adjacent to low fuel-loaded areas.	15 m buffer on each side of ~3 km trail = 9 ha of fuel management @ \$15,000/ha = \$135,000
Residential FireSmart							
35	High	Retain capacity to deliver FireSmart programs by continuing to hire full- or part-time FireSmart staff as needed. The VoP FireSmart staff should work with BCWS, LFN and others through any regional FireSmart committee that is developed.	FireSmart staff can efficiently deliver municipal FireSmart programs, including conducting FireSmart Assessments, providing support for the FireSmart Canada Neighbourhood Recognition Program, and coordinating fuel management programs.	VoP (PFR)	Annual	Capacity for FireSmart is maintained or enhanced	CRI FCFS funding: FireSmart Positions
36	Moderate	Continue supporting neighbourhoods through the FireSmart Canada Neighbourhood Recognition Program	The FireSmart Canada Neighbourhood Recognition Program motivates individuals and groups to take action through community hype. Pemberton has several distinct neighbourhoods that would be good candidates for the program and already has 2 recognized neighbourhoods.	VoP (PFR)	Ongoing	Number of neighbourhoods recognized	CRI FCFS funding: up to \$430 per assessment, \$1,070 per plan; up to \$5,350 per education event
37	Moderate	Continue to waive tipping fees for residents conducting yard cleanup, through partnership with Sea to Sky Soils or similar.	Yard waste burning restrictions limit options for debris disposal. Free debris disposal may be used as an incentive to participate in other FireSmart activities, like assessments or workshops.	VoP	Annual	Number of properties who elect to have debris disposed	CRI FCFS funding; ~\$100-150 per chipper crew hour.
38	Moderate	Continue making Home Ignition Zone (HIZ) assessments available for residents though VOP's trained Wildfire Mitigation Specialists. Leverage incentives to increase uptake including insurance discounts.	HIZ assessments encourage action in the Priority Zones of a community, through education or through incentives for mitigation (e.g., rebate program, insurance discount)	VoP (PFR)	Annually - spring - fall	Number of assessments completed annually	CRI FCFS: up to \$265 per property

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric Success for	Funding Source / Est. Cost (\$) / Person Hours
				(Involved)			
39	Low	Continue to engage with local garden centers to implement the FireSmart BC Plant [Tagging] Program.	FireSmart BC introduced a plant tagging program in 2021 that has been implemented with great success by 34 nurseries and garden centres to date. The Plant Program is an easy way to provide information at the point of purchase for homeowners and landscapers. https://firesmartbc.ca/landscaping-hub/plant-program/	Local nurseries (VoP)	Aim for Spring 2023	At least one local garden center participates in the Plant Program.	Staff time for engagement (2-4 hours)
40	High	Consider offering a FireSmart rebate program available for residents who have a pre- and post-work FireSmart assessment conducted. Focus on removal of conifer hedges, firewood storage (subsize FireSmart sheds?)/relocation.	FireSmart rebate programs are an incentive to complete FireSmart work and/or participate in a Neighbourhood Recognition Program.	VoP	Annually - spring - fall	Number of properties participating annually	50% of costs per property up to \$1,000, plus 2 hours administration time per property (CRI FCFS)
41	Moderate	Consider obtaining a Village of Pemberton chipper and trailer to facilitate residential FireSmarting.	VoP does not currently have a chipper and relies on BCWS equipment. Could be shared with Public Works. Driveway chipping programs have been very successful in other municipalities.	PFR (VoP Public Works)	1 year	A suitable chipper and trailer are obtained	Internal
42	High	Consider releasing an annual Pemberton FireSmart report to the public that tracks community-specific uptake in various FireSmart initiatives, as well as tracks fuel management at all scales.	As the program grows, reporting allows the Pemberton FireSmart program to track challenges and successes, further promote the program, and tailor outreach methods to achieve the most uptake.	VoP	Annual	An annual report is published	Eligible for CRI funding – FireSmart staff time. Estimate 40-80 hours.



Map 8: Overview map of prescribed and proposed fuel treatment units around the Village of Pemberton.



Map 9: Closer view of the proposed and prescribed treatment areas to the south/southwest of Pemberton (left) and along the Mackenzie FSR (right).

Table 23: Summary of Proposed Fuel Treatment Units for the Village of Pemberton's CWRP.

PTU Name	Total Area (ha)	Priority	Wildfire Behavior Threat (ha)				Overlapping Values / Treatment Constraints ³⁴	Treatment Objective / Rationale
			Extreme	High	Mod.	No Data ³⁵		
Mack	79	Mod-Low	13	9	13	44	-Fully within the SCF, not all within VoP boundaries though -Steep ground, access from the bottom for anything other than hand-treatment would be difficult given the CN RoW	This unit is well positioned for active forest management (potentially a combination of hand / machine treatments) and a pilot stand maintenance burn - it is anchored between low fuel areas on a consistent, moderate south facing slope (rail/river below, Mackenzie FSR prescription area above) and is intersected with trails for logical burn areas. The stand has accumulating surface fuel in consistent patches and burning would reduce fire hazard, provide positive outcomes associated with the return of lower severity fire (fire scars on veteran Douglas fir observed), and provide training opportunities.
Park	2	High-Mod	0	1	1	0	-Municipal ownership – treatment could be funded in-house and done without a fuel management prescription -Immediately adjacent to private property -May be difficulties treating adjacent to Pemberton Meadows Road	Proposing a FireSmart type clean up (e.g., pruning, removal of dead standing and downed material, surface fuel cleanup). Could be done as a community event in partnership with the Fire Department / FireSmart
Nkwuk	9	High	0	4	5	0	-Crown Land, majority is within the SCF -Conditional Harvest Zone for Spotted Owl habitat. -Minor overlap with the Pemberton Community Watershed. -Established Visual Quality Objective of 'Retention'	This area, and the entire footprint of the Nkwúkwma development was recommended for a prescription and treatment in the 2016 CWPP, prior to the land being transferred / sold to Lil'wat. This current PTU will look to treat the logical area to the south of the planned development, within the Village boundaries. Fuel management here will only be effective if the adjacent private land is also treated at the time of development.
Signal	14	Mod	3	5	4	2	-Extension of the One Mile Lake FMP that is scheduled for treatment -Roughly half in the SCF, half municipal land. -Overlaps an established recreation / trail network. -Signal Hill spirited ground area – a legally defined cultural management area.	This treatment will expand the currently prescribed area around One Mile Lake in order to anchor it into the transmission line right of way to the east. The area has a mix of dense high-hazard stem exclusion conifer stands and more open / rocky areas that have a considerable number of dead standing trees and deadfall.

³⁴ These highlight various general overlaps and constraints for each treatment unit, but this is an incomplete list of all of the overlapping values and/or constraints that would need to be managed for through a fuel management prescription.

³⁵ Portions of these PTUs fall outside of the eligible WUI for this CWRP but are within the Spelkúmtn Community Forest, and were therefore not included in the fire threat analysis. PSTA data lists a combination of High and Extreme ratings for these areas.

SECTION 6: APPENDICES

6.1 APPENDIX A: REVIEW OF 2016 CWPP RECOMMENDATIONS

Successful Inadequate / In-Progress / Unrealistic

Item	Priority	Recommendation	Status & Comments
Communication and Education			
Objective: To improve public understanding of fire risk and personal responsibility by increasing resident awareness of the wildfire threat in their community and to establish a sense of homeowner responsibility.			
1	High	<ul style="list-style-type: none"> This report and associated maps to be made publicly available through webpage, social media, and public FireSmart meetings. 	Available online.
2	High	<ul style="list-style-type: none"> Regular updates of the CWPP to gauge progress and update the threat assessment for changes in fuels, forest health, land planning, stand structure or changes to infrastructure in the interface. Updates should be completed every 5 - 7 years. 	Accomplished with 2022 CWPP
3	Moderate	<ul style="list-style-type: none"> Review current social media effectiveness and create a social media strategy to ensure that the full power of social media is leveraged to communicate fire bans, high fire danger days, wildfire prevention initiatives and programs, easily implementable FireSmart activities, and updates on current fires and associated air quality, road closures, and other real time information. 	<p>Working on a coordinated plan w/ SLRD & Lil'wat.</p> <p>Minor social media presence (mostly PFR)</p>
4	Moderate	<ul style="list-style-type: none"> Establish a school education program to engage youth in wildfire management. Consult Association of BC Forest Professionals (ABCFP) and British Columbia Wildfire Service (BCWS) (Pemberton Zone), as well as local fire officials and First Nations representatives, to facilitate and recruit volunteer teachers and experts to help with curriculum development and to be delivered in elementary and/or secondary schools. Educational programming can be done in conjunction with programs on fire extinguisher training and should include Pemberton Fire Rescue in curriculum development and presentation. Costs to be shared regionally (Squamish-Lillooet Regional District (SLRD), Village, and First Nations). Research funding opportunities related to wildfire and education. 	FireSmart education is in local schools (PFR – 7 hr/week CRI funded public outreach). School Education Kit has been useful.

Item	Priority	Recommendation	Status & Comments
5	Low	<ul style="list-style-type: none"> The Village of Pemberton should continue to install fire danger rating signs in strategic locations across the study area. Recreation sites and high-use recreational areas which are not already signed should be targeted first, such as the main parking lot at the base of the Mackenzie Basin Forest Service Road (FSR) and One Mile Lake Park. 	Signage at recreation areas not present, Pemberton interested. Resources to update sign should be considered.
Objective: To enhance the awareness of elected officials and stakeholders regarding the resources required to mitigate fire risk.			
6	High	<ul style="list-style-type: none"> Work with adjacent jurisdictions, governments, stakeholders, and provincial agencies to establish a Wildfire Suppression Group (N'Quatqua First Nation, SLRD, Ministry of Forests, Lands and Natural Resource Operations (MFLNRO), BCWS, Lil'wat Nation, and forest licensees) to identify wildfire related issues in the area, resource deficiencies, and to allow for a coordinated and cost-sharing approach to wildfire mitigation. 	VoP CFRC, SLRD CFRC
7	Moderate	<ul style="list-style-type: none"> Create and maintain a spatial database that includes CWPP spatial data for all CWPPs that have been developed on, or include threat assessments and recommendations over, land within the Pemberton Valley. This includes amalgamating spatial data from SWPI/UBCM, Lil'wat Nation, N'Quatqua First Nation, and SLRD. This database can be used in the regional wildfire mitigation planning for the Wildfire Suppression Group. Cost can be shared among members of the Wildfire Suppression Group. 	Mapped as part of the 2022 CWRP. Crown land treatments shown through RESULTS, but no proper provincial tracking for everything.
Objective: To reduce the risk of ignition from industrial sources.			
8	High	<ul style="list-style-type: none"> Work with industrial operators to ensure that right-of-ways do not contain fine fuel accumulations (easily cured) prior to the fire season and further are maintained in a low hazard state. Work with industrial operators to ensure that high risk activities, such as right of way mowing, do not occur during high or extreme fire danger times to reduce chance of ignitions. Industrial operators include CN Rail, BC Hydro, licensees, and independent power producers. 	Largely a legal obligation of industry. No concerns currently noted by PFR. Lil'wat Nation has concerns with CN vegetation management.
9	Moderate	<ul style="list-style-type: none"> Work with BC Hydro to ensure that hazard trees along distribution lines are assessed regularly. Work with BC Hydro to ensure that transmission line right-of-ways are maintained in a moderate hazard state and dead, fine fuel accumulations do not occur. Generally, ensure the transmission right-of-ways are in moderate or low hazard state and serve as fuel breaks. 	Largely a legal obligation of BC Hydro. No concerns currently noted by PFR. VoP can continue to lobby.
Structure Protection and Planning			
Objective: Improve the FireSmart conditions of the Village by encouraging home and property owners to voluntarily increase FireSmart compliance and improve suppression abilities for interface areas.			

Item	Priority	Recommendation	Status & Comments
10	High	<ul style="list-style-type: none"> Facilitate different neighbourhoods within the study area to become recognized as FireSmart communities. Recruit champions within each community to implement local projects. Champions should be trained in FireSmart, have educational materials available to them, and be supported by the Village and Fire Rescue to complete fire hazard mitigation projects. 	Bluffs became the first in 2022, Tiyata next. Hoping for 5 next year
11	Moderate	<ul style="list-style-type: none"> Identify and map available water sources (must have adequate supply for suppression purposes during the fire season, as well as be accessible for suppression crews) and identify areas of poor water availability. Develop a geospatial database with water availability and accessibility as attributes. Access and water use agreements may be appropriate in locations on private land or to access water licenses. Water source mapping can be integrated into the lamResponding³⁶ application, already in use by Pemberton Fire Rescue. 	PFR in process of IDing water sources; interested in capacity analysis. Recommendations offered in this plan.
Objective: Improve the FireSmart conditions of the Village by increasing FireSmart compliance for Village-owned assets and critical infrastructure.			
12	High	<ul style="list-style-type: none"> Complete FireSmart assessments for critical infrastructure and Village owned assets and prioritize FireSmart projects by efficacy at reducing fire hazard, cost efficiency, and visibility to the public. Implement projects according to priority to increase FireSmart compliance. FireSmart projects on Village-owned structures can be used as public-education/demonstration projects to display the practices and principles of FireSmart and the Village's commitment to wildfire threat reduction. 	11 assessments completed; mitigation completed for firehall, SLRD building and public works. 700+ hours this summer
Emergency Response and Preparedness			
Objective: Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.			
13	High	<ul style="list-style-type: none"> Remove barriers to action for landowners by providing methods for them to cheaply and easily dispose of the wood and green waste removed from their property. Programs may include scheduled community chipping opportunities, free green/ wood waste drop-off, or scheduled burning weekends. Information on how to obtain burning permits could be made available. 	Free drop off at S2S Soils. Looking to expand chipping capacity. Burning info is available but prohibitive.
14	Moderate	<ul style="list-style-type: none"> Complete wildland urban interface (WUI) Site and Structure Hazard Assessments for interface homes, make hazard mapping for assessed homes publicly available, and provide informational material to homeowners on specific steps that they can take to reduce fire hazard on their property. 	HIZ program (free) ongoing and expanding.

³⁶ lamresponding.com

Item	Priority	Recommendation	Status & Comments
Objective: To improve structural and wildfire equipment and training available to Pemberton Fire Rescue.			
15	High	<ul style="list-style-type: none"> Pemberton Fire Rescue to organize and facilitate annual cross training opportunities with BCWS. Interface training could include completion of a mock wildfire simulation in coordination with BCWS, instruction on early detection and reporting of wildfires. Training could be coordinated with other fire departments in the area (Birken Volunteer Fire Department, Resort Municipality of Whistler (RMOW), Mount Currie, and N'Quatqua) to enhance the firefighting capabilities in the region. It is recognized that BCWS crew resources are limited and their availability and is highly dependent upon the current fire season and other BCWS priorities. 	PFR has open communications with BCWS and work well together on interface fires in valley. SPU cross training planned this summer.
16	High	<ul style="list-style-type: none"> Pemberton Fire Rescue to continue focus on member training. Recommended target of 100% of members with Structure Protection Program – Wildland Firefighter Level 1 (SPP-WFF 1) certification. SPP-WFF 1 training is 6 hours (3 – 2 hour units) with practical use of fire department equipment. 	PFR trains in-house with wildland operations and some BCWS/OFC training (SPP 115 etc.)
17	High	<ul style="list-style-type: none"> The Village to obtain hard-suction hose to provide the ability to draft from natural water sources. 	Completed
18	High	<ul style="list-style-type: none"> The Village to procure a water tender for suppression in areas with limited water availability and a long distance from hydrants. 	Not required in VoP fire protection area (SLRD only)
19	Moderate	<ul style="list-style-type: none"> Coordinate with SLRD Electoral Area C to provide reflective house numbers and instructions about how and where best to affix them to facilitate emergency response. Research possible funding opportunities to offset costs. 	Was recommended in the SLRD Area C 2021 CWPP
20	Moderate	<ul style="list-style-type: none"> The Village of Pemberton to outfit the existing Haz-Mat trailer with an SPU with coverage for 20 – 30 homes. The trailer can be used for structure protection and demonstration of the ease and utility of exterior sprinklers for their homes. 	PFR procured a Type 2 SPU March 2022
21	Low	<ul style="list-style-type: none"> Review UBCM-owned sprinkler protection unit (SPU) request procedure. 	N/A

Emergency Response and Preparedness (Evacuation and Access)

Objective: To improve access and egress and enhance emergency preparedness and study area-specific evacuation plans.

Item	Priority	Recommendation	Status & Comments
22	High	<ul style="list-style-type: none"> The Village of Pemberton to continue working with Sea to Sky partners on a Pemberton Valley/ Sea to Sky Corridor evacuation plan, to be completed in 2017. Communication plans may require alternative strategies for areas with limited or unavailable cellular service. Evacuation plans should be reviewed, amended, and updated regularly. 	VoP (S. Toews) on the steering committee for multi-modal plan. 2020 Evac Route Plan by ISL Eng modeled evac constraints.
Emergency Response and Preparedness (Trail Management and Access)			
Objective: To include wildfire hazard and mitigation into future trail planning and strategy, improve access to interface natural areas, and reduce chance of ignition and potential fire behaviour along high-use recreational trails.			
23	Moderate	<ul style="list-style-type: none"> Consider wildfire management, specifically trails as access points for suppression and surface fuelbreaks in future trail development, strategy, and management. Consider recognizing wildfire hazard and the potential mitigating factors of trail networks into the <i>Pemberton and Area C Service Area Trails Master Plan</i>. 	No mention of fire or hazard abatement etc. in the 2020 Pemberton Valley Rec Trails Master Plan
24	Moderate	<ul style="list-style-type: none"> Establish trail standards for those trails identified to act as surface fire fuelbreaks and provide access for suppression crews. To act as a surface fire fuelbreak, provide access for equipment and crews, and serve as a control line, trails should be 1 m wide, pruned to a minimum of 2 m in height (slope dependent), and thinned within a minimum of 5 m of trail center. Trails can be prioritized for their potential as fuelbreaks, depending on location and current state (width, adjacent fuels, and accessibility). 	SLRD uses Whistler Trail Standards. RSTBC trail class/standards referenced for new builds No mention of using them as fuel breaks
25	Moderate	<ul style="list-style-type: none"> Develop standards for the abatement of residual activity fuels associated with trail building and trail maintenance. Ensure trail crews are aware of mitigation of fuels accumulations that may result from regular maintenance activity. Standards should include fuel disposal or mitigation methods (scattering, chipping, burning, or removal, dependent upon location, amount of material, and access). Fuels from trail maintenance and trail building should not be allowed to accumulate trailside. 	No mention in the 2020 plan. Would need to consult PORCA
26	Low	<ul style="list-style-type: none"> Develop a Total Access Plan to map and inventory trail and road network for suppression planning, identification of areas with insufficient access and to aid in strategic planning. The plan should be updated every five years, or more regularly, as needed to incorporate additions or changes. Leverage, or build on, the currently existing database. 	Similar to Rec 24
Planning and Development			
Objective: To reduce wildfire hazard on private land, increase number of homes in FireSmart compliance, and decrease risk of human-caused ignitions.			

Item	Priority	Recommendation	Status & Comments
27	High	<ul style="list-style-type: none"> Review the Official Community Plan (OCP), in particular Development Permit (DP) Area No. 2 – Land Constraints and update, if necessary, to reflect the changes in Provincial legislation. In the Wildland Fire Interface Hazards portion, remove reference to the Building Bylaw and develop building, landscaping, setback, and defensible space standards for development within the DP Area No. 2. It is highly recommended that the Village obtain legal confirmation on the OCP and Building Bylaw wording prior to adopting any bylaw amendments. 	OCP Update Underway
28	High	<ul style="list-style-type: none"> Develop a new schedule to the OCP to describe terms of reference to inform applicants and staff regarding the Wildland Interface Hazard DP process. Detail expectations, responsibilities, and consequences. Review other jurisdictions terms of reference as models. Include required components of the fire risk assessment, fuels management strategy and Qualified Professional (QP) credentials. Bonds should not be released until post-development inspection occurs and documentation that all mitigating recommendations have been completed, as per the required fire risk assessment and fuels management strategy. 	OCP Update Underway
29	High	<ul style="list-style-type: none"> Require a coordinating professional, to be hired at the expense of the developer, for all DP applications that fall into overlapping DP areas. 	OCP Update Underway
30	High	<ul style="list-style-type: none"> Review and expand the Wildland Interface Hazard DP area. Include all areas within 200 m of lands with high and extreme Wildfire Behaviour Class ratings. 	OCP Update Underway
31	High	<ul style="list-style-type: none"> Update the Village of Pemberton Landscape Plant List (2011) with flammability of each species and recommended planting distance from structure. Provide this list or a wildfire DP area-specific list to all applicants. 	FireSmart Landscaping Guide – no local nurseries part of the Plant Program yet, but efforts made.
			Pemberton plant list updated
Objective: To incorporate wildfire hazard reduction considerations in subdivision design.			
32	High	<ul style="list-style-type: none"> New subdivisions should be developed with access points that are suitable for evacuation and the movement of emergency response equipment. The number of access points and their capacity should be determined during subdivision design and be based on threshold densities of houses and vehicles within the subdivision. 	Controlled by Subdivision and Development Bylaw 677. Updating bylaw this year.
33	Moderate	<ul style="list-style-type: none"> Where new subdivisions border forested lands, consideration should be given to requiring roadways to be placed adjacent to those lands. If forested lands surround the subdivision, ring roads should be part of the subdivision design. These roads both improve access to the interface for emergency vehicles and provide a fuel break between the wildland and the subdivision. 	VoP staff have mentioned that they are often topographically constrained in requiring this.

Item	Priority	Recommendation	Status & Comments
34	Moderate	<ul style="list-style-type: none"> Consider establishing or enhancing existing water bodies that could serve as emergency water sources in areas of new development. 	A relevant idea where water supply concerns are raised by PFR. Sunstone has mentioned plans to place a man-made reservoir at the top of the development for irrigation.
Fuel Management			
Objective: Reduce wildfire threat on private and public lands through fuel management.			
35	High	<ul style="list-style-type: none"> Proceed with detailed assessment, prescription development and treatment of hazardous fuel units identified and prioritized in this CWPP. Collaboration with BCTS, woodlot owners, and other licensees may facilitate larger projects. 	Number of SLRD polygons have prescriptions through WRR. Treatment and maintenance treatment occurred in PEMB-4. One Mile Lake FMP to be implemented in 2023.
Objective: Maintain previously treated areas under an acceptable level of wildfire fire threat (moderate).			
36	Moderate	<ul style="list-style-type: none"> Complete monitoring and maintenance every 5 – 7 years on previously treated areas. Treated areas should be assessed by a Registered Professional Forester, specific to actions required in order to maintain treated areas in a moderate or lower hazard. 	PEMB-4 has seen 9 hectares of maintenance treatment.
Objective: Reduce the wildfire threat to the Pemberton Valley with a cooperative regional approach.			
37	High	<ul style="list-style-type: none"> Submit phase 1 application for Forest Enhancement Society of BC (FESBC) funding for the recommended landscape level fuelbreaks. Consultation with neighbouring local and First Nations governments, BCWS, and MFLRNO should be started prior to submitting application to ensure cooperative approach. 	Polygons are outside the VoP.

6.2 APPENDIX B: LOCAL WILDFIRE RISK PROCESS

Wildfire Risk Assessment plot worksheets are provided in Appendix C: Wildfire Risk Assessment – Worksheets and Photos, plot locations are summarized in Appendix B-2: , and the field data collection and spatial analysis methodology is detailed in Appendix B-2 and B-3.

6.2.1 APPENDIX B-1: FUEL TYPING METHODOLOGY AND LIMITATIONS

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.³⁷ Fuel typing is recognized as a blend of art and science. Although a subjective process, 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.³⁸ 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 sometimes do not occur within the AOI, fuel types which cannot accurately capture the natural variability within a polygon, and limitations in the data used to create initial fuel types.³⁸ Details regarding fuel typing methodology and limitations are found in Section 4.1.2. 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 risk, not as an operational, or site-level, 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 risk assessment should occur every 5 – 10 years to determine the need for threat assessment updates and the timing for their implementation.

Table 24 summarizes the fuel types by general fire behaviour (crown fire and spotting potential). These fuel types were used to guide the threat assessment.

Table 24. Fuel Type Categories and Crown Fire Spot Potential encountered within the WUI.

Fuel Type	FBP / CFDDRS Description	AOI 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 (Douglas fir, hemlock, cedar), with crowns separated from the ground	Surface and crown fire, low to very high fire intensity and rate of spread	High*

³⁷Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3.

³⁸Perrakis, D.B., Eade G., and Hicks, D. 2018. Natural Resources Canada. Canadian Forest Service. *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description* 2018 Version.

Fuel Type	FBP / CFDDRS Description	AOI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type – Crown Fire / Spotting Potential
C-7	Ponderosa pine and Douglas-fir	Low-density, uneven-aged forest, crowns separated from the ground, understory of discontinuous grasses and shrubs. Exposed bed rock and low surface fuel loading.	Surface fire spread, torching of individual trees, rarely crowning (usually limited to slopes > 30%), moderate to high intensity and rate of spread	Moderate
C-5	Red and white pine	Well-stocked mature forest, crowns separated from ground. Moderate understory herbs and shrubs. Little grass or surface fuel accumulation.	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
O-1a/b	Grass	Matted and standing grass that can cure; sparse or scattered shrubs, trees, and down woody debris. Seasonal wetlands that can cure	Rapidly spreading, high-intensity surface fire when cured	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 or birch (leafless and green)	Deciduous stands	Always a surface fire, low to moderate rate of spread and fire intensity	Low
S-1	Slash (jack / lodgepole pine, white spruce)	Any conifer slash	Moderate to high rate of spread and high to very high intensity surface fire	Low
N	N/A	Non-fuel: irrigated agricultural fields, urban or developed areas void or nearly void of vegetation and forests	N/A	N/A
W	N/A	Water	N/A	N/A

*C-3 fuel type is considered to have a high crown fire and spotting potential within the WUI due to the presence of moderate to high fuel loading (dead standing and partially or fully down woody material), and continuous conifer ladder fuels.

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

- C-3 fuel types being incorrectly identified by the PSTA as C-5;
- C-3 fuel types being incorrectly identified by the PSTA as C-7;
- C-5 fuel types being incorrectly identified by the PSTA as C-7;
- C-7 fuel types being incorrectly identified by the PSTA as D-1/2

6.2.2 APPENDIX B-2: WILDFIRE THREAT ASSESSMENT PLOTS

Table 25 displays a summary of all Wildfire Threat Assessment (WTA) plots completed during CWRP field work. The most recent 2020 WTA threat plot worksheets and methodology were used.³⁹ The plot forms and photos will be submitted as a separate document. The following ratings are applied to applicable point ranges:

- Wildfire Behaviour Threat Score (Coast and Mountains Ecoprovince)
 - 0 – 41 Low
 - 42 – 57 Moderate
 - 58 – 69 High
 - 70 – 100 Extreme

Table 25. Summary of WUI Threat Assessment Worksheets (2020).

WTA Plot	Geographic Location	Wildfire Threat Rating
BENCH-1	Upslope of the reservoirs in Benchlands – is now private land as part of the Nkwúkwma proposed development.	60 (High)
BENCH-2	Above homes on Eagle drive, will be inside the parkland of the proposed development.	55 (Mod)
ECONO-1	Above Sunstone (intersection of Cream Puff and Econoline)	42 (Mod)
MACK-1	Along "Lower Mackenzie Cruise", within the 2016 MK-FSR-10 proposed treatment area.	50 (Mod)
MACK-2	Below Mackenzie FSR, same area as Mack-1.	48 (Mod)
ONEMI-1	SE of One Mile Lake, corner of municipal parcel near the transmission line RoW.	64 (High)
RIDGE-1	NE corner of the Ridge development, inside the SCF.	41 (Low)
TWR-1	Area surrounding the knoll that the SAR/CBC/PFR radio towers are on – likely part of the now-private parcel.	50 (Mod)

³⁹ MFLNRORD.2020 Wildfire Threat Assessment Guide and Worksheets

6.2.3 APPENDIX B-3: FIRE RISK THREAT ASSESSMENT METHODOLOGY

As part of the CWRP process, spatial data submissions are required to meet the defined standards in the Program and Application Guide. Proponents completing a CWRP can obtain open-source BC Wildfire datasets, including Provincial Strategic Threat Analysis (PSTA) datasets from the British Columbia Data Catalogue. Wildfire spatial datasets obtained through the BC Open Data Catalogue used in the development of the CWRP include, but are not limited to:

- PSTA Spotting Impact
- PSTA Fire Density
- PSTA Fire Threat Rating
- PSTA Lighting Fire Density
- PSTA Human Fire Density
- Head Fire Intensity
- WUI Human Interface Buffer (1436m buffer from structure point data)
- Wildland Urban Interface Risk Class
- Current Fire Polygons
- Current Fire Locations
- Historical Fire Perimeters
- Historical Fire Incident Locations
- Historical Fire Burn Severity

As part of the program, proponents completing a CWRP are provided with a supplementary PSTA dataset from BC Wildfire Services. This dataset includes:

- Fuel Type
- Structures
- Structure Density
- Eligible WUI (1 km buffer of structure density classes >6).

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

- AOI
- Proposed Treatment
- WUI (1 km buffer of structure density classes >6)

The provided PSTA data does not 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 localized Fire Threat feature class that is included in the Local Fire Risk map required for project submission. 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 CWRP. This is accomplished by traversing as much of the AOI and surrounding Eligible WUI as possible (within time, budget and access constraints). Threat Assessment plots are completed on the 2020 form, and as per the Wildland Urban Interface Threat Assessment Guide.

For clarity, the final threat ratings for the AOI 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, BC Assessment, and orthophotography
3. Complete field work to ground-truth fuel typing and threat ratings (completed 8 WUI threat plots on a variety of fuel types, aspects, and slopes and an additional 250 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

The field data is used to correct the fuel type polygon attributes provided in the PSTA. This corrected fuel type layer is then used as part of the 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. Table 26 below summarizes the components and scores to determine the Fire Behaviour Threat.

Table 26: Components of Fire Threat Analysis

Attribute	Indicator	Score
Fuel Type	C-1	35
	C-2	
	C-3	
	C-4	
	M-3/4, >50% dead fir	25
	C-6	
	M-1/2, >75% conifer	20
	C-7	
	M-3/4, <50% dead fir	15
	M-1/2, 50-75% conifer	
	M-1/2, 25-50% conifer	
	C-5	10
	O-1a/b	
	S-1	
	S-2	
	S-3	5
M-1/2, <25% conifer		

	D-1/2	0
	W	0
	N	0
Weather - BEC Zone	AT, irrigated	1
	CWH, CDF, MH	3
	ICH, SBS, ESSF	7
	IDF, MS, SBPS, CWHsds1 & ds2, BWBS, SWB	10
	PP, BG	15
Historical Fire Occurrence 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	15
Slope	<16	1
	16-29 (max N slopes)	5
	30-44	10
	45-54	12
	>55	15
Aspect (>15% slope)	North	0
	East	5
	<16% slope, all aspect	10
	West	12
	South	15

WUI Risk Classes and their associated summed scores

Very Low	0
Low	0-35
Moderate	35-55
High	55-65
Extreme	>65

These attributes are summed to produce polygons with a final WUI Risk Score. To determine the Fire Threat score, only the distance to structures is used. Buffer distance classes are determined; <200m, 200m-500m and >500m) but only for polygons that had a 'high' or 'extreme' Fire Threat score from previous assessment. In order to determine WUI Risk; those aforementioned polygons within 200m are rated as 'extreme', within 500m are rated as 'high', within 2km are 'moderate', and distances over that are rated 'low'.

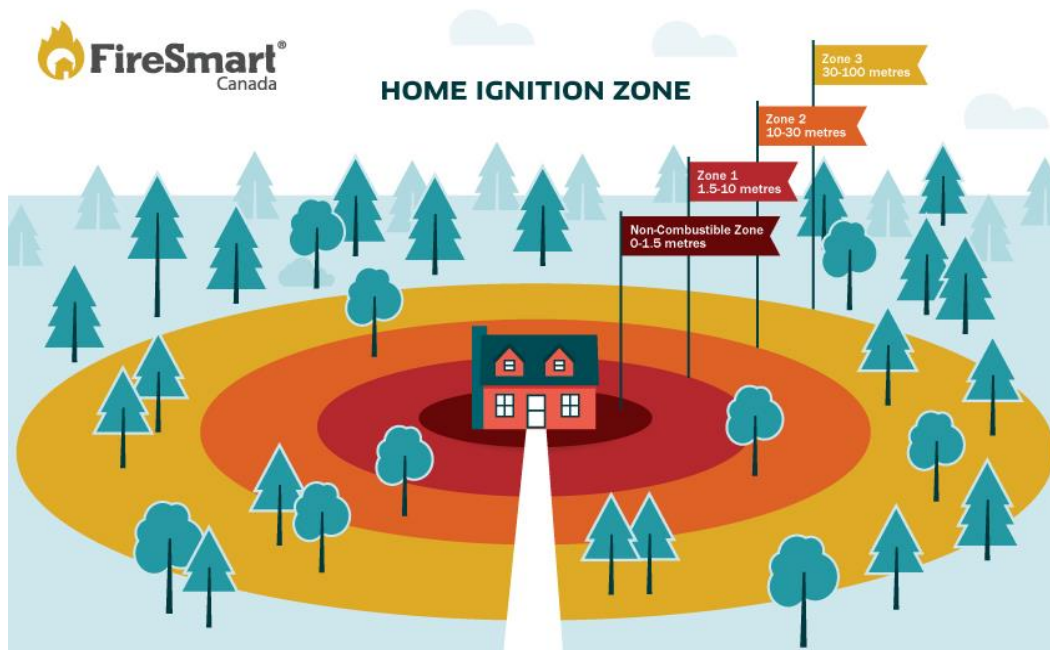
Limitations

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 Risk 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. Structures are considered, but there is no consideration for structure type (also not included on threat assessment worksheet). This method uses the best available information to produce accurate and useable threat assessment across the study area in a format which is required by the UBCM FCFS program.

6.2.4 APPENDIX B-4: PROXIMITY OF FUEL TO THE COMMUNITY

Home and Critical Infrastructure Ignition Zones

Multiple studies have shown that the principal factors regarding home and structure loss to wildfire are the structure's characteristics and immediate surroundings. The area that determines the ignition potential of a structure to wildfire is referred to as (for residences) the Home Ignition Zone (HIZ) or (for critical infrastructure) the Critical Infrastructure Ignition Zone (CIIZ).^{40,41} Both the HIZ and CIIZ include the structure itself and four concentric, progressively wider Priority Zones out to 100 m from the structure (Figure 14 below). More details on priority zones can be found in the FireSmart Manual.⁴²



⁴⁰ 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.

⁴¹ Cohen, J. Preventing Disaster Home Ignitability in the Wildland-urban Interface. *Journal of Forestry*. p 15 - 21.

⁴² <https://firesmartcanada.ca/> and <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/firesmart>

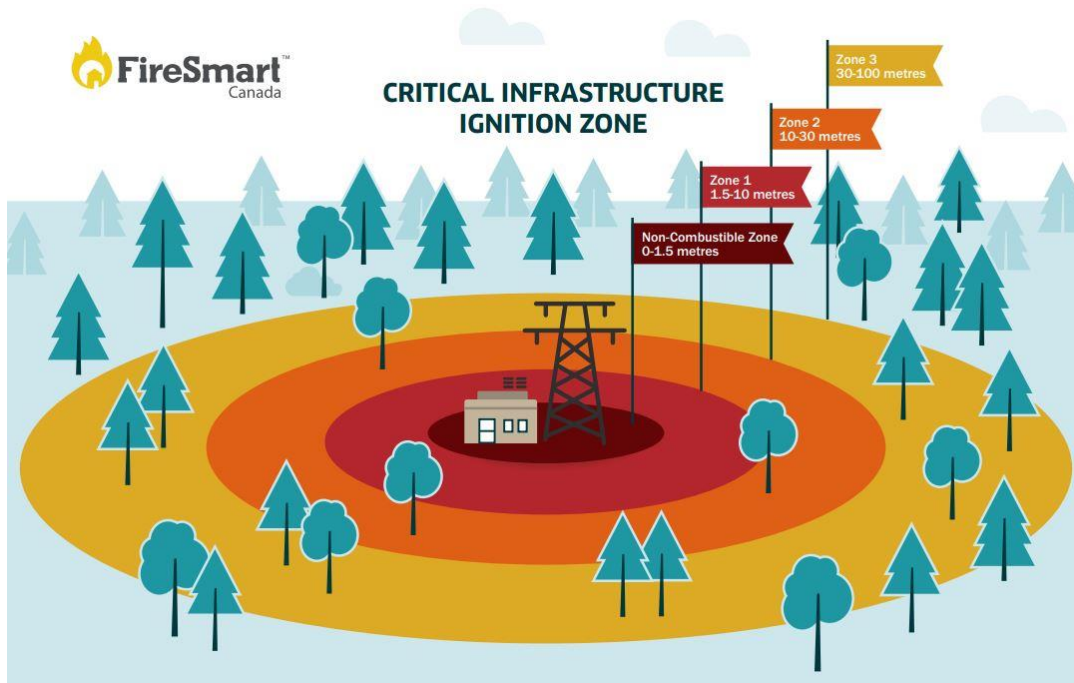


Figure 14: FireSmart Home and Critical Infrastructure Ignition Zone (HIZ, CIIZ)

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 can be transported long distances ahead of the wildfire, across fire guards and fuel breaks, and accumulate within the HIZ/CIIZ in densities that can exceed 600 embers per square meter. Combustible materials found within the HIZ/CIIZ 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/CIIZ 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.⁴¹ Increasing ignition resistance would reduce the number of homes simultaneously on fire; extreme wildfire conditions do not necessarily result in WUI fire disasters.⁴³ It is for this reason that the key to reducing WUI fire structure loss is to reduce structure ignitability. Mitigation responsibility must be centered on structure owners. 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.

⁴³Calkin, 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/>.

Table 27. Proximity to the Interface.

Proximity to the Interface	Descriptor*	Explanation
WUI 100 HIZ/CIIZ and Community Zones	(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 is FireSmart.
WUI 500 Community and Landscape Zones	(100-500m)	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 Landscape Zone	(500-1000 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.
Landscape Zone	>1000 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 (100m). These distances can be varied with appropriate rationale, to address areas with low or extreme fuel hazards.*

6.3 APPENDIX C: WILDFIRE RISK ASSESSMENT – WORKSHEETS AND PHOTOS

Provided separately as PDF package.

6.4 APPENDIX D: MAPS

Provided separately as PDF package.

6.5 APPENDIX E: COMMUNITY FIRESMART RESILIENCY COMMITTEE

The Village of Pemberton Community FireSmart Resiliency Committee (CFRC) was formed at the onset of plan development in May 2022. The Committee met five times over the course of plan development, with each meeting focused on one or more FireSmart disciplines.

Table 28. Members of the (2022) Village of Pemberton Community FireSmart Resiliency Committee

Agency	Role	Name
Pemberton Fire Rescue / FireSmart	Fire Chief	Cameron Adams
	Deputy Fire Chief (former FireSmart Coordinator)	Adam Malpus
	FireSmart Coordinator	Paul Stoker
	FireSmart Laborer	Merek Obrucnik
Village of Pemberton	Emergency Program Coordinator	Sarah Toews
	Development Services	Scott McRae
	Corporate & Legislative Services	Gwendolyn Kennedy
	Recreation	Christine Burns
	Councilor	Ted Craddock
Spelkúmtn Community Forest	Community Forest Manager	Klay Tindall
	Forest Technician	Jordan Gabriel
Lil'wat Nation	Safety Coordinator	Troy Bikadi
	FireSmart Coordinator	Vaughn Gabriel
BC Wildfire Service	Wildfire Officer, Pemberton Fire Zone	Marc Simpson
	Wildfire Technician, Pemberton Fire Zone	Joe Lax
Ministry of Forests (Formally FLNRORD) - Sea to Sky Natural Resource District	Land and Resource Coordinator, Wildfire Risk Reduction	Sara Barker