Community Wildfire Protection Plan

District of Peachland

Prepared for:
Dennis Craig, Fire Chief
Peachland Fire & Rescue Service
4401 3rd Street, Peachland BC

Prepared by:
Frontline Operations Group Ltd.
11510 Upper Summit Drive
Coldstream, BC V1V 2B4

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Fire Chief
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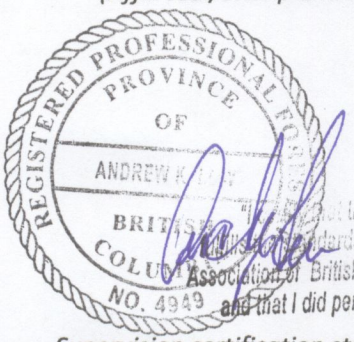
4401 3rd Street, Peachland BC V0H 1X7

Prepared by:

Frontline Operations Group Ltd.
11510 Upper Summit Drive, Coldstream BC V1B 2B4

Registered Professional Forester:	
Andrew K. Low	RPF 4949
Date signed	
March 31, 2021	

(Affix seal/stamp and sign)



"I certify that the work described herein
conforms to standards expected of a member of the
Association of British Columbia Forest Professionals
and that I did personally supervise the work."

Supervision certification statement

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Acknowledgements

Frontline acknowledges that our work on this project was carried out on the traditional and unceded territory of the distinct and sovereign Syilx/Okanagan Nation. Over the course of this project, we were afforded the opportunity to experience the diversity and beauty of Syilx Territory, and we reaffirm our support of the inherent jurisdiction of Syilx/Okanagan Nation to manage the land and resources within it.

We offer our sincere thanks to Dennis Craig, Fire Chief for Peachland Fire & Rescue Service for his support and guidance through the course of this project. We are especially grateful for his patience and understanding as we completed the project during a difficult and stressful time for everyone during the corona virus pandemic.

Executive Summary

The District of Peachland has long had a relationship with environmental disturbance, including wildland fire. The past few fire seasons alone have seen several wildfires that have affected residents through evacuation alerts and orders, including the Finlay Creek (2017), Mount Eneas and Munro fires (2018). In addition, climate change, coupled with the effects of a history of fire exclusion continue to compound the wildfire problem faced in British Columbia. To reframe the wildfire issues faced by the community, and to position the District to access future prevention funding under the Community Resiliency Investment (CRI) program, Peachland retained Frontline Operations Group Ltd. to undertake an update to its Community Wildfire Protection Plan (CWPP), which was first completed in 2005 and last updated in 2012.

Community Wildfire Protection Plans have been a foundational element of the former Strategic Wildfire Prevention Initiative (SWPI), and now the CRI program, and serves to paint the complete wildfire picture for communities in British Columbia. Within the context of the CRI program, a CWPP serves as the starting point for wildfire prevention and threat mitigation efforts for local government. These efforts are primarily centered around a combination of public engagement and education, and fuels management. The FireSmart program is an example of an effective education and engagement strategy to reduce the wildfire threat to residences and property and is an area in which Peachland has been active in promoting for some time. FireSmart is a key aspect of prevention and mitigation, as it attempts to generate and sustain grassroots participation in reducing the susceptibility of private property and homes to wildfire. Fuels management is a strategy undertaken at a larger scale by landowners and seeks to modify or reduce wildland fuel characteristics or abundance in order to reduce potential wildfire intensity and threat to adjacent values. Fuels management to mitigate wildfire threats to communities is a shared responsibility amongst local governments, First Nations, and the provincial government.

As a partial indicator of potential future wildfire activity, a fire history analysis has been completed for the CWPP. The occurrence rate of wildfires within the Peachland area of interest (AOI) indicates a relatively stable rate of occurrence lightning and person-caused wildfires. The annual area burned has increased in the past several years compared to previous decades. Furthermore, an analysis of two of three BC Wildfire Service fire weather stations in the

surrounding region demonstrate a steady increase in the number of Fire Danger Class 4 and 5 days occurring each year, as well as the seasonal severity rating.

Geospatial analysis of provincial fuel type layers and the provincial strategic threat analysis (PSTA) outputs further characterize the wildfire risks that Peachland continues to face. Although parts of Peachland are relatively well-protected by orchards or agricultural fields, the wildland urban interface is dominated by timber and remain vulnerable. Continued emphasis needs to be placed on the responsibilities of private property owners to manage their fuel hazards. This includes residential property owners and the steps they can take to manage their landscaping and structure characteristics to make their homes less prone to ignition during a wildfire.

Wildland urban interface wildfire threat assessments were completed on municipal and Crown land where geospatial analysis and fire behaviour modelling was classified as moderate or higher. Based on the threat assessments, 21 areas have been recommended for wildfire risk reduction treatment, totalling 83 ha – which includes four previously treated areas that will be due for maintenance treatments in 3-7 years.

Peachland will continue to face wildfire pressures, and these should be expected to increase in a changing climate. By maintaining a proactive focus on wildfire prevention and mitigation efforts, and building upon the progress already made, the community can continue to find ways to grow and thrive in an active wildfire environment.

Summary of CWPP Recommendations

CWPP Planning

Recommendation No.	Objective/Priority	Recommendation/ Next Steps	Responsibility/Funding Source / Comments
No. 1 - CWPP Planning Process	Establish an annual review cycle to assess and report CWPP recommendation progress. Priority: Low	Establish an annual review and reporting schedule that includes: • Progress related to CWPP recommendations. • Identification of impediments to progress • Identification of opportunities for improvement • Preparation for next year's activities and any related funding applications	Peachland with UBCM funding support This recommendation is a modification to the 2012 recommendations 1 -3.

Risk Management and Mitigation Factors

Recommendation No.	Objective/Priority	Recommendation/ Next Steps	Responsibility/Funding Source / Comments
No. 2 - Risk Management and Mitigation Factors	Maintain the Wildfire Interface Development Permit Area. Priority: High	Maintain the Wildfire Interface Development Permit Area for the Peachland. As the Official Community Plan (OCP) is amended or updated from time to time, ensure that requirements and guidelines complement the Wildfire Development Permit Area requirements.	Peachland This recommendation is about sustaining performance achieved since the previous CWPP.
No. 3 - Risk Management and Mitigation Factors	Conduct fuel hazard mitigation on remaining untreated municipal lands. Priority: High	Over a 3–5-year period, apply for funding to prescribe and treat or maintain 72.5 ha of municipal ownership class lands summarized in Table 11.	Peachland with UBCM CRI funding support This recommendation is about maintaining the proactive approach of previous CWPPs.

No. 4 - Risk Management and Mitigation Factors	Support fuel hazard mitigation – crown lands. Priority: High	Support FLNRORD to develop prescriptions and undertake wildfire risk reduction treatments on 10.5 ha of crown land summarized in Table 11 that pose a hazard to residential property in or can be incorporated into landscape level fuel breaks.	FLNRORD with funding from the Crown Land Wildfire Risk Reduction (CLWRR) program This recommendation is a carryover of the 2012 recommendations 5 & 15.
No. 5 - Risk Management and Mitigation Factors	Ensure that the current CWPP and related deliverables are readily accessible and shared with the public, First Nations, adjacent local governments, industry, and relevant NGOs. Priority: Low	• Continue to post the CWPP and maps on the Peachland website and share across social media platforms. • Share the CWPP and maps with partners and stakeholders. • Present and make available the CWPP and maps during public FireSmart meetings and presentations.	Peachland This recommendation is about sustaining performance related to the 2012 recommendations 32 & 35.

No. 6 - Risk Management and Mitigation Factors	Conduct FireSmart Community Recognition Projects Priority: High	Continue to support new FireSmart Community Recognition projects for Peachland neighbourhoods. A prioritized list of recommended areas can be found in Table 13 • Over a five-year period, plan on completing 1-2 community recognition projects per year. • While recognizing that FireSmart Community Recognition projects are not intended to be one-time efforts, provide annual support to the existing neighbourhood FireSmart groups in Peachland and support the annual application for renewal of recognition. ○ .	Peachland with UBCM CRI funding support. This recommendation consolidates prior FireSmart recommendations and is about sustaining performance and momentum. • Substantial progress has been made, with the completion of FireSmart Community Assessment Reports for: ○ Upper Princeton South Side ○ Bulyea Ave. ○ Forest Hill / Thompson Dr
No. 7 - Risk Management and Mitigation Factors	Support fire use and prescribed fire in the region. Priority: Moderate	Support those agencies and First Nations that are managing natural fire use and prescribed fire by: • Amplifying public engagement that supports prescribed fire use	Peachland and regional partners This is a consolidation in part of the 2012 recommendations 5 & 15.

No. 8 - Risk Management and Mitigation Factors	Establish a working relationship between Peachland and MoTI to address wildland fuel hazard concerns along Provincial highways and on MoTI owned rights of way. Priority: Moderate	Develop a memorandum of understanding (or similar) to facilitate the ongoing and shared interest in wildland fuel management and roadside vegetation control, including: • A shared interest in identifying, monitoring, and mitigating roadside wildland fuel hazards. Establishment of best practices related to roadside vegetation control in Peachland that attempts to limit the occurrence of hazardous wildland fuel during the fire season.	Peachland and MoTI, with support from CLWRR and/or CRI funding. This is a carryover and refinement of the 2012 recommendations 27 & 28.

Wildfire Response

Recommendation No.	Objective/Priority	Recommendation/ Next Steps	Responsibility/Funding Source / Comments
No. 9 - Wildfire Response	Establish and/or modify trail access to support wildfire suppression strategies and tactics. Priority: Moderate - High	• New trails in or near the WUI should be designed to complement wildfire suppression strategies and tactics. • Trail redesigns should complement wildfire suppression strategies and tactics. • Wherever possible, trail widths should permit the use of light vehicles for fire suppression purposes.	Peachland. Various funding. This is a carryover of the 2012 recommendations 9 & 21.

No. 10 - Wildfire Response	Develop a wildfire response plan to guide wildfire suppression strategies and tactics. Priority: High	Also known as a pre-attack or pre-suppression plan, develop a detailed map that identifies staging areas, water sources, trail heads, drop points and other potential incident facilities and landmarks. Consider identifying suitable helispots. Consider developing a response plan jointly with BCWS and adjacent response partners to facilitate firefighting assistance.	Peachland and BCWS. This recommendation is a carryover from the 2012 recommendations 23 & 37.
No. 11 - Wildfire Response	Consider the acquisition of a wildland Type 3 engine and a Type 2 water tender to improve wildfire response capabilities. Priority: Moderate - High	• A Type 3 wildland engine would complement the existing Type 6 and two Type 7 engines by supplying a larger volume of water during initial attack and structure protection. • A Type 2 water tender will provide greater mobility and access, while complementing the existing Type 1 water tender.	Peachland with support from external funding.
No. 12 - Wildfire Response	Pursue a joint wildland tabletop exercise with response partners. Priority: Moderate	• In conjunction with West Kelowna Fire Rescue, Summerland Fire Department, BCWS and other interested response partners, hold a joint wildfire tabletop exercise to practice interagency coordination and cooperation. • Recommended participants include command and general staff positions.	Peachland, BCWS, and regional partners with UBCM funding support

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1.Introduction

The Community Wildfire Protection Plan (CWPP) program was initiated by the Province of British Columbia as a response to key recommendations contained in the Firestorm 2003 Provincial Review (Filmon, Leitch and Sprout 2004). The CWPP program is administered by the Union of BC Municipalities (UBCM) as a foundational component of the Community Resiliency Investment (CRI) program- a new provincial program intended to reduce the risk and impact of wildfire to communities in BC through community funding, supports and priority fuel management activities on provincial Crown land (UBCM 2018). In 2020 the CWPP template was replaced by the Community Wildfire Resiliency Plan (CWRP) for subsequent CRI funding intakes. As with the CWPP, funding for CWRP development is available to all local governments and First Nations in BC.

1.1 Purpose

A CWPP identifies wildfire risks to a community, describes the potential impact that wildfire may have on the community, and details recommendations to reduce risk and increase the community's resilience to wildfire threats.

The overarching goal of the CWPP is to define the threat to human life, property and critical infrastructure from wildfires in a given area, identify measures necessary to mitigate those threats and outline a plan of action to implement the measures.

The intended outcome of the CWPP planning process is to provide the community with a detailed framework for further efforts that will:

- Reduce the likelihood of a wildfire entering the community;
- Reduce the impacts and/or losses to property and critical infrastructure;
- Reduce negative economic and social impacts to the community.

1.2 CWPP Planning Process

The District of Peachland conducted the CWPP process previously in 2012 and has since undertaken several fuel management projects, public education and FireSmart initiatives. This prior work has served to facilitate and simplify the CWPP update process.

Updating the CWPP for the District of Peachland began with the identification of the needs of the local government and community members involved in its development. Including key

stakeholders, incorporating land use plans and clear description of the wildfire risk were identified as foundational elements in properly preparing for wildfire. The updated CWPP was intended to complement any polices, plans, legislation or multi-party agreements currently held by the District of Peachland.

Frontline Operations Group Ltd. (Frontline) was retained as the consulting firm to conduct the CWPP update. Andrew Low, RPF, and John Davies, RPF, supervised the field assessments, analysis and report compilation as forest professionals qualified in all aspects of wildland fire management.

Frontline worked closely with Peachland Fire & Rescue Service Chief Dennis Craig during the development of the CWPP and the selection and prioritization of fuel treatment areas.

1.3 Summary of Recommendations

Recommendation No.	Objective/Priority	Recommendation/ Next Steps	Responsibility/Funding Source / Comments
No. 1 - CWPP Planning Process	Establish an annual review cycle to assess and report CWPP recommendation progress. Priority: Low	Establish an annual review and reporting schedule that includes: • Progress related to CWPP recommendations. • Identification of impediments to progress • Identification of opportunities for improvement • Preparation for next year's activities and any related funding applications	Peachland with UBCM funding support This recommendation is a modification to the 2012 recommendations 1 -3.

2. Local Area Description

The District of Peachland was incorporated in 1909. Mining, forestry and agriculture (tree fruits, cattle farming and ranching) were historically the economic drivers of the community (District of Peachland 2018). Located at the southern end of the Central Okanagan Regional District (RDCO), the small, linear community occupies approximately 12.63 square kilometers on the western shores of Okanagan Lake. This area is within the traditional territory of both the Westbank First Nation and the Penticton Indian Band (Cameron 2010).

Peachland is bordered by the City of West Kelowna to the north, the RDCO Brent Road neighborhood to the south, Okanagan Lake to the east and crown land in the Trepanier Valley to the west. The District is a popular destination with increased tourism through the summer months (District of Peachland 2018).

2.1 CWPP Area of Interest

The area of interest (AOI) defines the study area. Past iterations of CWPPs in BC included an additional buffer (often 2 km) beyond the administrative boundary of the community. Over time as more local governments developed CWPPs, this began to result in AOI overlap and the potential for planning duplication. For the purpose of this CWPP, the District of Peachland AOI is within the municipal boundary. However, the fire history analysis has included a 2 km buffer in order to assess the influence of nearby wildfires on the community.

The District of Peachland shares the northern border with the City of West Kelowna. It is important to note that there is WUI area that meets at this border around the junction of Highway 97c and Highway 97 (Map 1). This area represents an opportunity to coordinate wildfire mitigation efforts between the two communities, strengthening the resilience of the location.

2.2 Community Description

The District of Peachland operates or maintains almost $130 million of public infrastructure. This includes: water; wastewater (sewer) and stormwater systems; roadway networks; community buildings and facilities (including parks) and fleet (vehicles; (District of Peachland 2018).

In 2016, the most common occupations in the District of Peachland were in sales and services (26%); trades, transport and equipment operators (16%); and business, finance, and administration (15%; (District of Peachland 2018)). The top three employment industries in the region in 2016 were: health care and social assistance (13.1%); retail trade (13%); and construction (10.9%; (District of Peachland 2018)).

There are four major road corridors that service the District: Beach Avenue, Princeton Avenue, Ponderosa Drive and Trepanier Bench Road. Approximately 78% of the District of Peachland lies on slopes greater than 10 percent and approximately 47% is comprised of slopes greater than 30% (District of Peachland 2018). Trepanier Bench Road resurfacing and traffic light installation at the intersection with Highway 97 are pending (District of Peachland 2018).

Road access into Peachland is predominantly via Highway 97, which runs through the community. Broadly, evacuation of the District of Peachland would follow any of 3 egress routes along the provincial highways that intersect the AOI: southward towards the District of Summerland via Highway 97, northward towards the City of West Kelowna via Highway 97 or northwestward towards the City of Merritt via Highway 97c.

Peachland Fire and Rescue Service (PFRS) is located at 4401 3rd Street and is a volunteer paid-on-call fire department. The department responds to incidents in the municipality including fires (of any type), motor vehicle accidents, rescues, public assistance, first responder (medical), marine and water rescue as well as hazmat calls (District of Peachland 2019).

Peachland is situated entirely within the Regional District of the Central Okanagan (RDCO). The border between the RDCO and Regional District of the Okanagan-Similkameen (RDOS) abuts the eastern boundary of Darke Lake Provincial Park, which is approximately 2 km to the south west of Peachland. Peachland is approximately 3 km north of the District of Summerland municipal boundary, which lies within RDOS.

2.3 Past Wildfires, Evacuations, and Impacts

The most notable wildfire in recent history was the 2003 Okanagan Mountain Park fire on the east side of Okanagan Lake, opposite of Peachland, which reached a size of 25,600 ha, caused the evacuation of 33,050 people and damaged or destroyed 238 homes (Davies, Coulthard and Zukanovic 2012).

Most recently, a state of local emergency was declared for a 2018 wildfire (K51264) with 596 properties south of Princeton Avenue, east to Highway 97 under evacuation alert (Judd 2018) (Table 1). Three properties within the Central Okanagan West Electoral Area (303, 305 and 307 Log Chute Road) were placed on evacuation order (Judd 2018).

Table 1 Date, location, estimated size, evacuation type and cause of recent notable wildfires within the District of Peachland area of interest from 2009 to 2018.

Date	Event name	Alerts or Orders?	Fire size (ha)	Fire cause
July 17, 2018	Peachland Creek (K51247)	Yes	23	Lightning
July 17, 2018	Munro Lake FSR (K51278) / Mt. Eneas (K51264)	Yes	1,790	Lightning
July 17, 2018	Glenrosa (K51248)	No	15	Lightning
September 2, 2017	Finlay Creek Wildfire (K52024)	Yes	2,224	Person
August 26, 2016	McCall Creek (K50418)	No	2	Person
August 7, 2014	Drought Hill (K50446)	Yes	40	Person
September 9, 2012	Trepanier (K50869)	Yes	214	Person
July 12, 2010	Seclusion Bay (K50144)	Yes	24	Person
July 18, 2009	Glenrosa (K50739)	Yes	400	Person

2.4 Current Community Engagement

Peachland Fire and Rescue Service has an active public education program and provides station tours to community groups, schools, and the general public.

In 2005 the District of Peachland adopted recommendations for treatments around structures in three priority zones involving fuel removal, fuel reduction and fuel conversion (District of Peachland 2018). Projects have been completed in the following neighborhoods: Forest Hill Road, MacKinnon Road, and Sanderson Avenue ((District of Peachland 2019).

As part of the 2012 CWPP, a wildfire risk analysis was completed for the District of Peachland. Interface fuel hazard assessments were conducted for high-risk polygons and these polygons were ranked according to the site-specific hazard (Davies, Coulthard and Zukanovic 2012). The 2012 CWPP resulted in a recommendation that the District access funding through the Union of BC Municipalities (UBCM) and any other agencies, for a fuels management project (Davies, Coulthard and Zukanovic 2012).

2.5 Linkages to Other Plans and Policies

2.5.1 Local Authority Emergency Plan

The District of Peachland is included in the Regional District of Central Okanagan Emergency Plan, which is coordinated by the City of Kelowna on behalf of the regional district, the District of Lake Country, the District of Peachland, Westbank First Nation, Kelowna and West Kelowna (Regional District of Central Okanagan 2020). The emergency plan is intended to:

- assist emergency personnel to respond to disasters and major emergencies, such as floods, wildfires, major spills, plane crashes etc.;
- establish a centralized assessment and decision-making organization to share regional resources or request assistance from the provincial or federal governments;
- guide post-emergency recovery operations.

2.5.2 Affiliated CWPPs

Adjacent CWPPs include: Regional District of Okanagan-Similkameen (Low 2020) and the City of West Kelowna (Low and Davies 2018) and the Regional District of Central Okanagan (Blackwell 2010). Both the City of West Kelowna and the Regional District of Central Okanagan will have AOIs that overlap with the District of Peachland AOI. Joint projects are certainly possible, especially in Regional Parks or areas of overlap with Peachland.

2.5.3 Local Government Plans and Policies

The District of Peachland has established seven development permit areas (DPAs), including DPA 6.4.2 Natural Hazard Areas– Wildfire Interface, which is intended to minimize the risk to life and property in balance with preservation of forested and natural areas that contribute to the character of Peachland (District of Peachland 2018). Specifically, DPA 6.4.2 lists nine guidelines which recommend that subdivision designs:

- Require a report be prepared by a qualified professional to assess and make recommendations for fire mitigation prior to subdivision.
- Mitigate fire hazards on forested land to a level deemed acceptable by a qualified professional in forest fire hazard assessment prior to subdivision and/or dedication as park.
- Improve access to areas of the community that are considered isolated and that have inadequate developed access for evacuation and fire control.
- Provide access points between lots to public land beyond containing natural vegetation to ensure roadway access for fire hazard management.
- Provide access points suitable for evacuation and the movement of emergency response equipment.
- Consider using roads to create fire breaks between lots and forested areas.
- Optimize fire hydrant locations for protection of forested areas.

- Design building lots such that building locations are setback a minimum of 10 metres from the top of ridgelines, cliffs or ravines.
- Use hazard reduction methods that mimic the natural effects of localized ground fires such as thinning and spacing trees and vegetation, removal of debris and dead material from the ground and removal of lower tree branches in balance with habitat conservation and restoration.

The 2018 OCP also lists several objectives and policies that are relevant to community wildfire protection planning (District of Peachland 2018, 127-131). These include section 5.6.4 Natural Hazards, which lists the following objectives:

- Protection of public safety.
- Reduction of risk for property damage and personal injury from natural hazards.
- Reasonable protection of development lands from hazardous conditions.

These objectives are intended to be carried out via the following policies:

- Collaborate with regional partners about hazard management.
- Share data, information and mapping to improve hazard and resiliency planning.
- Continue efforts to protect citizens and visitors from wildfire and other hazards present in urban/wildfire interface areas.
- Promote the implementation of wildfire hazard assessment and mitigation measures in existing neighbourhoods.
- Require wildfire hazard assessment and mitigation measures be integrated into all new developments.
- Implement the Drought Management Plan.

The 2018 OCP outlines safe urban-wildland fire interface areas as an objective and following FireSmartBC guidelines as a policy in section 5.6.6 Natural Hazards – Wildfire Interface (District of Peachland 2018). FireSmartBC guidelines also heavily influence District of Peachland bylaws pertaining to properties in the WUI (e.g., Fire & Life Safety and Smoke Control Regulations Bylaw No. 1718- Interface Zone Regulations; (District of Peachland 2018).

2.5.4 Higher Level Plans and Relevant Legislation

The Okanagan Shuswap Land and Resource Management Plan (LRMP 2001) relates to Crown land throughout the Okanagan Shuswap Natural Resource District (Province of British Columbia 2001). The LRMP makes references to wildfire management and hazard reduction

(Table 4), none of which impinge on the ability of local governments to undertake mitigation work. The LRMP supports orders pertaining to the establishment of resource management zones and old growth management objectives (Province of British Columbia 2007). None of these orders impede the District of Peachland from pursuing strategic wildfire mitigation efforts.

Table 2 Wildfire references in the Okanagan Shuswap Land and Resource Management Plan (Province of British Columbia 2001).

Part 4 Community/Crown Interface (Page CCI 4-1)	
Sec 7	Protect populated areas from forest fire hazards in the wildland – urban interface, and protect the provincial forest from fires originating on contiguous private land.
Sec 7.1	The Ministry of Forests is to coordinate fire hazard reduction in the Interface zone through consultation with the public, licensed tenure holders, affected resource agencies, First Nations, and local government.
Sec 7.2	Where practical, coordinate and implement fire hazard reduction activities with priority areas for prescribed burning for ecosystem enhancement purposes.
Part 4 Ecosystem- Natural Disturbance Type 4 (page NDT 4 4-9)	
Sec 10.1	Where practical, return fire to the NDT4a at historical fire cycle intervals by developing and implementing a burn plan that includes restoration and maintenance burning.
Sec 10.3	Develop and implement a plan to modify suppression on naturally occurring wildfires that meet impact prescriptions.
Sec 11.9	Develop a fire management plan for the NDT4a and b.
Sec 11.11	Develop and implement a plan to modify suppression on naturally occurring wildfires that meet impact prescriptions.
Part 4 Mountain Goat Habitat (page Wildlife_Goat 4-3)	
Sec 2.1	Where other resource values are not threatened, enhance early seral foraging opportunities by implementing a "let burn" policy for high elevation wildfires in inoperable areas that are on, or adjacent to, goat winter ranges.
Part 4 Mule Deer Winter Range (page Wildlife_Mdeer 4-12)	
Sec 3.4	Where practicable, utilize prescribed burns under specific conditions or mechanical treatments to enhance winter range forage values.

2.5.5 Ministry or Industry Plans

As required by ministry policy, the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) has prepared fire management plans for each Natural Resource District in the province.

Fire management plans are intended to address all wildfire-related issues within the natural resource district, particularly the desired interaction between resource management concerns and fire suppression requirements. It is important to note that district fire management plans are currently not public documents. For the purposes of this CWPP update, the authors were afforded the opportunity to view the plan.

The current fire management plan for the Okanagan Shuswap Natural Resource District dates from 2015 and carries forward the 2014 wording with updates to spatial data only. The district fire management plan is a brief 15-page document that also includes high-level district mapping according to four broad "priority themes". The mapping themes are as follows:

- Theme 1 – Human Life and Safety
    - WUI areas (high, moderate and low structure density)
    - Evacuation routes and marshalling points
- Theme 2 – Critical Infrastructure and Property (that relates to maintaining Theme 1)
    - Energy generation and transmission, healthcare, first responder facilities, transportation, wildland structures etc.
- Theme 3 – High Environmental Cultural
    - Water resources, species at risk, cultural values
- Theme 4 – Resource Values
    - Ungulate winter range, old-growth management areas, timber, silviculture investments, range management, and visual quality areas

3. Values at Risk

The BCWS wildfire glossary of terms (2016) describes values at risk as the specific or collective set of natural resources and human improvements/developments that have measurable or intrinsic worth and that could be destroyed or otherwise altered by fire in any given area. The concept of determining the value of something in relation to some level of wildfire risk is

fraught with complication. The BC Forest Practices Board (2012) noted that assigning monetary value to natural resources is difficult and applied inconsistently across the province. This challenge becomes more complicated when considering non-consumptive values such as wildlife habitat. Within the context of the CWPP, values at risk include human health and safety, facilities, services, cultural and natural resources etc. that may be negatively impacted by wildfire. This includes human life, property, critical infrastructure, high environmental and cultural values, and resource values.

3.1 Human Life and Safety

Census data from the Government of Canada for 2016 indicates an enumerated population for the District of Peachland of 5428 people- up 4.4 % from the 2011 census (District of Peachland 2018). The 2016 census also indicates 2749 occupied private dwellings in the District of Peachland, an increase of 3.7 % from 2011. With a land area of 12.63 square kilometers, the population density of the District of Peachland is 340 people per square kilometer (District of Peachland 2018).

During the wildfire season, tourism and seasonal work creates an influx of people into the region. Periods of persistent fire load during this period can have notable impacts on the tourism and agricultural economies.

Wildfire smoke is of particular concern for the health and wellbeing of the public. Among a host of other constituents, wildfire smoke contains particulate matter (PM) which is primarily composed of organic carbon and black carbon components (Naeher, et al. 2007). The size of PM that biomass burning produces is usually fine particles less than 2.5 micrometers (μm), referred to as PM2.5 (Duran 2014).

Although everyone responds to wildfire smoke exposure differently, the BC Centre for Disease Control (2018) identifies the following groups as being most at risk:

- people over 65;
- women who are pregnant;
- infants and small children;
- people with existing chronic respiratory conditions.

3.2 Critical Infrastructure

Critical infrastructure assets are those physical resources, service and information technology facilities, networks and assets which, if disrupted or destroyed, would have a serious impact on the operation of an organization, sector, region or government.

Construction on a new water treatment facility began in January 2019 and is now operating at Peachland Creek (District of Peachland 2021). The total project cost (estimated in 2017) for the facility is $18.8 million (District of Peachland 2017). The implications of a wildfire impacting the facility are significant as the system is projected to serve over 2065 residential, commercial and industrial connections upon its completion (District of Peachland 2017).

The District of Peachland conveys wastewater to the Westside Regional Wastewater Treatment Plant on Gellatly Road in West Kelowna (RDCO 2010). In 2009, the Glenrosa Fire burned right up to the treatment plant and damaged several wood power poles. The implications of service interruption of the plant are significant, as the plant treats wastewater for approximately 47,111 people, as enumerated in the 2016 census (Statistics Canada 2016).

3.2.1 Electrical Power

The District of Peachland is served via a single powerline from the nearby Westbank Substation and is located at the southern end of BC Hydro's service territory (BC Hydro 2011). For most of its route, this feeder parallels Highway 97. In 2011, $2.5 million was invested by BC Hydro to improve the electrical distribution system in Peachland and the BC Hydro served areas south to Fish Lake Road (BC Hydro 2011). This improvement included the addition of a second feeder for service to Peachland, the relocation of both feeders away from difficult to access areas, and the replacement of 45-foot poles with 60-foot poles along portions of Highway 97, Drought Road and Buchanan Road (BC Hydro 2011). The current distribution feeder line travels along portions of Highway 97 from Westbank, down Drought Road, Buchanan Road and back onto Highway 97 to central Peachland (BC Hydro 2011).

Other electrical supply values in the surrounding area include 740 kV BC Hydro Transmission lines running W-E from Nicola Valley to West Kelowna approximately 800 m straight-line distance to the north of the District of Peachland AOI and run of river hydro projects on Trepanier Creek off of Clement Crescent, west of Thorne Road and east of highway 97 in the south of the District of Peachland AOI (ImapBC 2019).

As well, the nearby Westbank substation is located 4 km (straight line distance) to the north of the AOI in West Kelowna, Brenda Mines substation is located 18.5 km (straight line distance) to the north west of the AOI off highway 97C and Summerland substation is located approximately 15 km to the south of the AOI in Summerland (ImapBC 2019).

3.2.2 Communications, Pipelines, and Publicly Owned Buildings

The following infrastructure are noted:

- A Fortis BC natural gas pipeline running NE- SW (approximately 200- 600 m west of and parallel to Highway 97) runs through the middle of the District of Peachland AOI (ImapBC 2019).
- There are no cellular towers within or immediately adjacent to the District of Peachland AOI. There are several Telus and Rogers Towers in Okanagan Mountain Park and the nearby community of West Kelowna to the north (Nikkel 2018).
- Key municipal buildings are summarized below.

Table 3 Key municipal buildings in the District of Peachland.

Facility	Address
Community Centre	4450 6th Street
Fire Hall 21	4401 3rd Street
Municipal Office	5806 Beach Avenue
Museum	5890 Beach Avenue
Community Policing Office	4440 5th Street
Seniors Activity Centre	5672 Beach Avenue
Water Treatment Plant	Princeton Avenue
Public Works Yard	5379 Princeton Avenue

3.2.3 Water and Sewage Infrastructure

Municipal water for the District of Peachland is supplied from three surface water sources; Peachland Creek, Trepanier Creek and Okanagan Lake (District of Peachland 2017). Recommendations from the 2007 Water Master Plan and Strategy were to have the three systems integrated, with a treatment facility considered for the Peachland Creek source (District of Peachland 2018). The intended outcome of the construction of the New Water Treatment Facility at Peachland Creek (beginning in early 2019 and slated for completion November 2020) and the Trepanier Interconnect is to have all of Peachland using treated water from one source, Peachland Creek (District of Peachland 2018); (District of Peachland 2019).

The 2015 Amendment to the Water Master Plan describes the Peachland Creek source as adequate for municipal water, fire and environmental (fish) flows with the Okanagan Lake source as a standby for emergency use (Urban Systems 2015). According to the Annual Drinking Water Report, the District of Peachland had a total 2,448.95 ML of water pass through all intakes for the year 2017 with 2065 lots currently serviced by the water system (District of Peachland 2017). The 2018 OCP mentions fire flow service capacity infrastructure gap for the Beach Avenue Neighborhood-Resort (District of Peachland 2018).

The sanitary sewer system in Peachland is made up of individual septic systems and a community wastewater (sanitary sewer) collection system (District of Peachland 2018). The Phase 1 sewer project completed in 1998 encompassed the highest priority commercial and waterfront areas in the downtown of Peachland. Since 2004, the sewer system has been expanded mainly by developers to meet Subdivision and Development Servicing Bylaw requirements and now currently services 1336 lots (District of Peachland 2018). Peachland conveys wastewater to the Westside Regional Wastewater Treatment Plant on Gellatly Road in West Kelowna (Regional District of Central Okanagan [RDCO] 2010).

3.3 High Environmental and Cultural Values

3.3.1 Drinking Water Supply Area and Community Watersheds

Peachland Lake/Peachland Creek, Trepanier Creek and Okanagan Lake are the main surface water sources supplying the District of Peachland AOI (District of Peachland 2017). Okanagan Lake is typically relied upon to supply less turbid water to the Trepanier system during the spring runoff (District of Peachland 2017). Two community watersheds are located partially within the District of Peachland AOI (Table 4, ImapBC 2019). Most water drawn by the Peachland system is from the Peachland community watershed (approximately 66%) while the remaining portion (approximately 33%) is supplied by the Trepanier system and pumped from Okanagan Lake (District of Peachland 2017)

Table 4 Community watersheds in relation to the District of Peachland AOI.

Community watershed	Watershed area (ha)
Peachland	12,470
Trepanier	23,437

3.3.2 Cultural Values

Indigenous cultural heritage resources include archaeological sites, traditional use sites, historic buildings and artifacts, and heritage trails, or any other objects or places of historical, cultural or archaeological significance to British Columbia, a community or an aboriginal people (Archer 2009).

Archaeological sites in British Columbia that date to 1846 or earlier are protected from alteration of any kind by the Heritage Conservation Act (Province of British Columbia 1996). The provisions of the HCA apply to archaeological sites located on both public and private land, known and unknown, and are binding on government. The Archaeology Branch of the Ministry of Forests, Lands and Natural Resource Operations administers the provisions of the HCA and are responsible for making final decisions concerning the management of archaeological resources. Day-to-day planning, research and fieldwork are conducted by professional consulting archaeologists.

A 2007 Archaeological Overview Assessment for the Lower Princeton area neighborhood in the District of Peachland reported areas of high archaeological potential along the shoreline of Okanagan Lake (O'Neill 2007). The assessment also detailed a number of lithic scatters, cache pits, cultural depressions and petroforms within a 5000 m radius (closely overlapping the CWPP AOI) of the Lower Princeton area neighborhood (O'Neill 2007). Recommendations from the assessment included field reconnaissance of areas where future development is proposed (O'Neill 2007).

In a 2010 Archaeological Impact Assessment (AIA), several archeological sites and lithic scatter areas were identified within the area of Peachland's New Monaco Development, and the 52-ha project area was assigned an archaeological potential assessment of moderate to high (Cameron 2010). The same assessment also mentioned that the project area is within the asserted traditional territory of both the Westbank First Nation and the Penticton Indian Band (Cameron 2010). Referred to in the 2010 assessment, previous AIA's conducted in the area during the 1970s and around the time of the construction of Highway 97c (1986) noted suspected heavy disturbance to sites located within the impact area of the highway connector junction. Future activities were recommended to avoid any archeological sites and obtain Section 12 Site Alteration Permits when necessary (Cameron 2010)

Wildfire suppression and fuel treatment operations have the potential to seriously impact or destroy cultural heritage resources. It is incumbent on personnel who are actively working in

the field to be able to identify resources so that suppression and fuel treatment actions can be planned or altered in such a way as to not contravene the HCA.

3.3.3 High Environmental Values

The BC Conservation Data Centre identifies Blue and Red listed vertebrate animals and ecosystem communities within the District of Peachland AOI, as summarized in Table 7 (BC Conservation Data Centre 2019). A review of DataBC layers indicates that no fisheries-sensitive watersheds are within the AOI.

Table 5 Red and Blue listed species and ecosystem communities within the District of Peachland area of interest.

Common name	Scientific name	BC List status
Vertebrate animals		
Western Screech-owl, Macfarlanei Subspecies	*Megascops kennicottii macfarlanei*	Blue
Painted Turtle - Intermountain - Rocky Mountain Population	*Chrysemys picta* pop. 2	Blue
Lewis's Woodpecker	*Melanerpes lewis*	Blue
North American Racer	*Coluber constrictor*	Blue
Vascular plants		
Owyhee Mudwort	*Limosella acaulis*	Blue
Ecological communities		
Trembling Aspen / Common Snowberry / Kentucky Bluegrass	*Populus tremuloides / Symphoricarpos albus / Poa pratensis*	Red
Black Cottonwood - Douglas-fir / Common Snowberry - Red-osier Dogwood	*Populus trichocarpa - Pseudotsuga menziesii / Symphoricarpos albus - Cornus stolonifera*	Red

*Red: Includes and indigenous species or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia.
*Blue: Includes and indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia.

3.4 Other Resource Values

The Westbank First Nation has an active Community Forest Agreement for much of the Crown land surrounding Peachland.

3.5 Hazardous Values

The District of Peachland is not characterized by extensive heavy industry and the potentially hazardous materials associated with such. The extent of the hazardous materials found within the municipal boundaries are characteristic of many other communities. These include gas stations, natural gas utilities, water treatment chemicals and agricultural inputs.

Approximately 75% of the District of Peachland consists of sloped hillsides (District of Peachland 2018). The 2018 OCP update outlines objectives and policies (including DPAs) concerning the hydrogeological and geotechnical conditions in the District of Peachland AOI.

4. Wildfire Threat and Risk

This section summarizes the factors that help determine the wildfire risk around the community. These factors include natural fire regime and ecology, Provincial Strategic Threat Analysis (PSTA), and a local wildfire risk analysis.

A risk-based framework consists of the consideration of the likelihood of an unwanted wildfire event and the consequences to communities and high value resources and assets as the measure of risk, as follows:

- Likelihood is the probability of the unwanted wildfire event occurring.
- Consequence is the amount of damage occurring as a result.
- Risk is measured as the product of likelihood and consequence, but multiple inputs are also required in order to effectively quantify risk, including severity, value type, and vulnerability.

Through the identification of risk level, priorities for mitigation as well as opportunities for increasing community resiliency are both enhanced.

4.1 Fire Regime, Fire Weather, and Climate Change

During the fire season, the environmental conditions of the Okanagan valley often have the potential to support catastrophic wildfires. Consideration of past conditions and future climate change scenarios must be incorporated into any plan that assesses the wildfire situation and focuses on increasing future resilience of the region.

4.1.1 Fire Regime and Fire Weather

Frequent low-intensity, stand-maintaining natural and historical anthropogenic fires have strongly influenced the ecology of the District of Peachland AOI. The entire AOI is classified as Natural Disturbance Type 4 (NDT4). The NDT classification (Table 9) of an area represents the magnitude and frequency of natural disturbance (wildfires and windstorms, predominantly) across the land base.

Table 6 Natural Disturbance Type classification criteria in British Columbia.

Natural Disturbance Type (NDT)	Description
NDT1	Ecosystems with rare stand initiating events
NDT2	Ecosystems with infrequent stand initiating events
NDT3	Ecosystems with frequent stand initiating events
NDT4	Ecosystems with frequent stand-maintaining fire
NDT5	Alpine Tundra and Subalpine Parkland ecosystems

When defining natural disturbance, a distinction is drawn between stand-initiating and stand-maintaining events. Stand-initiating events typically terminate the existing forest and induce secondary succession to produce a new forest. Stand-maintaining events serve to keep successional processes stable (Province of British Columbia 1995). In wildfire terms, high intensity fire behaviour, such as intermittent or continuous crown fire, would be considered a stand-initiating event. Conversely, a low intensity fire surface fire consuming understory fuels while retaining a mature overstorey is considered a stand-maintaining event.

These distinctions are important to the assessment of the wildfire history of an area. An absence of frequent stand-maintaining processes can result in a series of ecological responses, including forest health, habitat and fuel loading issues. In the NDT4, low-intensity (i.e., surface fire) fire return intervals historically ranged from 4 to 50 years (Province of British Columbia 1995). Policies centered on aggressive fire suppression have resulted in a drastically reduced frequency (or absence) of fire in ecosystems that are dependant (i.e., maintained) by frequent, low-intensity surface fires.

Stand-initiating fires (i.e., crown fires) in Ponderosa pine dominated stands were historically rare, with return intervals of at least 150 to 250+ years (Province of British Columbia 1995). The longer a fire-maintained stand goes without fire maintenance, the greater the likelihood that a future fire occurrence will be a stand-initiating disturbance. From a firefighting standpoint this increasingly deteriorating condition can result in wildfires that require significantly more suppression effort and cost to control.

Three BCWS fire weather stations (see Figure 1) were reviewed for the District of Peachland CWPP update, including the West Kelowna station, recently installed in late 2016. The West Kelowna station provides representative weather observations and data, however there are only four complete fire season of data to analyze. The Penticton and Brenda Mines fire weather stations were also analyzed to provide a regional history of fire weather. As the West Kelowna station continues to operate, a clearer representation of persistent and ongoing fire weather conditions will emerge. The immediate benefits of the West Kelowna fire weather station include increased situational awareness for wildfire preparedness for Peachland Fire and Rescue Service personnel and BCWS firefighting resources as well as better planning information for operational fuel management treatments.

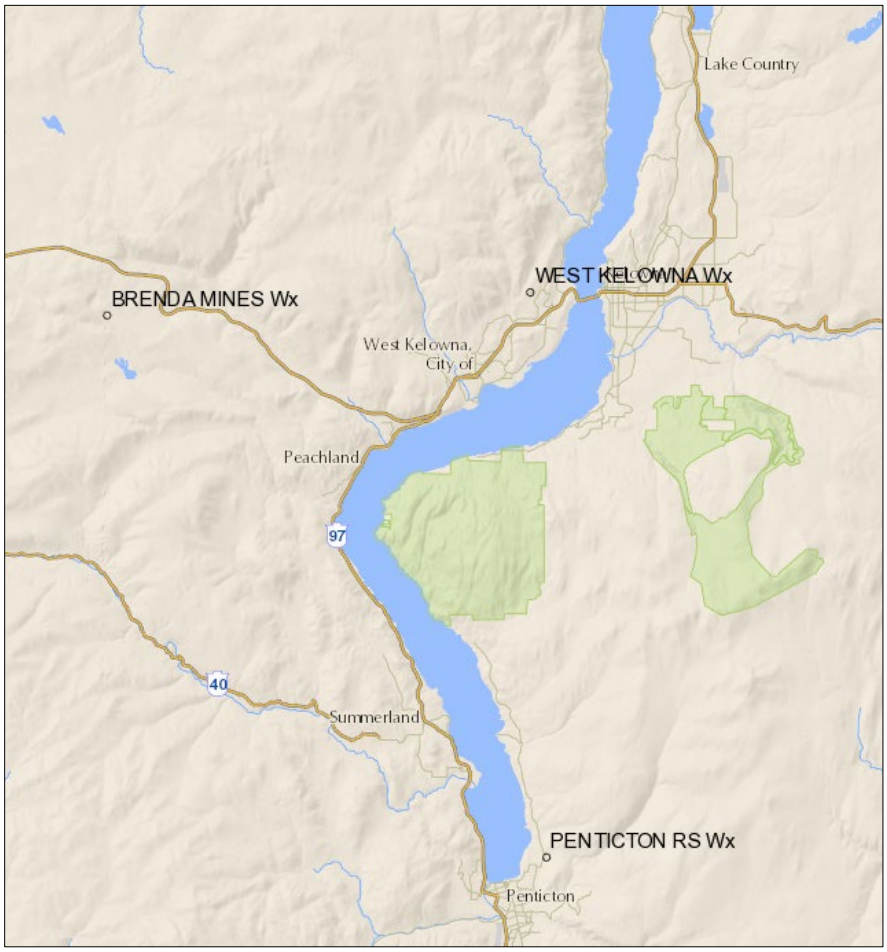

Figure 1 BC Wildfire Service fire weather stations in relation to Peachland.

For the purposes of CWPPs in BC, fire weather conditions are often described in terms of the Fire Danger Class. Fire Danger Class is defined in the Wildfire Regulation and is a rating derived from outputs of the Canadian Forest Fire Weather Index (FWI) System. Although the

intent of the Fire Danger Class rating scheme is to restrict high risk activities (primarily industrial) occurring on or about forest and grassland areas, the use of Fire Danger Class has been extended to the CWPP field as a straightforward means of characterizing fire weather conditions in an area represented by a weather station.

Fire Danger Class is determined by comparing the Buildup Index (BUI) to the Fire Weather Index (FWI) in one of three tables presented in the Wildfire Regulation. Each table is specific to one of three broad Danger Regions in BC; the District of Peachland is situated in Danger Region 3, along with the West Kelowna, Penticton and Brenda Mines fire weather stations that were included in this analysis . The actual Fire Danger Classes are numerical ratings from 1-5, in ascending order of severity. An illustration of the various inputs and components from which Fire Danger Class is derived is presented in Figure 2.

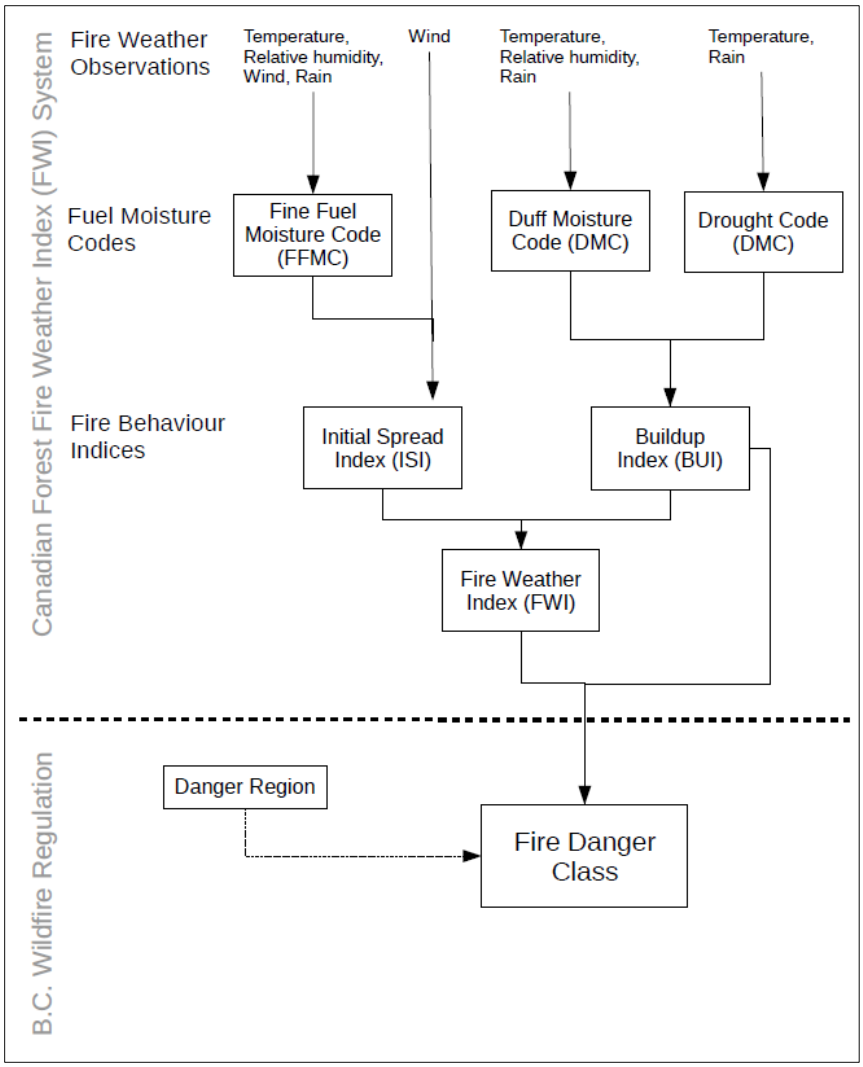

Figure 2 Fire Danger Class methodology flowchart from the Canadian Forest Fire Danger Rating System.

A Fire Danger Class report for each of the three fire weather stations analysed has been prepared (Figure 3, Figure 4, and Figure 5). The Fire Danger Class reports illustrate the number of days per year when the Fire Danger Class was rated 4 or 5 (Table 7). In Danger Region 3 (where each of the stations are located), Fire Danger Class 4 and 5 occur within the following BUI and FWI ranges:

- BUI: 51 – 201+
- FWI: 17 – 47+

For each of the stations, the average number of Fire Danger Class 4 and 5 days in each dataset is presented (see Table 7), as well as the median, maximum and year of maximum. As the West Kelowna station is limited to only four years of fire season data, the information is presented with a disclaimer. With the exception of the Penticton station (discussed below), 2017 was the year of maximum number of Fire Danger Class 4and 5 days.

Although the entire Penticton station dataset dates from 1970, the installation date for the station is listed as August 16, 1988 (DataBC 2021). It is unknown (and relatively unimportant for this particular purpose) as to what specific location from which pre-1988 Penticton station data was obtained but is important to note in order to caution the reader as to the validity of 1970 to 1988 portion of the dataset. For this reason, we have elected to analyze the Penticton RS dataset from 1989 to 2020 so that only complete annual data post-installation is compared. Of interest is the increasing linear trend for Fire Danger Class 4 and 5 days for the Brenda Mines station (Figure 3). Although the Brenda Mines station is roughly 30-km away from the West Kelowna station (Figure 5), and at an elevation of nearly 1,500 m, as opposed to the station elevation of 650 m for West Kelowna, Brenda Mines is somewhat representative of the higher elevation western portions of the District of Peachland AOI. For this reason, it will be important for Peachland to include both stations in their operational fire weather situational awareness as an indicator of the potential for both low and high-elevation fires that could impact the community. The installation of the West Kelowna station was a timely addition to the provincial fire weather network and its continued operation should be supported.

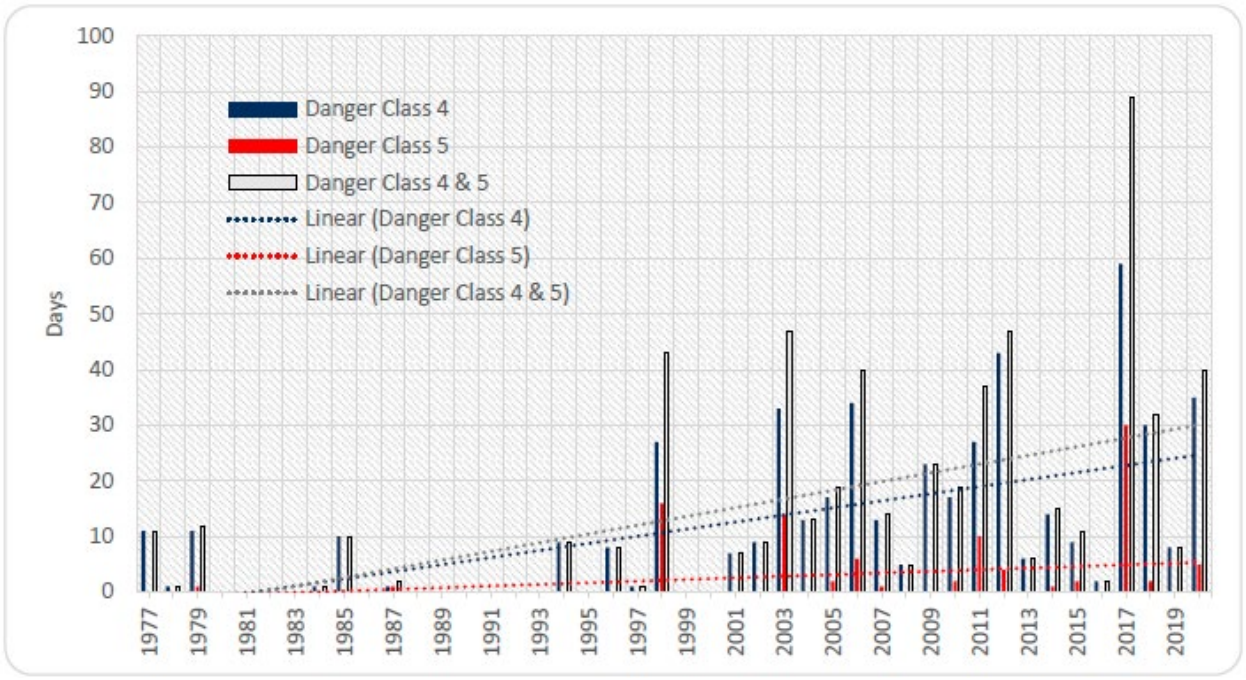

Figure 3 BC Wildfire Service Brenda Mines weather station Danger Class 4 and 5 report, 1977 to 2020.

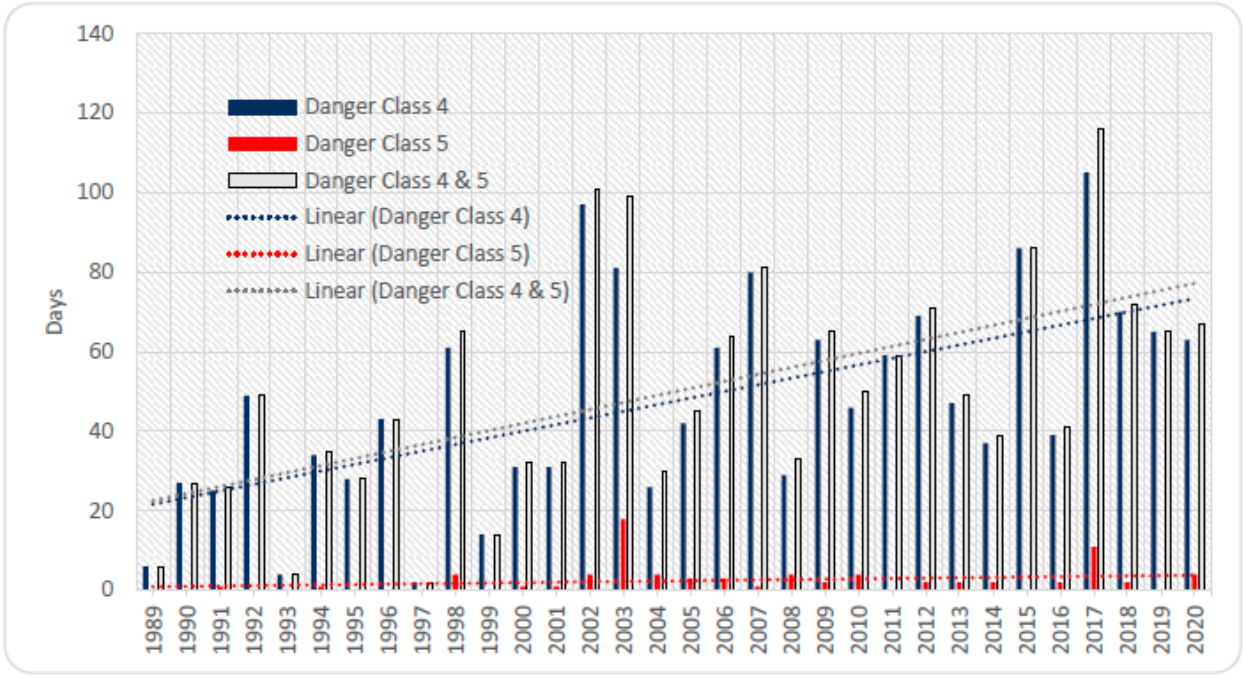

Figure 4 BC Wildfire Service Penticton weather station Danger Class 4 and 5 report, 1989 to 2020.

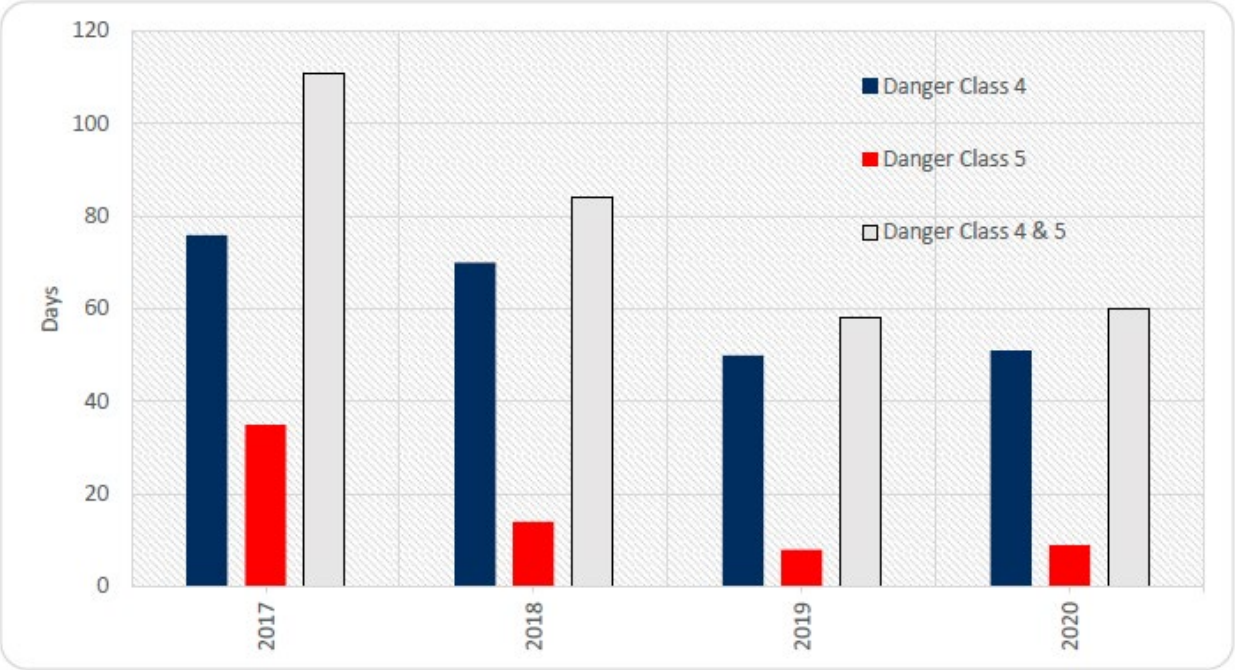

Figure 5 BC Wildfire Service West Kelowna weather station Danger Class 4 and 5 report, 2017 to 2020.

Table 7 Summary of fire Danger Class 4 and 5 days for local BC Wildfire Service weather stations.

Station	Period	Danger Class	Average	Median	Maximum	Year of maximum
Brenda Mines	1977 to 2020	Danger Class 4	11	8	59	2017
	1977 to 2020	Danger Class 5	2	0	30	2017
	1977 to 2020	Danger Class 4 & 5	13	8	89	2017
Penticton*	1989 to 2020	Danger Class 4	48	45	105	2017
	1989 to 2020	Danger Class 5	2	2	18	2003
	1989 to 2020	Danger Class 4 & 5	50	47	116	2017
West Kelowna**	2017 to 2020	Danger Class 4	62	61	76	2017
	2017 to 2020	Danger Class 5	17	12	35	2017
	2017 to 2020	Danger Class 4 & 5	78	72	111	2017

* Only complete data after the August 16, 1988 installation date is used here

** Four complete years of observations (2017 to 2020)

In addition to analyzing the Fire Danger Class, we have calculated and assessed the seasonal severity rating (SSR) for the Brenda Mines, Penticton and West Kelowna weather stations. The SSR makes use of the daily severity rating (DSR), which is calculated as follows:

DSR = 0.0272*FWI1.77

where FWI is the daily Fire Weather Index

The SSR is simply the mean of the DSRs over the course of one fire season. When the SSR for the three stations of interest are graphed we observe a distribution and trend similar to those of danger class (see Figure 6, Figure 7 and Figure 8).

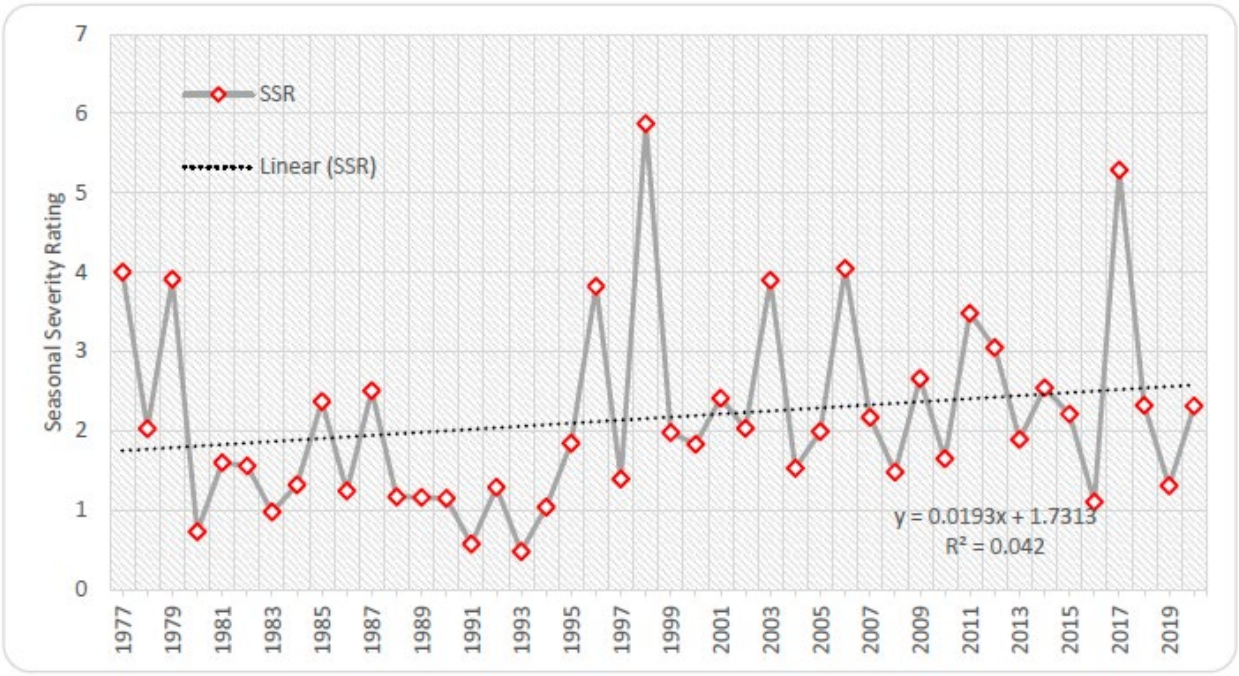

Figure 6 Seasonal severity rating for Brenda Mines weather station, 1977 to 2020.

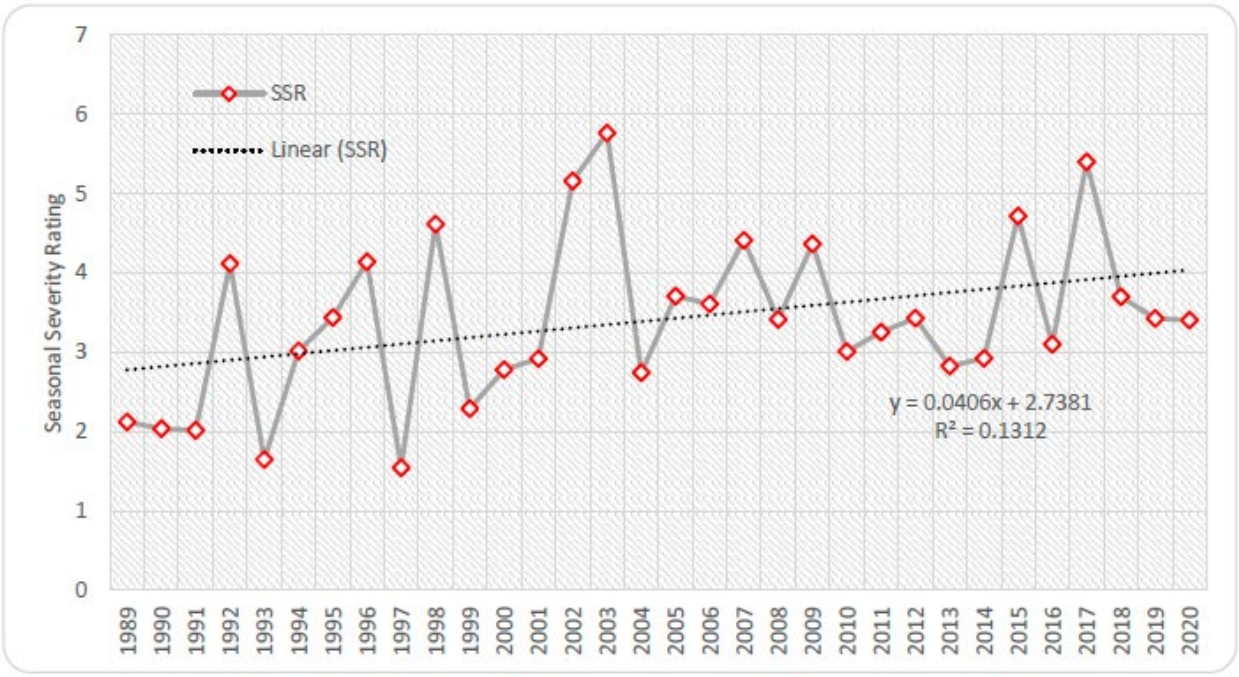

Figure 7 Seasonal severity rating for Penticton RS weather station, 1989 to 2020.

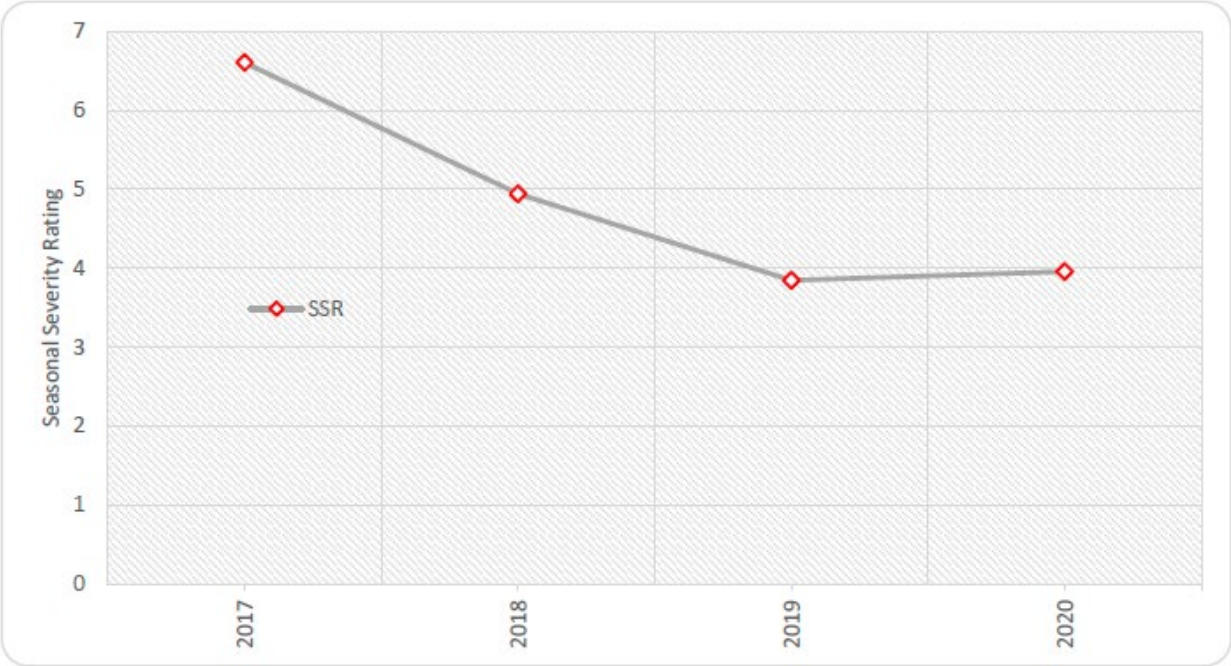

Figure 8 Seasonal severity rating for West Kelowna weather station, 2017 to 2020.

4.1.2 Climate Change

Climate change projections point to a warmer and drier environment and shifts in vegetation with the following implications in some areas of the province:

- Increased disturbances due to insects and disease
- Shifts in vegetation. Potential ranges of species will move northward and upward in elevation.
- Increased forest fire frequency
- Longer and more intense wildfire seasons
- Increased number of high and extreme fire danger days for an average year

As a result, some existing forests have an increased probability of more frequent, intense and more difficult to control wildfires that are likely to result in increased tree mortality, detrimental impacts to soils and hydrology, and increased threat to the community and interface areas.

The Pacific Climate Impacts Consortium (PCIC) is based at the University of Victoria and conducts quantitative studies on climate change and climate variability impacts for stakeholders in the Pacific and Yukon regions. Through analysis and interpretation of a variety of global climate models, PCIC serves to bridge the gap between climate research and practical application for a variety of end users. To do this, PCIC has a number of analysis tools

available, including the Plan2Adapt toolkit, as well as the more detailed Regional Analysis Tool (PCIC 2021).

The future regional impacts of climate change are based on the best available models and information. The PCIC (2021) has drafted a set of potential climate impacts for the Central Okanagan in the 2020's, including:

- Increase in hot and dry conditions.
- Increase in temperature.
- Longer dry season
- High intensity precipitation
- Decrease in snowpack.
- Possible changes in vegetation productivity

From a wildland fuel perspective, these impacts could result in a variety of ecological changes. Long term changes in moisture regimes can affect forest health and species distribution. Ecological communities may begin to migrate northwards or to higher elevations as site suitability and disturbance patterns shift. Already dry ecological zones may become drier and more prevalent at higher elevations, making an already fire-prone landscape more extensive. The modelled temperature and precipitation changes for the central Okanagan are summarized in Table 8.

Table 8 Summary of projected changes in average temperature and precipitation in the Central Okanagan to the 2050s.

Climate Variable	**Season**	**Projected Change from 1961-1990 Baseline**	
		Ensemble Median	**Range (10th to 90th percentile)**
Temperature (°C)	Annual	+3.2 °C	+2.1 °C to +4.3 °C
Precipitation (%)	Annual	+1.5%	-2.9% to +7.4%
	Summer	-5.0%	-34% to +3.9%
	Winter	+3.3%	-1.0% to +7.4%

This table shows projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the 2050s (2040-2069) for the Central Okanagan region. The ensemble median is a mid-point value, chosen from a PCIC standard set of Global Climate Model (GCM) projections (see the 'Notes' tab for more information). The range values represent the lowest and highest results within the set. This table has been adapted from the Pacific Climate Impacts Consortium, Plan2Adapt suite of climate change and adaptation tools, available here: https://www.pacificclimate.org/

4.2 Provincial Strategic Threat Analysis

The Provincial Strategic Threat Analysis is a provincial scale analysis that attempts to characterize wildfire threat across BC. The analysis combines historical fire density, potential spotting impacts and predicted head fire intensity to produce a wildfire threat score. These scores are grouped into 10 threat classes, ranging from 1 to 10, or Nil to Extreme. The PSTA layer is intended to serve as a starting point from which to design and conduct more detailed sampling to further characterize wildfire threat to communities.

4.2.1 Fire History

Fire history tells the story of the relationships between fire behaviour, landscape ecology, management policy (including fire suppression), human development and other land-use changes throughout the area. The potential for large, destructive and landscape-altering fires is related to the historical fire and fire response patterns within a given planning unit.

The District of Peachland AOI has a persistent history of wildfire on the landscape. The BCWS maintains a database of wildfires dating back to the early 1900s. Fire history data for fires that occurred prior to 1950 are limited to the archival fire file information that was available for digitization. These perimeters have been digitized from a variety of sources, some dating back to linen maps. From 1950 onwards, the wildfire dataset becomes more complete, capturing fires of all size classes and provides a more accurate picture of fire occurrence trends.

The dataset is by no means perfect[1]. A number of historical wildfires plot within Okanagan Lake and there are occasional discrepancies in information between point layers and perimeter layers for a given fire, but generally the dataset provides an adequate basis from which to conduct a historical fire analysis.

Since 1950, there have been 145 wildfires recorded in the provincial dataset within 2 km of Peachland. Of these, 33 were lightning-caused and 106 were person-caused (6 fires since 2010 are still listed as unknown cause). The summary statistics for wildfires within 2 km of Peachland are provided in Table 9 and Table 10.

[1] For example, we noticed that the 2012 Trepanier fire perimeter (K50869) was missing from the dataset. We advised BCWS of this omission and the perimeter has since been added to the historic fire perimeter dataset.

Table 9 Historic wildfire occurrence within 2 km of Peachland from 1950 to 2020.

	Wildfires^ within 2 km of Peachland from 1950 to 2020		
	Lightning	**Person**	**All (Lightning + Person)**
Total	33	106	145*
Average	0.5	1.5	2.0
Median	0	1	2
Maximum	4	7	7
Year(s) of Maximum	1958 & 1981	1979	1979

^The following fire types have been omitted: Nuisance, Smoke Chase, Duplicate, etc.
*Includes 6 fires categorized as "Unknown" cause since 2010.

Table 10 Historic area burned clipped to a 2 km buffer of Peachland from 1924 to 2020.

	Area burned* within 2 km of Peachland from 1924 to 2020		
	Lightning	**Person**	**All (Lightning + Person)**
Total	622 ha	1,498 ha	2,120 ha
Maximum	367 ha	726 ha	726 ha
Year(s) of Maximum	1930	1931	1931

*Fire perimeters have been clipped to a 2 km buffer of the Peachland boundary. Portions of fires beyond the 2 km buffer have been omitted.

The annual distribution of wildfire occurrence since 1950 is presented in Figure 9. The period between 1970 and the early 1990s saw the highest number of annual wildfire occurrence. The trend since early 1990 has been an oscillation around approximately 4 wildfires occurring within the AOI each year. The area burned summary (Figure 10) indicates two spikes in burned area in the 1930s followed by a lengthy lull. A recent and persistent increase in area burned since 2009 is evident (see Figure 10).

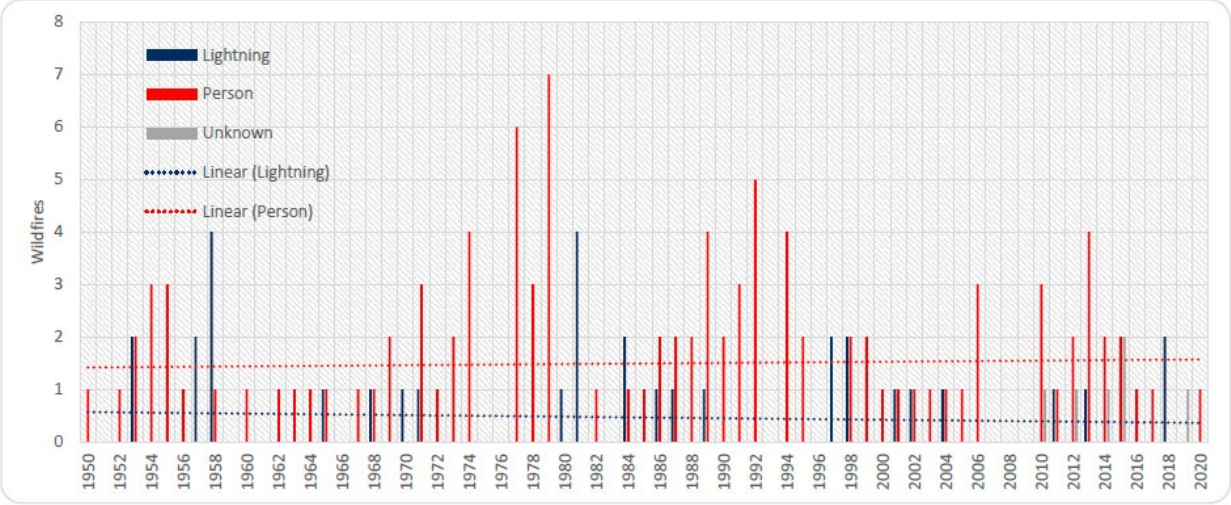

Figure 9 Annual wildfire occurrence within 2 km of Peachland from 1950 to 2020.

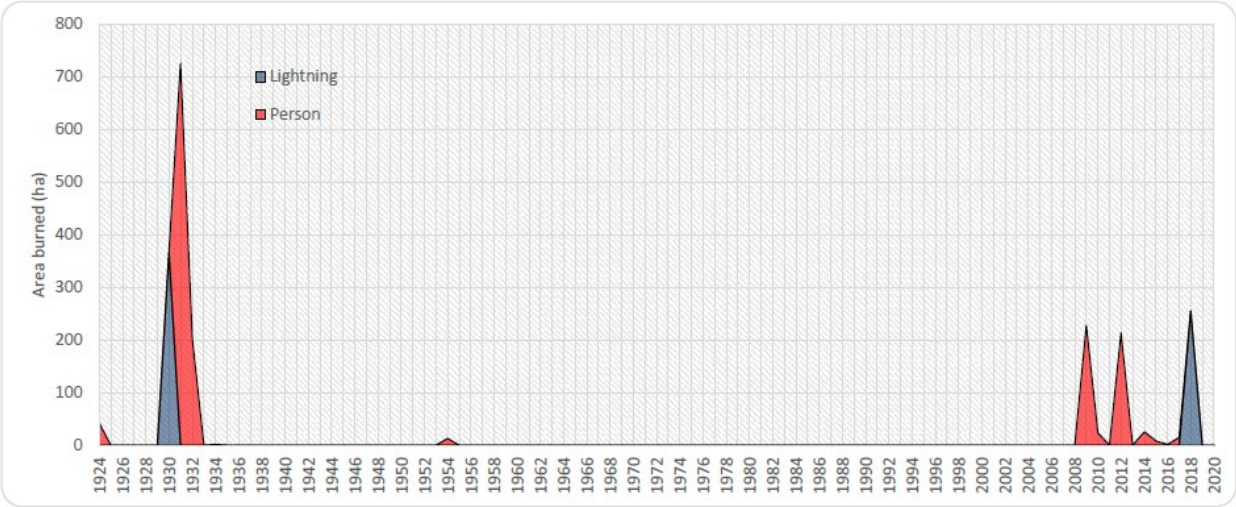

Figure 10 Annual area burned within 2 km of Peachland from 1924 to 2020.

4.3 Local Wildfire Threat Assessment

The process to assess wildfire threat for the District of Peachland CWPP followed the 2012 WUI Wildfire Threat Assessment guide methodology. Plot locations were selected through GIS analysis and FBP modeling of the provincial fuel type layer. Specifically, the methodology (as detailed in Appendix) selected polygons with a modelled fire behaviour rating of Moderate or higher that were within 100-m of a structure within the WUI. This methodology serves to identify the highest priority areas for field assessment.

5. Risk Management and Mitigation Factors

The risk associated with wildland urban interface fires can be viewed in terms of the probable frequency of a fire occurring combined with the probable magnitude of losses that occur as a result of the fire. As a fundamental element of wildfire management, wildfire occurrence relates to fire cause and is key to fire prevention planning and education. As discussed in 4.2.1, the annual area burned has increased in the last 10 years, while the number of human caused wildfires continues to oscillate around a rough mean. This trend illustrates the importance of a holistic approach to managing wildland urban interface fire threats- although prevention programs can reduce the occurrence of human-caused fires, the probability of a wildfire occurring will never be completely reduced to zero. The magnitude of each occurrence and its associated probable future losses must be reduced as much as possible.

Mitigating wildfire risk is a proactive approach to reducing potential impacts and subsequent losses from devastating wildfires. It is best conducted when coordinated amongst applicable land managers/owners that may include provincial and federal governments, local governments, First Nations, and private landowners. Evaluating all of the risks that apply to a given community is a key consideration when determining actions that local governments or First Nations can undertake to mitigate and manage the wildfire risk within and adjacent to their respective jurisdictions.

There are many different risk mitigation options available. Three have been identified for this section:

1. Fuel Management – reduce fire behaviour potential
2. FireSmart – reduce fire spread into community and impacts to values
3. Communication and Education – reduce fire occurrence

All vegetative and non-vegetative fuels should be considered when assessing the wildfire risk. High risk activities, human use and other environmental factors should also be assessed within the AOI. Accounting for these other factors ensures that fuel treatment designs and other recommendations meet the needs of the community and build resilience to the potential impacts of wildfire.

5.1 Fuel Management

Fuel management treatments can be employed as components in an overall strategy to reduce wildfire risk to communities in the wildland urban interface. In the District of Peachland, the predominant fuel type in the interface is C7 Ponderosa Pine Douglas-fir. This fuel type, exemplified in the Ponderosa Pine and Interior Douglas-fir Biogeoclimatic zones, is particularly well-suited to certain fuel management treatments, owing to its typical fire-maintained structure of well-spaced and pruned fire adapted conifer overstorey.

Key principles to be considered in the development of fuel treatment units (FTU's) include: continuity, relatively linear, anchored to non-fuel areas, accessible, defensible, and designed to be effective in changing fire behaviour from a crown fire to a surface fire during 90th percentile fire weather conditions for the local area. Proposed treatments should be sufficient in size, sufficiently treated, and strategically located with boundaries that can be effectively utilized for wildfire response. Boundaries should be consistent with logical burn unit planning principles including: utilizing topographical breaks and man-made and natural features

(roads, railways, hydro transmission lines, gas pipelines, wetlands, lakes, irrigated fields, non-fuel areas, etc.). Fuel treatment design should also consider constrained areas (i.e., private land, constraints that preclude treatment), and treatment method (commercial timber harvest, mechanical, prescribed fire, etc.). Other considerations include recommendations in existing CWPPs (that meet current standards), completed fuel management prescriptions, and completed fuel treatments, when they are compatible with the design standards noted above.
A variety of treatment methods are available for this particular fuel type, depending on treatment intensity, treatment timing, site sensitivity and public support, among other factors. Treatments in the C7 have traditionally been carried out by hand crews, whereby thinning and pruning have been undertaken with a variety of tools and techniques, including power saws, brush saws, pole-pruners etc. Debris disposal is typically carried out either through pile and burn, chipping or hauling off-site. These types of hand treatments can be labour intensive, depending on stand density, surface fuel loading and terrain limitations. Hand treatments are well suited to sites with thin and sensitive soils that would be otherwise degraded through ground-based equipment.
Fuel treatments can also be carried out with mechanized equipment, such as feller bunchers and excavators with various types of mulching heads. Conventional timber harvesting is also a viable form of fuel management in certain timber types, with the added benefit of at least partial recovery of costs through log utilization. Machinery can be used to realize higher production rates compared to hand crew treatments alone. Site sensitivities are a significant factor when considering the use of mechanized methods – thin soils, common to lower elevation hot/dry sites can be significantly degraded if treatments are not designed and carried out professionally.
Surface fuels must be considered and attended to regardless of the method selected for reducing fuel loading. Disturbance caused by hand falling/bucking or mechanical harvesting, processing and yarding can lead to acute increases in surface fine fuel loading. In many cases, particularly in Ponderosa pine and interior Douglas-fir stands, the use of low-intensity prescribed fire can be an effective means of both reducing surface fine fuel loads and realizing beneficial ecological fire effects.
Fuel management treatments should not be viewed as one-time actions, particularly on NDT4 sites. Treatments require periodic maintenance in order to have continued effectiveness.

Especially on NDT4 sites, fuel conditions will trend back towards pre-treatment structure in the absence of maintenance.

Interface fuel breaks are breaks occurring on Crown Land immediately adjacent to private land and in close proximity to the wildland urban interface and/or intermix areas. These breaks are designed to modify fire behaviour, create fire suppression options, and improve suppression outcomes. Interface fuel break dimensions are dependant on the forest/fuel type and associated fire behaviour, but generally this type of fuel break will occupy the WUI 100 zone. Existing natural features should be incorporated into interface fuel break designs to aid in impeding or modifying wildfire behavior.

Fuel breaks created through stand modification are not intended to be impenetrable barriers to fire spread; rather they are intended to modify and decrease fire behaviour. Similarly, the presence of an interface fuel break in itself does not ensure the survivability of adjacent structures, especially if those properties are not FireSmart. The combination of a well designed and maintained interface fuel break and adjacent private property and structures that are FireSmart, is a proven method of achieving real risk reduction.

Fuel breaks located beyond interface fuel breaks (i.e., beyond the WUI 100 zone) are termed primary fuel breaks. The location of primary fuel breaks is contingent on land ownership (Crown vs. private), existing natural and man-made features, fuel types, and prevailing wind patterns. As with interface fuel breaks, primary fuel breaks are intended to modify fire behaviour and create fire suppression options that reduce the risk of high intensity wildfire reaching a community or other built-up areas.

Primary fuel breaks may be located to completely surround a community or be strategically placed upwind of communities and perpendicular to fire season winds. Primary fuel breaks need to have sufficient width and fuel modification to minimize horizontal and vertical fuel continuity to effectively reduce the head fire intensity as a wildfire enters onto the fuel break.

As with interface fuel breaks, primary fuel breaks should not be viewed as impenetrable barriers to fire spread. The potential for ember transport and spot fires on the community side of any fuel break is a very real concern and may negate the effectiveness of any fuel break if not designed and treated in a manner that attempts to reduce this risk.

For each fuel treatment unit (uniquely identified), the fire management objectives related to the desired change in fire behaviour that will guide future fuel treatment prescription development are specified. For example:

- Conduct fuel treatments to create residual stands characteristics that do not support active crown fire.
- Apply prescribed fire under suitable conditions to provide ecological benefits, reduce fuel loading, and reduce the probability of catastrophic fire in the future.

Table 11 Fuel Treatment Summary Table.

Ownership type	Unit_ID	Area ha	Wildfire behaviour threat score	Wildfire behav. threat class	WUI threat score	WUI threat class	Total threat score	Feature Type	Geographic	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6	Comment
Municipal	PT_018	6.3	128	H	45	E	173	LFB	Riding Club	TFB	LBD	PRU	PIL	BP	PB	Forms part of west landscape break. Adjacent to Princeton Ave.
Municipal	PT_017	10.6	122	H	47	E	169	LFB	McCall Ck.	TFB	LBD	PRU	PIL	BP	PB	Forms part of west landscape break. Public use area. Vehicle accessible.
Municipal	PT_015	5.12	132	H	37	H	169	LFB	Gerrie Road	TFB	LBD	PRU	PIL	BP	PB	Forms part of west landscape break.
Municipal	PT_013	1.28	117	H	47	E	164	IFB	Ponderosa green belt	TFB	LBD	PRU	PIL	BP		Fuel is patchy. Moderate work required to clean-up.
Municipal	PT_012	0.22	120	H	42	E	162	IFB	Coldham Road #2	TFB	LBD	PRU	PIL	BP		Neighbourhood participation in place.
Municipal	PT_019	11.16	126	H	30	H	156	LFB	Upper Peachland Ck.	TFB	LBD	PRU	PIL	BP		Forms part of west landscape break.
Municipal	PT_010	2.36	106	H	48	E	154	IFB	Trepanier Greenway	TFB	LBD	PRU	PIL	BP		Includes RDCO trail. Extremely steep slopes with homes directly above.
None	PT_038	4.84	99	H	42	E	141	LFB	McCall Ck.	TFB	LBD	PRU	PIL	BP	PB	Forms part of west landscape break.
Municipal	PT_001	0.51	102	H	38	H	140	IFB	Lower Trepanier Bench Road	TFB	LBD	PRU	PIL	BP		Residents have already done some work - easy win to build support for FireSmart.
Municipal	PT_040	0.11	93	M	47	E	140	IFB	Ellison Avenue	LBD	PRU	PIL	BP			Upslope fuel wick between neighbourhoods.
Municipal	PT_002	0.14	101	H	38	H	139	IFB	Clarence Road	TFB	LBD	PRU	PIL	BP		Community mailbox location. Good opportunity to demonstrate FireSmart.
Municipal	PT_014	2.21	105	H	32	H	137	IFB	HWY 97 #1	TFB	LBD	PRU	PIL	BP		Intent should be to tie-into MOTI RoW.
None	PT_039	5.23	104	H	20	M	124	LFB	Sanderson Road	TFB	LBD	PRU	PIL	BP	PB	Forms part of west landscape break.
Municipal	PT_016	6.29	94	M	26	M	120	LFB	Seymour Lane	TFB	LBD	PB				Forms part of west landscape break. Includes a non-mapped legacy treatment. Due for maintenance treatment in 3-5 years.
Municipal	PT_008	11.89	94	M	26	M	120	LFB	Trepanier Greenway	PB	LBD					Majority was burned in 2012 wildfire. Maintenance burn in 3-5 years.
Municipal	PT_003	1.94	93	M	23	M	116	IFB	MacKinnon Road	TFB	PIL	BP	PB			Include a non-mapped legacy treatment. Due for maintenance treatment in 3-5 years.
Municipal	PT_020	0.31	87	M	27	H	114	IFB	Sherburn Road	LBD	PRU	PIL	BP			Upslope fuel wick between neighbourhoods.
Municipal	PT_011	0.45	86	M	23	M	109	IFB	Coldham Road #1	TFB	LBD	PRU	PIL	BP		Minimal work required to tie-into existing lawn space.
Crown Provincial	PT_006	0.27	89	M	20	M	109	IFB	Hardy Falls Regional Park	LBD	PRU					Riparian area adjacent to HWY 97. Lower priority.
Crown Provincial	PT_004	0.2	89	M	20	M	109	IFB	Hardy Falls Regional Park	LBD	PRU					Riparian area adjacent to HWY 97. Lower priority.
Municipal	PT_009	11.62	79	M	26	M	105	LFB	Trepanier Greenway	PB	LBD					Majority was burned in 2012 wildfire. Maintenance burn in 3-5 years.
Total area:		83.05														

Treatment Code	Activity / Action	Feature Code	Description
TFB	Thin from below	LFB	Landscape fuel break
LBD	Limb and buck existing downed stems	IFB	Interface fuel break
PRU	Prune		
PIL	Pile treatment debris		
BP	Burn debris piles		
PB	Prescribed burn		

5.2 FireSmart Planning and Activities

The FireSmart Canada program was founded by Partners in Protection[2], a multidisciplinary non-profit association comprised of national, provincial and local government agencies with fire protection mandates (Partners in Protection 2003). Modelled after the FireWise Communities USA program in the United States, FireSmart Canada has developed a comprehensive planning and assessment process to mitigate wildfire hazards to existing communities, as well as guide new development. The FireSmart program is primarily focused on residential homes, but the principles have been adapted for application in mixed-use areas, industrial activities and elsewhere. "Home" or "house" are the terms most often used when describing FireSmart principles, but "structure" or "building" are equally appropriate and more broadly applicable.

This section summarizes the current level of FireSmart that has been completed, is under implementation, and identifies areas that are FireSmart, or have received FireSmart recognition through the FireSmart Canada Recognition Program. The section also identifies future FireSmart activities within the AOI.

5.2.1 FireSmart Goals and Objectives

The general goal of FireSmart is to encourage communities and citizens to adopt and conduct FireSmart practices to mitigate the negative impacts of wildfire to assets on public and private property. Findings from a study of the 2016 Horse River wildfire in Fort McMurray indicate that FireSmart principles were one of the main reasons why individual homes survived, regardless of the broader wildfire threat surrounding them (Westhaver 2017). This was true in both the urban and rural areas.

As part of the mandate of Partners in Protection, the FireSmart program aims to reduce the risk of life and property from fire in the wildland urban interface. At the core of the FireSmart program is the relationship between a structure and the surrounding natural areas and how transfer of fire between the two may occur. Hazards are addressed progressively outward from the structure to the immediate surroundings. This is accomplished through the establishment of three zones around a structure:

- Priority Zone 1a (Non-Combustible Zone): The area within 1.5 m from a building

[2] In BC, the FireSmart "brand" has been taken over by FireSmartBC – a consortium of various groups, including the BC Wildfire Service

- Priority Zone 1: The area within 10 m from a building
- Priority Zone 2: The area 10-30 m from a building
- Priority Zone 3: The area 30-100 m from a building

Sites with relatively higher building densities have multiple sets of priority zones that invariably overlap. One building's Zone 2 may adjacent to another building's Zone 1 and so forth. This characteristic is common most WUI settings and speaks to the shared nature of wildfire hazard and of building collective resilience.

FireSmart encourages homeowners to conduct practices on their property to reduce damages and minimize the hazards associated with wildfire. These practices should aim to:

- Reduce the potential for an active crown fire to move through private land.
- Reduce the potential for ember transport through private land and structures.
- Create landscape conditions around properties where fire suppression efforts can be effective and safe for responders and resources.
- Treat fuel adjacent and nearby to structures to reduce the probability of ignition from radiant heat, direct flame contact and ember transport.
- Implement measures to structures and assets that reduce the probability of ignition and loss.

Large scale mitigations alone do not prevent damage or loss of homes from wildfire. Ignoring FireSmart principles and deferring to governments to manage fuels in wildlands adjacent to properties in the WUI may seem convenient in the short run but will be devastating in the long run. The spatial scale that determines home ignitions corresponds more to the specific site and characteristics of homes and property than to the landscape scales wildfire management and fuel modification strategies (Cohen 2000). Homeowners and governments must work together to assess and mitigate hazards in order to truly reduce wildland urban interface fire threats to homes and other properties.

5.2.2 Key Aspects of FireSmart for Local Governments and First Nations

The FireSmart program is wholly dependent on interest and participation from residents who live in fire prone environments. Obviously, while local governments cannot force residents to take an active interest in any particular cause or issue, they can conduct public education and awareness campaigns and support FireSmart projects, with the goal of building a critical mass of motivated residents who are committed to reducing the ignitability of their homes.

The challenge that local governments continue to face is how to motivate private landowners who are either unable or unwilling to mitigate fuel hazards on their property. Until recently, publicly funded programs such as FireSmart were not permitted to be used directly for work on private property, and there has typically been little recourse or appetite for local governments to compel private landowners to undertake mitigation actions. In the latest iterations of provincially funded mitigation programs, eligibility rules have loosened somewhat to enable a modest FireSmart rebate program for private land that local governments can apply for and administer. The challenge that local governments continue to face is gaining consistent participation and interest from private landowners. Even if most homes in a residential area undertake meaningful FireSmart actions, when unmitigated private properties are interspersed among them, the overall threat to mitigated property remains, due to the threat of structure-to-structure ignition and propagation.

Table 12 below gives a summary FireSmart practices and activities that could be adopted by a community.

Table 12 FireSmart Practices and Activities

FireSmart Theme	Suggested Activities
Communication, Education & Partnerships	• Host a FireSmart day • Use local government newsletters and social media. • Undertake FireSmart Local Representative or Community Champion training • Continue to pursue CRI funding for FireSmart projects. • Form a community wide FireSmart committee. • Encourage homeowners and/or neighborhoods to undertake FireSmart site assessments and area assessments
Vegetation management	• Develop FireSmart demonstration areas in public spaces, such as parks and municipal facilities. • Strengthen landscaping requirements in zoning and development permits to require fire resistive landscaping and replacement of legacy high-flammability plants. • Facilitate treatment debris disposal for landowners

Planning & Development	• Strengthen policies and practices for FireSmart construction and maintenance of public buildings. • Continue to support the enactment of Wildfire Development Permit Areas to require FireSmart exterior finishing, landscaping and professional assessments and recommendations.

From a regulatory standpoint, the District of Peachland has identified a number of areas where development permits are required to address a specific environmental hazard. Natural Hazard Areas– Wildfire Interface Development Permit Areas (referred to as DPA 6.4.2) have been mapped, whereby a professional hazard assessment is required for development, where the assessment recommendations may be binding or form covenants. The objectives of DPA 6.4.2 (District of Peachland 2018) are to:

- Require a report be prepared by a qualified professional to assess and make recommendations for fire mitigation prior to subdivision.
- Mitigate fire hazards on forested land to a level deemed acceptable by a qualified professional in forest fire hazard assessment prior to subdivision and/or dedication as park.
- Improve access to areas of the community that are considered isolated and that have inadequate developed access for evacuation and fire control.
- Provide access points between lots to public land beyond containing natural vegetation to ensure roadway access for fire hazard management.
- Provide access points suitable for evacuation and the movement of emergency response equipment.
- Consider using roads to create fire breaks between lots and forested areas.
- Optimize fire hydrant locations for protection of forested areas.
- Design building lots such that building locations are setback a minimum of 10 metres from the top of ridgelines, cliffs or ravines.
- Use hazard reduction methods that mimic the natural effects of localized ground fires such as thinning and spacing trees and vegetation, removal of debris and

dead material from the ground and removal of lower tree branches in balance with habitat conservation and restoration.

5.2.3 Priority Areas withing the AOI for FireSmart

Completed FireSmart projects are noted in Table 13, as well as suggestions for future FireSmart program areas.

Table 13 Summary of completed and recommended FireSmart projects. NOTE: Recommended areas may require further stratification and ID names are generalized.

Area ID	FireSmart project complete? Y/N	FireSmart Canada Recognition Received Y/N	Recommended FireSmart Activities Suggested timeline: 5 years (1-2 projects per year)
Bulyea Avenue	Y (2019)	Y	Completed FireSmart projects: • Support annual recertification of FireSmart recognition. • Support an annual neighbourhood FireSmart day. • Support the continuation of neighbourhood interest and participation
Upper Princeton South Side	Y (2019)	Y	
Forest Hill & Thompson Drive	Y (2020)	TBD	
6 Ave / Pincushion Pl	N	N	Support a Community Recognition project by: • Seeking CRI funding • Support the formation of a neighbourhood FireSmart committee. • Support the development of a Neighbourhood Assessment Report Provide annual support to the FireSmart board to hold a neighbourhood FireSmart event each year.
Desert Pines Ave	N	N	
Sanderson Ave.	N	N	
Bradley Dr.	N	N	
Seymour Ave. / Lane	N	N	

5.3 Community Communication and Education

The CWPP will only be successful if the community is engaged, informed and supportive of the process and the recommendations. Moving from the CWPP to implementation of specific activities requires that the community be well informed of the reasons for, and the benefits of, specific mitigation activities.

The following community engagement strategies would be of benefit to the District of Peachland and its residents in furthering wildland urban interface fire awareness and education:

- Continue to host a community wildfire safety page on the Peachland Fire and Rescue Service webpage, that includes:
  - The current CWPP;
  - Completed FireSmart Neighbourhood Assessment Reports;
  - Information for residents on how to conduct their own FireSmart Structure and Site Hazard Assessment Forms, and steps they can take to lower their hazard scores;
- Develop a communication strategy regarding wildfire risk and priority mitigation measures that are being undertaken by the community.
- Outline a process to encourage stakeholders in the natural resource sector to identify opportunities for mutually beneficial forest/fuel treatments.

5.4 Other Prevention Measure

Fire prevention can be achieved through communication and education initiatives, as well as through the development and implementation of policies and regulations, including operational guidelines and restrictions. Fire prevention can be addressed at the community level through various avenues. Danger class rating signs within fire protection zones, public communication, industrial work restrictions and fire bans are examples of public fire prevention measures.

5.5 Summary of Recommendations

Recommendation No.	Objective/Priority	Recommendation/ Next Steps	Responsibility/Funding Source / Comments
No. 2 - Risk Management and Mitigation Factors	Maintain the Wildfire Interface Development Permit Area. Priority: High	Maintain the Wildfire Interface Development Permit Area for the Peachland. As the Official Community Plan (OCP) is amended or updated from time to time, ensure that requirements and guidelines complement the Wildfire Development Permit Area requirements.	Peachland This recommendation is about sustaining performance achieved since the previous CWPP.

No. 3 - Risk Management and Mitigation Factors	Conduct fuel hazard mitigation on remaining untreated municipal lands. Priority: High	Over a 3–5-year period, apply for funding to prescribe and treat or maintain 72.5 ha of municipal ownership class lands summarized in Table 11.	Peachland with UBCM CRI funding support This recommendation is about maintaining the proactive approach of previous CWPPs.
No. 4 - Risk Management and Mitigation Factors	Support fuel hazard mitigation – crown lands. Priority: High	Support FLNRORD to develop prescriptions and undertake wildfire risk reduction treatments on 10.5 ha of crown land summarized in Table 11 that pose a hazard to residential property in or can be incorporated into landscape level fuel breaks.	FLNRORD with funding from the Crown Land Wildfire Risk Reduction (CLWRR) program This recommendation is a carryover of the 2012 recommendations 5 & 15.
No. 5 - Risk Management and Mitigation Factors	Ensure that the current CWPP and related deliverables are readily accessible and shared with the public, First Nations, adjacent local governments, industry, and relevant NGOs. Priority: Low	• Continue to post the CWPP and maps on the Peachland website and share across social media platforms. • Share the CWPP and maps with partners and stakeholders. • Present and make available the CWPP and maps during public FireSmart meetings and presentations.	Peachland This recommendation is about sustaining performance related to the 2012 recommendations 32 & 35.

No. 6 - Risk Management and Mitigation Factors	Conduct FireSmart Community Recognition Projects Priority: High	Continue to support new FireSmart Community Recognition projects for Peachland neighbourhoods. A prioritized list of recommended areas can be found in Table 13 • Over a five-year period, plan on completing 1-2 community recognition projects per year. • While recognizing that FireSmart Community Recognition projects are not intended to be one-time efforts, provide annual support to the existing neighbourhood FireSmart groups in Peachland and support the annual application for renewal of recognition. ○ .	Peachland with UBCM CRI funding support. This recommendation consolidates prior FireSmart recommendations and is about sustaining performance and momentum. • Substantial progress has been made, with the completion of FireSmart Community Assessment Reports for: ○ Upper Princeton South Side ○ Bulyea Ave. ○ Forest Hill / Thompson Dr
No. 7 - Risk Management and Mitigation Factors	Support fire use and prescribed fire in the region. Priority: Moderate	Support those agencies and First Nations that are managing natural fire use and prescribed fire by: • Amplifying public engagement that supports prescribed fire use	Peachland and regional partners This is a consolidation in part of the 2012 recommendations 5 & 15.

No. 8 - Risk Management and Mitigation Factors	Establish a working relationship between Peachland and MoTI to address wildland fuel hazard concerns along Provincial highways and on MoTI owned rights of way. Priority: Moderate	Develop a memorandum of understanding (or similar) to facilitate the ongoing and shared interest in wildland fuel management and roadside vegetation control, including: • A shared interest in identifying, monitoring, and mitigating roadside wildland fuel hazards. Establishment of best practices related to roadside vegetation control in Peachland that attempts to limit the occurrence of hazardous wildland fuel during the fire season.	Peachland and MoTI, with support from CLWRR and/or CRI funding. This is a carryover and refinement of the 2012 recommendations 27 & 28.

6. Wildfire Response Resources

Interface fires are complex incidents that typically involve both wildland and structural fires. During times when many fires are burning in the Province and threatening multiple communities at the same time, resource requests can exceed the resources available. In BC, these resources are deployed according to B.C. Provincial Coordination Plan for Wildland Urban Interface Fires (revised July 2016).

The BC Wildfire Service, as a branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), has responsibility to respond to wildfires outside local fire protection areas and to aid local fire departments on wildfires within their fire protection area, when requested. Fire departments are responsible for their own costs incurred while responding to wildfires within their jurisdiction. Costs incurred by the BCWS to undertake firefighting assistance within a fire department protection area are borne by the Province. In situations where the BCWS requests a fire department to respond to a wildfire outside their fire protection area, the fire department is compensated according to the Inter-Agency Operational Procedures and Reimbursement Rates agreement (The Office of the Fire Commissioner, The Fire Chiefs Association of BC, BC Wildfire Service, 2017).

6.1 Local Government Firefighting Resources

The District of Peachland Fire Rescue Service is enabled by Bylaw 1718 – A Bylaw to Establish the Regulations for Fire and Life Safety and Smoke Control within the Corporation of the District of Peachland (District of Peachland 2018). The Fire and Life Safety and Smoke Control establishment bylaw provides for the following authority to act within the municipal boundary:

- First medical responder
- Rescue
- Pre-fire planning
- Disaster planning
- Preventative patrols
- Other emergency incidents

The bylaw permits the above activities beyond the municipal boundary, but only under the following circumstances:

- Express consent of the Central Okanagan Regional District and the Regional District of Okanagan Similkameen, providing for fire protection or rescue services, or any above-listed service.
- Express consent of the Central Okanagan Regional District and/or the Regional District of Okanagan Similkameen or a request by the Royal Canadian Mounted Police or B.C. Ambulance Service, if life is in jeopardy, or
- Express consent of the Central Okanagan Regional District and/or the Regional District of Okanagan Similkameen for a request from the British Columbia Ministry of Forests.

The District of Peachland Fire Rescue Service is party to the Emergency Mutual Aid Agreement (Central Okanagan Fire Chiefs 2013) with the following jurisdictions in the central Okanagan:

- City of Kelowna;
- City of West Kelowna;
- District of Lake Country;
- District of Peachland;
- Regional District of Central Okanagan:
    - Ellison;
    - Joe Rich;
    - Wilson's Landing;

- North Westside.

6.1.1 Fire Department and Equipment

The District of Peachland Fire & Rescue Service is headquartered out of a single fire station (Station 21), situated at 4401 3rd Street. Peachland is served by a volunteer paid-on-call department that was first established in 1909. The current complement of apparatus includes the following:

Table 14 District of Peachland Fire Rescue Service apparatus complement.

Equipment	Type or Description	Quantity
Command	2019 Dodge Ram 1500 Sport 4x4,	1
Engine	2003 American LaFrance Eagle (1750/500ga/CAFS)	1
Pumper	2018 E-One Typhoon X (1500 rear-mount/770ga/30ga)	1
Tender	1998 International S2674 Eagle (400/3100)	1
Bush	2008 GMC C5500 4x4 / 2010 Fort Garry (210/200/10F)	1
Utility	2007 F-350	1
SPU	Type 3 Structure Protection Trailer	1

6.1.2 Water Availability for Wildfire Suppression

Water for fire suppression in the District of Peachland is referenced in Bylaw 1956 (District of Peachland 2014), which draws from the Fire Underwriters Survey (FUS) guidelines on water supply for public fire protection (Fire Underwriters Survey 1999). The following standards apply to fire suppression water in the District of Peachland:

- Maximum recommended distance between hydrants in single family residential areas is 180m;
- Maximum distance between hydrants commercial, industrial and multi-family areas is 90m;
- Minimum fire flows for new subdivisions or upgrades of 60 liters/sec for two hours in single/dual family residential areas and 90 liters/sec for two hours in multi-family residential areas;
- Pump stations:
    - Must be able to meet maximum daily demands, with largest pump out of service;

- Standby power must be able to provide maximum daily demand plus fire flow during a power outage.

The 2012 CWPP had a recommendation (#23) to develop and map of water sources that could be used for wildland firefighting purposes. This recommendation has been carried over and expanded to recommend the development of a wildfire response plan (sometimes referred to as a pre-attack or pre-suppression plan) that includes staging areas, water sources, trail heads and access etc.

6.1.3 Access and Evacuation

Access routes may often double as evacuation routes as well. Identification of emergency evacuation routes within the community boundary is a local government or First Nation responsibility. Fuel condition adjacent to evacuation routes should be considered in relation to potential fire behaviour and potential impediments to safe evacuation. Of most concern are areas where evacuation routes are limited. Fuel treatments necessary to ensure safe evacuation should be identified and prioritized in relation to other risks identified in the CWPP. District of Peachland Bylaw No. 1718 Section 7.15 and the 2018 OCP reference road classifications and specifications for hillside collector, local, public/private lanes and cul-de-sacs, including widths and geometry (District of Peachland 2018). All road specifications are within the guidelines recommended by FireSmart Canada for road widths and radii.

As referenced in Section 2, evacuation of the District of Peachland would follow any of 3 egress routes along the provincial highways that intersect the AOI: southward towards the District of Summerland via Highway 97, northward towards the City of West Kelowna via Highway 97 or northwestward towards the City of Merritt via Highway 97c.

6.1.4 Training

As experienced wildfire operators, select Peachland Fire and Rescue Service personnel would be well suited to participate in advanced wildfire training opportunities, including:

- Intermediate Wildland Fire Behaviour (S-290);
- Wildfire origin and cause investigation (FI-210);
- Ignition operations and prescribed burn training;
- Air operations and tactics training;
- Practical attachments to BCWS wildfire incidents.

Recognizing that it can be difficult to secure training time with local BCWS personnel, due to regular shift times and a Volunteer department, there may be more efficient ways to carry out interagency training. One strategy could be to conduct a tabletop exercise with West Kelowna Fire Rescue, Summerland Fire Department, and the BCWS. Holding a joint tabletop exercise amongst the various command and general staff could economize the time of the BCWS personnel while still getting together for meaningful face to face training.

6.2 Structure Protection

During the emergent stages of a developing WUI fire, the time and personnel to undertake structure assessments, plan and deploy structure protection sprinklers are often not available. Fires that either already are or have the potential to become longer duration fires with extensive areas requiring Structure Protection Unit (SPU) capability often make the most use of SPU equipment, crews and specialists. Type 1 SPU trailers are often deployed in these cases.

Homeowners should not rely on SPU capabilities being installed on their home in time for it to be saved. It will never be possible to dedicate sprinklers and firefighters to protect every home in BC from wildfire – homeowners need to take action themselves ahead of time by building or retrofitting structures and managing vegetation to FireSmart standards. Effort must be made in actively assessing and mitigating hazards that affect the ignitability of structures before a wildland urban interface fire disaster unfolds.

Peachland has a tactical advantage, however, in scenarios when their SPU can be deployed in a timely manner. These units have proven to be a valuable tool for local suppression needs in many cases. When made available for provincial deployment, SPUs can provide a source of income to a local government during the fire season. Such income can help subsidize the fire department and reduce the budgetary needs or burden on the Local Government.

6.3 Summary of Recommendations

Recommendation No.	Objective/Priority	Recommendation/ Next Steps	Responsibility/Funding Source / Comments
No. 9 - Wildfire Response	Establish and/or modify trail access to support wildfire suppression strategies and tactics. Priority: Moderate - High	• New trails in or near the WUI should be designed to complement wildfire suppression strategies and tactics. • Trail redesigns should complement wildfire suppression strategies and tactics. • Wherever possible, trail widths should permit the use of light vehicles for fire suppression purposes.	Peachland. Various funding. This is a carryover of the 2012 recommendations 9 & 21.
No. 10 - Wildfire Response	Develop a wildfire response plan to guide wildfire suppression strategies and tactics. Priority: High	Also known as a pre-attack or pre-suppression plan, develop a detailed map that identifies staging areas, water sources, trail heads, drop points and other potential incident facilities and landmarks. Consider identifying suitable helispots. Consider developing a response plan jointly with BCWS and adjacent response partners to facilitate firefighting assistance.	Peachland and BCWS. This recommendation is a carryover from the 2012 recommendations 23 & 37.
No. 11 - Wildfire Response	Consider the acquisition of a wildland Type 3 engine and a Type 2 water tender to improve wildfire response capabilities. Priority: Moderate - High	• A Type 3 wildland engine would complement the existing Type 6 and two Type 7 engines by supplying a larger volume of water during initial attack and structure protection. • A Type 2 water tender will provide greater mobility and access, while complementing the existing Type 1 water tender.	Peachland with support from external funding.

No. 12 - Wildfire Response	Pursue a joint wildland tabletop exercise with response partners. Priority: Moderate	• In conjunction with West Kelowna Fire Rescue, Summerland Fire Department, BCWS and other interested response partners, hold a joint wildfire tabletop exercise to practice interagency coordination and cooperation. • Recommended participants include command and general staff positions.	Peachland, BCWS, and regional partners with UBCM funding support

References

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Appendix 1: Local Wildfire Threat Process

A1.1 Fuel Type Attribute Assessment

The issue of fuel type is somewhat more complicated in BC compared to other parts of Canada, owing to the diversity and breadth of ecosystems in this province. Fuel types are a primary input to the Canadian Forest Fire Behaviour Prediction (FBP) System and form the basis for predicting rate of spread, type of fire and fire intensity class (i.e., the primary components of the FBP system). Although FBP fuel types are intended to be viewed qualitatively and not quantitatively, many forest types in BC simply do not represent a good fit with the established national FBP fuel types.

The FBP system is an adequate tool for wildfire pre-suppression (i.e., preparedness) and suppression operations. Systems such as FBP are "intended to assist firefighters and officers in estimating potential fire behaviour in constant conditions…" (Taylor & Alexander, 2016). The utility of FBP in quantifying wildfire threat or risk or assessing forest types for the purposes of prescribing long-term fuel management treatments is not well documented or reviewed. An ecological approach to describing wildland fuels provides greater opportunity to describe characteristics related to stand structure and biomass, as it relates to wildland fire behaviour.

The ecology of the Peachland AOI is predominantly characterized by the Interior Douglas-fir and Ponderosa Pine biogeoclimatic zones, as summarized in Table 15.

The natural disturbance patterns of the IDFxh1, PPxh1 and IDFdm1 have been characterized by historically frequent stand maintaining fires (i.e., fires in the NDT4, as discussed in 4.2) prior to the fire-return interval being interrupted by contemporary forest management and fire suppression policies. Stand maintaining fires are typically low intensity surface burns that consume understory fuels while retaining a healthy green overstory. These frequent fires kept ladder fuels to a minimum and typically resulted in an open, park-like stand structure.

In the absence of periodic low intensity fire in the area, small trees that would have typically been fire-killed have become established, forming thickets and creating ladder fuels and resulting in relatively higher tree densities. Fine fuels, such as dead Ponderosa pine needles, often accumulate at the base of mature trees, resulting in higher fine fuel loading that could produce fire intensity great enough to result in lethal scorching of trees whose thick bark would have otherwise protected the vital phloem and cambial tissues.

The FBP fuel types for most interface areas in Peachland are classified as Ponderosa Pine Douglas-fir; termed the C7 fuel type (Table 15). The C7 fuel type lends itself well to manual fuel treatments that target the small diameter understory conifers and retains the larger diameter overstory layer. However, a C7 fuel type that undergoes this type of treatment (often referred to as "thinning from below"), ultimately remains a C7 fuel type since the FBP system has limited options for modifying C7 predictions.

At higher elevations, in the MS and ICH zones and certain IDF subzones, C-3 and M-1/2 fuel types are more or less the best (but far from perfect) fit. These areas are more typical of a stand replacement fire regime, whereby high-severity fire results in a relatively higher proportion of tree mortality. Wet belt ecosystems, such as the ICH are notoriously challenging to classify according to fuel type. Often the best option is the M-2 or C-5 fuel types, though these are nowhere near a perfect match. The ICH zone is often typical of a mixed-severity fire regime, whereby examples of both relatively low-intensity and stand-replacing fires can be found on the landscape.

The FBP fuel type distribution for Peachland is presented in Table 15 and a generalized classification of all FBP fuel types, according to spotting potential, is provided in Table 16.

Table 15 Fuel type distribution in Peachland.

FBP Fuel Type	Area (ha)	%
C-3 Mature Jack or Lodgepole Pine	15	1%
C-7 Ponderosa Pine/Douglas-fir	501	28%
O-1a Matted/Cut Grass O-1b Standing Grass	342	19%
Non-fuel (water, urban, cultivation etc.)	925	51%
S-1 Jack or Lodgepole Pine Slash		0%
M-1 Boreal Mixedwood - Leafless M-2 Boreal Mixedwood - Green	17	1%
	1,798	100%

Table 16 Fuel type categories and relative spotting potential.

Fuel Type Categories	Fuel Type - Crown Fire/ Spot Potential
1: C1, C2, C4, M3-M4 (>50% C/DF)	High
2: C3, C7, M3-M4 (<50% C/DF) M1-M2 >50% Conifer	Moderate
3: C5, C6, O1a/b, S1- S3[1] M1-M2 (26-49% Conifer)	Low
4: D1, D2, M1-M2 (<26% Conifer)	Very Low

A1.2 Proximity of Fuel to the Community

Wildland fuels closest to built-up areas usually represent the highest hazard to communities. The common recommended approach (i.e., SWPI, CRI, FireSmart and others) is to reduce fuel hazards from the value or structure outward, ensuring mitigation continuity. Untreated areas adjacent to the value or structure may allow a wildfire to build in intensity and rate of spread, which can increase the risk to the value. To capture the importance of fuel proximity in the local wildfire threat assessment, the WUI is weighted more heavily from the value or structure outwards. Fuels adjacent to the values and/or structures at risk receive the highest rating followed by progressively lower ratings moving out.

The local wildfire threat assessment process subdivides the WUI into three areas – the first 100 meters (WUI 100), 101 to 500 meters (the WUI 500), and 501 to 2000 meters (the WUI 2000). These zones provide guidance for classifying threat levels and subsequent priorities of treatments.

Where fuel treatments are intended to reduce the risk to values in the built environment, the generally accepted practice is to begin treatments at the values and progress outwards. This strategy most often straddles the boundaries between private and public land and requires a coordinated effort to have any meaningful result. When gaps of untreated fuel are left, regardless of land status, the overall effectiveness of adjacent fuel treatments can become reduced or completely negated.

A1.3 Fire Spread Patterns

The BCWS has prepared ISI roses for each of its fire weather stations across the province, with the expectation that they be included in community wildfire protection planning. Similar to a wind rose, the ISI rose uses the direction and magnitude of ISI, which is a numeric rating of expected rate of fire spread that combines the effect of wind and the fine fuel moisture code (FFMC). Due to the effect of local topography on wind patterns, the utility of ISI roses for

anywhere but the immediate area surrounding a fire weather station is extremely doubtful and caution is recommended if attempting to extrapolate fire behaviour spread information at any distance beyond the area of topographic influence for a given station.

A1.4 Topography

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

Topography influences fire behavior principally by the steepness of the slope. However, the configuration of the terrain such as narrow draws, saddles and so forth can also influence fire spread and intensity. Slope aspect (i.e., the cardinal direction that a slope faces) determines the amount and quality of solar radiation that a slope will receive, which in turn influences plant growing conditions and drying rates.

The 2012 Wildfire Threat Assessment Guide (used for this CWPP) classifies slope slightly differently than the 2017 Wildfire Risk Classification process, but the intended outcome is similar – to characterize slope steepness in terms of how a wildfire will spread and behave on a given slope. The classifications ultimately attempt to reflect the role of slope as a primary input of the Canadian Forest Fire Behaviour Prediction System (FBP), which underpins much of the threat characterization and mitigation work in BC and elsewhere.

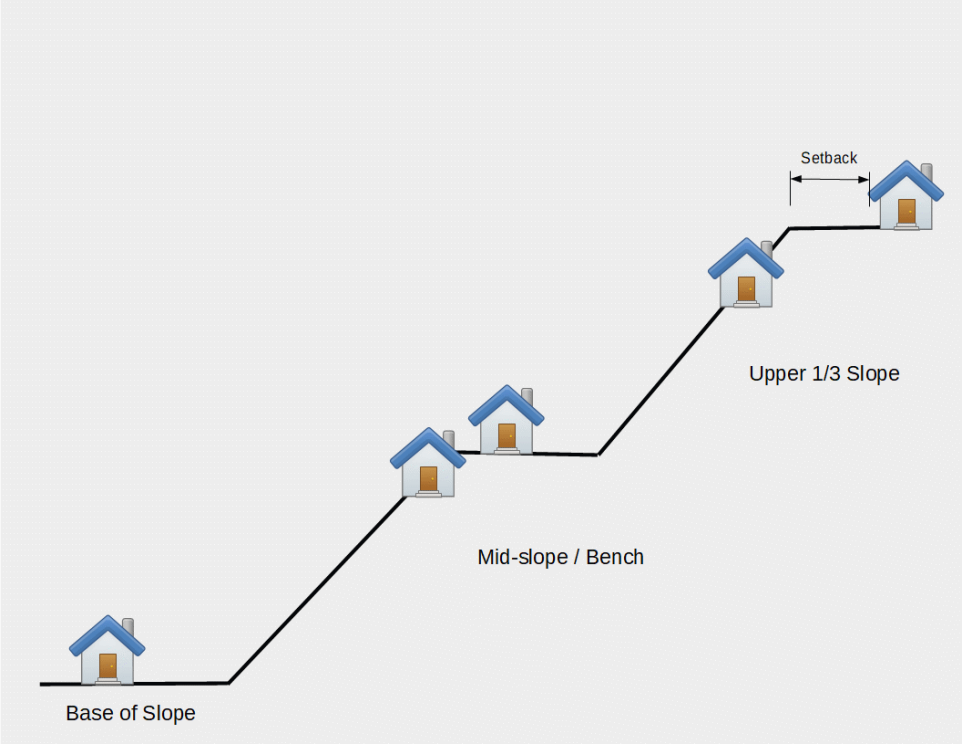

Figure 11 Relative slope positions of values at risk.

When structures (i.e., values) are situated on or near a slope, the position of the value in relation to the slope corresponds to the relative WUI threat rating. Where a slope is characterized by continuous and available fuel, values situated at the base of the slope are at less risk than values situated on the mid or upper slope (Figure 11). The risk to values that are situated on slope benches is dependant on the degree to which the value is "set back" from the crest of the slope. Adequate setback is where the value is far enough back from the crest of the slope, such that the value is not subjected to the full effects of upslope fire spread coming up from below. FireSmart Canada broadly defines adequate set back as 10 m for a single-story building, with set back increased proportionally for multi-story buildings (Partners in Protection, 2003). Set back is further illustrated in Figure 12.

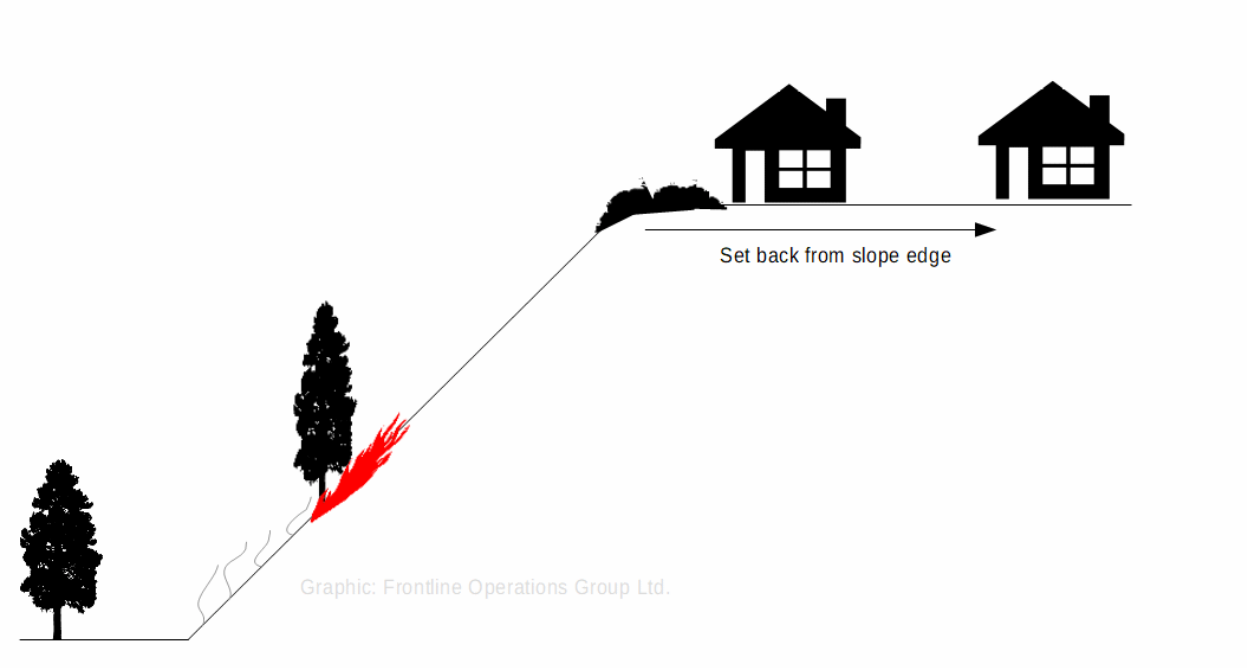

Figure 12 Set-back of structures from slope break in relation to upslope fire spread.

A1.5 Local Wildfire Threat Classification

The Wildfire Risk Analysis (WRA) is a GIS-based model that spatially quantifies and analyzes the relationships that exist between the critical factors affecting wildfire threat. The intent of the analysis is to provide planners with a decision-making tool to spatially identify the risk at the landscape level. This information allows planners to analyze and explore the implications of different management activities in relation to wildfire risk.

The overall rating spatially expresses wildfire threat by incorporating three key components (see Table 17), with specific weightings, as follows:

- Fire Intensity - 50%
- Rate of Spread - 25%
- Crown Fraction Burned - 25%

These three components are in turn calculated from contributing factors, or subcomponents, each of which is represented by a layer in GIS. The layers representing these three components are subsequently overlain to produce the final wildfire threat rating.

Fire Threat / Fire Behaviour

The fire behaviour of the WRA measures how wildfire will behave under extreme weather conditions. The Canadian Fire Behaviour Prediction System (FBP) provides quantitative outputs of selected fire behaviour characteristics for the major Canadian fuel types.

Fuel Types

Sixteen national benchmark fuel types, which are divided into five categories, are used by the Canadian Fire Behaviour Prediction System to forecast how wildfire will react. These fuel types were defined using the forest inventory and guidelines developed by the Ministry of Forests, Lands and Natural Resource Operations. Eleven fuel types were identified in the study area. It is important to note that these fuel types represent a type of behaviour pattern and their names are generic and do not accurately describe the type of stand itself.

Weather

Weather conditions used to calculate fire behaviour were derived from historic government records for two weather stations within the area. This weather data was compiled and statistically analyzed to determine the average 80th percentile fire weather indices for the months of May to September.

Topography

Topographical attributes required to predict fire behaviour include slope and aspect. The study area was delineated into polygons based on slope breaks of 10% intervals and aspects of 45 degrees. The cardinal wind direction was calculated from the aspect so that it was blowing upslope and the elapsed time was set at 24 hours.

All of the data pertaining to fuel types, topographical attributes, and fire weather was compiled for the entire study area. This information was then run through the modeling software (Remsoft FPB97) to create the three output fire behaviour layers: fire intensity, rate of spread and crown fraction burned.

Fire Intensity

This layer is a measure of the rate of heat energy released per unit time per unit length of fire front and is based on the rate of spread and the predicted fuel consumption. The units for this layer are kilowatts per meter.

Rate of Spread

This layer is a measure of the speed at which a fire extends its horizontal dimensions. It is based on the hourly Initial Spread Index (ISI) value and is adjusted for the steepness of slope, the interactions between slope and wind direction and increasing fuel availability as accounted for through the Build Up Index (BUI). The units for this layer are meters per minute.

Crown Fraction Burned

This layer is a measure of the proportion of tree crowns involved in the fire. It is based on the rate of spread, the crown base height and the foliar moisture content and is expressed as a percentage value.

Table 17 Wildfire risk analysis methodology: fire behaviour units and applied weighting.

Layer	Units	Unit Value	Weight
Fire Intensity	Kilowatts per meter (kW/m)	>0-500 501-1000 1001-2000 2001-4000 4001-10000 10001-30000 >30000	4 – Very Low 8 – Low 10 – Low 12 – Medium 16 – Medium 18 – High 20 – Very High
Rate of Spread	Meters per minute (m/min)	>0-5 6-10 11-20 21-40 >40	2 – Very Low 4 – Low 6 – Medium 8 – High 10 – Very high
Crown Fraction Burned	Percent of canopy crown burned (%)	0 1-9 10-49 50-89 90-100	0 – None 3 – Low 6 – Medium 8 – High 10 – Very high

Final Wildfire Threat Rating

The weightings of the fire behaviour layers were designated as follows with a total maximum value of 40 and categorized into threat categories as follows:

Table 18 Wildfire risk analysis methodology: Final wildfire threat rating.

Layer	Weight
Wildfire Threat	0 Very Low (Water) 1-19 Low 20-25 Moderate

	26-30 High 31-40 Extreme

**Please note: All areas of Private Land are removed from the analysis as per direction from the BC Wildfire Service.

A1.6 Local Wildfire Risk Classification

Not applicable, as the 2012 Wildfire Threat Assessment methodology was used.

A1.7 Summary of Fire Risk Classes

Very Low (Blue): These are lakes and water bodies that do not have any forest or grassland fuels. These areas cannot pose a wildfire threat and are not assessed.

Low (Green): This is developed and undeveloped land that will not support significant wildfire spread. Examples: Urban/suburban, farm areas with modified forest fuels; irrigated, managed, and heavily grazed fields; gravel pits; severely disturbed land; fully developed residential and commercial areas not directly adjacent to forested or undeveloped land; areas with no readily combustible vegetation on site.

Moderate (Yellow): This is developed and undeveloped land that will support surface fires only. Homes and structures could be threatened. Examples: Unmanaged fields with more than one year of matted grass in a cured state at sometime during the fire season; grass fields with shrubs and a deciduous tree overstorey; grass fields with coniferous shrubs and tree overstorey with less than 20% canopy coverage; patches of isolated coniferous stands less than 0.5 ha in size.

High (Orange): Landscapes or stands that:

- are forested with continuous surface fuels that will support regular candling, intermittent crown and/or continuous crown fires;
- often include steeper slopes, rough or broken terrain with generally southerly and/or westerly aspects;
- can include a high incidence of dead and downed conifers;
- are areas where fuel modification does not meet an established standard.

Examples: Areas of continuous beetle killed pine trees; forested land with coniferous coverage exceeding approximately 40% canopy closure; steep, gullied slopes with a continuous

coniferous cover; Douglas-fir stands with a high incidence of dead, dying and downed trees from root rot infestation; open grown coniferous stands with low live crowns that would allow candling of large trees.

Extreme (Red): Consists of forested land with continuous surface fuels that will support intermittent or continuous crown fires. Polygons may also consist of continuous surface and coniferous crown fuels. The area is often one of steep slopes, difficult terrain and usually a southerly or westerly aspect. Examples: Forested land with relatively continuous coniferous canopy closure, in excess of 40%, continuous dead pine; steep, gullied, forest slopes with a continuous coniferous forest cover.

Appendix 2: Wildfire Threat Assessment Worksheets and Photos

Included as a separate volume to manage page count.